the
APEX
University
Universiti Sains Malaysia
in support of the New Economic Model

TRANSFORMING HIGHER EDUCATION FOR A SUSTAINABLE TOMORROW

2010 Laying The Foundation

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(UNIVERSITI SAINS MALAYSIA)

(commencing 2009)

TRANSFORMING HIGHER EDUCATION FOR A SUSTAINABLE TOMORROW

2010 Laying The Foundation

UNIVERSITI SAINS MALAYSIA

2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Transforming higher education for a sustainable tomorrow:
laying the foundation / editors Dzulkifli Abdul Razak & Ramli Mohamed

ISBN 978-983-861-507-5

1. Education, Higher- -Malaysia. 2. Education, Higher- -Aims and objectives- -Malaysia. 3. Education and state- -Malaysia. I. Dzulkifli Abdul Razak. II. Ramli Mohamed.
378.595 LA1238

EDITORIAL BOARD

LAYOUT, DESIGN & PRINTING
P&Y Design Network @ Delimax (M) Sdn. Bhd.

Vision, Mission, Values and Thrusts

Laying The Foundation

Since its inception, USM (the then Universiti Pulau Pinang) has always been built on a very strong foundation of being unique, bold and forward looking thanks to the creative vision of its founders and leaders, as well as the community of scholars whose lives have been touched by the university.

The first Prime Minister of Malaysia, Tunku Abdul Rahman Putra Al-Haj
laying the foundation stone of the university on 7 August 1967

TRANSFORMING
higher education for a sustainable tomorrow

2010 Laying The Foundation

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بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيمِ

ISTANA ARAU
PERLIS

Message from the Chancellor of Universiti Sains Malaysia

When I was appointed the Chancellor of Universiti Sains Malaysia (USM) in 2000, USM had already been a familiar part of my life. Having seen it develop since its establishment in 1969, USM is just two years younger than my prince. Born in the turbulent year of 1969, USM has had to play a balancing role of educating the future generation of Malaysians without being torn apart by various demands.

Having come this far, the Perlis royal family is especially proud with our long history of association with this esteemed institution. A man who is past a certain age must not only be able to stand on his own but also must give back to the society. I am delighted that USM is doing exactly that.

In fact, USM had taken the uncharted road, carving out a niche market for itself by transforming its approach to research and education and reassessing its educational experience for students.

I am pleased to observe that USM is repositioning its research and education and positioning USM as a pioneering, transdisciplinary research-intensive university that empowers future talent and enables the *bottom billion* to transform their socio-economic well-being.

When I was serving as a Second Lieutenant in the Second Regiment of the Malaysian Reconnaisance Corps in Sabah in 1966 and Sarawak in 1967, and later as a Lieutenant in Pahang in 1968, I was fortunate to live among the most gracious people on earth. These native people of Sabah and Sarawak, and the Orang Asli in Pahang would – by today's definition – be known to be among the *bottom billion* community.

As much as we thought we could have helped them, there was even more we could learn from them. These people with so little physical wealth had so much to teach us about the human spirit. What I saw in them during my stay in Sabah, Sarawak and Pahang were humility, survivality, sustainability, universality and the spirit of giving.

They do not need help; they need equal and respectful partnership. I am proud that USM is taking this bold step in leading the transformation of their well-being and their lives and sharing our "knowledge" with them.

I believe that ultimately, knowledge must be a tool for good in advancing the well-being of humanity and I am proud that USM is sharing this belief.

I wish USM the best in its journey forward.

(TUANKU SYED SIRAJUDDIN IBNI ALMARHUM
TUANKU SYED PUTRA JAMALULLAIL)
DYMM Tuanku Raja Perlis
28 February 2011

D.Y.M.M. Tuanku Syed Sirajuddin Ibni
Al-Marhum Tuanku Syed Putra Jamalullail

CHANCELLOR

(commencing 2007)

Humaniversity – humanising the university

Dzulkifli Abdul Razak,
Prof. Tan Sri Dato'
Vice Chancellor
Universiti Sains Malaysia

The year 2010 has been a busy one for the university as we approach the last mile of the "Laying the Foundation" phase for the APEX programme. The process of laying the foundation is a continuation of the efforts started in 2009 which focus on various facets of activities of the university, including talent management, governance, resources, nurturing and learning, research and innovation, students and alumni development and so forth (see Figure 1).

This phase which is supposed to begin in 2007, is two years short, in view of the fact that the pronouncement of the award was made only in September 2008. This had tremendous implications on the preparation needed for the next phase of the transformation process (2011-2015) in accomplishing the APEX mission. For sure, the pressure and efforts needed have redoubled with lesser resources due to the delayed start. Some of these aspects are highlighted in the report so that the proper perspective is maintained. This is more significant now that we are entering the third year of implementation to "strengthen and enhance" the APEX initiative. It is time to deliver what has been planned under the APEX programme as approved by the Ministry of Higher Education in September 2008.

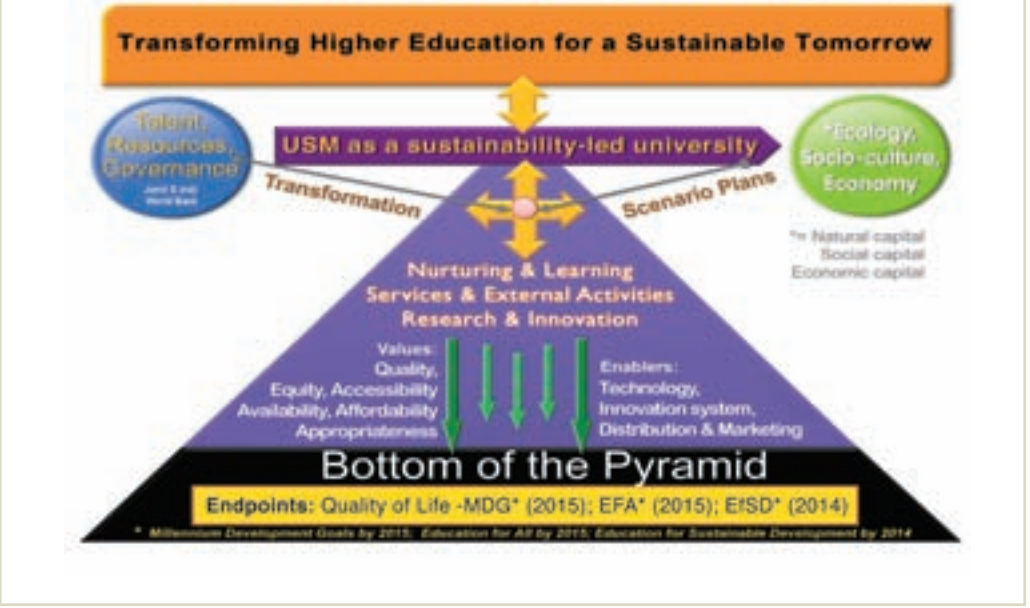


Figure 1: The USM's APEX university framework

Thus, the year 2011 marks the beginning of the "delivering excellence" phase amidst making the required refinement necessary to further reinforce the foundation laid in the past years. Great strides were made and bold measures were undertaken as part of laying the foundation which is the basis of this book. The hope is to share them with the Malaysian public, including policy and decision makers, as part of accountability measures under the APEX agenda. The trials and tribulations in its implementation are also presented so that the public will understand what are the constraints faced in the APEX journey. Needless to say, this must be preceded by transforming the mindset

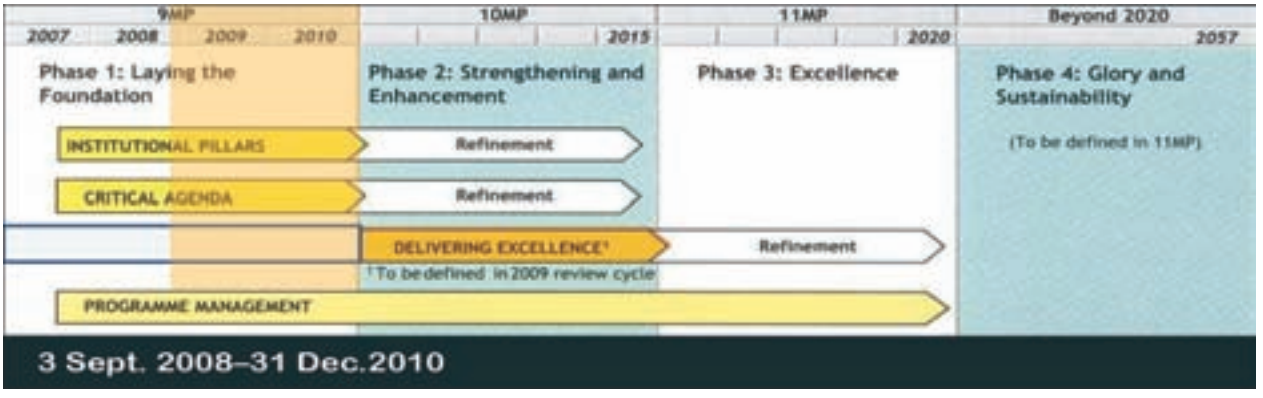
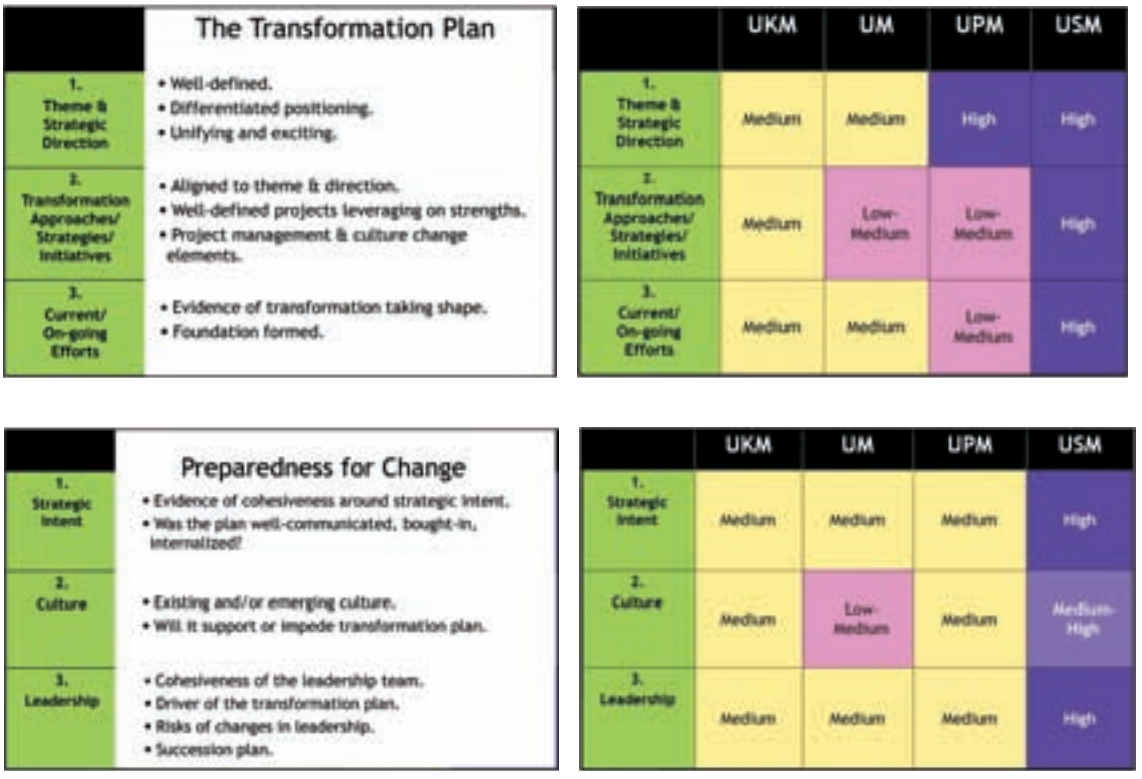


Figure 2: The transformation roadmap 2007-2010
(Source: MoHE, 2007)



The Transformation Plan	
1. Theme & Strategic Direction	• Well-defined. • Differentiated positioning. • Unifying and exciting.
2. Transformation Approaches/ Strategies/ Initiatives	• Aligned to theme & direction. • Well-defined projects leveraging on strengths. • Project management & culture change elements.
3. Current/ On-going Efforts	• Evidence of transformation taking shape. • Foundation formed.

	UKM	UM	UPM	USM
1. Theme & Strategic Direction	Medium	Medium	High	High
2. Transformation Approaches/ Strategies/ Initiatives	Medium	Low-Medium	Low-Medium	High
3. Current/ On-going Efforts	Medium	Medium	Low-Medium	High

Preparedness for Change	
1. Strategic Intent	• Evidence of cohesiveness around strategic intent. • Was the plan well-communicated, bought-in, internalized?
2. Culture	• Existing and/or emerging culture. • Will it support or impede transformation plan.
3. Leadership	• Cohesiveness of the leadership team. • Driver of the transformation plan. • Risks of changes in leadership. • Succession plan.

	UKM	UM	UPM	USM
1. Strategic Intent	Medium	Medium	Medium	High
2. Culture	Medium	Low-Medium	Medium	Medium-High
3. Leadership	Medium	Medium	Medium	High

Figure 3: The APEX Framework for Reform
(Source: APEX Evalution Committee, 2008)

and shifting the paradigm of those who are directly or indirectly involved. Moreover, it will invariably take more than a few years and thus remains to be the most challenging of them all[1].

Begin with the end in mind

At this juncture, it is noteworthy to reiterate that when USM was selected for the APEX role model, it did not start from *zero* as shown in the Figures 3 based on the evaluation carried out by the APEX Evaluation Committee in 2008 (see Figure 3).

It is on these premises that the foundation is being well anchored, using the metaphor of a tree that has its "foundation" deep rooted into the ground. The "meaning" of such a foundation is in line with the sustainability principle where it is ongoing, living and organic. It also encapsulates the twin idea of KPIs-KIPs (key performance indicators versus key intangible performances) to ensure that the foundation remains resilient to the many challenges that the university is bound to face.

As a result, within a span of about 850 days since September 2008, impressive results are beginning to show impact as commended and affirmed by one of the latest independent audit report, the Academic Performance Audit (APA) carried out by an independent panel appointed by the Malaysian Quality Agency (MQA[2]) in March 2010.

As an authoritative testimony, relevant quotes from the APA report will therefore be cited to reliably indicate the progress made by USM after the two years of laying the foundation. This,

[1] Dzulkifli Abdul Razak. (2010). Reboot the world. *New Sunday Times,* 28 March.
[2] Malaysian Qualification Agency. (2010). *Universiti Sains Malaysia: Academic Performance Audit Report*. Petaling Jaya: MQA.

in turn, augurs well for the coming years and phases in the transformation roadmap as shown in Figure 2.

To be sure, under the APEX framework, USM has envisioned a plan "to transform higher education for a sustainable tomorrow" with the goal of becoming "world-renowned for sustainability" and creating a sustainability-led university. In tandem with this, USM drives to move the sustainability agenda forward by reinvigorating and transforming its teaching-nurturing and learning programmes, research and development activities and other immediate services that can produce significant quality outcomes. They will be imbued with universal values, such as equity, availability, accessibility, affordability and appropriateness in the pursuit of quality.

As a consequence, to quote the APA Panel as referred to above:

> *The Panel commends USM's proactive policy on widening access for education for adult learners.*

At the end of it all, we hope to strive for the improvement of the well-being of humanity, especially those at the bottom of the economic pyramid, that is, the *bottom billion* as specified in the USM APEX mission. As the APA Panel noted:

> *The Panel commends USM for the constructive formulation of the* Transformation Plan and Strategy, *as outlined in the documents* Transforming Higher Education for a Sustainable Tomorrow *and* USM-APEX Sustainability Roadmap, *which drives the university to achieve excellence in education, research and services.*

Return the soul to education

In 2010, we expanded this "constructive engagement" by calling for greater efforts to humanise the university; we have fondly called this *humaniversity* – translated from the Malay term "insaniversiti". This is a deeper articulation of the vision "to transform higher education for a sustainable tomorrow" by giving it a more specific focus. The term "humaniversity" is intended to purposely refocus on the *raison d'être* of university education from one that is increasingly emphasising income, employment and accumulation of wealth to loftier ones which envision education as the accumulation of knowledge and people as the wealth of the nation as well as the importance of safeguarding their well-being.

To quote the 2010 Human Development Report, "...national development should be measured not just by economic growth, as had long been the practice, but also in terms of broader aspects of well-being." In other words, the idea of "humaniversity" which is further expounded in 2011 underscores the realisation that the success of a nation is not limited to tangible (KPI) measures in terms of gross domestic products, employment or wealth only, but also in the more intangible (KIP) dimensions of "whether people can lead long and healthy lives, whether they have the opportunity to be educated and whether they are free to use their knowledge and talents to shape their own destinies"(Dzulkifli, 2011[3]).

Corollary to this and as a university, we need to nurture the youths of the nation to become more sensitive to their environment, be aware of the sufferings of others and create a mission to help others when their assistance is needed. This is in sum the APEX agenda. Just as in Iqbal's narrative in one of his poems: "May I love the lamp of knowledge, O Lord; May supportive of the poor my life's way be; May loving the old, the suffering my way be".

At a meeting of the Muslim Vice Chancellors/Presidents Forum (MUVCF[4]), held in conjunction with the 2010 ISESCO Ministers of Education Conference in Kuala Lumpur, this point was reiterated through the resolutions adopted: to call for universities to anchor their education less on the norm-referenced approach (as in the eurocentric system) and more on the criterion-referenced approach (which is based on the best practices of early Muslim and relevant eastern institutions). Accordingly, the latter would imbue greater spiritual education ("education with soul") to nurture the young minds based on Islamic-universal values so as to "return the soul" of education to where it once belonged.

[3] Dzulkifli Abdul Razak. (2011). *Insaniversiti: Transformasi Untuk Menginsan Universiti*. (Humaniversity: Transformation to Humanise the University). Speech presented at 2011 Vice Chancellor Annual Address of Universiti Sains Malaysia, Penang, January. Also, Dzulkifli Abdul Razak. (2011). Humaniversity: Humanising the university. *New Sunday Times*, 9 January.

[4] See accompanying story "Return the soul to education" see page 45.

Picture of the Chancellory, where *The Lead* begins

The call made by MUVCF is in consonant to one made five years ago by Harry Lewis[5] (2006). The general thrust of Lewis's "soul" is not on religious identity, tradition and arguments but on the "larger purpose" of life such as issues of morality, ethics and character building that higher education is supposed to instil and nurture among students so that they become "better human beings"; but universities have largely forgotten this aspiration. Using the Harvard University to illustrate his point, Lewis (2006:xii) said:

> *...universities have forgotten their larger education role of college students. They succeeded better than ever, as creators and repositories of knowledge. But they have forgotten that the fundamental job of undergraduate education is to turn eighteen- and nineteen-year-olds into twenty-one and twenty-two-year-olds, to help them grow up, to learn who they are, to search for a larger purpose for their lives, and to leave college as better human beings. So totally has the goal of scholarly excellence overshadowed universities' educational role that they have forgotten that the two need not be in conflict. Lip service to education remains, in the form of teaching prizes and student public service programmes.*

Lewis attributed this *soulless* malaise of great universities, such as Harvard, to what he calls *struggles* that these institutions are undergoing and confronting: the intense competitions in the marketplace for the faculty, students and research grants. As a result, he said (p. xii), "the less likely it is to talk seriously to students about their development into people of good character who will know that they owe something to society for the privileged education that they received".

The illustration above implies that there is a strong support to what we had proposed some three years ago, namely, to transform higher education for a sustainable tomorrow. In the first instance, we need to nourish the characters of the campus community to be more vigilant and sensitive to their societal environment and be readily responsive to assist and support causes that can alleviate poverty, hunger, physical and mental abuses and the degradation of the ecosystem. In other words, the notion of *sejahtera* (as in *Kampus Sejahtera*[6] with its five basic elements) that cuts across the seven dimensions of social, physical, mental, intellectual, emotional as well as spiritual and ecological well-being is of prime importance.

Here the APA Panel affirmed the following:

> *The Panel affirms the active participation of the students (Students' Council and presidents of societies) in the formulation of the policies and holistic approach taken in the development of the students' well-being in line with the vision and mission of USM.*

And,

> *The Panel affirms the establishment of the Student Parliament which will provide an avenue for intellectual discourse among students.*

This has its support in the various programmes that have received commendations from the APA Panel, namely:

> *The Panel commends the university for conceiving an excellent mentoring system in learning and research for students to experience a more flexible and transdisciplinary education and research.*

---

[5] Lewis, H. (2006). *Excellence without a soul: how a great university forgot education*. New York: Public Affairs.

[6] *Kampus Sejahtera* is meant to guide the entire USM community from administrators, to lecturers, students, and support personnel to focus their commitment and responsibility to the university. What *Kampus Sejahtera* hopes to instil are five underlying values amongst its students and staff:

- To create a mindset for every individual to take responsibility for the campus
- To create spaces, both physical and social, which are conducive for work, play and learning
- To promote the ideal of sustainable development that is environmentally-friendly, pedestrian-friendly, work- and people-friendly as well as healthy lifestyles
- To provide quality health and dental care services focusing on wellness
- To support activity or project which propagates the pursuit of a sustainable campus

Also,

The Panel commends the Continuous Student Development (myCSD) system that rewards students for their participation in non-academic activities during the duration of their stay at USM.

In the case of the staff,

The Panel commends USM for its continuous effort to improve the Continuous Professional Development[7] (CPD) programme and providing support and guidance to the academic [and administrative] staff.

*M*ore generally however,

The Panel commends USM for the implementation of a well-documented mentor-mentee system in the university that enables staff and students to have access to trained mentors to assist them in improving their academic performance.

National and APEX transformation plans – a synergy

We believe that our APEX vision and mission are consistent and conform to the numerous transformational policies and activities (including the NKRAs and NKEAs) articulated by the government in the past year or two. This will help to connect the national agenda to global ones to which USM is already aligned in several ways. We believe that the APEX agenda is supportive of the current government and economic transformation plans, it being another transformation plan of the government. So too is the New Economic Model[8] in making higher education more responsive to the needs of humanity and to develop our youthful population to become holistic individuals who are highly conscious of their responsibility to the socio-economic impact on the people. In this regard, we affirm the clarion call of "people first, performance now".

Figure 4: The strategic landscape – the big picture

In fact, within the context of the the Economic Transformation Plan (ETP) and the Government Transformation Plan (GTP), we are convinced that an Education Transformation Plan as embodied by USM's APEX mission is imperative. Encapsulated within it are changes for education, higher education in particular, which will be sustainable, inclusive and act as high-value flagships that will turn Malaysia into a regional/global education hub. By the same token, the transformation of higher education will be a major thrust and vehicle for the successful implementation of ETP and GTP. In the words of the Minister of Higher Education, YB Dato' Seri Mohamed Khaled Nordin[9] (2011):

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[7] Continuous Professional Development (MyCPD) is defined as the commitment to structured skills enhancement and personal or professional competence. USM adopts MyCPD as a tool to record the development of personal qualities necessary for the execution of professional duties throughout a staff's working life. Organisations using MyCPD include Universiti Pendidikan Sultan Idris, Universiti Teknikal Malaysia Melaka, Universiti Malaysia Sabah and Dewan Bahasa & Pustaka.

[8] Dzulkifli Abdul Razak. (2010). APEX and NEM find common ground. *New Sunday Times*, 4 April.

[9] Mohamed Khaled Nordin. (2011). Pengajian tinggi ke arah transformasi negara. Speech presented at Amanat Tahun Baru 2011, Putrajaya, 17 January. Translated from the original Bahasa Malaysia text: *Semua perancangan yang (disediakan oleh KPT sepanjang 2011 ini) sebenarnya merupakan persediaan kita untuk meneruskan agenda sektor pengajian tinggi menerajui kegemilangan ilmu sekaligus menjayakan transformasi negara. Kita telah meletakkan asas yang kukuh dalam Fasa Satu, Pelan Strategik Pengajian Tinggi Negara (PSPTN) dan kini kita telah bersedia untuk melangkah ke fasa yang baru dengan penuh amanah dan tanggungjawab. Saya percaya, dengan kekuatan sumber dan kebijakan perancangan yang kita miliki, sektor pengajian tinggi mampu untuk menjadi penyumbang yang kritikal kepada transformasi negara ini.*

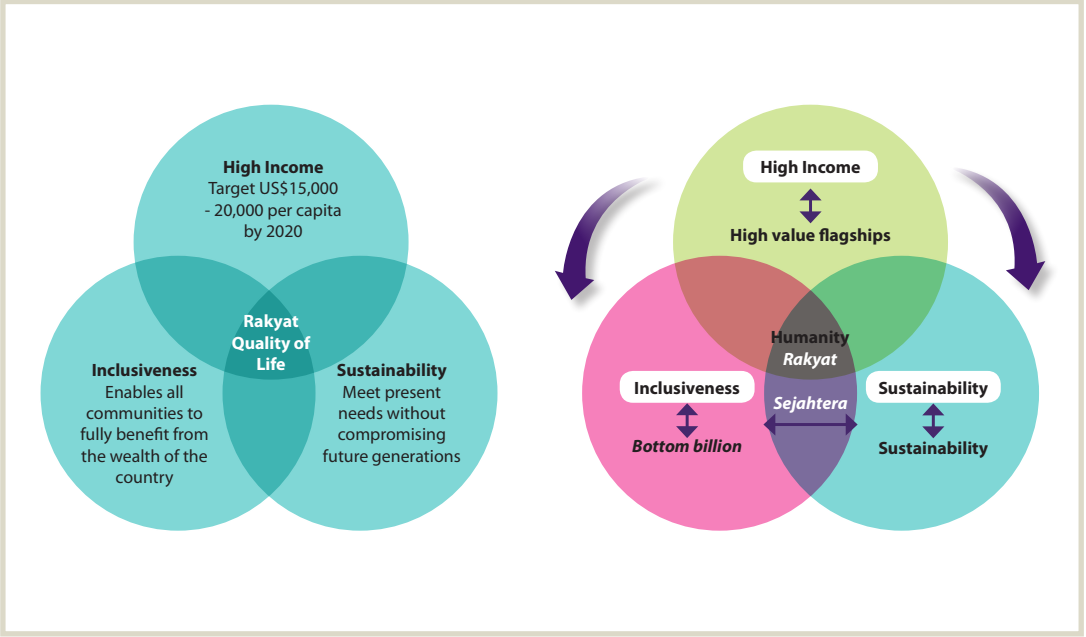


Figure 5:
The New Economic Model – APEX transformational goals: a synergy

All the plans (which have been prepared by MoHE throughout 2011) are in fact our preparations to continue the higher education sector agenda to uphold knowledge excellence as well as ensure the success of the national transformation. We have laid a strong foundation in the first phase of the National Higher Education Strategic Plan and now we are ready to embark on a new phase with vigour and responsibility. I believe with the strength and careful resource planning, higher education sector will become a critical contributor to the national transformation plans.

Taking this from the standpoint of the New Economic Model (NEM), the well-being and development of the people (*rakyat*) are central to the transformation of a model proposed for the evolution of an advanced economy for the country.

Clearly, nestled between the three components of the model, that is, high income, inclusiveness and sustainability, is the *rakyat* as the ultimate beneficiary of an inclusive, high income and sustainable development as envisaged in the NEM. This is similar to the aspiration of USM's APEX agenda, that is, to focus on the *sejahtera* of the people as its ultimate aim, albeit with the approach of a more global aspiration directed at the *bottom billion*[10]. For this to happen, the university must transform its programmes and activities to make its staff and students very mindful of their surroundings and the well-being of the people. To be "mindful" here means to be "active, questioning and capable of reassessing the way they view the world[11]" (Moscardo, 1996:38). Ultimately, the education obtained from USM and the knowledge accrued out of the endeavour should ensure that the students can not only have a higher quality of life, but equally important, they are free to use their knowledge and talents to shape their own destinies without compromising those of others.

The journey for autonomy and academic quality

That said, the struggle for autonomy remains one of the biggest challenges in laying the foundation which ended last year. The process started in February

[10] Dzulkifli Abdul Razak. (2010). Higher education key in achieving MDG. *New Sunday Times*, 2 May.
[11] Moscardo, E. (1996). Mindful visitors : Heritage and tourism, *Annals of Tourism Research*, *23*(2), 376-397.

2009, almost simultaneously as the beginning of the APEX initiative involving consultations and negotiations with numerous parties and ended on 13 December 2010, again also as simultaneously as the end of the two years involved in laying the foundation. All but one of the changes sought in the creation of a new APEX constitution as a transition to a full APEX Charter have been agreed upon. Notwithstanding, it is still a case of *so near yet so far* for the new constitution is yet to be gazetted for implementation. This is pertinent because in the announcement to launch the APEX initiative by the then Prime Minister on 27 August 2007, he crystallised a 3A framework

of autonomic, accountability and audits[12]. While the last two facets took off without a hitch, the autonomy dimension seems very much overdue.

So much so in the words of the APA Panel, it reemphasised:

> *The Panel strongly recommends that USM should urgently engage itself in serious discussion and dialogue with relevant authorities on matters relating to the governance and autonomy of the university.*

Yet internally, the university has put in place such practice as duly recognised by the APA Panel, for instance:

> *The Panel commends USM for putting into place good governance structures for both academic and administrative issues. The Panel also acknowledges that deans/directors are given autonomy in the management of their respective schools [and centres].*

And again,

> *The Panel affirms that the respective schools, centres and institutes are given sufficient autonomy to put place their respective policies, guidelines and procedures in education, research and community services.*

Yet again,

> *The Panel commends USM for its initiative to expedite the selection and recruitment process by empowering the schools to appoint their own academic staff and at the same time, maintaining the standard and quality of academicians.*

Unfortunately, as it stands today, even at time of writing, autonomy is still not part of the foundation that was laid out; this indeed remains a major obstacle to the blossoming of APEX as envisaged under the 3A framework. In several instances, it can be construed as a weakening of the foundation because to a large extent, there is an apparent absence of collegiality in making autonomy[13] happen, more so when it reflects that the level of trust and trustworthiness is very much to be desired. Thus the culture of command-and-control is still intact and preferred as far as the power that be is concerned. We therefore thoroughly support the statement highlighted by the APA report with the fervent hope that it be given the highest due consideration and that the new constitution be gazetted before long. This will complete the framework for APEX based on the 3A formula which in turn will provide the much needed speed and flexibility for the university to move to the desired state as agreed upon in the original APEX submission.

That apart, the APA reported several other recommendations, mostly minor in nature, to be put in place in order to further ensure the enhancement of the quality assurance process, input and outcomes. One of the more serious recommendations is the setting up of a physical academic quality centre that is fully staffed by qualified personnel. This has been undertaken and is currently fully functioning as per the recommendation by the independent panel. An overall complete response on the points raised as recommendations will be submitted in March 2011. Assuredly, this will further refine the foundation laid thus far.

In the same breath, attention must also be drawn to the long list of commendations and affirmations made

[12] Dzulkifli Abdul Razak. (2010). Audit the auditing system. *New Sunday Times*, 14 March.
[13] Dzulkifli Abdul Razak. (2010). The struggle for autonomy. *New Sunday Times*, 4 July.

by the APA Panel to ensure that the journey taken as defined in the APEX agenda is indeed on the right track. Some of these have been quoted earlier and the full range can be found in the report (page 37).

Hence, despite some of the constraints faced by the university, this report will enumerate several of its major achievements that show that quality levels in the context of equity, availability, accessibility, affordability and appropriateness have been well set up and initiated. Many of these will form the basis of delivering excellence in the years to come, beginning in 2011, connecting with the many global and international agendas that are duly supported by the university as part of its core values.

Other prevailing gaps

One of the major constraints – other than autonomy – faced the previous year was the financial contribution due under the APEX agenda. This is worth noting because unlike two years before (2009) when the university received a full reimbursement in the first quarter of the year, in 2010, the university received a mere 14 percent or RM30 million of what was due in the month of September. There could be several reasons to this, including the global recession faced by the country but it must be acknowledged that this did have a significant effect on a vital national agenda such as the APEX initiative.

Fortunately, through the prudent financial management based on targeted priorities, USM managed to pull through optimally as narrated in this volume. It cannot be left unsaid, however, that the performance and deliverables could have been presented with far better outcomes if the agreed financial contribution had been delivered on track. This is certainly the expectation in the remaining years to come – this is crucial if the achievements of APEX are to be maintained at the level to which they have reached and even to scale them up. Here the levelling up of talent management cannot be compromised any longer.

In the same way, while the various talent management strategies have been diligently worked out, there are also a number of bureaucratic and administrative hurdles that are still to be overcome. This too is of concern as we further advance the APEX agenda ahead of the tight timeline of 2013. Although the university is not relenting and will still insist on putting its best foot forward, it expects the highest levels of commitment from the other actors as well.

Again, the APA Panel recognises this when it highlighted the following:

> *The Panel affirms USM's strong and progressive commitment in implementing the APEX agenda. The Panel also notes that USM has tabled three progressive and constructive reports on its roadmap towards becoming the APEX university.*

In a similar vein, the Organisation for Economic Co-operation and Development (OECD) has been commissioned by the university to review the role of higher education in regional and city development. The aim is to strategise for a stronger, cleaner and fairer economy in relation to the social and cultural development of cities and regions where USM is located. An elaborate report on this is included in this volume (see page 305). The OECD has submitted an updated draft report on its findings, which will be finalised in March 2011. It will definitely provide a useful input from another independent source for the APEX agenda, albeit with a slightly different orientation and focus.

The next voyage

Acknowledging the various limitations in the year 2010, USM is still able to position itself well in the APEX agenda moving forward. Some of these are briefly described in this volume, in particular, the high value flagships with the greatest potential to lead the APEX journey in the next two years and beyond as the first full-fledged APEX university. Next in line are the projects/

programmes listed as the milestones.

All these are already integrated into the university roadmap, recently updated, to ensure that their chance of success remains high. And failure is not an option. Each success will then act as an important motivational leverage so that the inertia to arrive at the ultimate apical destination can be navigated as smoothly as possible. Some have been pointed out in the APA Panel report, such as:

> *The Panel commends USM for its excellent achievement in being recognised as the United Nations University Regional Centre of Expertise (UNU-RCE) on Education for Sustainable Development in 2005; as the only "excellent" university in the* Academic Reputation Survey in 2006*, as a research in 2007, and finally, as the first APEX university (sic) in Malaysia in 2008.*

This is very much due to the outstanding team work that has been a source of strength and inspiration in driving the university uniquely forward beginning from the turn of the new millennium, since late 2000. In this regard, the university would like to pay every tribute to the entire community of USM for pulling it off in such a short period of time. Taking this in a collective context, the APA Panel highlighted the following commendations.

> *The Panel would like to congratulate the Vice Chancellor and the Senior Management Team for their dynamic and visionary leadership on the roadmap for USM to become an APEX university.*

And,

> *The Panel would like to congratulate the Board of Directors for the support given to USM. The wealth of experience and wisdom of the Board is enormously important to guide and support the change that this university and all its stakeholders are seeking as an APEX university.*

With reference to this, on behalf of the university, I would like to pay particular tribute to the previous Chairperson of the Board, YBhg Tan Sri Dato Aini Arope, who has given much to USM in the various capacities he served the university.

In the same way, the university would also like to recognise and acknowledge the role played by the Pro-Chancellors, YBhg Tan Sri Dr. Lin See Yan, and YBhg Tan Sri Razali Ismail.

So too, the Chancellor, DYMM Tuanku Syed Sirajudin Ibni Almarhum Tuanku Syed Putra Jamalullail and last but not least the APEX University Patron, Seri Paduka Baginda Tuanku Mizan Zainal Abidin Ibni Al-Marhum Sultan Mahmud Al-Muktafi Billah Shah.

It would be incomplete if I do not acknowledge the sweat and toil that have gone into making this compilation what it is, and more importantly, the aches and pains that the entire teamwork made up of the USM community, including their families, endured in ensuring that the ideals of a "humaniversity" lives on as the seed for the university of the future.

Like the last compilation on APEX 2009, the sequel will also be distributed far and wide, including to members of the Cabinet and all Malaysian missions abroad.

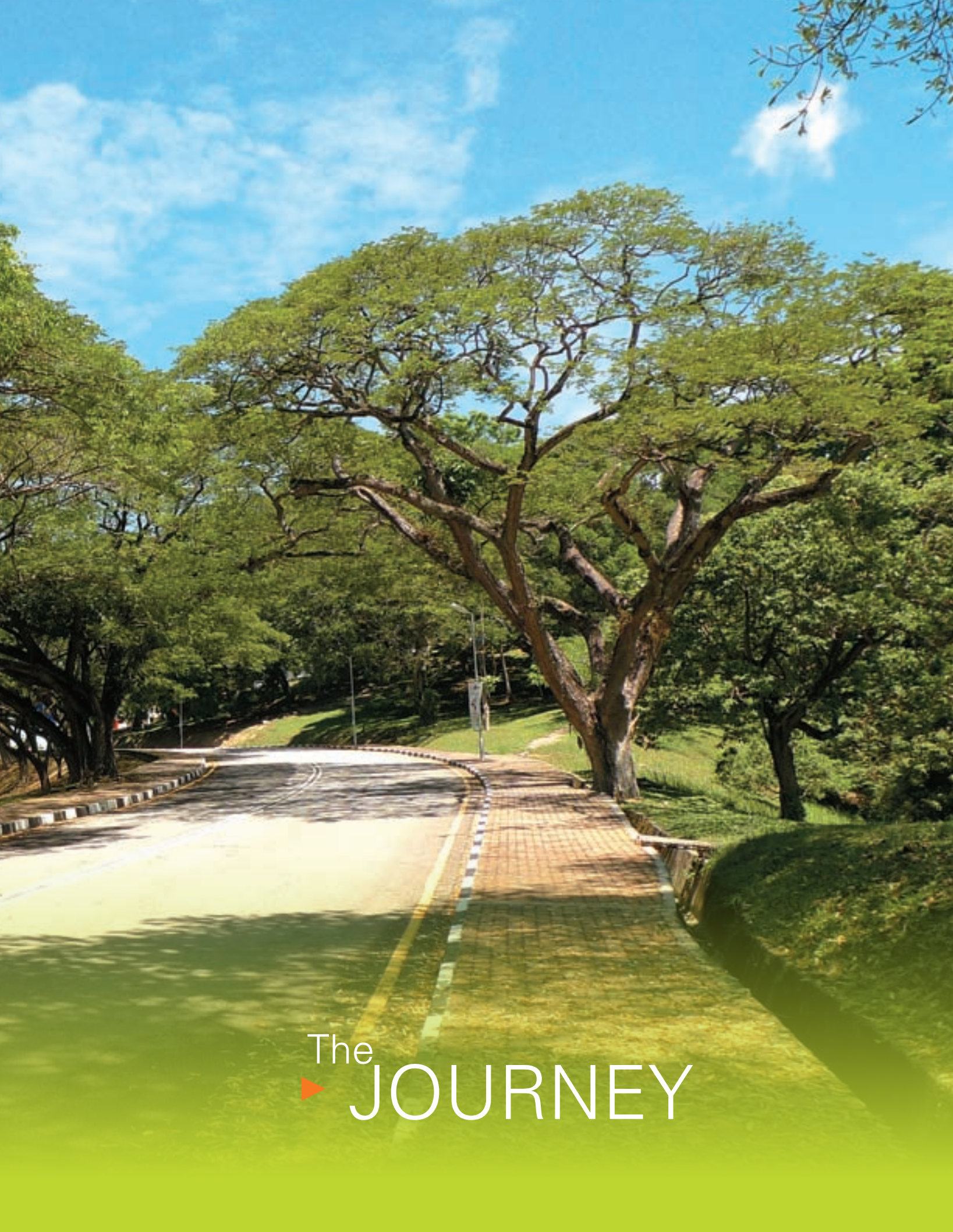
I hope you will enjoy the journey just as we have.

"Ensuring a sustainable tomorrow"

Dzulkifli Abdul Razak, Prof. Tan Sri Dato'
Vice Chancellor
Universiti Sains Malaysia
vc@usm.my
28 February 2011

The view of the Batu Uban entrance to the Main Campus


UNIVERSITI
SAINS
MALAYSIA



The JOURNEY

TRANSFORMING
higher education for a sustainable tomorrow

2010 Laying The Foundation

The JOURNEY

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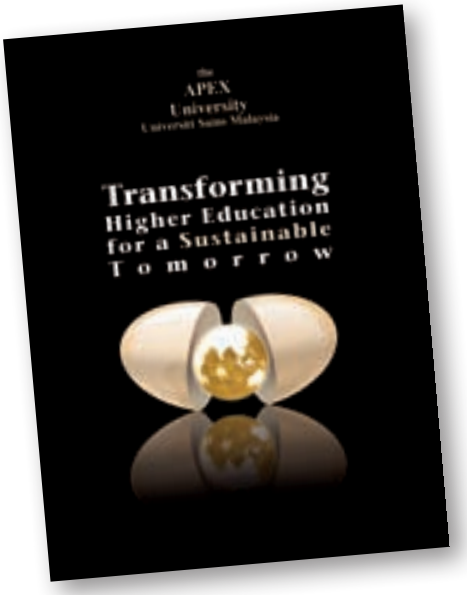
The conceptual overview of an APEX university

Introduction

The foundations laid by USM as the APEX university are critical contributors to Malaysia's social and economic development. A university focused on science and technology and informed by a rigorous and socially progressive values commitment, will help drive higher educational reform in Malaysia in synergy with the goals outlined in the New Economic Model[1], the Tenth Malaysia Plan[2] and Government Transformation Programme. USM's goal of transforming education for sustainability is critical to develop and educate properly qualified graduates who are ethically sensitive, well rounded and understand science and technology in ethical context.



The "Black Book" – the document that kickstarts USM's APEX journey

[1] Malaysia. (2009). *The New Economic Model*, Putrajaya, Economic Planning Unit, Prime Minister Department.
[2] Malaysia. (2010). *The Tenth Malaysia Plan: 2011-2015*. Putrajaya, Economic Planning Unit, Prime Minister Department.

Deputy Prime Minister, Tan Sri Muhyiddin Yassin, launching the APEX 2009 book

Transforming higher education lies at the heart of national development and the success of USM as the APEX university is central for the achievement of this goal. The stark reality that Malaysia finds itself in is that, while economic growth in Asia has been impressive, economic growth in Malaysia has lagged behind expectations thus leading to a middle income trap. In higher education a similar logic unfolds with Malaysian higher educational institutions facing increased pressures to compete in a global higher educational market.

Globalisation and the network society

Malaysian higher education institutions now have to deal with a globalised world in which, knowledge has become the driver of economic growth, ICT is now a defining form of social interaction, and the interaction between market, civil society, the state and education is rapidly transforming. According to some commentators, the dynamics and forces of globalisation have led to a radical rethink in respect to the role of the university in contemporary society.

Universities exist in a globalised world that is increasingly interconnected. Malaysian higher education exists within a network society. According to John Urry, "all places are tied into at least thin networks of connections that stretch beyond each such place and mean that nowhere can be an 'island'" (Sheller and Urry 2006)[3]. A network society is an institutional reality for USM. It is a critical characteristic of globalisation. Network sociology for example reveals to us the difficult and fluid terrain USM now operates within.

USM's strategic shift is in part based upon a recognition of the need to engage how globalisation is shifting and challenging our "sedentary" ideas of what an institution does and where it draws its legitimacy while at the same time not falling into the trap of uncritically celebrating certain post-modern idealisations of "fluidity" and "liquidity" which fail to account for asymmetric power inequality and the need to ground universities in a normative framework. The critical shift that Malaysia has witnessed with respect to the globalisation is the shift from nation to networks. This recognition of the salience and increasing importance of mobility and cross border networks as critical in development is a central insight for Malaysian national and higher educational development.

The critical question is what role does USM have in such networks, what is its place in them and how can it leverage best advantage from them? The advent of the network society means that as organisational logics are translated between contexts, they "become entirely different objects from what they were in their original social context"; this process of transformation is known often as glocalisation (Coronil 2000)[4]. Fixity which is the characteristic of modern life and how national institutions (such as universities) saw their mission is now challenged by

[3] Sheller, M. & Urry, J. (2006). The New Mobilites Paradigm, *Environment and Planning, 38*: 207-226.
[4] Coronil, F. (2000). Towards a Critique of Globalcentrism: Speculations on Capitalism's Nature, *Public Culture, 12*(2): 351-374.

The framework of sustainability and commitment to the *bottom billion* provides a renewed sense of intellectual and moral leadership and purpose to Malaysian universities in conditions of globalisation. Reframing and reinforcing the USM mission in normative terms are critical for the continued legitimacy of USM in Malaysian society.

Deputy Prime Minister, Tan Sri Muhyiddin Yassin speaking to the Vice Chancellor after the launching

"networked sociality" and "mobility".

Globalisation and neo-liberalism

Network globalisation is however contextualised within an increasingly instrumental approach to educational outcomes and to social outcomes in general. In other words, combined with a rapidly accelerating and narrowing concept of time and space and increasing interconnection between institutions and individuals is a reduction of complex cultural and social values and practices to objects of instrumental reason. Globalisation is also deeply infused with a neo-liberal logic bound by instrumentalism, individualism and consumerism. If a network society constitutes an opportunity for USM, neo-liberalism constitutes the threat to USM posed by globalisation.

Neo-liberal forms of globalisation that privilege individualism and a consumption ethic rearticulate the mission of education to fit the narrow norms and interests of the neo-liberal order. Within such an order, educational reform is characterised by privatisation, competition and a spread of business values through education. A corollary of this is an increasing instrumentalisation of educational outcomes and objectives. This often expresses itself in a reduction of the aims of education to managerial and performance objectives utterly alien to the deeper ethical and normative issues that for many students and teachers ought to characterise the educational project. In such conditions, the role of education as having more import than simply the creation of consumers, and the idea that educational institutions have a social responsibility that is more encompassing than simply serving the market is excluded from vision (Hirschman 1982[5]; Tweedie, Riley et al. 1990[6]; Bridges and McLaughlin 1994[7]; Levin 2001[8]; Stiglitz 2003[9]).

Globalisation is radically challenging conventional notions of sovereignty and this poses threats and opportunities for universities and educators. The decentring of sovereignty that is

5 Hirschman, A. O.(1982). Rival Interpretations of Market Society: Civilizing, Destructive, or Feeble. *Journal of Economic Literature*, *20*(4), 1463-1484.

6 Tweedie, J. & Riley, D.D. (1990). Should Market Forces Control Educational Decision Making?, *The American Political Science Review, 84*(2), 549-567.

7 Bridges, D. & McLaughlin T. (1994). *Education and the market place*. London, Falmer Press.

8 Levin, H. M. (2001). *Privatizing education: can the marketplace deliver freedom of choice, efficiency, equity and social cohesion?*. Boulder, Westview Press.

9 Stiglitz, J. (2003). *Ethics, Market and Government Failure, and Globalization*. The Governance of Globalization,The proceedings of the Ninth Plenary Session of the Pontifical Academy of Social Sciences, Acta 9, Casina Pio IV.

occurring under globalisation is the corollary of the process of consumer consciousness, cultural acceleration and technological change. It is also of crucial significance to understanding both the problems neo-liberal globalisation poses for contemporary societies (Sassen 1996)[10]. Neo-liberalism rearticulates the idea of the sovereign within the notion of the consumer. The consumer is now king. Yet under neo-liberal authority, the ascendancy of the consumer as sovereign is also implicitly the ascendancy of radically individualistic values that are in fact derived from a particular culture and are far from universal.

Permatang Pelajar in the USM Main Campus

Sustainability as a response to neo-liberalism and an example of positive globalisation

The framework of sustainability and commitment to the *bottom billion* provides a renewed sense of intellectual and moral leadership and purpose to Malaysian universities in conditions of globalisation. Reframing and reinforcing the USM mission in normative terms are critical for the continued legitimacy of USM in Malaysian society. The ideology of sustainability and commitment to the *bottom billion* provides USM with a terrain of moral leadership that is both relevant to Malaysian development, culture and spiritual aspirations but also connects to broader threads within globalisation (see USM, 2008)[11].

Critically the thrust of USM also provides a way to engage the ongoing dilemmas regarding science and ethics. This central problem, the role or place of ethics with science is addressed by directing USM's endeavours towards research dedicated to sustainability and the *bottom billion*. Appreciating the values dimension to scientific knowledge and the issue of values and culture to learning and higher education is a central contribution the USM approach to the mission and direction of higher education can make to Malaysian society. Such a strategy provides USM, at least in principle with an overarching legitimating principle which can be used to engage globalisation in an alternative way to the neo-liberal agenda.

The university in a garden APEX agenda is an example of educational leadership interested in substantive issues of moral and cultural accountability. The philosophy of sustainability provides us with a critical touchstone in reformulating and engaging with how we can pursue the public good as well as advance national interests within a framework of universal globalisation. The sustainability strategy of USM represents a clear and intellectually challenging re-theorisation of what role higher education must play in Malaysian national development. It also represents a significantly different approach to the problems of globalisation and provides a platform for repositioning USM in the higher education market place as a leader in addressing the critical and salient issues that currently perplex the world.

Just as Malaysia has forged its own distinct economic response to the problems of globalisation, Malaysian educational institutions also need to forge their "Malaysian" response to global change and the problems of

[10] Sassen, S. (1996). *Losing Control? Sovereignty in an Age of Globalization*. New York, Columbia University Press.
[11] Universiti Sains Malaysia. (2008). *Transforming Higher Education for a Sustainable Tomorrow*. Penang, USM.

education in the new world. The APEX strategy of USM is an effort to pursue a new direction for Malaysian higher education. Such an effort has significant reasons to suspect that it may succeed.

A large measure of the USM strategy in engaging globalisation aims to challenge the framing of globalisation as the simple imposition of neo-liberal culture economics and social relations. The reasoning for this is important. This is because USM is engaging in a project of cultural respect and not simply environmental protection. Perhaps a better way of putting this is to say that USM's sustainability project is fundamentally one of social justice, growth cognitive and ethical development and human respect.

In this sense, the USM project is not simply reducible to Malaysian interest alone (although its importance to Malaysian national development is critical). Rather it is both engaged with distinctly Malaysian themes and engaged in broader global dialogues. USM's recognition of the fundamental inequality that characterises the current global order and the need for educational institutions to engage this as a matter of priority is framed within the overarching idea of sustainability and commitment to the *bottom billion*. This is infused with normative value and it has universal significance and import.

Civil society

The USM model takes seriously the important role universities play in social development and civic engagement. USM's pursuit of the common good and betterment of Malaysian society is a central plank in its educational approach. This approach is not simply expressed in homilies to improvement. Rather it is the expression of USM's essential philosophy. The clustering of social science and humanities under the rubric "social transformation" provides us with an insight into the USM approach. The recognition that global problems are interrelated and that change needs to be aimed at changing "the system of our society" (USM, 2008, p.8) is a clear insight into the fundamentally political and social mission of a university. The recognition that all "sectors of the society consult and actively participate in decisions relating to sustainable development" (USM, 2008, p.8) and that the USM mission in part is "extending its reach to the local community"(USM, 2008, p.15) is a good example of the civic role USM aims to play. For example this role finds solid and deep expression in the Regional Centres of Expertise (RCE) programme of USM (USM, 2008).

USM's efforts in engaging civil society are impressive and find expression in citizenship projects and environmental projects in the broader Penang community. The specific engagement of USM with the broader society (civil society) not only links USM with the broader community but the RCE platform links USM to community activist NGOs and others in a strong bond with broader civil society. This link to NGOs connects USM through civil society to a broader public sphere that is international and global as well as local. This connection is significant. Malaysian political and social change is in many respects finding its deepest expression in civil society and community oriented action (Weiss and Hassan 2002)[12]. By linking to local communities and NGOs, USM increases its legitimacy with civil society and makes its research and scholarship relevant to Malaysian society.

Pedagogy

The USM project seeks to balance the human capital needs of the nation with a deeper ethical framework by seeking to address a fundamental problem that characterises Malaysian education: the problem of lack of creativity within educational institutions and a lack of engagement with issues of substantive moral personality. Ethics in many Malaysian educational institutions is largely taught with an emphasis on rote recitation of rules lacking substantive content and cultivation of moral personality. There is also a fundamental lack of engagement with critical thinking within some educational institutions.

Educational growth, change and development if not bounded by a deeper commitment to normative principles and the social good are in some ways reducing pedagogy to techniques and stripping it of its central moral essence. It is like "a circle with no centre" (Al-Attas 1985, p.148)[13]. The key to USM's approach is that it recognises the educational importance of having a vital and central rationale to its pedagogical reform. The best dialogical and socially constructivist pedagogy is rooted in a strong moral and ethical project and framework (consider Paulo Freire, for example) which temper and restrain individualism and hubris.

[12] Weiss, M. L. & Hassan S. (2002). Introduction: from moral communities to NGO's. In M. L. Weiss & S. Hassan, (Eds.) *Social movements in Malaysia: from moral communities to NGO's*. London, Routledge Curzon.

[13] Al-Attas, S. M. N. (1985). *Islam Secularism and the Philosophy of the Future*. London, Mansell Publishing.


View of Tasik Harapan

Practical ways in which USM can engage the agenda of educational reform include shifting learning to a student centred approach which focuses on ensuring that student learning is deep and embedded in understandings that are far more engaged than the type of knowledge realised through rote instruction and the recitation of formulas or facts. Problem based learning which is currently practised in the health sciences is an example of this approach (USM 2008, p.27). Another reform which can embed the ethical programme into the way knowledge is taught is the Sustainability Development Criterion which entails courses being, "required by their professional institutes to incorporate sustainable development into their curriculum"(USM 2008, p.28). This is currently exercised in Engineering at USM. Finally, reform to assessment strategies away from examinations and summative assessment towards formative assessment can help drive changes to teaching and learning which in turn will positively affect the development of the "whole personality" and develop deeper more embedded knowledge as well as normative commitments. In short, changes to pedagogy, curriculum and assessment which are currently underway at USM give practical support to the philosophical arguments made here.

Spiritual values and diverse networks

The role that USM can play in showing ethical leadership in the global public sphere (for example in the Islamic public global sphere) (Means 1969[14]; Bakar 1981[15]; Ali 1984[16]) provides an opportunity for USM to articulate itself in value terms that are coherent with the deeply held beliefs and values of the *bottom billion*. Recognising the importance of USM's moral commitment as possessing significant spiritual resonance within an Islamic public sphere situates USM within the discourse of civil Islam and provides a serious discussion point to how we envision the diversity of voices involved in debating globalisation. The garden metaphor and commitment to sustainability and social justice for the excluded and marginalised provide is a far more democratic and inter-subjectively respectful frame of discourse for higher education than the doctrines of neo-liberalism. The idea of a garden metaphor integrates the ideas of nurturing and care with social engagement and concern. These are critical aspects of an engaged and ethically serious higher education.

The university as a garden discourse through its spiritual resonance is actually quite a challenge to the radically possessive individualistic culture that informs contemporary neo-liberal globalisation. Consider the dialectical opposition between consumption and tendering/nurturing. The connection to Islam and multi faith values provides yet another "pillar" to the idea that USM is in fact engaging at multiple levels and with multiple publics. The importance of

[14] Means, G. P. (1969). The Role of Islam in the Political Development of Malaysia, *Comparative Politics, 1*(2), 264-284.
[15] Bakar, M. A. (1981). Islamic Revivalism and the Political Process in Malaysia, *Asian Survey, 21*(10), 1040-1059.
[16] Ali, A. (1984). Islamic Revivalism in Harmony and Conflict: The Experience in Sri Lanka and Malaysia, *Asian Survey, 24*(3), 296-313.

With regard to the issue raised by the Honourable Member from Machang pertaining to the implementation of APEX programme and the question on the allocation for the establishment of USM's Science Park which has yet to be disbursed to USM, I would like to inform that the selection of USM into the APEX programme is not anchored on the Science Park project but based on criteria such as governance, talent management and availability of resources. **Since the APEX programme was launched two years ago, USM has successfully demonstrated improvement in all these criteria.**

Minister of Higher Education, Dato' Seri Mohd Khalid Nordin, in responding to the question raised by a Member of Parliament during question time in the 12th Parliament on 2 November 2010.

A large measure of the USM strategy in engaging globalisation aims to challenge the framing of globalisation as the simple imposition of neo-liberal culture economics and social relations. The reasoning for this is important. This is because USM is engaging in a project of cultural respect and not simply environmental protection.

USM's role in engaging and representing a democratic and globally responsible dialogue in regards to higher education that is informed from Islamic values as well as the values of other great spiritual traditions is a model of practice that negates otherwise simplistic caricatures and prejudices that exist with respect to the relationship between spiritual values and higher education.

USM's practice is a model for Malaysia but also a Malaysian model for the world. Seen from a vantage point of cultural and ethical understanding, USM's commitment to sustainability and values of helping each other and not simply advancing personal interests is both a solid reassertion of Malaysian values and also a solid assertion of common values which extend beyond Malaysia. The success of Malaysia as a hub of education also means that it needs to internationalise and expand its understanding of its ethical role beyond simply "Malaysian" interests but rather engage a wider global audience. Finally, the role that USM can play in working between the Islamic public sphere and non-Islamic public spheres provides an important conduit for non-Muslims to understand the very real and critical contribution that Islam can play in debates over sustainability, justice and the social good. This is a contribution USM can make and it is not a small one.

Conclusion

The philosophy of the university in a garden, sustainability and commitment to the *bottom billion* provides us with a critical touchstone in reformulating and engaging with how we can pursue the public good as well as advance national interests within a framework of universal globalisation. The opportunities of universities working with civil society is another opportunity that globalisation offers us. Yet again, this opportunity can only be fully developed within a fuller and more sustainable ethical basis than consumption ethics and individualism. Ultimately, a university engagement with globalisation based upon sustainability and commitment to the *bottom billion* as its core principles is the basis of moral legitimacy, social inclusion and capacity building. For both individuals and diverse communities, this is the way that a university can engage globalisation on the basis of shared humanity and cultural dignity.

An educational project that engages the capabilities of students, teachers and the community of which it is a part within a framework of sustainability is the path forward to a new ocean of possibility not limited by the narrow promises of consumerism or the shallow goals of pure individualism. A sustainable university is in this sense one that is in keeping with the full development of human capacity tempered by the recognition that true capacity cannot properly exist without social justice environmental protection and mutual respect and recognition (Fraser 1992). Just as Malaysia has forged its own distinct economic response to the problems of globalisation, Malaysian educational institutions also need to forge their "Malaysian" response to global change the problems of education in the new world. The critical role that APEX reform plays in providing essential higher educational underpinning to national transformation and development is clear. The foundations have been laid. The hardest work lies ahead.

Scene of a convocation gathering outside Dewan Tuanku Syed Putra

The innovation eco-system: the precursor to the APEX ideals

The culture of innovation has set in at Universiti Sains Malaysia. The acculturation process was long and arduous with the footprints tracing back to the late 1990s but the rewards are worthwhile. Innovation has now become the key ingredient in USM's various success stories featured in this publication. It is the catalyst behind USM's drive towards achieving the APEX targets and its vision to transform higher education for a sustainable tomorrow.

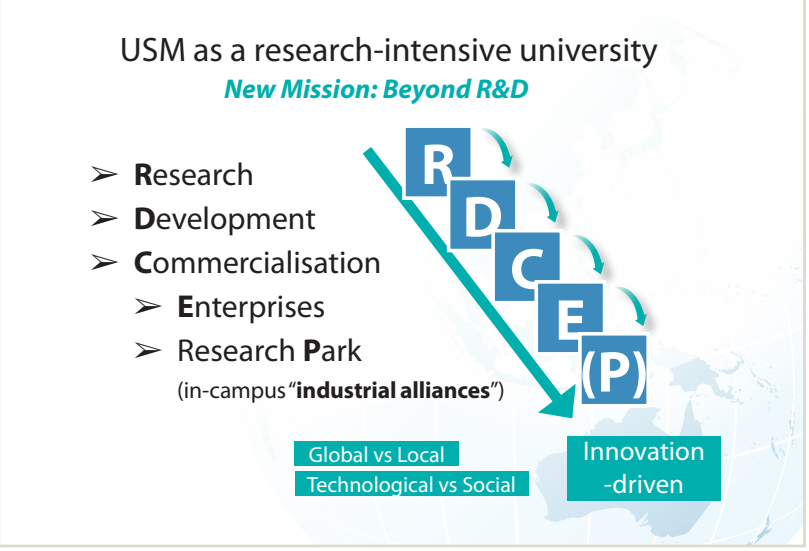


Figure 1: The "R-D-C-E-P" campaign in the branding exercise

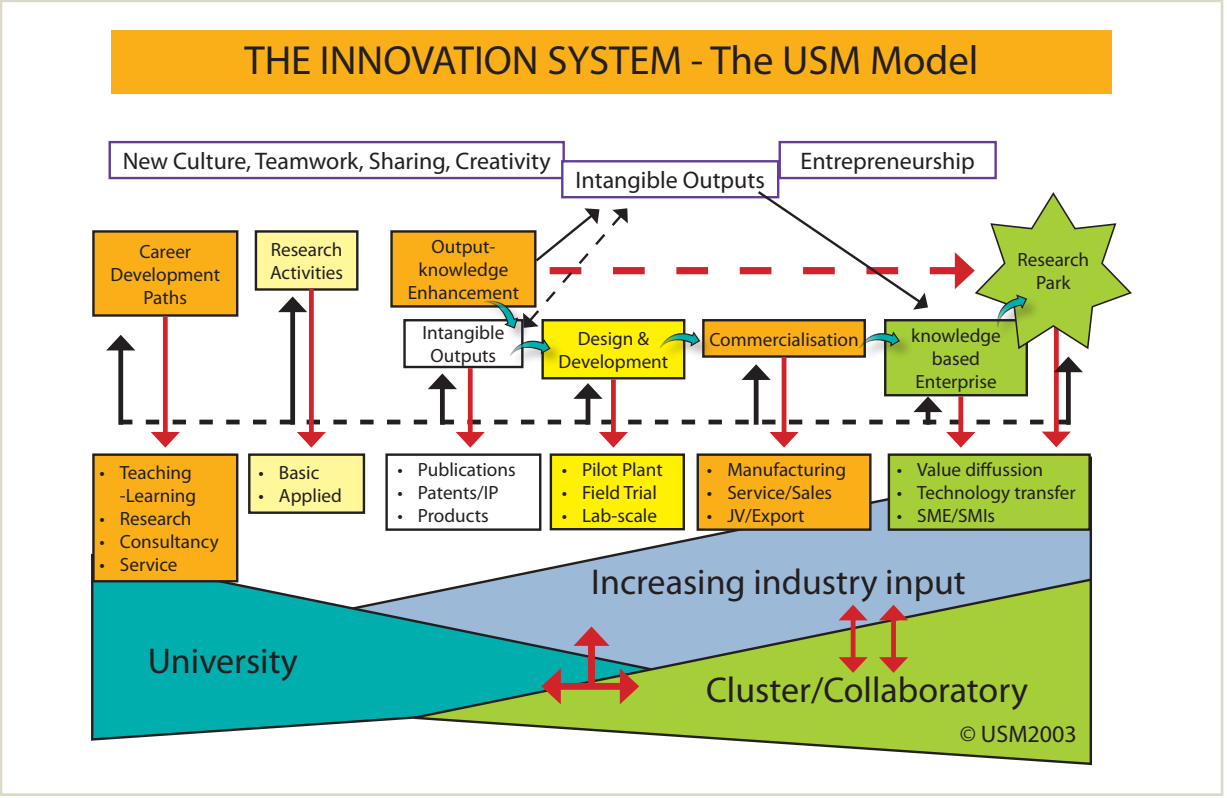


Figure 2: The USM's Innovation System Framework

USM visualises itself as a world class university that keeps giving back to the society. Research and development have always been the core business of USM. Two major efforts in the late 1990s could be credited to the turnaround of USM to becoming a research-intensive university. The first was the "Acculturation of Research and Development (R&D)" programme and the second was the establishment of a new promotion scheme for academics in USM that recognises that the creation of a culture in R&D must be complemented by an equally supportive promotion system. At the same time, however, a soul searching effort in the form of a self-audit on the outcome of USM's research work revealed that USM had many research outputs but not many had been translated into results that could directly benefit the society. It was determined at that point that to ensure that results of the R&D endeavours at USM (mainly financed by the public) go back to the society, the research community must engage in the research-development-commercialisation (R-D-C) value chain. This R-D-C value chain forms the platform and the impetus to the innovation culture in USM.

In general terms, the word "innovation" means to create new ways, products and processes towards an improvement in the quality of life, productivity and well-being. In the technological sense, "innovation" means extending the value of invention and newly developed intellectual property by ensuring that the society benefits from them. It is usually associated with some form of rewards to the inventors or the initiator of the intellectual property. Hence, the efforts to promote innovation at USM were fine-tuned to serve the society at large while at the same time ensuring that researchers are given due recognition and rewards for their contributions. Towards that end, several successful commercialised products served as a model for USM to understand the issues and challenges of bringing the entire university to adopt the R-D-C value chain.

2003 was a key turning point for USM when the Vice Chancellor, during his annual address, challenged the entire USM community to take the university to greater heights by thinking *out of the box* deemed as a prerequisite to an innovative culture. The event officially marked the commitment of the management to drive innovation forward. According to the Vice Chancellor, "If USM is serious about its global endeavours, it needs to exploit its innovation to gain competitive advantage. The factors and suitable types of innovation must be intelligently selected, properly nurtured and effectively managed".

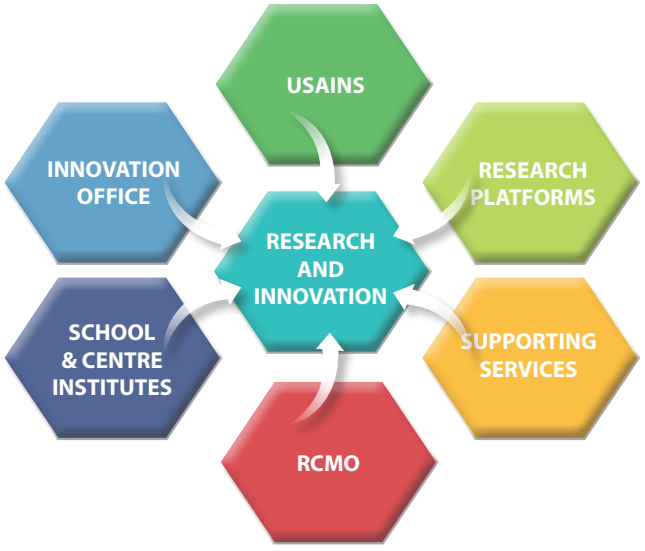


Figure 3: The research and innovation organisation at USM

Subsequently, the university has pursued various initiatives to operationalise its vision to ensure that the culture of innovation prospers. The gaps and the prevalent shortcomings in the then present landscape have been identified followed by a search for the enablers of innovation that would work in the USM environment. As the buying-in of the culture of innovation is critical, the university embarked on an intensive branding programme to inculcate the idea that research should lead to the transformation of the society (see Figure 1). The R-D-C value chain was then extended to include two more dimensions, Enterprises (E) and Research Park (P), that are viewed as the enablers for USM to realise the nexus of innovation. An "Innovation System" for USM was then established and represented as a framework illustrated in Figure 2. In addition to illustrating the R-D-C-E-P path, the framework also establishes several prerequisites to ensure that USM's effort in innovation will not only be impactful but will also be sustainable and become a culture within the university. The prerequisites include the spirit of cooperation and collaboration both within and with external parties and the need to ingrain and acknowledge intangible qualities such as teamwork and creativity, and outcomes.

With the Innovation System Framework established, the next task was to convert the framework and concepts into practical operating procedures and enablers. Several requirements were identified:

- The need to firm up the research organisation (Figure 3).
- The need to put in place enablers, policies and procedures for commercialisation. Some of the initiatives taken include:
  * Establishing USM's research output matrix.
  * Establishing USM's knowledge and technology bank.
  * Activating a clear process flow.
  * Defining players in the process flow (Figure 4).
- The need to ensure the availability of able human resources at the university. Some of the initiatives taken include:
  * Aligning the human resources to support the Innovation System.
  * Establishing a framework towards a human resource blueprint (Figure 5).

The effort at USM coincided with the Ministry of Higher Education's decision in 2005 to rebrand the research and development division of universities to research and innovation (R&I). The move provided further impetus for USM's drive towards innovation. The Innovation Office, established in USM in 2006, took custodianship over the Innovation System. The Innovation Office shoulders the responsibility to drive innovation in USM and to ensure that the ideals of the Innovation System are turned into a culture in USM.

The Innovation Office quickly established the procedures, policies and infrastructure to support the Innovation System. In August 2008, the Park (P) in the R-D-C-E-P value chain came into being through the establishment of sains@usm, an innovation park owned by the university.

By the time the bid for the APEX status was made, USM had already established

a system as well as an innovation culture that not only understood the need for research to produce outputs but also to turn them into useful outcomes that will ultimately impact the society. The drive and thoughts behind the APEX bid was in fact a continuum to the ideals and aspirations set forth by the earlier drive under the Innovation System efforts.

Institutionally, USM has all that it takes to deliver the APEX aspirations. The challenge now is to ensure that the entire USM community embraces the innovation ideals, capitalising on the enablers and executing decisions accordingly to result in the intended outcomes. The effort to align human resource management to the Innovation System has gone through several development stages, from the "transformation human resource" effort in 2007 to the talent management initiative under the APEX drive.

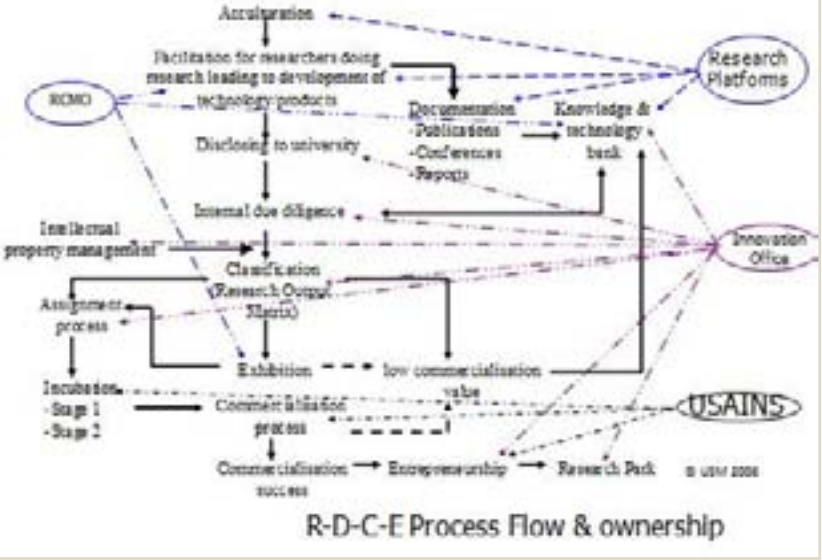


Figure 4: The innovation flow and ownership

In reality, the APEX programme provides the extra drive for USM to remain innovative. Today, USM is determined not only to empower future talent but also enable the *bottom billion* to transform their socio-economic well-being. The original intent of the Innovation System to navigate USM through the R-C-D-E-P value chain is now only an APEX programme away. USM is confident that it will be able to surmount the APEX challenge successfully.

Alignment between HR and the Innovation System

Recruitment → Retirement

	Human Resource Planning	R&S Recruitment & Selection	Training	Development	Compensation & Benefits
Human (Staff / Students)	Profiling C, Q, F, N, DS	Interview process & selection criteria	Training Needs Analysis	SKT/LPPT Promotion PTK	Reward
Organisational (Infrastructure)	USM/PTJ Manpower planning	Develop PhDs, post-doc internally	Training Needs Analysis	Succession Planning Leadership	Automatic Reappointment
Technical (Policies)	Review existing HR policies Develop an integrated HR Philosophy to guide all HR activities (Recruitment, training, compensation, retirement)				

Figure 5: Alignment between human resources and the Innovation System

Accelerating APEX through the Blue Ocean Strategy

Presenting the Buyer Experience Cycle at the workshop session

The selection of Universiti Sains Malaysia on 3 September 2008 as the first and only APEX university in the country has provided the platform for the university to move full steam ahead to transform itself. The areas which have been identified for transformation are (i) nurturing and (re) learning, (ii) research and innovation, (iii) industrial liaison and community engagement, (iv) student and alumni services, (v) postgraduate studies, (vi) talent management, (vii) resource enrichment, (viii) autonomy and accountability and (ix) good governance.

The university recognises that all the above mentioned transformation areas are being carried out by in other universities in the world and, in most cases, they are doing it at a much higher success rate and with greater recognition. USM realises that it is almost impossible to compete or even play a catch-up game with these established universities and break into the stranglehold of their dominance in the world stage. Judging by their talent pool, abundance of resources and supportive governance, the university believes that it simply cannot play the same game in order to be excellent as defined by them.

The university therefore has chosen not to compete with them and play the game as defined by their "rules". Instead, it has elected to pursue a different path to be strategically eminent and excellent, measured in different terms and contexts. It has decided to look into different transformation objectives and strategies which can promote new knowledge spaces that equal if not exceed higher relevance in the future. For this, the institution needs to contemplate a different customer base and introduce sustainability-led education through the creation of new demands which eventually focus on the needs of the *bottom billion* and the sustainability of the future.

It is on this premise and objective that we have chosen to embark on the Blue Ocean Strategy (BOS) which was expressed in our APEX proposal in 2008 and started in earnest in early 2010. This elaborate exercise is being documented in a forth coming book entitled *Universiti Sains Malaysia Insights and Experiences in the Blue Ocean Strategy: a Paradigm Shift in Higher Education* (USM, 2010). This book compiles ideas, issues, cases and challenges of implementing the BOS in the service sector in general and the higher education in particular. It is a culmination of numerous consultations, workshops and roll-outs involving the campus community. Since it is an ongoing effort, it is indeed not exhaustive.

Indeed, as the university navigates itself into the *blue ocean* by applying the principles promoted by Kim Chan and his colleagues, it is challenged by the magnitude and intensity of this BOS methodology, especially in the process of grappling with new ways and practices which the university hopes to introduce into a field, i.e., higher education, that has existed for many centuries. So the challenge is how many new ideas can we introduce? How *blue* can be we paint them? Only time can tell if the university has succeeded in the process of applying the principles and strategies and whether there are better ways of doing things. But we are confident that it will bring about the transformation that we desire.

Group work during the breakout session

To provide the context and relevance of integrating the BOS into the transformation process of USM, the university holds on to the view that universities are also competing amongst themselves for resources, customers, funds and so forth. This competition becomes more complex if resources are limited and the customer base is small. It is imperative therefore, for institutions of higher learning to explore new areas of focus and market space in order to survive. It is based on this premise that the university believes that the BOS can be adopted in higher education provided some modifications and adaptations are made, especially in the notions of profitability and the value curve. This is compounded by the fact that higher education in most third world countries is created to serve certain social and human resource development missions. It is therefore proposed that some terms, such as "profit", "buyer", "demand" and so forth should be adapted.

By using the right framework and variation, the BOS can strategise universities to specialise and become a pioneer in certain selected fields as well as to excel and be the best in the respective opted areas. A particular new area of demand is created rather than

fought over. As such, the game to be the best among the universities and competition thereof is irrelevant because the rules of the game have changed.

The BOS will bring the university to a much wider, deeper and untainted potential higher educational and innovations demand space that is yet to be explored. The strategy will identify the areas of teaching, research, consultancy and community engagement a university should focus on, and specialise in, so that competition in the areas will be irrelevant.

The BOS may be applicable and relevant to a university in the following areas:

- the reconstruction and reorganisation of strategies for higher education, research and development, innovation, business, governance, opportunity and students.
- focus on the higher education big picture and not ranking and numbers.
- reaching beyond existing needs and demands.
- getting the strategic higher education sequence right.
- overcoming key governance, autonomy and organisational hurdles.
- building execution into strategy.
- avoiding a toe-to-toe approach with other university's competitors particularly in areas of research and development.
- avoiding highly contested educational as well as unlock untapped potentials.

In short, the BOS may bring consistencies and alignment to the university's vision and mission, in particular, its value innovation which is the main essence of the BOS against impending price, profit, growth and costs.

Identifying the "pain points" of existing customers

As a case in point, during the recent exercise in *blue ocean* for postgraduate studies, USM identified several categories of "non-customers" as its new customer tiers to be persuaded and enticed. These are the thousands of students who graduate annually and enter into the job markets (who did not consider postgraduate studies as an option), the housewives, successful entrepreneurs who should share their experiences and the white collar prisoners who are currently incarcerated for various business offences and who have all the time in the world to focus on postgraduate studies.

The BOS offers systematic and reproducible methodologies and processes in pursuit of the university's underlying mission and vision. Instead of homogenisation and a low margin, a university which focuses on differentiation, lower costs and creates the ability of converting its client or consumers who were not originally in the university's spectrum into its customers, is in the *blue ocean*.

Never try to imitate anybody, because as long as you benchmark with somebody, at the best you will be is like them. Meanwhile, the person you benchmark is a ahead of you. You will never close the gap.

W. Chan Kim (2005), co-author,
Blue Ocean Strategy

The new USM constitution – an update

On 2 September 2008, Universiti Sains Malaysia (USM) was awarded the APEX university status, a status to be consolidated within five years. As part of the status, the Ministry of Higher Education (MoHE) had promised USM a new constitution that stipulates the autonomy and the right of governance to USM.

USM sent a complete draft of the proposed new constitution to MoHE in February 2009.

From February to December 2009, more than 16 meetings and/or workshops were held between USM and the MoHE legal advisor, the Director General of the Higher Education Department, the Chief Secretary and the Minister of Higher Education to seek views and agreement for this new constitution.

By December 2009, MoHE had approved the new USM constitution which was subsequently handed over to the Attorney General Office.

By mid-June 2010, the Attorney General Office had approved the proposed new USM constitution and returned it to MoHE together with a letter dated 7 June 2010 [Reference No. PN(PU2)75B/II].

The USM constitution, as part of the subsidiary of the AUKU (First Paragraph), does not require the approval of Parliament – the Minister of Higher Education would hand over the new constitution to the King to seek his Royal Consent under Section 26 AUKU. However, this did not take place even when the Attorney General Office had already approved the new constitution since 7 June 2010.

The discrepancy is that, 16 other universities' constitutions had already been submitted and the consent of the King had been secured on 1 January 2011.

> . . . the struggle for autonomy remains one of the biggest challenges in laying the foundation which ended last year. . . Notwithstanding, it is still a case of so near yet so far for the new constitution is yet to be gazetted for implementation. . . the autonomy dimension seems very much overdue.

USM's Vice Chancellor,
Professor Tan Sri Dato' Dzulkifli Abdul Razak


View of the Chancellory

The meeting between MoHE and USM

MoHE informed USM that there had been five major challenges that had delayed the approval of the proposed new USM constitution. A meeting between USM and MoHE was held on 26 December 2010 to discuss and resolve these challenges. Among the challenges discussed were:

1 Consultation regarding financial procedures

USM had informed the MoHE's Chief Secretary that discussion regarding the financial autonomy for the university is an administrative and policy matter and does not involve any legislative changes to AUKU. The first paragraph, Section 4 and 4A of AUKU have provided the university with wide powers in financial and administrative autonomy. USM should be given priority by the Cabinet in achieving its APEX objective. The Chief Secretary had scrutinised the relevant material and agreed with USM on this matter.

2 The power of the Minister of Higher Education and the Minister of Finance

Under Section 4A of AUKU, the university needs the approval of the Minister of Finance to conduct business, commerce and entrepreneurial enterprises. In the proposed new USM constitution, the approval from the Minister of Finance is replaced with that from the Minister of Higher Education. USM explained this move:

- There is no hidden motive in this amendment. This amendment does not free USM from government supervision, merely transferring the power to another minister based on a relevant reason. This amendment represents the ultimate accountability of USM to MoHE and recognises MoHE as the highest organisation in terms of hierarchy.
- The current legislative power stipulated in Section 4A of AUKU is selective. It provides for approval from the Ministry of Finance but not from other ministries or agencies which also deal with the university's activities.
- Some powers under Section 5, like joint ventures with franchised colleges, are strictly speaking, educational and not commercial power, and seeking approval from the Minister of Higher Education is more relevant and appropriate.

The MoHE Chief Secretary felt that the rationale for the replacement had to be redefined and asked that the suggestion be presented to the Minister for his approval. The Chief Secretary would raise this matter with the Minister as a matter of urgency.

3 Transfer of money from one coffer to another coffer

MoHE had deleted Section 55(2) of the proposed new USM constitution because it would allow the Board of Directors to do the following:

- Transfer any part of the money allocated for a specific annual repeated spending to another specific annual repeated spending.
- Transfer any part of the money allocated for a specific annual capital spending to another specific annual capital spending.
- With the consent from the Minister [Sub-section 11(2) AUKU] – to transfer any part of a balance from a specific annual repeated spending to another specific annual capital spending.
- To transfer any part of a specific annual repeated spending to the following years.
- To transfer any part of a specific annual capital spending to the following years.

As an explanation to the objection, USM had provided the following:

- The objection might have been the result of the Minister being unaware of the existence of Section 11(2) in AUKU that statutorily allows the Minister to permit a university to transfer any part of the fund meant for a specific annual repeated spending into a specific annual capital spending.
- It is important to point out that Section 11(2) allows the transfer of any part of the fund from a specific annual repeated spending into a specific annual capital spending.
- USM seeks power for the Board to transfer an annual repeated spending to another repeated spending and from an annual repeated spending of the university to the following year.
- This practice is important in emergency situations such as floods, fires, accidents, thefts or inflation due to the increase of price and morass of allocation and for unexpected situations like lawyer fees and court settlements.
- On the regulations for the transfer of money, the proposals of the new USM constitution are in line with the clauses of Section 11(2) AUKU which allow the transfer of money if permitted by the Minister of Higher Education.

The MoHE Chief Secretary agreed with USM's explanations.

Another view of the Chancellory

4 Government circulars

Section 45 of new USM constitution stated that "subject to any written laws", the Board could use – with any modification deemed appropriate – any rules, methods, circulars and directives from the Federal government. Section 45(A) allows the Board to amend or withdraw any circular.

MoHE had objected to Section 45 and USM had put forward the following arguments:

- The phrase "subject to any written laws" means that all Parliament acts (such as Statutory Body Act) and audit acts would always be applicable to USM (no exception to any parties).
- If any circular or directive that is applicable to the university were made through a subsidiary legislature, this circular would become applicable to USM. No exception would exist.
- However, if such a circular or directive were not based on law, but is merely administrative policy ordered by any Federal government department or if it contravened with AUKU, it would automatically not be applicable to a statutory body like the university. USM would then have a choice to follow or ignore such an order. If USM wished to ignore such an order, it could enact its own statute under Section 41- 48 of the USM constitution.
- Section 45 is similar to the current practice that allows the university to either follow or ignore Federal government circulars.
- Section 45 is based on the theory that a statutory body is not a government agency; it is a semi-autonomy body, with its own legislative rights apart from the Federal government. Legislative cases like Ramalingam v Chong Kim Fong [1978] and Rosneli Kundor v KSEDC [2004] support the distinction between a statutory body and the Federal and state governments.

The MoHE Chief Secretary agreed to this and has full knowledge about the non-compulsory prerogative of statutory bodies following circulars from Public Service Departments and the Ministry of Finance (MOF).

5 Incentives

Section 4(1) of the USM constitution permits the university to draw up regulations regarding services, salaries, scales, promotions, leaves and other matters as well as incentive grants. Section 4(1)(t) is the result of AUKU. In the first table of Section 4(1)(m) & (n), the only change is the inclusion of the word "incentive".

MoHE objected to the proposed incentive as funding to the university which comes from Parliament funding.

USM explained the following to MoHE's Chief Secretary:

- If the university has been all this time allowed to award promotions, scholarships and study leaves (which have financial implications to the annual budget), it essentially means the university has been giving incentives to its staff.
- An incentive is useful as a reward for excellent service, being well known as a scholar, research and achievement.

In order to overcome this obstacle, several alternatives were proposed by USM:

a. The Board could draft several policies and guides for incentive grants for the approval of MoHE and MOF.
b. In the annual budget estimate, the university could apply for incentive allocations like policies approved by MoHE and MOF.
c. If (a) or (b) as proposed above are not acceptable to MoHE and MOF, the USM Board of Director could amend Section 4 (1)(t) to facilitate incentives from money generated internally and other sources as listed in Section 49.

MoHE's Chief Secretary is in agreement with the explanation.

Other innovations of the new USM constitution

The USM Vice Chancellor also informed the MoHE's Chief Secretary that innovations are embedded in the USM constitution that would further generate governance and accountability. Among these innovations are:

I. Appointment of a Complaint Officer – Section 60.
II. Appointment of an Internal Auditor – Section 60(3) besides the existing External Auditor as stipulated under Section 60(1).
III. The Board is empowered to carry out audits – Section 52.
IV. Protection to whistleblowers – Section 81.
V. Set-up of Branch Campus Management Committees (Section 28), School Academic Councils (Section 30), School Management Committees (Section 31), Staff Welfare Committees (Section 34) and Students Welfare Committees (Section 35).

As it stands, four challenges had been overcome during the meeting between the MoHE's Chief Secretary and the USM Vice Chancellor. Only challenge No. 2 – The power of the Minister of Higher Education and the Minister of Finance – would be brought forward to the Minister for his approval.

The frontage of the newly renovated Dewan Tuanku Syed Putra

The APEX university budget 2009-2013

ANNUAL BUDGET REQUESTED 2009-2013	APPROVED BUDGET FROM CENTRAL AGENCIES
Budget for 2009 **RM124.5 million** 15 percent	**RM124.5 million** 100 percent
Budget for 2010 **RM210 million** 25 percent	**RM30 million** 14.28 percent
Budget for 2011 **RM290 million** 35 percent	**RM80 million** 27.58 percent
Budget for 2012 **RM165 million** 20 percent	
Budget for 2013 **RM40.5 million** 5 percent	

The total requested budget for 2009 to 2013 **RM830 million**

APEX performance measures for world-renowned universities have to be measured within the context of "academic space" which in USM's case is the "sustainability issues at the bottom of the pyramid". The key indicators used by USM for the budget request is according to three main pillars, namely, talent, governance and resources.

The proposed budget was given due consideration in its preparation in line with the current financial and economic situation.

The university has made a budget request totalling RM624.5 million for the fiscal year 2009 to 2011 of which RM234.5 million was granted. The shortfall of RM390 million or 62.45% has affected the university's plans towards achieving its target.

The total expenditure for the period 2009 till 30 November 2010 amounts to RM141 million, indicating an achievement of 91% of APEX funds received from the central agency for the said period.


Peruntukan USM dipercepatkan

Statement by the Deputy Minister of Higher Education on expediating USM APEX fund in *KOSMO!* 28 December 2010

Padang B of Minden Green

Mainstreaming education for sustainable development

As we embrace the concept of education for sustainable development to serve the educational needs of the 21st century while facilitating the fulfilment of the goals of the United Nations Decade of Education for Sustainable Development (UN-DESD) 2005-2014, our aspiration should no longer be to create a ranking system that places an emphasis on which educational institution is surpassing others. We should instead develop an appraisal process that will encourage and foster universities within a network to attain a level of academic and sustainability excellence while creating a conducive environment for mutual cooperation between partnering academic institutions of higher education (IHEs).

The conventional ranking system

Although they have been in existence for decades, conventional ranking systems utilise a rigid and rather inflexible approach toward their grading of tertiary institutions. Frameworks that discourage divergence from conventions while placing greater emphasis on financial expenditure for research and grants are among some of the features of current ranking systems that do not serve the interests of all IHEs.

It is quite clear that such guidelines are counterproductive to the well-being of institutions that wish to pursue an alternate form of educational development such as sustainability integration or in the case of IHEs in developing nations, face a lack of financial means by which to fund such research and grants.

In the long run, these criteria serve to inhibit creativity and stunt the growth of universities that would otherwise be open to new, creative development ideas; they only function in further strengthening the position of IHEs that comply with the now increasingly irrelevant and archaic ranking criteria.

The birth of AUA

In the light of this dilemma, the Alternative University Appraisal (AUA) initiative was developed as a means to create a learning community among universities that are engaged in education for sustainable development (ESD) in the Asia-Pacific region. The AUA is one of a number of projects that has emerged from a network of universities called *ProSPER.Net - the Promotion of Sustainability in Postgraduate Education and Research*, which has a membership of approximately 20 universities and academic institutions from around the region. Among its distinguished members are Tokyo University, the Royal Melbourne Institute of Technology, Hokkaido University, the Asian Institute of Technology, the Chinese Academy of Sciences - Institute of Applied Ecology, University Gadjah Mada, Yonsei University, TERI University and needless to say, Universiti Sains Malaysia.

The endeavour was initiated in 2009 through the conception of the AUA model that sought to appraise universities via an alternative set of perspectives while completely doing away with conventional ranking systems. At the outset, the AUA model acts as a form of self-review for participating universities while encouraging a sense of self-awareness of their own strengths and weaknesses in the field of ESD in order to further deepen and promote their respective activities. The mission statement of the AUA is also unambiguous in its developmental objective i.e., the AUA seeks to "facilitate and encourage institutions of higher education to engage in education and research for sustainable development and to raise the quality and impact of these activities by providing benchmarking tools that support diversity of mission, as well as a framework for sharing good practices and supporting dialogue and self- reflection".

This is the direction that USM, as an institute that prides itself with its involvement in sustainable development and ESD, desires to take, in harmony with its mission statement of "Transforming Higher Education for a Sustainable Tomorrow". Given the elasticity that the AUA creates with regard to the reorientation of higher education and the creation of a learning community, USM will take into account the other variables that should be considered in gauging a university's progress. In this way, it will effectively develop a more holistic, balanced and integrated approach toward its development plans in moving toward the status of a sustainability university and in addressing the needs of the *bottom billion* community.

While it was still in its preliminary stages of development, it was decided that the AUA would be formed with two rationales in mind, firstly, to enhance the value and attractiveness of universities that are engaged in ESD and secondly, to create a learning-oriented and supportive community that will function as a medium through which these institutions can improve their practices. A fundamental goal of the AUA undertaking is to bring about an Alternative University Peer-Consultation System that focuses less on the ranking of universities and instead, places a greater emphasis on their rating. As a university that seriously challenges conventional ranking and assessment systems which place little – if any – emphasis on addressing pressing societal and global issues, USM plays an important role in the support and promotion of the AUA initiative by extending, linking and marketing the project to its national, regional and international networks.

In addition to the above-mentioned constructive qualities of the AUA model, the initiative also functions as a tool for self-reflection between partnering institutions, thus enabling IHEs to assess their individual ESD involvements. This is accomplished via a series of self-awareness raising questions, as the AUA initiative represents a holistic approach

toward the creation of an appraisal system through its focus on ESD at IHEs by means of appraising both qualitative and quantitative aspects by review. It is believed that through this process, IHEs can specifically identify areas of ESD which need to be addressed in the future with a vision of protecting and enhancing the diversity of tertiary education. In line with this ambition, the AUA model is expected to function as the first step in AUA peer consultancy among universities and ESD experts in addressing ESD in diverse ways with the aim of sharing good practices and strengthening their respective initiatives.

Quality education and spiritual development should go hand in hand

Thus far in its implementation, the project has progressed remarkably well and is gaining – an increasing amount of support – given the unexpressed interest of many universities to be assessed via a different mode and with more localised parameters. Several activities have been conducted in terms of the content development of the appraisal system and its engagement process, with the model developed in consultation with a number of stakeholders through local and international conferences as well as meetings and consultations. It should be stressed that the model is not intended to intensify competition among IHEs or to impose a form of uniform pre-determined university ideal upon them; rather, it aims to provide perspectives in their efforts that will enable them to reorient themselves toward a sustainable future while simultaneously being assisted to identify specific areas that need to be addressed and/or improved upon. The proposed framework and parameters of the AUA have been exposed to several international university network associations such as IAU, AAU and AUN, to name a few. At the national level, opinion gathering was carried out by each core partner in order to further garner support as well as obtain professional feedback. Many of these participating institutions have also expressed keen interest and voiced support for the project.

The way forward

Pilot tests were also executed at core partnering universities and certain parameters with regard to the practicalities of the questions and indicators revised. The actual appraisal exercise has been scheduled for the following year among partnering institutions of the network. Other IHEs that are either keen on identifying their respective performance with regard to ESD endeavours or are just interested in being a part of a network that would serve as a viable alternative to current conventional ranking systems that are influential but constrictive will be permitted to participate.

That being said, the aim of the project is not to propose an appraisal system for a small subset of universities that reject mainstream ranking systems and wish to choose an alternative path; instead, it is to advocate the empowerment of an institution of higher education to decide for itself the development strategy of its own establishment. Given the more holistic and flexible criteria of the AUA model, universities can aspire to higher ratings according to both conventional and ESD measures.

In addition to this, the AUA system does not only recognise the good practices of participating universities that consciously espouse the principles of ESD, but also aims to shape the ways in which universities operate for a more sustainable future in accordance with the AUA system of recognising diversity, innovation and change towards sustainable development. Ultimately, the system is envisioned to function as a guiding force that shapes the universities of today and tomorrow along the line of other alternative appraisal systems such as AASHE, the ICHE Observatory Project and the currently being developed University Rating System for Southeast Asia (ASEAN). It is hoped that in due course, such productive assessment methods will restore the ideal functions of IHEs – most of which have allowed their founding ideals to be carried away by commercial, ranking-driven competition among other tertiary institutions.

THES ranking – cannot see the forest for the trees

On 2 December 2010, the editor of the Times Higher Education (THES) World University Rankings, Phil Baty, boasted in Singapore's *Straits Times* that "for those who want a truly comprehensive picture of world class universities, there is only one that really counts: the THES World University Rankings".[1]

However, there were two problems with that claim – the editor had previously written a critical piece on *that* ranking and research on university rankings had shown otherwise.

In May 2010, Baty had written that the rankings he had spoken highly of "had some serious flaws".[2] He admitted that the component that contributed 40 percent to the overall rankings "achieved only a tiny number of respondents to this survey". This resulted in a "dramatic volatility" in the rankings and it was "simply a stark and shocking example of the weakness of the ranking data".

While acknowledging the existence of "some good work by other agencies", Baty in the *Straits Times* article went on to explain the limitation of each of these endeavours and suggested that THES is the most comprehensive because it "examines performance across all of the university's core missions".

That THES has outranked sound suggestions put forth by other agencies might be unsubstantiated as well. A recent paper published in the *Higher Education* has indicated that THES only ranked 24th out of 25 rankings of higher education ranking systems (HERSs) in Europe.[3] The study was based on 10 out of 16 "principles of quality and good practice" established in 2006 by the members of the International Ranking Expert Group (IREG). IREG was founded in 2004 by the UNESCO European Center for Higher Education (UNESCO-CEPES).

The study also showed that HERSs "compiled and published by non-profit research entities seems to perform better than the majority of HERSs published by for-profit news outlets".

In the final analysis, Baty might have stated it most succinctly when he pointed out that "no list of the strongest universities can capture all the intangible, life-changing and paradigm-shifting work that universities undertake".

1 Baty, P. (2010). Why Times beats all on university rankings. *The Straits Times*, 2 December.
2 Baty, P. (2010). Flawed rankings. *The Star*, 2 May. Accessed online at [http://thestar.com.my/education/story.asp?file=/2010/5/2/education/6149861&sec=education] on 13 December 2010.
3 Stolz, I., Hendel, D. D. & Horn, A. S. (2010). Ranking of rankings: benchmarking twenty-five higher education ranking systems in Europe. *Higher Education 60*, 507-528.

Ranking of higher education ranking systems (HERSs) in Europe

Country	Name of HERS	Responsible entity	Methodology score[1]	Transparency score[2]	Consumer friendliness score[3]	Final score[4]
Germany	HochschulRanking	CHE	3.33	4.67	4.50	**3.90**
Austria	Hochschulvergleich	AQA	3.00	4.67	4.50	**3.75**
Switzerland	Ranking swissUp	swissUp	3.17	4.50	4.50	**3.75**
Germany	Hochschul-Ranking	Focus	3.33	3.33	3.00	**3.50**
The Netherlands	Keuzegids Hoger Onderwijs	KHO	3.00	4.33	1.00	**3.45**
Slovakia	Ranking (VS/HEI)	ARRA	2.67	4.00	3.00	**3.45**
United Kingdom	The Guardian University Guide	The Guardian	2.50	4.17	3.00	**3.45**
United Kingdom	The Times Good University Guide	The Times	2.67	4.00	3.00	**3.45**
Italy	La Grande Guida All'Universita'	La Repubblica	2.33	4.00	3.00	**3.30**
Switzerland	Champions League	CHST	2.50	4.00	3.00	**3.30**
The Netherlands	The Leiden Ranking	CSTS	2.17	3.83	3.00	**3.10**
The Netherlands	De beste studies	Elsevier	2.67	4.00	1.00	**3.05**
Sweden	Hur mycket citeras svenska publikationer?	Vetenskapsrådet	2.00	3.67	3.00	**2.95**
United Kingdom	The Sunday Times University League Table	The Sunday Times	2.33	3.33	2.50	**2.90**
Ireland	The Sunday Times University League Table	The Sunday Times	1.83	3.50	3.00	**2.85**
Sweden	Högskolerankingen	SDI	2.00	3.67	3.00	**2.85**
Germany	Humboldt-Ranking	Humboldt	1.50	4.17	3.00	**2.80**
Poland	Ranking szkół wyższych	Perspektywy	2.17	3.00	3.00	**2.60**
Poland	Ranking szkół wyższych	Wprost	2.17	2.83	1.50	**2.60**
United Kingdom	Financial Times League Table	Financial Times	2.17	2.67	3.00	**2.60**
Spain	Excelencia	CIS	2.50	1.83	3.00	**2.55**
Germany	Studentenspiegel	Spiegel	1.83	3.50	3.00	**2.50**
Poland	Ranking wyższych uczelni	Polityka	2.33	2.83	1.00	**2.50**
United Kingdom	World University Ranking	THES	1.83	2.50	2.00	**2.25**
Germany	Die besten Hochschulen	Karriere	2.33	2.33	1.00	**2.10**
Median			**2.33**	**3.67**	**3.00**	**2.95**

Note: HERSs are sorted according to their highest final score. [1] The methodology score was calculated as the average score for scales 2B, 3, 4A, 7A, 8 and 11; [2] the transparency score as the average score for scales 2A, 4B, 6A, 6B, 9A and 12A; [3] the consumer friendliness score as the average score for scales 15A and 15B. [4] The final score was computed as the average score of the respective overall scores of BPs 2, 3, 4, 6, 7, 8, 9, 11, 12, 15 (see Table 2 for scales used)

Source: Stolz, I., Hendel, D. D. & Horn, A. S. (2010). Ranking of rankings: benchmarking twenty-five higher education ranking systems in Europe. *Higher Education 60*, 507-528.

Why Times beats all on university rankings

By Phil Baty
For The Straits Times

UNIVERSITY rankings are always controversial, but this year's tables have provoked more than the usual level of debate, particularly in Singapore.

The proliferation of ranking agencies, with contrasting methodologies, has raised concern, not least because the different systems have produced dramatically different results for Singapore's leading universities. Now that ranking season is over, the world is left to ponder legitimate questions about which ranking systems are the most relevant or useful. I would suggest that for those who want a truly comprehensive picture of a world-class university, there is only one that really counts: the Times Higher Education World University Rankings, powered by data from Thomson Reuters.

Of course, there is some good work by other agencies. Shanghai Jiao Tong University's Academic Ranking of World Universities is objective and informative – but only if you want a narrow picture of established research power. Its six indicators are restricted purely to research. The Spanish Webometrics Ranking of World Universities also has value – but only for universities seeking to monitor their visibility on the Internet.

But the Times Higher Education rankings examine performance across all of a university's core missions: pushing the boundaries of understanding through research; sharing expertise with the wider community through "knowledge transfer"; working in an international context; and, crucially, providing an enriching teaching environment for students.

Times Higher Education magazine built on its 40 years of experience in reporting on higher education, to publish a new set of tables in September this year – with an entirely new methodology. The tables were the result of a global survey of user needs and 10 months of open consultation, and were devised with detailed expert input from more than 50 leading figures from 15 countries. The tables use 13 separate indicators – more than any other global system – to look at the whole institution.

The rankings place the most weight on a wide range of research indicators. We examine research reputation, income and volume (through publication in academic journals). We also look at "research influence" – measured by the number of times a university's published research is cited by academics around the globe, normalised for disciplines.

We judge "knowledge transfer" by looking at research income earned from industry. Internationalisation is recognised through data on the international staff and students attracted to each institution.

The most dramatic innovation is a new set of five indicators that give proper credit to the role of teaching in universities. But let us get one thing straight – we are not measuring teaching "quality". There is no recognised, globally comparative data on teaching outputs. What Times Higher Education does is look at the teaching "environment" – to give a sense of the kind of learning environment that students are likely to find themselves in.

The key teaching indicator draws on the results of Thomson Reuters' Academic Reputation Survey – a worldwide, invitation-only poll with responses from 13,388 experienced scholars. Respondents were filtered by whether they were more active in teaching or research, and were asked only to pass judgment within their personal experience. We asked them "action-based" questions, such as where would you send your best graduates for the most stimulating postgraduate learning environment?

We also include a staff-to-student ratio, hinting at the level of personal atten-

Source: *The Straits Times*, 2 December 2010

guardian.co.uk

University world rankings are pointless, UCL president says

World rankings of universities are worthless, says Malcolm Grant, because they cannot possibly capture their diversity

Malcolm Grant
The Guardian, Tuesday 21 September 2010

A larger | smaller

Malcolm Grant of University College London: 'Global rankings are now seriously overreaching themselves'. Photograph: Dan Chung/The Guardian

Imagine a newspaper decided to create a table ranking the world's cities. Is Moscow better than Sydney? Would Hong Kong squeeze in above Manchester? Or Bangkok above Brighton? It would be a nonsensical exercise. Better in what respect? They are all vastly different types of human settlement, meeting different aspects of human need in different cultures and climates.

True, there would be no shortage of data, though it would be of variable robustness and gathered on different bases in different countries. We could compare expenditure on public transport, or the area of open space, or unemployment. But to come to a single ranking, we would then have to manipulate the data: should a measure of the state of public health outweigh a measure of investment in public transport?

Exactly the same problems arise with world rankings of universities. Each time a new set is published, universities shoot up or down the league tables, and vice-chancellors the world over engage in their traditional exercise of deploy (if up) or deplore (otherwise).

Source: http://www.guardian.co.uk/education/2010/sep/21/university-world-rankings/print

Rather than world-ranking systems for higher education that are often ineffective in advancing engagement practices, we support appraisal systems such as the Alternative University Appraisal system (in collaboration with the United Nations University) as development tools.

International community and university networks
23 September 2010

USM's APEX journey on the right track

Flying majestically

As part of the 3As in APEX – autonomy, accountability and audit – USM has undergone at least four such official audits last year. Some are more rigorous than the others (which is more about verification and validation of data and information). We jest that the university suffered from a disease called "auditiitis"!

The audit APA is one comprehensive exercise that has been helpful in the APEX implementation activities, mainly focusing on academic quality at all levels.

It was conducted in March 2010 by a Panel of auditors representing the Malaysian Qualifications Agency (MQA). The Panel's task in the institutional audit was conducted according to the MQA's Code of Practice for Institutional Audit (COPIA). The team examined the policies, systems, structures, procedures and processes deployed by the university collectively when carrying out its vision, mission and goals (VMG) and ensuring its effectiveness in doing so. The Panel was accordingly able to make a fair judgement about the overall quality assurance system of USM.

The Blue Ocean Strategy, embraced by USM, is an effort to engage all staff and students in its strategic plans

The Panel's report covers the nine specified areas of assessment. In all, 19 commendations, 10 affirmations and 27 recommendations have been made based on the evaluations and findings.

The Panel of auditors recognises and firmly acknowledges the availability of excellent infrastructure facilities and resources, academic and administrative support staff and support services to enable USM to obtain excellence and remarkable accomplishments in the three main pillars of education, i.e., teaching, research and services.

The Panel shares USM's strong commitment on its vision, mission and educational objectives to transform USM into an educational institution for a sustainable future, aspiring to become a renowned and valued global university through the APEX initiatives.

MQA Panel's commendations and affirmations

The following are the MQA Panel's commendations and affirmations in accordance to the nine areas of assessment with reference to the COPIA guidelines.

1. The Panel commends USM for its excellent achievement in being recognised as the United Nations University-Regional Centre of Expertise (UNU-RCE) on Education for Sustainable Development in 2005; as the only "excellent" university in the *Academic Reputation Survey in 2006*, as a research university in 2006 and finally, as the first APEX university in Malaysia in 2008.
2. The Panel commends the university for formulating the vision, mission and goals statement that is inspirational within the framework of the Ministry of Higher Education (MoHE) Strategic Plan, the National Development Plan, the United Nations Millennium Development Goals 2015 and the United Nations Decade of Education for Sustainable Development 2005-2014.
3. The Panel commends USM for the innovative and creative approach of introducing the *University Passport* to its staff and students which will lead to higher standards of educational excellence and scholarship.
4. The Panel commends USM for the constructive formulation of the *Transformation Plan and Strategy,* as outlined in the documents *Transforming Higher Education for Sustainable Tomorrow* and USM-APEX *Sustainability Roadmap,* which drives the university to achieve excellence in education, research and services.
5. The Panel commends the university for conceiving an excellent mentoring system in learning and research for students to experience a more flexible and transdisciplinary education and research.
6. The Panel commends USM's proactive policy on the widening access for education for adult learners.
7. The Panel commends USM's programme of student exchanges across countries and the positive reports produced regarding their cross-cultural learning experiences.
8. The Panel commends the university on the support services available to students, including the pastoral care provided to the staff and students through the health clinic.

The Panel strongly recommends that USM should urgently engage itself in serious discussion and dialogue with relevant authorities on matters relating to the governance and autonomy of the university.

Fahami tujuan pelajar ke universiti

Understand why students go to universities, *Utusan Malaysia*, 1 July 2010

9. The Panel commends USM for the implementation of a well-documented mentor-mentee system in the university that enables staff and students to have access to trained mentors to assist them in improving their academic performance.
10. The Panel commends the Continuous Student Development (myCSD) system that rewards students for their participation in non-academic activities during the duration of their study at USM.
11. The Panel is impressed by, and highly commends, the numerous national and international awards won by USM students.
12. The Panel commends USM for its initiative to expedite the selection and recruitment process by empowering the schools to appoint their own academic staff and at the same time, maintaining the standard and quality of academicians.
13. The Panel commends USM for its continuous effort to improve the Continuous Professional Development (CPD) programme and for providing support and guidance to the academic staff.
14. The Panel commends USM for its national and international recognition of the excellent work conducted by the numerous centres of excellence and research centres.
15. The Panel commends the university on the establishment of the Science and Arts Innovation Space Research Park.
16. The Panel would like to congratulate the Board of Directors for the support given to USM. The wealth of

USM kekal universiti terbaik

UNIVERSITI Sains Malaysia (USM) yang berstatus universiti APEX sejak dua tahun lalu masih mengekalkan kedudukan sebagai antara universiti awam terbaik negara apabila memenuhi 20 Indeks Prestasi Utama (KPI) yang dipersetujui dengan Kementerian Pengajian Tinggi (KPT).

Timbalan Menteri Pengajian Tinggi, Datuk Saifuddin Abdullah, berkata pemantauan Pasukan Penilaian Keserakanan KPT ke universiti berkenaan awal bulan ini menunjukkan universiti itu berjaya memenuhi kriteria ditetapkan.

"Antara kriterianya adalah keupayaan USM menjana pendapatan hasil pengkomersilan penyelidikan dan pembangunan (R&D) dan sebagai universiti penyelidikan serta universiti APEX, USM berjaya menjana pendapatan RM1.5 juta, iaitu paling tinggi berbanding universiti penyelidikan lain.

"Dari segi kedudukan dan keupayaan USM sebagai universiti APEX, penilaian pasukan berkenaan dikhususkan untuk memantau pencapaian universiti penyelidikan termasuk universiti APEX mendapati pencapaian mereka memenuhi 20 KPI yang dipersetujui bersama kementerian," katanya ketika menjawab soalan tambahan Saifuddin Nasution Ismail (PKR-Machang)

USM remains the best university, *Berita Harian*, 15 December 2010

experience and wisdom of the Board is enormously important to guide and support the change that this university and all its stakeholders are seeking as an APEX university.

17. The Panel would like to congratulate the Vice Chancellor and the Senior Management Team for their dynamic and visionary leadership on the roadmap for USM to become an APEX university.
18. The Panel commends USM for putting into place good governance structures for both academic and administrative issues. The Panel also acknowledges that deans/directors are given autonomy in the management of their respective schools.
19. The Panel commends USM for the robust bold decision and initiative to transform and continually improve research and innovative activities to ensure that USM gains national, regional and global recognition.
20. The Panel affirms the formulation of 99 sustainability ideas compiled under 10 strategic foci that provide strong input and impetus towards transforming USM as a sustainability-led university.
21. The Panel affirms USM's strong and progressive commitment in implementing the APEX agenda. The Panel also notes that USM has tabled three progressive and constructive reports on its roadmap towards becoming the APEX university.
22. The Panel affirms the intention shown by USM to consult and obtain relevant inputs from internal and external stakeholders on its academic programmes, including curriculum development and review.
23. The Panel affirms that the respective schools, centres and institutes are given sufficient autonomy to put in place their respective policies, guidelines and procedures in education, research and community services.
24. The Panel affirms that many of the schools and centres have incorporated the Outcome-Based Education (OBE) and Learning Outcomes and *Kemahiran Insaniah* (LOKI) competencies in their teaching and learning courses particularly in medicine, dentistry, pharmacy, engineering, business, arts and humanities.
25. The Panel affirms that the strategy of providing training for certificates in teaching and learning to the academic staff is a very good initiative.
26. The Panel affirms the positive approach taken by USM to proactively assimilate foreign students towards an understanding of USM and the Malaysian cultural environment.
27. The Panel affirms the active participation of the students (Students' Council and presidents of societies) in the formulation of policies and the holistic approach taken in the development of the students' well-being in line with the vision and mission of USM.
28. The Panel affirms the establishment of the Student Parliament which will provide an avenue for intellectual discourse among the students.
29. The Panel affirms the Industry Advisory Panel's (IAP) input for programme review which is taken seriously by the various School Boards and whose action plans are forwarded to the Academic Planning Committee.

In the forty years of its establishment, the university has provided enormous contributions to the human capital development in many different fields of knowledge, competencies and skills, and in the social-economic, political and cultural development of the country.

The MQA Panel's recommendations

The following are the MQA Panel's 27 recommendations in accordance with the nine areas of assessment promulgated in the COPIA guidelines.

1. The Panel recommends that a more rigorous and continual education programme be consistently implemented for the understanding of the APEX vision, mission and goals at all levels of USM's staff, in particular, the middle and junior level staff, students, alumni, the industry advisory panel and external stakeholders.
2. The Panel recommends that USM intensifies its efforts to educate its staff and students on the *University Passport* and its purpose.
3. The Panel recommends that USM establishes an External Advisory Committee comprising experts in relevant areas to enhance support in the implementation of the APEX transformation agenda.
4. The Panel recommends that a more structured and rigorous strategy and operational plan be undertaken to ensure that all schools and centres implement the learning outcomes construct successfully.
5. The Panel strongly recommends that USM reviews the objectives of the certificate in the teaching and learning programme within the context of transforming USM into a world-renowned sustainability-led university and restructure it where applicable.
6. The Panel recognises the initiative of e-learning (*e-Learn*@USM) that has taken place. The Panel recommends that more attention is given to the development of this mode of learning to inculcate independent learning.
7. The Panel recommends that the industrial training period be increased to a minimum of six months and that more staff be given attachment for meaningful periods in order to make teaching and learning relevant to the demands of the industry.
8. In matters relating to appeals by students for reviews of examination results, the Panel recommends that in relevant cases, the examination scripts be remarked by two

Anjung Budi, USM Main Campus

independent reviewers rather than adhering to the current practice of a recounting of the marks by the same lecturer.

9. The Panel recommends that USM takes a more rigorous approach to increase its efforts to enable more students to participate in student exchange programmes.
10. The Panel recommends that the number of counsellors for students and staff be substantially increased so that the counselling unit's strategy of "rehabilitation, prevention and development" can be more effectively implemented.
11. The Panel recommends more student participation in the decision-making policies of USM particularly in curriculum development and research and other academic matters relevant to the students.
12. The Panel recommends that the Alumni Association, together with the Alumni Advancement Office, develops the establishment of the alumni chapter more effectively as this can provide inputs towards the enhancement of USM's overall achievements in education and scholarship.
13. The Panel strongly recommends to USM to expedite discussions with the authorities to ensure that an appropriate salary scheme for an APEX university be implemented to retain talents for the institution.
14. The Panel recommends that USM monitors the performance of candidates sent for postgraduate training closely to ensure the successful completion of their programmes.
15. The Panel recommends that USM implements an equitable workload distribution among its faculty members.
16. The Panel recommends that USM includes pedagogical and andragogical principles in basic teaching training skills.
17. The Panel recommends that USM develops a mentoring system for junior academic staff; in this respect, USM should develop guidelines that clarify its minimun expectations in teaching, research and service, whilst encouraging individuals to pursue their specific interests.
18. The Panel recommends that USM develops a mentoring system for the junior academic staff focusing on pedagogy and teaching skills.
19. The Panel recommends that ICT facilities and equipment be improved and a greater WiFi coverage in the campus be provided for the immediate needs of students and lecturers.
20. The Panel recommends that more local and foreign post-doctoral candidates be employed to strengthen research and suggests the offer of competitive remunerations and incentives to attract highly qualify experts and researchers.
21. The Panel recommends that USM incorporates a clear policy and guidelines for the implementation of the external examiners' and Industry Advisory Panel's recommendations and follow-up reports.
22. It is recommended that a purpose-driven survey on student feedback on course structures, contents and curricula be administered for programme monitoring and review.
23. It is recommended that the programme monitoring and review could be further facilitated by a university-wide structured documentation on the procedures and systems to support the processes. The newly-formed Quality Unit, which should be answerable directly to the Vice Chancellor, should ideally undertake this function.
24. It is recommended that the alumni network could be more actively solicited for the programme monitoring and review.
25. The Panel recommends that a central Quality Assurance Unit be established with a clear framework and be given prominent status by reporting to the Vice Chancellor. This unit is critical in the context of USM's journey to become a quality APEX university.
26. The Panel strongly recommends that USM should urgently engage itself in serious discussion and dialogue with relevant authorities on matters relating to the governance and autonomy of the university.
27. The Panel recommends that USM continues its efforts to inform all levels of staff of its strategic plans and discuss their roles in achieving the goals.

Lush green view of the Main Campus near Desasiswa Harapan and the School of Chemical Sciences

Return the soul to education

Pictures taken during the Muslim Universities Vice Chancellors' /Presidents' Forum (MUVCF), Kuala Lumpur, 19-20 October 2010

Return the soul to education – the words by USM Vice Chancellor succinctly capture the sentiments raised by 40 vice chancellors, presidents and representatives of higher education institutions of the Muslim world at the Muslim Universities Vice-Chancellors' /Presidents' Forum (MUVCF) held in Kuala Lumpur on 19 - 20 October 2010. In improving the quality of higher education, budget allocations and structures must take second place to the development of the mind, personality and achievement of the individual's full potential. Current epistemological methods of argumentations embraced by most higher education institutions today place great emphasis on scientific demonstrations (*burhan*) but much less on what are deemed to be the soul of education, the dialectics (*jadal*), rhetorics (*balaghah*), sophistics (*safsata*) and poetics (*shi'ir*), all of which are believed to be the key to generate more perceptive and creative minds. There is also a critical need to review the current state of education in the Muslim world in the light of the deteriorating Islamic and indigenous beliefs and values following the enhancement of Eurocentric ideas and academic dependency. Participants at the MUVCF declared that there is an urgent need to look into the approach to higher education collectively in order to develop minds with Islamic values. The following resolutions were reached at the forum:

1

Resolution 1

The forum declares that there is an urgent need to look for an Islamic approach to higher education, collectively, in order to develop minds with Islamic and universal values.

2

Resolution 2

Given the diverse structures and ideologies of the higher education model, Muslim universities must focus on a criterion-referenced as opposed to norm-referenced higher education approach. The latter is derived from the Eurocentric system. The former could be based on the best practices in early Muslim and relevant western institutions.

3

Resolution 3

The education system has currently deviated from, and perhaps even contradicts, the primacy of knowledge and education in Islam. As this could be a challenge not only to the Muslim ummah, there must be a concerted effort to reconstruct the "accepted" Eurocentric worldview on education.

4

Resolution 4

Given that there are inherent flaws in the current construct on higher education, there is a need for an alternative model focused on two central issues pertaining to education in general, namely, (a) intellectual and (b) structural dimensions.

5 6 7 8

Resolution 5

Given the current approaches of higher education that are characterised by Eurocentrism, anthropocentrism, androcentricism and a neglect of tradition (both local and Islamic), the reform of higher education should aim at realigning the teaching and learning process, as well as those of research and governance in order to close, if not eliminate, the existing gaps.

Resolution 6

Given the limited scope and depth of teaching and learning objectives, the education model(s) inspired by Islam, should be based on epistemology methods of argumentation (*mantiq*), which articulate the various stages of orientation such as (a) *burhan* (demonstration), (b) *jadal* (dialectics), (c) *balaghah* (rhetorics), (d) *shi'ir* (poetics) and (e) *safsata* (sophistics).

Resolution 7

Given there are gaps between the level(s) of education and scientific research in Muslim countries and in other nations, there must be a concentrated effort to strengthen commitment to higher education and involvement in R&D activities.

The efforts should include recommendations such as:

- Addressing the possible marginalisation of women in education.
- Examining the need to shift to high-tech products.
- Networking between member countries and improvement in shared infrastructure and infrastructure facilities including that of the Internet.

Resolution 8

Given that OIC member countries contribute significantly towards issues in higher education, they should participate in the following:

- Allocate more resources towards higher education.
- Improve, where necessary, the student-teacher ratio at universities.
- Encourage the establishment of universities/colleges and research centres while improving the performance of the existing ones.
- Stimulate further relevant and appropriate R&D activities.
- Encourage research joint ventures among members of OIC.
- Encourage private sector investment and support in R&D.
- Promote autonomy and open communication for better products and services.

9 10 11

Resolution 9

Given the biased orientation of the conventional measures of higher education performance, there is a need to construct an alternative approach, such as the Alternative University Appraisal led by the United Nations University, to reflect the state of a university more holistically and in line with the objectives and philosophy of Islamic higher education.

Resolution 10

Given that Muslims are over-dependent on foreign countries to model themselves based on a different playing field, there should be a special mechanism to allow room for the less developed or under-developed OIC member countries to explain their delayed performance in areas of higher education.

The countries may spend less in R&D but must prioritise their funding on basic and immediate needs. The forum thus should focus foremost on how to develop the Muslim ummah.

Resolution 11

Although there is a strong need for an Islamic education model, that does not necessarily mean the need to establish a new "physical" university to implement the model. A virtual university concept could be adopted and/or enhanced to operationalise such a model.

For the participants at the MUVCF, a paradigm shift in the approaches to higher education is crucial for the advancement of a learning society in Muslim countries. They resolved that a new model should be put in place, one that is inspired by universal and Islamic values alike.

ProSPER.Net – towards being a world-renowned sustainability-led university

The signing ceremony between Universiti Sains Malaysia and Hokkaido University, two of the founding members of ProSPER.Net

Introduction

The Asia-Pacific region is undergoing rapid development and there is serious concern over rapid environmental degradation causing damage to society and the economy, thereby undermining global sustainability. From the human resource standpoint, there is a need to develop environmental leaders equipped with the skills in taking actions for *greening* economic and social systems. Higher education institutions play a central role in developing environmental leaders who integrate environmental considerations with economic and societal development.

In order to achieve these objectives, efforts need to be undertaken collectively by as many stakeholders as possible. A network or platform that brings together various institutions like universities is critical in order to resolve issues with better impact and more synergistically. Also of importance is the need for any individual university which has been working independently to be associated with a pool of other universities who have the same interests.

The workshop in session in Hokkaido University, June 2010

ProSPER.Net

To answer this need, the Network for the Promotion of Sustainability in Postgraduate Education and Research (ProSPER.Net) has been formed as an alliance of several leading higher education institutions in Asia and the Pacific region that are committed to work together to integrate sustainable development (SD) into postgraduate courses and curricula through various collaborative projects. Member institutions have strong education and research programmes as well as aspiring innovators in sustainable development and related fields. This network is under the auspices of the United Nations University (UNU) Institute of Advanced Studies with funding derived mainly from Japan's Ministry of Environment and Ministry of Education. It is envisaged as a network of networks of the members who already have various associations with many other similar networks. It hopes to build and multiply impact by mobilising and connecting the myriads of projects that the members are involved in.

The network was formally established in 2008 with nineteen academic institutions from Asia and the Pacific region, including USM. The principles that ProSPER.Net is built upon are parallel with the USM-APEX vision of transforming higher education for a sustainable tomorrow. As an active and highly engaged member, USM is utilising this network as a platform for the following purposes:

- To pursue its aspiration to become a world-renowned sustainability-led university.
- To share and learn from other universities that are well known for promoting the sustainability agenda.
- To shape the sustainability agenda in higher education and be one of the growing leading regional institutions in determining this agenda.

USM's sustainability agenda and ProSPER.Net both have a similar mission, which is to promote sustainability in an inclusive manner, using the transformative principles and practices of education for sustainable development to address the main issues of delivering excellence and helping the *bottom billion*.

While there are many other networks with relatively similar objectives, ProSPER.Net distincts itself through its inside-out bottom-up approach among the members. Thus, despite being newly established, ProSPER.Net has become a dynamic consortium of universities that are currently working on various sustainable development issues and wish to share their experiences and learn from others towards the mainstreaming sustainability agenda. It is increasingly referred to as a successful example of collaborative projects which not only complement various related ongoing projects but elevate them further to being more than awareness building processes especially in capacity building. Apart from regular strategic meetings and teleconferences, there are currently three projects that run in a unique and true collaborative spirit and two new projects are being planned (see side articles in pp. 053-054).

Current projects of ProSPER.Net

a. Development of the faculty training module and resource materials for sustainability with USM as the project leader

The main objective of the project is to develop a training module for the introduction and integration of sustainability into the education and teaching processes at institutions of higher education. Ultimately, the aim is to produce a sustainability handbook that will facilitate the sharing of various ideas and good practices that currently exist in available literature and also new sustainability practices from member universities. During the course of the project, the critical issues of awareness-raising among faculty members on the need for SD integration as well as how this can be accomplished in their respective disciplines have been simultaneously addressed.

The project started with an expert meeting which gathered hard core academicians and practitioners of SD from at least 10 countries and five member universities of ProSPER.NET. The workshop has produced a distinct framework for the module which is an outcome of diverse experiences from the participants. The module was then exposed for feedback through a workshop to three different member universities, namely, TERI University, Gadja Mada University and Hokkaido University with USM as the facilitator. The workshop also served as soft training on sustainability.

The final stage of the project is the distribution of the module to diverse universities from around the world which would enable them to train their faculty members in the issues and principles of sustainable development while providing them with the tools they need to put the theories they learn into practice.

b. Integrating SD in business school curricular with USM as the core project member

The project was conceived to establish a consortium of regional universities and institutions which wish to look at restructuring their provision of business education. The Asian Institute of Technology is the leading institute of the project (including the School of Management, the CSR Asia Centre, the Yunus Centre and the Centre for MDGs) with USM, Shinshu University, Gadjah Mada University and Yonsei University as partners.

c. Diploma in the sustainable development programme with USM as the core project member

The project aims to provide an e-learning programme for development practitioners and policy-makers in the Asia-Pacific region. The programme converges various approaches to public policy and governance and provides professionals an opportunity to study without having to compromise on their work. The project is spread over three phases: ground work in 2008-2009, pilot testing in 2009-2010 and implementation in 2010-2011. Three course modules on natural resource management, economic reasoning in public policy and science and policy of climate change have been developed. The programme uses multi-media based video lectures and content-based html texts. The students can interact with faculties online.

d. Developing closer linkages to poverty reduction with USM as the core partner

The objective of the project is to develop improved linkages with regional poverty reduction initiatives in order to identify mechanisms to improve postgraduate curricula among ProSPER.Net members so that curricula can be influenced and guided by the agenda and needs of the region's poorer groups. The main activities are fact-finding visits to Poverty Reduction and Agricultural Management (PRAM) partner institutions to

identify key issues and experiences relevant to ProSPER.Net members, workshops with key PRAM stakeholders to distill and document key lessons learned and processes developed for institutional collaboration and curriculum development and a regional symposium on education for poverty reduction.

The main expected outcomes are key lessons learned from processes of PRAM development in media suitable public-wide distribution as well as papers and reports for ProSPER.Net members, communication materials and communication strategies on the process of the PRAM curriculum development, collaborative working relationships established between ProSPER.Net and the PRAM network leading to the production of joint funding proposals to expand collaboration.

e. A summer school for ESD with USM as the core project member

The aims of this project are to provide non-formal out-of-class learning opportunities for graduate students and also faculty members who act as facilitators. It will gather students from different disciplinary backgrounds to learn about sustainable development with direct involvement of sustainability experts throughout the session.

Through these projects and other projects to be proposed, USM hopes to locate itself in the regional map of sustainability networks and initiatives. With involvement in such regional activities, USM aspires to be part of the process contributing towards global sustainability. ProSPER.Net is believed to be an ideal avenue for implementing this trend.

Members of ProSPER.Net

These are the founding members of ProSPER.Net:

- RMIT University (Australia)
- Tongji University (China)
- TERI University (India)
- Universitas Gadjah Mada (Indonesia)
- Hosei Institute of Sustainability, Hokkaido University (Japan)
- Chubu University (Japan)
- Iwate University (Japan)
- Miyagi University of Education (Japan)
- Nagoya University (Japan)
- Okayama University (Japan)
- Rikkyo University (Japan)
- Shinshu University (Japan)
- University of Tokyo (Japan)
- Universiti Sains Malaysia (Malaysia)
- University of the Philippines (Philippines)
- Yonsei University (South Korea)
- Asian Institute of Technology, Chulalongkorn University (Thailand)
- University of South Pacific (Fiji)
- Institute of Applied Science (China)

Venue of the workshop

The CIMB-USM Lake Clean-up Initiative

Be a friend of Tasik Harapan through [http://www.facebook.com/group.php?gid=105063262883192]

21 August 2010 was a memorable day for Universiti Sains Malaysia. It was the launch of the CIMB-USM Lake Clean-up Initiative by USM Vice Chancellor, Professor Tan Sri Dato' Dzulkifli Abdul Razak. This event saw the gathering of some 600 students and staff of USM. The CIMB-USM branch staff was also there in full force to participate in this launch. The highlight of the event was the pouring of the EMAS (effective microorganism activated solution) and the throwing of the EM (effective microorganism) mud balls.

Tasik Harapan prior to the clean-up

Some of the participants attending the clean-up exercise

Tasik Harapan came into existence more than a decade ago and currently functions as a retention pond to prevent flooding in the vicinity. Tasik Harapan also provides students with a recreational venue for kayaking and flying foxes. Historically, it was the site of ex-Desasiswa Aman of the late 80s. Currently, the water in the lake is murky due to algae bloom. There is odour from the lake as well and dead fish are often seen afloat.The ecological balance is also disrupted as evident from the increase in the numbers and sizes of the famous *biawak* (lizards). Nevertheless, many ardent joggers are often seen enjoying Tasik Harapan in the evenings. It has also become a favourite spot for mini-picnics and leisurely walks.

Thus, this initiative gives the university the hope of restoring the lake using microbial technology. Our technology partner is Bio-Remediation Solutions Sdn. Bhd. The USM Alumni Liaison Office (ALO) under its fundraising drive is currently forging a sustainable partnership with the CIMB Foundation with the noble cause of rehabilitating Tasik Harapan. The CIMB Foundation has graciously agreed to donate the sum of RM116,000 to fund this initiative for a period of six months.

USM students and staff involvement

The Lake Clean-up Initiative involves a host of activities.

CIMB staff getting ready to throw mud balls into Tasik Harapan

Students and staff of USM carry out these activities. Through this initiative, we are able to mobilise the students and staff in an impactful manner and create history while making a difference to our environmental and sustainability issues. We are very excited at the possibility of having made a difference to our very own lake through excellent USM teamwork.

The activities involved are as follows:

- Initial phase and continuous water sampling.
- A *jar test* to determine the microbial mix.
- Designing the microbial mix.
- Devising the bioreactor for the lake.
- Mobilising the students: 100 core students from student representative groups and the School of Industrial Technology (those majoring in environment).
- Preparation of the EM liquid and the mud balls.
- Pouring of the EM liquid into the lake: to be done fortnightly.
- Inoculation of the mud balls: to be done fortnightly.
- Various ongoing research activities already undertaken at the different faculties.

Spin-off benefits from the Lake Clean-up Initiative

The Lake Clean-up Initiative would see a revival of an important part of the natural landscape within the campus grounds. Apart from the immediate improvement that would be derived from managing the long-standing water issues, this initiative would generate tangible and intangible benefits to USM, the local society and in a broader respect, the country as a whole.

The regenerated lake would provide a good research platform for continuous research in ecology and landscaping. Students and the local community would enjoy the recreational benefit of the improved water bodies and their surrounding landscapes. The sustainable EM approach ensures that the environmental importance of the area is not neglected. Upon completion, there would be substantial improvement in the flora and fauna biodiversity of the area.

Malaysians have often been accused of having a third-class mentality in caring and maintaining public and natural assets. Through this project, USM is determined to prove doubters wrong by showcasing a sustainable management of some of these natural assets. Through a series of public education and outreach programmes, proper planning in maintenance work, we believe this project will turn into a leading example of sustainable development in Malaysia.

Long-term collaboration

USM sees the initiative as a starting point in building a long-term relationship with the CIMB Bank. USM has plans to establish a Chair in Sustainable Development in the future and this would possibly be linked to the expertise and knowledge that will be further developed as a result of the successful lake clean-up project. Over the long term, the university hopes to be able to engage the CIMB Bank in ongoing research, teaching, outreach programmes and awareness building of key sustainable development initiatives throughout Malaysia.

Tasik Harapan after the clean-up

The new rules of engagement

Engage to transform. The Division of Industry and Community Network lives by these words. The division, better known by its Malay acronym BJIM (Bahagian Jaringan Industri & Masyarakat), leads USM in embracing the principle of engagement to fulfil USM's mission of "...empowering future talents and enabling the *bottom billion* to transform their social-economic well-being". Since its establishment in 2007, BJIM has supported more than 100 community engagement projects, some with industry participation, that have changed the lives of individuals, empowered communities and increased corporate conscience.

Universities used to be considered as Ivory Towers, looming high above the rest, detached from the community and engrossed in academic work for its own sake. They were perceived as having the upper hand in setting the directions of the world around them, prescribing solutions without in-depth engagements of the entities that they affect. Then came the second evolution when universities turned into Trading Towers, succumbing to the pressures of the market to produce employable students to fulfil the needs of the industry. Universities became pre-occupied with converting knowledge into material wealth, turning education into a big business with the industry as its partner. Core visions and missions of universities were placed on the line when the emphasis was placed on promoting marketable courses rather than advancing knowledge for the benefits of humanity.

Engaging the community and industry is the mandate of BJIM

Fortunately, calls for accountability have turned the tide. Universities around the world are gradually moving towards becoming Human Towers. A Human Tower has people as its building blocks and recognises the importance of engaging the community and industry in mutual learning and co-creation of knowledge for the benefit of humanity. True engagement is only achieved when there are shared understanding, evolved shared solutions, shared governance, shared assets and shared advantages in mind. The Human Tower evolution ensures that universities become the stalwarts of the community that they support by becoming partners in empowering the community to seek its own destiny.

At USM, the evolution into becoming a Human Tower has been taken very seriously. Besides the restructuring of its various programmes, USM has established BJIM to ensure a more structured approach in creating a meaningful relationship with the industry and community. Its key role is to foster closer, effective, meaningful and sustainable linkages and partnerships with the industry and the community. It does this by matching the knowledge, expertise, facilities and resources of USM to the needs and aspirations and expectations of the industry and the community to result in win-win situations. High on its agenda is the creation of a relationship with the community and the industry in which each stakeholder actively participates in identifying and defining problems, setting common objectives and strategising towards solving the problems. BJIM strives towards generating a synergy by drawing resources from the industry, government agencies and non-governmental organisations to create value for all stakeholders. BJIM's objectives have been articulated as below:

- To act as a one-stop referral centre or gateway for the industry and the community.
- To ensure that linkages and partnerships with the industry and the community are meaningful, effective, sustainable and well coordinated.
- To provide the industry and the community with:
  - A comprehensive database of the expertise, facilities and resources available at USM.
  - Information on new inventions, innovations, discoveries, technologies and activities of USM.

- To further enhance and strengthen existing linkages and partnerships and to establish new ones not only at the local and national levels but also at the regional and international levels.
- To engage in dialogues with the state, industry and community so as to ensure that the teaching programmes and research efforts are relevant to their needs, aspirations and expectations, without sacrificing the fundamental mission of a university.
- To guide and lead the industry and community towards sustainable development, advancement and transformation.

Engaging the industry and the community

While USM has always been actively working with the industry since it was established in 1969, the establishment of BJIM has further intensified USM's cohesive alliance and partnership with the industry. USM's engagement with the industry can be viewed both as a response to the economic demands of the nation as well as imperatives of a knowledge-based economy. Effective and sustainable collaborations with the industry also play a critical role in reaffirming USM's role as a "research intensive university" with world class standing, in tandem with its APEX status.

BJIM has also played a key role in transforming USM's approach in community activities. With engagement as its core value, BJIM has moved USM community activities from merely extending social and medical services to a more sustained involvement and partnership with the community. Schools and centres in USM have conducted community projects at various levels, from service to outreach to engagement types, that revolve around different themes such as empowerment, education, health and conservation. To ensure a solid foundation and a sustainable and effective implementation of community engagement programmes, BJIM has formed the University-Community Engagement Champion (Cluster). The UCEC cluster champions initiatives, efforts and activities that focus on establishing the university as a responsible, relevant and active partner of the community in addressing the needs of society, both at the national and international levels. At the international level, USM collaborates with the Global Alliance on Community-Engaged Research (GACER). GACER is an alliance of universities, networks and civil society organisations from various countries. It aims to facilitate the sharing of knowledge and information across continents and countries to enable interaction and collaboration to further the application and impact of community-based research for a sustainable just future for the people of the world.

The past three years saw BJIM as a hive of activities for numerous industry and community engagement projects. Featured in the following sections are some examples of how BJIM has assisted USM in engaging the community and industry towards social and economic transformations.

Industry engagement

Collaboration with Spirit AeroSystems Inc.

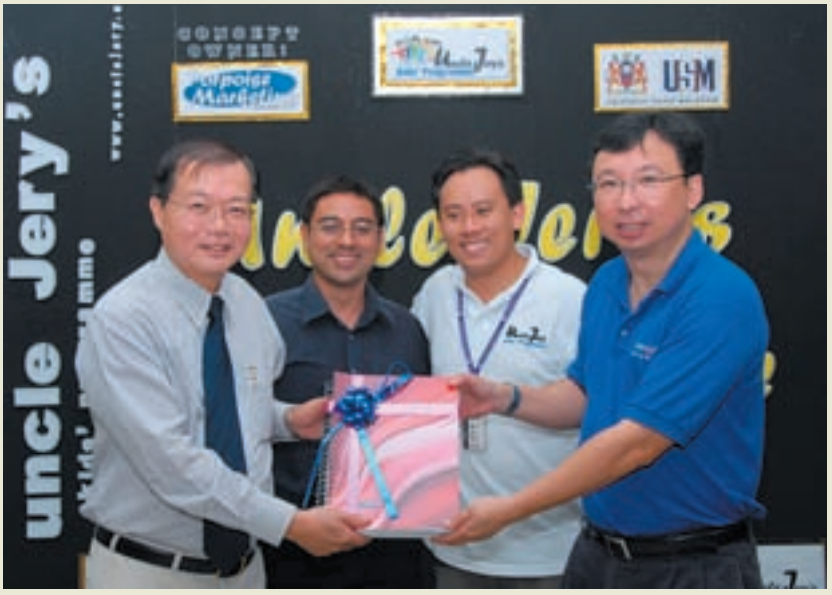
USM has been selected as the first university in Asia, and the third in the world, to participate in the Global Design Challenge (GDC) project created and organised by Spirit AeroSystems Inc. (Spirit), the world's largest independent supplier of commercial airplane assemblies and components. GDC is an academic competition sponsored by Spirit AeroSystems that encourages "outside-the-box" thinking among engineering students while using new technologies to design processes and aviation structure. Six undergraduate students and an academic staff of USM took part in GDC 2009, together with 12 students and two professors from the Wichita State University (WSU) and University of Manchester (UoM) and four Spirit engineers.

USM students use new technologies to design processes and aviation structure at the Spirit Global Design Challenge

The active participation of USM in GDC 2009 has opened eyes to its strength and capabilities. For instance, two of USM's graduates from GDC 2009, Saw Kee Hong and Ng Kok Chian, have been awarded a two-year research scholarship at WSU following their outstanding accomplishment during the programme. Both Spirit Malaysia (SM), Spirit's manufacturing arm in Asia and USM have also been actively collaborating on research and teaching development. Three USM first-year students have been sponsored for the Under-Graduate Apprentice Programme (UGAP) at SM. Every year, SM will continue to recruit another three new first-year students into the programme, where they will follow the same modules.

Furthermore, in March 2010, a five-year collaboration roadmap between USM and SM was outlined to include more specific and constructive collaboration activities. Among the activities is the sponsorship of final year projects for final-year students (four projects for 2010). In addition, an attachment programme for postgraduate students and staff has also been planned at SM and WSU alike for research activities. At the same time, engineers of SM will also start their graduate studies (M.Sc. and Ph.D. programmes) at USM. USM has been invited to participate for the second time in GDC 2010.

The collaboration between USM and Spirit is intended to address the nation's competitiveness in aerospace technology and to ensure that the technology generated flows through to the industry. This, among



BJIM bridging the corporate sector and the community

many, involves "pulling through" the technology to a level of technical readiness (TRL) or maturity sufficient for future knowledge acquisition and product development. In addition, the integrated activities will also help in building the right quality of human capital and establishing the capability in aerospace clusters in the future. Importantly, the SM and USM collaboration significantly benefits the partners and nation as a whole. USM, through BJIM, is proud to play a leading role in improving the nation's competitive advantage and its potential to thrive in the world market in the areas of aerospace science and technology.

The Corporate Conscience Circle (3C-BJIM)

The Corporate Conscience Circle (3C-BJIM) is one of the many initiatives of BJIM to bridge the corporate sector with the community. 3C-BJIM has now joined forces with the Philanthropy Trans-disciplinary Action Group (CP-TAG) in all aspects of Corporate Social Responsibility (CSR) related initiatives to bring in the corporate sector to provide short-term and long-term engagements for all stakeholders. The objectives are:

- To engage businesses and community-based organisations to promote CSR agendas.
- To use CSR to create a network to serve a larger community.
- To repurpose the corporate sector towards sustainable and engaged social responsibility.

Some of the CSR related activities that have been carried out included:

1. The First Penang CSR Forum: "Business Ethics – Our Competitive Edge," jointly organised by Intel Malaysia, investPenang and Motorola. The forum aimed to create awareness on business ethics amongst the public and the private sectors, identify potential collaborations between them on matters pertaining to corporate governance and provide a platform for ongoing dialogue on corporate governance between industry and the state government.
2. The Precious Gift Campaign with Chee Wah Corporation & Future Ace (2008/ 2009). The mission of the campaign was to create public awareness on the importance of early childhood education. Donations of books were made to various orphanages in Penang, Perak, Malacca, Johor, Selangor, Kuala Lumpur, Sabah and Sarawak.
3. The International IBM Corporate Service Corporate Volunteer Programme (2009). The "Train the Trainers" programme was part of the IBM Corporate Service Programme that brought eight IBM volunteers from Argentina, Canada, India and Germany to work with USM faculty members from the Schools of Management, Communication, Computer Sciences and Social Sciences; the aim was to develop a strategic blueprint of short and long-term initiatives to steer small and medium enterprises (SMEs) towards growth through sustainable business practices.
4. The CSR Workshop with delegates from Iranian public

relations practitioners (2009). This workshop was organised in collaboration with the Federation of ASEAN Public Relations Organisation (FAPRO), the Institute of Public Relations Malaysia (IPRM) and the Institute of Public Relations (KARGOZAR), Iran. The objective of this project was to create networking between professional public relations bodies in order to share and exchange information on industry and community related issues, as well as to work collaboratively on community development both in Malaysia and Iran.

5. The CSR and Corporate Strategy Seminar: Insights from Vietnam's Employer of the Year. Jointly organised by the Graduate Business School (GSB) Club, the aim of the seminar was to share experiences with Dr. Trinh Quoc Tri, a certified pharmacist from Vietnam, on a business model and successful practices on CSR and corporate strategy by adapting the concept of nurturing happiness at the workplace and unconditional giving.
6. The Seminar on Workplace CSR: Sharing IBM values in diversity management and supply-chain diversity. This seminar was jointly organised by the Graduate School of Business and the School of Management. The objective of the seminar was to share the IBM model and policies on diversity management.

SME Assist

The SME Assist cluster in BJIM was established to address the challenges of sustainable growth of the industry, sustainable growth of relevant and advanced knowledge and the sustainable supply of talented resources. The idea came from the observation of the current environment in which the industries' demand for talents is not adequately met, the economy being trapped in the middle income, and the Small and Medium Enterprises (SMEs) are lacking in finance, human capital, skill and technology. At the same time, there is a pool of resources from the experienced employees and ex-employees of Multinational Corporations (MNCs) waiting to be tapped. The SME Assist cluster's role is to synergise the various resources by drawing individuals (experts from the MNCs) and institutional (USM) talents to work together in creating value for all stakeholders.

The SME Assist cluster is currently developing and testing a low cost collaborative model to engage all level of stakeholders to create value and sustainable growth. It is a framework of creating mutual value through the innovative engagement of employees of SMEs and multinational corporations (MNCs), students, academic staff and ex-MNC experts. It involves the mutual understanding of the mutual needs, strengths and weaknesses and innovative collaborations to fill the gaps and needs of each other. The model leverages on the strength of the university as a learning organisation with excellent facilities and a vast pool of multi-disciplinary academicians. It provides the golden opportunity to raise students' competency and employability through active engagement with concurrent and contemporary challenges of the industries. The model helps to produce quality labour force for the industry. To strengthen the competitive capability of the SMEs, a low cost mechanism based on the combined efforts of MNCs, USM, academicians, students, ex-MNC experts and other partners including government institutions will enable the acceleration of the transfer of skills and knowledge.

The SME Assist model started with a joint effort among the USM School of Social Sciences, the School of Mechanical and Aerospace Engineering, the School of Management, the School of Electrical and Electronic Engineering, the School of Mathematics, the School of Communication and BJIM.

The first phase of the project focuses on the development of the culture and basic Kaizen capability of SMEs. The excellent relationship and collaboration with Motorola resulted in a research grant for studies towards the LEAN transformation of Motorola. This has enabled the jumpstart of the pilot model. Five industries have been identified with 14 projects in various stages of progress. Ten ex-MNC experts, three MNC experts, USM students and academic staff from more than six schools are engaged in this pilot model.

Below are three examples of the pilot projects.

1. ***Dr. Abdul Rahim Othman and Associate Professor Dr. Shahrul Kamaruddin of the School of Mechanical and Aerospace Engineering*** are actively deploying undergraduate students to participate in a series of nine projects related to the

Students in the LEAN transformation methodology/technology and deployment process

LEAN transformation methodology/technology and deployment process. In one of the projects, the SME Assist model was used to help transform a pharmaceutical company. Three third-year students working with five ex-MNC experts completed 10 weeks of internship at the pharmaceutical company. The project saw the successful transfer of knowledge from the USM academic staff and the ex-MNC experts to the students and the employees at the company.

2. ***Dr. Azizah Omar of the School of Management*** is leading a team of lecturers from the Schools of Management, Communication, Education and Mathematics to identify projects related to the LEAN transformation in Motorola Penang. Some of the projects that have been identified include: the *Motorola Lifestyles - Wellness Management for Healthy Minds & Healthy Bodies; the Effects of Team and Team Leader Emotional Intelligence and Team Conflict Resolution on Team Performance and Self-Directed Work Teams.*
3. ***Associate Professor Dr. Chin Yee Whah of the School of Social Sciences*** is engaging actively in researching the issues of SMEs at the national and international levels. Information derived from this research will help in the formulation of the SME Assist model.

The second phase involves the extraction of the experience from phase 1 into a cluster of knowledge using a knowledge management methodology that will enable the cloning and sustaining of the success of the pilot project. The focus will be on strengthening the engagement and deployment process and product development. In the third phase, the approach will be extended to other areas to meet the changing global challenges.

It is envisaged that the successful development and implementation of the SME Assist model and its adoption by other universities and government agencies will enhance the competitiveness of local SMEs and MNCs. In the process, it will also supply a talented pool of competent students who are relevant and contemporary in their knowledge and experience.

Community engagement

Kampung Sungai Batu Besi
(Population: 200)
Second Learning Centre (2006)

The Puncak Educational and Community Engagement Club, Lembah Bujang Kedah

The Puncak Educational and Community Engagement Club started as a community project in 1996 by Haji Romli Bakar, a former USM deputy registrar. With personal financial contribution, Haji Romli started three teaching and learning centres which provided tuition, guidance and motivation programmes free of charge for the deprived rural children in the Bujang Valley area. Initially, Haji Romli and his wife taught English and Mathematics to 11 children out of which eight gained entries into local universities, two into polytechnics and one became a jail warden. The number of students increased to 80 children in the second year. From a personal donation from Prof. Tan Sri Dzulkifli Abdul Razak, the Vice Chancellor of USM, a new premise was built and was equipped with used lecture furniture and equipment from USM.

The Founder of Puncak Educational and Community Engagement Club, Haji Romli Bakar

In 2006, a fresh water fish culture project was also initiated with the guidance from Dr. Eddy Tan from the School of Biological Sciences, USM and the local fisheries department. The project grew further through the support of USM with the establishment of an environmental centre to educate local people and visitors about the delicate ecosystem of the mangrove forest in the area. A walkway into the mangrove forest was built to allow visitors to explore the biodiversity of the area.

In June 2008, the third centre was set up at Kampung Belau by twin brothers who had studied at the first centre and who have now graduated, one as an aeronautical engineer and the other a mechanical engineer. The latter, Hafiz Ishak, now manages and teaches Mathematics at the centre which has a mini library that is equipped with a computer laboratory from computers donated by USM. To ensure that the activities are more organised, effective and legal, the Puncak Educational and Community Engagement Club was formed in 2004.

To date, the club has more than one hundred members and has become a vital force for change at the Lembah Bujang area. The activities of the club have drawn attention not only locally but also internationally. For example, students from the University of Santiago, California have been frequenting the centres not only for an exposure to local culture but also to be involved in motivational activities for the children. They are also helping to map and identify plants and herbs with medicinal qualities.

Promoting the rights and needs of persons with disabilities

Promoting the rights and needs of persons with disabilities

The rights and needs of persons with disabilities (PWDs) in Malaysia are often overlooked. Recognising the gravity of this situation in Malaysia, BJIM has proposed several initiatives to promote their rights as well as improve their way of life.

A campaign and training workshop, conducted from 6 - 7 August 2009 was among the major initiatives taken by BJIM with the participation from the Society of the Orthopedically Handicapped Malaysia. The aim of the workshop was to inculcate awareness among the campus community on the rights and needs of the PWDs. The programme was also aimed at producing audit inspectors who will contribute in ensuring that the design and management of the work environment embody access and provisions for people with disabilities. The programme was successful in creating awareness and empathy among participants and brought a new perspective to the participants' understanding of accessibility to buildings. More importantly, the programme served as a platform for the set-up of a reference hub in USM, the OKU cluster, that hopes to break down barriers limiting the full participation of disabled people in the society and to allow free mobility for all.

One of the immediate actions taken by the OKU cluster was to train RAPID Penang bus drivers to make

public transportation safer for PWDs in Penang. The Disability Awareness Training Programme enables RAPID Penang bus drivers to understand, assist and interact with PWDs using their buses thus ensuring that they have a smooth and safe journey. The Disability Awareness Training Programme conducted by USM with RAPID Penang is probably the first of its kind in Malaysia. As of August 2010, about 10 training sessions have been conducted and about 500 bus drivers have been trained in disability awareness. Based on reports received from PWDs who regularly commute using buses in Penang, there have been some positive changes. USM is now aiming to expand the programmme nation-wide for all forms of public transportation.

Another proud initiative under the full support of BJIM is the Sustainable Optimal Services for persons with disabilities, or the "Orang Kelainan Upaya" (S.O.S OKU). In this community engagement project, USM provides training to teachers and caregivers involved in the Program Pemulihan Dalam Komuniti (PDK) in Kelantan that was set up by the Malaysian Department of Social Welfare to help disabled children to become independent and help them integrate into the community. The training was made possible with the cooperation of the Department of Social Welfare Malaysia (Kelantan), the Ministry of Health (Unit of the Disabled) and the Kelantan Foundation for the Disabled (Yayasan Orang Kurang Upaya Kelantan or YOKUK). Prior to the training, several visits were made to the PDK in Kelantan to ensure that the teachers and the community were involved in the project from the beginning. The training module was developed based on the needs of the PDK and the feedback from the teachers and caregivers. Training is conducted within a three-month period. It begins with the training of the teachers and caregivers in new skills in the areas of physiotherapy, occupational therapy, sexual education for OKU (the disabled), psychological techniques, nutrition, oral health, hearing and speech therapy, sports, neurology and job stress management. Next, the teachers and caregivers undergo an on-the job training during which USM experts will visit the PDK to monitor how well the skills are applied. After the intervention, the quality of life of the disabled, the impact of the disability on the family and the job satisfaction of the teachers are reassessed and compared with the data collected before the intervention. While the disabled people of Kelantan have been the main beneficiaries of the project, USM aims to implement the training module in other states in Malaysia as well as in other countries that face similar challenges in the care for the disabled. The teachers and caregivers who have received the training will subsequently become trainers to ensure that the skills will be continuously passed on. It is hoped that the project by itself will have a sustainable effect on the quality of life of the children and their families and provide job satisfaction for the teachers.

Sg Sedim – Sg Pinang Expeditions: Capacity Building for Early Youngsters

The river expedition is a yearly activity of smart partnerships between USM, the Malaysian National Commission for UNESCO, the UNESCO-Malaysia International Hydrological Programme (UNESCO-MIHP) and relevant Malaysian government agencies at both national and state levels. Led by Associate Professor Dr. Nabsiah Abdul Wahid (School of Management) and Associate Professor Dr. Ismail Abustan (School of Civil Engineering), the project provides schoolchildren and teachers with field exposure on the river ecosystem in order to create a better understanding of environmental issues among the younger generation. The aim is also to create a team of "cadres" who care about river management and will then become the role models for their peers and community. Another expected outcome is for schools to start their own environmental awareness programmes or activities that can be done through the initiation of environment clubs or similar bodies.

Engagement of Stakeholders in Education for Sustainable Heritage Development in the World Heritage Site of George Town "Sharing Our Stories" (ongoing since 2009)

"Sharing our Stories" is a multi-lateral programme that brings together critical gatekeepers of heritage to help monitor the heritage site, share information and strengthen capacity and knowledge by providing research and education in the area of heritage education and conservation. The project is conducted by the USM team from

Breeding worms to minimise abuse of chemicals

the School of Arts led by Janet Pillai, together with the Cultural Heriatge Action Team (CHAT), an alliance of volunteer conservation architects, historians, heritage practitioners and educationists in Penang. The objectives are to provide information and raise awareness on sustainable heritage practices among all stakeholders in relation to the World Heritage Site as well as to set up platforms for discussions and negotiations with stakeholders on critical issues of conservation, restoration and sustainable development. Besides engaging with the community and acting as an advisory panel of experts on culture, history, conservation and legislation, the output of this project will be the dissemination of information through publications, print media and websites.

Worm Farming for the Poor (2009-ongoing)

This project is in tandem with the aspiration of the National Agriculture Policy of Malaysia (1998-2010) which aims at high productivity while ensuring conservation and utilisation of natural resources on a sustainable basis. This is done through the introduction of integrated agriculture, agro-forestry, mixed-farming, recycling of organic matter and soil and water conservation. Led by Associate Professor Dr. Hasnah Jais from the School of Biological Sciences, this project engages the rural communities in Padang Serai, Kedah. The main aim is to reduce the indiscriminate use of chemicals via the adoption of vermiculture practices. Knowledge on nature and ecological balance as well as awareness on environmental preservation are passed down to participating farmers and their families. Long-term deliverables of the project include income generation via vermiculture, which reduces imports on fertilisers and pesticides and environmental security via the recycling of solid organic wastes thus helping to alleviate landfill problems.

After one year in operation, a farmer has been able to harvest about two metric tons of vermicast a month. This particular farmer has his own packaging brand and a small time business of selling vermicast to local nurseries and hobbyists. He is able to at least earn an income of about RM1,000 per month.

SAHABAT YOKUK: "Discovering Potential, Transforming Lives of Children with Special Needs" (ongoing since 2004)

Yayasan Orang Kurang Upaya Kelantan (YOKUK) is an NGO set up to rehabilitate the mentally and physically disabled as well as poverty stricken groups. The School of Medical Sciences, USM started to collaborate with YOKUK in 2004 and together they have formed a volunteering organisation called SAHABAT YOKUK. The objectives of SAHABAT YOKUK are to actively conduct various activities to help improve the quality of life for those with special needs, especially

Improving the quality of life of people with special needs

children, and their parents as well as to instil and encourage volunteerism among USM staff and students. The project was initially sponsored by participating USM lecturers but started to receive funding from BJIM in 2009. A volunteering clinic (including the OKU Clinic) was set up at Hospital USM in 2008. Services from pediatricians, family medicine specialists, dentists, dieticians and ophthalmologists are provided at the clinic. Hospital USM has also generously provided common medications. Regular activities include clinics for the disabled, the *Donate Disposable Diapers (DDD) Programme* and the *Discovering Potential, Transforming Life Programme*. The latter is a special project conducted by medical students as a third-year elective. Besides home visits, other activities under this programme are parties for Down Syndrome patients, *gotong royong* / house make-overs and skill training and therapy sessions.

Outreach with the Orang Asli Community, Grik, Perak (ongoing since 2009)

The initial contact with the indigenous community or Orang Asli started when three social work students from the School of Social Sciences did their practicum training in community work at Kampung Sungai Raba, RPS Air Banun, Grik, Perak from 4 May - 7 July 2009. The students worked with the community for almost two months, giving them the opportunity to understand and identify the needs of the community. Using their social work skills, they were able to get the indigenous community to start income generating activities such as duck rearing and hydroponic farming.

Outreaching to Orang Asli

The success of the three pioneer students encouraged them to get other USM students to continue with their initial efforts to engage with the Orang Asli community. With the help of the Social Work Club USM, on 5 - 6 September 2009, a total of 120 students from various disciplines participated and undertook outreach activities with the community. The objectives of the programme are to give USM students the opportunity to engage in an outreach programme with the Orang Asli community, to expose USM students to their culture and tradition and to establish networking for further collaboration with the community and the *Jabatan Hal Ehwal Orang Asli* (JHEOA), Malaysia. The three-day programme provided a new experience for USM students as they were able to work with the community to help them improve the condition of the village, engage in educational activities with the children and engage in dialogues with the community leaders and the women folk as well as experience fasting with the community.

In January 2010, a total of 20 Orang Asli youths and community leaders visited USM under their own initiative and with funding from JHEOA. The visit was for them to learn more about USM as a higher education institution. In September 2010, the School of Social Sciences donated five new computers to the Orang Asli children and community. This initial small-scale project has been very meaningful and will be continued as it gives USM students opportunities to engage with the community more effectively and creatively through organising relevant and fundraising activities in order to provide continued support to the development of the community in general.

Pioneering community engagement

Q&A Session
Prof. Lim Koon Ong
Deputy Vice Chancellor
(Industry & Community Network)

From your point of view as the head of BJIM, why is the division critical to USM?

USM, like many other universities around the world, has gradually moved away from the old label of *an ivory tower*. In *an ivory tower*, faculty and students tend to be very much detached from the everyday life of the world outside. USM today aspires to be more of a Human Tower that not only produces new knowledge for knowledge sake but also applicable and economically useful knowledge for the well-being of society. To achieve this, USM needs to cultivate closer and meaningful relationships with the industry and the community. The old ways of preaching to the wider society are now being replaced by the idea of engagement. BJIM has been set up to facilitate the engagement process that will foster effective and sustainable linkages and partnerships with the industry and the community. BJIM's role is to match the knowledge, expertise, facilities and resources of USM to the needs, aspirations and expectations of the industry and the community. Importantly, these engagements must result in positive outcomes and impact.

How has BJIM evolved from the first day that it started operations?

In the first year of its establishment, BJIM was more active in talking, interacting and engaging with the industry, while efforts in community engagement were more modest. Today as our engagement with industry becomes more established, the focus of BJIM is shifted more towards working with the community. In this, BJIM attempts to bring industry, government agencies and NGOs together to empower local communities, especially through multidisciplinary initiatives. Since 2008 BJIM has supported and funded more than 100 community projects especially in areas exhibiting impact and sustainability.

What would you consider as your greatest accomplishment at BJIM?

I am honoured to be selected as the first Deputy Vice Chancellor to head BJIM. Being the first, I had to develop everything from scratch.

This can be challenging indeed especially when there were no models to follow or adopt. I have to set a clear direction for the Division, hence a clear vision statement has to be formulated from day one. To achieve the vision, I had to ensure that a good organisational structure coupled with the right work culture and a comprehensive execution plan are in place early. After all, vision without proper execution is mere illusion. In this, I am pleased to note that the vision of BJIM is now an integral and important part to USM's APEX agenda. In addition, BJIM's efforts have also contributed to the formulation of the industry/community engagement track for promotion.

This track has now been adopted by the MoHE for eventual implementation in IPTAs and USM is taking a lead in this.

What would you consider to be the greatest challenge for BJIM?

Re-orientating and changing the mindset of people continue to be our biggest challenge, particularly when it comes to transforming higher education. People are used to the idea of universities as institutions that are isolated and engrossed in academic work for its own sake. We at BJIM are continuously working hard to change the mindset of staff, faculty members and students of USM, to get them to become used to the idea of universities as Human Towers that serve as providers of the public good and defenders of public conscience. Universities have to be sensitive to the needs, expectations and aspirations of the community around them as well as of society at large. Universities must play a strong leadership role in the country's development policies and a proactive role in catalysing the participation of all stakeholders in the development process.

What are some of the most critical projects or activities that BJIM has undertaken?

I must say that all of the activities supported by BJIM are meaningful. However what has put BJIM in the international radar is the holding of an international conference on University-Community Engagement (UCEC 2009), the first conference of its kind in Malaysia and perhaps in the region as well. An outcome of UCEC 2009 is the setting up of the Asia-Pacific University-Community Engagement Network (APUCEN) of engaged universities.

What is your fondest memory of BJIM?

There is no such thing as the fondest; all are good memories, from challenges faced to positive outcomes.

What are your plans after retirement?

Take a long rest first; decide later. I believe I deserve some rest after serving USM for 34 years.

In the words of the second batch of APEX students

01 | NUR SOFIAH BINTI TUGERAN, Johor
Nur Sofiah has great interest in graphics. Taking up her interest seriously, she pursues her studies in communication graphics at the School of Arts, USM. Describing USM as a place of excellence and innovation across arts and sciences, USM has always been her dreamed world from which to build her future career as a graphic designer. Much to her anticipation, the programme has introduced her to the use of graphics as a unique and effective way of communicating a message to an audience. Nur Sofiah is enthusiastic and desires to promote the idea of sustainability via visual means.

02 | NURAISAH BINTI ZAKARIAH, Sabah
Having education alone is not enough. To become an agent of transformation, one has to excel. That is what Noraisah firmly believes. Coming from a place where education is defined as being able to read and count, Noraisah is intent to raise awareness of the importance of higher education to her people, the Bajaus of Sarawak. A degree (in Educational Studies) will certainly put her on the right track.

03 | NORAFIZAH SIDEK, Sabah
Norafizah is proud to be a Bajau, a member of the ethnic group that has been instrumental in the development of Semporna Sabah. With Datuk Seri Mohd Shafie Apdal, the Malaysian Minister of Rural and Regional Development, also a Bajau, as her idol, Norafizah is determined to become an influential economist to uphold a sustainability-based national economic policy to help poor people like the Bajaus in Semporna.

04 | MASMIN BIN MENSIH, Sabah
Masmin has eye problems – nearsightedness, farsightedness, astigmatism and colour blindness as well. The supportive environment he experiences at USM has taught him to be a helpful human being. Masmin is now set for a noble cause to help others with different abilities to excel in life by motivating them to value knowledge and enhance creativity.

05 | ZURIANI BINTI MUHAMMAD JUNAIDI, Sarawak
When Melanau peers in her village are busy planning for marriage at the young age of 18 or 19, Zuriani has her parents' full blessing to cross the South China Sea to pursue her dreams at USM, Penang. Zuriani wants to become a successful economist so that she can be a good example to the young Melanau generation. Her bigger dream is to bring a change to the remote parts of Sarawak.

06 | JACYLINE PORTIA, Sarawak
Jacyline is often frustrated by the media projections of Sarawak. While she is always proud of its diverse ethnic heritage and the enduring rainforests, there is much more to Sarawak than these stereotypical representations. Studying now to become a broadcaster, Jacyline hopes one day to capture people's interest in the "hidden" side of Sarawak that to date, has only been privy to the locals.

07 | RIZAL HAMSAARI, Sabah
Originating from Tawau, Sabah, Rizal has felt that his hometown is too far from Penang. Rizal was not interested to study at USM until he entered the university as a first year student at the School of Management. His views on USM then changed. He lauds the natural beauty of the university in the garden. More importantly, he acknowledges the credibility of USM through its sound curricula, competent academicians and innovative education all of which have made his love for knowledge grow.

08 | NUR ASHIQIN BINTI HAMIZAN, Negri Sembilan
Nur Ashiqin chose to study at USM for its prestige as an APEX university. She enrolled in the School of Physics with a big dream. She wants to have an in-depth background in physics and to use the knowledge to venture into entrepreneurship. In making change her goal, she has taken USM's unique transformation agenda for sustainability to her heart. Nur Ashiqin is now determined to be a change-agent in the society to ensure a more sustainable future both for herself and for others.

09 | TAN LOONG HUI, Kedah
Malaysians usually do not think twice about buying drugs over the counter. Little do they realise that prescribing drugs on their own for seemingly trivial sicknesses can be very dangerous and even deadly. Loong Hui believes that as a pharmacist in the future, he will have the responsibility to educate people on the importance of getting proper prescriptions as well in ensuring stricter policies on obtaining over-the-counter drugs.

10 | NG MING YIP, Johor
Ming Yip may first come across as a quiet young man but a chat with him will show that he is a politician in the making. Politics run in his vein, he says. Like his father, he wants to provide leadership to the people. Like a true politician, Ming Yip shows a deep concern for the community around him. He has been involved in a project that builds engagement between USM students and the elderly.

11 | ALVIN YONG SHEE MENG, Sabah
Although hundreds of kilometres away, Sabah is always close to Alvin's heart. As a member of the USM's Jazz Band, Alvin is proud to have contributed in a charity music event for the residents of Tawau, Sabah, who had been devastated by the August 2010 great flood. Always a conscientious young mind, Alvin also aspires to use his knowledge in physics to address issues in renewable energy.

12 | MOHD NORAZWAN BIN ABDUL JAILANI, Selangor
Razuan surprises his friends with the changes in him in the short four months that he has been in USM. Environmental sustainability has now become his mantra. A student in biology, Razuan feels at home in the University in a Garden and would very much like to help promote the garden concept everywhere by developing greener bio-technology.

13 | MACKARTNY JAMPONG ANAK ATA, Sarawak
Mackartny wants to make a difference to his own life and that of others by participating in volunteer programmes. As a student in the School of Housing, Building and Planning (HBP), he has a vision to design sustainable buildings and houses or "green buildings". He wants to make a difference by incorporating the criteria of sustainability, energy efficiency and health in the practice of his choice.

14 | WAN RUSYDAN RAZIMAN BIN WAN IBRAHIM, Kelantan
A student in the School of Housing, Building and Planning (HBP), Wan Rusydan envisages an ideal place to be one that is not only equipped with great facilities but is also clean and green. With that in mind, Wan Rusydan has set his ambition to become a role-model town planner in the country.

15 | MOHAMMAD AFFAN BIN ABAS, Sarawak
The general lack of interest in education among the community members of his village is an issue that Affan takes to heart. Most children will drop out of school after completing primary school. If he can have his way, Affan will develop a community counselling facility in his village to provide psychological support to help children sustain their interest in education.

16 | MOHD IZHAM ISNAN, Johor
Izham thinks that USM is different from other higher learning institutions in many ways. But what is most important to him is that USM is different because it does not make him feel different from any other students. As a person with different abilities or OKU, in short (a term coined by USM as an alternative to the term "disability"), Izham feels that USM is supportive of him and those in similar situations to pursue their dreams without any more hurdles than other people. More than anybody else, Izham can affirm that USM is truly a place where equality reigns.

The Student Parliament cultivates future leaders

Students making their stand

23 October 2010 was a memorable day for the 58 members of USM's students for they made history by participating in Malaysia's very first Student Parliament known as the Students' Consultative Council. The 58 members of the Student Parliament consist of students from the Students' Representative Council, the Council of Residents' Hostels and representatives from student bodies and clubs. Twenty issues pertinent to student affairs, welfare, development and academic have been discussed and debated with all the issues selected by the special panels of students themselves. The issues debated and discussed covered matters related with students' activities like competition and sports facilities, students' welfare such as Internet and allowance, and some local issues like the age of retirement for civil servants. All the views, opinions and outcome of the Council will be assessed by the university before taking appropriate action.

Student Parliament in session

The idea of a Student Parliament was first mooted by USM Vice Chancellor, Professor Tan Sri Dato' Dzulkifli Abdul Razak, in his keynote address at the 2003 Students' Congress. Following the Amendments to Section 15 of AUKU 2008 and the initiative of the USM Students' Representative Council (MPPUSM), 2008/09 Academic Session, a draft of the proposal was submitted to the Deputy Minister of Higher Education, Datuk Saifudin Abdullah.

Importantly, the members of the Student Parliament represent the views of students from all of USM's three campuses, the Main Campus in Minden, Penang, the Engineering Campus in Nibong Tebal, Penang and the Health Campus in Kubang Kerian, Kelantan. Furthermore, the Student Parliament differs from the Malaysian Parliament or other Parliaments in three aspects. Firstly, in the Student Parliament, there is no distinction between the members of the ruling party and the opposition. All members have similar status, that is, as members who can debate on issues independently, without being linked to any particular struggle.

Secondly, the Student Parliament allows observers to participate in the debate through a special session held prior to the voting on the proposal put forward. This not only provides ample opportunity for the proposal to be debated thoroughly but also provides an opportunity for third parties to express their views. Thirdly, in the absence of the university authorities, there will be freedom of expression. This implies that the university authorities will not control the proceedings. The Speaker will be totally responsible for conducting the sessions as stipulated in the standing orders and this means that the spirit of Section 15, which allows for freedom of expression, will be realised.

The Student Parliament, above all, recognises the voice of the students. Students now have a platform to openly debate their opinions and express views among themselves. The absence of authority figures from the university during the assembly provided an assurance that it was meant to be run by the students for the students. Indeed, the objective of the Student Parliament is to inculcate an environment of intellectual debate, in which students are forthright in expressing their views with facts, evidence and aspirations as their guiding principles. Through the

Ministry wants more students' parliaments at public varsities

By RICHARD LIM

PUTRAJAYA: Public universities have been encouraged to establish their own students' parliaments so that a national-level body can be set up in the future.

Higher Education Minister Datuk Seri Mohamed Khaled Nordin said that the students' parliament pilot project was going well at Universiti Sains Malaysia (USM) and other universities have been encouraged to follow suit.

He added that a national-level body could be set up once 75% of public universities had their own "parliament".

"We are aware that students are eager to be involved in nation-building and we want to encourage this," he said at a press conference yesterday after delivering his New Year's message to the ministry at the Putrajaya International Convention Centre.

"However, students must voice their opinions based on facts and not emotions," he added.

Mohamed Khaled also said that the ministry would grant more autonomy to public universities who were deemed to be "ready".

Each university would be assessed to gauge its readiness in four aspects, namely, governance; academic record and student intake; financial health and income generation; and human resource.

"We estimate that all research universities should get full autonomy by 2015," said Mohamed Khaled.

Presently, USM, Universiti Malaya, Universiti Putra Malaysia, Universiti Kebangsaan Malaysia and Universiti Teknologi Malaysia are the five research universities.

Khaled also announced that all private colleges and polytechnics in the country will be rated this year.

Universities and university colleges are already being evaluated under the Rating System for Malaysian Higher Education (Setara).

"It is important to know where our many colleges stand.

"We hope to come out with the results at the end of the year," he said.

The 402 private colleges would be rated through the Malaysia Quality Evaluation System (MyQuest) according to six tiers — from Tier 6 (excellent) to Tier 1 (very poor).

The score will be based on a breakdown of 40% for students and facilities, 30% for recognition of courses and graduates, and 30% for the quality management system.

Source: *The Star* ,18 January 2011, page N10

DPP beri peluang mahasiswa bebas bersuara

Oleh Tan Sri Razali Ismail

Commentary by the Pro Chancellor of the needs for Student Parliament, *Berita Harian,* 1 December 2010

Some observers attending the session

opportunity to debate and discuss various issues from various perspectives, character and leadership among the students will be built so that they will be able to champion social, local and global issues with confidence, maturity and knowledgeable in the future. Having the proposals from the Student Parliament submitted to the university authorities for consideration would also mean that students now have a voice in policy formulations.

The session brought forth various proposals, such as those pertaining to students with special needs (OKU) and Internet accessibility that are now being carefully considered by the university at the policy level. The success of the USM's Student Parliament demonstrates that when students have been provided a platform to express their views and be heard, the vision to transform higher education will be more applicable, practical and achievable.

PIMPIN Siswa

Training of young leaders

New students joining the USM community might be among the cream of the crop in the country when we talk about academic excellence but are they mentally prepared to become the kind of leaders and movers that the country aspires to have? To help them have a positive mindset as they commence on their studies, USM has introduced the *Program Intensive Mengupaya Insan Siswa* or the PIMPIN Siswa programme. The programme was developed around eight core development models:

- Love for the university.
- Love and patriotism for the country and respect for nature.
- Self-esteem development.
- Building self-resilience.
- Inculcating an appreciation for sustainability.
- Building soft skills.
- Fostering spiritual values.
- Enhancing intellectual capacity.

Attendance in the PIMPIN Siswa programme is compulsory for all first year undergraduate students (full-time). The programme is conducted through a three-day two-night session of camping activities held in a few selected areas in the country. During the camping, the students are exposed to the mandate of the university and get involved in activities that incorporate elements of adventure, survival skills, teamwork, spirituality and patriotism. The activities are geared towards building leadership and teamwork, experiential learning, strengthening racial relationships and building an understanding of the concept of sustainability.

Volunteerism@ USM/PUCS

The USM community, led by the Chancellor, cleaning up after the big floods in the northern region

The spirit of volunteerism is being kept alive with the establishment of the Secretariat of Volunteerism as a spin-off from a unit called the Association of Disaster that was formed in 2007. The secretariat was formed to coordinate the activities of all volunteer organisations within USM. To date, the main secretariat encompasses seven volunteer units, namely, Sekretariat Rakan Muda, *Sekretariat Perpaduan/ Rukun Negara, Sekretariat Green Lung, Kumpulan Kesenian Adikarma, Sekretariat Pencegah Rasuah, Sekretariat Okestra Cina* and the Penang Undergraduate Community Service (PUCS). All of these organisations are under the purview of the USM's Student Development Sector, the Unit of Culture and Volunteerism, Student Affairs and Development Division. Chaired by students themselves, each of the volunteer units is responsible for planning and strategising its own activities.

The Secretariat of Volunteerism has addressed various issues at university, national and international levels. At the university level, *Sekretariat Green Lung* is currently running the USM 100% *free smoke* area which sees that the smoke-free policy is being strictly implemented. The unit also helped to organise a baby dumping awareness campaign under the Tangisan Jiwa Project. The secretariat has also organised food drives for the flood victims in Pakistan.

Aside from the on-going activities, students of the volunteer units are continuously being provided professional training in various rescue-and-humanitarian assistance skills, in collaboration with the Civil Defence Department and the police. They will then be more equipped to respond rapidly to emergencies when the need arises. As the first university-based volunteer secretariat in Malaysia, the Secretariat of Volunteerism hopes to lead the way in nurturing the spirit of volunteerism among students throughout the country.

Planting a tree through
the spirit of volunteerism

Instilling entrepreneurship among staff

As an APEX university, Universiti Sains Malaysia has done extensive research across major fields to strengthen future talent and enhance the *bottom billion* households in transforming their socio-economic well-being. This is in keeping with the university's vision and mission in *Transforming Higher Education for a Sustainable Tomorrow.*

Microcredit is the provision of financial services to those who are excluded from conventional commercial financial services since most of them are too poor to offer much. It presents a series of exciting possibilities for extending markets, reducing poverty and fostering social change.

Micro Pinj 5th disbursement during Majlis Berbuka Puasa with the Chancellor

What is microcredit?

The concept of microcredit originated in the mid-1970s in Bangladesh through a pioneering experiment by Dr. Muhammad Yunus, then a professor of economics, at Chittagong University. His aim was to offer poor people financial services, entrepreneurship opportunities, protect mistreatment by moneylenders and a system from which they can produce, manage and maintain their own finances.

This was how USM initiated micro loans in Malaysia. In 1986, USM became the founder of the Amanah Ikhtiar Malaysia (AIM), followed by becoming the founder of the Tabung Ekonomi Kumpulan Usaha Niaga (TEKUN) in 1996, located at the Centre for Policy Research.

Projek Mikro Pinjaman USM

Microcredit is the extension of small loans to entrepreneurs too poor to qualify for conventional bank loans. This is where the Projek Mikro Pinjaman USM, better known as *Micro Pinj,* comes into the picture. This project was initiated by USM's Vice Chancellor, Professor Tan Sri Dato' Dzulkifli Abdul Razak, with the motto "Bersama Membangun Warga Penyayang Kampus USM Kita" which means "Together We Care, Together We Share in Our USM Campus". *Micro Pinj* was launched in the month of Ramadhan (September) 2008 by the Minister of Higher Education Dato' Seri Mohamed Khaled Nordin.

All cheque recipients with the USM Vice Chancellor and his wife during Majlis Sulung Penyerahan Cek *Micro Pinj*

The *Micro Pinj* concept is to help USM's *bottom billion* by providing its staff credit facilities in all three campuses. It will provide working capital for the staff in the low-income group to supplement their household income regardless of ethnicity, religion or political belief. *Micro Pinj* also helps to motivate these households to participate towards improving the quality of their respective livelihoods as measured by the project's seven key transformation indicators or KTIs: to increase household income, to increase household saving, to create self-employment among adult household members, to accumulate productive household assets, to fulfil basic household needs such as housing, education, health, nutrition, etc., to be able to fulfil religious obligations and to improve their staff productivity.

The target group

Micro Pinj targets the bottom forty percent (40%) of USM supporting staff basically those who fall within Grade 1 to 17 with priority to those with a take home pay of less than RM2,000 per month.

Table 1: Staff Distribution by USM Human Resource Department USM as of 19 April 2009

Scheme of Services*/ Campus	Main		Eng.		Health		Overall USM	
	No.	%	No.	%	No.	%	No.	%
Top Management (VU1 to VU7, VK5 to VK7)	123	3%	28	4%	33	1%	184	2%
Management & Professional (Grade 41 to 54)	1,421	35%	262	33%	915	21%	2,598	29%
Supporting Staff I (Grade 19 to 40)	569	14%	95	12%	1,650	39%	2,314	26%
Supporting Staff II (Grade 1 to 17)	1,902	47%	404	51%	1,665	39%	3,971	44%
Total	4,015	100%	789	100%	4,263	100%	9,067	100%

* Excluding Project Staff

Positive impact

From an updated survey of 41 *Micro Pinj* clients in October 2010, a large majority of them (90%) managed to improve their supplementary sources of household income while another 30% managed to increase their household savings. *Micro Pinj* loans help to facilitate accumulation of productive assets for use in supplementing household income. Loans from *Micro Pinj* have enabled the borrowers to increase their working capital and created self-employment among adult household members. Returns from *Micro Pinj* facilitate investment in health, nutrition and education of the children and dependents. Most of them are aware of *Micro Pinj's* key transformation indicators and strive to achieve them.

In leading, we care

Apart from pioneering microcredit for the poor in the late eighties, USM is taking the lead in providing microcredit facilities in striving towards a sustainable tomorrow for the bottom 40% of its staff.

Funding for *Micro Pinj*

The on-lending fund for *Micro Pinj* is internally contributed by the university's staff initiated by the Vice Chancellor in August 2008. Since then, a total of RM160,340.22 has been accumulated through three fund raising campaigns as noted in Table 2.

Table 2: *Micro Pinj* Fund Raising Campaigns

Campus / Campaign	Main	Eng.	Health	Total Contribution (RM)	Number of Contributors		
					Prof.	Academic / Administrative Officer	Schools / Centres
1st	55,140.22	7,800.00	12,000.00	74,940.22	56	5	1
2nd	18,140.00	1,600.00	5,310.00	25,050.00	12	48	3
3rd	44,500.00	2,300.00	13,550.00	60,350.00	33	40	1
Total Contribution (RM)	117,780.22	11,700.00	30,660.00	160,340.22	101	93	5

Most of the contributors are professors (55%) while 3% come from the other academic and administrative officers. All contributions to *Micro Pinj* are tax exempted.

Accessing *Micro Pinj* loans

Micro Pinj is designed to facilitate easy access to working capital. As such, no collateral or guarantor is required with priority to those earning less than RM 2,000 a month. However, the prospective borrower has to be a permanent staff of the university and a member of USM's Co-operative Book Shop, preferably within the 18 to 50 year age-group with an existing supplementary source of household income. The borrower will have to agree to monthly deduction through the Cooperative. No administrative fee is being charged for the time being. Normally a loan is approved within two days after loan appraisal

The man behind *Micro Pinj* at USM, Professor Dato' Sukur Kassim

and disbursed by cheque. A flexible repayment period of up to two years is available. The loan fund can be utilised by any adult household member of the borrower as part of the strategy to provide self-employment and supplement household income. *Micro Pinj* loans are covered by Takaful Malaysia life insurance. The operating cost is covered by the USM's Research Creativity and Management Office as an initial community engagement initiative.

Disbursement

Up to July 2010, *Micro Pinj* has disbursed 41 loans with a cumulative disbursement of RM118050.48 from the initial disbursement in February 2009 with an average loan size of RM 2,879.28. Most of the loans (98%) went to Bumiputra staff while female borrowers accounted for 42%. With a two year repayment period, *Micro Pinj* has collected RM4,8331.00 since then. Only one retired borrower is in arrears with the Portfolio at Risk or PAR at 1.98% at the end of December 2010. Among the pioneers, four have repaid in full before their two year repayment period. *Micro Pinj* has extended a second loan to four borrowers worth RM7,000.00.

Loan activities

Since *Micro Pinj* discourages start-up operations, most of the borrowers used the loan fund in scaling up their existing supplementary sources of household income. As such, *Micro Pinj* loan activities are centred on food-based businesses, for example, the sale of *kerabu rice*, curry puffs, varieties of food, burgers and agro-based businesses such as poultry farming, agricultural farming and catfish rearing. Other activities include working capital in purchasing recycling materials (paper, steel and chrome materials and plastics), stocking magazines and newsprint and increasing stocks in selling digital Al-Quran, photography and retailing.

Table 3: *Micro Pinj's* consolidated cumulative statement as of December 2010

No.	Particulars				RM
1.	Cumulative amount disbursed				
	Main Campus	Health Campus	Eng. Campus		Total
	85,596.98	17,453.50	15,000.00		118,050.48
2.	Cumulative amount repaid				74,909.00
3.	Balance Outstanding				43,141.48
4.	Number of Borrowers				
	Ethnic/Gender	Malay	Indian	Chinese	Total
	Female	15	2	0	17
	Male	24	0	0	24
	Total	39	2	0	41
5.	Number of subsequent loans				4
6.	Amount RM				7000
8.	Portfolio at risk				1.98%

Microfinance or microcredit?

Microfinance is the provision of financial services to low-income clients or solidarity lending groups including consumers and the self-employed, who traditionally lack access to banking and related services.

More broadly, it is a movement whose object is "a world in which as many poor and near-poor households as possible have permanent access to an appropriate range of high quality financial services, including not just credit but also savings, insurance, and fund transfers". Those who promote microfinance generally believe that such access will help poor people out of poverty.

Microcredit is the extension of very small loans (microloans) to those in poverty and is designed to spur entrepreneurship. These individuals lack collateral, steady employment and a verifiable credit history; they are therefore unable to meet even the most minimal qualifications to gain access to traditional credit. Microcredit is a part of microfinance, which is the provision of a wider range of financial services to the very poor.

The modern invention of microloans is credited to St. Louis entrepreneur Menlo Smith who was struck by the abject poverty he saw in the Philippines.

Microcredit is a financial innovation that is generally considered to have originated with the Grameen Bank in Bangladesh. In that country, it has successfully enabled extremely impoverished people to engage in self-employment projects that allow them to generate an income and, in many cases, begin to build wealth and exit poverty.

Due to the success of microcredit, many in the traditional banking industry have begun to realise that these microcredit borrowers should more correctly be categorised as pre-bankable; thus, microcredit is increasingly gaining credibility in the mainstream finance industry and many traditional large finance organisations are contemplating microcredit projects as a source of future growth, even though almost everyone in larger development organisations discounted the likelihood of success of microcredit when it was begun.

Danaletchimy A/P Muniandy
Support Staff
Cahaya Gemilang Hostel
Universiti Sains Malaysia

What made you apply for the *Micro Pinj* initially?

I wanted to support my husband in his business of distributing newspapers and magazines. My husband delivers these newspapers and magazines to markets and food courts. The loan was used to purchase a second-hand van and to increase the copies of newspapers and magazines purchased for distribution.

What have you learned from this business?

The *Micro Pinj* programme is a good opportunity for those who have an interest in business but are unable to start due to the lack of funds. As with all things, we have to start somewhere.

What is your future plan?

In the future, we plan to expand our business by targeting household businesses. Maybe, by then, my husband would need to hire a worker to help him in the distribution.

Rosli bin Othman
Support Staff
Chancellory
Universiti Sains Malaysia

What made you apply for the *Micro Pinj* initially?

I needed capital to expand my business, as my food stall was initially borrowing space from another operator. I needed the capital to rent a proper stall, buy more utensils and as a rolling capital for daily operations.

My wife is the main operator of the food stall we operate near the state mosque. I applied for a RM5,000 loan and was given two years to pay it back. I am on my way to clearing the loan.

What have you learned from this business?

My main task is to buy fresh products from the market. I have learned to improvise in situations when the prices of these fresh products change drastically. Customers will not be aware of these rising prices unless they go to wet markets themselves.

What is your future plan?

As of now, my priority is to stabilise the business. My main challenge is in seeking a willing worker to help my wife and I as currently, I am holding a daytime job and am not able to help my wife run the stall.

USM football builds team spirit

In 2010, the USM Football Club (USM FC) wrote a new chapter in Malaysian football history by being the first university team in the country to enter the professional world of Malaysian football. USM FC was among the 12 teams qualified to play in the nation's second tier league, that is, the Premier League championship organised by the Football Association of Malaysia (FAM).

USM XI

Officially established in 2008, it is registered as the USM Staff Football Club (Kelab Bolasepak Staf USM), or better known as USMFC. As a semi-profesional football club, USM FC's members are university's staff (amateur category) and contract players (profesional category). Members of the amateur category are mostly USM Support Group staff working as clerks, laboratory assistants and general workers from various departments. Although they come from different departments and have different job backgrounds, the members have managed to build a strong team. This is due to their remarkable commitment, passion for football and strong ambition to elevate USM to be the new powerhouse in Malaysian football. USM FC has accordingly become an active platform for them to show their ability, potential and talent which in turn has brought significant contribution to the university. They are groomed by a dedicated coaching team headed by a full time A-licensed coach, S. Veloo, a teacher at Penang Free School and also an alumnus of USM.

In 2009, USM FC began competing at the national level football competition. After being the powerhouse of Penang state's First Division League competition for a long time, USM FC (which formerly played under the USM Staff Sports Club's banner) earned the valuable ticket from the Football Association of Penang (FAP) to represent Penang in the 2009 FAM Cup competition. The FAM Cup competition is the nation's third tier football competition. After an excellent performance in the 2009 FAM Cup competition, USM FC was promoted to play in the Premier League 2010 championship. In this championship, USM FC had the honour of playing alongside state teams such as those representing Sabah, Sarawak and Melaka and another eight prominent football clubs in the country, namely, those representing Felda United FC, Perbadanan Kemajuan Negeri Selangor (PKNS) SC, Malaysian Armed Forces, Royal Malaysian Police, Harimau Muda 'B' (Malaysia's Under-19 team), Pos Malaysia, Muar FC and Kuantan Port/Shahzan Muda FC. The most memorable match for USM FC was when they managed to beat Sabah, a state team, in the second round game of the 2010 competition. Subsequently, USM FC has survived and successfully retained its place in the 2011 Premier League competition.

USM is not only the first university in the country to feature in a professional league, but also the first university to have its own stadium which has been sanctioned by the FAM as its home venue. Following this, the stadium has been used for USM FC home matches. Every week, Penang football fans will congregate at the USM stadium to watch and support the USM FC team and experience the euphoric atmosphere of USM FC matches. At the stadium, the public can also experience a green environment. A big tree at the centre of the spectator area is a manifestation of a green stadium. More importantly, however, the greening up practice of the campus in the prohibition of the sale of bottled drinks underlines the sustainability agenda of the university. Certainly, this is part of USM's social responsibility to educate the public on sustainability issues and ways on how it can help to take care of the environment.

Born in a research university context, USM FC has the advantage of benefitting from the university's

One happy university

USM in celebratory mood after retaining placing on nation's second tier league

Source: *The Star*,
20 August 2010

research and development in sports. USM FC has taken part in a research project by the Advanced Medical & Dental Institute (AMDI). The research project involved studies on the physical aspects of the players including their mental strength and consumption/loss of water – which was conducted before/during/after every match. In the same vein, players had to undergo various scientific-related tests such as psychological profiling sessions, weight measurement tests and the doping test. While the scientific psychological profiling tests were conducted by the Sports Science Unit of the School of Medical Sciences, motivational workshops were conducted by AMDI. The motivational workshops aimed to strengthen team building and the mental power of the players. The AMDI's motivational workshop received good support from the National Sports Council (NSC) which had sent their trained officer to give lectures in the workshops. In addition, AMDI has also extended its medical facilities and specialists to USM FC – particularly in providing injury diagnosis and treatment to the players. Unlike other football teams, USM FC has great advantages in terms of accessibility to sports science knowledge, technology and expertise.

USM FC may not have won the 2010 Premier League crown but it did enough to merit a celebration after the championship ended. Their ability to retain their place in the country's second tier League and to be the only university in the country's professional scene are two strong reasons for USM and USM FC to celebrate. With the experience gained in the 2010 competition, USM FC will surely be a stronger team in the years ahead. For the 2011 championship, the team's target had been to be among the top four in the League and to secure an automatic berth to the Malaysia Cup competition, the most prestigious football competition in the country. With great commitment and hope, USM FC is striving to bring the prestigious Malaysia Cup back to Penang after a hiatus of more than 35 years.

View of the Corporate and Sustainability Development Division

Leading the way

DEAN
Professor Azlina Bt. Harun @ Kamaruddin

Established in 1992, the School of Chemical Engineering at Universiti Sains Malaysia was intended to meet the demand for professional chemical engineers to spearhead the country's industrial economic growth. Starting small at the Perak branch campus in Tronoh, the school has expanded – in terms of quantity and quality of staff and students as well as of facilities and equipment – as it moved to a bigger campus in Nibong Tebal in 2001. Gradually, the school built its foundation in teaching and research and in time, gained recognition as a leading centre of chemical engineering studies in the country.

Taking the lead, the School of Chemical Engineering is one of the best performing schools in USM. Measured by the key performance index (KPI), the university's performance – cumulated from the performance of its entities including schools and centres – is assessed on the basis of reaching the target of being a Research University (KPI of 75 marks and above) or a higher goal of APEX (KPI of 95 marks and above). In 2008, the school was top on the list of the performing schools with a score of 150 marks, which is far above the APEX benchmark. Although the trajectory of its performance moved downward slightly by 26 points in 2009, the school has shown a repeat performance of reaching the APEX standard of excellence. The impetus to the school's standing is its strong reputation in research. This is reflected in its robust publication track records. In 2009, the school's publication in citation-indexed journals to researcher ratio was 3.2:1, with cumulative impact factors of 229.69. The remarkable performance marks the school's commitment to outstanding research and teaching.

I can say with confidence that the School of Chemical Engineering is the top in research and international journal publications, our Masters and Ph.D.s are the best in Malaysia in terms of their thesis quality and publications, our graduates have all the required skills to meet the industry needs and our young academic staff members are innovative, committed and hard working.

Subhash Bhatia
Professor, School of Chemical Engineering

Group photo after the presentation of the accreditation by IChemE
(from left), Dr. Syamsul Rizal Abd Shukor, Prof. Abdul Latif Ahmad, Neil Atkinson (Director of Qualifications and International Development, IChemE, U.K), Prof. Tan Sri Dato' Dzulkifli Abdul Razak, Prof. Khairun Azizi Mohd Azizli, Prof. Subhash Bhatia

The school is committed to provide the best education in the field of chemical engineering sciences. The undergraduate study programme at the school leads to the degree of Bachelor of Engineering in Chemical Engineering in three specialisation areas: (1) Process Control, (2) Biochemical and Environmental Engineering and (3) Separation Process and Catalysis. The programme has been accorded national and international recognition. It has been accredited by the Board of Engineers Malaysia and by the United Kingdom-based Institute of Chemical Engineers (IChemE). The IChemE accreditation is a prestigious recognition that reflects a standard of high quality appraised by a prominent world body that has a membership of almost 90 countries world-wide, including New Zealand, Australia, India, Singapore, China, Ireland and others. The undergraduate programme at the School of Chemical Engineering has been accredited by IChemE since 2006 and following this process, a renewal of accreditation has been secured for another five years, from 2009 till 2013. The continuity in accreditation shows that the courses offered by the school are at par with those offered by the leading schools of chemical engineering in first world countries.

Aimed to produce leaders and entrepreneurs in the current global society, the school has built partnerships for an undergraduate student exchange programme with partner universities such as Hankuk University of Foreign Studies in South Korea and University of Minnesota in USA. The school has also undertaken an undergraduate research internship programme with a few universities abroad such as Al-Baath University in Syria, Sultan Qaboos University in Oman and the Korean Advanced Institute of Science & Technology in South Korea. This is to ensure that the curriculum for undergraduate studies is in line with the developments in the fields of chemistry and engineering.

Like the Bachelor of Engineering in Chemical Engineering, USM rejoices

to be the first university in the country to receive IChemE accreditation for the Master of Engineering in Chemical Engineering. The School of Chemical Engineering at USM offers programmes for higher studies leading to the Master of Science (M.Sc.), Master of Science (M.Sc.) by the mixed mode and Doctor of Philosophy (Ph.D.) degrees by research in various areas ranging from creating fundamental knowledge (such as catalysis, environmental engineering, enzyme technology, bioprocess engineering, adsorption technology, process control) to pioneering technologies (such as membrane technology, nanotechnology). Research at the school has attracted grant collaborations with a number of institutions such as Imperial College London (British Council Grant), Universite Henri Poincare, France (SDCC / AIT - France Network) and the Asian Institute of Technology, Thailand (SDCC / AIT - France Network). To keep the students abreast with the increasing sophistication in the emerging areas and the technology in use, the postgraduate programme is also designed to include student attachments to universities that have expertise in the field of chemical engineering such as National Taiwan University in Taiwan, Osaka University and Kyoto University in Japan and Trento University in Italy. While the attachments give invaluable exposure to local students, the intake of foreign students pursuing their postgraduate studies at the School of Chemical Engineering has been increasing in numbers in recent years.

One possible attraction to the school is its existing facilities. The school is well equipped with modern and up-to-date laboratories for teaching and research. Among the laboratories are the Unit Operation Laboratory, the Process Control Laboratory, the Analytical Laboratory and the Environmental Laboratory. Software packages for modeling, simulation and optimisation of complex chemical related processes are incorporated in the laboratories to facilitate learning and research work. The Analytical Laboratory, for example, is equipped with Atomic Force Microscopy (AFM), Gas Chromatography Mass Spectrometry (GCMS) and Raman Spectroscopy, Scanning Electron Microscope (SEM). In addition, the school also provides dedicated spaces for postgraduate students to carry out their research in specialised laboratories, namely, the Chemical Reaction Engineering Research Laboratory, the Bioprocess Engineering Research Laboratory, the Separation Process Research Laboratory and the Environmental Engineering Research Laboratory. The provision reflects the school's commitment for facilitating research work and training.

What drives the school are neither its programmes nor facilities. The drivers are the people. What are being harvested today come from the seeds laid by previous teams headed by different deans: Associate Professor Ir Aziz Omar (4 years) , Professor Abdul Rahman Mohamed (8.5 years) and Professor Abdul Latif Ahmad (5 years). The onus is now laid on the shoulders of the present dean, Professor Azlina Harun @ Kamaruddin and her team members to continue to develop the school's education and research that are of the highest calibre.


Institution of Chemical Engineers

Master of Engineering in Chemical Engineering

Universiti Sains Malaysia

IChemE

Certificate of recognition from IChemE

Compounded excellence

Photos and names of students and lecturers greet visitors with stories of their achievements, on-going passions and future aspirations

The walls of the main hallway to the School of Chemical Engineering explain it all. Photos and names of students and lecturers greet visitors with stories of their achievements, on-going passions and future aspirations. The people are the critical elements for the school and the research chronicles plastered on the walls are testament to its culture of excellence. The school has been able to chart its way to the top from year to year because it understands its business like it understands chemistry. Like chemicals in an experiment, it knows that people are elements that need to be mixed in the right proportions, with the right procedures and at the right moment, to produce the desired reaction. Many a time, catalysts in the form of personal inspirations, rewards and recognitions are required to accelerate the reaction. What results is the compounded excellence that has been the pride of Universiti Sains Malaysia.

Building the right chemistry

The "hall of fame" at the entrance to the school is a good example of how it creates a strong team spirit among its students and lecturers. The dean, Professor Azlina Bt. Harun, explains that posting the photos of the students and the lecturers along with information on their current research projects, the grants that they are holding or the theses that they are working on is a quick and easy way to let everybody know what others are doing. Researchers and visitors will know who they should approach for expertise in specific areas. While some may argue that the school's website will do the same job, having your name and face featured in front of your school gives you a different sense of pride. For students, it means that the school knows you by name and by your achievements; you are not just another name in its enrolment list. For lecturers, it means that your research, no matter how small or big, is being recognised as making a contribution. The "hall of fame" has also brought about a healthy competition among students and lecturers. To belong on that wall, one has to work for it. The motivation is not in out-performing others but rather, to be a part of a winning team.

Just like atoms in chemical elements, the people at the School of Chemical Engineering are tightly bound. Each individual is keenly aware that he or she forms the critical link that makes the school function at its best. While individuals are duly recognised for their contributions, the school knows that quality results from the combination of the best of minds and bodies. New lecturers are immediately paired with senior lecturers not only to put the younger lecturers on the fast track to research

excellence but also to contribute new ideas and knowledge. The school is rather "young" with many of its lecturers at the age of 35 and below. The synergy between the young lecturers' fresh ideas and the older generations' wisdom has led to many great success stories such those of the carbon nanotube research team headed by Professor Abdul Rahman Bin Mohamed. The team has had a major breakthrough in methane catalytic vapour (CVD) technology that addresses critical problems in the production of carbon nanotubes such as scalability, purity and production costs. Another team, headed by Professor Abdul Latif Bin Ahmad, has been conducting intensive research in the area of water membrane research and to date, has invented several state-of-the-art techniques in modifying the membrane pore size, porosity and performance characteristics to meet specific industrial needs.

Ironically, it is the vibrant energy of senior professors such as Abdul Rahman and Abdul Latif that often motivates young lecturers rather than the other way around. Strength and inspirations are drawn from professors who are still prolific at research and publication despite having been with the school for decades and having achieved all the accolades that young lecturers are only starting to pursue. Abdul Rahman and Abdul Latif see themselves as mentors whose roles are to cultivate a culture of research excellence, set a high benchmark to achieve world class standards and guide their research teams in the right direction. Abdul Rahman believes that there should be no "individual" at the school as its needs and those of the university should come first. Abdul Latif explains that a strong team spirit in a team can be built if we understand the problems faced by members and solve the problems as a team. Both professors also agree that a little bit of pushing goes a long way.

When asked about their own mentors, the two professors as well as other senior lecturers mentioned one name in unison, Professor Subhash Bhatia. Almost a Godfather-like figure in the school, Subhash is the source of reference in many ways. His wide repertoire in the area of chemical engineering has seen him involved in various research teams. As explained by Associate Professor Lee Keat Teong, Subhash is an excellent mentor in problem solving due to his ability to make others see things clearly and his passion for his work. He is invariably at the school on Saturdays and has often been seen taking stacks of journals to be read at home. According to Associate Professor Ahmad Zuhairi Abdullah, Subhash has the ability to push researchers to recognise their own potential as he is not one who will be satisfied by anything short of excellence particularly in designing research and experiments. Ahmad Zuhairi knows that he has always to be on his toes when meeting Subhash as the latter will always ask, "what's next?". His practical ways in doing things have also made Subhash a reference point in administrative matters, often helping the school to come up with new ideas and to see things from different angles. It seems Subhash has been the impetus for the unique mentoring culture that has clearly taken the school to where it is today.

The long tenure of Subhash is yet another proof of the strong team spirit at the School of Chemical Engineering. Often, universities are not able to retain their expatriates for a long duration. But at this school, expatriates are here to stay. Subhash is an Indian engineer who has been at the school for 15 years and he is looking forward to many more years of service. He is not alone. Professor Bassim H. Hameed joined USM in 1999 and has never looked back since. To date, he has published more than 175 research articles in international and national journals and proceedings including 85 articles in ISI-indexed journals. He now heads among others, the Reaction Engineering & Adsorption (READ) research team. He explains that in the school as well as at USM, expatriates are made welcome and have never been treated any differently. His work is being recognised at the highest level. At the school, he gets the respect that he deserves which to him, always means more than any monetary remuneration or award. The school has been very supportive of all his needs and in return, he is more than willing to contribute his best.

The strong team spirit is also alive among the students and the administrative and technical staff. Students would inspire each other in research as well in academic performance. Those whose work has been published would treat others to lunch or dinner as a way of showing their appreciation to their support circle. Their facebook pages are full of stories on research, ideas and motivations to inspire others in research. The camaraderie among the students contributes

to the healthy competition seen in the school. The chemistry there would not be complete without the administrative and technical staff. Azlina, the dean, has made it very clear that the school would not have been able to run like a well-oiled machine without their support; in their absence, the academic staff would not be able to focus on teaching and research. In sum, each and everyone at the School of Chemical Engineering knows that he or she is an essential element to the chemistry of the school.

A matter of transformation

Chemical engineering is the study and practice of transforming substances at large scales for the tangible improvement of the human condition. True to their field, researchers at the School of Chemical Engineering are constantly curious about the transformation that is needed to change the world around them. The pursuit for transformation started early in its history as a school. It has been inculcated right in the beginning that to transform into a top school, research would be the main drive. The school knows that as part of an academic institution, what would matter the most would be its ability to produce world class research. It has been drummed into all researchers that each of them must strive to head his or her research under his or her own research grants. That tradition has been upheld till today whereby 100% of the lecturers are principal investigators of at least one research.

A key to the transformation for the school is its propensity for excellence. Scrupulous attention is given to good problem statements and quality data. Taking a cue from Subhash, lecturers at the school are very meticulous when checking papers and research work by students. Papers are returned very quickly to show students that their work is appreciated and that the lecturers are interested in what they are doing. The dean emphasises that it is quality not quantity that matters. Nevertheless, the number of publications produced by its lecturers year after year has proved that quality produces quantity.

Transformation also starts early at the individual level. Second and third year undergraduate students are exposed to scientific articles due to the requirement of writing a term paper for selected courses. Some of these students will apply to become research assistants during the semester break. Fourth year undergraduate students are encouraged to write scientific articles based on the final year projects or review articles based on elective courses.

Postgraduate students are encouraged to produce publications from the first day that they step into the school. During their first year, students are trained to publish by being encouraged to write reviews on their field of study. They would start by sending their articles to local journals and work their way up to international journals towards the end of their studies. The push for publication produces a contagious culture of publication and research. Students aim high – some would have a long list of publications (up to more than 10) to be included at the end of their thesis. A thesis without a list of one's own publications would be a major embarrassment for students at the School of Chemical Engineering!

Postgraduate students, needless to say, are in the very capable hands of seasoned professors and lecturers. To build future generations of young researchers, one of the school's deliberate strategies is to train masters and Ph.D. students to be in charge of research grants, getting them involved right from the proposal writing stage. The exposure allows them to learn the ropes of research management very quickly and makes it second nature to them thus allowing them to be more efficient researchers after completing their studies. Students become so highly immersed in research that research outputs become their key aim rather than the thesis that they need to produce.

Transformation is a continuous process at the school. While it has become an envy and inspiration to others, it is now gearing up for yet another transformation. Innovations are on its agenda and with all the right elements in terms of people, body of knowledge and infrastructure in place, the School of Chemical Engineering is now developing the strategies to turn more of its research findings into applicable innovations.

School of Chemical Engineering,
USM Engineering Campus,
Nibong Tebal

The nucleus

Q&A Session
Professor Subhash Bhatia

The School of Chemical Engineering has been identified as a model PTJ. In this context, almost everybody has mentioned you as an outstanding leader and mentor. What is your approach?

One day, Prof. Abdul Rahman Mohamed gave me a CV to evaluate the suitability of hiring a candidate for the post of an academic staff. I checked the CV and found that most of the papers listed under publications were papers presented in conferences and published in proceedings. The candidate had not published any paper in international journals. I told Rahman that we should hire only those candidates who have good publication records in international journals.

Rahman asked me how our school could succeed in doing this. My answer to his question was that we had to do it collectively by developing a research culture where everyone could publish his/her research findings in international journals. This was the turning point; we agreed to start there and prove that we could do it.

In 1997, I was the first one in the school to succeed in getting our final year undergraduate project-based research published in the *Canadian Journal of Chemical Engineering.* At that time when we managed to publish one paper, everyone started talking and felt that what they thought was not possible was actually possible. This created a research atmosphere and culture where everyone realised the importance of research in terms of securing grants and publications. What is important is confidence building among the staff so that everyone feels that things are possible by doing them in the right manner and providing encouragement to the younger academic staff. I strongly feel that senior academic staff should help the younger staff. I am always ready to help, whenever required.

But most of them say you do not help them by holding their hands . . .

I give them encouragement. For example, when Professor Azlina's research grant application was turned down by RCMO, she was naturally disappointed. Then she, Prof. Farhan and I sat down to relook the proposal, redefine the boundaries of the research area clearly and she resubmitted the proposal. She was awarded the research grant. So I think what I did was confidence building.

Can we go back to what you said? You said that in the beginning, when a paper was published, the others had commented that that was not possible. What made them think that that was not possible?

It was not meant to be impossible. When I joined USM, I found that there was a trend that most of the academic staff always liked to publish their work in conference proceedings and had never thought about publishing it in peer-reviewed international journals. To build confidence in Malaysian tertiary institutions is difficult, initially. For a university to be at the top in the international arena, the publication of research work in international high impact factor journals is extremely important. Everyone must work in that direction by creating a reseach culture, an environment of healthy competition and confidence building. Who can help in this process? There are things that a school can do.

A right kind of mentor can play an important role in building this type of atmosphere. A major role of a mentor should be to encourage the staff and to build confidence among the young academic members. These young lecturers are generally quite energetic and innovative but sometimes, they need to be shown the right path leading to success. Success creates confidence, power of competition and independence. The young lecturers should be trained to write papers. If their papers are not accepted for publication, there should be someone who can guide them on how to get their work published by giving right tips based on his/her experience.

Why . . . ?

Why? They are not trained. Sometimes they lack focus. Focus comes from experience.

You said that the salary structure at USM is a poor one but you are still here. Why?

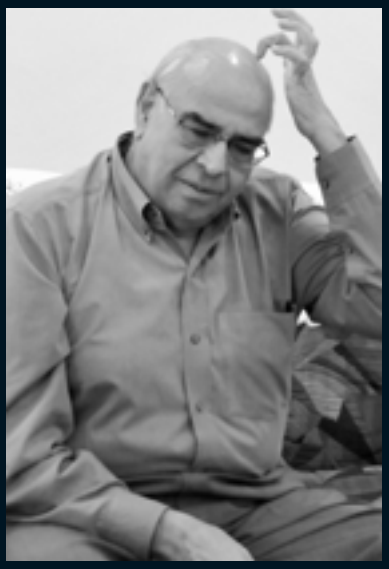
Let me share some information with you. I have been approached by a number of universities which have offered me positions with higher salaries. It is not a question of the salary; it is my relationship and strong commitment with USM. I do not wish to leave USM for the sake of a higher salary. I know that the university has recognised and appreciated my contributions. One of the aspects that I have found very encouraging here is that expatriates are never treated as outsiders. I feel that I am working at home.

Over the years, what kind of culture transformation have you hoped for?

What has been created is a culture for competition. If a lecturer gets a research grant and others do not, they will be asking the recipient why he/she is successful while they have not been so. To me, if a lecturer is not successful with an application, I would go and ask him/her why the application was not successful. We would sit down to work it out so that the next application is successful. Once this happens, it builds confidence among the academic staff. With this confidence, the lecturer can move forward on his/her career path. The important thing is that, with time, people should be able to work on their own and be independent.

So you give confidence to the young lecturers; you also give them specific guidance . . .

I believe that the university should focus on three aspects: 1. research publication 2. innovation and 3. industrial consultation and services. In order to meet these objectives, there should be three kinds of mentors: first is the one who can help young lecturers to write and publish papers. The second one is someone with a passion for innovative research leading to products for the society as well as



industry. This mentor could help in developing new products based on innovative technologies. This may help in getting international awards and patents. If someone is not good in writing, he/she may be a good innovator. Since young minds can be very innovative, once they get facilities and encouragement, they can be quite productive.

The last mentor would be the one who has sound experience in solving industrial problems. This person could be a bridge between the industries and young lecturers in the identification of industrial problems. This person can advise the young lecturers who may have an inclination in providing solutions to industrial problems. Some could liaise with the industrial sector to give advice and seek industrial funding for the university. The academic staff could be excellent writers or product innovators or technology/solution providers capable of meeting the challenges of the industries as well as the society. I think this can bring the university to a high ranking globally.

What kind of qualities must a driver have?

Hard work. The person should be committed and must see a clear career path. I think this has been spelt out by USM very clearly.

What else?

Direction. Direction is very important. Do not look at 20 things at one time. Focus on only one area of research where your capabilities are and where you feel confident that you can achieve excellence.

You said young people these days do not want to work hard . . .

Young people look for short cuts. I have seen myself. You can talk to many of them and at the end of the talk, they ask, "Prof., what I can get from this?" They look for the carrot first. So I tell them – you work first and the success will come.

You talk about expatriates who are not happy in other schools but who flourish at the School of Chemical Engineering. Why?

When these expatriates go to other schools, they only associate with the dean. If the dean wants something to be done, he would ask them. When you do this kind of thing, other staff would be

unhappy. One must avoid this kind of situation if one wants to stay in the university.

Of all the Malaysian universities that offer chemical engineering, are we attracting the best?

We are. But our big competitor is Universiti Malaya because of its location in Kuala Lumpur.

In terms of getting jobs after graduation?

Our graduates have no problems in securing jobs.

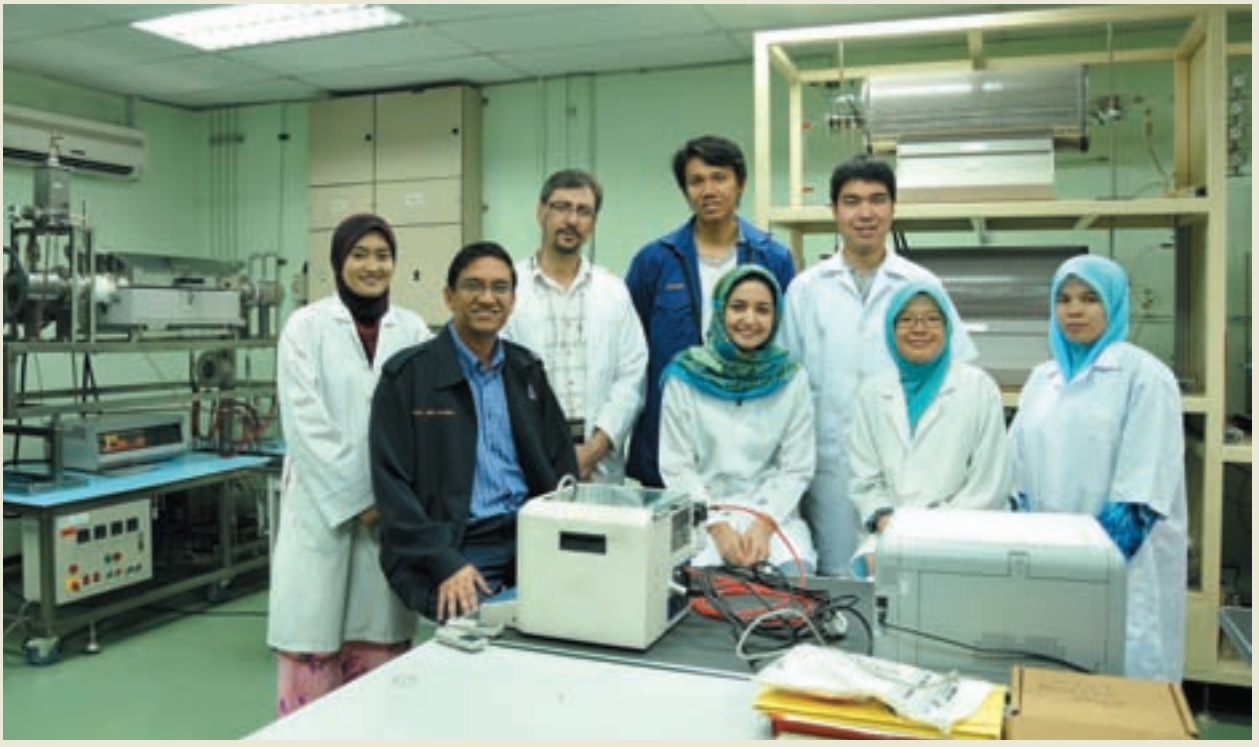
What do you think about APEX and how does it make a difference?

APEX is the recognition which USM has achieved as one of the four research universities of Malaysia. I am very proud that I am a part of a university with the APEX status. In order to achieve the objectives of a APEX university, every one in the university has to work hard and contribute towards meeting its goals. The APEX status is not associated with the academic staff only but with every individual of USM whose contributions are counted in achieving the goals of APEX. APEX needs new thinking, work culture and attitude and a commitment from everyone so that we are different from other universities and can stand tall among them. As an APEX university, we should be a leader to make the changes in higher education, research, innovation, technology development by addressing the issues of sustainability and protecting the environment. An APEX university should act like a knowledge bank and learning centre, where people have confidence that the higher education that is provided is unique and designed to produce graduates who are trained to provide sustainable solutions to the problems related to energy, natural resources, health, environment, diseases and poverty. The contributions of USM as an APEX university should be recognised in terms of their impact in research, innovation, sustainable industrial development, excellent academic system and a better life for the *bottom billion* of the country.

What is the future of the School of Chemical Engineering?

The future of the School of Chemical Engineering is very bright. Looking at the past achievements of the school, I can say with confidence that 1) we are top in research and international journal publications, 2) our Masters and Ph.D.s are the best in Malaysia in terms of their thesis quality and publications, 3) our graduates have all the required skills to meet the industry needs and 4) our young academic staff members are innovative, committed and hard working.

There are certain areas where we have to work hard and these include our interactions with the chemical industry as well as consultancy jobs from the industry In future, we must make an effort to be more visible in the industries. Chemical engineering is undergoing rapid changes in research areas around the world in view of global warming, energy demands, environment protection, safety and the sustainable development of the industries. We have to be in tune with the latest developments related to these chemical engineering research areas. They include molecular engineering, biotransformation, energy and environmental engineering, nanoscience and nanotechnology, concepts of biorefining in the production of chemicals using natural resources, new materials for energy storage, transformation and utilisation, surface and interfacial engineering, system design and engineering. The School of Chemical Engineering has to look at the strength of the research areas of the present academic staff and find new ways to meet future challenges by embarking on these new research directions. In this way, the school will not be left behind in research, innovation and future industrial needs. The curriculum needs to be revised and changed in line with new research areas to produce graduates with required skills so that they can be the leader in the future chemical industries of Malaysia.



Research group members of Prof. Abdul Rahman Mohamed (second from left), Nurul Hidayah, Ali Hassani, Yeoh Wei Ming, Maedeh Mohammadi, Lee Kim Yang, Rohaya and Nurul Aini

Professor Abd. Rahman Mohamed
Nanotubes

Professor Abdul Rahman Mohamed's research interests are in the fields of Nanoscience and Nanotechnology, Environmental Pollution Control, Catalysis and Reaction Engineering.Catalysts are substances that change the rate of a chemical reaction without undergoing permanent chemical changes themselves. They play an important part in many industrial reactions that enable specific desirable reactions to take place. However, not all catalytic processes are considered to have "green features" as some involve the use of hazardous or non-renewable substances, high cost materials, energy intensive and high risk processes and excessive waste generation.

Green catalytic technology covers design of novel catalytic materials, chemical processes, catalytic reactors and products that reduce the involvement of hazardous or non-renewable substances. Besides that, it provides a number of other benefits including waste reduction to eliminate costly treatments, safer products and reduced use of resources to improve the competitiveness of chemical manufacturers. Green catalytic technology fits well within the objectives of sustainable development in meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Carbon nanotubes (CNTs), an innovative product, have an amazingly wide range of applications. In this regard, Western Europe, US and Japan are actively involved in nanotechnology research and development and continue to be the leading spenders in nanotechnology research and development. These governments have spent in excess of USD 22 billion for the development of nanomaterials. Applications of CNTs will boost the electronic, chemical, mechanical, material, pharmaceutical and medical industries, with the revolutionary changes arising in these areas. This promises mankind a higher standard of living, better quality of life and healthier and richer lifestyles. Hydrogen, a side product of the developed technology, is widely needed in the chemical and petrochemical industries.

Its future application is as an energy carrier in fuel cell for automobiles, replacing petrol and diesel as fuel. In view of the exhaustible reserves of petroleum, it is vital to the world that a substitute such as hydrogen be developed. The success of this research plays a contributory role in spearheading Malaysia to global recognition and to greater economic and industrial growth.

Environmental catalysis is a key technology to provide solutions to many environmental issues. In Malaysia, lately the emissions of SO_2 and NO_x gas from various sources of combustion have caused human health and environmental problem. Thus, efforts to control these SO_2 and NO_x emissions have become a great deal to the Department of Environment, Malaysia as well as to the general public. Furthermore there is also a demand from Malaysian palm oil mills to find new applications for waste by-products and the possibility of generating value added products to the waste materials. In order to manage the requirements and demands, these research studies have been materialised with a process which simultaneously removes SO_2 and NO_x at an economical cost and concurrently exploits the usage of palm oil mill waste by-products. The catalytic technology used in this research work could solve the environmental problem on top of encouraging the usage of value-added local products.

The focus on waste minimisation and water conservation in recent years has also resulted in the production of concentrated or toxic residues. It is of utmost importance to dispose off these residues in a proper manner as well as to keep the concentration of chemicals in the effluent stream to a certain minimum level in order to comply with the environmental laws, which are becoming more stringent these days. As a response, the research into more efficient wastewater treatment technologies so as to degrade the complex refractory molecules into simpler molecules is vital to combat the deteriorating water quality.

[FIRST ROW FROM LEFT]: Muslina Abd Majid, Wan Khairunnisa Wan Ramli, Prof. Abdul Latif Ahmad [SECOND ROW FROM LEFT]: Oh Pei Ching, Nuur Fahanis Che Lah, Muhammad Azan Tamar Jaya, Nor Irwin Basir [THIRD ROW FROM LEFT]: Low Ee Mee, Norhidayah Ide

Professor Abd. Latif Ahmad
Membrane technology

Prof. Abdul Latif Ahmad received his doctorate in Membrane Technology from University of Wales, Swansea, United Kingdom in 1995. Latif was accredited as one of the youngest professors in Universiti Sains Malaysia and currently, he is the Research Dean of the Fundamental Science Platform in Universiti Sains Malaysia. Latif is a fellow of the Institute of Chemical Engineers, United Kingdom. He is also inducted as Chartered Engineer and member of the European Desalination Society and a member of the American Chemical Society.

Latif supervising his graduate student

Abdul Latif's core field is membrane technology, which remains a major focus of his research. He is the pioneer of membrane synthesis in Malaysia, encompassing a wide range of membranes including nanocomposite polymeric membranes, advanced functionalised membranes and catalytic ceramic membranes which cover microfiltration, ultrafiltration, nanofiltration and reverse osmosis membranes. He is the first in the region who has successfully invented a novel membrane auto casting machine for the fabrication of even, smooth, ultra-thin and defect-free membranes with enhanced life span. This achievement is a breakthrough in membrane science and technology as new types of membranes with varying properties and morphologies can be produced to meet the wider and more diversified applications to cater to the market demand.

Pertaining to wastewater treatment, among one of his most prominent research inventions is the development of a novel-innovative treatment process of palm oil mill effluent (POME) using membrane separation technology coupled with chemical/physical pretreatment. Using this invention, palm oil mill effluent, one of the world's most polluting wastewaters can be treated and recovered as crystal clear drinking water that comply with the United States Environment Protection Act (USEPA) Standard. Another key advantage of his work is that this treatment process incorporates the zero-discharge concept whereby no waste products are produced; instead the by-products can be converted to organic fertilisers and value-added products such as carotene can be recovered. Other advantages include smaller space for installation, lower investment and operation cost and the non-usage of microorganisms which are extremely difficult to handle. In short, with his novel and innovative invention, POME can now be easily treated using a cost effective, zero discharge and green technology.

[FIRST ROW FROM LEFT] Soon Ai Ni, Muataz Sh, Khayoon, Professor Dr. Bassim H. Hameed , Akpan U. George, Moses Aderemi Olutoye, Nur Ashikin Binti AB Rahman, Nur Hidayah Binti Mohammad Azmi [SECOND ROW FROM LEFT] Dr. Victor Obinna Njoku, Manase Auta, Foo Keng Yuen, L. H. Chin

Professor Bassim H. Hameed
Reaction engineering & adsorption

Professor Bassim H. Hameed's research in the area of Reaction Engineering & Adsorption (READ) started more than a decade ago in the School of Chemical Engineering, Universiti Sains Malaysia. READ was established with the specific goal of conducting research in the fields of Reaction Engineering and catalysis applied to environmental and energy problems, biomass pyrolysis, production and characterisation of activated carbon and their applications to industrial wastewater treatment and pollutant transport in the environment. Within the span of time mentioned above, a considerable experimental and theoretical infrastructure which allowed investigation into a wide variety of issues related to READ has been acquired.

Researchers hard at work

Laboratory scale high-pressure reactors, experimental set-ups for preparation of activated carbons, fixed-bed adsorption systems for removal of pollutants from air and water streams have been constructed and analytical instruments are available for analysis of different pollutants. Catalysts for (a) upgrading of petroleum residual oil, (b) production of biodiesel from edible and non-edible oils and (c) advanced oxidation processes (AOP) have been developed and fully employed in the processes. Both the catalysts and activated carbons with other adsorbents have been characterised to validate their properties.

Since the inception, Bassim's research was supported by research grants from Universiti Sains Malaysia, MoHE and MOSTI. So far four Ph.D. and 14 M.Sc. students have graduated from his group, while eight Ph.D. and six M.Sc. students are currently on their research. One post-doctoral fellow finished his work in 2009, while there are two post-doctoral fellows on their programmes. To date, Bassim has published more than 175 research articles in national and international journals and proceedings including 85 articles in ISI-indexed journals. According to Scopus, Bassim's h-index is 22. According to a recent Science Direct report, more than 15 of his papers were among the Top 25 Hottest Articles accessed in 2007-2010.

The READ Group has gained recognition nationally and internationally and has an overbearing impact on the environment, as the products developed have been employed to put our environment in a proper aesthetic condition. The leader of the group, Bassim has received many awards in recognition of his outstanding contributions to research. He won the Chancellor's Sanggar Sanjung award for excellence in research products, silver and bronze medals from the Ministry of Science, Technology and Environment (MOSTE), Malaysia and I–TEX respectively in 2003 and 2004 for research products development and innovations. In 2005, he received the Chancellor's award for excellence in research. He received the Dean's outstanding lecturer award in both 2007 and 2008. Again, in 2008, he received the Vice Chancellor's excellence achievement award for 2007. In the same year, he received seven Chancellor's Sanggar Sanjung (Hall of Fame) awards for excellence in journal publications in 2007. In both 2009 and 2010, he was a leading awardee of the Chancellor's Sanggar Sanjung awards for excellence in journal publications.

USM leading researchers – of talent and passion

The researchers have been the primary force that has built USM from strength to strength, bringing it to where it is today. USM is proud to boast a long list of eminent researchers who have brought recognition both to the university and the country. Their work has been recognised at the international level, with a list of publications going into the hundreds and have received various awards at the national and international levels. For example, USM researchers have been gaining a lot of attention in the Thomson-Reuters website (http://science.thomsonreuters.sg/, accessed on 23 December 2010) with Professor Zainuriah Hassan ranking first for all click throughs (please see the accompanying screen shot). Many of these researchers are also editors to several journal publications.

What sets leading researchers apart from many of us is that, when asked to write about themselves, they would rather write about their research. The introduction to many of their profiles, such as one by Professor Abdul Rahman Mohamed, starts with the technical introduction to their research, followed by discussions on the current state of their research and why the research is important . For these researchers, the *self* and research have been intertwined into one and for some, research clearly comes first.

Passion makes the life of these researchers go around and permeates every little thing they do. Associate Professor Lee Keat Teong from the School of Chemical Engineering, is much known among his students and colleagues for his passion for developing new technologies for renewable fuel production. It is also passion that provides the drive for them to work long hours, seven days a week. In fact, for many of them, the laboratories and the office have become their second, if not the first home.

While passion has been the drive for these researchers, reason has been the bedrock of their success. These are researchers who live by the principles of science as well as humanity. Their in-depth knowledge of their field of research has made problem solving second nature, thus allowing them to make precise and accurate decisions leading to rapid research discoveries. USM leading researchers, however, are not doing research for the sake of research

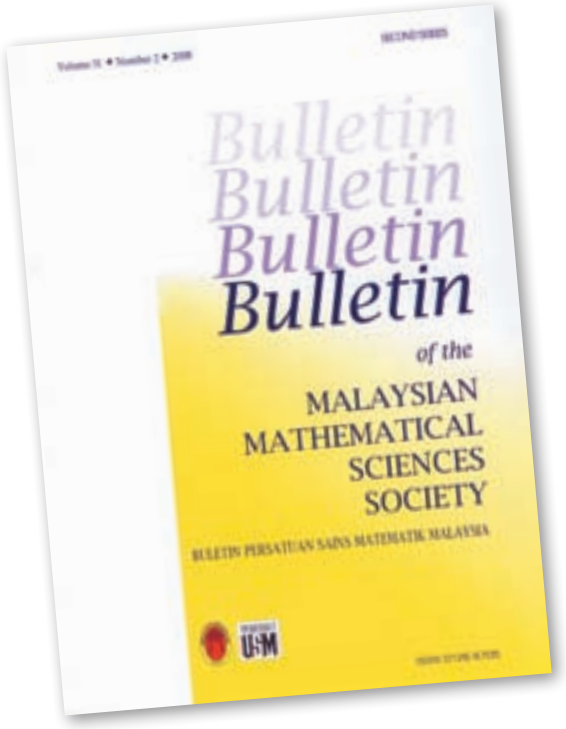
but rather, in the hope of bringing about changes in the world that we live in. The work of Professor Asma Ismail, for example, has resulted in rapid and affordable diagnostics for infectious diseases particularly for people in underdeveloped countries. Their research is about bringing transformations to the people around them. It is these researchers that have been the inspiration behind USM's corporate vision. They live and breathe that vision.

Interestingly, the long list of publications, awards and innovations has not been a reason for them to rest on their laurels nor has it led to magnanimous egos. In fact, the opposite is observed. Despite the various administrative positions that these researchers hold, they have always made time for research and their research students and have never failed to produce publication upon publication. These researchers are also eager to help young researchers produce quality research and nurture them to become excellent researchers. For instance, Professor Subhash Bhatia has been the mentor for young researchers, many of whom have become leading researchers themselves such as Associate Professor Lee Keat Teong and Professor Azlina Harun.

USM has indeed been privileged to have on board such a diverse and talented group of researchers. Their contribution to the university has been immense and integral to USM achieving its APEX targets. Importantly, they have taken it upon themselves to train young researchers to follow their footsteps, thus putting into motion a virtuous cycle that will enable USM to continue to have a big community of talented, passionate and concerned researchers.

Highly accredited mathematical journal published by USM

The Bulletin of the Malaysian Mathematical Sciences Society is a peer-reviewed and open-accessed journal published jointly by the Malaysian Mathematical Sciences Society and Universiti Sains Malaysia. It publishes original research articles and expository survey articles in all areas of mathematics in one volume of three issues – January, May and September – every year. The publication of the bulletin began in 1978 under the purview of Universiti Malaya and then moved to Universiti Kebangsaan Malaysia in 1996. USM took over the publication in 1998 and the mandate to publish the bulletin annually now remains with USM. A Letter of Understanding was signed between the Malaysian Mathematical Sciences Society and USM to jointly publish the bulletin in 2001. This was subsequently followed with the signing of a Memorandum of Agreement between both parties in 2004. Professor Dato' Rosihan M. Ali of the School of Mathematical Sciences USM has been appointed as Editor-in-Chief for the bulletin since its operation under the USM banner. Currently, there are 21 members in the Editorial Board comprising academicians from Malaysia, India, Taiwan, Bangladesh, Indonesia, Pakistan, Japan, Iran, China, South Korea, Hong Kong and Australia.



A journal of high repute, the bulletin is indexed by the citation databases of *Science Citation Index Expanded* (ISI Web of Science), *Mathematical Reviews/MathSciNet* (American Mathematical Society), *Zentralblatt MATH* (European Mathematical Society), *Scopus* (Elsevier), *Current Index to Statistics*, and *Statistical Theory and Method Abstract*. The bulletin has also exchanged arrangements with 49 international journals which are indexed and abstracted in the citation databases of *ISI*, *Scopus* and *Mathematical Reviews*. The bulletin is widely accessible. It is covered by Google Scholars and subscribes to EBSCO, SWETS, EXLIBRIS and Kinokuniya. In addition, each article that is reviewed and indexed in the database of *MathSciNet* is linked to the bulletin's website and also included in the Electronic Library of Mathematics offered by FIZ Karlsruhe/Zentralbatt Math. Access to the bulletin is also made easy through its own website of http://math.usm.my/bulletin.

The bulletin started to distinguish itself in 2007 when it was included in the *Science Citation Index Expanded* (Web of Science). It was the fourth Malaysian journal indexed in the *Web of Science* database alongside other three journals: the *Asia-Pacific Journal of Public Health*, the *Journal of Oil Palm Research* and the *Journal of Rubber Research*. Recognition for the journal has increased as it obtained the best ERA quality rating amongst Malaysian journals from the *Journal of Citation Report* (JCR) in 2009. Out of 251 impact factor journals from the 2010 Master Journal List in the *Science Citation Index Expanded* for the category of Mathematics, the bulletin is ranked 222 and has an impact factor of 0.341. It reflects 16.5% of impact factors journals listed in *MathSciNet* by American Mathematical Society and only 225 of 883 established journals in *MathSciNet* were rated higher than the bulletin.

Due to its outstanding reputation, the bulletin has increasingly become an important avenue for research paper publications. In 2009, there were 521 submissions from more than 61 nations, mainly from China, India, Turkey and Iran. In general, paper contributors are mostly from South Asia and East Asia regions, followed by Europe and Africa. The bulletin has gained a reputation as an established scholarly Malaysian journal of world class standard.

Scholarly publisher of repute – Penerbit USM

Penerbit USM (USM Press) publishes academic books and peer-reviewed journals in the fields of humanities, social sciences, management, medicine, sciences and engineering. Formed in 1972, *Penerbit USM* is committed to the dissemination of knowledge through scholarly publications. Since its inception, it has been implementing the publication policies of Universiti Sains Malaysia formulated by the University Publication Committee which is chaired by the Deputy Vice Chancellor (Research and Innovation). *Penerbit USM* comprises divisions and units that carry out acquisition, editorial, production and marketing activities. Its current director, Professor Dato' Dr. Md. Salleh Yaapar, is a distinguished scholar of literature and an accomplished author. Its editorial team consists of skilled and experienced editors such as Akhiar Salleh, A'watif Ahmad and Fazlina Mohamed Rouse who are often appointed as consultants and juries at university and national levels.

With over forty years of experience in this field, *Penerbit USM* is a recognised publisher in Malaysia. Its publications have won several awards at the national level including the Malaysian Council of Scholarly Publishers (MAPIM) Award, the Malaysian Mathematical Society (PERSAMA) Award, the Malaysian National Book Council (MBKM) Award, the Malaysian Linguistic Society-Public Bank Award, the Fuji Xerox Award and the USM *Anugerah Sanggar Sanjung* Award.

As an established publisher, *Penerbit USM* has also embraced the vibrancy of journal publications. Many of its journals are abstracted and indexed in a number of established databases such as ISI, SCOPUS, the Bibliography of Asian Studies (BAS), the Malaysian Abstracting and Indexing System (MyAIS), the Google Scholar, the Directory of Open Access Journals (DOAJ), MathSciNet, the Southeast Asian Serial Index (SASI) and Genamics JournalSeek. As of 2010, there are 15 journals published by *Penerbit USM*. The journals are:

1. Asian Academy of Management Journal
2. Asian Academy of Management Journal of Accounting & Finance
3. Bulletin of the Malaysian Mathematical Sciences Society
4. International Journal of Asia-Pacific Studies (IJAPS)
5. Journal of Construction in Developing Countries
6. Asia Pacific Journal of Educators and Education
7. Journal of Engineering Science

View of the Penerbit USM's building

8. Journal of Physical Science
9. *Kajian Malaysia*
10. *Kemanusiaan*: The Asian Journal of Humanities
11. Malaysian Journal of Distance Education
12. Malaysian Journal of Pharmaceutical Sciences
13. Malaysian Journal of Medical Sciences
14. Tropical Life Sciences Research
15. *Wacana Seni*: Journal of Art Discourse

In its effort to improve the visibility of these journals, *Penerbit USM* has licensed EbscoHost in the delivery of the journals' digital contents to individual academics and libraries worldwide. It is expected that the journals' digital contents will be made available through the ProQuest database in 2011. *Penerbit USM* has also made great efforts in upgrading the quality of these journals both in print and electronic form. As of last year, it has started using Scholar One Manuscripts as an online management system for the journals.

Penerbit USM has a gallery called *Taman Buku* (Book Garden) that showcases and sells its publications. The gallery also promotes activities related to the enhancement of reading habits and knowledge dissemination to the campus community and the public. In the same vein, *Penerbit USM* organises *Heboh Buku* (Book Fest) as an annual event to promote new publications. The book fest hosts a number of activities such as book launching ceremonies, book review sessions and poetry readings. *Penerbit USM* also publishes the Healthy Campus Series, as part of its corporate social responsibility, which focuses on social issues such as preservation of the environment and poverty eradication. *Penerbit USM* also prides itself in the publication of its *Pantun Series* which demonstrates a continuous effort in preserving Malaysia's literary heritage.

To move forward, *Penerbit USM* has focused on establishing linkages with international authors and publishers. The strategies include attracting international authors to publish with *Penerbit USM* and working in collaboration with global publishers. To date, it has published a number of books written by international authors and is collaborating with the International Convention of Asia Scholars (ICAS) based in Leiden, the Netherlands to co-publish books on Asian Studies. Apart from establishing linkages, *Penerbit USM* has also embarked on new ways of publishing, marketing and promoting its publications internationally through e-publishing and e-commerce.

Indeed, the future for *Penerbit USM* is promising. It has made significant impact on the national publishing arena. It is now important for *Penerbit USM* to further enhance its profile by attracting more authors and distributors of international repute. Aiming to go beyond national recognition, *Penerbit USM* aspires to be one of the leading world class publishers for the global market.

Awards received by Penerbit USM

Penerbitan ilmiah

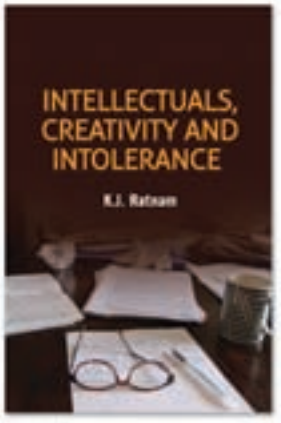
USM menang tiga daripada lima Anugerah Mapim

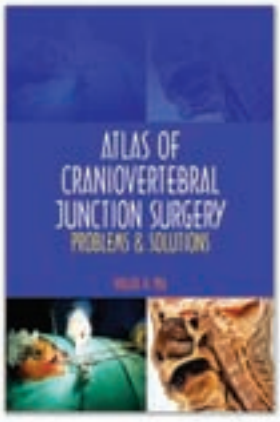
Academic publications – USM won three of five Mapim Award, *Berita Harian,* 14 April 2010

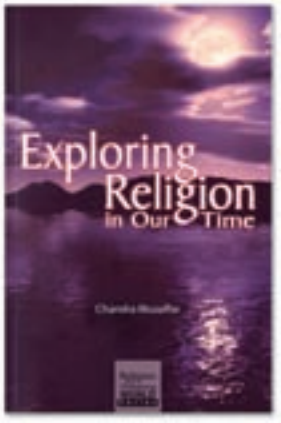
Amongst its impressive backlist of titles which have won the prestigious MAPIM Award are the following:

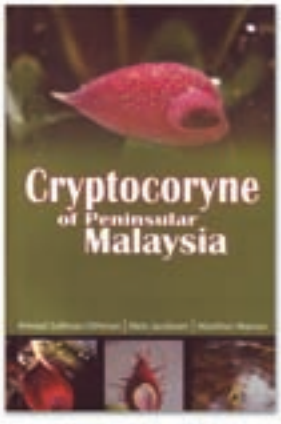
- Best Book Category (Humanities and Social Sciences) 2007
  Appreciation Prize
  Muhammad Haji Salleh. (2006). *Romance and Laughter in the Archipelago: Essays on Classical and Contemporary Poetics of the Malay World,* Penang: Penerbit USM.
- Best Article Category (Humanities and Social Sciences) 2007
  Appreciation Prize
  Patricia Matusky. (2004). The Iban Pantun – Poetry and Song, *Wacana Seni: Journal of Arts Discourse,* 3, 61-85.
- Best Article Category (Science, Technology and Medicine) 2007
  Appreciation Prize
  Bacille Calmette-Guerin, Rapeah Suppian, Zainul Fadziruddin Zainuddin & Mohd. Nor Norazmi. (2006). Cloning and Expression of Malaria and Tuberculosis Epitopes in Mycobacterium Bovis, *Malaysian Journal of Medical Sciences 13 (1),*13-20.
- Best Copy-editor Category (Science, Technology and Medicine) 2007
  Appreciation Prize
  Nik Nurolaini Nik Mohd. Isa. Copyeditor of Mahyuddin Ramli & Noor Faisal Abas (Eds). *Teknologi Binaan untuk Negara Membangun*. Penerbit USM.
- Special Prize for Bulletin 2007
  Bulletin of the Malaysian Mathematical Sciences Society. Published by Penerbit USM and The Malaysian Mathematical Sciences Society. ISSN 0126-6705
- Best Book Award (Humanities and Social Sciences) 2008
  Jelani Harun. (2008). *Undang-undang Kesultanan Melayu dalam Perbandingan,* Penang, Penerbit USM.
- Best Book Award (Science, Technology and Medicine) 2008
  Hollol K. Pal. (2008). *Atlas of Craniovertebral Function Surgery: Problems and Solutions,* Penang, Penerbit USM.
- Best Journal Article Award (Science, Technology and Medicine) 2008
  Rosihan M. Ali, V. Ravichandran & N. Seenivasagan. (2008). Subordination and Superordination of the Liu-Srivastave Linear Operator on Metamorphic Function, *Bulletin of Malaysian Mathemathical Science Society 31(2)* 193-207.
- Best Book Award (Humanities and Social Sciences) 2009
  Jelani Harun. (2008). *Bustan al-Salatin: A Malay Mirror for Rulers,* Penang, Penerbit USM.
- Best Book Award (Science, Technology and Medicine) 2009
  Ahmad Sofiman Othman, Neils Jacobsen & Mashhor Mansor. (2009). *Cryptocoryne of Peninsular Malaysia: A Portrait of an Enchanting Plant Genus,* Penang, Penerbit USM.
- Best Journal Article Award (Science, Technology and Medicine) 2009
  Shamani Supramaniam, Rosihan M. Ali, See Keong Lee dan V. Ravichandran. (2009).Convolution and Differential Subordination for Multivalent Functions", *Bulletin of Malaysian Mathematical Science Society 32(3),* 351-360.

PENERBIT USM









Centres of excellence for swimming and hockey in USM

Universiti Sains Malaysia pursues excellence in both the academic and athletic fields. The establishment of its research centres and units signifies the development of academic excellence. Likewise, athletics excellence is very much linked to the development of sports centres and programmes. USM provides various sports and recreational amenities such as seven soccer fields, an athletics stadium (with an approved eight lane synthetic running track and a soccer field), an Astroturf hockey stadium and an Olympic sized swimming pool (complete with spectator facility). In addition to these major infrastructures, the university has facilities for other sports such as badminton, squash, volleyball, basketball, table tennis and gymnasiums. The USM involvement in sports is broad and diverse but swimming and hockey are highly ranked activities.

Making the splash in the Malaysian swimming scene

USM has established a Swimming Sports Excellence Centre (or Pusat Kecemerlangan Sukan Renang) and a Hockey Focus Sports Centre (or Pusat Sukan Tumpuan Hoki) to strengthen the country's mission to produce athletes of high calibre, capable of world class performance and at the same time, who are academically qualified – specifically swimmers and hockey players. This mission is aligned with the Ministry of Higher Education's (MoHE) target to produce at least 30% of Malaysian national athletes pooled from the student populations of the universities by 2015. The MoHE pioneer initiative was launched in 2010 to advance sports by involving universities in sourcing sports talents and utilising their resources in sports science and research. To support this initiative, USM has revitalised its swimming and hockey centres towards delivering excellence.

The Swimming Sports Excellence Centre

The USM swimming centre was given a major revamping in 2010. In its initial stage, the centre has set up an advisory committee board comprising the Vice Chancellor, Professor Tan Sri Dato' Dzulkifli Abdul Razak as the advisor, Professor Dato' Omar Osman as the chairman, Muhamad Mohd. Hanif as the secretary, Hajah Salmiah Che Puteh as the treasurer and a list of committee members including the Sports and Recreation Centre as the secretariat. The role of the committee board is to ensure the success of the planned national programme of producing great swimmers to compete at national as well as international levels.

In its revival, the centre which was previously known as the USM swimming centre is now changed to the Swimming Sports Excellence Centre (Pusat Kecemerlangan Sukan Renang). To streamline the operational aspects, a workshop was held to formulate a standard policy to address pertinent issues that range from managing the facilities to grooming the talents. With regard to implementation endeavours, three categories of swimmers have been formed : (1) category I *onsite* USM – consisting of eight athletes trained by USM coaches, (2) category II *offsite* – comprising ten athletes which are recruited from other universities and groomed by their own university coaches and (3) category III – including seven national athletes under the management of, and training by, the National Amateur Swimming Association and the National Sports Council of Malaysia. These 30 athletes are the pioneers. A more aggressive search for talented swimmers at public and private institutions is planned for the future. The centre targets for an

USM spearheading hockey to its greatest potential

increase in onsite: offsite percentages of athletes by 60:40 in the next round of recruitment. Hence, the centre intends to organise championships such as the 2nd Invitational USM Swimming Championship and the USM Open Swimming Championships in 2011 to achieve the target. Future action plans have been developed for members of the USM Swimming Sports Excellence Centre to participate in championships of national as well as international standing.

The Hockey Focus Sports Centre

In line with the MoHE's initiative to increase the number of hockey players of high calibre, USM has been selected to spearhead hockey to its greatest potential. Focusing on excellence, the USM hockey centre was formalised as the Hockey Focus Sports Centre (Pusat Sukan Tumpuan Hoki) in 2010. Similar to the revival of the Swimming Sports Excellence Centre, the Hockey Focus Sports Centre has undergone a major transformation which includes the implementation of renewed policies and guidelines and an improvement of equipment and facilities. This includes appointment of coordinators and coaches, upgrading work on the facility and acquisition of new equipment.

Unlike swimming, USM has established its reputation in hockey through its involvement in Pesta Hoki USM-Penang (also known as the USM-Penang International Hockey Tournament). It is one of the Asia Pacific region's leading sporting events – which is open to all clubs, institutions of higher learning, colleges, schools, government departments and private institutions in Malaysia and the Asia Pacific region. The tournament has gained popularity from time to time and this has given USM a major impetus in the sporting arena. This annual tournament has seen over 350 teams in the sixes and sevens categories with over 50 teams from the Asia Pacific region – such as Singapore, Thailand , Indonesia, Brunei, India, Sri Lanka, Hong Kong, Uzbekistan – and about 300 teams from the host country of Malaysia. Since its inception in 1973, the tournament has seen the development of young talents through the Under 12 to senior categories. The tournament is indeed a stepping stone in the search for talent and is certainly a great privilege to the centre in its quest to deliver excellence.

Padang A of Minden Green

Leading the debate on Malaysia's economic future

The economic roadmap announced by the government marks the first time in the country's history where its economic agenda is shared with the public. Malaysians are generally excited over the prospect of pursuing economic reforms to achieve its economic growth.

As part of its economic agenda, the government has announced 131 projects totalling RM670 billion under the Economic Transformation Programme (ETP) that will be led by the private sector. Many CEOs have called for the government's role in business to be reduced to allow freer competition.

Panelists and organisers of the Grand Debate

Sensing that there is a gap in the discussion of Malaysia's economic future, USM's Graduate School of Business organised the Grand Scholarly Debate on 9 October 2010, presenting a platform to discuss the hurdles and challenges facing the private sector as the new engine of growth in the ETP. The Debate was also viewed as a step towards enhancing the relationship between the private and public sectors given the role of the private sector as the engine of growth. The overall objective of the Debate is to realise the government's vision to achieve a high-income economy status by 2020.

The topics that were discussed during the forum included an analysis on the 12 proposed National Key Economic Areas (NKEAs), strategies towards energising the private sector, eliminating market distortion, implementing merit-based programmes, re-assessing the subsidy system, strengthening the financial environment and attracting foreign investments into high-value added sectors.

The Debate sessions

The Debate consisted of two sessions – the morning session was a lively open round-table debate between two key government policy makers and representatives from two of Malaysia's largest Chambers of Commerce. They discussed the challenges and issues facing the economy in the presence of 500 invited guests comprising corporate leaders, academicians, representatives from various Chambers of Commerce, business associates, members of NGOs and eminent economists.

The four distinguished panelists were the Chairman of the National Economic Advisory Council (NEAC), Tan Sri Amirsham A Aziz, the Chairman of the Malaysian Industrial Development Authority, Tan Sri Sulaiman Mahbob, the President of the Malaysian International Chamber of Commerce and Industry (MICCI), Charles Ireland and the Chairman of the British American Chamber of Commerce, Jonathan Addis.

The afternoon session, called *Views from distinguished speakers*, was attended by former Proton Chairman, Tan Sri Dr. Mahaleel bin Tengku Arif; he expressed his views regarding what had been discussed during the morning session.

The Debate questions

The morning session was followed by a question-and-answer session. Among the questions raised was whether the private sector is ready to be the country's growth engine in the years ahead, given the pervasive and dominant role of the government over businesses in the past.

Under the 12 proposed NKEAs, questions were raised on whether Malaysia has the skilled workforce to

meet diverse demands given the huge percentage of unskilled workers in the country. Some suggested that perhaps it makes more economic sense to focus on fewer sectors and tap into Malaysia's economic core strengths.

In terms of funding, the total amount of investments needed to implement the NKEAs projects over the next 10 years amount to RM1.4 trillion of which 27% or RM378 billion will be sourced from foreign direct investments. Hence, the investments required from foreign investors average about RM37.8 billion annually beginning from this year. Questions were raised on whether the government is doing enough to improve the investment climate to compete for global FDI flows.

Others in the audience also raised the question of implementation. The slew of economic programmes announced by the government – the ETP, the New Economic Model (NEM) and the 10th Malaysia Plan to name a few – will witness the transformation of Malaysia's entire economic landscape if implemented effectively. While setting targets and plans demonstrates the government's commitment to transform the economy, they have to be carried out within a specific time frame and speed in order to win the confidence of the people and investors.

Some guests even went to the extent of suggesting that the volatile electrical and electronics sector should be entirely removed from the country's economic agenda. This sector is being projected to increase Malaysia's gross national income to RM90 billion by 2020, generating 157,000 jobs. The Malaysian government is adamant that the sector maintains its global share in the semiconductor and LED industry despite its volatility and higher operating costs.

The Debate is pioneering the kind of discussion that combines industrial experts, public policy makers and academia and held outside the typical Klang Valley. It provides a chance where there is a meeting between important players of the country – both from the private and government sectors – to debate on how to assist the country with its government transformation programme (GTP) and economic transformation areas (ETAs) to enable the country to move towards the achievement of a high- income economy and the NEM in general. Inputs from the Debate would be forwarded to PEMANDU for its consideration.

Lush green beauty of the campus

IPS – the gateway to graduate education

Visit the IPS website at [http://www.ips.usm.my/]

The strong emphasis on sustainability in education and research has made the Institute of Postgraduate Studies (IPS) even more important. One of its key aims is to attract and retain talented postgraduates to support USM's aggressive research agenda following the APEX announcement. In fortifying its role in strategising, managing and monitoring all matters pertaining to postgraduate study programmes, IPS has outlined a 10-year strategic roadmap based on four pillars: student quantity, student quality, academic environment and student support services. The roadmap delineates a holistic approach in postgraduate training that infuses quality at the input level and a continuous student enhancement programme at the process level so that the graduates at the output level are versatile, innovative and highly employable.

Thumbs-up for USM

Two initiatives that have been rolled out in line with the 10-year roadmap are the Postgraduate Academic Support Services Centre and the Postgraduate Marketing Unit. The Postgraduate Academic Support Services Centre provides not only consulting services for editing and statistical analysis for students but also caters for a structured development of academic skills such as thesis writing as well as transferable skills such as time management and planning, presentation skills and entrepreneurial skills. The Postgraduate Marketing Unit was established to meet the highly competitive demand in the sector of higher education. The unit was specifically set up to monitor and evaluate potential markets, ensure the positioning of USM as a sustainable, transdisciplinary, pioneering research university that is thoroughly understood by the community and to ultimately execute outreach strategies that will diversify the postgraduate student profile.

In ensuring the quality and credibility of USM as an international research university, IPS has played a prominent role in two international collaborations, the Co-Tutelle agreement between USM and Universite Henri Poincare (UHP) in France (the first for a Malaysian public university) and the USM-RIKEN Joint Graduate School Programme. The collaborations encourage long-term and sustainable research activities between the universities as well as foster the development of tools, facilities and equipment for research.

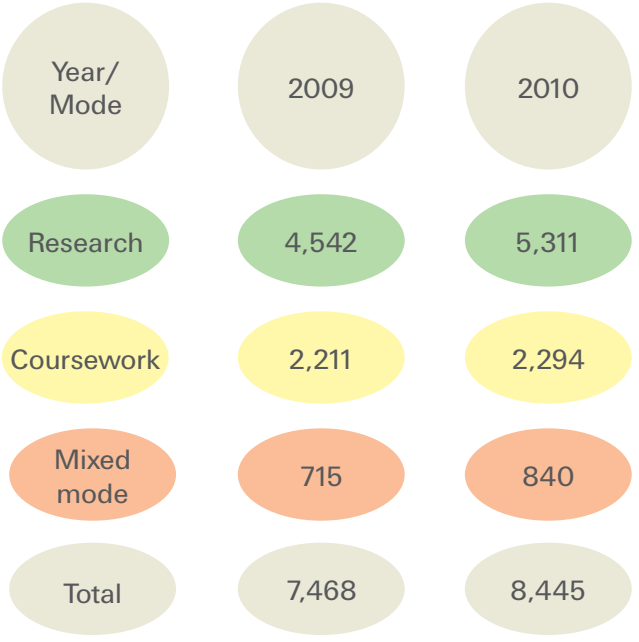
The French connection

The Co-Tutelle agreement between USM and UHP, started since 1999, specifies the development of a sustainable future for socio-economically challenged individuals, while providing an opportunity for improved well-being. Upon completion, candidates receive a Ph.D. degree from both USM and UHP. Ph.D. candidates from USM will be selected to further their research in UHP under the Academic Staff Training Scheme (ASTS). Thus far, the following staff have participated in the programme: Dr. Afidah Abdul Rahim (Deputy Dean of Academic and Student Development, School of Chemical Sciences, 2002-2005), Dr. Noor Hana Hanif bt. Abu Bakar (lecturer, 2006-2010), Dr. Koh Cha San (PPJJ, 2005-2008) and Tuti Katrina Abdullah (registered with the School of Materials and Mineral Resources Engineering). In 2009, the memorandum of agreement between UHP and USM (represented by the School of Chemical Sciences and the School of Materials and Mineral Resources Engineering) was renewed to make it possible for students at USM to carry out postgraduate (Masters) studies in the fields of (i) chemistry and molecular physics and (ii) physics and materials, at UHP and for students of UHP, to study (i) chemical instrumentation and (ii) materials and engineering, at USM.

Going Japanese

Similarly, a USM-Riken Joint Graduate School Programme was established under the name Asian Programme Associate (APA) to identify and foster

Postgraduate Enrolment



talented young scientists capable of contributing to future research collaboration between USM and the RIKEN Institute, a renowned science and technology institute in Japan. The programme, coordinated by Associate Professor Sudesh Kumar, is tailored to Ph.D. students registered under USM to carry out research at RIKEN for a maximum period of three years. Upon completion, students will receive a Ph.D. degree from USM and a certificate from RIKEN.

Initially funded by RIKEN, the limited budget had allowed only a student per year to pursue the programme. The increasing demand and the positive progress of the programme motivated RIKEN to later expand the programme to allow the participation of as many as three USM students per year. The APA programme has now evolved to the current wider programme known as the International Programme Associate (IPA) where students are jointly funded by USM and RIKEN.

The USM-RIKEN Joint Graduate School Programme has far reaching short-term and long-term national and international impacts. The immediate short-term impact can be seen in the exposure given to USM students. The high levels of fundamental research carried out at RIKEN as well as the advanced facilities there provide students with extensive opportunities to learn and master new knowledge and research skills. The programme also provides IPA candidates with the opportunities to interact with leading scientists of various nationalities at RIKEN, thus encouraging them to form their own research networks. In addition, the programme provides valuable opportunities for the students who are interested to learn the Japanese language as well as to get acquainted with the work ethics of the Japanese.

RIKEN actively promotes collaborative efforts with USM and Malaysia via various high impact initiatives. Last year (2009), the 2nd International Conference on Biobased Polymers was held at USM. The conference was jointly organised and funded by USM, RIKEN and Tokyo University and brought together for the first time in Malaysia, world-renowned experts in the field of bio-based and biodegradable polymers. The conference focused on the development of environmentally friendly materials to ensure a sustainable tomorrow.

Experiencing local culture

In 2007, RIKEN awarded Malaysia's ex-Prime Minister, Tun Dr. Mahathir Mohammad the prestigious RIKEN Honorary Fellow for his strong commitment to develop science and technology in Malaysia. During this historic event, USM was invited to showcase the exemplary strong research collaboration between RIKEN (Japan) and USM (Malaysia).

The USM and RIKEN ties had been in place prior to the Joint Graduate Programme. RIKEN had hosted several researchers from USM to establish research collaborations, most of them focusing on the development of bioplastics at the School of Biological Sciences. In August 2006, USM conferred an Honorary Doctorate on Professor Yoshiharu Doi to commemorate his contribution in starting many of the research collaborations with USM. Doi and RIKEN's President, Professor Ryoji Noyori, now sit on the International Advisory Board of USM.

Recently, USM and RIKEN have also been discussing the further expansion of the Joint Graduate Programme to provide training and also to jump-start USM's Brain Science Programme that will emulate RIKEN's world-renowned Brain Science Institute, which is headed by Prof. Susumu Tonegawa, a Nobel laureate in medicine. It is hoped that this programme will eventually lead to the establishment of joint research laboratories or research centres in USM where RIKEN scientists can conduct collaborative research and provide training.

In an effort to support USM's research agenda, discussions are currently underway to establish more joint degree programmes between USM and universities overseas for flagship coursework and research mode programmes.

Reaching out

From 12 -21 December 2009, IPS and the Research & Education for Peace Unit organised an outreach programme to Mindanao, 2009 involving four staff and eight postgraduate students from various disciplines of studies. The programme highlighted USM's role in helping conflict affected areas like Mindanao through its various educational and outreach programmes and especially by way of supporting human resource development. Discussions were held at several universities around Cotabato City, Marawi, General Santos, and

Zamboanga with students, staff and other invited guests. The universities and institutions visited included the University of Southern Mindanao, Mindanao State University System, Notre Dame University, Western Zamboanga State University, Sulu State College, Basilan State College, the Institute of Bangsamoro Studies and the Bangsamoro Development Agency.

Fellowship programmes

While students in Malaysia have been rather privileged in having access to numerous opportunities in pursuing postgraduate education, the same cannot be said about students in many other developing and underdeveloped countries. To help those students, IPS initiated three key fellowship programmes, namely, the USM-CMLV Fellowships that are open to applicants from Cambodia, Laos and Myanmar, the USM-VIED (Ministry of Higher Education, Vietnam) Joint Fellowships that are offered to doctoral candidates from Vietnam and the USM-TWAS Fellowships for those from developing countries such as Bangladesh, India, Nigeria, Sudan, Uganda, Ghana, Palestine and Yemen. Another important fellowship that is being offered is the Tun Sri Lanang Fellowship and Research Grant that has been created to encourage research on Tun Sri Lanang, a renowned scholar on the history of the Malay Archipelago.

The way forward

Since the realm of postgraduate education has undergone transformation from a decade ago, an academic accolade can no longer be the ultimate objective. A postgraduate degree is now a channel and a source of training for meeting the human resource demands of a flexible and vibrant economic sector.

In USM, providing postgraduate education is envisaged on a global stage with worldwide exposure and expansion to present our own brand of philosophy of education that is based on sustainability. These impetus and efforts have been further accelerated when the university was awarded the Research University (RU) status in 2007 and later in 2009 with the Accelerated Programme for Excellence (APEX) award by the Ministry of Higher Education, Malaysia.

Against this postgraduate education landscape, IPS will further enhance the promotion and propagation of a student-centred integrated programme approach that would culminate in a holistic student experience in USM. Rising to this challenge, in the coming years, IPS is set to provide a platform for collaboration and synergising efforts between schools/centres within USM as well as with institutions outside USM.

In addition, IPS will strive to facilitate for transdisciplinary research that would provide an opportunity for cross-sectorial linkages thus paving the way for increased student mobility, innovative impact on current trends in research and towards problem solving focused research. These measures are set to increase the international positioning of postgraduate education in USM.

USM's unique buddy system ensures that it is home away from home

Embracing Internet-based learning via *e-Learn*@USM

In line with the APEX transformation plan, Universiti Sains Malaysia has undertaken a continuous revamping of most of its activities pertaining to nurturing and learning. The efforts include enhancing student-centred learning (SCL), introducing sustainable curricula with market relevance, utilising technology in learning (TEL), nurturing skills competencies among academic staff and establishing linkages between research and learning. Central to the collective efforts is the acculturation of Internet-based learning.

Living in the information age, Internet-based learning has becoming a global trend. This is because new technologies can offer improved teaching options that are pedagogy driven and more engaging to students. They allow the provision of student-centred learning which supports flexible, experiential and self-directed learning. The benefits are substantial. Hence, most educational centres worldwide have embraced the challenge of incorporating information and communication technologies in the delivery of educational activities and learning outcomes. USM has taken the challenge with great commitment.

Centralised e-learning

USM has embarked on the restructuring of centralised e-learning to deliver innovative online resources to complement face-to-face teaching activities. In actuality, this mode of delivery has been established in USM since 2002 with a number of schools deploying their own Internet-based platforms for course deliveries. The earlier deployment, however, has not been systematic or well coordinated in terms of the governance, structure, guidelines and databases used as well as training. To streamline Internet-based learning at USM, *e-Learn*@USM was introduced in 2009. It is an all-encompassing platform that includes not only the schools in the Main Campus but also the schools at the Engineering Campus and the Health Campus.

e-Learn@USM uses the open-source Learning Management System (LMS) as the platform and MySQL as the database for learning. The centralised platform allows the back-end university database, incorporating courses, lecturers and students, to be integrated live into the system. Such integration also allows the provision of the single sign-on (SSO) facility with other university applications. The centralised system also allows the academic staff and students access to registered courses automatically at the beginning of each semester. As of the first semester of 2010, there have been 3,123 registered courses with 13,666 registered users in the *e-Learn*@USM of which 1,113 of them are academic staff.

e-Learn@USM is now in the second year of its implementation and the involvement from the academic staff and students thus far has been encouraging. On an average, approximately 3,000 students and lecturers (about 24%) log-in into the system daily. *e-Learn*@USM has the resource and activity tools that are designed for nurturing and learning. These tools are embedded in the Moodle LMS (as depicted in Table 1).

Table 1. The resource and activity tools within the Moodle LMS

Resource tools	Activity tools
Insert a label	Assignments
Compose a text page	Chats
Compose a webpage	Choices
Link to a file or website	Forums
Display a directory	Glossaries
Add an IMS content package	Journals
	LAMS
	Lessons
	Questionnaires
	Quizzes
	SCORM/AICC
	Surveys
	Wiki

USM is committed to providing an efficient network infrastructure for the Main Campus as well as for the branch campuses. In 2010, USM began utilising the broadband width of 2 x 155 Mbps at the Main Campus and 1 x 45 Mbps at the branch campuses. The bandwidth between campuses is at 34 Mbps. The current bandwidth is sufficient for the campus-wide and centralised e-learning implementation at the three campuses. An increase in the bandwidth will be made from time to time depending on the requirements. There is also a provision of Wifi coverage at the Main Campus with the current coverage of almost 90%.

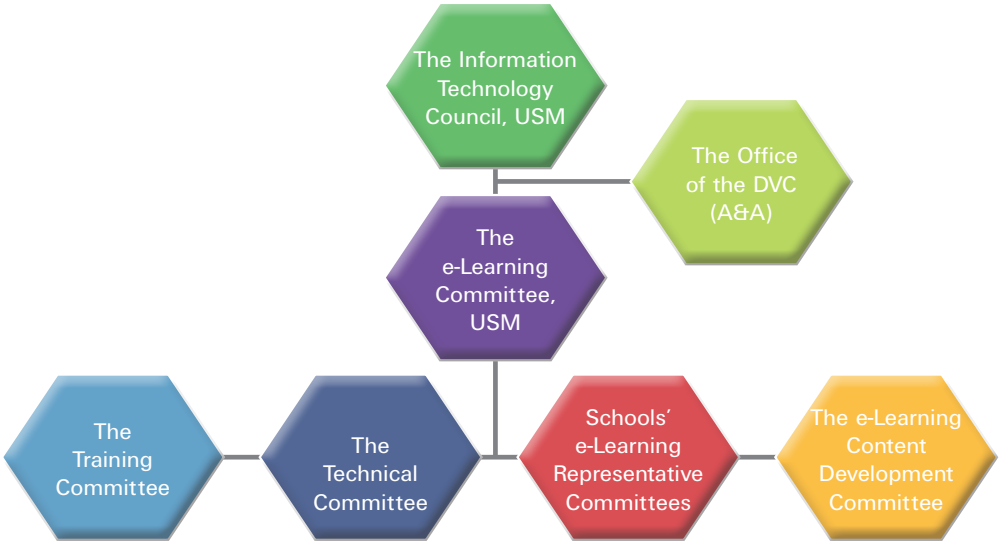


Figure 1. The organisational structure of *e-Learn*@USM

The governing bodies

e-Learn@USM is under the direct purview of the office of the Deputy Vice Chancellor (Academic and International Affairs) and the USM Information Technology Council. The operation of *e-Learn*@USM is headed by a coordinator. As of 2010, Prof. Abd. Karim Alias of the School of Industrial Technology is an acting coordinator to *e-Learn*@USM in the absence of the elected coordinator, Prof. Hanafi Atan of the School of Distance Learning. The coordinator is supported by trained IT personnel who also provide "help desk" services to the users.

In terms of the technical aspects (server, database, platform, security, etc.), *e-Learn*@USM is fully supported by the Centre for Information, Knowledge and Technology (CIKT). The CIKT also provides the computer laboratories as well as the facilitators for training purposes. Facilitators of training programmes are elected among lecturers who have the appropriate expertise in the usage of the LMS, multimedia, authoring tools and pedagogy. There are a number of committees involved in ensuring the smooth implementation of *e-Learn*@USM. The organisational structure of *e-Learn*@USM is shown in Figure 1.

The way forward

USM is committed to continuously transform the way teaching and learning are being conducted. Using *e-Learn*@USM, more ICT-based teaching and learning will be introduced to the academic staff. The enhancement of student-centred learning approaches will continue to be made. To support this, the university plans to establish an e-learning unit which will act as a one-stop centre to provide assistance to the entire university community in the areas of skills acquisitions in ICT as well as in aspects of course content development.

There is no doubt about the feasibility of the transformation plan for centralised e-learning at USM. Continuous efforts have been made to buttress the plan and the challenge is now to strive for further improvements especially in formulating policy, developing course contents, providing training and granting recognition.

For comprehensive approaches towards transforming nurturing and teaching, a sustainable e-learning policy for USM is necessary. In this regard, the university invited Professor John Hedberg of Macquarie University to provide the necessary exposure and a one-day training was held on 14 May 2010 attended by school e-learning representatives. Subsequently, the university will be organising one-day workshops on the formulation of e-learning involving deans, heads of departments as well as school e-learning representatives. A document policy

The interface of *e-Learn*@USM

will be tabled in the USM e-Learning Committee for its consideration and subsequently, this will be forwarded to the Senate for deliberation and approval. With the policy in place, all teaching and learning practices among the academic staff should be streamlined.

As for course content development, discrete contents are developed individually by the academic staff. USM has acquired various authoring tools made available for rapid course content development directly from power point presentations. These have been developed individually and are used by the staff in their face-to-face lectures. The authoring tools currently available are: the Articulate Studio Suite and the Lecture Maker. Through the proposed e-learning unit, assistance and support in terms of media facilities such as graphics, audio and video materials and instructional designs required by the lecturers for course content development can be made available.

The successful implementation of the e-learning agenda in USM also greatly depends on the training provided to the academic staff. USM through the *Unit Latihan* (Training Unit), will continuously provide the appropriate training for its academic community so that appropriate exposure and skills can be acquired by all concerned. Training will be conducted for 4-6 weeks at the beginning of the semester and opened for voluntary participation. There are three levels of training. The first is the beginners' level which focuses on Basic Moodle training; the second is the intermediate level which includes training on essential multimedia and authoring tools (Articulate, Lecture Maker), and the highest level specialises on student-centred learning using the Learning Activity and Management System (LAMS).

Last but not least, USM realises the importance of providing incentives and awards to recognise active individual involvements in *e-Learn*@USM. On 12 May 2010, USM has organised a one-day seminar which includes an agenda of providing incentives and recognition to staff who have been the active users of *e-Learn*@USM for the entire academic year. The recognition and incentives are in the form of cash, certificates and plagues. To sustain a successful implementation of the e-learning agenda, the formulation of the e-learning policy is urged to include appropriate incentives, recognition and awards in nurturing and teaching – which are similar to the kinds of recognition received from research and publication works. At the same time, the yearly appraisal of the staff should also include their involvement in nurturing and teaching – of which their involvement in *e-Learn*@USM can be used as the yardstick.

Managing student intake through seamless registration

Introduction

As a result of the intake glitch experienced by USM last year, the seamless intake system has further been improved for the second APEX batch this year.

The system was developed when USM decided to conduct its own intake as part of the APEX journey. The interface used in the system is the same as that used by the Ministry of Higher Education (MoHE).

One of the main enhancements of pohon@USM is that the system uses the Sybase database with two developed platforms, namely, the web-based ASP and the client-server based Powerbuilder.

The first step is always the hardest . . .

The following are the main objectives of developing the system:

- Being able to identify students according to their interests and preferences through the MUnSYI test.
- To enable USM to conduct its own selection process.
- To enable the analysis of entry (statistics and reports) to be done without relying on MoHE.

Access to the system can be made via the following:

- The admissions officer
- Admissions staff
- The dean
- Candidates

The web-based ASP allows the application system to be accessed and utilised through the URL [https://pohon.usm.my]. Several guidelines have been identified and put in place to ensure the success of the admission process. Among them are:

- The work schedule
  For the purpose of carrying out all recruitment activities at USM, the Admissions Unit has developed two work schedules that take into account all aspects of admissions and coordination of the relevant and integral parties involved in the intake process, be these within or outside USM, i.e., the Malaysian Examination Council (MPM), MoHE, USM's PPKT, Senate, BHEPP, the bursary, schools and the accommodations unit. Regular meetings and bilateral discussions have been conducted to ensure the smooth and effecient implementation of the second intake.

- Systems planning and responses
  Since late 2009, three technical teams have been deployed in the Admissions and Enrolments Unit (previously emplaced in PPKT) to focus on the pohon@USM intake system. Numerous meetings between PPKT and the admissions technical team have been held. The work is currently well defined and is focused on an action-oriented workflow.

- Teamwork
  There is strong cooperation and collaboration among the PPKT team, the admissions technical team, the admissions staff and deans. Such teamwork, together with the support and close monitoring from the top management, namely, the Deputy Vice Chancellor (Academic and International) and the Registrar.

will enhance the success of the subsequent intakes.

Improvements

A significant improvement is the establishment of the admissions technical team in the Admissions and Enrolments Unit. The technical team will focus on the needs and success of the system.

The interview module has been vastly consolidated to facilitate viewing and ranking according to merit and the MUnSYI score points. The previous module did not have such features.

The following steps have been taken to improve the module:

- Provision of a display of the merits from Options 1 to 8.
- The choice by each dean of a school of the number of candidates required.
- A display of the selection list with the verification of the dean for each candidate selected.
- Provision of a process to add and drop courses.
- Provision for confirmations.
- Display for the use of a "sms blast".
- Provision of space for staff to indicate updates in the time and place of interviews (previously provided in the first intake).

The module has also been streamlined to facilitate an online monitoring process. The duration will be short to reflect effectiveness in the use of the data in the selection process.

Announcements

USM uses four (4) methods of notification, i.e., the offer letter, the website, phone calls and the Short Messaging System (SMS) to inform candidates of the receipt of applications.

Usefulness of the MUnSYI test in its matching of programmes

The Malaysian University Selection Inventory (MUnSYI) test was introduced by USM at its inaugural APEX university student intake during the 2009/2010 academic session. MUnSYI is an instrument built specifically as a means to obtain information about the suitability of individuals to participate in programmes offered at the university. Scores derived from this test are used to select suitable candidates to pursue the various programmes. The MUnSYI instrument is developed to obtain information on the intrinsic qualities of candidates such as the following:

- Career interests
- Personality
- Integrity values
- Emotional intelligence
- Patriotism

In particular, the justification for the use of the MUnSYI test is as follows:

- It will enable candidates to identify programmes that suit them best.
- It will enable the university to discover the most suitable candidates based on the concept of "the right person for the right programme". This test is targeted to distinguish potential candidates who would succeed in the fields studied.
- Selection of candidate does not focus only on academic achievements but also takes into account the aspects of career interests, personality, integrity values, emotional intelligence and patriotism in line with the National Philosophy of Education.
- It will help to reduce future academic problems such as changing of programmes, poor academic performances and emotional disorders.
- Among the criteria used for ranking universities is one based on the number of students who graduate in time and secure employment within six months after graduation. Coordination with field studies and the appropriate students helps in the realisation of these aspirations.
- The MUnSYI test reflects the various aspects of the National Education Assessment System (SPPK), which is in the process of being implemented by the Ministry of Education.

Positive public reactions

The implementation of MUnSYI as an additional entry requirement into USM has received positive feedback from the public that has accepted that it is a reflection of the emphasis in the quality of the candidates to be selected. This new entrance measurement and an increase in the academic entry requirements have indeed increased USM's leverage up a level above all existing public universities. In the second intake, the admissions unit scheduled a staggered application process to facilitate the application of more than 23,000 applicants for the mainstream intake. The schedule was as listed below:

Application category	Starting date for application	Closing date for application	Number of applications
Matriculation Phase 1 Phase II	12 October 2009 21 May 2010	29 January 2010 22 May 2010	10,082
Diploma or Equivalent	04 January 2010	02 May 1010	5,045
STPM	02 Feb 2010	30 March 2010	7,957
		Total Applications	23,084

All 23,084 applicants were invited to sit for the MUnSYI test on 24 April 2010 conducted in collaboration with the Malaysian Examination Council (MPM) in more than 100 centres located throughout the country. This massive task was an added value to USM. A total of 4,108 candidates was offered the bachelor degree programmes with the breakdown shown below:

USM campuses	Total
Main Campus	2,710
Engineering Campus	616
Health Campus	782
Overall	4,108

The implementations of the MUnSYI test and stringent selection procedures have raised the quality of incoming students for the degree programmes. The MUnSYI test is unique only to USM and it has been useful in the selection of the *best fit* students for appropriate programmes.

The way forward

The existing application and selection system and processes will be constantly reviewed and revised for enhancement in line with the demands and needs of each new intake. Structured workshops and discussions will be held with the relevant parties involved to strengthen the scrutiny of the pohon@USM system itself and constant research is done on the application process, selection and announcement systems. The technical team with the guidance from the Admissions and Enrolments Unit will be directly involved in the development and improvement of available systems.

USM will ensure that there is planning in advance for each intake and is more prepared in terms of time and important dates for data transmissions and all matters involving the Malaysian Examinations Council (MPM) and the MoHE. Planning is also being done to the systems data so that it can be accessed directly by the owner of the data (Admissions and Enrolments Unit).

Achieving *sejahtera* through holistic preventive care

Health is not merely the absence of disease or symptoms. It is the presence of well-being in all aspects of life – physical, emotional, intellectual, social, spiritual and environmental. In achieving excellence, good health is a primary condition. Universiti Sains Malaysia is committed to achieving excellence and has embraced the challenge of creating a healthy place for learning and working. Its campus is called "Kampus Sejahtera" (or healthy campus). The Malay word of *sejahtera* – which embraces the meanings of peace, wellness, tranquillity, harmony and health – is used to demonstrate a holistic approach to maintaining the well-being of the individuals, communities and culture of the university. Campus health concerns that range from health-related to environmental-oriented issues are integrated throughout the university's various programmes. Kampus Sejahtera has continuously promoted healthy-living practices and implemented sustainable projects and activities. Central to this campus-wide commitment is the quality healthcare provided to the USM community.

Pusat Sejahtera provides a comfortable waiting area for its clients at the main lobby

The primary healthcare provider, especially for the USM main campus residents, is Pusat Sejahtera which was formerly known as the USM Health Centre (or Pusat Kesihatan USM). Established since 1969, the centre started its operations by providing basic healthcare services to students. In 1993, the services expanded beyond students to include USM staff, their dependents and retirees as well. The centre started to use an electronic data management called "e-klinik" in 1999. Another wave of change occurred in 2008 when the name *Health Centre* was changed to *Sejahtera Centre (or Pusat Sejahtera)*. The change reflects the university's vision to create a holistic campus community in line with its aspirations towards achieving excellence. Holistic health in medical practices is emphasised. All aspects of people's needs – physical, mental, social and spiritual health – are taken into account and seen as a whole.

One important facet of holistic health is the prevention of disease. The focus moves beyond traditional healthcare which emphasises the treatment of mostly physical illnesses. While treatments of illnesses are attended to seriously at Pusat Sejahtera, medical practitioners at the centre are vigilant of other signs in their patients including breaking illness, budding depression and alarming symptoms. Such practices allow preventive measures to be adopted and subsequently appropriate treatment to be given at the early stage. In the same vein, Pusat Sejahtera has proactively organised activities such as *sejahtera* walks, health talks and campaigns, free health screenings to enhance health awareness and disease prevention. Pusat Sejahtera also actively monitors the campus premise for possible mosquito larva breeding grounds and the eateries to ensure a state of cleanliness of the food served and in the food handlers.

Located at the Main Campus of the university in Penang and led by its Director, Dr. Nurulain Abdullah Bayanuddin, Pusat Sejahtera provides a broad range of general health services to the campus community it serves. It acts as a one-stop centre for outpatient services as well as dental care. The centre is well equipped with medical facilities such as X-ray, ultrasound and stress test machines and laboratories for urine and blood tests. Its dental clinic is equipped with up-to-date dental equipment. The preventive aspect of

dental care is stressed with all first time patients being required to take a dental screening as well as prophylaxis (scaling and polishing). Oral hygiene instructions will also be given, with the patients being taught how to exercise proper oral care. The other dental services provided are restorative dental treatment, oral medicine and oral surgery (extractions and minor surgery only).

Meanwhile, specialised healthcare facilities for physiotherapy and heamodialysis treatments are also available at the centre. To cater for emergency cases, the centre provides ambulance services and emergency room care equipped with portable automatic extension demolition (AED) facilities. There are a total of nine beds – four for males, four for females and one for VIPs – to accommodate patients at times of emergency. Its broad range of services also includes the formation of a support circle group called Kelab Jasa Budi at Pusat Sejahtera for the USM retirees to occasionally meet up to discuss shared health problems and issues of common interest.

Pusat Sejahtera has invested heavily in improving its services and facilities. The centre has adopted an *e-klinik* system, developed in-house by USM researchers and IT experts, to allow the automation and streamlining of the workflow in the healthcare setting. The use of the e-klinik has improved services and productivity; it also saves costs, time and energy. The centre has expanded its storage facilities adhering to good storage practice whereby the drug storage is fully equipped with 24-hour humidity and temperature control pertaining to optimum drug storage conditions. The levels of drugs stored are governed closely by the current usage trend to ensure continuous supply with minimum wastage. Several expensive medications with high consumption rates are being purchased via HUSM's tenders for the benefit of the economy scale of purchase.

Pusat Sejahtera is also committed to address critical health problems in the society. As problems such as obesity, diabetes, smoking and cancer among women are intensifying in Malaysia, the centre has taken proactive action by establishing dedicated clinics to address such problems in its university setting. The four clinics – the Weight Management Counselling Clinic, the Diabetes Counselling Clinic, the Quit Smoking Clinic and the Sejahtera Women's Clinic – all share a common goal of addressing their distinct problems via continuous health education and research. Pusat Sejahtera works in collaboration with relevant centres and schools such as the School of Pharmacy and the National Poison Centre, to run the clinics.

1. **The Weight Management Counselling Clinic**
   The aim of the Weight Management Counselling Clinic is to create awareness among the campus community on the importance of healthy diets and healthy lifestyle practices. The clinic helps overweight and obese clients to lose weight in a safe and effective manner through the emphasis on proper and balance food intakes. Clients are advised on the dangers of obesity-related health problems and subsequently are helped to modify their habits to achieve a healthy lifestyle.

   The coordinator of this clinic is Dr. Normala Abdul Wahid, assisted by a facilitator SN Marihan Ibrahim. They assist clients to lose weight in small group counselling sessions held weekly, followed by regular recordings of the sessions. The sessions include physical clinical examination and blood screening, food diary keeping, calorie auditing and food preparation demonstrations. The clinic operates on Friday mornings from 8:15 a.m. to 11:30 a.m. Each group has to undergo three counselling sessions for a complete programme.

2. **The Diabetes Counselling Clinic**
   The Diabetes Counselling Clinic provides specialised advice to the USM community on ways to combat diabetes. As the incidence

One of the dental service rooms with sophisticated equipment at Pusat Sejahtera

of diabetes is increasing in Malaysia, the clinic has set an ultimate goal to free USM from diabetes. The School of Pharmacy has joined forces with the centre to manage the clinic. The clinic is coordinated by Professor Dr. Syed Azhar Syed Sulaiman from the School of Pharmacy, assisted by facilitator JM Jamiaton Halaliah Abd. Razak. The clinic operates on the first Wednesday afternoon of the month from 2:30 p.m. to 4:30 p.m. The counselling session will cover a series of talks on diabetes mellitus, and aspects related to its treatment, diet and exercises.

3. **The Quit Smoking Clinic**
   The Quit Smoking Clinic was formed with the intention of reducing the number of smokers at USM. It was launched by the Vice Chancellor Prof. Tan Sri Dato' Dzulkifli Abdul Razak on 26 January 2002. In 2003, the Quit Smoking Clinic of USM was declared by the Penang Health Department as the best Quit Smoking Clinic. The efforts include giving motivation to quit smoking and providing appropriate treatments in the form of counselling and therapy. In the therapy sessions, nicotine substitutes are used to replace cigarettes. The clinic has been established to collaborate in research with the National Poison Centre. The focus of the research work is on smoking prevention and treatments. Sulastri Samsudin, a pharmacist, acts as the coordinator assisted by SN Hadijah Saad. The clinic operates on Thursday afternoons from 2:00 p.m. to 5:00 p.m.

4. **The Sejahtera Women's Clinic**
   The goal of the Sejahtera Women's Clinic is to lead USM in the prevention of cancer. It does so by educating the campus community about the disease of cancer among women. The impetus to the formation of the clinic is the rising numbers of women suffering from cancer in Malaysia and worldwide. The role of the clinic is to help them detect two very common types of cancer among women, that is, cervical cancer and breast cancer, at the early stage. The clinic offers free pap smear tests to detect cervical cancer and PSP tests to trace breast cancer problems. Facilitators for this clinic are SN Janaigee a/p Ramasamy and SN Nik Sunita Nik Shapik. The clinic operates on Thursday afternoons from 2:00 p.m. to 3:30 p.m.

Through the provisions of quality healthcare services and continuous education, Pusat Sejahtera aspires to be the best health centre among institutions of higher learning in Malaysia.

DCC and WADA – resolving miscommunications

DCC remains the best facility for tests on doping in sports

The event leading to the suspension and revocation of USM's Doping Control Centre (DCC) World Anti-Doping Agency (WADA) accreditation began on 5 March 2010 when a sample from an Egyptian footballer was sent by the Saudi Arabian Anti-Doping Commission for in-competition testing. The analysis was duly completed and the findings submitted, using protocols which DCC believed were the ones in use at the time.

However, WADA has claimed that these protocols had by then already been replaced by a revised set and that the new protocols had been communicated to all stakeholders including anti-doping laboratories on 21 September 2009 via emails.

In response, WADA established a Disciplinary Committee on 23 April 2010, which recommended that DCC be suspended. DCC was later informed by WADA's Executive Committee of its decision to suspend and eventually revoke its accreditation.

The credibility of DCC has always been the utmost priority

The background

USM's DCC was established in 1994, after Malaysia's Ministry of Youth and Sports appointed Prof. Dr. Manfred Donike from the University of Sports, Cologne, Germany to carry out a study on the establishment of a doping centre to cater for the 1998 Commonwealth Games to be held in Malaysia.

The study recommended that it was viable to establish the laboratory in USM and based on this, the Ministry decided to establish DCC, an International Olympic Council (IOC) accredited centre, at the university. Since its official establishment in 1995, Prof. Aishah Abdul Latif has been its director.

DCC's reputation as a reliable testing laboratory has evolved from the experience of providing drug testing to the sport community, fulfilling the standards and guidelines set by IOC and later in 2004 by WADA. The centre is one of only 34 laboratories worldwide that holds WADA accreditation and is one of five laboratories in the Asian region with this credential.

DCC has put Malaysia on the world map and has also significantly enhanced opportunities for Malaysia to host major international sporting events. WADA's continued recognition of DCC is therefore of great value and needs to be safeguarded.

USM's response

The revocation of WADA's accreditation was a matter of great concern and USM decided to establish an Independent Committee – chaired by Prof. Emeritus Dato' K. J. Ratnam – to look into the matter with the following terms of reference:

- To enquire into the circumstances that led to the suspension and later the revocation of DCC's accreditation by WADA.
- To recommend steps on how to regain its accreditation from WADA.
- To make suggestions regarding the future growth and development of DCC.

The Committee was informed by Aishah that USM had engaged a London-based lawyer to represent DCC before CAS (Court for Arbitration of Sport) to contest WADA's decision on the matter.

The findings

DCC strongly maintains (and the Committee found no evidence to doubt this) that it did not receive this [email] alleged communication. The Committee found it curious that even by WADA's own admission, the revised protocols had been communicated only via email. As pointed out by Aishah, it had been common practice for even less important documents to be sent by post and courier service in addition to e-mail.

Taking all matters into consideration, the Committee came to the conclusion that the action taken by WADA's Executive Committee was both unduly hasty and ridden with procedural flaws. Any shortcomings on the part of DCC notwithstanding, the Committee came to the conclusion that neither natural justice nor due process had been well served by the course of action taken by WADA.

Aishah was emphatic that her responses to the allegation of non-compliance had all been submitted in time but that WADA had refused to entertain her explanation.

The Committee took note that there are two parts to DCC's activities, namely,

work for WADA and a variety of other tasks undertaken by the Centre for Advance Analytical Toxicology (CAATS) for private and public clients. There are indications that the possible overlapping of these activities had been a source of unhappiness to WADA, which appeared to be of the view this could affect the integrity of WADA-related activities.

Overall, the Committee was impressed by the quality of work done at DCC. It was made clear by Aishah that the allegations of non-compliance did not arise from weaknesses at DCC but rather from the fact that DCC did not receive the 2009 Technical Protocol until the point when they were asked to analyse Sample B of the original test.

It is important to reiterate that the only communication that WADA claimed to have sent was via email that, from all evidence, was not received by DCC.

Recommendations

Taking all factors into consideration, the Committee recommends that the functions performed by DCC and CAATS be separated. In this connection, it would be necessary for USM to take urgent steps to plan for a restructuring of DCC, with two objectives in mind:

- To reflect its different functions.
- To give it additional staff of academic standing, from whose ranks a deputy could be appointed who could further assist DCC to better integrate its research activities with those of the rest of the university.

The way forward

The importance of having DCC's WADA accreditation status is not only crucial for its own sake but also to strengthen Malaysia's chance of hosting the Asian Games in 2019. In 2013, Malaysia will bid for the Games and the credibility of DCC can be an important factor in the success of this bid. In this connection, Majlis Sukan Negara (MSN) is willing to give its full assistance.

The sequence of events

21 September 2009	WADA claimed to have sent a revised set of protocols to all collaborating centres including USM's DCC via email.
5 March 2010	DCC completed an analysis on a Saudi Arabian athlete and submitted the findings of samples.
22 March 2010	The implementation of new protocols was brought to the attention of DCC when preparations were being made to analyse Sample B from the same athlete.
23 April 2010	A Disciplinary Committee was established by WADA.
10 May 2010	DCC responded in writing to WADA.
12 May 2010	The Disciplinary Committee established by WADA had a tele-conference among its members.
21 May 2010	The Committee recommended that DCC be suspended.
26 May 2010	The Chairman of WADA wrote to DCC to inform it of the recommendation of the suspension.
4 June 2010	DCC responded.
17 June 2010	The Chairman of WADA's Executive Committee wrote to inform DCC of its decision regarding the accreditation status.
18 July 2010	DCC submitted its appeal.
20-21 July 2010	USM's Independent Committee met to carry out its work as set out in the terms of reference.
4 November 2010	The Appeal Brief was submitted to the Court for Arbitration of Sport (CAS).
23 November 2010	The response was received from WADA's lawyer.
December 2010	CAS hearing set for January 2011.

The lush greenery provides shade at Permatang Pelajar

Fusion of innovative ideas at sains@usm

Universiti Sains Malaysia's "Science and Arts Innovation Space", or sains@usm, is a planned space aimed at providing a platform for a fusion of innovative ideas from multiple and across disciplines, as well as the creation of a community of innovators, inventors, researchers, entrepreneurs and generally, the people who can help make things happen.

Nestled in the verdant landscape of Bukit Jambul, Pulau Pinang, this 12.5-hectare (31-acre) site has been approved by the Pulau Pinang Municipal Council (*Majlis Perbandaran Pulau Pinang*, MPPP) for the development of up to 164,438 square metres (1.77 million square feet) of built-up area. The approved proposed development comprises four new buildings to accommodate research laboratories, studio facilities and business incubators/offices (each from six to eight storeys high); one 12-storey commercial building; one 19-storey building of strata residential units; one convention centre complex with exhibition halls and service apartments as well as public amenities such as an amphitheatre, *musolla*, a day-care centre, food and beverage outlets and recreational parks and grounds.

When completed, sains@usm will be able to offer space for rent and support services to innovators with potential commercialisable projects or products; these innovators are also those who require access to the various research and technical expertise that USM has.

Dato' Saifuddin giving speech at sains@usm

Signing of the collaboration agreement with Mutiaracom Sdn. Bhd. during the visit of the Minister at the Prime Minister's Department, Tan Sri Nor Mohamed Yakcop

At the moment, sains@usm has three buildings accommodating a number of research centres and providing business office space with shared facilities such as auditoriums and function areas. More renovation works in the three existing buildings will be conducted in 2011 to prepare more space and facilities for tenants.

To spearhead the planning, development and management of sains@usm, USM established a company, Sanggar SAINS Sdn. Bhd. on 8 August 2008. Apart from managing the physical development, Sanggar SAINS has also initiated the "Innovator Programme", a structured approach to guide and assist the commercialisation of USM's R&D outcomes and the creation of start-up companies or joint ventures between USM and industry partners.

Development of sains@usm

The conceptual Master Plan of sains@usm was launched by DYMM Tuanku Syed Sirajuddin Ibni Al-Marhum Tuanku Syed Putra Jamalullail, the Chancellor of USM on 22 June 2008.

The submission of the sains@usm Master Plan to the Penang State Municipal Council (MPPP) was made on 16 April 2009. The application was put on a fast track by MPPP and after technical reviews by the various regulatory agencies, USM received the approval for the Development Order for sains@usm from MPPP on 8 December 2009. The main condition of the the Development Order stipulated that work on the project had to start within twelve months of the approval, failing which the Development Order would lapse.

Following the application for the Development Order, USM and Sanggar SAINS wasted little time in exploring the funding options for the development of sains@usm. The university has always been keen to attract private investment into the development and it was planned from the beginning that upon completion, sains@usm must be able to generate revenue to provide returns for such investment, hence the combination of commercial elements with R&D and incubator-type components in sains@usm. This was also intended to be provide another source of income generation for USM in the long run.

Since the proposed development of sains@usm involves government land and assets, on 15 October 2009, USM and Sanggar SAINS presented to the

Public-Private Partnership Unit (*Unit Kerjasama Awam-Swasta*, UKAS) of the Prime Minister's Department, a proposal for the development of sains@usm based on a private finance initiative (PFI) with two potential partners from the private sector: Sains Integrated Development Sdn. Bhd. and TH Properties Sdn. Bhd. The gist of the proposal was 1) for the private sector partners to raise funding of up to RM415 million from the financial market for the development of the commercial components, and 2) to seek a development grant of up to RM200 million from the Malaysian government for the construction of the general infrastructure and R&D and incubator buildings at sains@usm.

UKAS responded on 17 December 2009, in essence recommending to USM that to ensure the commercial viability of sains@usm, an application needed to be made initially to the Economic Planning Unit (EPU) of the Prime Minister's Department for the R&D and incubator components to be funded under the Tenth Malaysia Plan development budget and for sains@usm to be built in phases.

At the same time, USM had also sought, through the Ministry of Higher Education, for a re-allocation of unutilised development funds under the Ninth Malaysia Plan to enable USM to appoint consultants to prepare detailed building designs. This option, however, did not materialise.

In January 2010, upon consultation with YB Tan Sri Nor Mohamed Yakcop, the Minister at the Prime Minister's Department overseeing economic planning and privatisation projects, USM was advised to re-submit the PFI application to UKAS, in view of the new guidelines for PFI projects which were being introduced.

A second presentation to UKAS on sains@usm was made by USM and Sanggar SAINS in April 2010, whereby UKAS indicated that under the new public-private partnership guidelines, the government would no longer provide guarantees to any project financing. Instead, commercially viable PFI projects may enjoy access to a Facilitation Fund to be contributed by the government, whereby a project may receive support of up to ten per cent of the approved total project costs. However, in the case of sains@usm, UKAS again advised that the R&D and incubator components should seek funding under the development expenditure of the Tenth Malaysia Plan, to enhance the viability of the commercial components which were to be funded by private partners.

By May 2010, USM had submitted, through the Ministry of Higher Education, an application to the EPU for funds under the Tenth Malaysia Plan for the development of the R&D and incubator components of sains@usm. Further consultations were also held with the Minister at the Prime Minister's Department in July 2010.

In the meantime, in anticipation of the funding under the Tenth Malaysia Plan, USM proceeded to get approval from the Ministry of Finance to appoint consultants to prepare the detailed building designs to be submitted to MPPP before 7 December 2010, the expiry date of the Development Order for sains@usm. The approval for the appointment of the consultants was obtained on 6 July 2010 but actual appointments had been held back pending the availability of the budget.

In the same vein of preparing for the development, on 13 June 2010, USM and Sanggar SAINS executed a memorandum of collaboration with IJM Corporation Berhad and TH Properties Sdn. Bhd. to work together on developing a feasible public-private partnership for the development of the commercial components of sains@usm.

In December 2010, USM received a recommendation from the EPU that the incubator components of sains@usm should be developed along the model used by the Malaysian Technology Development Corporation (MTDC), the government-owned technology venture capital firm and where possible, to be funded in the recommended manner. It needs to be highlighted, however, that MTDC mainly provides business incubation space for start-up businesses and companies that it invests in, whereas sains@usm is aimed at not only providing business space but also laboratories and other facilities to help complete the last stage of R&D towards commercialisation.

As at the end of 2010, USM had yet to receive any funding under the Tenth Malaysia Plan for the development of the R&D and incubator components at sains@usm. In the absence of any development-related work taking place, USM had to seek for an extension of the Development Order for sains@usm. MPPP has now extended the Development Order to 7 December 2011.

The Innovator Programme

In a move to spur commercialisation by USM in a structured approach, Sanggar SAINS had in July 2009 introduced the Innovator Programme, comprising the following components:

1. *i*-Biz

i-Biz is targeted at USM research that has potential commercial values. The programme involves not only helping researchers to manage intellectual property registration and licensing but also to build compelling business propositions for products that have commercial potential. Sanggar SAINS provides guidance and advisory services on further business development, including development of business plans and applications for grants.

2. *i*–Roadshow

This is a programme to reach out to USM researchers and disseminate information on commercialisation mechanisms and methods.

3. *i*–Bootcamp

This programme provides hands-on training, nurturing and coaching for researchers and students from USM who wish to set up enterprise or to develop their ideas and research projects into commercial products.

4. *i*-Connect

This is an industry-focused networking forum to connect the innovations to the industries and for the researchers to connect with each other. *i*-Connect is open to all researchers and aspiring entrepreneurs.

5. *i*-Clinic

Under this programme, USM and Sanggar SAINS screen and channel start-up candidates who have proof of concept ("POC") to funding agencies such as Cradle Fund Sdn. Bhd.

6. *i*-Pitch

This is a workshop to train researchers and aspiring entrepreneurs on how to present an effective investment pitch to potential investors or funding partners.

The schedule of the readiness of various projects is as shown below.

Stage of project readiness	Progress since July 2009, as at December 2010
Start-up potential	Thirty projects/products from various fields that have proceeded past proof-of-concept ("POC"). Sanggar SAINS helped the researcher(s) to either develop the business plans or seek and assess commercialisation partners or secure funding. Four start-up companies have been incorporated so far. (For comparison: as at March 2010, only 14 projects were deemed commercialisation-ready, with no start-up companies established)
Industry partnership	Twenty seven projects/products (including eight at the "advanced stage" of licensing deals) have been introduced to potential commercialisation partners involved in activities ranging from pharmaceuticals, water and waste management, construction to manufacture of cars. (For comparison: as at March 2010, only eight projects were at this stage)
Further development required	In the case of seven projects /products. Sanggar SAINS will assist in further market expansions, if required.
Ideas	Twenty eight product ideas that have yet to go through POC/POV.

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Eureka! The oldest civilisation complex in Southeast Asia discovered

Mokhtar showing the crew of the Discovery Channel's *Hidden Cities* around the civilisation complex

To many Kedahans, the mention of Bujang Valley invokes vague memories of primary or secondary school field trips that involved a visit to the Candi Bukit Batu Pahat, the nearby archaeological museum and a picnic at Batu Hampar. Most other Malaysians, on the other hand, are only familiar with Bujang Valley through school textbooks that describe it as the location of an ancient Hindu-Buddhist civilisation in Kedah. Important as the valley was as an archaeological site, the lack of new major discoveries prior to 2007 has let it slowly slide from the national consciousness.

Mokhtar explaining the discoveries to archaeologists and anthropologists

In 2007, however, the Centre for Global Archaeological Research, Universiti Sains Malaysia (CGAR@USM) discovered the Sungai Batu complex that quickly turned the Bujang Valley into one of the most important new discoveries in the history of Malaysian and Southeast Asian civilisation. Ninety seven mounds (sites) of great archaeological significance have been discovered within the Sungai Batu complex. To date, archaeological excavations conducted at ten of the 97 mounds have revealed structures used for ritual purposes and a riverside jetty built in the second century AD. There are also iron-smelting sites used since the first century AD, indicating that the Sungai Batu civilisation was a thriving centre of economy. The archaeological findings at the Bujang Valley is yet another "world first" discovery made by CGAR@USM. In 2008, CGAR@USM had found the oldest handaxes in the world dating over 1.83 million year old, in Lenggong, Perak.

The discovery of Sungai Batu gives a more holistic and complete picture of the Bujang Valley civilisation than any found since the 1840s. Earlier research concluded that Bujang Valley was founded based on religion (Hindu-Buddhist) at the end of the fourth century AD. The new findings verified using chronometric dating (by radiocarbon and OSL) and going as far back as the first century AD, suggest the need to rewrite not only the history of Malaysian civilisation but also that of the region. For Sungai Batu provides the earliest example of a "civilisation complex" in Southeast Asia.

The discovery of Sungai Batu in itself is an intriguing story of how arts and science are both crucial in archaeological research. Associate Professor Mohd Mokhtar Saidin, the director of CGAR@USM and head of the archaeological research in the Bujang Valley, is a firm believer in the importance of a multidisciplinary approach in archaeological research. The Sungai Batu discovery was not by any means a chance discovery. Mokhtar's research team consists of

Locals are employed to assist in the excavations at Sungai Batu

experts in various fields, including geology, geophysics and ancient literature. Ancient literature scholars have been convinced that the civilisation in the area goes back beyond the fourth century AD. To know where to start looking for the older civilisation, the team relied on experts of the geological history of the area. After identifying possible archaeological sites, the team then used magnetic field technology to find anamolies underneath the earth surface, which had eventually led to the discovery of the Sungai Batu complex. Without the amalgamation of knowledge in the arts and science, the Sungai Batu complex would have continued to lay dormant right under our eyes as it had been before 2007.

The history of the Bujang Valley archaelogical research

Located in South Kedah, the Bujang Valley covers the coastal plain around Gunung (mount) Jerai (1,300 metres high) and is irrigated by the Sungai (river) Merbok and Sungai Muda and their tributaries such as Sungai Bujang and Sungai Batu. Sungai Bujang, a tributary of the Sungai Merbok, flows from the foot of Gunung Jerai to the Straits of Malacca. The name "Bujang" is said to have derived from the Sanskrit word "Bhujangga", meaning *serpent*, a reference to the meandering course of the river. As the highest point in Kedah, Gunung Jerai is a prominent landmark that signals sailors crossing the Bay of Bengal to enter the Straits of Malacca. The mountain is not only a landmark but is also rich in minerals and was believed to be the sacred home of God during that period. For all these reasons, the Bujang Valley became a strategic area for settlement and a centre for trade and industry, lying halfway between the major civilisations of Asia and China in the east and India and the Middle East in the west.

Records of the antiquity of the Bujang Valley come from two main sources: literary and archaeological. Among the

important literary sources is the Hikayat Merong Mahawangsa or the Kedah Annals, although there are also Chinese, Indian, Arabic and western records. The Bujang Valley, or the old Kingdom of Kedah, was known as Chieh-Cha in the Chinese records of I-Tsing, as Wu-Shing, Kataha in Sanskrit, as Kadaram, Kidaram and Kidara in Tamil, as Kalah in Arabic and as Quedah in the west.

The earliest archaeological report of the Bujang Valley came from James Low, a government official in Penang who discovered the first monument in the early 1840s. Later, in 1894, Irby discovered the ruins of an ancient temple on the summit of Gunung Jerai. In the 1920s and 1930s, Evans enriched the inventory of the valley's monumental and artifactual remains. Just before the Second World War, Quaritch-Wales and his wife undertook extensive research and found more than 30 structural and numerous artifactual remains.

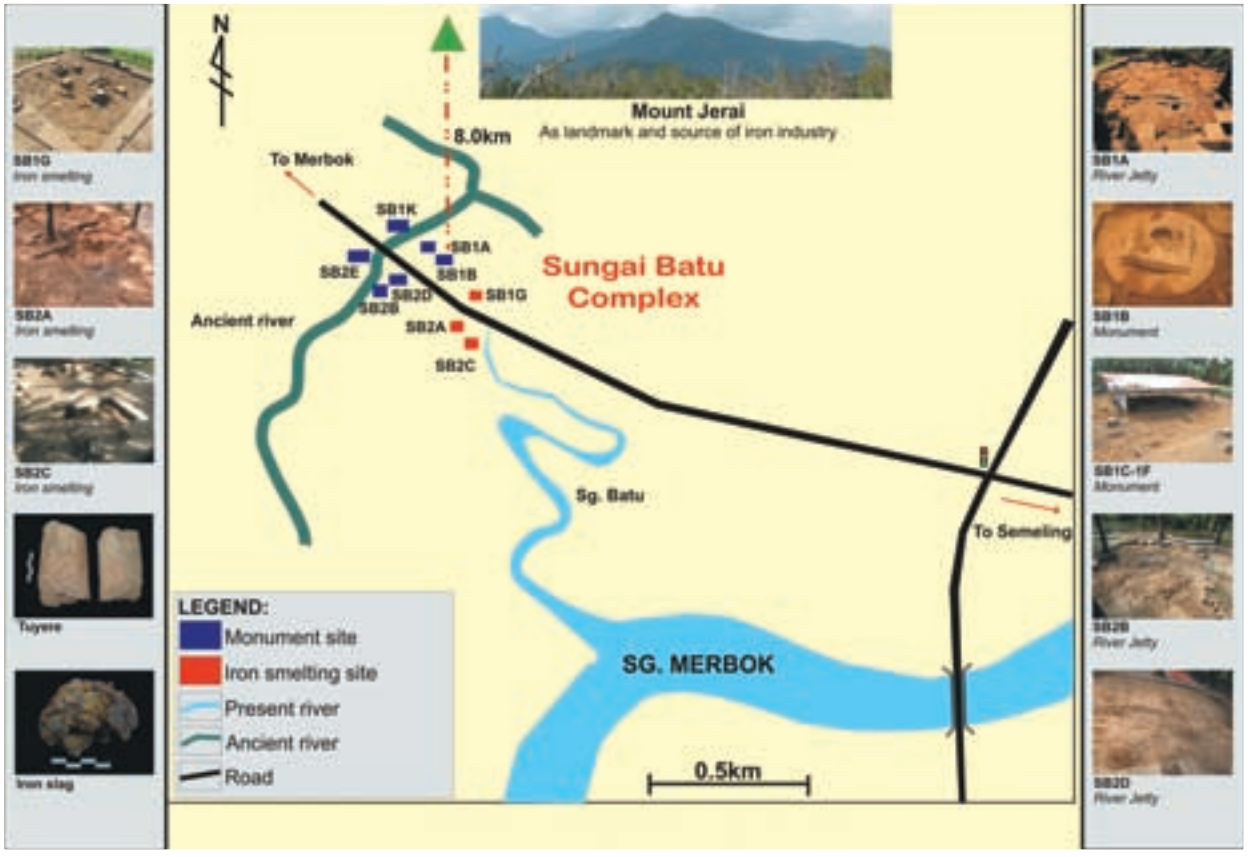
After the war, several researchers continued investigating the archaeology of the Bujang Valley such as Sullivan and Lamb in the 1950s and 1960s. Among their important works were excavations of Candi Bukit Batu Pahat and Candi Permatang Pasir. In the 1970s and 1980s, Malaysian archaeologists became directly involved in the Bujang Valley archaeological excavation and conservation for the first time; these were conducted by amongst others, Al-Rashid, Adi Hj Taha, Nik Hassan Shuhaimi, Kamarudin Zakaria and Leong Sau Heng. The Bujang Valley Archaeological Museum was established in 1980 and more than 80 sites have been recorded throughout the Bujang Valley since the 1840s.

The research findings conducted between the 1840s and 2007 concluded that the Bujang Valley civilisation began no earlier than the fourth century AD, with evidence of two dominant trading or cosmopolitan centres at Sungai Mas (as a Buddhist phase), then at Pengkalan Bujang (as a Hindu Siwa phase). Other centres appeared to be of secondary importance. The finding of trading items such as ceramics (from China, Thailand and the Middle East), glass (from Egypt and Syria) and beads (from India and Java) suggested that the site was an entreport.

The discoveries of Sungai Batu

In 2008, CGAR@USM was requested by the Heritage Department of the Ministry of Information, Communication and Culture to research the palaeo-environment of the Bujang Valley sites. One of the aims of this research was to obtain a more complete picture of the Bujang Valley so that it could be developed into a heritage park. One of the main questions concerning the Bujang Valley civilisation was why the evidence of civilisation went only as far back as the fourth century AD, given that we know that the valley was on a trade route used much earlier. In Geographike Huphegasis, for example, Ptolemy mentioned that the trading system between east and west passed through Peninsular Malaysia as early as the first century AD. So where can the earliest evidence of the Bujang Valley civilisation be found? During the first to the third centuries AD, most of the sites in Sungai Mas and Sungai Bujang (including Pengkalan Bujang) were still under the sea or in swampy areas and the only area around Sungai Merbok that was suitable for settlement during that time was Sungai Batu. By using the GIS, geophysical and geological mapping for palaeo-enviromental reconstruction, CGAR@USM found a new site, Sungai Batu, that seems to reveal older evidence.

Mokhtar discussing CGAR's discovery with the crew of Discovery Channel's *Hidden Cities*

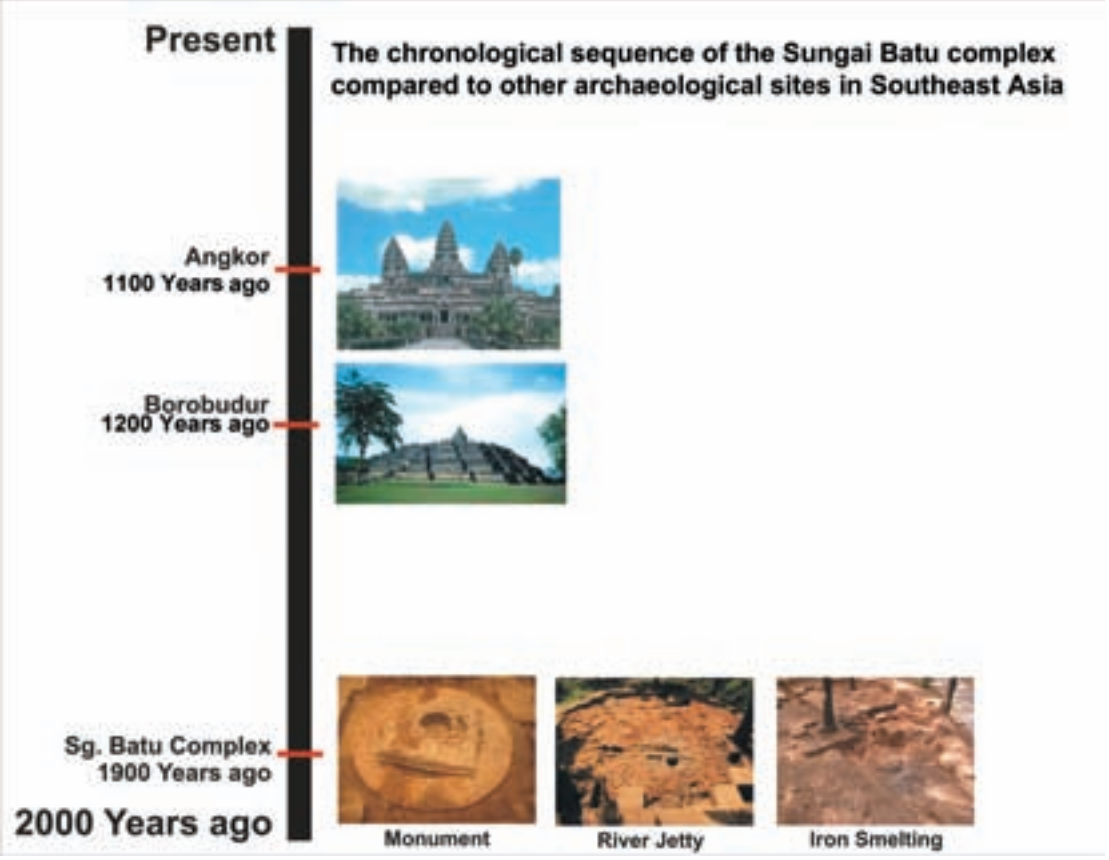


The location of Sungai Batu Complex

Of the 97 mounds in Sungai Batu earmarked for exacavations, ten have been excavated so far. Among the most significant discoveries in the latest excavations are that there was (1) an iron-ore smelting industry in the first century AD, (2) an ancient brick structure indicating spiritual beliefs and practices belonging to the early part of the second century AD, and (3) an ancient, roofed brick platform, believed to be a jetty, located near Sungai Batu, dating from the early part of the second century AD. The 2009 excavations in Sungai Batu thus revealed important evidence of a Southeast Asian civilisation based on trade and the iron industry, in which Sungai Batu played a major role from the first century AD.

An industry-based civilisation

Three of the ten mounds excavated so far reveal evidence of an iron smelting industry. Found among the thousands of pieces of iron ore and iron slag was a large number of clay pipes (known as *tuyere* in French) which were apparently used to blow air into iron ore smelting furnaces. This evidence seems to confirm information found in Tamil literary works. The Tamil poem Pattinappalai, from the classical Cankam Period (200 BC - 200 AD), refers to the import of *kazhakaththu akkam* (the produce of Kazhakam) at the seaport of Pukar or Kavirippumpattinam on the east coast of India. The Tamil word *Kazhakam* of the Cankam Period refers to a place located in the northwestern part of the then ancient Malay Peninsular,that was also known as Kataram or Kataha in Sanskrit. Khazakam, as a place name, is apparently a derivation from the Tamil root word *Kazh*, which signifies *iron* (black). Another Tamil epic entitled Parunkathai, composed by the Kongkuvelir in the tenth century AD, refers to *kataraththu irumpu* which



means iron from Kataram, which was one of several materials which was said to have been used in the making of the chariot in which the Princess Vacavathaththai made her journey to the city of Jayanthi.

Two Islamic scientists, Al-Kindi and Al-Biruni, also mentioned in their publications the importance of iron from Kalah, believed to be a reference to Bujang Valley. Of Kindi's three categories of ancient or finest-quality swords, the best were said to have come from Yemen, Qalai (Kalah) and Hindi. Kindi mentioned that in the mid-fourth to the tenth centuries AD, the traveller Misar ibn Muhalhil identified Kalah as the place where Kalah swords were made. Biruni's study of iron mentioned *shaburqan* (hard iron) swords called *Qala*, named after Kalah, the place where the raw material came from. "You hear a ring from Qala, but a harsh tone from anything else."

Thus, the latest archaeological findings concerning the existence of an iron-smelting industry at Sungai Batu from the first to the fourteenth centuries AD and the Tamil and Arabic records apparently support and confirm one another. In addition to producing iron of superior grade, Sungai Batu must have displayed other essential features of a well-developed civilisation such as skilful "geologists" to mine the iron ore around Gunung Jerai and "architects'"to construct the structure dedicated to spiritual beliefs and the river jetty to export the iron products and "iron specialists" to produce iron of superior quality. There were also others who provided harbour facilities to meet the needs of merchants arriving by sea and river from different parts of the world and contributed to the efficient administrative system of a port-city.

Lembah Bujang tamadun awal Asia Tenggara

TANGGAL 6 Julai 2010 merupakan tarikh penting dan cukup signifikan kepada penemuan kompleks tamadun seawal abad pertama Masihi yang bertunjukan industri besi di tapak Sungai Batu, Lembah Bujang, Kedah Darul Aman.

Pada tanggal itulah berlangsungnya Persidangan Antarabangsa Lembah Bujang dan Ketamadunan Awal Di Asia Tenggara yang menghimpunkan para sarjana dari seluruh dunia di Kuala Lumpur.

Kehadiran seramai 24 orang sarjana luar dari China, India, Amerika Syarikat, Thailand, United Kingdom, Laos, Vietnam, Filipina, Indonesia, Myanmar dan Kemboja membuktikan bahawa penemuan tapak ini telah sampai ke pengetahuan khalayak yang meluas serta mempunyai kesan terhadap penyelidikan tentang tamadun awal di Asia Tenggara.

Pembentangan 28 kertas kerja, termasuk sarjana dari Malaysia merupakan pencapaian berkelas dunia hasil ekskavasi Fasa I (Februari hingga Mei 2010) di Tapak Sungai Batu, Lembah Bujang oleh Pusat Penyelidikan Arkeologi Global (PPAG), Universiti Sains Malaysia yang hasilnya adalah pandangan baru tentang Lembah Bujang.

Saya sedar bahawa Lembah Bujang bukan sesuatu yang baru bagi mereka yang membuat penyelidikan tentang sejarah awal kerana penyelidikan mengenainya telah dilakukan sejak kurun ke-19 lagi.

Bagaimanapun, penemuan Sungai Batu merupakan suatu pencapaian baru dan penting, yang menuntut agar kajian semula dibuat terhadap sejarah awal kita.

DR. RAIS YATIM
Menteri Penerangan Komunikasi dan Kebudayaan

Lebih dua tahun lepas, saya telah memintа Perbadanan Warisan Negara mempromosikan Lembah Bujang. Maklumat arkeologi yang ada sekarang masih tidak mencukupi bagi meningkat rahsia sebenar yang wujud di Lembah Bujang dan oleh itu, kita perlu melakukan penyelidikan dan mencari tapak baru bagi mendapatkan lebih banyak maklumat tentang sejarah Lembah Bujang.

Universiti Sains Malaysia dan Jabatan Warisan Negara telah melakukan penyelidikan yang meliputi jalan kepada penemuan 97 timbunan tanah dan kerja mencari gali (ekskavasi) yang dilakukan terhadap 10 daripadanya telah menemui hasil penting.

Kesimpulan ahli sains daripada pelbagai disiplin termasuk yang memiliki kepakaran dalam bidang arkeologi, geologi, geografi telah berusaha tanpa mengenal penat dan jemu selama lebih setahun dan saya ingin mengucapkan tahniah kepada mereka atas dedikasi, komitmen dan semangat yang begitu mendalam, yang hasilnya, telah memudahkan kita lebih memahami tentang peradaban awal yang wujud di Malaysia dan Asia Tenggara.

Penemuan pelbagai struktur, bukan sahaja tapak kuil, tetapi juga relau besi, dewan dan jeti di sepanjang sungai purba, memberi dimensi baru kepada pemahaman kita tentang Lembah Bujang.

Paling penting, kini kita tahu bahawa seawal kurun pertama Sebelum Masihi lagi, kawasan ini telah didiami komuniti manusia yang terlibat dengan kegiatan melebur besi dan perniagaan logam itu sebelum pernah dikesan di sini sebelum ini.

Para sarjana yang hadir di Kuala Lumpur ini turut membincangkan tentang kedudukan Lembah Bujang sebagai suatu kawasan penempatan orang India di luar negara asal mereka yang mempunyai pengaruh kuat agama Hindu/Buddha dari kurun ke-6 hingga ke-12 Sebelum Masihi.

Menyedari sumbangan besarnya terhadap sejarah negara dan wilayah sekitar, saya telah meminta Kementerian Penerangan, Komunikasi dan Kebudayaan yang saya terajui supaya memperjuangkan dana yang diperlukan bagi membiayai kerja-kerja penyelidikan dan pembangunan di kawasan ini.

Terkini, kira-kira tiga minggu lepas beberapa tapak baru telah dikesan di Jerai di mana kerja mencari gali yang dijalankan di situ telah menemui lebih banyak relau yang menunjukkan bahawa industri berkaitan besi merupakan suatu kegiatan penting dalam bidang ekonomi – kegiatan melebur besi dan perniagaan jangkung besi yang jelas menunjukkan bahawa logam itu mempunyai pasaran besar bagi kegiatan penghasilan peralatan dan kelengkapan ketenteraan.

Dihantar usaha penyelidikan yang dibuat di Jerai, Kedah itu akan menjana hasil ekonomi bagi negara ini. Menyedari bahawa penyelidikan memerlukan wang – kementerian menteri, Jabatan Warisan Negara telah memperuntukkan RM3 juta bagi membiayai penyelidikan ini dan jumlah wang yang diperlukan ini berbalik kepada ia menemui bukti penting tentang sejarah silam yang tidak ternilai harganya.

Pengetahuan yang diperolehi melalui wang yang dibelanjakan itu akan memberi pelangan daripada segi ekonomi melalui pelancongan dan industri berkaitan dengannya kelak. Penyelidikan merupai warisan merupakan pelaburan penting dalam bidang pelancongan – pelancongan adalah produk akhir yang terhasil daripada usaha penemukaan ilmu pengetahuan.

Pada era globalisasi ini, setiap negara perlu membuat penyelidikan dan memelihara budayanya bagi membentuk jati diri masing-masing, selain memberi tumpuan terhadap usaha membangunkan ekonomi. Dengan adanya tempat seperti Lembah Bujang dan Lembah Lenggong, masyarakat dari seluruh dunia pasti berminat untuk datang ke negara ini bagi mebuat tapak budaya kita yang begitu tinggi nilainya dan sekali gus memasukan lagi industri pelancongan kita.

The earliest civilisation in Southeast Asia in Bujang Valley, *Utusan Malaysia*, 12 July 2010

Local traders supplied various products from surrounding areas to the international merchants, farmers provided rice to the residents of the city-state and so on.

In short, Sungai Batu was clearly a sophisticated civilisation whose economy was based primarily on the iron industry.

In the big picture

Mokhtar and his team at the National Heritage Department are currently working on submitting a proposal to enlist the Bujang Valley as a UNESCO World Heritage. Such a listing would not only be meaningful to the archaeological community but also the local community at Bujang Valley. The community at the Bujang Valley has played an important role in the discovery and research work of CGAR@USM, with more than 100 of them working on site. Some who were interviewed had expressed interest in pursuing a career in archaeology and are keen to continue their study in the field. It is hoped that by turning the Bujang Valley into a UNESCO World Heritage site, the local community would be able to benefit from the influx of tourists to the area. For CGAR@USM, the heritage listing is its way of saying *thank you* to the local community.

Ruins of river jetty revealed at Sungai Batu complex, dated early 2nd century AD
(Source: Pusat Penyelidikan Arkeologi Global, USM)

The oldest monument revealed at Sungai Batu, dated 1900 years old
(Source: Pusat Penyelidikan Arkeologi Global, USM)

Tuyere used as bellows in the Sungai Batu iron smelting industry

Iron sources (hematite and magnetite) in the Sungai Batu iron industry

Findings that could lead to yet another World Heritage site in Malaysia

CCB@USM charting new frontiers in chemical biological research

CCB pursing chemical biological research towards a new paradigm for science

The Centre for Chemical Biology in USM (CCB@USM) is focused on understanding biological systems and inspiring genome-based discoveries that provide social and economic benefits to those at the bottom of the global pyramid. It is a trans-institutional effort to create a new paradigm for science, with the potential to benefit society by strategic alliance between academia and the biotechnology sector. Since its inception in 2008, the centre has been actively pursuing to transform the findings of fundamental research into practical applications of significant interest and benefit to public and private enterprises. Some of its notable research portfolios in 2010 include the One-stop Bioinformatics Hub, the Malaysian Microbial BioBank (MMB) and the Recombinant Alpha Amylase from the Malaysian Hot Spring Bacterium for Bakery Products.

The One Stop Bioinformatics Hub is a data-centric, integrative knowledge-analysis-sharing hub to efficiently support and enhance the capability of biological researchers from various fields in Malaysia and Asia

The One Stop Bioinformatics Hub

With the emergence of the genomics era and exponential increase in biological data, bioinformatics has become increasingly important to make sense of the wealth of information. Everyone in the life sciences has been exposed to bioinformatics, whether it is to analyse the sequence of a single gene or protein, create a homology model of a molecule, deduce the evolutionary relationship between sequences, screen chemical libraries for potential drugs or decipher an entire genome.

Recently, CCB@USM launched a One Stop Bioinformatics Hub to serve the life science research community of Malaysia. It is a whole suite solution that meets the need for easy access and analysis of up-to-date large-scale biological data sets of major bioinformatic repositories with a workflow engine dedicated to data synchronisation, processing and distribution. It also features a public access web portal for various bioinformatic tools.

CCB@USM's One Stop Bioinformatics Hub is a data-centric, integrative knowledge-analysis-sharing hub to efficiently support and enhance the capability of biological researchers from various fields in Malaysia and Asia. Its user-friendly graphical interface facilitates users of all skill levels, giving greater exposure to the usage of existing open source applications and encouraging more Malaysians to dive into the wide field of bioinformatics.

The hub is composed of three major components: 1) up-to-date large-scale biological data sets of major bioinformatic repositories with a workflow engine dedicated to data synchronisation and processing through Biomaj and Bio Mirror; 2) a customised high-throughput genomic annotation pipeline and 3) a public access bioinformatic tools web portal. The hub provides Malaysia with locally-hosted mirrored databanks for faster processing and search results. The current collection exceeds 1.1 terabytes, comprising the world's core databanks including NCBI, EMBL, Swiss-Prot and the Influenza Virus Database (IVDB).

The customised, fully modular automated genome annotation pipeline is designed to speed up genomic analyses. Using cutting-edge servers and algorithms, the customisable high-

throughput automation framework allows researchers to focus on results, minimising the need for time consuming data processing. Rather than having to access bioinformatic tools through different websites, the hub provides an all-in-one resource from simple searches to large-scale genome analyses.

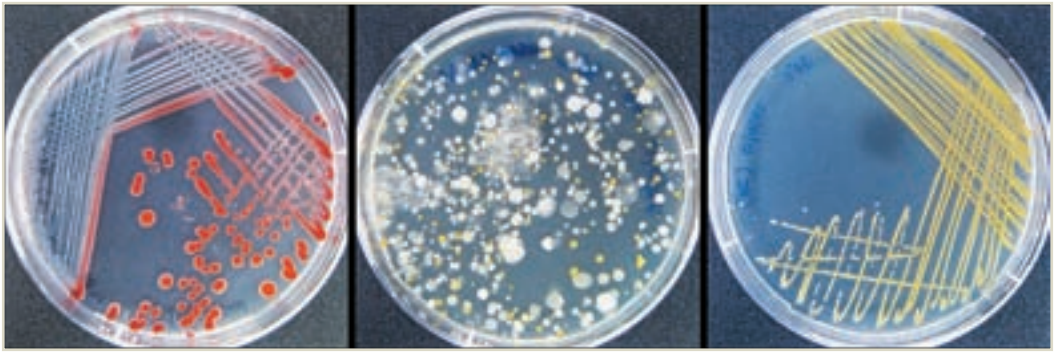
CCB@USM eyes the Malaysian untapped biodiversity – the Malaysian Microbial BioBank (MMB)

Malaysia is one of the 12 mega biodiversity centres in the world with its mosaic of habitats and ecosystems harbouring thousands of species of plants and animals and an even greater number of microorganisms. According to the Convention on Biological Diversity, global biodiversity has been on the decline over the past several decades. It is therefore imperative that we preserve what we have before it is lost forever.

Various efforts to establish a national culture collection in Malaysia have previously been unsuccessful for the last 25 years. CCB@USM has taken the challenge and recently spearheaded a Malaysian Microbial Culture Collection (BioBank) programme. It is the first systematic culture collection of Malaysia's natural heritage and environment. The Malaysian Microbial BioBank is an indispensible initiative that involves research and conservation of the microbial world through mapping its unique biodiversity.

MMB is an interdisciplinary programme combining fundamental research, industrial application, and educational outreach and community services. One of the major aims of the culture collection is to collect, identify, characterise and preserve microorganisms from diverse Malaysian niches. High-throughput screening of these microbes is essential as they offer a wealth of novel enzymes, secondary metabolites and other bioactive compounds with potential usage in health, biofuel production, bioremediation and various industries. The creation of a comprehensive collection will put Malaysia alongside well-known international repositories such as the American Type Culture Collection (ATCC) and the German Microbial Culture Collection Centre (DSMZ).

CCB@USM has placed initial emphasis on the isolation of bacteria, fungi and algae that are extremophiles, endophytes and human microflora. Thus far, 280 pure cultures have been isolated from different environments and are currently undergoing the identification process. One such environment is the Ulu Slim hot spring in Slim River, Perak with the highest recorded temperature of 104°C. Recently completed genome sequences of two bacterial isolates from Ulu Slim, *Geobacillus thermoleovorans* CCB_US3_UF5 and *Thermus sp.* CCB_US3_UF1, will enhance our fundamental understanding of how life can survive at extremely high temperatures.



Some of the unique cultures that have been isolated

Partnership with the local industry – the Recombinant Alpha Amylase from the Malaysian Hot Spring Bacterium for Bakery Products

The first major outcome of CCB@USM's Microbial BioBank is an α-amylase enzyme from local isolate *Geobacillus thermoleovorans* CCB_US3_UF5. CCB@USM has cloned, expressed and purified the recombinant enzyme and characterised its activity.

Amylases are of great significance in biotechnology with applications in the food, fermentation, textile and paper industries. Commercially produced α-amylase from microorganisms represent about 25-33% of the world enzyme market. In the baking industry, α-amylase is involved in manufacturing of high quality products where it prevents staling and improves the texture and shelf-life of baked products.

This will be the first Malaysian α-amylase that can serve for production scale for different industrial applications. It is currently in the patent application process. The recombinant enzyme meets the demand for the amylase enzyme in the bakery industry where bacterial α-amylases are primarily used to increase the shelf-life of bakery products.

Field sampling at the Ulu Slim hot spring with the isolation of Geobacillus thermoleovorans CCB_US3_UF5 and production of α-amylase (powder form)

Halal food-grade collagen from sheepskin

Collagen is the major structural protein component of connective tissues, including skin, tendon, cartilage and bone, accounting for approximately 30% of the total protein in mammals. To date, at least twelve distinct types of collagen have been documented. Type I collagen is the most common and consists of three intertwining polypeptide chains (i.e., two α1 peptide chains and one α2 peptide chain arranged in a right-handed helix). This Type I forms the major portion of the collagen contained in both soft connective tissues, such as skin and tendon, and hard connective tissues, such as bone and dentine.

Preparation of sheepskin for digestion with plant-based enzymes

Exchange of documents between USM and Holista Colltech at the BioMalaysia Conference in Kuala Lumpur on 1 November 2010 witnessed by the Deputy Prime Minister

In biological systems, collagen displays weak immunogenic properties due in part to its ability to mask potential antigenic determinants within its structure. It is thus partly resistant to proteolysis because of the somewhat impenetrable helical structure. In addition, collagen is a natural substance for cell adhesion and forms a major tensile load-bearing component of the musculoskeletal system. Therefore, because of these unique properties, collagen is often incorporated in numerous medical applications, including implants, transplants, organ replacement, tissue equivalents, vitreous replacements, plastic and cosmetic surgery, surgical suture, surgical dressings for wounds, burns, to name but a few. Human consumption of collagen has also been reported to provide beneficial effects on joint, bone and skin health as well as for weight management and sport performance. Extensive efforts have been devoted to the production of modified collagen suitable for use in these various applications.

Despite these significant advantages, commercially produced collagen or collagen-based materials are not universally accepted. Religious and ethnic beliefs often lead to uncertainties about using collagen, for example, uncertainties with regard to halal principles. The major reasons for these objections include the source of collagen (bovine sources prohibited for certain faiths) and the enzyme (i.e., pepsin from porcine sources) used in the hydrolysis and extraction protocols. The majority of these materials currently in commercial production are of porcine origins. Though other sources, such as bovine and fish skin, have been explored, issues of bovine collagen from the religious aspect (especially Hinduism and Buddhism) as well as the properties of the fish skin collagen (i.e., different from that extracted from warm blooded animals) are questions often raised.

In this respect, the present project provides a method for producing halal food-grade collagen from a more religiously neutral animal skin (i.e., ovine). Collagen in its natural state is a protein of high molecular weight (>100 kDa). This characteristic is quite valuable for medical and cosmetic applications but unsuitable for food additive applications. The production of hydrolysed collagen of optimum size for food additives involves the exposure of the skin to an organic acid buffer in the presence of digesting enzymes which originate only from plant sources. This project has subsequently resulted in the production of high yield hydrolysed collagen at the lowest cost while overcoming the problems aforementioned. This proprietary process results in the production of collagen-based materials

Holista-USM hasilkan kolagen halal kambing biri-biri

Oleh SHAMRATH AZIZ

KUALA LUMPUR - Kolagen di pasaran sebelum ini diperoleh daripada dua sumber utama iaitu lembu dan babi yang mempunyai banyak permasalahan di kalangan penggunaberagama Islam, Hindu dan juga Buddha.

Kolagen digunakan bukan sahaja untuk tujuan kosmetik tetapi digunakan secara meluas dalam bidang perubatan khususnya untuk merawat luka selepas pembedahan.

Kini kebimbangan tersebut dapat diatasi melalui penemuan satu sumber baru kolagen yang dihasilkan daripada sumber kambing biri-biri yang mana ia lebih bersifat neutral.

Penghasilan kolagen tersebut telah berjaya direalisasikan oleh Holista CollTech Limited (Malaysia) (Holista Malaysia) dan Universiti Islam Malaysia (USIM) dalam menghasilkan kolagen yang bersumber halal.

Ketua Pegawai Eksekutif Holista Malaysia, Datuk Dr. Rajen Marnickavasagar berkata, selain berjaya menghasilkan kolagen bersumber kambing biri-biri itu satu lagi perjanjian telah dimeterai bersama USIM yang bertujuan untuk menjalankan kajian untuk mengetahui bagaimana enzim tumbuh-tumbuhan mampu mengurai kolagen tersebut untuk memudahkan sistem penghadaman manusia.

"Ia juga meliputi usaha mengekstrak benar lebihan dan serat daripada kulit kambing biri-biri bagi menghasilkan makanan ayam dengan status halal," katanya dalam kenyataan pada majlis penyerahan HoMalaysia 2010 di sini kelmarin.

Turut disaksikan pada majlis persaksian yang telah dipertukarkan oleh Timbalan Perdana Menteri, Tan Sri Muhyiddin Yassin itu ialah pertukaran dokumen perjanjian antara Holista Malaysia dengan USM.

USM telah diwakili oleh Naib Canselornya, Prof. Tan Sri Dzulkifli Abdul Razak.

RAJEN (kiri) bertukar dokumen perjanjian dengan Dzulkifli (kanan) disaksikan oleh Muhyiddin (dua dari kiri) di Kuala Lumpur kelmarin.

Holista-USM produced halal collagen from sheepskin, *KOSMO!*, 3 November 2010

predominantly of a molecular mass of 3 kDa and with a tight molecular weight distribution. This is the most desired molecular weight distribution having the optimum properties in terms of solubility, availability and assimilation in human metabolism.

Ovine skin is considered as bulk waste in Australia and would historically need to be buried or treated in a manner that would not cause environmental or biological hazards. As an alternative, Holista Colltech will import this waste material to Malaysia and utilise the skin as the source of collagen. This practice is viewed as a more sustainable approach in turning waste into wealth as well as protecting the environment. The cost of waste treatment could also be eliminated and additionally provide income to the sheep farmers. The product could be considered as the world's first food-grade halal collagen from sheepskin. This will make Holista Colltech's ovine collagen more relevant to the growing global Islamic population that is increasingly looking for halal certified products. Therefore, it is possible for Malaysia to pioneer and lead in the halal collagen market. A further aspect of the R&D will provide not only collagen for food, but nutraceutical and pharmaceutical applications are also being explored. The global food-grade collagen market is currently estimated at RM1.6 billion annually, with each kilogramme of collagen selling for RM120.

This project collaboration commenced soon after the signing of a Memorandum of Understanding on 18 September 2009 between USM Doping Control Centre (DCC) and Holista Colltech Ltd.(HCT), a merger of Holista Biotech Sdn. Bhd. and Colltech Australia Ltd. This project collaboration was initiated as DCC could offer the expertise and support instrumentation that can assist in the research needs of HCT. The project terms called for the development of better processes and standardisation protocols in the production of halal collagen from ovine skin. Holista Colltech, headed by Dato' Dr. Rajen. Marnickavasagar (Group CEO of Holista Colltech) who is also the founder of Holista Biotech Sdn. Bhd., has been listed in the Australian Stock Exchange as HCT since 13 July 2009. Holista Biotech is actively involved in the area of herbal research and food

DCC staff using the MALDI-TOF mass spectrometer to analyse the products of collagen digestion using plant-based enzymes

ingredients whereas Colltech Limited is the only company in the world that can produce sheep collagen (cosmetic grade) protected by a patent. Currently, Holista Colltech operates in Malaysia to which nearly all its operations and research have been shifted and where USM – one of the key collaborators – is located. HCT is building a 25,000 square feet facility near Kuala Lumpur at a cost of RM8.5 million. When completed in April 2011, it will import sheepskin from Australia to produce up to one ton of food-grade collagen daily in a form that has been hydrolysed or broken into smaller molecules to aid digestion. The production will provide HCT with a vital revenue stream as the company believes that its halal ovine collagen will command a premium over existing collagen products.

The framework for partnership arrangement between USM and Holista was established to provide research collaboration in the areas of (a) development of all processes leading to the effective commercial production of halal collagen, (b) development of stability and standardisation protocols, (c) development of products combining collagen with other natural substances, and (d) establishment of the necessary platform technologies to make Malaysia an emerging player in the world collagen market. These activities include all provisional research and consultancy services as well as knowledge transfer in various stages. In addition, funding and support from Holista Colltech for the development of the activities, processes and technologies were mutually agreed upon.

Following the implementation of the halal collagen research and development at DCC USM, a further agreement was signed with HCT on 1 November 2010 at the BioMalaysia Conference in Kuala Lumpur and witnessed by the Deputy Prime Minister YAB Tan Sri Haji Muhyiddin Yassin. This agreement will take this partnership further whereby DCC at USM will focus on the development of potentially useful by-products from the food-grade collagen production process, including for example, the excess fat and fibre by-products for incorporation into halal chicken feed.

A halal, affordable meningococcal ACYW-135 vaccine for pilgrims and the *bottom billion*

The “meningitis belt”. Source: CDC

The meningococcal disease is a serious bacterial illness caused by the bacteria *Neisseria meningitis*. The World Health Organization reported that even when meningococcal meningitis is diagnosed early and adequate treatment is started, 5% to 10% of patients die, typically within 24 to 48 hours after the onset of symptoms. The effects of bacterial meningitis include brain damage, hearing loss or a learning disability in 10% to 20% of survivors. Prevention is therefore imperative.

The signing ceremony at the Malaysian Embassy in Cuba, February 2010

While vaccines for meningococcal have been available for more than 30 years, halal vaccines have been left wanting. Haj pilgrims and umrah visitors, in particular, are in a dilemma as it is mandatory to get a meningococcal vaccination before entering Saudi Arabia. Recognising the predicament faced by Muslims around the world USM, in its ongoing effort to build a solid platform for a halal hub, has recently signed an agreement with Finlay Institute (FI) Cuba to co-develop, produce and market the combined tetravalent meningococcal meningitis vaccine (Men ACYW) under halal conditions. The signing ceremony was held at the Malaysian Embassy in Havana, Cuba in February 2010. This is the first academic collaboration of its kind to produce a halal vaccine – namely the development of the polysaccharides serogroups A, C, Y and W_{135} from *Neisseria meningitidis* under halal conditions.

In the agreement, USM will be responsible for the performance of clinical trials and product registration as well as for facilitating the halal accreditation of the vaccine. It will also facilitate the marketing of the vaccine to selected countries in the region. In return, FI will develop the vaccine right up to pre-clinical testing and will transfer the technology to USM. This collaboration is anticipated to be completed in three years and will form the basis for future co-development and commercialisation of pipeline vaccines and pharmaceuticals from FI via USM.

USM have also been given the rights to produce and market the halal vaccine, initially in four countries with significant Muslim populations, that is, Malaysia, Indonesia, Singapore and Brunei, with possible expansion into other countries later. USM will ensure that the cost of the vaccine will be significantly lower than those produced by other suppliers. This cost factor is important, not only for the benefit of Muslims going for haj and umrah but also for other populations in the world, particularly those located in the so-called "meningitis belt" that is populated by some of the world's *bottom billions*. The clinical trials, product development and manufacturing, halal certification, product registration and marketing will be managed by Sanggar SAINS, a wholly-owned subsidiary of USM, together with its industry partners.

A deadly, infectious disease

Meningococcal is most common in infants of less than one year of age and people with certain medical conditions, such as the lack of spleen. There are five major meningococcal serogroups – A, B, C, Y and W_{135}. Serogroups B and C are mainly found in the Americas and Europe. Serogroup A and, to a lesser extent, serogroup C are found in Africa and some areas in Asia. Sercogroup Y has recently emerged in Northern America. Serogroup W_{135} has been associated with meningococcal disease epidemics in Saudi Arabia and Burkina Faso.

Populations in overcrowded places or places with dry seasons, prolonged droughts and dust storms are also at high risk. This is because the spread of the disease is through person-to-person contact, such as by way of respiratory droplets of infected people. A person can be infected through exposure to an asymptomatic carrier. At any one point of time, it is estimated that up to 5 to 10 per cent of a population may be asymptomatic carriers of the disease. These conditions are present in Mecca during the haj and umrah seasons. Prompted by a serogroup A meningococcal disease outbreak associated with the 1987 haj, Saudi

VA-MENGOC-BC® vaccine
FI is one of Cuba's premier institutes dedicated to the research, development and production of human vaccines. Its leading product is the meningococcal BC vaccine VA-MENGOC-BC®, with more than 50 million doses already commercialised. The active pharmaceutical ingredients (API) of the VA-MENGOC-BC® are the outer membrane protein from the Neisseria meningitidis serogroup B and capsular polysaccharide from the Neisseria meningitidis serogroup C.

Arabia has since required that haj and umrah visitors as well as migrant workers have a certificate of vaccination with a tetravalent (A,C,Y,W_{135}) meningococcal vaccine before entering the country.

The incidence of meningococcal disease is very high in the "meningitis belt" of sub-Saharan Africa, an area extending from Mali to Ethiopia, with periodic epidemics during the dry season (December -June). During epidemics, the rate of disease can increase from 5 -10 cases per 100,000 to 1,000 cases per 100,000 population. Serogroup A predominates in the "meningitis belt" although serogroups C, Y, and W_{135} are also found. This area of Africa also comprises some of the poorest countries in the continent, further compounded by a high incidence of other diseases such as HIV and malaria. Thus most vaccines are not affordable for these countries.

USM has a long-standing research collaboration with FI – dating back to 2003. Both parties appreciate the strength of each other and the level of trust and rapport that has been forged will ensure that the project will be successful.

The meningococcal polysaccharide vaccine against serogroups A, C, Y & W_{135} (Men ACYW) is one of the main R&D projects being undertaken at FI, based on its broad experience in the production of the meningococcal serogroup C vaccine component. This collaborative project involves the development and preparation of the capsular polysaccharides from serogroups A, C, Y, W_{135} by FI using animal-free components and processes in the entire workflow, i.e., from strain and culture media selection, elaboration of the master and working seeds, development of fermentation processes and for API purification and vaccine manufacturing. Parallel to vaccine formulation and freeze drying procedures, all relevant analytical procedures will be established to evaluate and release the intermediate and final products based on the Guidelines and Technical Reports for meningococcal vaccine production as laid down by the World Health Organization. This know-how and technology will be transferred to USM via a training and technology transfer programme.

Current available meningococcal vaccines

Several meningococcal vaccines are currently available in the market (worldwide):

i. **Menomune**™ by Sanofi Aventis: Declared by Muzakarah Jawatankuasa Fatwa Majlis Kebangsaan Bagi Hal-Ehwal Ugama Islam Malaysia Kali Ke-53 (27 November 2002) as haram because it contains porcine elements.

ii. *Menactra*™ by Sanofi Aventis: Not known to be certified as halal by any authorities.

iii. **Mencevax**™ by GSK: The Muzakarah Jawatankuasa Fatwa Majlis Kebangsaan Bagi Hal-Ehwal Ugama Islam Malaysia Kali Ke-53 (27 November 2002) declared that since Mencevax™ is a bovine-based vaccine, it was permissible for use. The declaration was based on the "akhafu al-dhararin" *fiqh* method, even though the Jawatankuasa Fatwa was unable to ascertain whether the bovine sources came from animals slaughtered in a syariah-compliant manner. However, it is important to note that on 16 July 2010, Majelis Ulama Indonesia (MUI) issued a fatwa (Fatwa Majelis Ulama Indonesia Nomor: 06 Tahun 2010) that Mencevax™ is haram. Based on a site audit conducted by Lembaga Pengkajian Pangan, Obat-Obatan dan Kosmetika, Majelis Ulama Indonesia (LPPOM MUI) (The Assessment Institute for Foods, Drugs and Cosmetics, Indonesian Council of Ulama) at GSK's vaccine manufacturing plant in Belgium on 20 and 21 May 2010, it was found that the production

processes of Mencevax™ involved materials with porcine elements.

iv. **Menveo**™ by Novartis: There has not been any official announcement whether Novartis is registering Menveo™ with the National Pharmaceutical Control Bureau (NPCB), Ministry of Health Malaysia or applying for halal certification from the Malaysian Islamic Development Department (Jabatan Kemajuan Islam Malaysia, JAKIM). On 16 July 2010, Majelis Ulama Indonesia (MUI) issued a fatwa (Fatwa Majelis Ulama Indonesia Nomor: 06 Tahun 2010) that Menveo™ is halal. A site audit conducted by LPPOM MUI at Novartis' vaccine manufacturing plant in Italy from 17 to 19 May 2010 verified that the cleansing in the production processes of Menveo™ complied with syariah requirements. The initiative to ascertain which meningococcal vaccine is halal has received strong support from Indonesia's Ministry of Health.

However, on 8 August 2010, the president director of Bandung-based PT Bio Farma, Indonesia's national vaccine producer, issued a public statement insisting that despite LPPOM MUI's certification of Menveo™ as halal, in reality there was no halal meningococcal vaccine available in the world, due to the absence of halal seeds for the vaccine and "nowhere in the world does [a vaccine] exist that does not contain porcine materials" [paraphrased].

Furthermore, Menveo™ is a conjugated vaccine targetted for infants in endemic countries and is expensive, thus it is not a suitable alternative to the unconjugated meningoccocal vaccine intended for haj and umrah (in terms of cost and demand).

Vaksin halal meningokokus

Halal meningococcal vaccine, *KOSMO!*, 26 Feb 2010

Value proposition of the halal Men ACYW

The differing fatwas and technical interpretations on the halal status of meningococcal vaccines currently in the market indicate a room of opportunity for the development of a halal meningococcal vaccine where the raw materials, ingredients, manufacturing processes, packaging and distribution comply with syariah requirements from the source to the finished product, while complying with the requirements of the relevant drug control and approving authorities. Furthermore, it is anticipated that the halal vaccine will cost less than the current vaccines mentioned above. The estimated cost of Sanofi Pasteur's Menumune and Menactra is RM260 and GSK's Mencevax is RM140, whereas USM's vaccine is anticipated to cost less than RM100. This is due to the lower R&D and production costs which will make it affordable to developing countries.

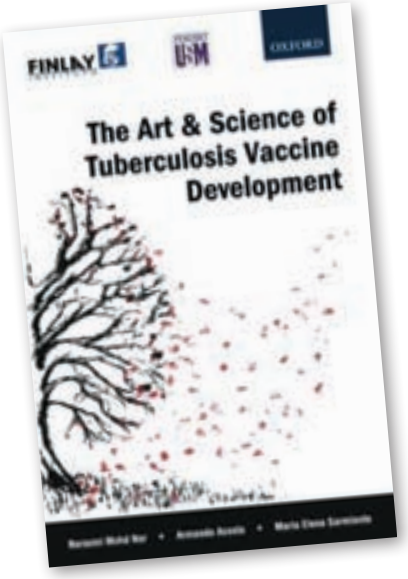
Other advantages of USM's halal vaccine include:

1. Collaborating with a world renowned research institute to learn and develop vaccines via technology transfer.
2. Enabling USM/Malaysia to be recognised worldwide in vaccine R&D and manufacturing within less than five years.
3. Providing visibility on the halal certification of pharmaceuticals and biologicals that will give a competitive edge for Malaysia.

The way forward

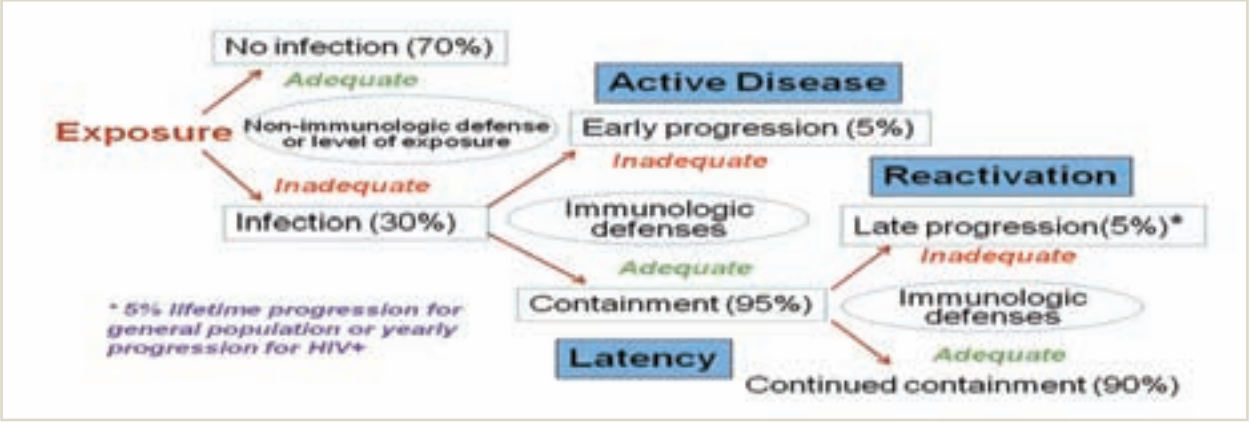
This project is a model for establishing the vaccine manufacturing capability for USM and Malaysia to ensure a sustainable development of Malaysia's vaccine industry. Many more pipeline vaccines and pharmaceuticals may adapt this model to produce affordable drugs and biologicals, particularly for developing nations. USM is planning to set up a pilot plant and smart partnership with manufacturers for other pipeline products.

The art and science of tuberculosis vaccine development

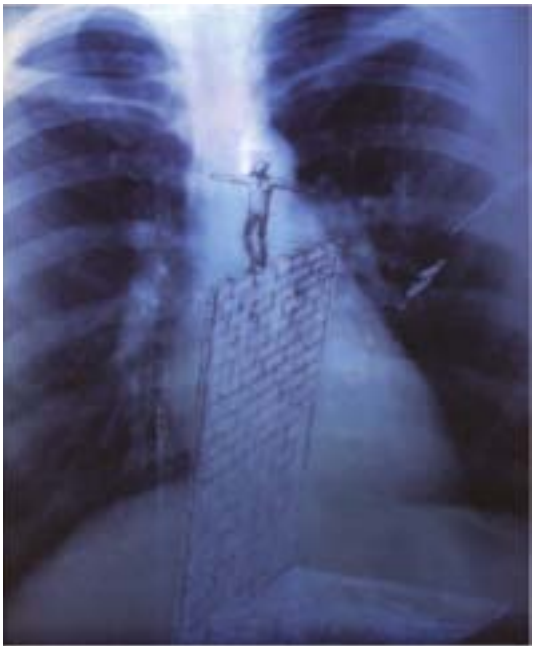


Editors: Norazmi MN, Sarmiento ME, Acosta A.
Publishers: Oxford Fajar Sdn Bhd in collaboration with Penerbit USM, 2010

Universiti Sains Malaysia in collaboration with Finlay Institute, Cuba has initiated a non-profit international project to produce a book entitled "The Art and Science of Tuberculosis Vaccine Development". This book brings together leading world experts in the field of tuberculosis (TB) vaccine development to provide in-depth and critical appraisal of the current situation and the challenges we face in this research field. A unique feature of the book is the inclusion of images from the works of renowned artists to help visualise the scourge of the disease – and to broaden the message of the book beyond the mere technical scope. This book is the first of its kind in the world that combines both art and science to send out an important message of collaboration amongst all the people of the world to address the problem of TB. The book is therefore appealing to both scientists and non-scientists alike.



Possible outcomes of exposure to M. tuberculosis
M. tuberculosis is spread via aerosols. Thirty per cent of exposed individuals will become infected, 5% of whom will have active disease, characterised by fever, night sweats, persistent dry cough and weight loss. The other 95% will have latent disease where, although there are no symptoms, the mycobacteria continue to persist until the host immune competence is compromised and the disease may be re-activated. This may occur in about 5% of individuals with latent infection. What determines the various outcomes of infection is still not well understood



"Inner Balance"
By Agustin Bejarano, mixed/X-ray film (43x35.5 cm)
TB complexities must be mitigated by seeking new solutions and alternatives based on the concept of sustainable health

The book aims to depict the diverse and, sometimes, controversial approaches of TB vaccine development. It hopes to give readers an insight into some of the multiple challenges of the field, covering areas in epidemiology, immunology, bioinformatics and technological platforms as well as ethical, regulatory and clinical aspects, among others. This book serves as a timely effort on the control of TB to illustrate and highlight the many issues involved and the resulting complexities that must be faced in seeking new solutions and alternatives to fulfil the concept of sustainable health. USM has funded the publication of the book and will distribute it freely to selected organisations which can make a difference in our collective fight against the disease.

"The struggle against TB is not dictated from above and has not always developed in harmony with the rules of science but it has originated in the people itself, which have finally correctly recognised its mortal enemy. It surges forward with elemental power, sometimes in a rather wild and disorganised fashion, but gradually more and more finding the right path." (Robert Koch, Nobel Lecture, The Nobel Prize in Physiology or Medicine 1905)

This book is an example of an altruistic collaboration between scientists and artists of different parts of the world to work together to provide an update on the "Art and Science of Tuberculosis Vaccine Development".

TB is on the increase. Courtesy of: Uschi Entenmann, Zeitenspiegel, photographs by Christoph Pueschner and Ivo Saglietti

Our research activities on TB as well as the book initiative are timely since there are barely five years left before the conclusion of the Millennium Development Goals (MDGs) in 2015. USM is therefore playing an active role to help realise the objective of MDG6 to combat the growing TB menace in view of the WHO Stop TB Strategy and the Stop TB Partnership's Global Plan targeted for completion in the same year (2015).

Tuberculosis – the disease

It is estimated that between one third to one half of the world's population is already infected with *Mycobacterium tuberculosis*, the causative agent for TB. *M. tuberculosis* is spread by aerosol and approximately 30% of exposed individuals will become infected. Of these, 5% will have the clinical disease – characterised by fever, night sweats, persistent dry coughs and weight loss – while the other 95% will have latent infection, where they do not show any symptoms but still harbour the bacteria. Approximately 5% of the latter group, the so-called latently-infected individuals, will eventually show symptoms when their immune system is weakened due to old age or when they contract diseases that affect their immune competence – referred to as disease re-activation.

"My heart waits also, towards light and towards life for another miracle of spring"
On the Old Elm (Poem) – Antonio Machado
Courtesy of: Uschi Entenmann, Zeitenspiegel,
Photograph by Ivo Saglietti

"The ritual of silence"
Augustín Bejarano, mixed / canvas - 175 x 250 cm
TB is deeply rooted in populations where human rights and dignity are limited. While anyone can contract TB, the disease thrives amongst the most vulnerable, the marginalised, the discriminated against and people living in poverty

…Obviously this is a situation set to spiral out of control. Call it what you want, a time bomb or a powder keg, any way you look at it this is a potentially explosive situation…

WHO Director-General Margaret Chan

"The Garden"
Aimeé García
Oil / canvas and fabric flowers

Nothing has changed
The body is susceptible to pain,
It must eat and sleep,
it has thin skin and blood right
underneath and adequate stock of
teeth and nails...
Tortures (Poem) –
Wislawa Szymborska

For women, the results of the stigmatisation due to TB have been particularly severe – divorce, loss of work and separation from their children

According to a recent report by WHO, despite the discovery of a vaccine against *M. tuberculosis* about eight decades ago (the live attenuated M. *bovis* bacille Calmette Guerin or BCG), TB remains the leading infectious disease killer of adults after HIV/AIDS – in fact, it is the primary cause of mortality in AIDS. More specifically, in some Asian countries such as Cambodia, China, the Philippines, Vietnam and the former Soviet Union – some of the countries most affected by TB – it is a top killer. TB is therefore re-emerging with a vengeance.

To make matters worse, the emergence of multidrug resistant (MDR) and extensively-drug resistant (XDR) TB, as well as co-infection with HIV, may cause this disease to spiral out of control if appropriate controls are not put in place.

Furthermore, the diagnosis of the disease is difficult and compliance to the long treatment is a major problem. Every three minutes, a person living with HIV dies of TB, made worse by the fact

The launching of *The Art and Science of Tuberculosis Vaccine Development*

that drugs, diagnostics, and vaccines currently available are not appropriate for people with HIV/TB co-infection. Each untreated TB patient could infect 5 - 10 people a year; thus, this may cause an unprecedented escalation of the problem if not addressed quickly.

"MDR-TB does not stop at borders. An uncontrolled local epidemic threatens the stability of global health security. TB anywhere is TB everywhere" Dr. Shigeru Omi, WHO Regional Director for the Western Pacific.

The social impact of tuberculosis

Tuberculosis has long been associated with poverty and poor public sanitation. It is inevitable that the disease thrives among the most vulnerable, the marginalised, the discriminated against and people living in poverty. This situation is compounded by the strong association between HIV and TB, further enhancing the stigma associated with the disease. For women, the results of the stigmatisation due to TB have been particularly severe – divorce, loss of work and separation from their children.

There is however growing recognition that social and behavioural factors in TB control need to complement scientific and clinical approaches against the disease. Awareness and education within the affected community and the public at large should form part of future control strategies against TB.

Tuberculosis vaccine development

The field of TB vaccine development is a dynamic area of vaccinology. Recently, several vaccine candidates have entered clinical trials for the first time – more than 80 years since the introduction of BCG – the first (live vaccine) against the disease.

The pathogenesis and immune response against *M. tuberculosis*, the causative agent for the disease, are still not fully understood and this is reflected in the wide array of experimental strategies that are used for the development of new generation TB vaccines. Research and development on TB vaccines span from basic research up to clinical studies.

So why is BCG no longer effective in curbing the disease? Between 1908 and 1921, Calmette and Guerin developed what is later known as the bacille Calmette Guerin (BCG) vaccine from a virulent strain of M. *bovis* after 230 subcultures in their laboratory. Since then, BCG has been used on more than three billion individuals with low incidence of serious complications although its efficacy has been controversial. In several controlled clinical trials, the efficacy of BCG ranges from 80% protection in the UK to no protection in India. There is however consensus about the ability of BCG to afford protection against the severe forms of the disease in children (milliary and meningeal). On the other hand, there is also agreement on the lack of BCG in affording protection against pulmonary TB in adults and its inability to block the transmission of the disease.

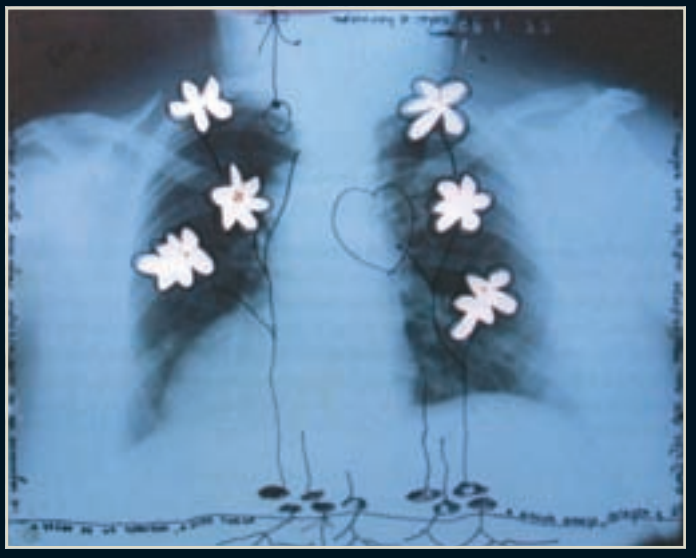
The failure of BCG as an ideal vaccine against TB may be due to several factors. They include the documented loss of genetic materials during the passage of the original strain to different parts of the world – hence the loss of potential relevant protective antigens; the inability to stimulate the CD8-positive T cell population; the immune cells responsible in killing cells already infected with *M. tuberculosis*; the absence of important T cell antigens; genetic variations of the vaccinated populations and the effect of the infection with non-tuberculous environmental mycobacteria in tropical regions where disappointing results of clinical trials have been obtained. Therefore, intense efforts have been directed to the development of more effective vaccines against TB to replace or to improve on the current BCG.

Many research groups are currently working on various technology platforms to create such vaccines. The development of two live recombinant BCG constructs by two major groups (Max Planck, Berlin, Germany and Aeras, Rockville, USA) expressing candidate antigens that are thought to confer better protection than BCG are currently in clinical trials. A weakened variant of *M. tuberculosis* is also being developed by a group in Spain. Other types of TB vaccines are also being developed, mainly to be used in individuals already immunised with BCG or to boost the immune system for individuals suffering from the disease or those with latent infection.

USM has been collaborating with Finlay Institute, Cuba on the development of TB vaccine candidates. The first phase of this collaboration, funded by the Ministry of Higher Education, Malaysia, was completed in 2007. The second phase of the project is funded by the Ministry of Science, Technology and Innovation, Malaysia, and is expected to be completed in 2010. We have developed several approaches either to replace BCG or to be used in conjunction with BCG to boost the host immune system.

Our work on recombinant BCG has been internationally recognised by being listed as one of the pipelines for TB vaccines in the Stop TB website.

The Friends – Nelson Dominguez
The defense mechanisms against TB are extremely complex and interconnected and some of them, potentially important, are still unknown



Untitled – Lili Sarmiento
Bioinformatics makes possible the interaction between very distant researchers. The large number of databases produced, sometimes with the use of very expensive technologies and processing programmes, once made freely available online, benefited researchers from all parts of the world, even those from low-resourced laboratories

Transformation Relief – Katharine Honey
"... Obviously this is a situation set to spiral out of control. Call it what you want, a time bomb or a powder keg, any way you look at this is a potentially explosive situation...."
WHO Director-General Margaret Chan

Complexity – Franklin Sotolongo
TB control is only through the integrated action of multiple factors at the social and biological level

Generations – Alfredo Sosa Bravo
The individual's characteristics can result in susceptibility or resistance to TB, and can determine the resistance or susceptibility to specific strains

Determination – Agustin Bejarano
"The struggle against TB ... has not always developed in harmony with the rules of science, but it has originated in the people itself, which have finally correctly recognised its mortal enemy. It surges forward with elemental power, sometimes in a rather wild and disorganised fashion, but gradually more and more finding the right path."
Robert Koch, Nobel Lecture, 12 December 1905
The Nobel Prize in Physiology or Medicine 1905

Sence – Lisbet Fernández
Children can be deprived of their right to education, ostracized by their peers and sometimes by teachers, due to having a family member sick with TB

All artworks from *The Art & Science of Tuberculosis Vaccine Development*
Kuala Lumpur: Oxford Fajar Sdn Bhd

New discoveries in urban pest management

Figure 1: *Misotermes mindeni*, the termite endoparasitoid found in the USM Main Campus

The year 2010 has been a productive year for the Sustainable Urban Pest Management programme of the Urban Entomology Laboratory, Vector Control Research Unit. Sixteen 16 ISI-listed peer-reviewed journal papers were published along with the completion of studies by three Ph.D. and four M.Sc. students. As in the past, our research activity has concentrated on biology, behaviour, ecology and management of subterranean termites, pest ants, cockroaches and bed bugs. The laboratory had also serendipitously discovered two new species of silverfish (order Thysanura) that were found to co-exist with subterranean termites and ants (see side article).

Termites

In 2009, we discovered a new species of phorid fly, *Misotermes mindeni* (Figure 1) that parasitises soldier termites of *Macrotermes gilvus*.

This year, we studied the behavioural and morphological changes in the host after undergoing parasitism by the fly. Parasitised soldiers showed a significantly lower level of interspecific aggressiveness compared with healthy soldiers. In most instances, the parasitised soldiers avoided or retreated from an opponent's attack on confrontation. The parasitised soldiers also showed an abnormally rounded head capsule and remarkably short mandibles. The mandible length was significantly shorter compared with those of the healthy soldiers. The parasitised soldier's head was also significantly broader than that of a healthy soldier (Figure 2). Additionally, the parasitised soldier possessed longer antennae but a shorter hind tibia compared with healthy specimens.

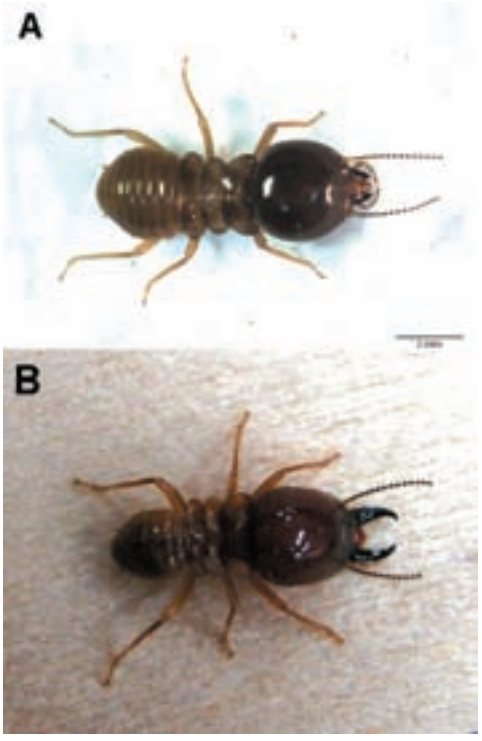


Figure 2: The parasitised (A) and healthy (B) major soldier termites of *Macrotermes gilvus* (after Neoh & Lee 2010 – *Environmental Entomology* 39: 835 – 840)

Figure 3: The Asian subterranean termite, *Coptotermes gestroi* is a highly invasive species that has spread to many parts of the world. It was believed to have originated from this region (Photo credit: Lee Chow Yang)

We also carried out video recording on the fly larval emergence process in the termite body. Only a single larva per host was observed. The fly larva developed in the termite soldier's head capsule and filled the whole capsule lumen. Once the fly larva had consumed the entire content of the termite soldier's head capsule, it was ready to pupate a week later under laboratory conditions.

During larval pre-emergence, the empty-headed parasitised soldier with an enlarged abdomen appeared to be capable of only moving slowly. A few hours later, the fly larva contracted intensively and applied sideways pressure to the intersegment membrane of the soldier's abdomen, using spiracles to perforate the termite's abdominal wall. The process took 10 minutes to complete. Body fluid in the termite abdomen oozed out of the abdominal wall perforation. The fly larva then pupated in the dried carcass of the host and would emerge as an adult fly after 14 days.

At this stage, the mechanism on how the larval parasitoid of *M. mindeni* enters the host is unknown. Such information is difficult to obtain because of the cryptic nature of subterranean termites and the limited knowledge of the biology of the genus *Misotermes*. Further investigations are currently ongoing and we hope to unravel the findings in future.

Coptotermes is a genus of the family Rhinotermitidae that is widely distributed in pantropical and subtropical regions. There is a growing concern about the economic impact of subterranean termites, especially those from genus *Coptotermes*, on urban structures, in forestry, and in agricultural crops in most subtropical and tropical countries of the world. These termites represent the major pest species in the Americas, Asia and Australia. In Malaysia, *Coptotermes* spp were responsible for 90% of all infestations in buildings and structures. In addition, several invasive *Coptotermes* have been transported from their native range in the Orient to other parts of the world. These subterranean termites can extend themselves well beyond their normal habitation range. For example, the Asian subterranean termite *Coptotermes gestroi* (Wasmann) (Figure 3) have established themselves as serious structural pests in Florida, West Indies, Mexico, Brazil and Taiwan.

Despite the importance of this genus, classifying the *Coptotermes* species has been very challenging due to the overlapping of morphological characteristics between different species. The problem is further compounded by a limited number of available specimens, especially at the imago caste. This has made identification of the termite at the species level difficult and unreliable. An accurate identification of the species is needed for the effective management of these insects in urban settings and to establish an environmentally sound management strategy.

Practising good science does not need to be a sophisticated and glamorous activity, involving high-tech instruments and millions of ringgit of research grants.

Figure 4: A male German cockroach, *Blattella germanica*. The German cockroach is an important cosmopolitan insect pest. In this region, it thrives very well in food preparation outlets, hotels and food factories (Photo credit: Evan Quah Seng Huat)

With the help of pest management professionals, we managed to collect many *Coptotermes* species from various parts of Asia, Australia and the USA. Using morphological characteristics and analyses of mitochondrial DNA sequences, we determined the phylogenetic relationships of the *Coptotermes* species that were collected. Our results revealed that there were six major clades among the *Coptotermes* species that were studied: I *(C. acinaciformis),* II *(C. lacteus and C. frenchi),* III *(C. curvignathus),* IV *(C. kalshoveni, C. sepangensis and C. travians),* V *(C. gestroi, C. vastator and C. heimi)* and VI *(C. formosanus, C. cochlearus, C. dimorphus* and *C. guangzhouensis)*. We also found that *C. vastator* and *C. heimi* were likely junior synonyms of *C. gestroi*. In other words, *C. vastator* and *C. heimi* and *C. gestroi* were actually the same species. Similar observation was made for *C. cochlearus* and *C. dimorphus* to *C. formosanus.*

The availability of accurate identification and information about phylogenetic diversity of *Coptotermes* is important for the improvement of termite management strategies. With the finding of synonymous species, information concerning those species from different geographical regions can now be pooled. Regulatory authorities may now be able to accept efficacy assessments of termite management strategies from any given region if the targeted species is the same, as contrasted with the past when they were thought to be different species. This will benefit all parties and will in the long run, save time and resources.

Cockroaches

Heavy reliance on and the high frequency of insecticide use have led to the development of their resistance to insecticides. Insecticide resistance in the German cockroach, *Blattella germanica* (Figure 4), is a challenging issue that has faced the pest management industry for many decades. This problem transcends geographical regions and different classes of insecticides.

Earlier, our laboratory had revealed the prevalence of insecticide resistance in numerous populations of the German cockroach in Malaysia. An earlier study revealed high levels of deltamethrin resistance in populations of German cockroaches in Singapore where resistance levels were detected up to 4,000-fold in comparison with a laboratory susceptible strain. However, no ensuing detailed report has been published regarding the insecticide resistance status in German cockroach populations from Singapore.

We were fortunate to obtain the support of the Singapore Pest Management Association and the Environmental Health Institute, National Environment Agency of Singapore to carry out a study on the status of insecticide resistance and to detect potential cross-resistance in field populations of German cockroaches from Singapore. In addition, possible resistance mechanisms in the resistant strains were investigated through synergism studies. We collected 22 populations of the German cockroaches from various food preparation outlets in Singapore including restaurants, hotels, food courts, garbage chutes, KTV outlets, nightclubs, etc. A broad range of insecticides, including

Figure 5: The tropical bed bug, *Cimex hemipterus* (left: male; right: female). Bed bug infestations are extremely difficult to manage as they are cryptic and are highly tolerant to insecticides (Photo credit: How Yee Fatt)

relatively newer compounds such as fipronil, imidacloprid and indoxacarb, was used.

Our findings indicated that when compared to a laboratory susceptible strain, resistance levels ranged from 3.0 to 468.0x for the pyrethroids, from 3.9 to 21.5x for the carbamate, from 1.5 to 22.8x for the organophosphate, from 1.0 to 10.0x for phenyl pyrazole and were absent or low for the neonicotinoid (0.8 - 3.8x) and the oxadiazine (1.4 - 5.3). Synergism studies using piperonyl butoxide (PBO) and S,S,S-tributylphosphorotrithioate (DEF) in combination with a discriminating dose (LD_{99}) of selected insecticides were conducted to test for possible resistance mechanisms. Resistance to pyrethroid was reduced with PBO and DEF, suggesting the involvement of P450 monooxygenase and esterases in conferring resistance. Propoxur resistance was also suppressed with PBO and DEF and coadministration of both synergists resulted in complete negation of the resistance, indicating the involvement of both P450 monooxygenase and esterase. In six *B. germanica* field strains evaluated, esterases were found to play a role in chlorpyrifos resistance, whereas the P450 monoxygenase involvement was registered in three populations. Additional resistance mechanisms, such as *kdr-type* and *Rdl* mutation contributing toward pyrethroid and fipronil resistance, respectively, may also be involved in some strains in which the resistance levels were not affected by the synergists. We conclude that insecticide resistance is prevalent in field German cockroach populations in Singapore.

Currently, we are working with Institut Teknologi Bandung, Indonesia on a project on the status of insecticide resistance in the German cockroach in Indonesia and hope to unravel the outcome of the research within the next two years.

Bed bugs

Sleep tight, and don't let the bed bugs bite – Many would remember this old saying if you grew up between 1940s and 1960s. After the early 1970s, bed bug problems gradually diminished. No one really knows why and what causes them but after a gap of three decades, they are now back to haunt us!

Over the past 10 years, the resurgence of bed bug infestations has gained worldwide attention, especially in the tourism and pest management industry. Increasing numbers of bed bug infestations were reported in the U.S.A., Europe, Canada, Australia and Korea. Bed bug bites are a medical nuisance to humans; they may cause cutaneous reactions such as erythema, wheals, vesicle formation and haemorrhage. Repeated bites cause skin lesions and in some cases, victims develop systemic hypersensitivity or even severe haemoglobin loss.

Scratching wounds that develop after bites may even trigger secondary infections. The cryptic behaviour of bed bugs may also prompt delusory parasitosis among homeowners and hoteliers. Bed bug infestation has also been one of the major factors contributing to economic losses in the hospitality and tourism industry in the present day.

In Southeast Asia over the past five years, pest management professionals have reported bed bug management to be increasingly important. Unfortunately, many of such reports

have been anecdotal in nature or were published in local newspapers and other trade magazines. No information about bed bug infestation in this region is available in the scientific literature. A survey was thus carried out in Malaysia and Singapore with the help of pest management professionals.

A survey on 54 bed bug-infested sites (hotels, public accommodations and residential premises) in Malaysia and Singapore revealed that, unlike the temperate and sub-tropical regions where *Cimex lectularius* was commonly found, only *Cimex hemipterus* was found. Bed bug infestations were common in hotels and public accommodations when compared to residential premises.

The three most common locations of infestation within an infested premise were the bedding (31.1%), the headboard (30.3%) and cracks and crevices surrounding the baseboard, wall or floor (23.5%). Based on the results, we also speculate that the route of movement of bed bugs in hotels and public accommodations is more direct than in residential premises.

All infestations recorded in Malaysia and Singapore thus far involve *C. hemipterus* (Figure 5) Although several studies focusing on the management of *C. hemipterus* exist, with the exception of the biological study carried out by Omori in 1941, there is a dearth of information about the biological parameters of *C. hemipterus*. This prompted us to carry out a detailed biological study on the species.

Under environmental conditions of 26 ± 2°C, 70 ± 5% relative humidity and a 12-h photoperiod, with blood meals provided by the human host, six strains of tropical bed bugs had a fecundity of up to 50 eggs per lifetime, over 11 -14 oviposition cycles. Increased feeding frequency improved fecundity. After feeding and mating, adult females normally took 2 -3 days to produce a first batch of eggs. The oviposition period lasted 2 -7 days before cessation of the oviposition cycle. The egg incubation period usually lasted 5 -7 days before the emergence of first instars. The nymphs underwent five stadia (the first four of which each took 3 - 4 days, whereas the last took 4 -5 days) before becoming adults at a sex ratio of 1:1. More than five blood meals were required by the nymphs to ensure a successful moult. Unmated adults lived significantly longer than mated adults (Figure 6). Unmated females lived up to almost seven months but the longevity of mated males and females did not differ significantly.

Figure 6: Unmated adult bed bugs live longer than the mated ones. The more frequent they mate, the shorter their life spans. In bed bugs, too much sex kills! (Photo credit: How Yee Fatt)

Earlier, we found that the route of movement of bed bugs affects the infestation frequency. A better understanding of the movement behaviour is relevant to those trying to manage bed bug infestations. Although some studies have discussed the spread of bed bugs via the passive dispersal pathway along which the insects are carried unnoticed by the host to a new location, bed bugs can also actively disperse over relatively shorter distances, such as from room to room within a building and between contiguous buildings. Thus, we examined the effects of different life stages and feeding regimes on the active dispersal behaviour of *C. hemipterus.*

Results indicated that the fifth instars and adult males and females showed significantly greater movement frequency compared with the other stages. The first and second instars showed limited movement (< 8 metres) over the experimental period. Starved bed bugs showed greater movement frequency compared with blood-fed bed bugs, with the exception of adult females. Blood-fed adult females exhibited significantly greater movement frequency and distance compared with starved females. Blood-fed females moved up to 42 metres over 120 hours. Regression analysis between movement distance of the fifth instars and adults and the time intervals revealed a positive relationship, suggesting that delays in bed bug control efforts will increase the risk of the greater infestation.

The outcome of this study suggested that during bed bug inspection, the presence of only late instars and adults in premises would indicate a new infestation, whereas an established infestation would likely consist of mixed stages.

Survival and thermal-tolerance limits are two of the most critical factors that can be exploited for bed bug management. Survival and thermal-tolerance limits can also be used to provide useful information for management of bed bugs via heat treatment. We examined the survival of *C. hemipterus* under different regimes of temperature and relative humidity (RH), using field-collected strains. Insects were exposed to temperatures ranging from 20 to 45°C and relative humidities (RHs) of 33, 75 and 100%. *C. hemipterus* survived longest under the interaction of low temperature (20°C) and high relative humidity (75 -100%). Survival and water losses were significantly affected by temperature and relative humidity (either singly or in interaction). Strain and sex significantly influenced bed bug survival but not on water loss. Eggs, first instars and adults reached their upper thermal lethal limit within 1 h at 39°C, 44°C and 46°C, respectively. The survival and water loss profiles showed that starved *C. hemipterus* started to die after losing 35 - 45% of their body weights. The outcome of this study suggested that heat treatment could be a feasible yet sustainable strategy in managing bed bug infestations.

Concluding remarks

Practising good science does not need to be a sophisticated and glamorous activity, involving high-tech instruments and millions of ringgit of research grants. Many of the greatest discoveries in the history of mankind were simple, "cheap" and elegant. Yet, these discoveries led to numerous other scientific opportunities that ultimately benefit mankind. A few good examples include the discovery of the antibiotic property of penicillin from the mould *Penicillium notatum* by Alexander Fleming, the discovery of the role of the *Helicobacter pylori* for most peptic ulcers by Barry Marshall, the discovery of genetic transposition by Barbara McClintock, the discovery of DDT as contact poison for arthropods by Paul Muller, and the waggle dance in bees as a means of communication by Karl von Frisch. Good science is often based on a good research question, followed by dedication, passion and tons of curiosity. Lastly, as a developing nation, there is really no need to travel to the other end of the world or to space to explore new opportunities in science, when there are so many that we have neglected in our backyard that are yet to be discovered.

As a developing nation, there is really no need to travel to the other end of the world or to the space to explore new opportunities in science, when there are so many that we have neglected in our backyard that are yet to be discovered.

More new species of insects discovered

Figure 7: *Xenolepisma penangi*, the new species of silverfish that was discovered to co-exist with the Pharaoh ant (Photo credit: Veera Singham K. Genasan)

Figure 8: *Crypturelloides mindeni*, the new species of silverfish that was discovered to have an inquiline relationship with the subterranean termite, *Globitermes sulphureus* (Photo credit: Veera Singham K. Genasan)

Introduction

In 2010, two new species of silverfish (order Thysanura) were discovered in Universiti Sains Malaysia's Main Campus. These became the third and fourth new species of insects to be discovered in the Main Campus over the past three years.

The two silverfish were found to co-exist with the Pharaoh ant, *Monomorium pharaonis* and subterranean termite, *Globitermes sulphureus*, respectively. After the specimens were collected and sent off to Graeme Smith, a retired Australian expert on silverfish taxonomy for close examination, it was concluded that both species were new to science.

A new species of cricket *(Myrmecophilus leei)* was found in 2007 while in 2009, a new species of termite endoparasitoid *(Misotermes mindeni)* was discovered.

Xenolepisma penangi

The first new species, named *Xenolepisma penangi* (Figure 7) in honour of the state of Penang where it was found, was discovered by Ph.D. student Kuah Meng Kiat in a colony of the Pharaoh ant, nesting between a wooden plank and styrofoam in a rack in the USM's Aquaculture Research Complex.

Normally, ants demonstrate aggressive behaviour towards non-nest mates and other insects when they are found in their nests but in this situation, both X. *penangi* and *M. pharaonis* are able to co-exist in the nest. The silverfish were also found moving along with the Pharaoh ant trail in another location in the building, suggesting a strong inquiline relationship with this ant species. This new species is also the first record of a *Xenolepisma* being found in Southeast Asia.

Crypturelloides mindeni

The second new species, named *Crypturelloides mindeni* (Figure 8) is very unique because we have to create a new genus to describe it as it cannot be classified in any of the existing genera of silverfish. The name *Crypturelloides* was chosen because of its close proximity to the genus *Crypturella*. This new insect species was discovered by Ph.D. student Veera Singham K. Genasan during an excavation of a *G. sulphureus* mound in the USM Main Campus.

The termites did not show any aggression towards the silverfish, even when the silverfish pushed their heads under the bodies of the termites, suggesting the inquiline relationship with the termite species. The species was so-named in honour of the Minden campus where it was discovered.

Discovery work like this is never planned. Serendipity does happen! However, without a good pair of eyes, passion and the curiosity of these students discoveries like these would not have been possible.

Many of the greatest discoveries in the history of mankind were simple, "cheap" and elegant. Yet, these discoveries led to numerous more opportunities that ultimately benefit the mankind.

HiCoE on molecular medicine

With its long list of "firsts", it is not surprising that the Institute for Research in Molecular Medicine, USM has been redesignated from a research centre to a higher education centre of excellence (HiCoE) by the Ministry of Higher Education (MoHE). INFORMM, with its niche area in "diagnostic platforms", not only fulfils the stringent criteria set by the MOHE but also assumes a comfortable seat as a leader in innovation and creativity. The several "firsts" that have been INFORMM's claim to fame include the following: the first research full-fledged trans-disciplinary research institute in USM; the first research institute in Malaysia to perform research according to the The Research to Development to Commercialisation to Entrepreneurship (R-D-C-E) model which is now widely adopted by the government for the New Economic Model; the first and only research cluster in USM to have satisfied the USM criteria for a "world class research programme"; the first university research institute in Malaysia to win the Islamic Development Bank (IDB) award for science and technology; the first research institute in Malaysia to develop and commercialise a research product and now, one of the six first HiCoe in Malaysia, a status accorded during a colourful event graced by the Prime Minister of Malaysia.

Prof. Rahmah Noordin supervising her postgraduate students

INFORMM has trained hundreds of local and international undergraduate and postgraduate students in molecular medicine

INFORMM was officially launched on 25 June 2005 by the then Minister of Higher Education. After its inception, INFORMM continued its journey of excellence focusing on fundamental and translational research in priority areas in molecular medicine in Malaysia as well as on enteric diseases, parasitic diseases, pharmacogenomics and novel therapeutics, with focuses on rapid diagnostics for typhoid, paratyphoid, cholera, filiriasis, tuberculosis and personalised medicine. INFORMM relied on endogenous and outsourced technologies that included dot enzyme immunoassays, ELISA, PCR including PCR-ELISA, thermostabilised PCR, immunochromatography, biosensors and biochips. It recently acquired new technologies, bionanotechnology and antibody engineering that, coupled with its other newly acquired skills in FRET and non-PCR based amplification, have positioned it to develop new innovations and to improve established tests to produce more sensitive, specific and cost effective tests.

Excellence is an attitude

While past achievements have gained it the HiCoE designation, INFORMM is not one to rest on its laurels. The designation is seen as an opportunity to further develop its value chain of research and development, commercialisation and innovation in performing cutting-edge fundamental and applied research that satisfy national needs to produce high impact outcomes, high-skilled human capital and establishing collaborations with national and international partners and industries. Of utmost importance in INFORMM's agenda is the nurture of scientific exploratory work and creativity of knowledge discovery in its niche area to create wealth for the country. INFORMM strives to become an "education-wide knowledge enterprise that will initiate and lead intra and inter institutional research in collaboration with international and industrial partners at standards consistent with global best practices, connecting innovation systems by fostering discovery, creativity and new talents".

INFORMM's vision is to be a key global player for training and R&I in molecular medicine. Its mission, within the next three years, with emphasis on outcomes that serve low-resource settings, shall be achieved by spear-heading world class knowledge creation and dissemination of molecular medicine through the following:

- Multi-dimensional fundamental and translational research.
- Becoming the preferred centre for training, R&I and services.
- Acquisition and transfer of cutting-edge technologies and ICT.
- Development of diagnostic and therapeutic platforms while embracing eco-friendly systems.
- Fostering national and international partnerships.
- Setting-up of viable business ventures.
- Continuous enhancement of the human capital through learning and development.

- Development, motivation and empowerment of students to fully realise their total potential, from selection to employment.
- Outreach and community-engagement programmes that create a positive impact in the lives of people.
- The creation of a conducive and harmonious work environment that propagates the spirit of "1 INFORMM".

Apart from research, INFORMM provides an enabling environment for the training of students and scientists, adopting the R-D-C-E concept. The R-D-C-E concept has yielded sustainable economic activities through the commercialisation of diagnostic kits

with the Typhidot taking a "flagship product" role and commercialised in 18 countries. INFORMM has been actively involved in human resource development and has produced, and is still producing, many molecular medical scientists trained in the R-D-C-E approach to research and innovation at the Ph.D. and M.Sc. levels including the first local Ph.D.s in pharmacogenetics. Apart from that, INFORMM has trained hundreds of university undergraduates from many local institutions on molecular medicine through its industrial training programme. Other activities in human resource development at INFORMM include "practical attachments" of university and college students, teaching seminars and workshops and organisations of scientific meetings and conferences for technology/knowledge transfers.

INFORMM also organises scientific meetings and conferences, the most recent being the 14th Emerging Infectious Disease Conference under the US-Japan Scientific cooperation programme at the National Institute of Health (NIH), USA in October 2010.

INFORMM had a humble beginning at MITD but it now boasts of new homes in Kelantan and Penang, more staff and state-of-the-art equipment that include a DNA sequencer, a cell culture facility, RT-PCR equipment and HPLC-MS. Its successful bidding for an IDB funding has added to the array of its cutting equipment a MALDI-TOF, several HPLCs, a bioanalyser, a pyrosequencer as well as facilities for bioinformatics. Through its collaboration with Biotech Corp., INFORMM also boasts a state-of-the-art nanobiotechnology facility. INFORMM now has the human resource and excellent infrastructures to perform cutting edge research and innovation in bioinformatics, genomics, proteomics, RNAomics and pharmacogenomics for its major clusters of enteric diseases, parasitic diseases and pharmacogenomics and novel therapeutics aa well as its developing cancer studies cluster. Coupled with the other three technology platforms of antibody engineering, FRET and non-PCR based amplification, INFORMM will become a one-stop centre for research and innovation for the development of diagnostic and therapeutic products.

Networking activities

For its outreach and community engagement programme, INFORMM adopted SAHABAT, Persatuan Perantaraan Pesakit-pesakit Kelantan. SAHABAT is a non-governmental organisation affiliated with the Malaysian AIDS council to serve the communities of drug users (DUs) and people living with HIV/AIDS (PLWHA). INFORMM @ SAHABAT is a comprehensive harm reduction programme for IDU (injecting drug users) to reduce the risk of HIV transmission from and among them to complement the government's programme to reverse the dual drug use-HIV/AIDS epidemics. It is also aimed at improving the quality of life for DUs and PLWHA. To help clients engage in gainful activity, INFORMM at SAHABAT also developed a "Farming at SAHABAT" with a seed fund from Bahagian Jaringan Indusri (BJIM) in USM. A piece of land has been converted into a farming plot and the harvests are sold to local wet markets.

INFORMM @ SAHABAT provides a win-win situation. To the DU and PLWHA community, it provides direct access to healthcare and an opportunity to be involved in gainful employment. To INFORMM-USM, INFORMM @ SAHABAT provides a conduit to serve needy communities and contribute to the national strategy for HIV prevention. Apart from this, it also provides research opportunities and material to enable the implementation of the research findings directly to stakeholders. Another community outreach and networking activity similar to that at SAHABAT is at the Kelantan State Health Department where INFORMM provides diagnostic tests for typhoid fever and carriers, the data from which are also available for research at INFORMM.

INFORMM's research network spans across the globe encompassing various reputable international organisations such as the National Institute for Cholera and Enteric Disease (NICED) in Kolkata, India; Western Australia University, Perth; the International Medical University Task Force for Global Health, Atlanta and the Karolinksa Institutet, Sweden. INFORMM also recently visited several world class research institutions in the UK for the purpose of learning best practices and seeking collaborations. Notable results from the visits include:

1. A plan for a joint INFORMM/ University of Glasgow Ph.D. programme that is being planned for implementation in September 2011.
2. An advanced molecular biology/ medicine facility at the University of Glasgow that is available for INFORMM staff and students to train at no cost (with INFORMM providing transportation and living expenses).
3. A list of experts at the University of Glasgow, Biodiagnostic Institute (BDI) in Dublin, London King's College and London Imperial College offers to be part of a research consortium for the purpose of application for funding from EU, Welcome Trust and other sources.

Delivering excellence

INFORMM's contributions have been multi-faceted and significant both in terms of research and innovation and in terms of science and technology. INFORMM has also played important roles in influencing the country's various policies.

Impacts from research and innovation

1. The discovery of a specific Salmonella protein led to a novel diagnostic test for typhoid that is more rapid and easier to perform compared to the "Gold" WWF standard used previously.
   a. Apart from the reduction in typhoid morbidity and mortality that this test can contribute to, the work that led to the discovery produced several young scientists, local and international, who worked for their postgraduate degrees based on the project. They can now provide the much-needed expert human resource for the development of science and technology in their respective countries.
   b. The test is now commercialised in Malaysia and in almost 20 other *bottom billion* countries where typhoid remains endemic. The commercialisation has generated economic activities, both in Malaysia, the innovating country, and in acceptor countries that use the kits, creating many jobs. These people have also learned new technologies that were not indigenous in their countries.

International postgraduate student at work

INFORMM has provided the much-needed human resource for the development of molecular medicine in the country

2. A new test for typhoid carriers has recently been developed and this represents an important milestone in typhoid management because of its ability to detect typhoid carriers will facilitate its eradication.
3. The rapid diagnostic test for filiarisis, a world first, is helping WHO in its effort to eliminate the disease that similarly remains endemic in several countries. Filiarisis is a very debilitating disease that causes deformities and is difficult to treat. Although the disease is almost eradicated in most parts of the world, it remains endemic in some including in Sarawak in Malaysia and in Indonesia.
    a. The successful application of this test is definitely of great impact to the victims, the endemic countries and the world.
    b. The work that led to the discovery also produced several young scientists who worked for their postgraduate degrees based on the project.
4. Research in pharmacogenetics has made available pharmacogenetic information for the major ethnic groups in Malaysia; it is useful in drug development for the local population. The recently developed personalised medicine for the methadone test helps to optimise the methadone maintenance therapy to reduce risks for toxicity and to improve its effectiveness in reducing the HIV spread.
5. New knowledge created from the above work has been published extensively to be shared by the world.
6. INFORMM scientists have also been invited to give talks on relevant subjects. This not only contributes to knowledge/technology transfers but also gives exposure to the scientists who are now recognised as leading scientists in their areas and have been invited to become consultants in organisations like WHO, thus contributing to the world body's efforts to improve the quality of healthcare globally.
7. INFORMM has successfully trained many young scientists at the M.Sc., Ph.D. and post-Ph.D. levels. Although the majority are from Malaysia, several are from other countries including Bangladesh, Pakistan, Nepal, Iran, Iraq, Syria, Saudi Arabia and Indonesia. These young scientists will provide human resources for the betterment of science and technology in their countries.

Impacts on policies

1. The procedures for the formation of INFORMM have, in the main, been adopted and adapted by both USM and MoHE as procedures to select and rank CoE. INFORMM founding director, Professor Asma Ismail, has been instrumental in this and INFORMM has now become a model for CoE that hopes to spur the government's efforts in the new economic model of a high income nation through knowledge creation and innovation.
2. On the individual level, Asma, through her work at USM, MoHE and MOSTI, has been instrumental in several policy decisions, both at USM and at the national level. She has been a prominent player in the processes leading to the concepts of research excellence, research universities and centres of excellence, policies that have changed research landscapes in Malaysia. On a wider scale, Asma has helped rewrite policies on research in USM and in the country.
3. Through his work with non-

governmental organisations, Professor Rusli Ismail has been in the forefront in the policy change of the government in relation to the fight against illicit drugs. He was in the three-member team that presented to the then Deputy Prime Minister heading a cabinet committee on drugs on 13 February 2003 the merits and need for harm reduction to complement a supply and demand reduction for illicit drugs. An about-turn policy was formulated that day and a comprehensive harm reduction programme is now in place in Malaysia to reduce the harms associated with illicit drugs, including the transmission of HIV and other blood-borne infections. Rusli also wrote the first draft on methadone maintenance therapy that is now implemented nationwide. Rusli still sits on the National Task Force on Harm Reduction at the Ministry of Health.

4. Through her work with Brugia, Professor Rahmah Noordin is one of the experts involved in the ongoing WHO programme for the eradication of filiarisis. Malaysia aims to eradicate the disease by 2013.

In recognition for the impacts it created, INFORMM has received many awards and recognitions at the national and international levels. Among the most prestigious were the 2008 IDB award (with USD 100,000) for science and technology and the 2010 HiCoE status with the annual grant of RM 3 million for three years. Several of its members have also won awards (Asma, Rahmah and Rusli) and recognition (Asma, Rahmah and Rusli) and sit in several policy-making committees (Asma and Rusli) at the national and international levels including being recognised as experts by WHO (Asma, Rahmah and Rusli). INFORMM has thus contributed significantly to the development of science and technology, especially in Malaysia. The impact, moreover, has extended beyond the shores of Malaysia, reaching other countries including many in the Islamic world.

At INFORMM, the following services and expertise are available:

- Cloning and protein/enzyme production with up-scaling capability
- Antibody production using either antibody engineering or conventional polyclonal/monoclonal approaches
- Nanoparticle (e.g., nanogold, nanomagnets) production
- Nano-conjugation for diagnostic applications
- Diagnostic platforms (e.g., dipsticks and lateral flow test kits)
- Typhoid screening (including for carriers)
- Elephantiasis (Filirial disease) screening
- Cell culture
- Clinical pharmacology and bioequivalence studies including study designs, pharmacogenetics and pharmaokinetics
- Doping screening (drug abuse screening)

HiCoE on drug research

Some of the researchers of CDR at work

Drugs have become ubiquitous in modern living. The challenge is to ensure that we continue to have control over them. The responsible use of drugs, such as drugs for tropical diseases, has led to the saving of lives while the reverse has been linked to the collapse of societies. The Centre for Drug Research (CDR) at Universiti Sains Malaysia is determined to ensure that the society continues to have a healthy relationship with drugs.

In 1973, upon the Malaysian's government invitation to assess the drug abuse situation in the country, a World Health Organization (WHO) team recommended an in-depth study on the drug abuse problem. In view of the increasing national concern regarding this problem, in 1976, the Vice Chancellor (VC) of USM requested researchers from the neuropsychopharmacology, social sciences and behavioural sciences to develop multi-disciplinary research programmes. Consequently in 1978, the Drug Abuse Research Centre was formally established by the university under the office of the Vice Chancellor. The centre was designated as a "National Centre (Pusat Penyelidikan Dadah Kebangsaan) to undertake research for developing policies and guidelines for ongoing and future drug abuse programmes" and its research activities were placed directly under the Cabinet Committee on Drug Abuse Control to meet national needs. The centre's research activities quickly gained attention and recognition of international organisations such as WHO and the United Nations (UN) Narcotics Commission which led to its designation as a WHO Collaborating Centre for Research and Training in Drug Dependence in 1979. In 1980, the centre was given an additional responsibility by WHO to function as an International Data Centre on the Epidemiology of Drug Dependence. In recognition of the regional and international value of the centre's

research activities, the UN Office on Drugs and Crime designated it as a UN Collaborating Centre in Research and Training in 1981 under Article 8(c) and 38(b) of the Single Convention on Narcotic Drugs 1961 as amended by the 1972 protocol. In 1983, USM in collaboration with WHO earmarked two potential areas of research pertaining to tropical diseases, namely, research in clinical pharmacology and drug development for these diseases. This led to the approval of a five-year (1985-1989) grant by WHO to strengthen the centre's research capacity. In view of this expansion and to reflect the larger mandate, the centre's status was upgraded to a full-fledged centre at USM in 1985 and it is now known as the Centre for Drug Research (CDR, Pusat Penyelidikan Dadah dan Ubat-Ubatan). Experts from CDR have also served in and chaired several international committees including the WHO Expert Committee on Drug Dependence and the UN Advisory Committee to the Secretary-General on Drug Control Medicine. Its relentless efforts in drugs research gained its due recognition by USM in 2002 when it was judged to have met the stringent criteria set for the recognition of world class programmes. Subsequently in 2009, having met the criteria requirements set by the Ministry of Higher Education and with the approval of the Malaysian cabinet, CDR was formally selected out of 146 other applications as one of the first six higher institution centres of excellence (HiCoE) with the niche area of research focusing on behavioural research in addiction.

Adopting a trans-disciplinary approach by combining arts and science, CDR undertakes research in socio-medical, clinical pharmacological and health areas, requiring resources and facilities that cross academic and professional boundaries. To further consolidate its position as the leader in addiction research, it is currently strengthening and expanding its competency in the area of behavioural experimental research. The centre has also established a name in infectious disease research, focusing on three thrust areas, namely, chemical/drug analysis, ADME-toxicology and clinical pharmacology. Additionally, to ensure the sustainability of the drug research in the country, CDR provides practical training to postgraduate students who undertake graduate work leading to a higher degree.

Since its establishment, CDR has continued to gain recognition as a centre of excellence through its high quality scientific research. It is recognised internationally and works closely with several international and national institutions, such as WHO that has formally recognised CDR's analytical laboratory since 1992 and national registration authorities and federal government agencies such as the Ministry of Science, Technology and Innovation as well as national and international pharmaceutical companies. It has also established a global collaborating network with the Drugs for Neglected Diseases Initiative (DNDi, Geneva) and has become DNDi's regional office for Asia since 2005.

The substance

Three ingredients have been instrumental to CDR's success: its knowledgeable and skilled academic staff, its vast network of partnerships and collaborations and its cutting edge facilities. CDR is mobilised by eight highly dedicated academic staff with extensive research experience and unique core competencies in pharmacology, herbal-drug interaction, signal transduction, pharmacokinetics, drug metabolism, pharmaceutical analysis, drug discovery and design, toxicology, biomedical analysis, multivariate classification, addiction research, behavioural sciences, human and experimental behavioural pharmacology, neuro-psychopharmacology, drug evaluation research, pharmaceutical product development, clinical epidemiology, phytochemistry and pharmaceutical chemistry.

Many of CDR's accomplishments are gained through its vast network of partnerships and collaborations with local and international organisations. Some of its partners include Malaysian Biotechnology Corporation Sdn. Bhd. under the Bionexus Partners Programme for Biomedical Analysis since October 2008 and Invest Penang (Invest-In-Penang Berhad) for a Strategic Roadmap for the Development of Biopharmaceutical Research & Industry in the Northern Region of Peninsular Malaysia since September 2007. Various research collaborations have also been established, such as with the Pharmaceutical Science Research Division, King's College London and Guys Hospital London for the blood-brain-barrier (BBB) work and University of Erlangen (Germany) and Yale University (USA) for behavioural research.

The groundbreaking research that has been the pride of CDR would not have been possible without its cutting edge facilities. The CDR's facilities are focused on the following themes: behavioural research that offers facilities for understanding behaviour

CDR has signed agreements with numerous biotech companies to support the needs of the Malaysian life sciences industry

and its neural underpinnings; drug discovery facilities that focus on the discovery of new lead compounds from natural resources while lead optimisation is performed using knowledge-based drug design and synthesis. Toxicology and drug metabolism screenings are conducted using in-house facilities whereas biomedical analysis uses various modern instrumentations such as GC-MS and LC-MS^n for qualitative and quantitative measurements. CDR also provides facilities to measure the biological equivalence of pharmaceutical products and is one of the few bioequivalence study centres which have been set up in the country to provide services to the pharmaceutical industry.

Prescribing solutions

CDR has made numerous contributions to the academia, industry, society and nation. The centre's research work has been continuously published in high impact citation-indexed journals. From the year 2007 to December 2010, 60 journal articles with a cumulative impact factor of 87.705 and 34 non-citation indexed journal articles and refereed proceedings as well as six other publications that have an impact on government/society/policy have been published. The centre's researchers have published in over 150 international publications and 54 monographs under the national and international monograph series. They have presented their research findings at more than 150 national and international conferences and also serve as advisors in national and international scientific committees.

CDR signed MoAs with the Malaysian Biotechnology Corporation Sdn. Bhd. in October 2008 and with Pharmaniaga Berhad in July 2009. Under the Bionexus Partners Programme (BNP) with Malaysian Biotechnology Corporation Sdn. Bhd., a laboratory in CDR called the Biomedical Analysis Unit (BAU@CDR) has been earmarked to complement BNP's objective of supporting the needs of Malaysia's life sciences industry for high-end research facilities, infrastructure and capabilities. Thus, BAU@CDR is committed to providing the industry with quality services, equipment and facilities. In its partnership with Pharmaniaga Bhd., CDR has been appointed to provide consultancy services to advise on the optimisation of analytical and extraction processes and the identification of phytocompounds for the Kacip Fatimah Project – Phytocompounds Screening and Structuring Elucidation & Manufacturing of API Samples for Preclinical Studies.

CDR is currently conducting two major projects: the first focusing on behavioural research to expand existing behavioural screening procedures to study the relationship between behaviours and the impact of psychoactive compounds. The project will result in a comprehensive behavioural screening procedure to explain the addictive potential of natural and synthetic psychoactive compounds. In addition, the research project also focuses on establishing the behavioural effects of psychoactive drugs, relating these to the intrinsic effects on the brain. For example, it will examine the implications of acute and chronic exposure of addictive psychoactive compounds on the learning process, memory mechanisms and other psycho-neuronal effects. Further, the project will include investigations on the implications of external stimuli, such as stress, nutritional status and diet, on behavioural outcomes and their implications on treatment regimens.

The second project, the blood-brain-barrier research, aims to develop and establish a blood-brain-barrier (BBB) model that can be used as a research tool to study the transport mechanisms of psychoactive drugs and assess the impact of various disease conditions on the transport mechanisms. In this project, apart from establishing in vitro and in vivo experimental procedures, the molecular transport mechanisms involved in the movement of psychoactive compounds, their inhibition or facilitation, from the blood to the central nervous system (brain) will be studied. This knowledge will contribute to the better understanding of the development of differential addictive potential of various psychoactive compounds. In addition, the project will examine the effects of disease conditions (e.g., inflammation, fever, etc.) on the BBB and its implications on the transport mechanisms and consequently, their impact on treatment outcomes. Both of these projects are funded by the Ministry of Higher Education through an annual grant of RM3 million for a period of three years.

While research has been its core business, CDR is always cognisant of its responsibility towards the society at large. With the establishment of the Drug Education and Prevention Unit, the centre, in collaboration with various federal and state government agencies such as the National Anti-Narcotics Agency, the Ministry of Health and the Ministry of Education, has organised talks, training workshops, forums, exhibitions through Youth Outreach Programmes to educate youths, particularly school children, on the dangers and adverse health effects of abusing drugs, promote tobacco-free and drug-free lifestyles, as well as educate the masses on prevention approaches for drug abuse problems. CDR also regularly conducts courses in basic and intermediate pharmacology and research methodology for officers from the National Anti-Drug Agency to impart knowledge and strengthen their skills in conducting high quality research geared towards addressing drug abuse problems in community settings. Other current research projects in addiction research address issues such as identifying risk behaviours faced by women and children living in the streets of Kuala Lumpur, measuring the severity of addiction among ketum leaf users covering aspects of cognitive function, severity of withdrawal and dependence of the ketum leaf users. Research programmes using educational counselling methods among needle exchange drug users and behavioural drug risk reduction counselling among drug users undergoing methadone treatment are also currently being implemented.

Drug abuse surveillance has always been the core activity of CDR

CDR also collaborates with international agencies such as WHO, DNDi and ILO to execute research and training projects on behalf of these agencies. In collaboration with ILO, CDR has conducted regional addiction and rehabilitation training courses and produced training kits and modules. CDR is also proud to play a major role in developing new drugs to address issues pertaining to tropical diseases that often inflict the *bottom billion*. Research on tropical diseases, sometimes known as the "poor men's diseases", is often neglected by multinational companies due to minimal market opportunities. Hence, no new drugs have been developed and marketed. CDR takes responsibility to lead research on tropical infectious diseases. For instance, recent malaria research with its research partners like DNDi, Mahidol University, Thailand, CRP-Santé, Luxembourg, WHO/TDR, Switzerland, University of Oxford, UK, Farmaginous Brazil and University of Bordeaux, France, has resulted in the

development of a new artesunate/mefloquine co-formulate dose regimen for the treatment of malaria. The centre's role encompasses conducting clinical/pharmacokinetic studies, analytical method development for the assay of clinical samples and preparation of expert and technical reports in accordance with ICH guidelines. CDR also participated as a collaborating co-development group with the artesunate/amodiaquine (AS/AQ) product in 2006 and artesunate/mefloquine (AS/MQ) in 2007. The project was funded through an international grant to DNDi/WHO.

Research studies at CDR have also been pivotal to the development of various systems, strategies, programmes and policies at the national level. These include the development of a national drug abuse monitoring system for the government – a regional drug abuse surveillance system called the Asian Multicity Epidemiology Work Group comprising 12 countries from East and South Asia and studies on the incidence and prevalence of drug abuse among risk populations like school children and unemployed people. Evaluation studies on treatment and rehabilitation programmes have facilitated the review and modification of these institutional programmes. Clinical evaluation studies on adjunct medications in treatment and rehabilitation (e.g., naltrexone) address relapse rates and psycho-social support needed for effective intervention programmes.

Under the Anti-Infective Programme, significant contributions have been made. The centre's research has been pivotal in the government's approval to use mefloquine as a third line drug for the treatment of malaria patients. In 2007, CDR developed artesunate for global registration and an anti-malaria medication called fixed-dose, artesunate-based combination therapies. With its GLP-compliant laboratories, CDR has developed analytical methodologies for antimalarial drugs, scientific methods to measure antimalarial and antifilarial drugs in biological fluids and conduct quality assurance for WHO.

Boosting performance

CDR believes that the complex issues involving the use and abuse of drugs in society are best approached through the engagement of all stakeholders. As such, the CDR is always interested in the creation of smart partnerships with universities, governments, NGOs as well as community-based service providers to develop, modify, validate and deliver new options or knowledge-based care to individuals in community settings. In tandem with the university's efforts, CDR is currently working on forging collaborations and cooperations with other research centres at USM to set up the Malaysian Community Engagement Centre on Health which is conceptualised as an integrated virtual centre to empower communities to combat drug abuse problems in the country.

The CDR has made collaborations with:

- King's College London and Guys Hospital London to expand the blood-brain-barrier research work.
- The University of Erlangen (Germany) and Yale University (USA) for behavioural aspects of addiction.
- The National Drug Research Institute, Australia.
- The Medical University of Vienna, Austria.
- The London School of Hygiene and Tropical Medicine.
- A global collaborating network has been established with the Drugs for Neglected Diseases Initiative (DNDi, Geneva) whereby the centre has been appointed as the Regional Office for Asia since 2005.

The centre has also established partnerships with organisations in the private sector such as:

- Malaysian Biotechnology Corporation Sdn. Bhd. under the Bionexus Partners Programme for Biomedical Analysis .
- Pharmaniaga Bhd. for bioanalysis.
- Invest Penang (Invest-In-Penang Berhad) .

To further strengthen its niche areas of research as well as to bridge laboratory research findings with human behavioural studies outcomes, CDR is exploring collaborative links with:

- Imperial College, London for training slots, research project design and translational research (translating research findings into policy and action).
- The Institute of Psychiatry, London for addiction research.
- The University of Newcastle, UK for training in assessing addiction potential and addiction liability of new molecules.
- The Institute of Neurology, University of London for training on stereotactic implantation methods.
- The University of Bristol on psycho-behavioural research in addiction.
- The University of Nottingham on the neurochemistry of addiction.
- Rockefeller University, USA on the environmental and genetic effects on addictions.

To ensure the continuous supply of human capital, postgraduate training is provided at CDR where a postgraduate student registered with USM is provided practical training and required to undertake graduate work leading to a higher degree. CDR's postgraduate programme offers M.Sc. M.A. and Ph.D. degrees. All the postgraduate programmes offered are by the research mode. Since its establishment, CDR has produced 31 postgraduate students in all its research disciplines.

In addition, CDR provides industrial training to undergraduate students from various schools of study in USM as well as from other universities throughout the country, such as:

- Universiti Malaysia Sabah
- Universiti Putra Malaysia
- Universiti Teknologi Malaysia
- Universiti Malaysia Terengganu
- Universiti Industri Selangor
- University of Nottingham (Malaysia Campus)
- Universiti Islam Antarabangsa Malaysia
- Universiti Tunku Abdul Rahman
- University College Sedaya International

In keeping with the global development on drug addiction research, CDR has identified two scientific platforms as its new niche areas. The first, the epidemiological and behavioural platform, will focus on medical and behavioural consequences of drug abuse, the relationship between drug use and crime and drug addiction treatment through prescription medication and herbal substitution therapy. The second, the laboratory-based platform, will focus on behavioural experimental research to expand existing behavioural screening procedures to study the relationship between behaviours and the impact of psychoactive compounds. The project is envisioned to result in a comprehensive behavioural screening procedure that will enable a better understanding of the addictive potential of natural and synthetic psychoactive compounds.

With the two new niche areas in place, the centre is confident that it will continue to be the leading referral source to the government and other international bodies in addressing the emerging challenges posed by drug abuse and tropical diseases.

Some of CDR's major research projects include:

- Evaluation of governmental drug abuse treatment and rehabilitation programmes.
- Prevention education research among adolescents.
- Epidemiological studies on nature and extent of drug abuse among various target populations such as adolescents, young adults and women.
- Pharmacotherapy studies on medications as adjunct treatment in drug rehabilitation programmes.
- Health promotion with reference to dengue fever.
- Development and implementation of national/regional/international drug monitoring systems.
- Prevention of drug abuse through the development of personal and social skills – a pilot study.
- Clinical pharmacokinetic and pharmacological studies of drugs.
- Clinical pharmacokinetic and pharmacological studies of antimalarial drugs.
- Fixed-dose artesunate/mefloquine and artesunate/amodiaquine combination therapy.
- Quality assurance and bioequivalence of pharmaceuticals especially antimalarial drugs.
- Analytical and extraction studies of drugs for tropical diseases.
- Forensic studies of abused drugs.
- Addiction and rehabilitation – Asia Pacific training and evaluation studies.
- Rapid assessment studies of injecting drug users and their health consequences.
- Absorption, distribution, metabolism, excretion and toxicological evaluations of drugs for neglected diseases.
- Drug discovery and development of potential psychoactive compounds for the treatment of drug addiction and chronic pains from selected local plants.
- Effects of herbs on hepatic drug metabolism (herb-drug interactions).
- Biological activities of herbs.
- Discovery and development of new anti-cancer compounds.
- Behavioural pharmacology studies of mitragynine and its derivatives.

The centre provides consultancy services to government bodies and private agencies in the areas of:

- Bioequivalence studies
- Dissolution testing
- Drug testing in various formulations
- Water testing for injection formulations
- Chemical content analysis in herbal preparations
- Statistical analysis and report writing
- Drug abuse and social-behavioural research

The aim behind HiCoE formation

Q&A Session

V. Navaratnam
Professor
Centre for Drugs Research

What is a HiCOE?

A higher institution centre of excellence.

Since you are involved in the selection process for the establishment of HiCOE, can you share with us how these HiCOE are selected?

In the Ministry of Higher Education strategic plan, there is some kind of a journey that these public institutions have to take. For the smaller institutions to grow, the HiCOE selection comes into play. The selection of HiCOE is seen as a parallel path for these smaller universities to have pockets of excellence. Currently, all HiCOE are in research universities, except in the case of UiTM.

How many HiCOE are there already?

A: Six and we have split them into those for research, service, teaching and learning. The six are in USM (two) and one each at UPM, UM, UKM and UiTM.

When was the first discussion held regarding the need to have these centres of excellence?

The first paper was the *Memorandum Cadangan Penubuhan Universiti Penyelidikan*. During that period of discussion, there were some concerns of exclusivity. So we put out another paper as a response. In 2007, the Minister of Higher Education sent a note to the Cabinet called *Strategik ke Arah Mempertingkatkan Kedudukan Institusi Pengajian Tinggi Awam Tempatan Di Peringkat Antarabangsa*. By then, we were already talking about the APEX university as well as the centres for excellence (COE). The COE paper actually went to the Cabinet in December 2008 together with *Cadangan Penarafan Pusat-pusat Kecemerlangan Institusi Pengajian Tinggi Awam Sebagai Pusat Kecemerlangan Kementerian Pengajian Tinggi.*

What is the relationship between raising the status of COE and the eminence of the university?

This is what we called complementarities. So even in the case of a non-research university, the COE would become the primary driver for research excellence. The assumption is that these non-research universities have small pockets of excellence. For example, Universiti Teknologi Petronas (UTP) has very strong core research in oil and gas. Can this be developed so that the centre/unit it comes from becomes a potential centre of excellence? That was the kind of thinking.

If we look at UiTM that has campuses scattered all over the country, we ask what its drivers of research are. The university undertakes its own analyses and has formed the Accounting Research Centre. It has excellent staff at different campuses. Over two years, the university has built a track record and within five years, it can apply for the COE status. This is seen as a primary driver for a non-research university. In the case of a research university, it should be complementing and/or supplementing what the other research universities are doing.

Along the way as you formulated the HiCOE criteria for selection, did you visit any places?

We went to the east and west coasts of the United States. We looked at three concepts – those of a science park, a centre of excellence and a driver of a research base. One of the key conclusions that came out from that trip is that a pure postgraduate research university like the Rockefeller University is a luxury that Malaysia cannot afford.

Then we went to UK and looked at different facilities and science parks. We spent some time looking at the Research Assessment Exercises (RAEs) implemented by the UK government. The UK government is funding universities based on this assessment.

We subsequently visited the University of Hamburg in Germany. In France, we visited Bordeaux University and the University of Paris. We looked around. We also studied materials pertaining to universities in Korea and Japan. Nearby, we looked at Chulalongkorn University.

Eventually, what are the criteria used to select COE?

For COE, the broad criteria are almost the same as those for research universities. Basically, you must be formally recognised by the university you belong to. You must have a track record which must have been approved by the Senate. These centres must also have national value or kepentingan nasional.

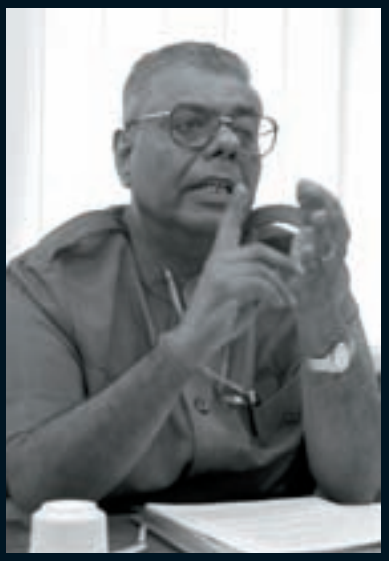
How do you measure these criteria?

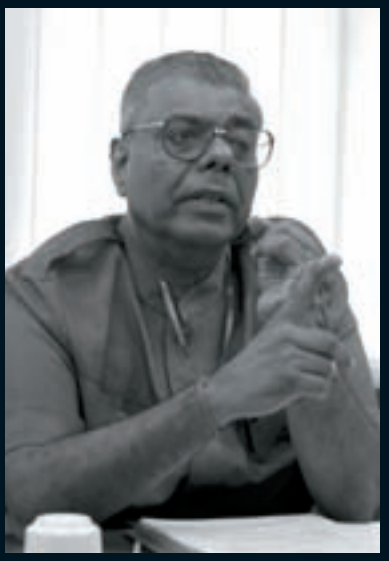
These centres must be recognised by a national body or one that has been assigned a great amount of work on behalf of the national body or one that is being established by the Cabinet. You need to have a minimum track record in multidisciplinary research utilising appropriate human capacity. This is expected to be in the region of five permanent staff members, plus about 10-15 collaborators within the country. In term of output, we expect patents, publications and research grants. We are also looking for regional and international recognitions.

Critical in these criteria is whether the centre is attracting the brightest students. Logically, if you are a centre of excellence, you should be attracting the best students, usually those with above 3.0 in the CGPA. Networking and consultancy are critical. Most of the research university (RU) criteria are applied although at a purely research centre, the criteria are even stricter. In a HiCOE, we expect each staff to bring in RM50,000 of research grants and the centre, as a whole, should have RM500,000. Most of them would have grants in the RM1 million bracket.

Share with us the selection process.

In the previous exercise, the panel received 146 applications. These were reclassified into HiCOE research and HiCOE teaching. From this group, 96 applications were classified as under research





and innovation (R&I). Then, selection panels from various disciplines sat down to deliberate. Each panel had six members from the universities. The panel looked at the five core criteria – postgraduate students, status of establishment, publications, staff members and a five-year track record. Any application that met 60 percent of these criteria would make it to the next level.

After the second round, 10 applications were focused upon and the applicants had to provide specific details. These applications were scrutinised by two panels. Six were eventually short-listed and the applicants were called to make formal presentations. The entire group was audited.

How long would be the audit process?

Usually one day. We will have all the audit panels presenting their findings. Audit panels will consist of some members from the main panel, plus some independent auditors. In essence, audit panels are independent from the main panels.

What does it take for these HiCOE to obtain their status?

Once internally approved up to the KSU level, the applicants have to write an action plan for a grant of RM3 million each. They have to present the action plan and our Panel of Mentors has to agree to it. The purpose is for these centres to identify the niche areas that will enable them to serve the fundamental needs of Malaysia.

What happens once an action plan is agreed to?

The applicant would be allocated RM3 million annually, for a period of three years.

To get the next RM3 million, does a recipient have to do another presentation?

No, but the three-year action plan is monitored. Verbal presentations and audit visits might be carried out during this period.

How many more HiCOE will be selected? Will the number increase?

Our target is 10 by 2010 and 20 by 2020. The financial resources are there but the competition will get tougher as we move along.

Accelerating pharmaceutical and nutraceutical research

IPHARM taking the lead in pharmaceutical and nutraceutical research

Healthcare biotechnology serves a pivotal role in the realisation of the National Biotechnology Policy (NBP) passed in 2005. In 2006, the Malaysian Institute of Pharmaceuticals and Nutraceuticals (IPHARM) was approved and established by the Malaysian Cabinet as a forward-looking research institute placed under the BIOTEK section of the Ministry of Science, Technology and Innovation. As Malaysia's first government institute to focus fully on pharmaceutical research, the main thrust of IPHARM is to accelerate the discovery, development and commercialisation of pharmaceutical and nutraceutical products through a world class R&D culture.

Recognised by USM as a centre of excellence since 2008, IPHARM encapsulates USM's concept of a *University in a Garden* which recognises the symbiotic relationship between human and nature. This relationship, however, can only truly exist if there is respect for nature and the role that it plays in sustaining life and promoting better living. USM and IPHARM have now taken the leading role in building the appreciation, love and understanding of the secrets of flora and fauna.

For thousands of years, natural products have played an important role throughout civilisation in the treatment or prevention of diseases. These "natural product medicines" have come from terrestrial plants, terrestrial microorganisms, marine organisms and terrestrial vertebrates and invertebrates. A well-accepted statistical figure revealed that between 1981 and 2002, natural products or natural product-derived drugs comprised 28% of all new chemical entities (NCEs) launched in the market. Another study reported that natural products or related substances accounted for 26%, on par with the top 35 worldwide ethical drug sales in 2002. Among them, paclitaxel (ranked at 25 in 2000), a plant-derived anticancer drug, had sales of $1.6 billion in 2000. At present, at least 70% of all discovered anticancer compounds are derived in some way from a natural source. A major reason contributing to this success is the fact that secondary metabolites from natural sources are formed to function within living systems, which theoretically make them more "drug-like and biological friendly" than totally synthetic molecules.

Malaysia houses one of the 12 mega-diversity centres in the world. From a biological perspective, Malaysia is home to 10% of living organisms in the world, with an estimated 15,500 species of higher plants. This rich diversity magnificently houses a diversity of chemical compounds that may benefit mankind. Malaysia is therefore blessed with a mega-diversity library of natural compounds that hold huge potential as next generation drugs. However, these resources can only benefit from a well-thought, well-managed and professionally executed plan involving research and development activities. At IPHARM, research activities are housed under five different divisions: assay development, bioscreening, *hits to leads*, lead optimisation and bioprocessing. Broadly, these divisions endeavour to accomplish the following:

- **Identify niche areas in pharmaceutical and nutraceutical biotechnology by exploiting readily available natural resources in Malaysia**

  IPHARM aims to play a leading role in identifying, optimising, formulating and evaluating potential compounds derived from these resources. A key step will be to both fund, and collaborate with, relevant research institutes in natural product drug discovery. Under the 9th Malaysian Plan, IPHARM distributed and managed over RM70 million worth of research project fundings to major research institutes nation-wide.

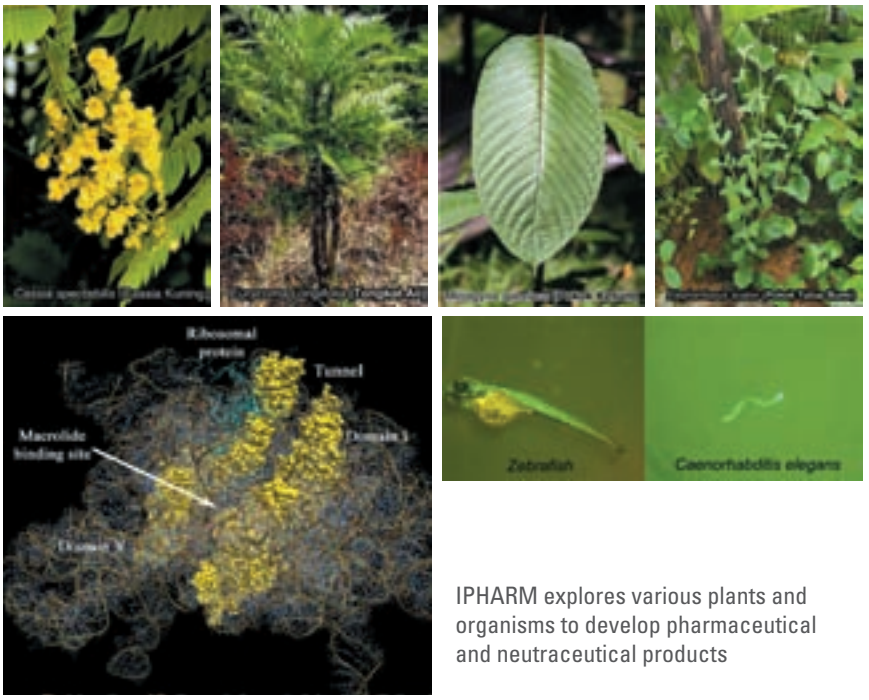
- **Ensure regulatory compliance in pharmaceutical and nutraceutical biotechnology R&D**

  Academic and industrial initiatives must strictly adhere to regulatory requirements stipulated by the respective authoritative bodies in order to market products that meet international standards. IPHARM will deploy standards that comply with good laboratory practices (GLPs) as implemented by the World Health Organization (WHO) and the Organization for Economic Cooperation and Development (OECD).

- **Sustain prioritised R&D activities and adapt to the latest technology in the drug discovery and development research area**

  IPHARM will play an active role in developing and establishing the latest platforms and technologies throughout the country to complete the whole spectrum of drug discovery which ranges from fundamental research to clinical trials. The Malaysian government recognises the strength and value of biotechnology biology as an integral part of drug discovery research. The positioning of IPHARM under the BIOTEK division of the Malaysian Ministry of Science, Technology and Innovation will enable IPHARM to harness the country's existing resources in biotechnology to accelerate its endeavours in drug discovery research.

Since its inception, IPHARM has positioned itself as the country's leading training centre in various areas of drug discovery and pharmaceutical research. As a centre of excellence, IPHARM is capable of housing and conducting world class research



IPHARM explores various plants and organisms to develop pharmaceutical and neutraceutical products

programmes. Accordingly, a vibrant research-based postgraduate programme now exists at IPHARM as manifested by the presence of over 30 candidates registered as full-time Ph.D. and M.Sc. students in biotechnology-based pharmaceutical research. Another advanced training programme facilitated by IPHARM is the Malaysian-QB3 post-doctoral programme, which was devised to identify and offer qualified Malaysians to undergo an intensive full-time research attachment at the prestigious University of California San Francisco. Since 2008, four candidates have been selected and assigned to work under the guidance of world-renowned principal investigators in chemical biology, advanced screening technologies, marine natural product chemistry and yeast-based screening systems. IPHARM also hosts tertiary and college students for short-term attachments to enable early exposure to the challenges and solutions involved in the pharmaceutical industry.

Selective collaborations with world-renowned research organisations are a hallmark of IPHARM's research endeavours. On-going active alliances have already been established with Stanford University, Shanghai Institute of Materia Medica, Griffith University ESKITIS, QB3 (University of California San Francisco), Interuniversity Consortium TEFARCO INNOVA (Italy) Drug for Neglected Diseases Initiative (DNDI), National University of Singapore, University of Jordan and several national institutes such as Universiti Sains Malaysia, Universiti Malaysia Trengganu and Universiti Malaya. Activities include joint research projects, training, research attachments and joint-hosting of conferences.

IPHARM is presently situated at Universiti Sains Malaysia's sains@usm, a science-themed park situated at Bukit Jambul, Penang. Beginning in 2011, the institute will be relocated to a permanent 10-acre research complex comprising two research blocks, an administrative block and a pre-clinical research facility. The research blocks will house state-of-the-art laboratories and equipment, including nuclear magnetic resonance, high-powered computing and servers for computer-aided drug discovery, automated screening platforms, bioprocessing instrumentation and many others. The country's first compound and small molecule repository will also be initiated under the 10th Malaysian Plan. The new IPHARM research complex will continue to support the country's aspiration in becoming a powerhouse in natural product and bio-healthcare research and development.

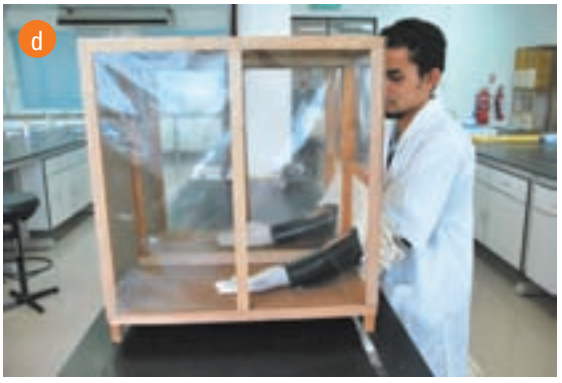
The new IPHARM complex at USM, Penang is poised to become the powerhouse for the development and commercialisation of pharmaceutical and nutraceutical products

Enhancing vector control over the decades

Background

The history of the Vector Control Research Unit (VCRU) dates back to 1972, three years after the establishment of the Universiti Sains Malaysia (USM)'s School of Biological Sciences in 1969. It began when a pioneer group of academic staff actively conducted research on vector biology and control. Recognising the ever-growing importance of vector-borne diseases and urban pests within the region, the VCRU was established on 1 October 1991 under the USM School of Biological Sciences. The main aim of the unit is to conduct and support research in biology and control of vectors and pests of public health importance, including urban pests.

a, b & c: Household insecticide products bioefficacy evalution



d: Mosquito repellent evaluation
e: Chemical analysis
f: WHO in vitro test plates

Currently, the activities of VCRU comprise about 30% research, while the remaining 70% are devoted to services to national and international organisations as well as the pesticide industry in testing and evaluating public health pesticides and application technologies. The unit has been used as a reference centre for such activities for the last two decades. The unit also provides support for the training of undergraduate and postgraduate students in the field of medical and urban entomology at the School of Biological Sciences and also offers various workshops for the training of public and private sector staff on the different aspects of vector biology and control.

VCRU is a member of the Technical Committee for Household Insecticide Products as well as a member of the Industrial Standard Committee for Materials, of SIRIM (M) Sdn. Bhd., the Malaysian standards development agency. As such, the unit provides advice on the development of guidelines, procedures and criteria for the testing of household insecticide products prior to the registration of these products with the Malaysian Pesticide Board, a prerequisite before entering the Malaysian market.

The unit has also been collaborating with the World Health Organization (WHO) on the following:

- Testing and evaluation of insecticides for public health use.
- Testing and evaluation of pesticide application equipment for vector control under the WHO Pesticide Evaluation Scheme (WHOPES).
- Production and distribution of WHO insecticide susceptibility test kits for monitoring insecticide resistance in national vector control programmes globally.
- Production and distribution of WHO in vitro micro test plates for monitoring the resistance of human malaria parasites to drugs.

National and international impact

Being a member of SIRIM's Technical Committee for Household Insecticide Products and Industrial Committee for Materials, VCRU is instrumental in the development of national guidelines for the laboratory testing of such products for registration and use in public health. Since its establishment, the unit has been recognised as a national and regional reference centre by the pesticide industry for the testing and evaluation of insecticides for personal and public health use. Test results obtained by the unit are widely accepted by the National Pesticide Board for registration of the products in the respective countries.


g


h


i


j

VCRU is in close collaboration with WHOPES in the laboratory and field testing of household insecticide products and insecticides used for space spraying including the field testing of space spray equipment used in vector control. These tests are crucial to ensure the success of vector control in the universal effort to reduce the transmission of vector-borne diseases such as malaria, filariasis, Japanese encephalitis and dengue/dengue haemorrhagic fever. More recently, VCRU was involved with WHOPES in developing WHO guidelines for the testing and evaluation of household and public health insecticides.

Uniqueness of the unit

VCRU is unique in the sense that it is the only national bio-efficacy laboratory that has the facilities to conduct the full range of tests on household insecticides as recommended by SIRIM and WHO for the purpose of registration and public health use. The unit is the national and regional reference centre for the testing and evaluation of household insecticides.

The unit is the first institute in Malaysia appointed by WHO – and currently the only agency worldwide – to produce and distribute WHO susceptibility test kits for monitoring insecticide resistance and WHO in vitro micro test plates for monitoring resistance of human malaria parasites to drugs on a global basis.

The way forward

VCRU is further strengthening its capacity to serve as a centre of excellence for the laboratory testing and evaluation of public health pesticides including indoor residual sprays, larvicides, space sprays and long-lasting nets. Strengthening of the unit shall pave the way for the unit to be joined to the network of WHOPES collaborating centres for such testing. Such collaboration will empower the unit with increased national and international visibility, thus providing more opportunities for exchange of information and technical cooperation with other institutions.

To expedite its inclusion, the unit works in strict compliance with internationally agreed and peer reviewed guidelines of WHO. At the same time, it is processing ISO 9001:2008 and ISO 17025 accreditation to ensure the highest standards of management and good laboratory practices and procedures in the testing and evaluation of public health pesticides.

g : WHO test kits
h : Mosquito culture
i : Cockroach culture
j : Mosquito preparation for testing

VCRU is unique in the sense that it is the only national bio-efficacy laboratory that has the facilities to conduct the full range of tests on household insecticides as recommended by SIRIM and WHO for the purpose of registration and public health use.

USM's Vector Control Research Unit activities

Activities that are carried out at VCRU are as follows:

a. Biology and control of vector mosquitoes and house flies

- Systematic and ecology of vector mosquitoes and house flies
- Screening novel, formulated insecticides
- Integrated control (chemical and microbial agents)
- Space spray (ULV/thermal fogging) evaluation
- Testing the resistance of vector mosquitoes and house flies against insecticides
- Testing the sub-lethal effect of insecticides/ microbial agents against vector mosquitoes
- Biochemical studies on insecticide resistance

b. Biology and management of cockroaches, pest ants, bed bugs and subterranean termites

- Insecticide resistance status and management of cockroaches in Malaysia
- Development and evaluation of novel insecticide products
- Population dynamics of cockroaches
- Use of parasitic wasps to manage cockroach infestation in sewers
- Foraging and feeding behaviour of urban pest ants
- Caste differentiations of the Pharaoh ant
- Baiting strategies against invasive pest ants
- Foraging ecology and baiting of subterranean termites
- Swarming behaviour of subterranean termites
- Molecular phylogenetics of Coptotermes spp. from Asia
- Biology of a termite endoparasitoid, *Misotermes mindeni*

c. Evaluation of the bio-efficacy of household insecticide products (mosquito coils, aerosols, mats, emanators and liquid vaporisers)

- The Glass Chamber Method
- The Peat Grady Chamber Method
- The Glass Cylinder Method
- The Plywood Residual Method

d. WHO susceptible test kits

Global distribution, preparation, storage and improvement of WHO test kits for susceptibility/ resistance studies of pests of public health importance.

e. WHO in vitro micro test plates

Global distribution, preparation, storage and improvement of WHO in vitro micro test plates for monitoring anti-malarial drug resistance.

National and international collaborations of the Vector Control Research Unit

VCRU has close and long lasting collaborations with local, regional and international research institutions and industries. Past and present collaborating agencies are as follows:

A. National

The public sector

- The Ministry of Health
- The Malaysian Pesticide Board, Ministry of Agriculture
- The Institute for Medical Research

Universities/research institutes

- The Institute for Medical Research
- Universiti Kebangsaan Malaysia
- University of Malaya
- Universiti Malaysia Sarawak (UNIMAS)

The private sector

- Fumakilla (M) Sdn. Bhd.
- SIRIM (M) Sdn. Bhd.
- Bayer Crop Science (M) Sdn. Bhd.
- Sara Lee Malaysia Sdn. Bhd.
- ReckittBenckiser (M) Sdn. Bhd.
- SC Johnson & Son (M) Sdn. Bhd.

B. International

The public sector

- The World Health Organization
- The government of the State of Lagos, Nigeria
- The Jeddah Municipality, Kingdom of Saudi Arabia

The private sector

- ReckittBenckiser, Australia
- Brandenburg, United Kingdom
- Okada, Singapore
- MSR Green, Singapore
- Sumitomo Chemical Enviro-Agro Asia Pacific Sdn. Bhd.
- SC Johnson & Son Pte. Ltd.
- Clark, USA
- TIFA (CI) Ltd., USA
- Novartis Animal Health Inc.
- Syngenta

Universities/research institutes

- University of Florida, USA
- University of South Carolina, USA
- Prince of Songkla University, Thailand
- Mahidol University, Thailand
- Purdue University, USA
- University of Alabama, USA
- University Kyoto University, Japan
- University of Osaka, Japan
- London School of Hygiene and Tropical Medicine, UK
- Liverpool School of Tropical Medicine, UK
- Consortium of Keele-Salford-Manchester Universities, UK

1. Briefly describe the history of the unit.

The late Professor Yap Han Heng, the founding coordinator of the VCRU was instrumental in setting up the unit. He started research on biology and control of mosquitoes in 1972. In the early 1980s, he obtained a seed grant from WHO to set up a laboratory at the School of Biological Sciences dedicated to do research on the biology and control of vector mosquitoes. The work was further expanded to include the evaluation of insecticides, from both the household and public health viewpoints, for WHO and the pesticide industry. After nearly a decade of work on vector mosquitoes, the laboratory finally became a unit under the School of Biological Sciences in 1991. In the mid-1990s, the unit also started undertaking research on urban pest management particularly on important urban insects such as cockroaches, pest ants and termites.

2. What expertise and services are offered by the unit?

The unit has expertise in vector mosquitoes and urban insect pests. We are a centre of reference for information on the biology of Aedes, Anopheles and Culex mosquitoes in relation to the transmission of diseases vectored by these mosquitoes and their control. We also provide expertise in the bionomics and management of urban pests such as termites, cockroaches and ants. Our expertise on vector and urban insect pests in tropical Asia is highly sought after by researchers and the industry worldwide.

3. List the most significant achievements of the unit and what impact it has on policies.

One is the major involvement of VCRU in the development of SIRIM standards. Household insecticide products have to meet these standards before they can enter the market in Malaysia. Second, these standards became the basis for WHO in developing the WHO guidelines on the evaluation of household and public health insecticides and repellents. Many of the research findings have also resulted in changes in pest management strategies against vector mosquitoes and urban insect pests in this region.

4. Are we generating sustainable funding for research in vector control and are we training human capital for it?

Yes, VCRU gets yearly and regular research grants from the pesticide industry to conduct research on the development of new insecticides for use in vector and urban pest control as well as research on ecology, behaviour and management of urban insect pests. Since we are under the School of Biological Sciences, we have postgraduate students both at the Ph.D. and Masters levels doing their research work at the unit under the supervision of associate members who are academic staff of the school. To date, associate members of the unit have guided more than 60 postgraduates in medical and urban entomology and more than 300 final year students in their research.

5. What are some of the unit's networking activities?

Networking is wide and we have collaborations with universities, research institutes and agencies and the industry and have forged a good working relationship with all of them. Many of these collaborations have resulted in joint publications, appointments of visiting professors and exchange of research students.

Q&A Session

Zairi Jaal
Professor & Coordinator
Vector Control Research Unit
School of Biological Sciences
Universiti Sains Malaysia

The premises of the Vector Control Research Unit

Living up to USM's pioneering spirit, internationally

Indian nationalist and statesman Jawaharlal Nehru bust and his famous quote greet visitors to the KLE University

As we arrived at the Karnataka Lingayat Education (KLE) University, we could not avoid sensing the similarity between its colonial-style buildings and those in Malaysia. If anything, this only tells visitors of the university's long history in education.

As we stepped into one of the buildings, the bust of Indian nationalist and statesman, Jawaharlal Nehru greeted us. Below the bust is crafted one of his famous quotes:

"Success often comes to those who dare and act; seldom goes to the timid."

Then it dawned on us. This summed up the similarity between two institutions involved in a unique international education collaboration.

KLE University is one of 211 quality educational institutions operating under the KLE Society (see side article). Seven dedicated teachers and three generous patrons founded KLE Society in 1916. Their mission was to provide education, basically, to the children of the farming community in Karnataka, India; this community is a large one.

A state-of-the-art lecture room where lectures and demonstrations are streamed live on LCD screens and recorded for future viewing

USM was established in the turbulent year of 1969 and is now on a mission to transform education for a sustainable tomorrow. USM is pioneering transdisiplinary research that empowers future talent and enables the *bottom billion* to transform their socio-economic well-being.

The pioneering batch of students of the USM-KLE University medical programme is the epitome of this spirit. The students have gone against the trend of living and studying in Malaysia. They choose to go to India to experience studying there first hand despite the usual less-than-generous publicity about living conditions in India. They choose to blaze the trail by being the pioneer batch of students in the programme. In fact, one of the students actually opted out of the USM medical programme at USM's Health Campus to attend the same programme in India.

Since the programme began a year ago, KLE University has made tremendous progress in providing cutting edge facilities to the 43 pioneer medical students while retaining some existing ones. Facilities like lecture halls, laboratories, problem-based learning/ small group discussion rooms, reading rooms, computer rooms and hostels have been upgraded while new ones have also been built for the incoming students.

Besides these, some traditional practices have been retained. Students would have the golden opportunity to work with cadavers, something valuable which most medical schools around the world are unable to provide anymore. KLE University also has an excellent collection of specimens that cover all study areas in the medical programme.

This, in essence, sums up the best that this education collaboration can provide to the students: the best of both east and west, old and new, traditions and new discoveries.

Meals are provided at the hostels and the rooms are shared on a twin-sharing basis. Washing machines are also provided to assist the students. The wireless Internet connection is provided.

During a recent meeting between students and the USM management, the students were thrilled to share their experience with their friends in Malaysia. This collaboration is unique because it signifies the confidence of two universities from developing countries coming together to share the best of their traditions.

Having partners with similar values and standards is crucial in any collaboration. The KLE Society has also expressed its interest to work together in other fields like dentistry, pharmacy and engineering. Seeing the commitment given by both parties and the progress made in the programme, it is a matter of time before these other collaborations come about. After all, *success often comes to those who dare and act.*

Some of the specimens to reinforce medical training

Students would have the golden opportunity to work on a cadaver

The Karnataka Lingayat Education (KLE) Society

In 1916, the Karnataka Lingayat Education Society (KLES) was founded by seven founder life members, who were also addressed as "Saptarishis" [Seven Saints] in honour of their unparallelled services in the field of education. The founders of KLES pledged to dedicate their services for the cause of education, imbuing it with noble ideals and fertile imagination in the heart.

The saga began with its illustrious founders, Sri Chachadi Veerabhadrappa Gunappa Desai, ruler of the Chachadi Province, Sri Artal Rudragouda, District Deputy Collector in the British Government and Sri Vaijappa Anigol, Rao Bahadur during the British rule, who all collectively believed in providing education for the common man.

Their efforts were ably supplemented by the seven visionaries – Sri S. S. Basavanal, Sri M. R. Sakhare, Sri B. B. Mamadapur, Sri H. F. Kattimani, Sri Panditappa Chikkodi, Sri B. S. Hanchinal and Sri Sardar Veeranagouda Patil – with the collective contributions from renowned philanthropists of the region, such as Sri Sirsangi Lingaraj, Sri. Raja Lakhamagouda Sardesai and Sri Bhoomaraddi Basappa and help from other philosophers, intellectuals and educationists. The society soon began laying a strong educational foundation, with its base at Belgaum, Karnataka.

On 13 November 1916, the society started an Anglo-vernacular school in Belgaum. The Lingaraj College came into existence in June 1933. In 1947, the B. V. B. College of Engineering and Technology was started in Hubli. Later in 1963, the J. N. Medical College at Belgaum and the G. H. College at Haveri began operations.

From 1984 onwards, the society commenced courses in dentistry, education, nursing, information technology, computer applications, hotel management, business management, tourism, fashion designing and agriculture in colleges and polytechnics across India.

Today under the leadership of Prabhakar Kore, KLES runs 211 institutions.

Source: http://klesociety.org

Q&A

Saiful Ridzuan
Ayer Keroh, Melaka

What made you apply for this programme (the USM-KLE medical programme)?

I was actually offered admission into this programme. I was in the pioneer batch of students together with a few other friends.

What were your initial expectations of the place, facilities and location?

Initially, I was wondering what they have in India. However, I convinced myself to go especially following Prof. Kamarudin Jaalam's (USM's medical programme representative in India) briefing. I was convinced by his explanations.

Have these expectations changed after being there?

Yes, my perceptions have really changed. I feel that I can live here without encountering any problems. In fact, I have managed to travel a bit. Facilities are provided as promised. The weather is mild, cool and really comfortable.

What is the best part of this programme?

The best part of this programme has to be the possibility to do dissections. Studying anatomy comes alive with the actual dissections. The dedication and concern of the teaching staff are really important.

Would you recommend Malaysians to this programme? Why?

Of course, I would try to promote this programme. For me, the degree or level of study is not the main issue. If we are honest that we wish to pursue knowledge, want the experience and are not merely focused on the level of study, we would be able to appreciate the beauty of life here. Prof. KJ once said, "If you want the best knowledge, you must acquire it from the best teacher".

Q&A

Francesca Fesheila Tan
Tuaran, Sabah

What made you apply for this programme (the USM-KLE medical programme)?

This medical programme is a collaboration between two well-known universities; the campus offers the best facilities and environment for studying medicine.

What were your initial expectations of the place, facilities and location?

Belgaum is an unknown city in India. Lack of learning facilities!

Have these expectations changed after being there?

Yes, a 100%. I have absolutely positive feelings now. The place and environment are very suitable for studying medicine due to its mild cold and warm temperatures; Belgaum is also a very quiet city. The facilities are perfect not just for lectures and practical classes but the engineering technology of the building is one of a kind in this world! We have the chance of dissecting cadavers; this is a once-in-a-lifetime experience that we will never get in any other medical university in the world.

What is the best part of this programme?

Getting more values of life, as we are learning not just to be doctors but to be real human beings. We have learned about the different cultures, food and spices of the Indian people. They are down-to-earth people, very helpful, friendly and respectful towards guests.

Would you recommend Malaysians to this programme? Why?

Undoubtedly, I would recommend Malaysians to apply to this medical programme. It will mould us to be not just ordinary doctors but specialists who are known worldwide.

Q&A

Fauziyah Ashraf
Setapak, Kuala Lumpur

What made you apply for the USM-KLE medical programme?

I really want to do medicine. And I was hoping that I could do it overseas rather than in Malaysia – I have seen how well my sister is doing overseas. At first, I had planned to go somewhere else using my own money. Somehow some problems came up. Then I saw the advertisement about this programme and it was another opportunity to do what I had really wanted to do. So, I grabbed this chance by applying for the programme.

What were your initial expectations of the place, facilities and location?

I had been told that I would be in the first batch. As part of the pioneer group, of course there would not be much that I could expect. And we are talking about India. However, I think this place is better than what I expected it to be. It is a very good environment for studying purposes.

Have these expectations changed after being here?

As I stated earlier, I had not expected much from this place initially. I decided to be very flexible. So, nothing has changed. I have accepted that I have to study in this place and am trying my best to cope with it. But of course, there are many things that can be improved regarding the facilities, for instance, the numbers and varieties of books provided in the library. And maybe, we could have our own room for the student's council community as we have already got the community.

What is the best part of this programme?

Being here gives me an opportunity many of my friends in Malaysia do not have, like studying with cadavers. We also have the chance to learn from very knowledgeable teachers who have extensive information to impart – I find it hard to differentiate between the need to do well in examinations and simply gaining extra information! The best part is that there are three seasons here. And I love it.

Would you recommend Malaysians to this programme? Why?

I know that this programme has given me an opportunity to do what I want. I hope that this can happen for others. Plus, I really want to see our community here grow. So, of course I would recommend this programme to others.

Engaging the community through a community-based medical curriculum

Medical students reaching out to the community

Introduction

Community and Family Case Studies (CFCS), which was formulated in 1982, is a unique programme in the five-year integrated undergraduate curriculum of Universiti Sains Malaysia's School of Medical Sciences, leading to a bachelor's degree of Doctor of Medicine. For almost three decades, CFCS has been successful in shaping a new breed of medical students in Malaysia.

The goal of the School of Medical Sciences is to produce "competent medical practitioners" who are equipped with a spectrum of medical knowledge, skills and attitudes and capable of applying them to solve problems, either at the individual or community level. Thus, the CFCS programme truly reflects the philosophy and educational approaches of

As part of the efforts to ensure sustainability of the intervention programmes, students offer regular medical check-up to local community

the school while at the same time, it serves as a practical field laboratory as well as a "bridge" to the community. The establishment of CFCS by USM in the early 1980s was the first of its kind in Malaysia and one of very few community-based medical curricula in the world. It has received local and international recognition and also been adapted by other medical schools elsewhere. It is now a flagship of the university in meeting the agenda laid out under APEX.

Uniqueness and gaps filled

Research from evidence-based studies has shown that a doctor's interpersonal and communication skills have a significant impact on patient care, while the World Health Organization (WHO) has advocated the characteristics of a good manager, leader, decision maker, care provider and also a good communicator in "five-star doctors". True to the original objective of the programme, CFCS does achieve several of those requirements.

Through CFCS, students not only learn and understand the essence and the reality of the local community but they are also enriched by the experience. Based on students' feedback in 2007/2008, for instance, more than 80% of them either agreed or strongly agreed that community residencies were beneficial for their professional development. A research study in 2009 to evaluate students' perceptions of CFCS as an approach to community-based education also showed that the programme has indeed promoted the development of leadership, team building and communication skills as well as in-depth understanding of a socio-culturally diverse population. Such a positive outcome is expected to make a difference in the future service provided by these students to fellow humans.

The impact of community residencies on student-community relationships seems rather interesting. Community residencies, a unique module in the CFCS programme, provide a dramatic experience for many students, particularly for those who have never before set foot in rural Kelantan and are completely foreign to local practices. Some students have expressed appreciation for the experience. In some cases, the relationship lasts for a long time and continues even after they have graduated. CFCS has certainly set in place a firm foundation for a permanent bridge linking the university's students and the community. Through CFCS, USM has received various recognition internationally as a good base for community-oriental learning programmes.

Description of the programme

CFCS is a central feature of USM's community-based educational curriculum in medicine. Essentially, the programme provides students with experiential learning through a holistic and multidisciplinary approach. It is conducted over twelve weeks of teaching and community residencies in Phase II (Year 2 and 3) and a self-directed learning activity in Year 4 (Phase III).

The programme is coordinated by two committees each chaired by a senior lecturer who is appointed by the Vice Chancellor through the Dean of the School of Medical Sciences. Committee members and supervisors of the Phase II programme are mainly

lecturers from the Department of Community Medicine, while in the Phase III programme, clinicians are involved. For academic, administration and fieldwork activities, the chairperson is assisted by other support staff which include Environmental Health Officers and Public Health Nurses.

For Phase II, students are taught public health theories and research methodologies to enable them to identify and resolve health problems in the community. Following five weeks of lectures, seminars and field visits to public health related facilities, the students are posted with foster families in selected communities for four consecutive placements consisting of five days each (community residencies). Each of the community residencies has a specific objective: consecutive community profile surveys, community diagnoses, community health interventions and finally, evaluations of the interventions. The weeks in between community placements are used for preparation, data processing and group presentations of the findings and plans for action.

For Phase III, the CFCS programme is completely student-driven. The students are organised into small groups and assigned to a clinical supervisor. Individually, students have to adopt one patient each (individual case) and in small groups, they have to select and manage a challenging disease (group case). Through a learning contract and under the supervision of clinicians, students pay home visits to their patients, manage them and their diseases at home, record evidence and present the evidence for final grading.

For at least a year, the USM Hospital provides free medical and dental services to every member of the immediate family adopted by medical students as a return favour for participating in the student training. Besides the usual personalised patient care, students go all out to assist patients by obtaining and providing whatever possible resources necessary to improve their quality of life.

Inclusiveness of the *bottom billion*

All areas in coastal Kelantan have been, at one time or other, sites for the CFCS community engagement. In fact, in Kelantan, it is almost a certainty that selected communities will consist of rural families who are invariably located at the lower end of the socio-economic status. Although the official poverty rate in Kelantan is 10.6% (2004), most of the surveys conducted by CFCS students from 2002 onwards show the rate to be higher than 50%.

Phase III students are encouraged to adopt patients from low socio-economic backgrounds with chronic diseases requiring regular health education, follow-up, rehabilitation or special arrangements. To date, these patients come from poor areas in the coastal town of Tumpat in the north, coastal Kota Bharu, the fishing district of Bachok and the agricultural district of Pasir Puteh in the south.

Community-based health promoting activities

Depending on the intervention design, Phase II students are encouraged to gather appropriate materials, equipment and other resources from diverse sources such as the university, government agencies, non-governmental organisations (NGOs) and the public. In the community, the community leaders (*Penghulu*) play a major role in providing additional resources, organisational skills and most importantly, motivation for community members to participate at the point of implementation.

Examples of health-promoting interventions conducted by the

students include static and interactive exhibitions, video shows, talks, forums, quizzes, medical and dental check-ups and screenings, counselling on related health complaints, demonstrations on healthy cooking, physical activities (aerobic exercises and competitions, e.g., clean houses, healthy babies). In cases when the targeted population fails to attend activities at intervention sites, students either organise transportation to bring them over or conduct home visits to rope them into the intervention process. The home visits essentially deliver the same messages as those found at intervention sites but are formatted to suit the privacy of individual homes.

Phase III students have been known in the past to organise fund-raising activities to buy equipment, such as wheelchairs and prosthetics for patients, canvas individual donors and charitable clubs and societies to provide support for patient education and care and set up home care for peritoneal dialysis for diabetic patients. In groups, the students focus on reducing patients' suffering from particular chronic diseases for long-term mutual benefits. They have also assisted patients to organise themselves by forming formal support groups and registered voluntary associations with the specific objective of improving their quality of life. In other words, the students motivate and improve the capacity of patients to solve their health problems by themselves.

Sustainability

Besides measuring the impact on the target population in the community, students have also devised several methods to make sure that their intervention efforts do not go to waste. It is common to find that students in the Phase II CFCS programme plan and develop projects or activities with potentially sustainable outcomes, such as the formation of support groups or informal clubs mostly for women (women's club, aerobics club, etc.), creation of health information desks (at the *Penghulu's* office), networking with appropriate organisations (e.g., waste recycling companies for garbage disposal), creating direct linkages to local government clinics and health NGOs and also providing (hard and soft copies) health manuals, pamphlets, posters and information sheets to target populations.

To this end, Phase III students have also been innovative in creating support organisations for sustainable long-term care of patients such as the Kelantan Thalassemia Society, the Kelantan Diabetic Society, the Kelantan Society for Cerebral Palsy and the Kelantan Down Syndrome Society. The Kelantan Thalassemia Society, for instance, is a showcase of a strong linkage between CFCS and the community which remains active until today. Created in 1996, the society has a group of permanent staff and grown over the years to be a major player in the health community with 250 members and a huge operating budget. It continues to promote and protect the interests of the members and sustains its link with HUSM. Indeed, the Kelantan Thalassemia Society has become one of the major bridges linking the university and the surrounding communities, making the activities inclusive.

What next?

Community-based educational programmes, such as the CFCS programme, have been shown to have at least two pragmatic outcomes. Firstly, students can learn from the community. They are exposed to real field situations so that they gradually develop their skills in communication and solving problems, become more confident in their work and appreciate the interplay of factors affecting health and illness in the community. Secondly, the community or patients themselves would have gained benefits from the health-promoting activities provided by the students. The communities and the families which are part of the *bottom billion* would stand to gain much more if CFCS programmes were to be expanded to other poor communities beyond Kelantan, either to other states in Malaysia or those in neighbouring countries such as Cambodia, Indonesia, Laos or Vietnam. The School of Dental Sciences is also developing similar programmes for the community.

Rolling out Malaysia's first e-motorcycle

An e-motorcycle undergoing rigorous tests

As easily extractable petroleum resources become harder to find, it is inevitable that the price of oil will rise. While we will not immediately be pitched into complete darkness by a new "energy crisis", one sector that is bound to suffer from high oil prices is transportation. Petroleum-based liquid fuels, gasoline or diesel, have a very high energy content per unit weight or volume, making them ideal energy sources for transportation. When oil becomes expensive, what will we turn to for our transportation needs? Certainly, compressed natural gas (methane or CNG) is an alternative but there are several problems with its use as a vehicular fuel. First, it is stored as a low-density gas resulting in bulky storage tanks and low vehicle ranges and second, it too will one day run out. We will still have sources of power for our electrical grid long into the future, including non-renewable resources such as coal and nuclear. These will be increasingly replaced by renewable alternatives such as hydroelectric, wind and solar. The challenge will be to create transportation systems which are capable of exploiting such renewable electrical sources of power.

e-motorcycles developed by USM with power from 1kW to 7kW

This is exactly the aim of the Electric Motorcycle programme taking place at the Engineering Campus of Universiti Sains Malaysia. The School of Mechanical Engineering has developed a range of electrical motorcycles with power from 1kW to 7kW and top speeds of up to 100 kph as part of a demonstration project. Five of these motorcycles will be handed over to the USM security forces for use in their daily rounds of the campus as part of a long-term study. These electric motorcycles will be monitored for daily usage, speed and power output, as well as charging time and current. This will allow assessment of changes in battery capacity and charge-discharge efficiency as a function of life time, valuable data missing from most shorter-term studies. Currently, all of the so-called "e-motos" will be charged from the standard 240V AC outlets; however, these will be replaced with solar power in the second phase of the project.

MODENAS has supported this project with the donation of several motorcycles. The standard Kriss models are stripped of their engines and fuel tanks and fitted with electric motors and several batteries. The throttle grips are replaced with electrical sensors which are connected to motor controllers hidden under the seats of the motorcycles. The systems operate from 36 to 72V and have ranges of 50 to 80km when fully charged. From a distance, they almost look like normal motorcycles, but with a bulging frame below where the basket is usually placed. They are unmistakable, however, when they go whizzing silently by, causing heads to turn. They can be fully charged within eight hours and are very inexpensive to operate, costing approximately two sen per kilometre, compared to around five sen per kilometre for conventional motorcycles.

The bulk of the development has been performed by a group of graduate students headed by Ahmad Syazli Kalili at the USM Engines Laboratory with extensive support from the technicians of the School of Mechanical Engineering under the leadership of Zalmi Yop. The overall vehicle design, including torque, speed and power requirements, has been carefully studied. Various motors, controllers and battery packs were modelled and evaluated before the final systems were fabricated. Each vehicle is then tested on USM's chassis dynamometer to verify the vehicle

Berita

Modenas, USM bakal pasarkan motosikal elektrik pertama negara

SYARIKAT pengeluar motosikal negara, Motosikal dan Enjin Nasional Sdn Bhd (Modenas) dan Universiti Sains Malaysia (USM) bakal memasarkan motosikal elektrik pertama negara setelah kedua-dua pihak menjalinkan kerjasama penyelidikan yang telah membuahkan hasil yang positif.

Pengerusi Modenas, Datuk Syed Mohamad Aidid Syed Murtaza, berkata kerjasama penyelidikan itu bermula hampir dua tahun lalu memampukan hasil yang cukup memberangsangkan dan menjangkau generasi pertama motosikal itu berada di pasaran pada tahun ini.

"Sehingga kini, kita telah menghasilkan sebanyak 15 prototype yang bakal digunakan oleh USM bagi tujuan pandu uji dan sebagainya. Kita akan memikirkan pengumuman lanjut berhubung perkara ini dari masa ke masa," katanya.

Prof Horizon (kanan) memberi penerangan mengenai prototaip e-bike' MODENAS-USM kepada Syed Aidid (dua dari kanan) dan Dzulkifli di Kampus Kejuruteraan USM, Nibong Tebal, baru-baru ini.

"Namun yang lebih penting adalah kerjasama menghasilkan motosikal elektrik membuktikan bahawa kerjasama antara universiti dan industri sebenarnya mampu dimajukan ke tahap penghasilan produk demi manfaat masyarakat selain turut memelihara alam sekitar," katanya ketika menyaksikan penyerahan prototaip motosikal elektrik kepada Naib Canselor USM, Prof Tan Sri Dzulkifli Abdul Razak di Kampus Kejuruteraan USM, Nibong Tebal baru-baru ini.

Sejumlah daripada motosikal yang dikenali sebagai 'e-bike' itu akan digunakan pengawal Jabatan Keselamatan USM di kampus induknya di Minden, Pulau Pinang manakala selebihnya di Kampus Kejuruteraan USM.

Syed Aidid yang juga Pengerusi DRB-Hicom berkata, selain mesra alam, motosikal elektrik itu juga mudah untuk diselenggarakan dan orang ramai dijangka akan beralih kepada motosikal teknologi hijau itu khususnya dalam situasi ketika harga petrol melonjak naik.

Dzulkifli pula berkata, USM sedang merangka satu skim khas pertukaran motosikal daripada motosikal biasa kepada motosikal elektrik tersebut yang melibatkan pelajarnya dalam usaha membolehkan universiti itu menjadi kampus yang cukup mesra alam khususnya menerusi penggunaan teknologi tempatan.

Penyelidik yang bertanggungjawab terhadap usaha itu, Profesor Horizon Walker Gitano-Briggs dari Pusat Pengajian Kejuruteraan Mekanikal USM, berkata motosikal itu berupaya bergerak dengan kelajuan 60 km/j selama tujuh jam secara berterusan.

Ia juga lengkap dengan ciri motosikal biasa dan hanya memerlukan sumber plak elektrik biasa bagi tujuan mengecas semula baterinya sebelum boleh digunakan semula.

"Buat masa ini, motosikal ini yang ada menggunakan bateri 'lead acid' dan kami sedang merancang potensi penggunaan bateri 'Lithium Polymer' yang lebih tahan lama berbanding bateri sedia ada," katanya.

Penyelidikan itu dijalankan menerusi Geran Penyelidikan Universiti selain turut dibantu MODENAS. – **Oleh Shukri Mutt Ali**

MODENAS and USM to market the nation's first electric motorcycle, *Berita Harian*, 19 March 2010

performance and measure the motor and controller efficiency. The resulting data have been used in various journal publications and graduate student theses.

The School of Electrical Engineering has been working on similar projects, including electric bicycle motor and controller design, under the leadership of Dr. Dahaman Ishak. Both the School of Mechanical Engineering and the School of Electrical Engineering are working together on an integrated starter-generator, or ISG, which will be used to hybridise small vehicles including the existing "e-motos". The ISG uses a small internal combustion engine coupled directly to a high-efficiency generator which can also act as a motor to start the engine. On an electric vehicle, the ISG is used as a "range extender". When the batteries start to get drained below a certain level, the ISG starts up the engine which then drives the ISG as a generator, recharging the batteries. During short trips, the ISG may never start up, resulting in an all-electric operation. During long trips, however, the ISG will kick in and allow the hybrid vehicle to be driven for well over 100 km.

This technique will also be applied to conventional motorcycles, turning them into "mild hybrid" vehicles. Lee Jih Houh, a Ph.D. student in the Mechanical Engineering department, is working on the design of an ISG which will replace the usual generator of a motorcycle with a much more powerful starter/generator. At traffic lights, the engine can be shut off, saving fuel. When the throttle is opened, the ISG will instantly start the engine and provide additional torque to launch the motorcycle. The ISG can also be used to provide additional torque when overtaking another vehicle. During engine breaking, such as when descending a steep hill, the ISG can be used as a generator providing a breaking effort while recharging the battery. It is expected that the ISG will reduce the fuel consumption of a conventional motorcycle by 10 to 20 %.

While electric and hybrid motorcycles may seem overly sophisticated today, we are designing these systems for the future, a future where the price of oil will be much higher than it is today and when every drop will truly count. This is yet another example of how USM is leading the way towards a cleaner and greener tomorrow through our academic efforts today.

Q&A Session

Dato' Syed Mohamad Aidid Syed Murtaza

Chairman
MODENAS

What is the key aim of the e-motorcycle collaboration between USM and MODENAS?

The key aim of the collaboration between USM and MODENAS is to come up with an e-motorcycle that will place Malaysia in the forefront of e-motorcycle production in the region. Both parties have been given the mandate to spearhead a national project, with MODENAS being the national motorcycle producer, to produce an e-motorcycle that will become the benchmark not only for Malaysia but also for this part of the world. While e-motorcycles are not new, the first certification of e-motorcycles in Malaysia will be given to MODENAS.

What are the roles of USM and MODENAS in this collaboration?

Certain parts of the motorcycles are made at the R&D centre of MODENAS in consultation and collaboration with USM. MODENAS will work closely with the USM Engineering Campus in some areas of the R&D. USM will serve as a referral centre for MODENAS and provide the technical support and professional input.

Apart from initiating the effort on this project and providing the technical support, USM's Professor Dr. Horizon Gitano Biggs has been selected by the Ministry of Transport to lead and become the chairman of the working group on the e-motorcycle. His extensive experience and exposure in terms of research and development and the testing of e-motorcycles make him the distinct expert in the field in Malaysia. He will lead a working group comprising representatives from the Motorcycle and Scooters Assemblers and Distributors' Association of Malaysia (MASAAM), SIRIM Berhad and SIRIM QAS, the Road Transport Department (JPJ), KeTTHA, Voltron Battery, MIROS and academicians. One of the working group's key aims is to develop a Malaysian Standards on Electric Motorcyle-Construction and Functional Safety that will make Malaysia the first in ASEAN to have such standards in place. At present, Taiwan is the only country in Asia that allows the use of e-motorcycles on the road. The biggest challenge in having e-motorcycles on the road is that they do not produce any noise. That is why we are now working with the Ministry of Transport together with JPJ to come up with a solution. How do we introduce a form of noise so that people on the street can hear it?

What are some of the challenges in producing e-motorcycles and how does USM contribute towards addressing them?

First, it has quite a high speed; it can go as fast as 70-80 kmh but there is still some limitation on the mileage. So we need to have proper

stations for users to recharge the e-motorcycles. The alternative is to replace the battery. There are two types of batteries, the dry cell and the wet cell. The wet cells are like normal batteries while the dry cells will last longer but are more expensive. USM could possibly develop R&D on new forms of energy, such as developing solar cells or nuclear cells to replace the current batteries. The question is whether we can work on a new form of energy in place of electricity.

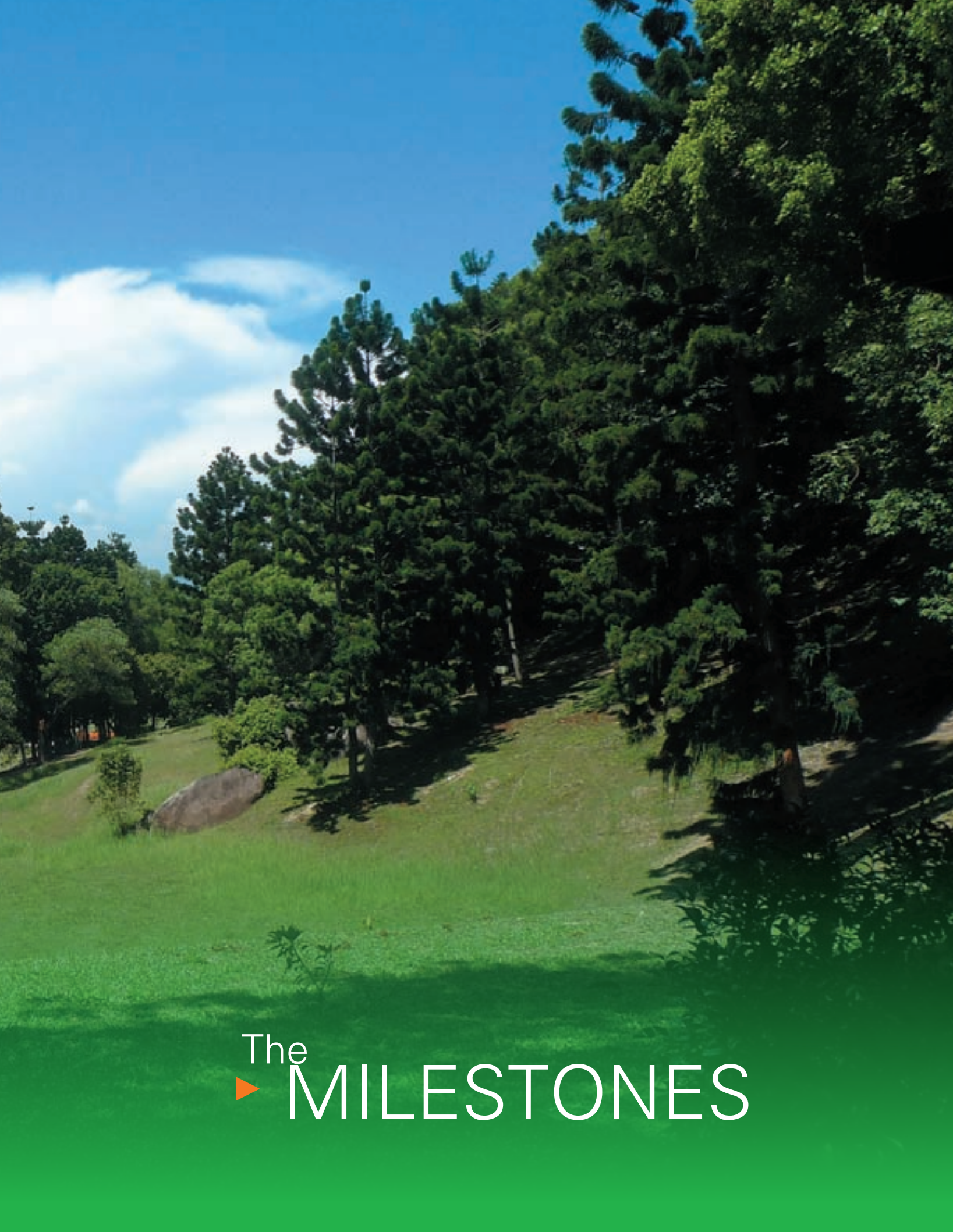
Who is the target market for the e-motorcycles?

We will initially cater for people who are much more concerned about the environment. The other possibility is the younger generation which is more concerned about environmental issues. We foresee it being used in housing estates and rural areas for people to go on short trips to the shops or mosques. They are more for community usage, utility for the community and not for the highway.

How much more expensive are e-motorcycles compared to normal motorcycles?

It depends on how we develop the e-motorcycles. The core is the battery. The difference will not be very much. At the end of the day, they are environmentally friendly and consumers will be able to afford them. They will not cost much more than normal motorcycles – we have to make them affordable. There will also be less wear and tear with e-motorcycles as there are not as many moving parts compared to normal motorcycles. There is only an electric component that we have to admit we are importing but we would like to work with USM to develop our own engine. USM will work with MODENAS in localising the electric engine.

The USM team proudly presents the nation's first e-motorcycle



The MILESTONES

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Empowering and engaging regional communities for capacity building

As a consequence of the 2005 ASEAN University Network (AUN) workshop on "the Asean Integration Initiatives (IAI) in Higher Education Management in the Cambodia-Laos-Myanmar-Vietnam (CLMV) countries", Malaysia was identified as the lead country to help strengthen CLMV's higher education. CLMV countries have experienced tremendous changes due to the fluctuating forces in economics, politics and also technologies. Added to the changes are the increasing demands of globalisation and internationalisation in education. To survive and strengthen higher education in this ASEAN region, Malaysia has proposed collaboration – as the weak become strong when they collaborate.

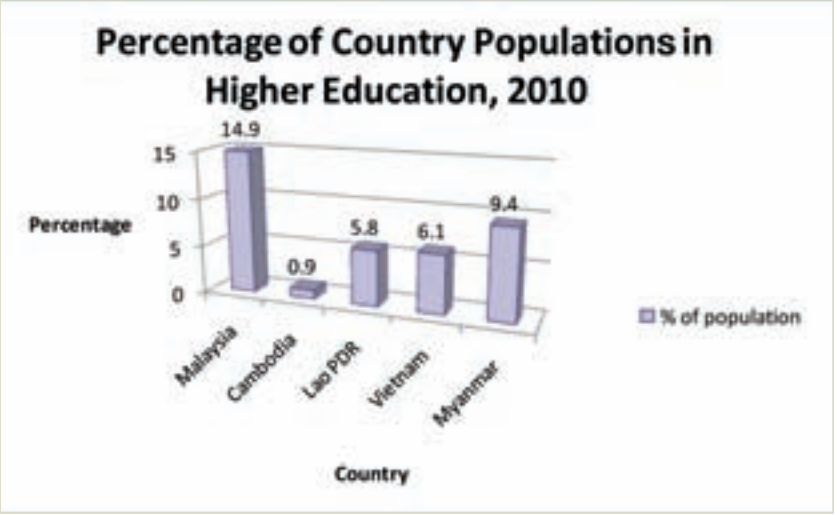


Figure 1: Percentage of country populations in higher education, 2010
Source: Barro and Lee (2010)

Figure 2:
Objectives of the Malaysia-CLMV collaboration

In the efforts of collaborating, Malaysia has played important roles in organising conferences and workshops for the CLMV countries on aspects relating to policy formulation and framework. The National Higher Education Research Institute (IPPTN) – which is the higher education policy research arm of Malaysia's Ministry of Higher Education (MoHE) – was appointed to act as the Secretariat of the Committee for the Implementation of the CLMV projects. As IPPTN is hosted and staffed by Universiti Sains Malaysia, it manifests the university's strong involvement and commitment to the Malaysia-CLMV collaboration.

Figure 3: Delegates and participants of the Kuala Lumpur-CLMV dialogue

The players and situational context

Being part of ASEAN, Malaysia and the four countries – Cambodia, Lao PDR, Myanmar and Vietnam – have, to some extent, similiar geographical identities, shared traditions and values, and common developmental interests. Among the five, however, the percentage of population engaged in higher learning differs significantly (see Figure 1). Malaysia is considerably ahead of the CLMV countries in this aspect.

Malaysia's strength in higher education stems in part from its vast experiences and ability in identifying, analysing and effectively managing and coordinating strategic higher education policy issues. The CLMV countries on the other hand, are not exposed to current thinking, development and challenges in the field of higher education policy, and thus, fail to effectively articulate strategic higher education issues. They also fall short in their capacity to manage higher education in order to build internationally recognised institutions. The scenario prompted IPPTN, which has been involved in policy research analysis since 1997, to initiate collaboration between Malaysia and CLMV countries.

The Malaysia-CLMV collaboration

The objectives of the Malaysia-CLMV collaboration are interwoven. Narrowing the gap between Malaysia and the CLMV countries in terms of the articulateness of higher education policy issues and capacity building is one of the main objectives (Figure 2). Closely linked to gap bridging is the goal of fostering networks of policy makers to communicate key strands and enhance opportunities to strengthen relationships. Thus, the gathering of intelligence on the higher education market in the CLMV countries becomes a desired goal as well. As relationships strengthen, mutually beneficial collaborative projects between Malaysia and the CLMV countries are expected to be achieved. Accordingly, the opportunity for Malaysia to position itself as the agenda setter (or at the least, the role model) for higher education in the ASEAN region is wide open.

Aimed to achieve the objectives, IPPTN, in collaboration with the MoHE, planned a series of dialogue workshops. An initial workshop, the Kuala Lumpur-CLMV dialogue entitled *Strategic Dialogue on Higher Education and Developing Human Capital between Malaysia and CLMV Countries*, was held on 1–2 December 2008 (Figure 3). This dialogue assembled high-ranking officers (i.e., the country's Director-General and Deputy Director-General of higher education and the Vice Chancellor of a university) from Malaysia and the CLMV countries to exchange knowledge, experiences and information on higher education issues. Among the salient topics discussed in the forum were the autonomy of universities and empowerment, quality management and assurance, mobility and mutual recognition, and capacity building and networking. This conference paved the way for the subsequent country workshops.

**Individually,
we are one drop.
Together,
we are an ocean.**

Ryunosuke Satoro
Japanese poet

The first in the Malaysia-CLMV dialogue was the *Malaysia-Cambodia Workshop on Higher Education and Developing Human Capital: Towards Strategic Partnerships and Alliances*, held at Phnom Pehn, Cambodia on 25–26 February 2009. This seminar yielded, among others, a joint agricultural research project entailing expert, staff and student exchange.

The Malaysia-Vietnam workshop was held in Hanoi, Vietnam from 23–24 June 2009. Among the issues raised at this conference were poverty alleviation, training, research (multidisciplinary research, in particular) and information sharing through a common database.

As for the Malaysia-Lao PDR workshop, it was held from 10–11 August 2009 at Vientiane, Lao PDR. The needs of Lao PDR were identified in the following fields: medicine, engineering, tourism, entrepreneurship, leadership, e-learning and the health sciences. Short courses, attachments and training for resource development were suggested.

An improved proficiency in English was a common aspiration among the three countries. To this end, it was recommended that the Malaysian government provides intensive English courses to selected students and employees before they undergo further training in Malaysia.

Fulfilling the vision

The Malaysia-CLMV collaboration has led to improved knowledge and closer relations among policy makers and educationists in Malaysia and the CLMV countries. This will open up unparallelled opportunities for joint ventures, strategic partnerships and international alliances which may assist the CLMV countries in making improved higher education policy decisions. This, in turn, will help boost ASEAN's position in the global higher education market in the long term. Hence, the formation of an ASEAN Higher Education Area, similar to the European Higher Education Area, is becoming feasible and within reach.

A list of mutually agreed-on higher education policy research clusters will be the basis for "buddy" networking and synergistic collaborations and partnerships. By sharing best policy practices with the CLMV countries, higher education players from Malaysia will have the opportunity to establish their presence in these countries. The desirable effects may be assessed by the increasing numbers of student intake from the CLMV countries in local universities, and the strengthening of institutional collaboration as well as Malaysia's influence on the regional education system. Consequently, these will bring Malaysia one step closer to its mark of being a centre of excellence in higher education.

The onset of the Malaysia-CLMV collaboration indicates strong aspirations for sustainable development. This echoes USM's Accelerated Programme for Excellence (APEX) vision for a sustainable tomorrow. The university involvement in the Malaysia-CLMV projects, through IPPTN, has been able to set up linkages among the participating countries. As a result, the CLMV higher education ministries have taken the opportunity to work in partnerships with local Malaysian universities which readily share their expertise and skills in line with their respective renowned fields of specialisation. Apart from its involvement in the workshops, USM has been actively engaged in providing human resource and training programmes to students and workers of the CLMV countries. One main effort that has come to fruition is the USM-CLMV Fellowship, a sponsorship programme for CLMV students to pursue their studies at USM. Indeed, the Malaysia-CLMV collaboration is a manifestation of USM's efforts in extending a hand to those countries less developed than Malaysia. It clearly embraces the university's aspirations of reaching out to the billion at the bottom of the socio-economic pyramid.

The journey ahead

Coming together to propose plans for collaborative projects is admirable. However, that accomplishment on its own is neither sufficient nor sustainable without follow-up efforts. It is the commitment to take action and execute the proposed plans that requires much focus and determination. As such, various projects are currently being implemented.

One main effort refers to the inception of the *Aid before Trade* campaign. Here, scholarships (aid) to study in Malaysia are provided to recipients in the CLMV countries. Upon completion of their course, the recipients will return to their home country to administer the learnt knowledge and skills, and collaborate (trade) with Malaysia on mutually beneficial projects. They will act as the link between the countries.

Another ongoing effort is an IPPTN-led project, *The University Self-Assessment System for ASEAN/Southeast Asia – A Pilot Project*. This project presents a framework to guide regional universities in Malaysia, Thailand, Cambodia, Lao PDR, Philippines and Vietnam to carry out self-assessments. The individual university will then gauge its performance against

benchmarks to assess the extent to which it has fulfilled its own mission. Dimensions and elements used in the assessment will be in accordance with the university's regional context and aspirations. Unlike many current world university rankings which embody status, prestige and competition, this exercise will cultivate a more effective self-reflection to identify and encourage improvement within the individual university.

In the spirit of collaboration, the countries are bound to learn an important lesson: there is no need to pit against one another in order to achieve excellence. Each of the countries in the Malaysia-CLMV collaboration has its own set of strengths and weaknesses. The key is harnessing our strengths to bolster others in their shortcomings while they return the deed in kind. Through collaboration, each country brings different efficiencies to the table. Thus, moving as one, we will but grow from strength to strength.

Hamzah Sendut II Library – knowledge depository within the lush green of the Main Campus

Bridging the world in sharing knowledge

The introduction of multimedia tools and technologies into the teaching and learning process is changing the way teachers teach and students learn. It is providing powerful tools for accessing, storing and disseminating information and re-shaping the delivery methodology of our educational content. Multimedia resources offer an excellent alternative to traditional teaching. By allowing students to explore and learn at different paces, every student has the opportunity to learn at his or her full potential.

The use of multimedia in the teaching process also allows the concept of education to go beyond the classroom walls and cover a larger dimension of students and audiences. This is not only limited to certain geographical sectors but it can provide a global opportunity for both learners and educators. Multimedia can play this vital role in every level of education and especially at the institutions of higher education. For this purpose, the Yokohama National University (YNU) has developed the Interactive Multimedia Education (IME) technology by which a new generation of video conferencing can be used for communication rather than the traditional face-to-face approach. IME also provides learners and the educators with a new set of interactive facilities such as shared screens, white boards and a special laser pointer system. IME is also able to store videos and presentations from learners' PCs simultaneously with synchronised recording technology.

Utilising this technology, YNU has created interactive global classrooms with different universities in Kenya, Thailand, Indonesia, China, Korea and Universiti Sains Malaysia (USM); USM has thus joined the *Leadership in Sustainable Living with Environmental Risks* course which is conducted by YNU through IME. Through this online course, USM students are being trained on some issues such as environmental leadership, ways of living with risks, and basic philosophy and technology for environmental restoration.

Since the establishment of IME at USM, a few major educational events have been conducted through IME. At a first event of its kind, a group of YNU postgraduate students visited USM in January 2010 under the 2010 Sustainability Education Exposure Programme. Through this programme, the YNU and USM students were engaged in a series of lectures and interactive presentations discussing their points of view on different sustainability agendas. As part of the programme, the USM and the YNU delegation at USM were connected to the YNU campus in Japan via the IME system for further discussions with their counterparts in Japan.

In the second series of these academic interactions, a new group of YNU postgraduate students and their lecturers visited USM in July 2010 for the International Workshop on Sustainable Living and Environmental Risks. Throughout this workshop, both the YNU and USM postgraduate students presented their studies on various fields of sustainability. All the presentations were broadcast live via IME to the YNU campus in Japan. Through this live interaction, the YNU students and lecturers in Japan also found an opportunity to engage themselves with the discussions at USM. At a part of this workshop, an IME connection has been also made with UNILA in Indonesia where the Indonesian students also took part in the discussions at USM. The third round of these discussions was scheduled for the end of September 2010 at USM.

Panaromic view of the campus
over looking the Penang bridge

Exchanging experiences, broadening views

The Commonwealth Universities Study Abroad Consortium (CUSAC) was established in 1993 in New Delhi India. USM is one of the pioneer members of CUSAC. The main objective of CUSAC is to encourage the mobility of students through student exchange programme among member commonwealth institutions. CUSAC functions as a network to facilitate the formation of partnerships among these institutions for the purpose of exchanging students, especially at the undergraduate level. The network also provides opportunities for its members to share experiences and best practices not only on student exchanges but also good practices and policy on all areas of internationalisation of higher education.

USM started its student exchange programme, better known as Skim Belajar Luar Negara (SBLN), in 1994/95 immediately after the establishment of CUSAC and one of the two institutions that hosted USM students for a semester study was the University of British Columbia, which was also a pioneer member of CUSAC. The other institution was the University of Minnesota, USA.

In the 90s, CUSAC provided USM the opportunity to develop new links and as a CUSAC member, USM was able to establish cooperation with a number of universities not only from the North but also those from the South such as Fiji, India, Sri Lanka, Pakistan and Jamaica. Through these links, USM students have had the opportunity to spend some part of their studies in other institutions; this would not have come about through other platforms or mechanisms.

The mobility of students through CUSAC was further enhanced through the establishment of the CUSAC Bursary Scheme in 2000 with a donation from the Association of Commonwealth Universities. The scheme covers the cost of an economy return flight from the home to host institution as well as a GBP500 contribution towards living costs whilst on exchange. In the beginning, the scheme was designed to support students from developing countries especially those who would not otherwise be able to study abroad. In 2008, this scheme was also made available to support one or two students from developed countries with priority given to those who travel to developing countries. Through the scheme, USM received students from India (the Indian Institute of Technology, New Delhi), Fiji (the University of the South Pacific) and Pakistan (the University of Sindh).

USM students received the bursary for travel to the University of the West Indies, Jamaica and the University of Guelph, Trent University and Dalhousie University in Canada.

The biannual members' meeting and conference provides USM with the opportunity to learn and to share with other member institutions its experience in internationalisation in general and in organising student exchanges specifically. The most recent members' meeting and conference was hosted by the University of Cape Coast, Ghana from 30-31 August 2010. The conference theme was *Student Mobility in Higher Education*, with a particular emphasis on exchange in and with African universities. During the meeting, a USM representative was invited to speak at the closing panel session on a topic *Evaluating the Exchange Programme*. The quality of CUSAC is that it provides all like-minded practitioners the opportunity to discuss and share their experiences in various issues of internationalisation, in a formal and informal setting during these meetings.

In 2000, USM started to play a vital role in CUSAC when it was elected to be the representative of Asia and thus a member of its Executive Committee. The role remained until the last election in 2009. During the tenure as Executive Member, the USM representative was elected as Chair for 2004 till 2006 and held the position of Treasurer. The Executive Committee through its meetings discusses proposals from members and suggests the future directions of CUSAC.

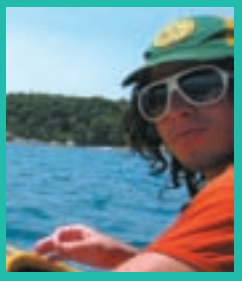
USM has used its expertise in organising student exchanges with overseas institutions to introduce student exchanges between Malaysian higher education institutions. In 2000, the Malaysian Vice Chancellors' Council approved the USM proposal to start a student exchange programme among Malaysian public higher education institutions. In 2003, USM with three other institutions, namely, UM, UTM and UNIMAS, began discussions on the programme and the first mobility of students among these universities started in the 2004/2005 academic session. The programme is now open to all other public higher education institutions in Malaysia and through this implementation, USM has received students from UPSI, UTM and UUM. The main objective of this programme is to provide students with opportunity to experience the difference in teaching and learning at the host institutions and to allow them to take up courses that are not offered at the home institution, therefore further enriching their learning experience.

For USM, CUSAC does not only provide the opportunity for student exchanges but is also a platform to promote its postgraduate programmes and research. When USM hosted the members' meeting and conference in 1996 and 2004, it had the opportunity to showcase what it offers. During the members' meeting in Ghana, one of the issues raised was the lack of training opportunites for faculty members of the Ghana higher education institutions. USM should seize the opportunity to train the faculty members of these institutions especially those who need to upgrade their education at the Masters and Ph.D. levels.

Currently, 54 institutions from 21 countries are members of CUSAC. Although the number is small, the increased scale and complexity of the student exchange world has opened up new opportunities. Many institutions are now looking at the possibility of sending their students for short-term credit earned courses and joint-degree or twinning programmes. USM can enhance its current links with member institutions to include these activities.

Incoming students

Abigail Somuah
(University of the West Indies, West Indies)
USM has good people to meet. The students are friendly and helpful in more ways than one. The campus is a beautiful sight to look at with all the splendid landscaping and colourful cultures of students. It is inviting to any race, culture and nationality.



Eero Pajunen
(Australia National University, Australia)
In USM, I met friendly and helpful student buddies. They assisted me while I was on an exchange visit here at USM. Besides that, they showed me around Penang and I have visited beautiful places. Apart from that, I found that the schedule was not too cramped and I have enjoyed many holidays and visited many places in Malaysia.

Markus Deutsch
(Dalhousie University, Canada)
USM has the most beautiful green garden as compared to other universities. USM provides a wide range of courses and we have the opportunity to choose the courses that we want. On top of that, the students here are friendly and they come from many different cultures. In addition, we can develop social networks among the students here. Last but not least, USM offers me the opportunity to taste different kinds of food such as the Malay, Chinese and Indian food. My favourite food here is Nasi Goreng Pattaya. It is extremely delicious.

Outgoing students

Nurshafinaz Aznan
(University of Guelph, Canada)
I have such beautiful memories that will last a lifetime studying at University of Guelph. The students and faculty were very helpful in showing me what my programme encompassed and gave me a new experience into what university life is.

Zaharatulaila Annnoa@Anuar
(Australia National University, Australia)
Studying at the Australia National University was such a great experience. It matured me both mentally and physically. To survive, I had to improve my English.

Intan Farhana Shazwani
(The University of Sydney, Australia)
The learning process in The University of Sydney is different from the learning process in my country. I had to be active and very interactive in class. The learning environment there is very challenging and the people there are friendly.

A proud moment, a sterling performance

Changing course, reclaiming our future

Introduction

The Right Livelihood College (RLC) is proud to have flown the USM flag internationally this year, particularly at the 30th Anniversary Conference of the Right Livelihood Award in Bonn, Germany. This conference brought together approximately 80 "Alternative Nobel Prize" laureates and included a pioneering programme called "RLC@Bonn" which linked the laureates with 25 postgraduate students. A parallel youth conference saw the participation of 120 undergraduate students from all over the globe.

USM's example of actively contributing to the strengthening of the "academic-change makers" link has inspired the historic Lund University in Sweden, one of Africa's largest universities, Addis Ababa University and the highly respected University of Bonn to join as partner campuses of the RLC.

Following a global initiative which began some 500 days ago, the RLC aims to make the knowledge and skills of RLA laureates accessible to all by linking academic institutions and students with these laureates through a variety of activities including lectures, international seminars, internships and academic fellowships.

The global secretariat of the RLC, located at and hosted by USM has, in its second year, upscaled its activities. With four campuses in three continents, the RLC is playing its part in realising USM's vision of transforming higher education for a sustainable tomorrow.

Forging alliances for a better world

USM and the RLC are working to extend the activities of the college to other campuses throughout the world. In June 2010, after a productive series of discussions, Addis Ababa University, one of the oldest and largest universities in Africa officially became the first African campus of the RLC. In September 2010, the Center for Development Research (ZEF) at the University of Bonn, with whom USM had signed an earlier MoU, became the first German campus of the RLC. Both campuses hope to initiate a lecture and academic fellowship programme.

In addition, the RLC has also developed links with a number of other academic and like-minded institutions across the globe, with the aim of collaborating on specific mutually beneficial endeavours and projects. Talks have been progressing successfully with Seton Hall University, a reputed institution of higher learning in the United States and the University of Nancy in France.

RLC Director Prof. Dato' Anwar Fazal being given the honour of signing the "Golden Book" of the City of Bonn on 15 September 2010

Furthermore, whilst at Bonn, the RLC has initiated alliances with the following institutions headed by RLA laureates:

- Transcend Peace University headed by Professor Johann Galtung, acknowledged as the "Father of Peace Studies", offers government and non-government practitioners training in the theory and practice of mediation, conciliation and peace building.
- Bija Vidyapeeth, the "Earth University", established by Dr. Vandana Shiva, offers a unique opportunity to explore and practice the art and science of sustainability based on ecological principles at the peaceful pollution-free setting of Navdanya's organic farm in Doon Valley, India.
- Gono Bishwabidyalay (The People's University), founded by Dr. Zafrullah Choudhury in Bangladesh, aims to serve as a link between the "modern" and "traditional" sectors of the society and economy, guided respectively by established science and by the people's experience and knowledge.
- The Weeramantry Center for Peace Education and Research, founded by Judge Christopher Weeramantry in Sri Lanka, is focused on carrying out practical, educational and research projects with an aim of achieving universal understanding towards building a culture of peace.
- The School for Wellbeing, where Sulak Sivaraksa is a facilitator, offers a creative learning space for a diversity of stakeholders inducing cross-cultural studies in happiness, wellbeing and quality of life.
- The Center for Peace and Applied Research, headed by Dekha Ibrahim Abdi of Kenya, aims to institutionalise peace education for people from all walks of life, linking peace with other related issues.
- The Heliopolis University for Sustainable Development, founded by Ibrahim Abouleish of Egypt, is committed to finding answers to the challenges of the future – climate change, resource scarcity, population growth and extreme poverty – and has declared sustainable development to be its overall guiding principle.

Projects of hope

The RLC organised several activities over 2010 in pursuit of its objective of being a hub, incubator, catalyst, multiplier and accelerator of the laureates' ideas.

Lectures

Anwar Fazal, Director of the RLC, gave several lectures in 2010 including:

- A keynote address at the Swami Satyananda Centenary Lecture, organised by Interfaith Spiritual Fellowship on 10 July 2010. The theme of the address was "Making a World of Difference: Hearing Each Other, Working Together – A Spiritual Response".
- "Doing Peace", an address to 1,500 students on 31 May 2010 at the Taiping Convent School to launch their school peace project, the first in the country.
- "Fighting Hegemony through Galactic Organising – Unleashing Incubators, Catalysts, Hubs, Multipliers and Accelerators" at the Citizen's International Roundtable in Penang and "The Multiversity Agenda – Resisting Hegemony" on 5 August 2010.

Happiness all around at every convocation

Additionally, Sharan Srinivas, RLC Programme Manager, presented a paper entitled "The Politics of Communalism: Marginalisation of Ethnic Minorities and Women in India's Northeast" at the USM KANITA Seminar Series on 24 June 2010.

Fellowships

It is envisaged that fellowships and research grants would be given to outstanding students and researchers to further work with the laureates to help realise the vision and mission of the initiative.

In 2010, USM approved two Right Livelihood Fellowships for the following Ph.D. candidates:

- Montawadee Krutmechai of Thailand arrived in Penang in early July 2010. She is supervised academically by RLC Steering Committee member Prof. Datin Rashidah Shuib and her field supervisor will be Thai RLA laureate Sulak Sivaraksa. Her Ph.D. topic is entitled The Role of Religious Women in Developing Self-Reliant Communities.
- Sabrina Taif of India whose topic will be on Peace, Conflict Resolution and Gender. She will be working with renowned peace activists Dekha Ibrahim Abdi (Kenya) and Asha Hagi (Somalia).

Books

The RLC coordinated in a special publication RLA laureate Pat Mooney's *"BANG! What Next? Collusion, Convergence or Changes in Course?"* book printed and mailed from Penang to all RLA laureates in preparation for the Bonn conference. The 286 page book, an outcome of the "What Next" project of the Dag Hammarskjold Foundation, based in Sweden and the ETC Group, based in Canada, looks at current concerns and futuristic alternative thinking.

Additionally, RLC Programme Manager Sharan Srinivas is writing the conference book *"RLA '30: Changing Course, Reclaiming Our Future"*, documenting the experiences, speeches and debates of the Bonn conference. It has been decided that the conference book will be written and laid out in Penang, and published in Sweden as an official Lund University Centre for Sustainable Studies publication. It is hoped that the book will be completed in time for a launch on the sidelines of the Right Livelihood Award ceremony at Stockholm in December 2010.

Further, the RLC will also submit the completed manuscript to the USM press to publish a Malaysian edition of the book.

Catalysing change in Bonn

In 2010, much of the RLC's energy was dedicated to making a significant impact at the 30th Anniversary Conference of the Right Livelihood Award in Bonn, Germany. The RLC contributed in the conceptualisation, planning and organising of various components of the conference. Its staff also actively participated at the conference, giving keynote addresses, facilitating workshops and organising an exhibition.

Sounding the call

RLC Director Prof. Dato' Anwar Fazal delivered an opening speech to the main conference on the theme of capacity building and developing the "academic-activist" link. Subsequently, he delivered a keynote address to the Youth Future Project conference on 14 September which involved 120 undergraduate students from all over the globe.

True change starts at the grassroots level: physicians who did not wait for politicians before acting to end unnecessary suffering in the Middle East; villagers who work themselves out of poverty; and environmental movements which unite the victims of ecological devastation. Combine this work on the ground with targeted advocacy, for example for the constitutional rights of indigenous people, and you understand why this year's Right Livelihood Award Laureates yet again offer role models, whose work and commitment can be replicated throughout the world.

Jakob von Uexkull
Founder and Chairman
Right Livelihood Award Foundation
on the announcement of the
2010 Right Livelihood Award laureates

View of the Dewan Tuanku Syed Putra foyer

Facilitating transformation

Anwar and Srinivas facilitated the Harnessing Universities for Social Transformation: Floating Ideas workshop for RLA laureates and other partners on 15 September. This was the most highly attended internal laureates' workshop that day, attracting thirty participants.

The RLC was able to use this workshop to build alliances with several pioneering educational institutions established by laureates. For capacity buillding, the RLC launched two resource materials for capacity building: Changing Course, Relcaiming Our Future – Links to Make It Happen and Taking Action – Days, Weeks, Years, Decades.

Anwar also made several presentations including a presentation on Global Civil Society, Democracy and Global Governance hosted by the Friedrich Ebert Foundation. Additionally, he gave a public lecture at the Center for Development Studies (ZEF) entitled A Citizen's Journey into Space: Global Civic Activism in the 21st Century.

Reclaiming the future

The RLC successfully partnered with the Center for Development Research (ZEF) at the University of Bonn to raise 40,000 Euros from DAAD (German Academic Exchange Program) for the support of a project called RLC@Bonn involving a team of academics and postgraduate students who played a key role not only as conference rapporteurs but also had the opportunity to interact with and build links with the laureates. They will also serve as a network of future links with academic institutions in the 15 countries they come from.

RLC Programme Manager Srinivas led and supervised twenty five students from fifteen countries who rapporteured the conference and is authoring the conference book, which will be published both in USM and at Lund University.

Rashidah, Director of KANITA, the Women's Development Research Centre and member of the RLC Steering Committee, actively participated in the conference and made links with laureates and academics.

Fostering innovation

The RLC is also working to upscale a novel participatory planning tool, Visualisation in Participatory Programmes (VIPP) at USM and is facilitating the setting up of a global hub for promoting such training. Two world leaders in the training, Dr. Hermann J. Tillmann from Germany and Dr. Maria Salas from Peru are working with the RLC as advisors to further this project and associated activities relating to food sovereignty and indigenous rights.

Tillman is a German anthropologist specialising in agricultural indigenous knowledge systems. He is also a trainer on participatory methods in rural

The foyer area of the Dewan Tuanku Syed Putra leading to the Hamzah Sendut Library

development. He taught at the University of Hohenheim for Rural Communication and Agricultural Extension from 1985 to 1993. He has served as consultant and trainer for several German development organisations including GTZ, DSE (now InWent), Miseror, Bread for the World as well as UNICEF and ISNAR on training methods, facilitation, gender perspective and indigenous knowledge.

Salas is a Peruvian anthropologist. She stimulates processes of experimental learning among groups using a broad repertoire of participatory tools. She has been teaching theory and methods on knowledge systems, indigenous knowledge, and intercultural dialogue at graduate schools, research centres and universities in Andalusia, Spain; Lima, Peru; Chiang Mai, Thailand and Beijing, Chengdu and Kunming, China. She has also worked as a consultant to international donor agencies on participatory development concepts and methods in Latin America, Europe, Africa and Asia.

Onwards and upwards

The RLC plans to host four different international workshops with RLA laureates over the period of 2011. These are:

- Environmental Justice – with Sahabat Alam Malaysia (SAM) – RLA 1988
- Migrant Worker's Rights – with Irene Fernandez – RLA 2005
- Mobilising Change – with Anwar Fazal – RLA 1982 and the International Baby Food Action Network – RLA 1998
- Public Health Activism – with Zafrullah Choudhury – RLA 1992

The RLC, in partnership with KANITA, also plans to get Kenyan laureate Dekha Ibrahim Abdi to USM in 2011 to deliver a public lecture series.

With an eye on our future, the RLC is providing technical support to the organisers of the Global Higher Education Forum (GHEF) 2011, to be hosted by USM. The RLC is working to finalise collaboration between GHEF 2011 and the conference of the World Future Studies Federation (WFSF) so as to enable both conferences to be held concurrently under the principle of "one conference, one theme". Prior to the conference, the RLC will also be assisting the WFSF in holding a course on futures leadership and foresight, which will also take place in Penang.

Recognition

Anwar was honoured with the first ever Lifetime Achievement Award by Consumers International (CI), the worldwide body representing consumers interests globally, at the 50th Anniversary of CI. The citation described him as "the most influential person in the international consumers' movement".

Partner Campuses of RLC

Lund University

Lund University, located in Lund, Sweden was founded in 1666. Today, it is an international centre for research and education that has approximately 46,000 students. Lund is consistently ranked among the top 100 universities in the world and is the top university in Sweden in the most recent Times Higher Education ranking.

The Lund University Centre for Sustainability Studies (LUCSUS) is a platform for education, research and cooperation inside and outside academia on questions related to sustainable development. LUCSUS is an independent faculty at Lund University that currently has about 30 employees, of whom about half are graduate students in sustainability science. The education consists primarily of international master's programmes, LUMES (Lund University Master's Programme in Environmental Studies and Sustainability Science). Research is conducted often in international cooperation, for example, under the EU framework programmes. Since 2008, Universiti Sains Malaysia has coordinated the Linnaeus programme LUCID (Lund University Centre of Excellence for Integration of Social and Natural Dimensions of Sustainability). LUCSUS became an RLC partner campus in 2009. Website: http://www.lucsus.lu.se/

Addis Ababa University

In 1950, Emperor Haile Selassie I declared the foundation of the University College of Addis Ababa. It was renamed Haile Selassie I University in 1962 and then Addis Ababa University in 1975. At the time, there were only 33 students enrolled compared to the current number of more than 40,000 students.

Starting from only one diploma and certificate granting department, namely biology, the university today comprises more than 25 faculties. In 2010, Addis Ababa University became the RLC's first partner campus in Africa.
Website: www.aau.edu.et

University of Bonn

The University of Bonn is a research and education centre with 200 years of tradition and about 30,000 students from more than 100 countries. The Center for Development Research (ZEF), an independent research institute at the University of Bonn, became RLC's partner campus in 2010. ZEF conducts interdisciplinary and applied research on crosscutting socio- political, economic and environmental problems in Africa, Asia and Latin America with the overall goal of contributing to sustainable development.

Since 1997, ZEF has conducted the Ph.D. programme "Bonn Interdisciplinary Graduate School for Development Research" which is unique in terms of its interdisciplinary set up, internationality and size (around 140 Ph.D. students from more than 70 countries). Particular focus is given to strengthen the capacity of highly qualified scientific staff, advisers, and managers from partner countries.

ZEF ranks among the top 10 of worldwide science and technology think tanks. Website: www.zef.de.

Sculptures greet visitors to the School of the Arts

Charting new directions for a sustainability roadmap

The 3rd International Conference of UNESCO Chair on Higher Education for Sustainable Development. Penang, Malaysia (20-22 November 2009)

Introduction

As part of the APEX initiative, USM has embraced the vision of becoming a sustainability-led university of world class standing. In order to achieve the broad APEX goals, USM has embarked on a range of missions. The establishment of the Centre for Global Sustainability Studies (CGSS) is an example of one such important initiative. The director of the centre also occupies the Chair of the APEX Sustainability Task Force. The centre's activities have therefore been focused mainly on two fronts: developing a USM-APEX Roadmap for Sustainability and formally establishing and promoting CGSS.

Producing the "USM – APEX Sustainability Roadmap: Aspiring to Meet Global Challenges"

Establishment of the Sustainability Office

Given the need to constantly promote, monitor and evaluate sustainability implementation at USM, the Centre for Global Sustainability Studies (CGSS) was officially launched on 14 December 2009; with this, the university has also established a Sustainability Office. The mission of CGSS is to contribute – through education for sustainable development, scientific assessment, policy research and capacity building – to efforts to resolve pressing problems confronting the Malaysian society and the global community today and in the future.

Development of the USM-APEX Sustainability Roadmap

Under the leadership of the Chair of the Sustainability Task Force, Emeritus Prof. Dato Zakri Abdul Hamid, a multidisciplinary sustainability team was involved in the development of the Roadmap, which imparts the state of readiness and action plans of USM, in rolling out a systemic adoption of the principles of education for sustainable development (ESD).

Teaching and training programmes

CGSS has organised and hosted a series of public lectures. "Coping with Global Environment Change in the Anthropocene and Human Security Concepts in Policy and Science", presented by Professor Dr. Hans Guenter Brauch and Professor Dr. Ursula Oswald Spring, and "Climate Change, Biofuels and Food Security", presented by Professor Albert Sasson, a former Director General of UNESCO, were both held in July 2010. "Sustainable Urban Future Challenges and Opportunities", presented by Professor Hans Van Ginkel was held in May 2010.

Additionally, CGSS is working closely with overseas counterparts, to offer two training programmes:

Public lecture held on "Sustainable Urban Futures Challenges and Opportunities" by Prof. Hans Van Ginkel on 20 May 2010

- Environmental governance – the role of MEAs and EIA/SEA
- Climatic extremes and disaster risk management in Asia Pacific countries

The Master's Development Programme (MDP)

CGSS is preparing to offer a new Master's Development Programme (MDP), similar to the one being promoted by Columbia University, New York. This will be a training programme tailored for anyone planning to play a leadership role in the broad area of sustainability. A proper blend of theory and practice will be a special feature in this programme.

The Global Master's in Development Practice (MDP) is an innovative, cross-disciplinary graduate degree programme that provides students with the knowledge and skills required to better identify and address the global challenges of sustainable development.

MDP programmes consist of two years of cross-disciplinary academic training in health, social, natural and engineering sciences and management, along with rigorous, hands-on field training experiences. The creation of MDP programmes is an acknowledgement addressing extreme poverty and sustainable development throughout the world, which requires expert knowledge and an interdisciplinary approach. By broadening students' training, they will be able to more effectively understand and address the root causes of the challenges of sustainable development such as extreme poverty. All MDP programmes belong to a global network of MDP programmes and have been developed in concert with the recommendations of the report of the International Commission on Education for Sustainable Development Practice.

In addition, the MDP programmes are designed to provide the necessary knowledge and skills for the following:

- "Generalist" development practitioners who understand the complex interactions among fields, enabling them to coordinate and implement effectively the insights offered by subject-specific specialists.
- "Specialist" development practitioners with an all-round knowledge base in the practice of sustainable development, so that they can contribute as effectively as possible to cross-disciplinary policy teams.
- Policy administrators, policy professionals and other decision makers who want to pursue effective strategies for sustainable development practice.
- Private-sector professionals dealing with decision-making and problem-solving relating to sustainable development practice.

- Educators who want to better address the challenges of sustainable development practice in their curricula.

Research and Publications

CGSS and its committee members have been involved in a variety of research and publications. The research and publications focus specifically on targeted sustainability challenges. Below is a list of some of our work:

Publications

Some of our publications include *USM – APEX Sustainability Roadmap: Aspiring to Meet Global Challenges, 99 Sustainability Ideas @ USM, and Climate Change, Biofuels and Food Security.*

Research

- Development of indicators for sustainability monitoring and evaluation.
- Implementation of the New Economic Model: the role of education for sustainable development in building a knowledge base infrastructure.
- "Building a front end industrial base towards a high income society".
- An extended indicators brochure .
- Applying the indicator worksheets (teaching, research and community engagement) on USM's sustainability initiatives and other international institutes of higher education.

Professional Network Development

- The 3rd International Council for Science (ICSU) Regional Consultation in Asia and the Pacific was held in October 2009; it was organised and sponsored by CGSS and was held for the first time in Penang. The leading scientists from around the world came together for this two- day event to discuss and speak about how science can contribute to some of the most pressing challenges facing society, including hazards and disasters, ecosystem change, sustainable energy and climate change.
- The Asia Pacific Regional Workshop on the International Satoyama Initiative Concept (Eco-system Services in the Asia Pacific region) was held in Penang in October 2009. The Ministry of Environment of Japan (MoEJ) and the United Nations University Institute of Advanced Studies (UNU-IAS) organised this conference. This event was hosted by CGSS and co-organised by UNEP, ICSU, SCBD, LESTARI and IGS. This workshop reviewed the Management Features of Satoyama – Landscapes in the Asia Pacific Region and their benefits for bio-diversity, conservation and human well-being.
- The post-conference forum on "The Quranic Botanical Garden" was held in December 2009 in Penang. The conference was sponsored by CGSS as a follow-up to the First International Forum on QBG which was held in Doha in March 2009. The leading fellows of the Islamic World Academy of Sciences (IAS) presented the concept and components of the Garden and its current significance towards the conservation and sustainable use of biological diversity.

CGSS involvement at national and international meetings

This is an integral part of the activities of CGSS and a listing of our involvement and leadership in this area follows:

- A Global Workshop and Satoyama Initiative was held in UNESCO Headquarters in Paris in January 2010. Emeritus Prof. Dato' Zakri Abdul Hamid represented CGSS at this conference.
- The 15th Inter-Governmental Meeting and Scientific Planning Group Session were held in March 2010 at Busan, Republic of Korea. Prof. Kanayathu Koshy and Fera Fizani Fitzri represented CGSS at this meeting which focused on Environment and Sustainable Development and their main thrust was on capacity building though research, training and policy dialogue, which is line with the interest of CGSS.
- The Asian Metro City Summit 2010 Conference, "Sustainable Development Solutions for Planning and Urbanisations of Cities" was held in March 2010 in Kuala Lumpur. Dr. Norizan Md Nor represented CGSS, in which discussions on construction, transportation, environment, funding, infrastructure public services, green technology, pollution, urban poverty, disaster reactions and more were conducted.
- CGSS was one of the four centres invited to the scoping meeting for the development of a synthesis report and a book on climate change in the A-P region based on the findings of 53 research projects completed by APN.
- The ACU Conference of Executive Heads (Universities and Millennium Development Goals) was held in Capetown, South Africa in April 2010 and was attended by Dr. Zainal Abidin Sanusi on behalf of

Emeritus Prof. Dato' Zakri Abdul Hamid. At this conference, the vice chancellors of universities from Commonwealth countries got together to present and discuss various topics such as the reduction of poverty, the elimination of hunger, gender equality, sustainability and so forth.

- Asia Pacific Network for Global Change Research conducted a Climate Synthesis Workshop that was held in August 2010 in Kobe, Japan. Prof. Kanayathu Koshy was invited to be part of a select team, tasked with developing a synthesis report of all APN funded climate research projects and writing a book on climate change in Asia and the Pacific, to represent CGSS.
- A two-day conference was held in July 2010 at Bradford, United Kingdom on Tomorrow's Sustainable Universities – Current Experience, Future Challenges and Opportunities. Dr. Norizan Md Nor represented CGSS at this conference, where discussions on the current best practice in achieving university-wide sustainability in higher education were examined.

Sustainability awareness programmes

For the promotion and implementation of the Roadmap, CGSS@USM has embarked on a road show within the university. As a result, it is expected that the different sections of the university, such as schools, institutes, centres and other financial cost units, will develop their own programmes and projects, with targets, timelines and indicators.

Conclusion

In the light of our past and current achievements, CGSS is envisaged to be a leading entity in bringing about USM's vision of becoming a sustainability-led university, not only within the region but also at international levels. Hence, the full support and co-operation from all sectors are needed in order to make USM's vision a reality.

The enchanting Tasik Harapan

The USAINS Group of Companies – the commercial arm of Universiti Sains Malaysia

Background

In 2004, Universiti Sains Malaysia (USM) published the *Research at Universiti Sains Malaysia* series. In Volume 1 on *Policy Studies and Consultancy Services* of that series, Chapter 14 sets out "the USM-Industry Collaboration – the USAINS Experience". That chapter covers the background to the USM-industry collaboration that took place in the 1970s, the incorporation of the USAINS Group of Companies and the initiatives taken by USM to bring about university-industry collaboration.

MOA Signing Between USAINS and Northern Corridor Implementation Authority, 2009 on Funding Arrangements to Operate & Manage COE – EE (IC Design)

South China Sea and Gulf of Thailand Training Workshop on Mangroves, 2007 funded by UNEP

The *ad hoc* initiatives of the 1970s evolved into the setting up of USM's *Industrial Consultancy Unit* in the early 1980s, which was upgraded into the *Innovation and Consultancy Centre* in the late 1980s. The focus of engagement with industry was to fulfil USM's social responsibility by nurturing the growth of small and medium enterprises and to share the university's resources and expertise with the community. Responding to the need for timely and commercially sustainable engagement demanded by industry and in keeping with the *Corporatisation Policy* of the nation, USM incorporated the *USAINS Group of Companies* in 1998, officially launched it in 1999 and commenced operations in 2000, as the nation's first fully approved university commercial arm.

USAINS in the context of USM's APEX agenda

How is USAINS Group of Companies, as the commercial arm of USM, contributing to USM's *Accelerated Programme for Excellence* (APEX)? What are its commercialisation innovations, unique benchmarks, tangible outputs and achievements? How has USAINS contributed to the sustainability of higher education? These issues will be addressed in this article.

USM's APEX agenda has been conceived with the objective of making USM the vehicle for the transformation of higher education to achieve excellence and to develop Malaysia into a sustainable nation in all aspects – economic, socio-political, spiritual, cultural and environmental. This APEX agenda is the logical outcome of significant steps taken by national and USM's leaders over the years.

The realisation that public universities should not become *black holes* that swallow public funds but rather, should be accountable in terms of performance, resulted in the national policy on the corporatisation of public universities in the 1990s. This policy was aimed at making public universities function more efficiently and effectively, by enabling the re-engineering of the universities' internal governance and making provisions for public universities to incorporate entities that could engage in commercial activities.

Growth without excellence and sustainability is not desirable. In the context of a university, excellence may be intangible but it demands accountability in terms of quality graduates and dissemination of knowledge via publications. Sustainability being more tangible, demands that the university's graduates are capable of making immediate meaningful contributions to national growth and that its resources can be deployed in innovative ways to generate national wealth, including additional income for the university and its staff, hence reducing the dependence on public funds.

Sustainability in the context of Vision 2020 of the nation, also requires that public universities support the national aspiration to develop high value-added

1. Wetland Resource Characterisation and Mapping Works at Sg. Setiu, Terengganu funded by the Malaysian Remote Sensing Agency
2. Study on Ingression of Jellyfish into Thermal Power Plants at Costal Areas of Peninsular Malaysia for Tenaga Nasional Malaysia

industries, by providing excellent and relevant graduates capable of developing and leading these industries and by offering cutting-edge technical and scientific services through consultancies and the licensing or outright sale of innovative products and related know-how and intellectual properties that can be commercialised the world over. USAINS programmes and initiatives contribute to fulfilling these aspirations of USM's APEX agenda.

The evolution of a developed nation, sustained by high value-add industrial production, presents vast opportunities for universities to engage with industry beyond fulfilling social responsibilities. The new engagement envisages commercial collaborations between university and industry that bring forth sustainable development of the nation and adequate rewards to the university. The primary role of USAINS in these engagements is in initiating, promoting and in acting as a catalyst. USAINS strives to distance USM from commercial risks of a financial or legal nature, by harnessing and managing university resources and services in a timely and efficient manner that meets the expectations of industry. Where appropriate, USAINS launches new knowledge-based enterprises aimed at commercialising USM's intellectual properties.

Hence, USAINS strives to fulfil the sustainability aspect of USM'S APEX agenda by enabling USM to balance the intangible benefits of excellent graduates with

Visit to Silterra Sdn. Bhd. – a front-end semiconductor manufacturer in Kulim, Kedah

the tangible benefits derived from commercial activities that are based on USM's resources and services with the added dimension of accelerating the development of high value-add knowledge based industries. The journey that commenced in 2000 to provide additional income for USM has accelerated with the APEX agenda, namely, to provide for sustainable financial growth by commercialising USM's resources, services and intellectual properties.

The corporate structure and financial performance of USAINS

Usains Holding Sendirian Berhad *(Usains Holding Private Limited)* commenced operations in the year 2000 with an operating budget of RM100,000 and a management team of three headed by a managing director, a legal/administration manager and a financial executive. Today, it is a multi-million ringgit (RM) operation with an annual turnover exceeding RM60 million, offering research services and serving as a referral centre for the commercialisation of research.

Its initial efforts were focused on winning over the trust and continued commitment of USM's commercial clients that were previously dealing with USM's Innovation and Consultancy Centre. Simultaneously, USAINS commenced engagement with other organisations to introduce the various services and expertise and benefits that could be derived from contracting with USAINS. The scale of its activities has expanded based on industry demands and USM's aspirations.

Currently, the USAINS Group of Companies consists of Usains Holding Sendirian Berhad that is wholly owned by USM and five subsidiary companies that are in turn wholly owned by the Holding Company. Directors of these companies are all nominated by USM's own Board of Directors. The chairman of USAINS Group is not associated with USM, while the other directors are USM's full time staff, with the exception of the Group Managing Director who is a retired senior professor and dean from USM with vast experience in engagement with industry and government agencies. USM's Board of Directors' review on a quarterly basis of the financial operations of the USAINS Group and its annual audited accounts are tabled for this Board's consideration and for onward remittance to the Ministry of Higher Education and the Minister of Finance.

USAINS Group has its own financial procedures modelled on the check and balance provisions of USM's financial procedures. Nevertheless, all financial decisions relating to commercial matters are decided upon within the USAINS Group. All commercial activities are contracted directly by clients unless clients for their own convenience insist on contracting with USM. For such collaborations, the contracts with USM specifically provide that the contractual obligations and benefits are to be assigned to its commercial arm – USAINS Holding Sendirian Berhad. The entire USAINS Group audited accounts are consolidated with USM's own accounts each year when presented to the Malaysian government.

Currently, the management team of the USAINS Group consists of a Group

Managing Director, three General Managers/Coordinators who head subsidiaries/major projects and fifteen Corporate Officers who provide a range of in-house services like finance and accounting, business development, marketing, legal and human resource. The coordinators function on a part-time basis and are full-time academic staff of USM.

A comparison of USAINS performances along pertinent indicators taken from the audited accounts for the year 2000 and before audit accounts for the year 2010 are presented in Table 1 below.

Table 1: Pertinent financial information relating to USAINS' performance

	2000 (1st Year of Operations) USAINS Holding (RM)	2010 (11th Year of Operations) USAINS Group (RM)
Business secured for USAINS & USM	18,624,468	63,158,884
Revenue to USAINS	3,624,140	38,019,309
Net profit for the year	49,991	5,258,563
Revenue to USM	4.34 million	10.78 million
Consultancy fees paid out to USM staff *(2001 figure is shown as this payment was not highlighted in the previous year's report)	*4.5 million	5.4 million

Based on its performance for the financial year 2009, USAINS declared a maiden dividend of 6% to USM, its sole shareholder. This is over and above payments directed to USM as part of cost of sales for USM's services and payment of consultation fees to USM staff.

Pioneering innovations to address the needs of the moment and beyond

To address the attrition rate among medical specialists at USM's School of Medical Sciences, USAINS initiated a collaboration effort with a private hospital. This collaboration enabled USM's medical specialists to officially provide medical consultancy and admission services to full-fee paying patients of the private hospital.

Since then, this arrangement has been replaced by an Executive Health Services Scheme whereby patients of USM's own Teaching Hospital can opt to receive treatment in more salubrious surroundings and from medical specialists of their choice by paying the full fees involved. USM benefits from this arrangement as USAINS ensures that all expenses are recovered and that there are no hidden costs or unfair practices. In addition, the Teaching Hospital, the medical specialists and supporting staff and USM itself receive part of the full fees. The increased incomes have somewhat alleviated the attrition rate among the medical specialists of USM.

The Malaysian government has since initiated schemes to enable medical specialists serving with the Ministry of Health to provide similar services on their off-days. The next phase of this initiative would materialise in the setting up of a full-fledged ward for full-fee paying patients. The culmination of this initiative would, of course, be the establishment, based on economic considerations, of a Private Specialists Centre.

More recently, USAINS delicately executed a meticulously planned approach to address the needs of USM's academic staff who are professionals from the engineering, architectural and quantity surveying fields. The opportunity for these professionals to practise their trade was curbed due to some quirk in the regulations – they, being full-time employees of USM, could not as a general rule set up their own private companies to practise their professions, while the regulations provided for professional work of this nature to be awarded solely to private companies that have directors and shareholders

drawn from the professionals only.

USAINS first addressed this dilemma with USM's Board of Directors which readily agreed to approve the incorporation of a private limited company by USM's professionals under the guidance of USAINS. Lengthy and in-depth negotiations followed with the individuals concerned and this has now blossomed into the formation of a Multidisciplinary Professional Company. This Company would now be the vehicle that would enable USM's professional staff to practise their trade, earn extra income and enrich their knowledge and practical experience. These should in turn translate into more relevant curricula and enhance the teaching skills of the staff involved and generally, introduce USM's graduates from these fields to the practical workings of the building and construction industry.

The direct commercialisation of USM's R&D findings was initially addressed by licensing the findings to industry players. Where short-falls have occurred, USAINS has stepped in to recover the licenses and redeem the goodwill developed for USM's products by boldly entering into joint-venture arrangements with what are perceived to be industry players who are more sensitive to market demands and cost overruns.

One such JV-company being launched is Reszon Diagnostics International Sendirian Berhad, which is in the process of marketing some of USM's diagnostic kits developed at USM's Health Campus in Kubang Kerian, Kelantan.

USAINS has also initiated the production and sale on its own, of USM's products that are perceived as not having developed markets. This is being done by our in-house brand: EQ-USAINS.

Once these products develop market demand, they would either be licensed out or they would be produced and marketed more intensely through joint ventures or spin-off companies. One such product that has since graduated to full-scale production is currently sold under the trade name of PORTAFOAM. It is envisaged this would be a spin-off company in due course.

Where USM's inventors have committed themselves to reaping the full benefits of commercialisation, USAINS has facilitated their efforts and guided them. A group of USM lecturers in 1997 committed themselves to developing a multimedia conferencing system that would be truly *Made in Malaysia*. Their efforts eventually resulted in the incorporation of Mlabs System Berhad (*Mlabs System Limited*) which successfully made an initially public offering of its shares on the Malaysian Securities Board in 2005. USM has thus the distinction of spawning the first IPO listing of a company based on its R&D efforts.

USAINS has also been alert to the needs of the nation. Realising the slackening pace of the electrical and electronics industry that has been the hallmark of Penang from the 1970s till the 1990s, USAINS initiated collaborative deliberations among the industry leaders, the Penang state government and USM to address the objectives of the Second Industrial Master Plan of Malaysia; among others, the plan provides for the upgrading and diversification of the production sector especially in the area of software engineering and is mindful of the importance of research and developmental activities.

This initiative resulted in the conclusion of a Memorandum of Agreement between the Penang state government and USM in 2003 to set up a Collaborative Research & Resource Centre (CRRC) to be managed by USAINS and funded in its initial years by the Penang state government.

The main objectives of the CRRC included: (a) fostering collaboration and facilitating R&D activities of direct relevance and benefit to the future development and industrialisation of Penang by enhancing cooperation between the industrial sector and institutions of higher learning; (b) identifying available skilled manpower and high-tech equipment that could support strategic activities; (c) assisting companies in the small and medium scale industries in intellectual property creation and protection matters and (d) developing a task force of experts in cutting-edge areas of science and technology who could re-engineer the current and future workforce.

At the national level, the CRRC objectives were in time overtaken by the formation of Economic Development Corridors. USAINS based on its track record and proposals, succeeded in being appointed as the operator and manager of the Northern Corridor Implementation Authority's (NCIA) very first CoE – the Centre for Excellence in Electrical & Electronics – IC Design. This CoE is being operated and managed for NCIA by a Special Purpose Vehicle in the form of a fully owned subsidiary of USAINS – Usains Infotech Sendirian Berhad. It is envisaged that this tangible collaboration aimed at industrial value-add activities will result in more spin-off

companies. These developments form the catalyst for reaffirming the state of Penang as the Silicon Valley of the East.

At the international level, USAINS has repeatedly been identified to conduct various courses based on USM's own research and development activities and findings. USAINS also facilitates collaborations involving prominent USM experts who are recognised by international bodies.

Samples of some such collaborative engagements are listed below:

- A postgraduate education course on radiation protection and safety of radiation sources for the International Atomic Energy Agency in collaboration with Nuclear Malaysia (a fully residential course for about 20 high-level participants conducted over eight months – the course is currently being conducted for the fourth cohort).
- A Training Workshop on Mangroves, 2007 – building capacity with respect to the management of the mangrove ecosystems bordering the South China Sea and the Gulf of Thailand, for about 20 participants from countries bordering South China Sea and sponsored by the United Nations Environment Programme.
- The archaeological study of Sungai Batu and development of the Lembah Bujang Heritage for the Malaysian government.
- A Memorandum of Understanding with the National Board for Certified Counselors, INC (NBCC), by its division NBCC International to set up a branch office in Malaysia for NBCC-I.
- USAINS sponsored an address by Dr. Lee Yuan Tseh, Noble Laureate in Chemistry to the USM faculty and the Institute of Chemistry (Northern Chapter) members.

The innovations developed by USAINS have been acknowledged and commended at the highest levels of the nation. In 2004, USAINS secured the Multimedia Super Corridor (Incubator) for Kompleks EUREKA (USM's purpose-built incubation centre), within a year of its move to this complex – the first university incubator to be so awarded.

In Chapter 4 of the *Knowledge Content in Key Economic Sectors in Malaysia 2004* (issued by the Economic Planning Unit of the Prime Minister's Department) entitled *Innovating for Competitive Edge*, the efforts of USAINS in commercialising products stemming from USM's research have been highlighted. USAINS frequently receives visitors from other universities wishing to understand our operations and management with a view to initiating or improving their organisational set-ups.

The latest acknowledgement of USAINS standing as both a national and international benchmark in pioneering scientific technopreneurship came when USAINS was invited to formulate and conduct a one-week Technopreneurship Knowledge Transfer Programme by the International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) under the auspices of UNESCO and located at the Academy of Sciences Malaysia.

USAINS conducted this programme successfully in 2010 for 24 participants (mostly senior scientists with inventions of their own or holding senior positions in their respective universities) from 15 different south-south countries from South America, Africa, Middle East, South Asia and Malaysia. As at the time of writing, USAINS has been approached by ISTIC to conduct this programme again in 2011.

Conclusion

USAINS strives to provide USM with financial strength that is a key indicator of sustainability. The financial largesse earned by USAINS gets distributed to USM in the form of payments for use of its facilities and services and in the form of dividends. It also gets distributed to USM's academic staff in the form of consultancy fees and this partially alleviates the attrition rate of USM's personnel in competitive fields. There is also distribution to the *bottom billion* within USM in the form of its administrative, technical and supporting staff for services rendered in the course of USM's academic staff rendering consultancy services. USAINS managed projects generate part-time employment to USM's postgraduate and undergraduate students and full-time employment to USM's graduates.

The initial years (2000 – 2005) of operations of the USAINS Group were devoted to consolidating services developed on the basis of USM's own track record and versatility in providing solutions to public policy issues as sought by international organisations, various ministries and government authorities and departments. The next five years (2006 – 2010) saw USAINS initiating collaborations aimed at consolidating itself with industries – multinational, national, and large, medium and small.

It is envisaged that over the next five years (2011 – 2015), the USAINS Group shall venture into creating more spin-off companies, expanding on its own subsidiaries, entering into joint ventures

and charting out new business activities. Up to the present moment, USAINS has focused on business activities utilising USM's intellectual properties, since the ultimate objective was to introduce USM's scientific and technical expertise and services for the betterment of the community.

Given the sustainability aspirations of the APEX agenda and the government's request that public universities generate a significant percentage of their operating expenditure on their own, USAINS shall respond to this call by developing additional lucrative businesses that are related but not necessarily based purely on science and technology. This would be a quantum leap from organic to synergistic growth. In all that USAINS does, the over-riding principle is that they must be beneficial to USM.

Global outreach through higher education

With so much focus on transforming higher education, it is easy to lose sight of the big picture. But Universiti Sains Malaysia is clear about its vision. Higher education should become a force of change for the many lives that it touches, a force that leads to a sustainable tomorrow. This force of change should also spread far and wide. The collaboration between USM and a higher education institution in Haiti, the Ecole Superieure d'Infotronique d'Haiti (ESIH) under the Leadership Development for Higher Education Reform (LEADHER) project is a good example of how through higher education, a small country like Malaysia can make an impact around the globe.

Meeting with consultants and architects at CUSM, Port Au Prince 1 October 2010

Transforming dreams

Despite the calamity that hit their country, Professor Patrick Attie, the Vice Dean of ESIH and Sam Marlene, ESIH International Cooperation Expert, remain positive that things will work out for the better. The 7.0 magnitude earthquake in January 2010 killed more than one hundred thousand Haitians, including 13 ESIH students and an ESIH professor. Nevertheless, when class resumed on 15 March 2010, 80% of its students turned up. In their determination to put back the pieces of their lives, the students and the faculty members of ESIH are focused on the future. Higher education, they believe, will bring the much needed transformation to Haiti. For instance, before the earthquake, Haiti had only one geo-physicist despite its history of seismic activities. To prepare for future calamities, Haiti needs to be prepared. But beyond preparing for future disasters, Haiti is also working towards developing a knowledge-based economy. Attie, for example, is keen on moving the nation towards becoming a producer of high added-value technological products. Higher education therefore is imperative in the rebuilding agenda.

It is with these capacity building efforts in mind that USM and ESIH have agreed to join hands under LEADHER, a project run by the International Association of Universities (IAU) based in Paris, France. Being the Vice President of the IAU, USM's Vice Chancellor Professor Tan Sri Dato' Dzulkifli Abdul Razak was adamant that IAU acted quickly to meet the urgent needs of the community scholars in Haiti. The main goal of the project was to explore aspects of internalisation of higher education with the objective of developing closer linkages and research collaboration. The focus of the project was on post-disaster capacity building for various aspects of the medical and health sector and campus building in Haiti. The project is envisioned to:

1) Provide training for sustainability and human capital development.
2) Reconstruct and restructure a medical health and health training programme (with ESIH as the springboard to the entire higher education system in Haiti).
3) Establish a medical and health system (in both the institutional and system-wide context) that is highly prepared for untoward eventualities.
4) Build capacity in earthquake and natural disaster planning for campuses.
5) Develop a portfolio of potential collaborative projects in areas of social transformation.

Visit to the Medical Faculty of Notre Dame University Haiti, 1 October 2010

6) Promote research linkages through research projects, postgraduate and post-doctoral students and joint publications.

The project took off with a visit by the ESIH representatives, Attie and Marlene from 20 - 24 September to USM followed by a return visit to Haiti by USM delegates led by Professor Ahmad Sukari Halim from 26 September - 4 October 2010. The fact-finding visits allowed both parties to explore various avenues for collaborations. Ahmad Sukari explains that at the initial stage, the key objective of USM is to forge a working relationship with ESIH to open more windows of opportunities for future collaborations with other Haitian institutions. USM is keen to share with Haitian institutions its experience in capacity building in various countries. USM also hopes that the collaboration will help it build a strong network with French-speaking institutions affiliated with ESIH and other Haitian universities.

The USM-ESIH collaboration marks the first initiative in higher education that Haiti has embarked with an Asian nation. Past collaborations with Asian countries had focused mainly on primary and secondary education. Ideally, ESIH would like to engage with organisations that are prepared to make a commitment to the people of Haiti and have the empathy for what they have gone through. While there have been as many as 4,000 international non-government organisations offering aid to Haiti after the earthquake, many of these are not there for the long term. Capacity building in the area of higher education requires a sustainable approach, hence making USM an attractive partner. For USM, the collaboration is viewed as part of its responsibility as its mission has always been about empowering future talents and the *bottom billion* to help them transform their socio-economic well-being. The USM-ESIH collaboration is the first step among many towards those transformations.

Quality, opportunities and hope

Quality, opportunities and hope – these are the three elements that ESIH looks for in the collaboration. With extensive experience in capacity building efforts in calamity stricken areas such as in Aceh and Pakistan, USM is well prepared to provide quality assistance to the Haitians both in rebuilding the physical infrastructure as well as human capacities. USM's School of Housing, Building and Planning (HBP) will be contributing its expertise towards designing lightweight building blocks and anti-seismic architecture. The School of Health Sciences will share its expertise in developing training modules for paramedics and non-medical civilians in post-disaster areas. ESIH has also expressed interest to work with USM's IT experts in researching and designing virtual reality simulations of medical applications and historical monuments.

Being an optimist, Marlene prefers to focus on the silver lining behind the disaster that has struck Haiti. The earthquake has indeed opened up various higher education opportunities for the people of Haiti. The US and the French government were among the governments that had been quick to offer scholarships for Haitians to study in their countries. Similarly, USM would like to offer higher education opportunities by inviting more of Haitians to study in USM. While financial constraints hinder USM from offering scholarships, studying in USM means that Haitians will be able to access quality education at much lower costs than studying in the US or France.

Press conference at Chancellory,
Universiti Sains Malaysia,
23 September 2010

From their short visit to USM, both Attie and Marlene attested that the student facilities in the USM campuses are equal to, if not better than, many that they have seen in other universities around the world. In addition, USM is also looking forward towards exchange programmes involving students and staff.

A fervent hope of the Haitian delegates is that USM will help become an influential voice to promote higher education in Haiti. What strikes the ESIH representatives the most was the positive attitude of the Malaysian government and its strategic approach towards higher education. In contrast, higher education has only recently become a centre of discussion in Haiti, with the first effort being to moot the idea of the formation of the Ministry of Higher Education. While in general the idea has been agreed upon, whether or not it will materialise will only be known after the November 2010 general election. In the past, Haitians had witnessed millions of dollars dedicated for education disappear without making much of an impact due to lack of enforcement of policies, commitment and strategic directions. It is hoped that USM will help open channels of communications at the ministerial level to gain the greater participation and commitment of Haitian politicians towards improving higher education.

At the institutional level, USM hopes to impart its *business unusual* approach towards higher education that has been one of its recipes for success. For instance, while other higher institutions in Malaysia are focused on mainstream and Ivy League institutions in benchmarking excellence, USM is not afraid to shift its focus to non-mainstream countries like Haiti and Cuba in its effort to redefine excellence in higher education. The USM-ESIH collaboration reflects USM's strong belief that excellence in education is only truly achieved if it is able to bring equality to society and transform it for the better. Marlene, for one, believes that carrying on *business as usual* will not work for Haiti as the existing system can no longer support the kind of transformations envisioned for its higher education. The irony was that the earthquake has made the problems more obvious and the solutions more urgent. But she believes that dreams can come true. USM is confident that it will be able to contribute in developing strategic directions to help Haiti achieve its dreams.

The visits have resulted in the identification of several specific areas of interests that both parties would like to pursue. For joint research, the parties have identified seven key research topics: environmental management, town planning, solid waste management, light-weight building materials, earthquake resistance materials and design, detection of hot-spot areas using the geographic information system (GIS) and disaster medicine. The delegates have also expressed interest in staff and student exchange programmes. In teaching and learning, the delegates are keen to embark in long-distance learning, collaborate with other learning institutions such as the Al-Bukhary International University, initiate MBA (entrepreneurship) programmes and develop expertise in the area of plastination of anatomical specimen techniques. Both the Haiti and Malaysian delegates now look forward to forge strategic partnership as part of the implementation plan of the activities that they have identified.

Transforming smiles, transforming lives

On 7 October 2010, 75 children lined the corridors of the Dhaka Community Hospital to be screened for a reconstructive surgery that would decidedly transform their lives. These children had been born with cleft lips and/or palates, defects that in developed countries are treated within 12 months after birth. Hearing that a group of plastic surgeons from Universiti Sains Malaysia, in collaboration with MERCY Malaysia and the Dhaka Community Hospital, was offering free surgeries for underprivileged children, parents and children travelled from far and wide, by car, boat or train to seize what might have been perhaps the only chance of a lifetime to free cleft lip and/or palate children from social stigma. In the mission, a three-day session resulted in the transformation of the lives of 57 children. The other 18 children would have to wait for the next mission due to various reasons – health conditions that did not permit surgery, age limitations or highly complex cases that required more elaborate surgery and equipment.

1. Tasiff in the reassuring hands of Ahmad Sukari
2. Salma after surgery. The smiles of both mother and daughter say it all
3. Wendy Neoh (left) hard at work to ensure patients and parents understand the processes and that their needs are met at the Dhaka Community Hospital

The humanitarian aid mission was the fourth under the MERCY Malaysia's Cleft Lip and Palate (CLIPP) project. The CLIPP project is a holistic humanitarian aid mission that takes care of all the needs of parents and children before, during and after treatment, even to the extent of visiting past patients to ensure that they get further treatment or therapy if there was a need. The engagement of USM's plastic surgeons also ensures that patients get holistic medical care that not only fixes the problems but also attends to complications that may arise from these problems such as ear infections and oral muscle conditions that impede speech. The CLIPP project will continue to serve the people of Bangladesh as long as there is a need for it. An MoU signing ceremony between MERCY Malaysia and USM in September 2010 marked USM's commitment to continue to send its plastic surgeons to ensure the sustainability of the project.

Embarking on the CLIPP project is one of the ways USM is contributing towards the betterment of the lives of the *bottom billion* population in Bangladesh. In a country where people are struggling merely to survive, cleft lips and/or palates are often left untreated because they cannot afford a surgery that costs about RM1,000. While cleft lip or palate surgery is viewed as a necessity in developed or developing countries like Malaysia, it is considered a non-life threatening surgery and a luxury in Bangladesh. Public health allocations are reserved only for the most dire health complications. The surgery might not be a matter of life or death, but for those who are suffering from the condition, it offers a new lease of life.

The lack of the required expertise for cleft lip and palate surgeries has also made the CLIPP project critical. In Bangladesh, those who can afford it or who have saved up enough for the surgery would be treated by lesser trained operators rather than by plastic surgeons. The lack of training and expertise of these operators often result in inadequate treatment. Many a time, plastic surgeons in the CLIPP mission find themselves fixing problems that were not resolved

by earlier operations such as muscles that were not manipulated properly to ensure proper speech. The MERCY Malaysia - USM collaboration ensures that the people of Bangladesh get the best treatment as the team comprises some of Malaysia's very experienced plastic surgeons and anaesthetists.

A normal smile, a normal life

What does it take to put a smile on a face? Not much of an effort for many of us, but to the children with cleft lips or palates, smiling is not only physically difficult but also mentally a challenge due to ridicule from society. Getting the condition treated will allow them to have at the very least a normal smile, but more importantly, there would be hope for a normal life.

Smiling would be the least of the problems compared to the various other complications that the 75 children who came to the Dhaka Community Hospital have had to endure due to their defects. Even to breathe is a challenge to some of the children. Other complications include impaired hearing due to related muscles affected by the cleft lip or palate condition and ear infections because of susceptibility to fluid collection in the middle ear.

Children with cleft lips and/or palates are often underweight and malnourished as a cleft lip and/or palate often renders feeding difficult. In some cases, fluids would leak through the nose, thus making breathing a challenge especially for babies. Babies suffer from insufficient suction making it difficult to get much needed nutrition from their mothers' milk. The CLIPP mission in September 2010 would allow such children to consume food like normal people.

Speech development is yet another complication for a child with a cleft palate. The cleft palate interferes with the control of the air flow in the mouth that is crucial for forming sounds in language. Air would leak through the cleft to the nose thus preventing the build-up of pressure that is necessary for certain sounds to be made. Children with cleft palates often have nasal speech that is only understood by family and close friends. Surgery would help seal the cleft and allow better control of air flow. However, in many cases, speech therapy after surgery is required as the children would have acquired bad speech habits prior to surgery that would not disappear automatically after surgery. Hence, MERCY Malaysia conducts follow-up visits to ensure that these children get the needed speech therapy.

Children with cleft lips and/or palates also have to deal with emotional and social issues. They are often saddened because the condition makes it difficult for them to get close to other children. Fais Hassan*, for instance, may have many friends but not many of them would be called close friends. He loves to play cricket but he would only be called to join in when a team does not have enough members. In some cases, children with cleft lips and/or palates become so distressed that they avoid going to school altogether. Getting the condition treated would allow them to play and learn like any other child.

Marrying daughters is important in the traditional families in Bangladesh. For Salma's* mother, it feels like a big burden had been lifted from her shoulder after Salma's cleft lip surgery. Like any other mother in Bangladesh, she had dreamt that her daughter would marry a good man one day. That dream was thought to be impossible until 10 October 2010, the day she saw Salma smiling a normal smile after her surgery. She now thinks that Salma's future will be as bright as her smile. A proof to that is Rani* who is now married to a man from a nearby village following a cleft

For the underprivileged people of Dhaka, the free treatment offered under the CLIPP project is a chance of a lifetime

Parents and children lining up the corridors of the Dhaka Community Centre to be screened for surgery

lip surgery under the CLIPP project a year ago. Encouraged by her husband, she now plans to resume her education at an evening school.

Mission impossible?

Professor Ahmad Sukari Halim, who led the USM team of very experienced surgeons, anaesthetists and nurses, ensured that the services rendered were the best and that each mission met tight deadlines. Fifty seven surgeries by three plastic surgeons and two anaesthetists working under highly challenging conditions were not easy feats. Every step had to be carefully planned to ensure that children who came from hundreds of kilometres away would not be disappointed.

The surgeries themselves were taxing on the doctors and nurses involved. On top of that, being used to the well-equipped hospitals in Malaysia, they had to adapt and be creative when the suction machine literally went up in smoke, the ECG monitor malfunctioned and the anaesthetic gas tanks could not be replaced in the middle of a surgery. They also had to deal with language barriers, different protocols and out-dated medical facilities in the Dhaka Community Hospital. Dr. Ruwaida Isa, the anaesthetist, for instance, was surprised that halothane gas, long abandoned in Malaysia, is still being used.An impossible mission for many but Ahmad Sukari was not easily deterred by mere logistics. He had brought the best and hence expected nothing less from his team. The doctors worked long hours, often from 8 a.m to 9 p.m, operating on up to 17 children a day, stopping only for lunch, prayers and frequent power outages that left them in pitch black darkness during precision surgeries! But their spirits were always high and often, they were seen joking around with the local doctors and nurses.

The surgeons would not have been able to pull off such a feat if it had not been for the help of the nurses both from USM, MERCY Malaysia and MERCY Malaysia's senior programme officer. The nurses from USM were among the most senior and had been working with the surgeons for more than ten years. They knew the surgeons very well, to the point of being able to read their minds. They played a critical role in ensuring that the surgeons could focus on the surgery while they took care of their needs in the operation theatre. MERCY Malaysia's team, comprising Wendy Neoh, the senior programme officer and medical officer/ nurse and volunteer nurse, Che Tah Hanafi and Harithan Nordin, were the people behind the scene without whom the entire mission would not have been possible. As always, the MERCY team was the first to arrive in Dhaka to arrange the publicity, logistics, medicine and medical facilities. Neoh had worked hard at coordinating operations with both USM and the

Dhaka Community Hospital. Che Tah and Harithan ensured that officers and the nurses at the hospital met all the needs of the team from Malaysia. The team stayed at the hospital to ensure that its members could be contacted at a moment's notice, particularly for post-operations in case complications arose.

"Alhamdulillah, wa laa ilah, ha illallah...," is a common zikr lullaby used by Muslim mothers when putting children to bed. To hear the lullaby in an operation theatre, sung by an anaesthetist to soothe a crying baby to deep sleep under general anaesthesia, would touch any heart. Ruwaida and all the doctors in the mission showed deep care for their patients and their sincerity assured both patients and parents that they were in good hands. Tasiff* , for example, quickly stretched out his arms to hug Ahmad Sukari for assurance in the operation room, just like any anxious child would do. With such commitment and care, it was not a surprise that the mission went as planned and with great success.

The transformative forces

The 57 children were not the first to receive cleft lip and/or palate treatment. As of March 2010, 160 reconstructive cleft lip and/or palate surgeries had been conducted under the CLIPP programme initiated by MERCY Malaysia since 2008. While past missions had seen the involvement of doctors from various Malaysian universities, including three missions led by the present team leader, the MoU between USM and MERCY Malaysia signed in September 2010 marked a commitment by the two parties to work exclusively together for the long term in Bangladesh.

USM's unique contribution comes in the way of a strong team of experienced plastic surgeons, anaesthetists and nurses who are able to work on complex cases and under the most rudimentary conditions. Other than Professor Ahmad Sukari, the team also comprised Associate Professor Mahamarowi Bin Omar (anaesthetist), Dr. Wan Azman Wan Sulaiman (plastic surgeon), Dr. Khoo Teng Lye (plastic surgeon), Kalsom Yahya (head nurse), Hashimah Husin (staff nurse) and Murni Othman (staff nurse). The travelling costs of the team were met by USM's Division of Industry and Community Network (Bahagian Jaringan Industri dan Masyarakat), a section that has been set up with the vision to ensure that the university stays relevant with the industry and the community. The group of USM doctors has now taken that vision to a new level by making USM's presence felt by an international community in Bangladesh. The USM team was also joined by Ruwaida, a paediatric anaesthetist from the Hospital Raja Perempuan Zainab II, Kota Bharu, who is an honorary lecturer of USM.

Besides its tireless efforts to pool resources and liaise with the Dhaka Community Hospital, MERCY Malaysia provided crucial support in financing the food, travel and accommodation of the patients and their family members as well as providing all the medicine and medical equipment for the mission. MERCY Malaysia, working with the Dhaka Community Centre, was also responsible for organising the publicity and logistics for the project.

Fais Hassan resting after the surgery. Peeping from behind is Abdullah, waiting for his turn for the surgery. Abdullah dreams to drive big machines in other countries when he grows up. His parents now think that the dream is no longer impossible

Gentle hands transforming lives

The Dhaka Community Centre, MERCY Malaysia's project partner in Dhaka, is a trust-owned private, non-profit making organisation that is dedicated to serve the low-income, underprivileged people of Dhaka. Although under-resourced, it is highly dedicated to provide the best possible treatment to the poor people of Bangladesh. To do that, they have collaborated with various organisations throughout the world, such as MERCY Malaysia and USM. To date, it has established 28 rural health centres across Bangladesh, making health care services accessible and affordable for the marginalised poor.

All three partners believe in the core values – sustainability and serving the underprivileged. The transformations would not be complete if after surgery, the children do not have access to good post-operation treatment, medicine or speech therapy. Hence, MERCY Malaysia and the Dhaka Community Centre make it a point to do follow-up checks of the patients after surgery. Patients who did not pass the initial screening are contacted to ensure that they get the treatment in the future. As for USM, it takes an active role along with its partners in capacity building initiatives. Local doctors and nurses received hands-on training by helping USM surgeons during the surgeries. Workshops are also conducted during each mission to provide exposure to the local doctors and nurses regarding the intricacies of cleft lip and palate surgeries. In addition, USM provides consultancy for the setting up of a new Intensive Care Unit and post-operative care wards in the Dhaka Community Hospital. It has also made a firm commitment to provide the medical expertise for future missions. Ahmad Sukari has already lined up his team for the next mission in March 2011. At the same time, he is busy planning for a donation drive to ensure that the USM team has the financial resources for future missions in Dhaka.

**Not actual names*

Reconstructive surgery – restoring normality

The Unit Sains Rekonstruktif (USR) at the School of Medical Sciences, USM, is a relatively new and small unit consisting of five plastic and reconstructive surgeons and 36 nurses and support staff. Nevertheless, the unit has become one of the jewels of USM. Of the 23 plastic and reconstructive surgeons now working with the Ministry of Health hospitals, USM is pleased to note that 12 of them were trained in USR besides another three plastic surgeons serving Hospital Universiti Kebangsaan Malaysia and Universiti Putra Malaysia. The unit has also been the leading tertiary referral centre in the country for plastic and reconstructive surgery since 1997. Having some of the most experienced plastic surgeons in Malaysia and one of the most advanced technical capabilities in plastic and reconstructive surgery, USR's expertise is often sought to resolve complicated cases from various hospitals or medical institutions. The unit has even received referral cases from Brunei, Thailand and Indonesia. Seven fellowship positions have been granted to the graduate plastic surgeons of USR in various internationally recognised centres in the world, showing the recognition of this unit in the international arena. USR is also set apart from other local and international reconstructive science units by its strong emphasis on research. For the past 14 years, USR has been the main Malaysian contributor of scientific publications in the area of plastic and reconstructive surgery in leading international journals.

Leading the way

Since 2001 and with the co-operation of the Ministry of Health, USM through USR has been the only university in the country offering the Master of Surgery (Plastic Surgery) degree programme to local and international students. To date, twenty plastic and reconstructive surgeons have completed their plastic and reconstructive surgery speciality training in USR; these include seven surgeons now serving in various local universities, twelve in several hospitals of the Ministry of Health and a surgeon from Yemen. At present, USR is training ten trainee plastic surgeons from the Ministry of Health, five from various local universities and a trainee from Libya under the Master of Surgery (Plastic Surgery) programme.

Apart from the plastic and reconstructive surgery master student trainees under the Master of Surgery (Plastic Surgery) programme, USR also offered one-year fellowship training in reconstructive microsurgery to an orthopaedic surgeon from Egypt in 2008. In 2009, the Burn Unit of USR was honoured by the World Health Organisation (WHO) to train three surgeons from the Democratic People's Republic of Korea in clinical management of burns via the WHO fellowship programme. Apart from training plastic and reconstructive masters student trainees under the four-year training programme, USR also provides training to numerous oral maxillofacial, ear, nose and throat (ENT), orthopaedic and general surgery masters students from USM and other universities through one to four-month attachment programmes or postings in USR.

The unit has also been prolific in providing research-based training at the masters and Ph.D. levels. To date beside the two post-doctoral fellows, there are 16 research based trainees in USR and a number have already graduated. Three of the students have received the prestigious National Science Fellowship (NSF) beside 14 awards received by the staffs and students at national and international levels. The research of the students encompasses areas ranging from biomaterials, tissue engineering to cleft genetics. With collaboration with SIRIM and Nuclear Malaysia, USR has pioneered the use of chitosan dressing which is based on shrimp industry waste, particularly the porous-structure chitosan serving as the template for three dimensional skin substitutes. Exploration in the use of human follicle stem cells and adipose-derived stem cells is currently underway to fabricate an efficient organotypic culture system. The pathogenesis of hypertrophic scar and keloid in relation the role palm oil based vitamin E (tocotrienol) is also studied beside studies on the newly developed epithelial-mesenchymal co-culture system. Genetic studies are conducted to identify gene mutations involved in cleft lips and palates for a better understanding of cleft pathogenesis for future prevention measures.

Meeting health care needs

USR provides clinical services in the areas of reconstructive microsurgery, burn care and surgery and cleft and craniofacial surgery. A total of 8,030 operative procedures in plastic and reconstructive surgeries have been performed at the Hospital USM from September 1997 till December 2010. USR has also performed the most – totalling more than 380 cases – free tissue transfer surgeries in the country since 1997 for head and neck, breast, trunk, genitalia and extremity reconstructions in cases of various causes.

Together with orthopaedic surgeons, surgeons from USR are the key players in the Orthopaedic Oncology Reconstructive Unit (OORU) who manage major limb reconstruction following excision of complicated orthopaedic tumour cases from all around the country. The USR also receives cases for reconstructions from the general orthopaedics, otorhinolaryngology (ORL), general surgery, oral maxillofacial surgery and obstetrics and gynaecology (O&G) departments.

Due to its location in Kubang Kerian, Kelantan, the cases that USR receive are mainly from the East Coast of Peninsular Malaysia. However, its expertise is often in demand to resolve complicated cases from hospitals from other parts of Malaysia including Sabah and Sarawak. Its reputation has also gone beyond the shores of Malaysia to Brunei, Indonesia, Thailand and as far as Somalia.

USR is a key referral centre for cleft and craniofacial surgery, especially for complicated and re-operated cases. The surgeons in USR are actively involved in the Combined Cleft Clinic in Kota Bharu, that offers cleft lip and palate patients multi-disciplinary care soon after birth. For the past three years, the USR team, in collaboration with MERCY Malaysia, has also been providing surgery to cleft lip and palate patients in Dhaka Bangladesh (for the full story, turn to page 277). Other international community engagement projects include a medical mission to Baghdad, Iraq in 2001.

Reconstructive surgery requires meticulous preparation

In burn management, the Burn Unit of USR is at the forefront and plays a leading role in the country with its expertise on the various applications of modern dressing, skin allograft application, keratinocyte cell culture sprays and Meek micrografting. The Burn Unit of USR is the sole burn centre in Malaysia that is capable of performing these worldclass techniques. These have contributed to the improved outcomes in the management of burn victims.

Research and development

USR firmly believes in the importance of research and development in improving patient care and outcome. As such, the unit has invested much of its energy in researching new knowledge and developing applications, focusing mainly on the areas of biomaterials, tissue engineering, burn and wound care, reconstructive microsurgery and genetic research linked to cleft lips and palates. USR has received recognition and support from international bodies, ministry and university via numerous grants. These include 6 international, 13 national, 23 university level grants with total cumulative amount of RM 11,87 millions. In terms of research publication, the research and development activities at USR have resulted in more than 54 publications in international journals, e-journals, proceedings and book chapters, 18 publications in national journals and 63 published abstracts.

Based on a MoU recently signed between USM and the O'Brien Institute, Melbourne, Australia, USR is embarking on two projects, A Pilot Production of Biodegradable Scaffold for Skin Regenerating Templates from Natural Based Polymers and Development of Wound Management Products for Chitosan Derivatives. As part of the Technofund SIRIM-USM-Nuclear Malaysia project, USM will soon sign another memorandum of agreement to establish a service contract between USM and the Australia Tissue Engineering Centre (a fully owned subsidiary of the O'Brien Institute); USM will thereby be responsible for obtaining the Good Laboratory Practice (GLP) certification for the re-evaluation of products through sub-contracts to GLP laboratories and to conduct pre-clinical studies. The project is envisioned to further enhanced USR's capabilities in tissue engineering technology.

The way forward

Plastic and reconstructive surgery has been rapidly growing since its existence in the medical fraternity. USR has the mission and vision to further develop and enhance its sub-specialities, including reconstructive microsurgery, cleft and craniofacial surgery and burn surgery with hand surgery and paediatric plastic surgery in the pipeline. Linkages and collaboration with various sub-speciality centres around the world are being expanded. In term of clinical services, USR is looking forwards to ensure accessibility of service and care to the *bottom billion* people by expanding the services to rural areas in Malaysia and under developed countries in the Asian regions by training more reconstructive surgeons in line with the university aspiration. USR is gearing towards more intense research activity and broader collaboration to achieve quality and sustainability.

The Vice Chancellor's residence overseeing the greenery

A sustainable substance for a sustainable future: Tualang honey

Introduction

More than 10 nutritional and health products are derived from bees, namely honey, bee pollen, propolis, bee bread, bee venom, bees wax, bees stinger, royal jelly, queen embryo, etc. This creature supersedes the contribution of diary animals such as cows, sheep, chickens and pigs in producing natural food for healthy living. Honey is almost a complete food.

Universiti Sains Malaysia researchers headed by Assoc. Prof. Siti Amrah Sulaiman have embarked on researching the effect of Malaysian natural jungle Tualang honey on a number of diseases since 2007. Current research on honey comprises basic and translational research as well as clinical trials. Clinical trials which are ondergoing or have just been completed are on SLE (Systemic Lupus Erythromatosis), HIV, menopause, depression, chronic obstructive airway disease, burns, traumatic injury and cancer. A few products in the form of sachets, pastels and honey-impregnated dressings are in the pipeline.

Tualang honey has been found to improve healing of superficial and deep degree wounds due to trauma or burns, leaving lesser scars and faster healing. Honey is also shown to be more receptive to these patients as it is soothing to the skin unlike conventional modern dressings that "burn" the skin. Through these researchers, the HUSM pharmacy now is supplying "medicated" honey to be used for these purposes. Honey is "medicated" by being passed through gamma irradiation at Agensi Nuklear Malaysia [formerly known as MINT] to remove any bacterial spores which might be present.

The International Honey Science Network

International scholars working on honey research include Professor P.C. Molan, the *godfather* of honey research from Waikato University in New Zealand, Professor Dr. Stefan Stangaciu, the president of the World Association of Apitherapists from Romania, Assoc. Professor Dr. Jennifer Eddy, a family physician from the University of Wisconsin, USA (who has done clinical trials in using honey on chronic diabetic wounds), Professor Rose Cooper, microbiologist at the Cardiff School of Health Sciences UK (who has published some landmark papers on the anti-bacterial properties of Manuka honey), Professor Sunita Despande of India, a microbiologist who has worked extensively on Indian Jambul honey and Professor Kamaruddin Yusoff, a biochemist and a pioneer of honey research in Universiti Malaya. These researchers have commended USM for not only pioneering the International Honey Science Network (which we started after the successful organisation of an international conference in 2006) but also for currently conducting the most active and focused research on honey for medicinal purposes.

Since we began four years ago, the progress of honey research has grown exponentially. The clinical applications and relevance in clinical practice are vast. The potential gadgets that could be developed by researchers of honey and honey bee products could range from simple nasal drip applicators for chronic sinusitis to the development of nano-tubes to deliver bee products to diseased sites. Honey indeed is a natural substance for a sustainable future. Many new proposals for honey research are in the pipeline.

We acknowledge FAMA for contributing more than 1.73 metric tons of Tualang honey for research.

The *Tualang* tree

Disaster management

The 2004 Indian Ocean tsunami was an eye-opener for the world. It took us by surprise; its effects could be felt far and wide and the economic aftermath lingers until today. Nevertheless, something positive has come out of it. We are now more alert and better prepared for the next tsunami. For instance, the residents of Kuala Muda, Kedah, who were hard hit by the mega tsunami in 2004 now take no chances. A tremor on 7 April 2010 from an earthquake in Sumatra sent them running out of their houses with their important documents. With victims of natural disasters like those in Kuala Muda in mind, Universiti Sains Malaysia established the Disaster Research Nexus (DRN) within the School of Civil Engineering in March 2010 to spearhead research and development in natural disaster mitigation programmes to reduce the adverse impacts of natural disasters and to help empower communities so that they are resilient to such disasters.

The ENVISTATE – The Situation Awareness System for natural disaster mitigation

GIS-Based Hydrological and Hydraulic Modelling for River Flood Extent Mapping in Urban Areas: A Case Study on the Sungai Kayu Ara River Basin, Kuala Lumpur

Converging minds

In the South China Sea Tsunami Workshop 3 (SCSTW3) hosted by USM in November 2009, it was recognised firstly, that disaster mitigation requires the integration of knowledge and experiences from various diverse fields of science, social science and engineering; secondly, a coherent platform is needed to facilitate disaster management at several stages: pre-disaster, during disaster and post-disaster reconstruction and rehabilitation. To fill that gap, in November 2010, DRN co-organised under the Vice Chancellors' Council of National Universities in Malaysia (VCC), the Second Joint Symposium of Asian Heads of Research Councils (ASIAHORCs) with the theme of *Natural Disaster Management: Lessons Learnt and Shared Best Practices.* Launched in 2007, ASIAHORCs aims to establish strategic partnerships between Japan and the countries of Asia, amidst rapidly advancing science and technology development in the region. Participants of the Second Joint Symposium of ASIAHORCs comprised distinguished Asian and Japanese experts, researchers, postgraduate students and those involved in natural disaster research and mitigation. The symposium placed special focus on strengthening the region's scientific research collaboration network, to be on par with those carried out in Europe and North America.

The main objective of the Second Joint Symposium was to provide a platform for the Japanese and Asian experts and researchers to deliberate on issues related to natural disasters such as community preparedness and resilience, early warning systems and current research and advances on natural disasters. The main objectives may be summarised as follows.

- To enhance quality output in all aspects of disaster research, community resilience and disaster scenario development in Asia.
- To develop an implementation plan for a sustainable natural disaster mitigation policy and a comprehensive disaster risk management programme at disaster hot spots in Asia.
- To improve research quality, provide training to young researchers and facilitate transfer of disaster science and technology by active collaboration.

Visit from Professor Patrick Attie, Vice Dean, Ecole Superieure d'Infotronique d'Haiti (ESIH) and Rose Marie Marlene Sam to the School of Civil Engineering, USM on 24 September 2010

The Second Joint Symposium was unique because it focused on both the hard and soft sciences. DRN strives to strengthen communication between the academic scientists and on-site application communities to improve the implementation of hazards prediction, preparedness and mitigation leading to effective emergency management programmes. The nexus accomplishes its work through four major activities: information dissemination and services, regular training workshops, basic scientific research and dedicated consultancy services.

A safe and secure society

Given the society's perception of safety and the country's experience of past disasters, it is deemed necessary that a long-term sustainable research methodology and institution be developed for a comprehensive disaster management, focusing on disaster resilient living spaces and communities. As such, DRN offers scientific analyses and predictions of disasters within the context of societal development and sophistication. It also offers comprehensive diagnoses of the vulnerability and risk from disasters inherent in modern societies with high population densities, conducted based on well-established technologies and methodologies for disaster mitigation design and planning. Following the Second Joint Symposium, community disaster management has been further developed to construct or otherwise, to modify, such development to suit the requirement of modern societies, taking into consideration cultural aspirations, sustainable development, community safety and comfort. Theories and practices of disaster mitigation policy that accommodate land use redevelopment, conservation of environment and preservation of community harmony and safety have also been established.

Social transformations in times of disaster

Several impact studies were also highlighted at the Second Joint Symposium. The studies provided an overview to the "what" and "how" of the handling and management of post-disaster trauma affecting communities befallen by a disaster. Management of post-disaster trauma is critical to avoid psychological scars to individuals and also to encourage them to have the will to live, the motivation to "get up and take charge" of their lives quickly to improve their situation. Experts from the social sciences play a critical role in facilitating an affected community's participation in dealing with post-disaster trauma (especially if the residents have to be relocated or their dwellings reconstructed/ repaired). Participation is facilitated by establishing committees that act as a channel to voice the community's interests and to gain support for post-disaster programmes instituted. Self-help groups (including women's groups) have also been formed to ensure that technical, monetary, psychological and material assistance are optimised. Social scientists are also involved in handling social issues such as orphaned children, women and men who have lost their spouses, family members and livelihoods, the provision of temporary care and schooling for the children and ensuring the safety of persons and property (e.g., from looters and other criminals) by deploying volunteers. They also facilitate in securing assistance from religious and corporate bodies, NGOs and other donors on a continuous and sustained basis.

Ensuring sustainable development

The impact of disasters is felt most acutely in societies gripped by poverty. Immediately after any disaster, the victims will, in all likelihood, not have the resources required to continue with normal life. Ensuring a healthy and safe livelihood under abject conditions is

the most important step to be taken to enable poor neighbourhoods to have the facilities and resources to move on with their lives immediately after a disaster. Several agencies, such as Majlis Keselamatan Negara (MKN), Malaysia Meteorological Department (MMD) and NGOs (including MERCY), currently perform these very important functions. DRN works closely with them to build the expertise and human capability to provide help after a disaster. During the second Joint Symposium of ASIAHORCs, DRN formulated several guidelines on good practices and procedures in assisting disaster stricken communities. The ultimate objectives were to develop communities that are resilient to disasters and whose members have the proper mindset, tenacity and perseverance to endure temporary hardship while struggling to restore lives that have been destroyed by the disaster. Extensive knowledge has been accumulated in the past from various societies and communities; this knowledge can be made readily available by proper documentation and dissemination of these very crucial knowledge and experience. One of DRN's key responsibilities is to compile, collate and disseminate these documents to communities at risk and in danger.

DRN contributes to sustainable development through the following:

- Research outputs such as integrated modelling in the form of decision support systems that enable faster and accurate dissemination of knowledge.
- Tsunami Impact Simulation and Mapping (TISM@USM) for community resilience and to save lives.
- Maps such as the "Flood Risk Map", the "Landslide Risk Map and the "Seismic Hazard Map" to ensure sustainable development.
- A Code of Practices and Guidelines for building and slope constructions.
- The integration of multi-discipline domain experts to form a robust research cluster platform that develops and deploys pragmatic solutions for disasters.

The way forward

With major international agreements in place and the country's high commitment for the implementation of Agenda 21, Climate Changes and Tsunami, the overall environment has been very conducive for DRN to take root and thrive. Commitments from MEXT, EU, JICA, UNESCO and bilateral partners have ensured a steady flow of funds for DRN to assist it in future endeavours.

As part of its effort to disseminate and share knowledge on disaster management, DRN has committed to a collaboration with the Malaysian Metrological Department (MMD) to jointly organise the National Technical Seminar on Earthquake and Tsunami (NaTSET2010) on 10-11 November 2010. It will also be participating at the next South China Sea Tsunami Workshop 4 in Banda Acheh in 2011.

At the global front, DRN, along with a few schools in USM, has been actively involved in the rebuilding efforts of Haiti's higher education that has been severely affected by the devastating earthquake on 12 January 2010. The project is funded by the International Association of Universities (IAU) - Leadership Development for Higher Education Reform (LEADHER) Grant. On 24 September 2010, Professor Patrick Attie, the Vice Dean, Ecole Superieure d'Infotronique d'Haiti (ESIH) visited the School of Civil Engineering at USM as part of the mission to create a strong and sustainable cooperation between the two universities. Associate Professor Ir. Dr. Mohd. Nordin Adlan, on behalf of the School of Civil Engineering, has shared some of the successful consultancy projects undertaken by USM. Attie has expressed interest in sharing USM's expertise in various fields. In a return visit by the USM team to Haiti, Professor Evens Emmanuel, the Dean of the Faculty of Engineering and Architecture of Quisqueya University, Haiti, and his team have identified water, environment and waste management as areas for future collaborations with USM. USM will propose several measures to provide a reliable solution in terms of developing the technical know-how and practical approaches for the Laboratory of Water Quality and Environment, Quisqueya University, Haiti. It is hoped that the project will initiate a meaningful collaboration with the Quisqueya University.

The holistic approach adopted by DRN ensures that disasters can be better predicted and better managed. Taking a proactive rather than reactive approach empowers people in natural disaster zones, offering them alternatives for action and providing them better control and hope over the situation. Science and technology feature prominently in DRN activities, bringing together experts from diverse areas to work together in understanding how nature works and how disasters can be mitigated. Ultimately, DRN aims to develop comprehensive disaster management plans and keep them updated for disasters of various types to safeguard the well-being and interests of people in disaster stricken areas.

Propagating sustainable agriculture and pharmaceutical industries

Walking along the rows of shelves filled with thousands of bottles of plants makes one feel like it is a walk in a lush tropical rainforest teeming with the bounties of the earth. That is the experience one gets at the Plant Tissue and Cell Culture Laboratory of the School of Biological Sciences that houses Universiti Sains Malaysia's ground breaking research in plant tissue culture technology. The laboratory has produced some of Malaysia's most high quality plants ranging from ornamental plants to fruit and timber trees.

A & B:Tissue-cultured Eksotika papaya plants produced high fruit productivity and uniform fruits

Fruit bunches harvested from tissue culture plants: Pisang Awak (C); Pisang Rastali (D); Pisang Mas (E); Pisang Berangan (F)

Plant tissue culture technology, that subsumes plant organs or tissue cultures, callus cultures and the growth of plant cells and embryos outside an intact plant maintained in aseptic conditions on a suitable nutrient medium, is a technique essential in many areas of plant sciences. This technology has enabled us to increase knowledge in many areas including cell division, tissue differentiation, plant nutrition and preservation. It can be considered as a combination of the art and science of plant multiplication and metabolite production *in vitro*. It is the true-to-type propagation of a genotype with the purpose of producing carbon copies of original unique plants or simply put, to clone the plants in quantity. The callus and cell suspension cultures can also be utilised to regenerate plantlets or to extract or manipulate some primary and secondary metabolites. Secondary metabolites are chemicals produced by plants normally in very small quantities in their natural selves but large amounts of these compounds can be produced if the plants are under stress. The *in vitro* culture technology for plant cloning and production of useful plant products can hence be said to result from the culmination of all the inventions, theories and discoveries man has made regarding the anatomy and physiology of living plants.

Today, many plants are commercially produced via the tissue culture technique especially ornamental plants, fruit trees, timber trees and medicinal plants. Many of these plants have reached the limits of their improvement via traditional methods. The emphasis on sustainable agriculture, with an increasing world population and the loss of prime land to housing and industry, has made this method of propagation indispensable.

Research activities on plant tissue culture have been carried out at the School of Biological Sciences since 1975, first set up by Dr. Chris K.H Teo. For the first fifteen years, most of the research activities were mainly on the micropropagation of ornamental plants such as the Nepenthes, Gloxinia, dwarf roses, caladium and aquatic aquarium plant species. Micropropagation studies were then extended to fruit trees such as the banana (*Musa* spp.), papaya (*Carica papaya* cv Eksotika and Taiping) and nangka (*Artocarpus heterophyllus*) when Prof. Chan Lai

G: In vitro seedlings of Jack Fruit (Artocarpus heterophyllus Lamk.) cv Mastura

Keng join USM as a teaching staff in 1982. In the early 1990s, with the growing emphasis of the Malaysian government on the importance of medicinal plants for the production of herbal products, the research activities were expanded to the micropropagation of local and foreign medicinal plants.

The popularity of plants as herbal medicines has been on the rise for the last 10 years especially in Europe and North America. Even today, 75% of the world's population still relies on plants as food sources and pharmaceutical and traditional medicine. Hence, plants grown in their natural habitat or those grown in an inefficient agricultural system will not be sufficient to sustain the world's rapidly growing population especially in developing countries. There is therefore extreme pressure on the available cultivable land to produce food and fulfil the needs of uses such as the production of pharmaceuticals and chemicals from plants. To help solve this problem, since the mid-1990s until today, besides micropropagating plants, the research team led by Chan has been focusing its research on the potential of producing secondary metabolites from various plant species using cell culture technology. The laboratory was then renamed as the Plant Tissue and Cell Culture Laboratory.

The plant tissue culture research activities at USM have been carried out vigorously with great success. Led by Chan and recently including Dr. Sreeramanan Subramanium, the research team, together with more than forty postgraduate students and two post-doctorates, works like a big family conducting a multitude of research on a range of plants with various beneficial interests. Their research on the selection and micropropagation of elite clones of fruit trees have produced better fruits with higher quality and quantity in a shorter time. The tissue culture propagation of papaya plants makes possible the elimination of variation in the field population. The technique also results in the propagation of good quality papaya plantlets using tissues from higher yielding trees. Until today, there have not been other efficient methods for the large-scale propagation of papaya. The researchers have proven that plants derived from the tissues of a good yielding mother plant would breed true to type (photos A &B). This propagation protocol can hence be used to further develop Malaysia's agriculture industry as our country is one of the key players in the export of tropical fruits.

The team has also successfully established an efficient micropropagation protocol that can be applied to four Malaysia banana cultivars, the Rastali, Berangan, Mas and Pisang Awak. This technology has been transferred to the farmers in Kelantan and Balik Pulau and Teluk Kumbar, Penang. It has increased fruit yields with uniform fruits (photos C, D, E & F).

Another success story that has been conducted since 2004 involves the micropropagation study on jackfruit (*Artocarpus. Heterophyllus*) cv Mastura (photo G), a Malaysian new hybrid, for the production of selected cultivar plantlets. The established protocol for the micropropagation of jackfruit plants has resulted in the production of uniform and high quality clones for farmers.

The ornamental plant industry is a thriving business as nurseries are burgeoning everywhere these days. Due to a ferocious appetite for anything exotic, collectors are indiscriminately removing plants from the wild and this has led to many orchids and various wild ornamental plants being placed on the endangered list. Research was hence commenced with the objectives of establishing a mass plantlet production protocol for the horticultural industry to supply plants for sale as pot plants, cut flowers and plants for replanting in parks and gardens like the Penang Botanic Gardens. The ornamental plants that have been successfully mass produced include *Chrysanthemum morifolium*, Gloxinia (*Sinninga speciosa*), Gerbera (*Gerbera jamesonii*), Maidenhair Fern (*Adiantum raddianum*) and various species of orchids including the near extinct slipper orchid. The team later established a micropropagation protocol for the mass propagation of the near extinct and endemic Malaysian Araceae ornamental plants, *Alocasia reginula, Alocasia watsoniana, Alocasia sanderina, Colocasia antiquorum, Gonatanthus pumilus, Syngonium podophylum and the Caladium* spp. (*Caladium bicolor* "Florida Crown", *C. hortulanum and C. humboldtii*).

The various micropropagation protocols developed by the research team for the fruit crops and ornamental plants have produced a sustainable method of growing these fruit trees and ornamental plants on a large scale to fulfil the demands of the market. Furthermore, these can all be done in a smaller land area, consuming fewer resources and in a shorter time frame.

Due to the growing importance of herbal medicinal plants and the fact that Malaysia is among the top countries with the most diversified plant species with medicinal values, research activities were expanded into the micropropagation of local medicinal plants and the production of bioactive compounds with medicinal values using the plant cell culture technique. The cell culture technology is especially important when the traditional method of collecting local medicinal plants from the wild has been increasingly threatened by habitat destruction, over-exploitation, land use changes and pressures from other human activities. The early research focused on the production of useful secondary metabolites from Tongkat Ali (*Eurycoma longifolia*) cell cultures. The cell culture technique has now been extended to other local medicinal plants such as Misai Kucing (*Orthosiphon stamineus*), Dukung Anak (*Phyllanthus niruri* L.), medicinal plants of the Zingiberaceae family for the production of useful bioactive compounds and senduduk (*Melastoma malabathricum*) for the production of pigments with high anti-oxidative activities. The cell culture technique has also been successfully applied to valuable medicinal plants

Tissue culture clones of Araceae ornamental plants (H) Caladium hortulanum (I) Caladium humboldtii (J) Caladium bicolor (K) Syngonium podophyllum (L) Colocasia antiquorum (M) Gonatanthus pumilus (N) Alocasia sanderina

that are grown outside Malaysia such as *Artemesia annua* and *Hyoscyamus niger*. The insect juvenile hormone (JHIII) was mass produced via the cell suspension culture of a bio-insecticidal plant, *Cyperus aromaticus*. It has been proven that the harvested cells can cause abnormalities of the *Aedes aegypti* mosquitoes larvae which result in eventual death and disruption of their life cycle. This indicates that disease carrier mosquitoes can be eliminated by feeding them with the *C. aromaticus* cell extracts. These projects definitely give huge impact globally in eliminating diseases due to insects as the carrier.

Another breakthrough research is the production of *Hibiscus rosa-sinensis* cells which have the potential of treating hair-loss problems. The cell extract has been shown to have hair-growth promoting activities.

The success of the research team in producing artemisinin from *Artemesia annua* using the established cell suspension culture protocol has attracted collaborative research between USM and the Institute of Tropical Research (ITB), HoChiMinh City, Vietnam. The research team from ITB is responsible for the selection of elite *A. annua* clones from the field while its counterpart from USM has optimised the production of artemisinin from the *A. annua* cell cultures. *A. annua* is valued for producing artemisinin, a sesquiterpenoid lactone, which is a promising antimalarial drug and effective against both chloroquine-resistant and sensitive strains of *Plasmodium falciparum* as well as cerebral malaria with a high safety profile. This species has received worldwide attention because it is an important source of the artemisinin. Currently, the commercial sources of most artemisinin are from field-grown leaves and flowering tops of *A. annua*, which are subjected to infestation of bacteria, fungi and insects that can affect the functional medicinal content of this plant. Moreover, this plant can only be grown in regions with a temperate environment. The fluctuating environmental conditions also change the synthesis of the artemisinin. This project hence becomes very important in providing superior quality of raw material to the pharmaceutical industries in Malaysia as it cannot be grown in a tropical country; a sustainable supply of artemisinin can also be assured. The developed technology can be replicated in many malaria infested countries and any country that cannot support its cultivation. This would be finally helpful to reduce the cost of artemisnin with sustainable production and will benefit the *bottom billion*.

The research team has also successfully invented a special culture vessel to hasten the production of plantlets and a unique cell culture system for the mass production of bioactive compounds using the established plant cell technique. Its research products have won numerous awards at national and international product exhibitions.

A project that is indeed novel to the Plant Tissue and Cell Culture Laboratory is the *in vitro* culture of Malaysian lichens. Lichen is a composite organism consisting of a fungus and algae or cyanobacteria which many of us might not even think twice about. The research team is now aiming to prove with groundbreaking research on Malaysian lichens that we are not only rich in lichen diversity but also in its chemical compounds. More importantly, the *in vitro* culture technique of growing lichens is unique and the project is highly inventive as it involves many uncharted territories and we aim to lead the way. The team is working together with Professor Yamamoto of Akita University, Japan and his team with the hope of establishing an efficient methodology for the *in vitro* culture of lichens. To date, a few cultures have been successfully cultured, the first of their kind in Malaysia (Figure 9). Since this project is new in the Malaysian context and as Malaysia has a great diversity of lichen species, USM, with the help of its Japanese counterparts, will pave the way for new knowledge and research skill for further research and development.

With the team expertise and experience, services such as training of staff on various tissue culture techniques and courses for updating the latest *in vitro* culture technologies are constantly provided to staff of plant tissue culture companies in Malaysia. Consultation service on setting up commercial scale laboratories for mass production of tissue cultured plants is also available and provided to any interest party upon request.

The achievements of Chan and her research team from the School of Biological Sciences have shown that *in vitro* plant culture technology has high potential and can contribute significantly towards the sustainable development of agriculture and pharmaceutical industries not only in Malaysia but internationally. This can be seen from the various international linkages that the team has had in different parts of the world. The team has carried out collaborative research with Mitsui Chemicals Inc., Japan and Tropical Fruit Research and Education Centre (TREC), University of Florida, Homestead, Florida. The team still has ongoing

research collaboration with Kansai University, Osaka and Akita University, Akita, Japan; Institute of Tropical Biology, Ho Chi Minh, Vietnam; South China Botanical Garden, China; Mazandaran University, Babolsar, Iran and Airlangga Universitas, Surabaya, Indonesia. With collaborators worldwide involved in the various research projects, exchanging ideas from the pool of knowledge will definitely benefit all involved. The inclusiveness of the endeavours for people in the *bottom billion* population and the under-developed, developing or developed world is indeed unique to this field of research. Most importantly, as this research is sustainable for the development and conservation of these valuable plants via plant tissue and cell culture technology, its laboratory in USM has been requested to act as a consultation centre for local and international companies. Its achievements are recognised world-wide and this is further proven when Chan was accorded the Commonwealth of Learning (COL) Award on 25 November 2010 by COL, Canada. COL's partners include other Commonwealth agencies, members of the UN System (UNESCO, UNICEF, UNIFEM, UNDP and the World Bank), national and regional distance education associations and industry.

The success of all the research activities can only be achieved, continued and sustained until today due to continuous funding that the team has successfully obtained from the Malaysian Government mainly the Ministry of Science, the Penang State Government, UPEN Kelantan, FELDA and outside agencies such as Japan Biotechnology Association, MACEE USA and some local companies. The active research activities have successfully trained out human resources experts in plant tissue culture to the man power required by companies involved in plant biotechnology activities. To date, thirty-three Ph.D. and Masters students and more than sixty first degree students have graduated from this laboratory. Currently, there are forty-two postgraduate students still pursuing their research studies together with the research team.

The view of Pesta Konvo site

Resolving solid waste problems – from Penang to Mecca

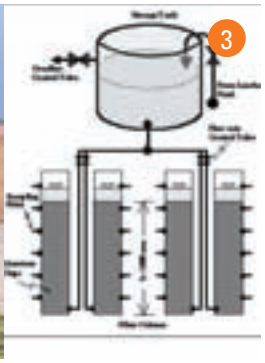
Solid wastes

Municipal solid waste (MSW) disposal has become an ever-increasing problem in many parts of the world, especially in developing countries. Generally, the greater the economic prosperity and the higher the percentage of urban population, the greater is the amount of solid wastes produced. Changing lifestyles, food habits and living standards of the urban population have been the major contributors to the growth in MSW. Efforts to properly manage solid wastes, however, have not been parallel to the rising MSW.

A team, led by Prof. Dr. Hamidi Abdul Aziz from the School of Civil Engineering, USM has now stepped up to face the increasing challenge. For the past 10 years, the team has been involved in various types of solid waste management research, in particular, municipal waste management, landfill technology and leachate management. The team members, Assoc. Prof. Ir. Dr. Mohd. Nordin Adlan, Dr. Mohd. Suffian Yusoff, Assoc. Prof. Dr. Ismail Abustan, Assoc. Prof. Ir. Dr. Mohamad Razip Selamat and Ali Huddin Ibrahim of the School of Civil Engineering, Assoc. Prof. Dr. Mohd. Nawawi Mohd. Nordin and Dr. Rosli Saad of the School of Physics and Assoc. Prof. Kamar Shah Ariffin of the School of Materials and Mineral Resources Engineering, have not only been actively developing solutions for MSW disposals in the country but also internationally.

The tricky leachate

Most of the existing solid waste landfill sites in developing countries, including Malaysia, are practising either open dumping or unsanitary landfilling without having many environmental protection measures in place. These dumping



1. A leachate quantification study at a sanitary landfill in Malaysia
2. The biological process of leachate in an aeration basin
3. A filtration study in the field
4. Improper landfilling may result in pollution to the environment
5. A leachate treatment plant at Pulau Burung, Nibong Tebal, constructed based on research at USM
6. Leachate quality after treatment at Pulau Burung, Nibong Tebal, constructed based on research at USM

grounds post a significant threat to the environment with some of them located at the upstream of water intakes or at sensitive groundwater catchment areas. The practice has been highly unsustainable and created many problems, such as fires, due to landfill gases, rodent infestations, bad odours and leachate pollutions. Technological and financial constraints have been seen as the reasons behind improper sanitary landfill concepts. Intermediate treatments, such as incineration, pyrolysis and recycles, are not actively practised to effectively remove the wastes in many countries.

One of the most outstanding problems associated with the design, operation and long-term care of landfills is managing the leachate that is formed when water infiltrates into deposited wastes. The water can be from rain, groundwater or the wastes themselves. As the liquid moves through the landfill, many organic and inorganic compounds, like heavy metals, are transported in the leachate that then move to the surface or base of the landfill cell and pollute the surface and groundwaters. Implementation of a fully engineered sanitary landfill is necessary and a more economically feasible landfill design is crucial, particularly for developing countries which are striving to achieve the goal of sustainable development.

Knowledge on the generation rates of leachate is important, especially for subsequent treatment. Hamidi's team has developed a formula to quantify the actual amount of leachate generations in the field from different ages of landfills. These values are important for the future design of landfills in Malaysia and in other countries, especially in the designing of leachate pipes, leachate collection systems, retention ponds, leachate treatment facilities, etc. The formula has been utilised for the design of new sanitary landfills in Malaysia, such as those in Nibong Tebal, Pulau Pinang and Langkawi.

A leachate quantification study at a sanitary landfill in Malaysia

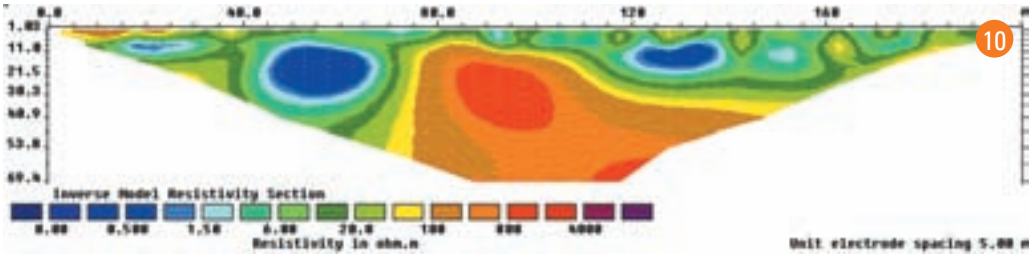
Researchers throughout the world have been continuously searching for a total solution for leachate treament. Finding an all encompassing solution has been a challenge as this treatment is very much dependent on factors like the composition of wastes, climate and biodegrability patterns. In general, the treatment of landfill leachates is a very complicated and expensive operation that requires multiple approaches. Several wastewater treatment processes have been applied for treating landfill leachate; however, a method may only be suitable for a specific type of leachate. Treatment of such leachate with a conventional water treatment system, that is a combination of sedimentation, biological treatment, filtration and carbon adsorption, cannot remove salts nor can it remove certain organics such as recalcitrant harmful compounds.

The serious leachate pollution problem in Malaysia has made the efforts by Hamidi and his team even more critical. A few occurences of disrupted water supply in Selangor due to the ammoniacal pollution to water catchment have been reported quite recently. These have been associated with the accidental discharge of leachate from unsanitary landfills located upstream of the water intake point. To make it worse, only a limited number of properly designed landfills is available to date due to the lack of appropriate leachate control and treatment facilities in other dumpsites.

For the USM team, the most challenging pollutants in leachate are the Chemical Oxygen Demand (COD), ammoniacal nitrogen and colour. The rest are quite simple to treat. As the leachate is stable (matured), a biological process is not recommended. After comprehensive laboratory and field tests at various dumpsites in Malaysia, the team has developed a treatment system consisting of biological and physical-chemical processes to remove all the pollutants. A new adsorptive media called *ZELIAC* (derived from a low cost medium) has also been developed and incorporated in the treatment process. The effluent complies with the new Environmental Quality Act for Transfer Station and Landfill Standard, 2009. The findings of the research team have been implemented in the field where two leachate treatment plants have been constructed at two landfills, the Majlis Perbandaran Seberang Perai (MPSP)'s landfill located at Pulau Burung, Nibong Tebal and the Majlis Perbandaran Langkawi's landfill in Langkawi.

Consider the scenario in the Holy City of Makkah. On a normal day, the amount of wastes generated is in the range of 1,800-2,000 tonnes. The daily amount, however, increases exponentionally to 3,000 tonnes during Ramadhan and to 4,500 tonnes in the haj season. Without an effective solid waste management, the city will post a health threat to the residents and pilgrims alike particularly during the packed seasons of haj and umrah. Wastes must be collected and disposed as soon as possible in to ensure that the pilgrims can perform their rituals in peace.

Currently, landfilling has been the method of waste disposal in the Kingdom of Saudi Arabia. Wastes are dumped and compacted before being



1. The condition of the closed Mina landfill
2. The Mayor of Makkah being briefed on the project
3. Construction of a new monitoring well for environmental surveillance at the Mina landfill
4. Collected leachate from the Mina landfill
5. On-site greenhouse gas sampling
6. Leachate sampling at a monitoring well
7. The surveyed area of the Mina landfill covering a total area of 0.9 km^2
8. The USM research team with the Vice Chancellor during his visit to the Mina site
9. Survey work in progress
10. Typical pseudo-sections of the subsurface imaging tomography of the Mina landfil

covered with soil. The disposal site in Muassin, Mina, which is located about 8km from Makkah, however, has reached its maximum capacity. With an area of 0.9 km^2, the site had operated for 17 years and was closed in 2002. A new site, located in Kakia, 15 km from Makkah, has now been utilised as a landfill. Identical to most of Malaysian landfills, the landfill in Muassim had been defectively designed and set up. Furthermore, the closure for this site has not been adequately engineered according to required standards. A study is necessary in order to evaluate the baseline data on the potential pollution to the underground water and greenhouse gases released to the environment at this site.

According to international standards, sanitary landfilling involves an area which has been designed with impermeable lining material, leachate collection pipes, gas release pipes, leachate collection ponds, leachate treatment systems, gas collection and treatment systems, water runoff control, etc. In the landfill closure, each of the aforementioned aspects must be provided for; the site must also be covered with a number of impermeable soil layers. Continuous inspections are needed until the pollution level is under control. Among the most important parameters to be noted in closing a landfill site are the amount of the buried wastes, the underground water level and leachate amounts, precipitation amounts, topography and site area information, the existence of lining material, leachate collection and existing gas control technology.

Realising the gravity of the matter, the Mayor of Makkah, Dr. Osama Fadil Al Bar invited 10 USM researchers from the School of Civil Engineering, the School of Physics and the School of Materials and Mineral Resource Engineering to run a preliminary investigation in the Muassim landfill from 19 - 27 June 2008. The purpose of the study was to obtain preliminary data and to determine the possible level of pollution at the site. USM researchers, the only ones from abroad, collaborated with researchers from the King Abdul Aziz University, Jeddah. The outcomes of the study were presented to the Mayor.

Osama has entrusted USM in completing the project and has invited another 14 staff members to conduct data collection for the first phase of study, that is, to design the appropriate pollution control facilities and subsequently, safely close the site (phase 2). The research team, led by Hamidi , stayed in the Holy city from 21 January - 4 February 2010 and completed the following:

- Mapped the entire area in order to obtain the total area of the site along with the total volume of wastes buried. This study was led by Mohd. Nordin.
- Carried out geophysics tests to determine the soil strata and groundwater, leachate and also buried waste levels. This study was led by Mohd. Nawawi in collaboration with the Saudi Geological Survey Department.
- Installed several monitoring wells to have better knowledge of both leachate and waste levels. This study was led by Kamal Shah.
- Monitored the level of pollution from leachate, the flow of leachate and also the presence of gases. This study was led by Ismail Abustan.
- Tested types of soil that would be most suitable as the final cover soil. This study was led by Mohamad Razip.

All the above data are still being analysed and the final site closure is still in the design stage.

Even though the frequency of precipitation in Saudi Arabia is minimal, the occasional heavy rain will add to the leachate in the wastes making pollution harder to control. Thus, the team has suggested the divergence of precipitation from the landfill site. Apart from that, the leachate will also be collected systematically for further treatment. The outflow of the leachate will be blocked and landfill gases will be channelled to a collection point, potentially to be utilised as an alternative energy source at the site. The site will be covered with suitable media and planted with decoration plants to improve its aesthetical value. The site could even be turned into a recreational park.

The funding for this project is fully borne by the Mayor of Makkah. USM will continue its support either in technical aspects or by providing expertise in order to ensure the success of the project. Two agreements were signed in April 2010 between USM and the Mayor for the following projects:

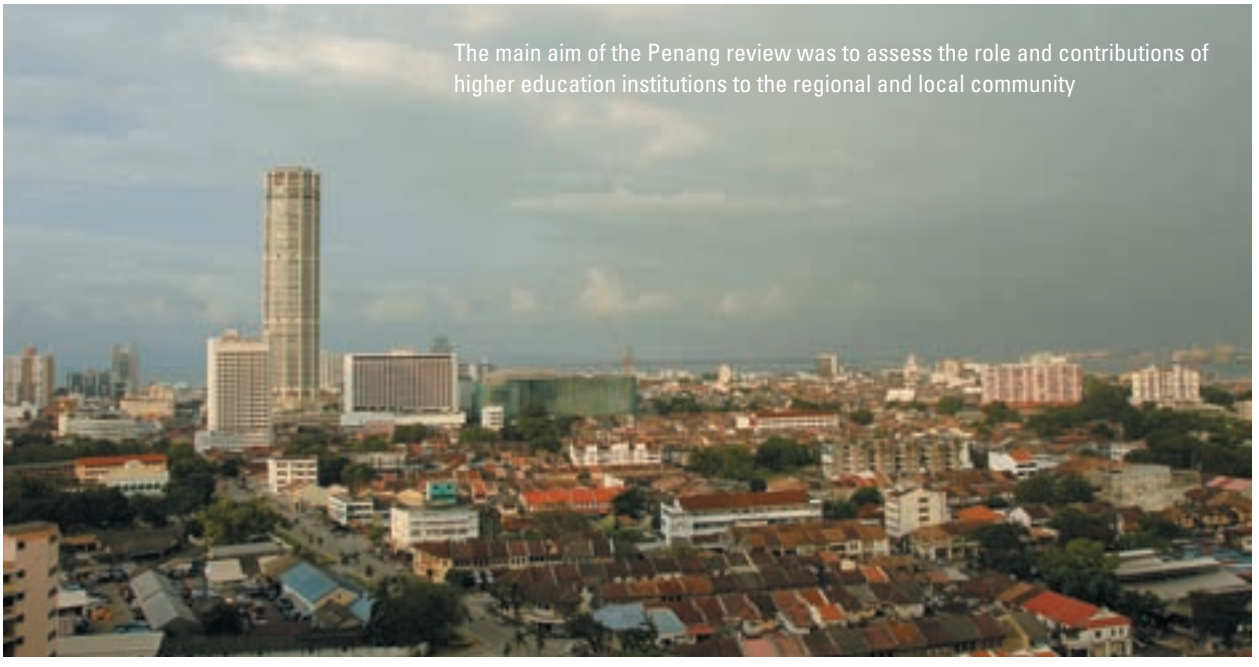
1. The proposed design and tendering for a safe closure of the disposal site at Muassim, Mina – Phase 1
2. The proposed design and tendering for the new phase at the Kakia landfill disposal site – Phase 1

The USM research team is expected to be involved in the supervision during the construction stages of the above projects when new agreements will be signed.

Students at Permatang Pelajar

For a stronger, cleaner and fairer region

Universities are the nation's primary source of knowledge creation and talent. They produce human capital which is the most critical resource to any economy, especially in the present knowledge-based economic system. Globalisation of the knowledge-based economy has increased competition among cities and regions to create the best conditions for growth and development. Hence, universities and higher education institutions today strive to become more internationally oriented and produce globally competitive citizens in order to sustain the competitiveness of the regions they serve. Universities have become increasingly important in human capital development and systems innovation.



The main aim of the Penang review was to assess the role and contributions of higher education institutions to the regional and local community

In assessing the roles of the university in driving the economy, the Organisation for Economic Co-operation and Development (OECD) has been conducting *Reviews of Higher Education in Regional and City Development*. The OECD is an international body that uses its wealth of information to help governments build stronger, cleaner and fairer economies. The said reviews are used by the OECD as a tool to mobilise higher education and the social and cultural development of cities and regions.

The reviews analyse the way higher education systems impact local and regional development. They examine the contribution of higher education institutions to human capital and skills development; knowledge and technology transfer and business innovation; social, cultural and environmental development and regional capacity building. The review process has been designed to facilitate partnership building in regions by drawing together higher education institutions and their stakeholders to identify strategic goals as well as work together towards them.

Participation of Universiti Sains Malaysia in the OECD reviews

Universiti Sains Malaysia took part in the 2008–2010 OECD review. In the review process, all participating regions executed a joint self-assessment by higher education institutions and regional stakeholders which resulted in a self-evaluation report. The National Higher Education Research Institute (IPPTN) was appointed to carry out the task which was led by the regional coordinator, Professor Morshidi Sirat of USM. In facilitating the review process, a local regional steering committee and working group were established to assist the regional coordinator.

Parties involved in the Penang region review

The regional steering committee comprised key stakeholder groups (i.e., both public and private higher education institutions, and regional ministries, businesses and industries). Among the stakeholders were the Penang Secretary Office, Penang Municipal Council, Penang Skills Development Centre and Wawasan Open University. The stakeholders provided support in the form of finance and information as well as monitored the continuing commitment of the region to the review.

The working group, on the other hand, consisted of the report writers. The writing process involved the collection of information and resources, and holding of discussions with the steering committee. These tasks were carried out by IPPTN, in collaboration with researchers from USM and the Socio-Economic and Environmental Research Institute.

The Penang review process started in March 2009 and the self-evaluation report was completed in April 2010. Upon submission of the report, an OECD review team visited Penang from 17 to 21 May 2010. The team of six esteemed individuals are Jaana Puukka, OECD Secretariat; Patrick Dubarle, former OECD Secretariat; Aims Mcguinness, Senior Associate with the National Center for Higher Education Management Systems; Andrea-Rosalinde Hofer, Policy Analyst in the OECD Leed Programme; N.V. Varghese, Head of Governance and Management in Education, International Institute for Educational Planning, United Nations Educational, Scientific and Cultural Organization and Hena Mukherjee, National Expert.

The OECD review team in Penang

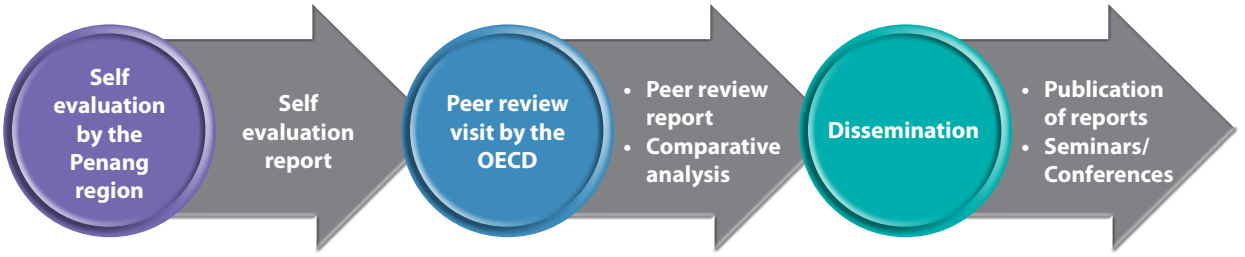


Figure 3: The complete review process

The main aim of the Penang review was to assess the role and contributions of higher education institutions to the regional and local community. Specifically, the following were the objectives of the Penang self-evaluation report:

- Provide a comprehensive background on the Penang region, highlighting socio-economic and cultural assets and the changes/ developments of these assets over time.
- Determine the extent to which the said changes were a result of the interaction between various regional forces, in particular, higher education systems.
- Examine the role of higher education institutions in bringing about marked changes in the socio-economic and cultural fabric of the Penang region.

Purpose and significance of the Penang review

The outcome of the review is expected to pave the way in building strategies and capacities to improve the relationship between higher education institutions and their regional stakeholders at different territorial levels. The review was the first of its kind in Southeast Asia.

Being a leading university and the only university with the Accelerated Programme for Excellence (APEX) status in the country, USM plays a very important role in the region's development and knowledge transfer. Hence, the university's actions and policies were the main focus of the Penang review.

The review contains independent assessments on the contributions of USM to the local community. As regional stakeholders were involved in the reviewing process, this made the review free from any biases. The likelihood of a one-sided approach was eliminated by presenting the achievements which were not only claimed by the university but also confirmed by others in the panel review.

Increasing awareness on the need to enhance partnerships among USM, the stakeholders and the local community has prevailed from this review report. The awareness has created opportunities for dialogue between the university and its international and regional stakeholders. This has led to increased networking and collaborations.

Heeding the APEX call

It is through such strengthened interactions with the stakeholders and local community that the university has begun to embrace its vision of enhancing regional engagement. It has accordingly embarked on more tailored research which supports the industry requirements.

Most issues raised by the stakeholders have been addressed by follow-up actions. The needs of people with disabilities or elderly citizens in regards to education have been among the concerns of society, and the university has responded by offering special lifelong learning programmes. Inclusiveness of minority groups in the consideration of higher education implementation has also helped the university to reach out to the *bottom billion* of the socio-economic pyramid.

In addition, the benefits of taking advantage of the many strengths of Penang such as in the fields of tourism, heritage and culture, have been greatly emphasised. USM has taken steps towards delivering excellence in the design of education curricula specially catered to capitalise on these attractive fields. Attraction to the fields, are therefore expected to encourage student enrolment in the university and enhance the development of niche research areas. These can strengthen the position of the university and the state of Penang in terms of having a sustainable and competitive advantage over other institutions and

regions. Added to the advantage is the generation of income and tax revenue through increased non-profit and community-based activities in the region.

The above are among the many favourable outcomes of the review. Throughout the whole evaluation process, the service of USM's Division of Research and Community Network as a pathway between the university and regional firms has been reinforced.

The road ahead: pressing on

The next stage after the OECD team review visit is the preparation of the peer review report by the team with recommendations for policy and practical measures, and institutional reforms (Figure 3). A comparative analysis on specific issues will also be undertaken by the OECD. USM and other higher learning institutions should act on those recommendations, particularly in terms of fostering partnerships and engagement with the local community. Upon completion of the peer review report, dissemination activities in the form of seminars and conferences will be organised by the Penang region to launch all findings. Other participants from different regions will be invited to the workshops. This will give Penang the opportunity to share perspectives and insights gained during the review process.

The peer review report may now be under way. However, even without the report, it has become increasingly clear that Penang is faced with two key challenges. The first is to ensure a sustainable match between the supply and demand of skilled labour that allows the local economy to grow. It is suggested that educational attainment levels across the population should be improved to face this challenge. USM should be actively involved in widening access and improving education success through long-term collaborations with schools and the provision of social, academic and financial student support. The second challenge is in promoting innovation in the existing industry and supporting new entrepreneurship to fuel technological and socio-economic advancement. To overcome this challenge, USM should guarantee work-based and experiential learning opportunities for students specialising in all fields. The institution should also explore more effective ways of boosting graduate employment and entrepreneurship, building on internationally renowned best practices and extending its work to social entrepreneurship, cultural industries and also green growth.

Overall, USM should ensure that its impressive community engagement activities become more demand-driven as is already the case with its outreach, and research and development on AIDS and crime prevention. At the middle stage of the review process, the most crucial element is staying on course and keeping focus: USM indeed has to press on.

Interdisciplinary approach to develop the Neuroplastic Curriculum©

Introduction

The Brain Research and Information Network Centre for Neurocognitive Science [BRAINetwork CNS] was established in the School of Health Sciences, Universiti Sains Malaysia, to spearhead frontier research in the field of neurosciences. BRAINetwork began with a broad initiative in 2005 as fundamental science research. Since 2008, it has adopted a transdisciplinary approach that pools and integrates USM expertise from neurosciences, education, sociology, architecture, information technology, fine arts and management to understand human cognition and learning behaviour. Collectively, research at BRAINetwork seeks to understand how the structure and function of the brain relate to thought and behaviour, learning and memories formation, language and attention as well as ethical approaches to neurocognition.

The BRAINetwork model: new pathways to research

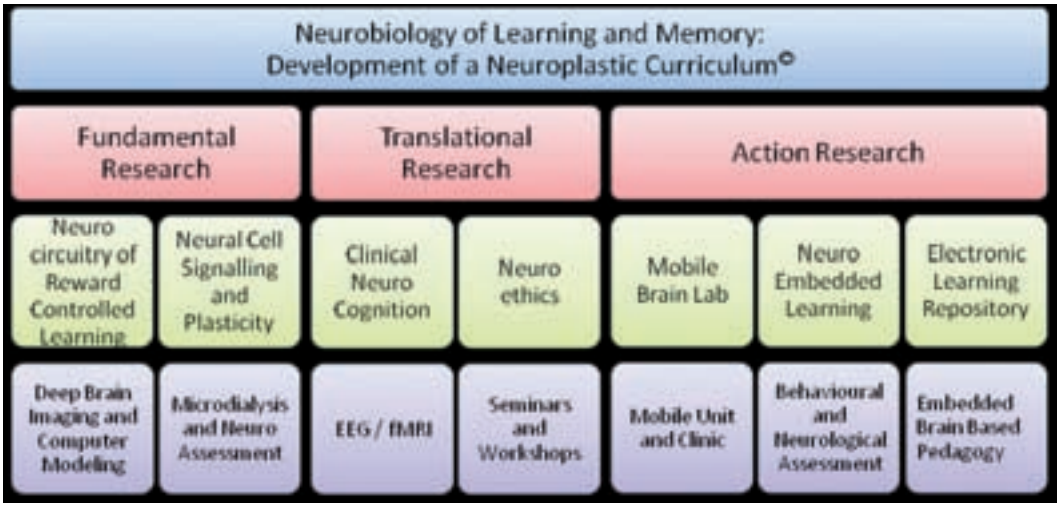
Recent advances in neurobiology have made it easier to study brain function in live healthy humans. Research has established clearer links between physical and emotional functioning and specific areas of the brain. The boundary between brain and mind, however, is becoming increasingly blurred. Contribution from science knowledge alone is not sufficient in understanding the phenomenon. This has prompted the formation of a USM BRAINetwork research model which is founded on the principles of transdisciplinarity research across the fields of humanities and sciences.

Contrary to previously held concepts that learning occurs at specific periods of the brain's development, there is evidence that both the developing and the mature brain are structurally altered when learning occurs. Studies have found that direct contact with a stimulating physical environment and an interactive social group can alter the structure of nerve cells and the tissues that support them.

In short, the brain architecture is malleable; it is *neuroplastic* and can be reconstructed and rewired according to the stimuli it receives. Learning is thus a lifelong process that involves the continuous development of new pathways and circuitry within the brain.

BRAINetwork uses this concept of neuroplasticity to create new, powerful paradigms for education: utilise cutting-edge fundamental discoveries in neuroscience to discover the influences of emotions, gender, culture and the arts on learning and to assess the potential benefits and pitfalls of using pharmacology, technology and clinical interventions to boost brain performance. BRAINetwork proposes a *Neuroplastic Curriculum*© which utilises educational and clinical interventions to screen for learning abilities and suggest brain-based learning strategies which work parallel to, and integrate with, the existing curriculum, utilising the neuroplasticity of the brain to promote the learning process. It supports three research domains. First is fundamental research which explores the molecular mechanisms of neurocognitive decline, second is translational research which is clinically based and third is action research which directly impacts on the community.

The BRAINetwork Research Model



An overview of the BRAINetwork projects

The BRAINetwork research is an integrated venture led by a team of researchers of different backgrounds: physiologists, clinicians, molecular biologists, chemists, educationists, architects and information technology experts. The formation of a transdisciplinary team allows synthesis of knowledge to be applied in an educationally relevant setting – from early childhood to adolescence – in order to formulate a neuroscientific approach to learning via the *Neuroplastic Curriculum*©. There are five separate projects which will eventually lead to the integrated research venture. Each study looks at different aspects of the whole but works closely with one another. Researchers use different research strategies and forms of validation in order to develop hypotheses and conduct research across the projects.

Project 1

The Mobile Brain Laboratory

BRAINetwork's first project examines implicit learning in the cognitive, linguistic and social domains in young children and adolescents. This project is an essential component in understanding how people learn and has direct and important relevance for learning in informal and formal environments. The project will screen for learning abilities such as dyslexia, ADHD and autism and also serve to validate and develop hypotheses from other projects.

Neurophysiological assessment

Project 2

Design of a socio-culturally relevant brain friendly learning centre

BRAINetwork's second project focuses on the design of a high-quality learning environment designed for neurobiological learning and transfer. The design will be approached in a transdisciplinary manner comprising not only the physical setting but also the social, organisational, pedagogical and emotional environments that are integral to the experience of place.

The BRAINetwork Community-Based Mind Centre

Project 3

Development of an electronic personalised learning object repository

There are many types of learners such as visual learners, auditory learners and tactile learners. In addition, there are many with learning disabilities such as dyslexia and ADHD. Yet the curriculum is "one-size-fits-all" and this is disadvantageous to a large proportion of students. BRAINetwork's third project aims to develop a learning management system as well as a database of learning objects that can be adapted to different types of learning styles. The aim is to differentiate learning via automatically generated learning plans that individualise the learning process.

Preliminary testing of EEG modules by BRAINetwork facilitators

Project 4

Fundamental research on the effect of REM sleep on DREAM protein expression

Learning, memory and synaptic plasticity in a transgenic mouse model of dopaminergic dysfunction

There are many aspects of learning behaviour that can be studied only in an animal model. This animal model is a transgenic mouse model that allows specific targeted assessment of the dopaminergic reward system. This system is implicated during the learning process and is a valuable tool that can provide information on how various brains process learning and the effect that neuroplasticity has on various brain models.

Project 5

Emerging ethical issues in neuroscience and potential impact for education

Neuroethics is a relatively new branch of bioethics that is relevant to research related to the brain/mind interface. This is an important issue that needs to be addressed especially when it involves learning and the brain. However, as yet there are no recognised guidelines and criteria. This project will engage the community to frame the relevant guidelines that would help shape the *Neuroplastic Curriculum©*.

BRAINetwork CNS : the way ahead

BRAINetwork has developed a three-pronged five-year research plan as follows:

Reconstruction of the neural microcircuitry of reward-controlled learning in the rat hippocampus

This project will construct a computational model of the reward-controlled learning and memory pathway via deep-brain neuroimaging methods and harnessing the immense power of a national grid computing network that will be deployed for simulation-based research into the molecular basis of neurocognitive decline. The significant impact of this project includes the construction of a biologically accurate computational simulation, visualisation and a virtual model of the hippocampal pathway for reward-controlled learning and memory. Hence, a novel method of computational modelling that takes into account the neuroplasticity and cognitive reserve of the neural system can also be developed.

Neurocognitive decline and the recovery of neurocognitive function in the post-operative period secondary to traumatic brain injury

This project will determine the neurological profile of patients with traumatic brain injury and correlate it with the biochemical markers of inflammation [CRP, IL1 and IL10] and axonal damage [tau and C-tau protein] with the aim of developing a marker for neurocognitive decline [NCD]. This will lead to cutting-edge research in the field of neurocognitive decline which is relevant to our understanding of learning disorders such as ADHD, autism, dyslexia and addiction. The project will clarify the mechanisms of neurocognitive decline in relation to learning and memory and subsequently, develop a set of national guidelines for neuroethics.

Neurocognitive parameters of embedded learning in the Neuroplastic Curriculum©

This project will develop a *BRAINetwork Embedded Learning Programme* that directly benefits communities [*the bottom billion*]. The programme has the following three-pronged approach: [1] focus on affective pedagogy, [2] screening for neurocognitive ability and cognitive bias and [3] the set-up of sustainable satellite community brain-mind centres. The implementation of this project will further develop the *Neuroplastic Curriculum*© to include the concept of embedded learning and affective pedagogy. Successful implementation will spread the message across communities and therefore increase community consciousness regarding these new approaches to education.

Conclusion

BRAINetwork leads a transdisciplinary research programme in making a groundbreaking contribution towards a new brain-based approach to learning via the *Neuroplastic Curriculum*©. It explores the relationship between neurocognitive ability, cognitive bias and a brain-based affective pedagogy in learning and memory. BRAINetwork CNS reflects a strong commitment in expanding neuroscience research and plans to develop a strong transdisciplinary research cluster in neurocognitive science within the niche area of "wellness". Paving the way to the frontier of knowledge, BRAINetwork CNS aspires to be an intellectual centre for both the national and international neurocognitive science community.

View of Padang B as seen from the Batu Uban entrance

Boosting knowledge-based talent

It has already been a year since the Indian Institute of Technology Kanpur (IITK) [www.iitk.ac.in] India and Universiti Sains Malaysia (USM) signed the Memorandum of Understanding for future collaborations. Thus, USM's Centre of Engineering Excellence (CEE) empowered itself through a crystal-clear vision and mission as well as well-defined objectives.

One of CEE's main agendas is inculcating innovative human capital to generate knowledge-based talent for the present and future needs of Malaysia's industry. Therefore, collaboration between USM – IITK plays an important role in realising this agenda. A few courses were successfully organised between the School of Electrical and Electronic Engineering (SEEE) and IITK while the involvement of the industry has been impressive.

The MoU, signed on 22 August 2009 by USM's Vice Chancellor Prof. Tan Sri Dzulkifli Abdul Razak and IITK Director Prof. Sanjay G Dhand, marked the new era of international partnership and collaboration between USM and India's top technological institute. One of the objectives of this MoU is for USM and IITK to jointly develop and run advanced short courses in areas related to electronic design and manufacturing. Three short courses have successfully been conducted. They are:

- Wireless circuits design and system, 14-18 December 2009

  Course instructors: Professor Ajit K. Chaturverdi (IITK), Associate Professor Dr. Fadzil Ain (USM), Assistant Professor Dr. Adrish Banerjee (IITK) and Dr. Aditya Jagannathan (IITK).

- Display technology, 15-17 June 2010

  Course instructors: Professor Deepak Gupta (IITK), Professor Mohd. Zaid Abdullah (USM) and Professor Monica Katiyar (IITK).

- RFIC design, 13-15 December 2010

  Course instructors: Dr. Kumar Srivastava (IITK), Dr. Arjuna Marzuki (USM) and Associate Professor Dr. Tun Zainal Azni Zulkifli (USM).

The courses were well attended by engineers as well as technical specialists from the northern region especially those working in the electronic industries located at the Penang Free Trade Industrial Zone. Following the successful running of these short courses, USM and IITK are now planning to further the collaboration covering areas related to research and development activities.

For a start, one Ph.D. student from SEEE will spend a three-month research stint at IITK, working in the area related to radio frequency (RF) and microwave design. It is envisioned that this will spur more research activities between the two institutions and help realise other objectives as stipulated in the MoU.

Figure 1: Discussion prior to the MoU signing ceremony between USM and IITK

KHAZANAH NASIONAL

Khazanah Nasional is the investment holding arm of the Government of Malaysia and is empowered as the Government's strategic investor in new industries and markets. As trustees to the nation's commercial assets, our main objective is to promote economic growth and make strategic investments on behalf of the Government which would contribute towards nation building.

Khazanah is also tasked to nurture the development of selected strategic industries in Malaysia with the aim of pursuing the nation's long-term economic interests.

Khazanah has investments in over 50 major companies, both in Malaysia and abroad, and our companies are involved in a broad spectrum of industries.

Khazanah is also the key agency mandated to drive shareholder value creation, efficiency gains and enhance corporate governance in companies controlled by the government, commonly known as Government-Linked Companies, or GLCs.

The Regional Talent Repository: a human capital development initiative

As part of its continuing drive to engage industries better, USM has embarked in collaboration with the Northern Corridor Investment Authority (NCIA) and Deloitte Consulting (Deloitte) to pilot the design, development and implementation of a talent repository that will primarily cater to the needs of the northern community. A memorandum of understanding was signed on 31 July 2010 between the three organisations with the objective of building a good foundation to help address the region's human capital challenges.

Three key priorities defined within the pilot programme aim at addressing pre-graduation employment, developing a collaborative process for course accreditation with polytechnics and the industry, and lastly, the framework design of a talent repository which will cater to the northern region's industry and talent needs. The pilot programme initially targets the electrical and electronics manufacturing product sector which is a key National Key Economic Area for the country contributing 41% of Malaysia's manufacturing exports (2009 estimate).

To date, all priorities have been initiated and addressed with success. Shared here are the key development outcomes of the programme, in particular, the design framework for the Regional Talent Repository (RTR), which will be an important platform supplying critical information for institutional planning, development and intervention.

Involve industry in curriculum development and to ensure that teaching evolves to reflect new technology and processes. Employers should have a greater say in the vocational and skills-training education curriculum. It is essential that a cluster approach be adopted to take advantage of scale economies as well as proximity to industry; e.g., the Human Capital Development Initiative of USM-NCIA-Deloitte.

New Economic Model Concluding Report:
Strategic Policy Measures
3 December 2010

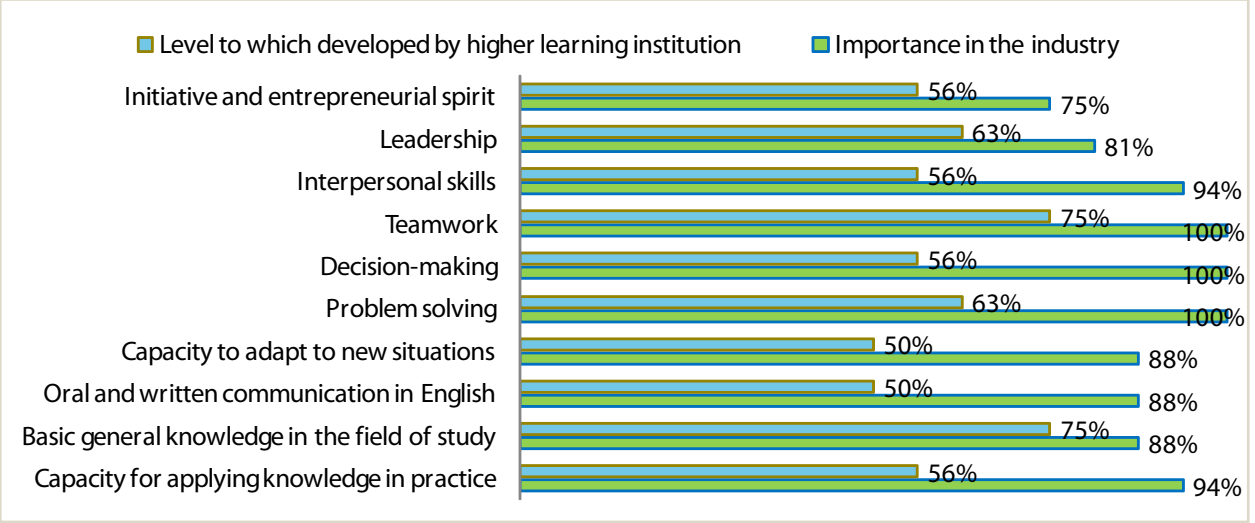


Figure 1: The Skills Gap Survey

The current state

According to statistics issued by the Ministry of Higher Education, 22% or about 27,600 graduates (2009) are unemployed six months after graduation from a total of 125,800 graduates. The data collated from 19 participating public and 138 private universities do not consider the many that are "under-employed" or are qualified but are unable to secure a suitable job that corresponds to their graduate skills.

At the onset of the pilot programme, a survey (Figure 1) was conducted with selected industry stakeholders, such as Intel, AMD, Globetronics and Silterra to understand their challenges with talent they employ today. Across the board, it was found that the largest skill gaps appear in areas such as interpersonal skills (team working), decision-making, problem-solving and knowledge applications. And while graduates seem skilled technically, they lack the creativity, independence and confidence to follow through with work/projects assigned or even handle tasks and events with initiative and flexibility.

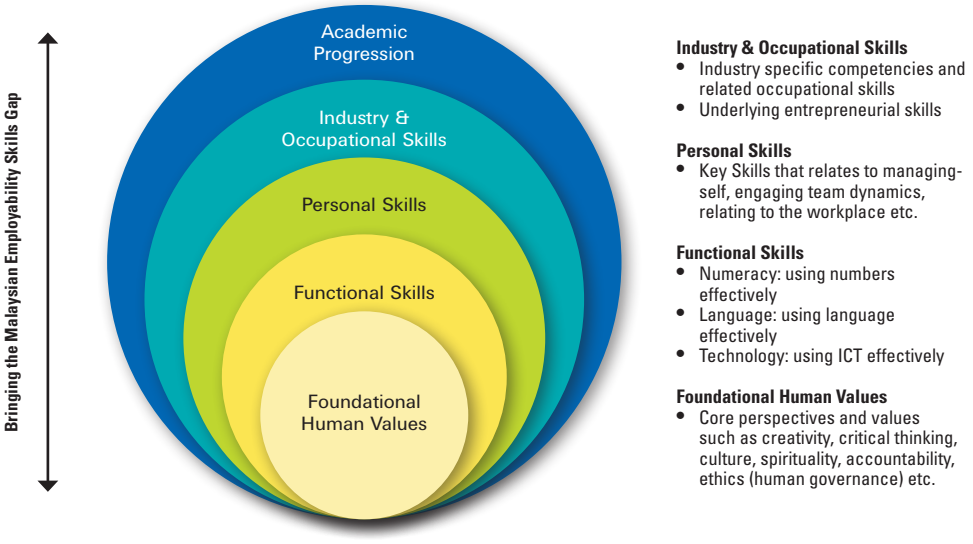


Figure 2: The Employability Skills Framework

Integrating competency and career

The idea behind a regional talent repository is not new. The consideration however to integrate a competency and career framework (as highlighted in Figure 2) is critical to address intervention effectively. Understanding the diverse skills challenges our graduates face will provide academic and industry stakeholders (where relevant) the necessary information to act as both will be impacted by the performance of the graduates. Actions by both stakeholders can include more relevant curricula and industry internships designed to better equip undergraduates.

Providing access to undergraduates to assess their skills competencies which will enable them to understand how and where those competencies are applied in their prospective careers is invaluable. This perspective allows for undergraduates to take better control of their career choices and personally act on erasing or decreasing their weaknesses.

The Regional Talent Repository (RTR)

- The design of the the RTR brings together three information portals each with its own specific set of functionalities:

  The student portal: a comprehensive student information reference site where the key goal is to capture input from undergraduates on their academic/vocational achievements, skills development and assessments results based on industry requirements (job/role specific), career ideas/plans and as a learning management platform of choice for online content. The data dashboard within collates and provides critical information regarding skills requirements for the undergraduates' prospective careers of choice (in economic sectors important to the region) and benchmarks their given skills to highlight improvement areas for action.

Figure 2: The Student Skills Benchmark

- The industry portal: the RTR will be the platform of choice for the industry to share relevant information on its workplace planning requirements and the skills required for growth. Industry members will also be able to view the quality and quantity of talent supply and interact with undergraduates directly for better prospective employment planning.

Figure 3: The industry view of a Student Skills Profile

Figure 4: The industry view of the Overall Skills Benchmark

- The institutional portal: government, academia/TVET stakeholders have access to accurate, up-to-date information regarding the state of employability, industry collaboration and interventions and results from the programmes conducted that will aid skills development for the region and community. The RTR will be a vital information tool to show stakeholders the talent landscape for a given period and if it is failing or succeeding in meeting with industry needs.

Fast Facts

- The Northern Region Human Capital Development Initiative MOU was signed between USM, theNorthern Corridor Investment Authority (NCIA) and Deloitte Consulting Malaysia on 31 July 2010.
- It aims to facilitate and create better human capital development initiatives between institutions and theindustry to bridge the talent divide.
- The framework for a Regional Talent Repository (RTR) for career and employability skills intervention has been designed specifically for regional sectors and industries.
- The RTR covers the three distinct perspectives of the student, the industry and the institution, providing views of information collated, analysed and presented for more effective and sustainable interventions.

Figure 5: An institution view of talent demand and supply

The thriving northern corridor requires the proper management of its human resources

Music for cerebral therapy

Minister for Women and Family Development, Dato' Seri Shahrizat Abdul Jalil at a musical performance by children with cerebral palsy

Music is known for its therapeutic effects on the human body and its psyche. The auditory energy pattern of music is similar to the bodily energy pattern, suggesting a close connection between the patterned sounds of music and the brain waves. Music activates a kind of brain activity that helps soothe pain, heal psychological maladies and even improve physiological functions. Thus, music is becoming a helpful tool for health. The development in music therapy, which uses music to heal, has established the benefits of using music to help people ward off depression, manage pain, promote movement, induce calmness, ease muscle tension and more. Research in music therapy supports its effectiveness.

In the spirit of researching, a group of researchers in Universiti Sains Malaysia has embarked on a music therapy research project on children with cerebral palsy. The project aims to inquire into the effectiveness of involvement in music – through learning and playing musical instruments – in improving the gross motor functions of these children who suffer from cerebral palsy, a form of neurological disorder that permanently affects body movement and muscle coordination. The research is a unique endeavour for it brings into confluence the arts and science in discovering the use of gamelan, a traditional musical instrument, to gauge the gross motor functions of these children. This music therapy research on the use of traditional music in addressing a specific disability is the first of its kind in Asia, thus implying the significance of this research project.

Mohamed Ghouse enjoying his work with his music enthusiasts

The research project

The idea for the music therapy research project was mooted by Professor Emeritus Dato Dr. Mohamed Ghouse Nasuruddin of the School of Arts in his paper *Creativity and Music Therapy as a Function of the Brain* presented during the USM Brain Awareness Week in 2005. The preliminary formality of research – which included the submission of a project proposal and the subsequent application for research and ethics approval – took a period of two years. Officially, the project started in September 2008 and the actual therapy began on 16 February 2009.

The music therapy research reflects an interdisciplinary commitment between the School of Arts and the Department of Neuro Science of the School of Medical Sciences at USM. Headed by Mohamed Ghouse, the research project was assisted by Maria Soccoro and Dr. Abdul Rahman Ghani of the Department of Neuro Science. Meanwhile, Dr. Mumtaz Becker from the School of Arts helps in the administration of the therapy as designed by the principal investigator.

In the administration of the therapy, the subjects were sourced from the Penang Spastics Centre. A total of nine subjects was selected – five dipelagic (all four limbs are affected but both legs are more severely affected), one tripelagic (three limbs are affected, usually both arms and a leg) and another three who had acceptable ambulatory function (mobile but not stable). All subjects were generally described as having mild spasticity conditions. The age range of the subjects was between 7 and 12 and their cognitive age – receptive language age – was between 4 and 11 years old. Procedurally, the subjects underwent several pre-intervention tests. The tests included the Wechsler Abbreviated Scale of Intelligence cognitive test, a receptive grammar test and the Gross Motor Function test. The purpose of these tests was to gauge the subjects' level of efficiency of their gross motor functions as well as to determine their cognitive age prior to the actual intervention of music therapy.

The design of the therapy incorporates the playing of gamelan musical instruments – which was for the first time introduced in music therapy research. Gamelan is an ensemble consisting of percussive instruments of knobbed gongs (Bonang) and a metal xylophone (Saron). The use of gamelan induces movement exercises to strengthen hands, arms and postures and includes elements of acting and storytelling.

Using gamelan as a tool for treatment, this music therapy is a non-invasive intervention which focuses on improving the gross motor functions of the striking action. The playing of the gamelan instruments supposedly causes the player to relax and extend the muscle range, hand eye co-ordination as well as cognitive and muscle memory. Thus, the goal of the intervention is to improve the subjects' kinesthetic sense.

The intervention was administered for two days a week (Monday and Friday) from 9.00 a.m. to 10.15 a.m. at the Gamelan Studio/Laboratory of the School of Arts over the period of six months. Prior experience of using gamelan among the subjects was checked – all subjects had no experience in playing the instrument before. After completing the six-month intervention, the subjects underwent post-intervention tests which are similar to the pre-intervention tests – i.e., the Wechsler Abbreviated Scale of Intelligence cognitive test, a receptive grammar test and the Gross Motor Function test. The post-tests were

conducted to measure if there was any improvement in the subjects' gross motor functions as a result of the music therapy intervention.

The findings of the research are inspiring. The clinical results show a definite improvement in gross motor functions which is evident in the basic striking action, handling of the beaters and selective striking of the knobbed gongs. There are indicators of some semblance of fine motor functions among the subjects – children suffering from cerebral palsy. There are overall improvements in posture, cross-legged sitting and the speed of executing the musical pieces. More interestingly, the research also found an increase in the children's span of attention and their confidence in playing the music pieces, as well as an improvement in their cognitive memory.

The research impact

The results of this research project are consistent to the body of knowledge – which strongly supports the benefits of music therapy. By transforming an aesthetic traditional music into a functional healing tool, the viability of this research project has been recognised at the national level. Seemingly, the Malaysian Ministry of Women, Family and Community Development has planned to apply the therapy process developed by the research team at its rehabilitation centres nationwide. The first initiative is reflected in the application of this therapy at of one of the government rehabilitation centres – Taman Sinar Harapan in Kuala Terengganu – in May 2010. The other six government rehabilitation centres are expected to follow in the future. While the use of music therapy in Malaysia is still in its infancy, the introduction of the therapy programme to help the disabled has shown its significance.

A major shortcoming identified in the implementation of the therapy is the shortage of trained personnel. The research project has discovered a dearth of such trained personnel – such as neuro psychologists, music/art and learning disability therapists – to support the administration of therapy. Most rehabilitation centres which are operated by the Malaysian government or NGOs or even private organisations lack qualified personnel. The shortage is not only in terms of specialised psychologists and therapists but also trained personnel to counsel families in this predicament.

Taking heeds of the shortcoming, the research project provides the basis for a music therapy programme. The programme will train clinical personnel to meet the needs of the special community – the disabled. The programme will also train social and community workers – through their involvement in meaningful activities embedded in the therapy process – in ways to help the disabled and their families. As a continuous effort, the programme will also conduct research and courses as well as develop products and processes for ceaseless improvements. In line with the university's vision for a sustainable tomorrow, the music therapy is certainly a sustainable project to help improve the life quality of the disabled community.

Using music to improve the psychomotor of cerebral palsy children

Toying around with simple ideas

Introduction

In this age of electronic games and hi-tech toys, we often forget that it is usually the simplest of inventions that can entertain a child for hours. Our folk toys have a spirit, a wryness and humour, a comical or winsome quality and a robustness that says, "reach out and touch me, give me a spin, a lift, a twist, a pull, a breeze and I will connect with you". This connection does not diminish after a day, a week or a year. The toys possess a particular vitality, sometimes mixed with tough genius, that makes them more than the sum of their parts.

Folk toys are simple, yet often very ingenious in design and operation. Most were invented or modified and made by men and women with scant knowledge of the science involved and with few tools, little space and hardly any money, to touch or ignite a child's imagination and fancy.

Some of the toys found in Malaysia are very low-tech and most are disarmingly easy to make. Many of them run on the principle of gravity (marble games, rolling acrobats, top spinning), muscle power (the self-propelled "sled" or *upih pinang*) or wind power (kite flying and "sail boating"). There are no springs to break or depleted battery packs to replace. What is more, they have come to the present trailing behind a long history of successful and creative cultural plays and stage performances. They have also survived because a legacy of design improvements has made sure that they are rugged – if not almost indestructible – as evident in our traditional kites and tops.

Objectives

The Toy Museum aims to collect and exhibit a wide variety of hand-crafted toys which celebrate and draw attention to parts of their places of origin – their history, geography, topography, natural history, people and stories. The creations must have meaning for present day children and for future generations and become part of the life of the community. Other objectives of the Toy Museum include:

- To serve as a catalyst for regeneration.
- To enhance the visual quality of the built environment.
- To provide a focal point for community pride and identity.
- To build self-confidence in children and their families in a multiracial environment.
- To organise workshops in toy art which in turn would provide an adrenalin source for new ideas and creative solutions.
- To empower the public not to be a passive audience in the museum but a contributor to the body of ideas on which the craft concentrates.

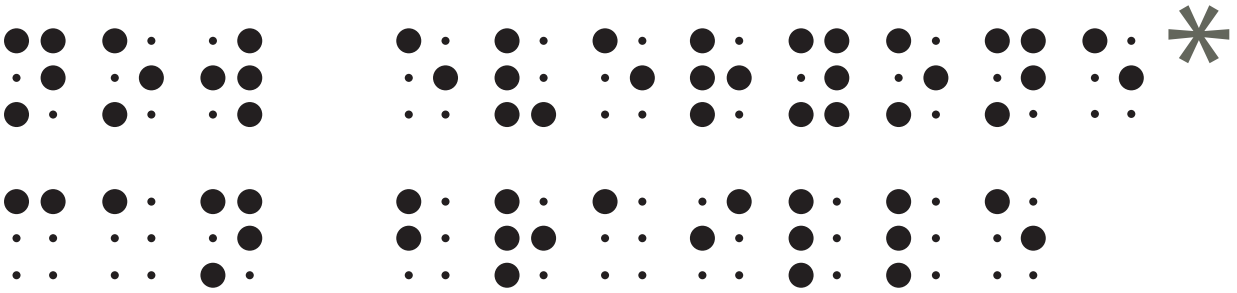
The toy-making workshop

Under supervision, children and adult may utilise the workshop for a small fee. They will be encouraged to work in a form where they will happily park their perfectionist tendencies at the door. Small glitches are common in the best folk art and make it all the more human. And they will create a unique toy of lasting delight for any child.

If toy-making experience is any indicator, everyone participating in the workshop will have a relaxing yet stimulating time cutting out, putting together, painting and giving the toys to your child. When you have completed a toy, you can rest assured there is not another one anywhere exactly like that. You can even put your signature on it. And when you give a child a handmade toy with its roots in Malaysian history and folk culture, you link that child to the past as well as to yourself.

One important aspect is that toys need to be shaped and constructed primarily according to the requirements of craftsmen and the people using them. They are used as well as looked at. They need to be properly designed so that they operate efficiently. Thus, the physical functions of the art and science of design are connected to the effective operation of objects according to criteria of usefulness and efficiency as well as those of appearance, appeal and environment.

In addition to the design of small toys, crafts and large machines, private dwellings and great public buildings, art is concerned with the design of the man-made environment. Modern societies can no longer afford to have their communities develop on a piecemeal, fragmented, unrelated basis. Too many of the problems of urbanisation have their origin in social failure to plan comprehensively and in advance of need. The formation of the Toy Museum will constitute a new and fruitful synthesis of art, science and marketing.



* Now everyone can braille!

"There is a wonder in reading Braille that the sighted will never know: to touch the words and have them touch you back"(Jim Fiebig). The wonder is now over. Now everyone can read Braille using eKodBrailleBM, developed by Universiti Sains Malaysia researchers from the School of Educational Studies. It is an online multimedia tutorial system to teach Malay Braille to the sighted.

eKodBrailleBM is the first and only online multimedia tutorial system with an embedded Braille simulator to support the teaching and learning of Malay Braille on the Internet. It is not just a regular website but a complete tutorial system which is able to track student learning. The purpose of this innovation is to solve the problem of teaching largely dry, memory-dependent contents to sighted individuals – without the need for expensive Braillers or Braille translation software. Hence, it provides a cost-effective platform for the learning of Braille by pre-service teachers, in-service teachers, parents of children with visual impairment and NGO personnel serving people who are blind.

Dr Lee Lay Wah menunjukkan penggunaan eKodBrailleBM dengan hanya melayari laman web http://ekodbraille.ses.usm.my

USM cipta laman pengajaran braille

GEORGETOWN: Seorang pensyarah Universiti Sains Malaysia (USM) mencipta laman sesawang khusus dikenali eKodBrailleBM yang menawarkan pengajaran braille kepada orang normal bagi membantu proses pengajaran dan pembelajaran golongan cacat penglihatan.

Ciptaan itu yang dipercayai pertama di dunia, dibangkitkan atas kesedaran kekurangan sumber pembelajaran berasaskan braille bagi digunakan sebagai alat sokongan dalam proses pengajaran dan pembelajaran untuk golongan cacat penglihatan.

Produk eKodBrailleBM ialah Sistem Tutorial Multimedia Atas Talian Kod Braille Bahasa Malaysia dibangunkan Prof Madya Dr Lee Lay Wah dari Pusat Pengajian Ilmu Pendidikan (PPIP), bagi membantu sesiapa saja celik braille mengajar orang buta.

Ia adalah sistem pertama seumpamanya di dunia menawarkan alat bantu mengajar yang mudah digunakan berpandukan kepada empat teori pembelajaran utama merangkumi teori pembelajaran masteri, pengajaran, teori multimedia dan teori motivasi.

Lay Wah berkata, eKodBrailleBM dicipta dengan beberapa kelebihan yang bersifat interaktif selain mempunyai ciri seperti animasi Flash, Braille Simulator, penilaian bimbingan, permainan Braille dan tutor maya.

"Kelebihan produk ini membolehkan sistem pembelajaran dilakukan secara individu mengikut kelapangan diri masing-masing," katanya pada sidang media di sini, semalam.

Sistem tutorial multimedia itu menawarkan kursus kod braille dalam lima tahap pembelajaran secara lengkap iaitu asas braille, singkatan braille, tanda braille, tanda matematik asas dan braille lanjutan yang membolehkan mereka menjejaki langkah pembelajaran.

Setiap individu mengikuti kursus dalam tahun akan diarahkan sijil bagi setiap kejayaan menamatkan tahap pembelajaran serta menerima lima sijil pencapaian yang diktiraf PPIP.

The USM braille learning website, *Berita Harian*, 3 March 2011

This innovative open-access online tutorial system is provided free for anyone who wants to learn Malay Braille, hence allowing an unlimited number of people around the world to learn Braille simultaneously via eKodBrailleBM. In essence, the tutorial system can be used by all universities and colleges which are training pre-service special education teachers. In-service teachers who are teaching blind students but have not been trained in Braille will reap the benefits as well. The society at large, especially parents of children who are blind and currently lack the opportunity to learn Braille, can now explore the wonder of touching words with their children. The gateway to this is HYPERLINK "http://ekodbraille.ses.usm.my/"http://ekodbraille.ses.usm.my

The system is developed based on the theories of instruction such as Mastery Learning, Direct Instruction, Multimedia Learning, Motivational Design and Cognitive Strategies. The application of theories combined with the advance of technology has produced an interactive, individualised learning environment using features such as animated demonstrations, the Braille simulator, guided assessments, Braille games, virtual tutors, help pages, learning tracking systems, online certification and learning management databases. The interactive eKodBrailleBM offers five mastery levels: (1) Basic Braille, (2) Braille Contractions, (3) Braille Signs, (4) Basic Mathematical Signs, and (5) Braille Texts. The learning progress is monitored. Online certificates endorsed by USM are given upon completion of each mastery level.

Indeed, eKodBrailleBM is a manifestation of the Social Responsibility (SR) project undertaken by USM. This project, started in 15 December 2009, was fuelled by the USM Research University Grant. The head researcher for the project was Associate Prof. Dr. Lee Lay Wah, who is the Programme Chairperson (Special Education) at the School of Educational Studies, assisted by project members such as Prof. Dr. Abdul Rashid Mohamed and Foo Kok Keong. The team has successfully developed eKodBrailleBM to serve the community and is now determined to move forward. It is set to develop a British Braille course and a Jawi Braille course in the near future.


For the
RECORDS

Anak Malaysia diiktiraf pakar farmaseutikal Asia

GEORGE TOWN – Universiti Sains Malaysia (USM) mencatat sejarah buat negara apabila pensyarahnya meraih pengiktirafan berprestij dalam bidang pendidikan farmaseutikal di Taiwan baru-baru ini.

Profesor Madya Syed Azhar Syed Sulaiman, 48, yang merupakan doktor dan penyarah Pusat Pengajian Sains Farmasi menerima anugerah itu daripada Persekutuan Pertubuhan Farmaseutikal Asia (FAPA).

Beliau adalah antara calon yang dinominasikan daripada 35 buah negara rantau Asia Pasifik untuk dipilih oleh enam juri.

Syed Azhar ketika ditemui berkata, kejayaan yang dicapai akan meletakkan nama Malaysia sebagai sebuah negara yang mempunyai pakar bidang farmaseutikal dan pendidikan farmaseutikal unggul.

"Sebagai penerima anugerah FAPA, saya bertanggungjawab menilai program pendidikan ini ke negara-negara tertentu," ujarnya.

Mula berkhidmat di USM sebagai pegawai farmasi pada tahun 1999, anak kelahiran Kota Bharu, Kelantan ini kemudian menyambung pengajian doktor falsafah di Amerika Syarikat.

Syed Azhar pernah menyumbang kepakarannya dalam bidang klinikal farmasi ke beberapa negara antaranya Mongolia, Pakistan, Vietnam dan negara-negara Asia Barat.

FAPA yang ditubuhkan pada 1986 mengiktiraf negara, institusi dan individu yang dilihat berjaya memberi sumbangan secara signifikan dalam bidang farmaseutikal melangkaui negara-negara di Asia Pasifik.

SYED AZHAR menunjukkan anugerah yang diterimanya di USM, George Town semalam.

The Ishidate Award

The School of Pharmaceutical Sciences' educator, Dr. Syed Azhar Syed Sulaiman, was presented with the Ishidate Award in the recent 2010 Federation of Asian Pharmaceutical Association (FAPA) Congress in Taiwan. The Ishidate award recognises pharmacists in Asia Pacific who have played an outstanding role in the development of any of these domains: hospital pharmacy, pharmacy education, community pharmacy, industrial pharmacy or pharmaceutical research. Since its launch in 1986, Syed Azhar is the first Malaysian conferred with this prestigious award. The recognition is for his outstanding contribution to enhancing pharmacy education in Malaysia and the neighbouring countries such as Mongolia, Pakistan, Philippines, Indonesia, Thailand, the Middle East and Vietnam. His commitment in advancing pharmacy education in these regions has set an admirable precedence for others to follow.

The ISTIC-TWAS Entrepreneurship Award

Aimed at building scientific capacity in developing countries, the Italy-based Academy of Sciences for the Developing World (TWAS)) and the Malaysian-based International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) have joined forces for a challenging cause. The partnership has introduced the ISTIC-TWAS Entrepreneurship Award, an esteemed recognition for innovative scientists of the developing world. Professor Rahmah Noordin of the School of Medical Health USM has created history by being the first recipient of the award. Her antibody kits for eradicating filariasis – caused by parasitic worms of *Brugia* genus – won the first place, ahead of 17 other scientific achievements. The use of the antibody kit has been approved by the World Health Organization (WHO) and has proved useful in eradicating filarial worms during a drug intervention case study in South Korea. Her innovation stood out from the others for its impact – or possible impact – on sustainable development which is expected to bring benefit to the large and growing population of the developing world.

The APICTA Award

A set of software tools for analysing medical images, called *Endeavour*, won the APICTA Malaysia 2010 E-Health Award, presented by the Multimedia Super Corridor (MSC) Malaysia to recognise innovations in ICT products and solutions. *Endeavour* allows medical doctors to retrieve, view, inspect and analyse in 3D format various modalities of medical imageries – such as CTs, MRIs, ultrasounds and digital X-rays – and also to discuss and collaboratively annotate the same medical image dataset via the Internet among multiple doctors in different geographical locations. The innovative device exhibits strong R&D and collaborative efforts to improve healthcare and its delivery. Headed by Assoc. Prof. Dr. Mandava Rajeswari of the School of Computer Sciences USM, the *Endeavour* team has turned its valuable research into solutions which are less technical and more cost effective than the existing system originated from developed nations. *Endeavour* reflects successful multi-disciplinary research with practical applications and viable solutions to help the *bottom billion*.

USM bangunkan **ENDEAVOR**

Ciptaan terbaru dalam bidang perubatan mampu hasilkan diagnosis tepat

The JC Bose Memorial Award

Dr. Arjuna Marzuki of the School of Electrical and Electronics Engineering USM has been conferred the JC Bose Memorial Award 2010 by IETE (Institution of Electronics and Telecommunication Engineers). Based in India, IETE is geared by the Indian's Leading Technical Professional Society that has institutionalised the tradition of recognising its members' achievements by presenting different categories of awards. Dr Arjuna's paper on "A 1.5 V, 0.85-13.35 GHZ MMIC Low Noise Amplifier Design Using the Optimization Technique" won him the award in the category that celebrates the best engineering oriented papers published in IETE periodicals.

The Asiawater Management Excellence Award

Professor Chan Ngai Weng from the School of Humanities USM was named the recipient of the Asiawater Management Excellence Awards 2010 for the individual (national) category at the recent Asia Water Conference & Exhibition held in Kuala Lumpur. Professor Chan is the first Malaysian to receive this Asia's most prestigious water industry award. He is a president of Water-Watch Penang, (former) chairman of the Malaysian Nature Society and a professor in hydrology. Of all these positions, Chan is better known as "Malaysia's waterman" who has been relentlessly campaigning for water-saving in the country and abroad. The award recognises his outstanding engagement in and contributions to advancing and facilitating the optimal use, protection and conservation of water resources in Malaysia and also Asia.

The PNB Investment Quiz

The PNB Investment Quiz is one of the Permodalan Nasional Berhad's educational programmes to educate the public on the importance of investment and financial management. For this year's event, USM team comprising Khu Say Ee, Lim Yu Cheng and Chai Sheh Lung of the School of Management USM won the top prize – defeating contestants from other local universities: Universiti Kebangsaan Malaysia (the first runner-up), Universiti Utara Malaysia (the second runner-up) and Tunku Abdul Rahman College (the third runner-up). Competency in technical knowledge and logical thinking is the key to their success.

The BIS London Award

Three USM students showcased their final year projects and beat off competition from 130 other young inventors around the world at the British Invention Show 2010 in London. They swept four gold medals and three special awards at this world event – the UK's largest exhibition of invention, innovation and technology. The first invention, an innovative use of old tyres to prevent erosion in rivers and hills earned Yohanes Saimi, 23, a gold medal and the Special "Diamond" Award. Another invention on the use of starch to produce biodegradable plastics by Nor Fasihah Zaaba, 23, won two gold medals and the "Special Prize for Innovation" from Russia. The fourth gold medal was won by Muhammad Ghaddafy Affendy, 24, who also received a Special Platinum Prize for his creative use of sago in zinc polymer batteries for a safer, cheaper, and environmentally-friendlier device than portable batteries. The trio have made Malaysians proud.

USM grads shine in Brit show

Trio sweep gold medals and awards at invention exhibition

PERSAMA Awards (Staff)

In the 18th National Mathematics Symposium 2010, four USM researchers were presented with PERSAMA (Malaysian Mathematical Science Society) awards. Associate Professor Abd. Rahni Mt. Piah and Professor Dato' Rosihan M. Ali were named the recipients for the scholarly journal publications category. Meanwhile, Associate Professor Low Heng Chin won a consolation prize of the same category. The fourth award went to Dr. Syakila Ahmad who was named the main recipient for the doctoral thesis award. These are national recognitions to USM researchers for the quality of their research work.

The Nordin Sopiee Chair

As a tribute to his numerous intellectual contributions, the former Prime Minister of Malaysia Tun Abdullah Haji Ahmad Badawi inaugurated the Nordin Sopiee Chair in Global Studies at Universiti Sains Malaysia on 4 September 2006. Professor Chandra Muzaffar was appointed as the holder of the Chair in 2007 and continues to preside over it until today. A distinguished Malaysian scholar, Chandra addresses great challenges of the global age – from the ecological crisis and the crisis in governance to those of widening economic disparities and the contemporary family. He has rationalised the vast terrain of global studies by focusing on The Role of Religion in a Globalising World.

PERSAMA Awards (Students)

The Malaysian Mathematical Science Society (PERSAMA) was formed in 1970 to enhance interest in mathematical studies and giving recognitions to the high achievers has become an annual event. In the 18th National Mathematics Symposium 2010, USM took pride in the winnings of three PERSAMA awards for excellence in postgraduate research. First, Shamani a/p Supramaniam was the main recipient for the master's thesis category. Her thesis "Convolution and Coefficient Problems for Multivalent Functions Defined by Subordination" was completed under the supervision of Dr. Lee See Keong. The other two were consolation prizes won by Kew Lee Ming and Khoo Hee Kooi. Their winnings also gave credit to their supervisors, Assoc. Prof. Ahmad Izani Md. Ismail and Dr. Ong Hong.

A Toastmasters' Club Award

Aimed at improving the communication and leadership skills of the USM community, the university Toastmasters' Club was chartered in 2007 by the Alumni Liaison Office. As educational programmes are the heart of every Toastmasters' club, its membership extends to both USM students and staff. In the Table Topic Speech Contest 2010 held in Miri, Sarawak Dr. Asha Suresh Chand was announced the winner.

The ASEF University Alumni Network (ASEFUAN)

Liew Yen Yee, a fifth year medical student of USM was selected to represent Malaysia in the 16th Asia Europe Foundation (ASEF) University session and the 9th Annual Conference and General Meeting of the ASEF University Alumni Network (ASEFUAN).

USM menang Perodua Eco-Challenge

Antara pelajar ijazah Sarjana dan ijazah Pertama yang menerima hadiah wang tunai RM20,000 dan RM3,000 bagi kategori masing-masing.

SYAJARATULHUDA MOHAMAD ROSLI

GEORGETOWN - Universiti Sains Malaysia (USM) mempertahankan kejuaraannya di Pertandingan Perodua Eco-Challenge setelah menewaskan enam pasukan lain mewakili pelbagai institusi pengajian tinggi lain.

Timbalan Naib Canselor (Hal Ehwal dan Pembangunan Pelajar) USM, Profesor Datuk Omar Osman berkata, kumpulan pelajar dari Pusat Pengajian Kejuruteraan Mekanik muncul juara dalam Kategori Transmisi Manual setelah kereta Perodua Viva yang diubahsuai pasukan itu berjaya membuat catatan jarak 37.2 kilometer menerusi penggunaan hanya 1 liter petrol.

"Pasukan yang sama turut meraih tempat ketiga dalam kategori Kejuruteraan dan Reka bentuk pada pertandingan yang sama.

Kejayaan itu membuktikan keupayaan pelajar di dalam menghasilkan inovasi baru yang bukan sahaja mampu membantu dalam penjimatan

sedia bekerjasama dengan Perodua jika mereka merasakan apa yang telah dihasilkan oleh pelajar ini sesuai diaplikasikan di dalam produk kenderaan yang dihasilkan oleh mereka.

"Kenderaan dengan enjin yang telah diubahsuai ini boleh bergerak dengan

USM won Perodua Eco-Challenge, *Sinar Harian*, 5 July 2010

Kalahkan 98 pasukan IPT seluruh negara

USM juara Perniagaan Malaysia

PULAU PINANG 29 Dis. – Universiti Sains Malaysia (USM) muncul juara pertandingan Perniagaan Malaysia antara institusi pengajian tinggi (IPT) yang diadakan buat pertama kali di [illegible]

USM winning the Malaysian business entrepreneurship competition (Perniagaan Malaysia), *Utusan Malaysia*, 29 December 2010

3 pelajar harumkan nama USM

"Selain USM pertandingan ini juga disertai oleh lebih 37,000 pelajar dari 270 universiti yang diadakan di lebih 40 negara."

• Shahidan Shafie

Three USM students won The L'Oreal Brandstorm International Marketing Award 2010, *Sinar Harian*, 4 July 2010

Kerusi santai pelajar USM bakal ke Itali

REKAAN ringkas dan praktikal kerusi santai modular idea pelajar Universiti Sains Malaysia (USM) Pulau Pinang terpilih untuk dipamerkan pada pameran Perabot Antarabangsa di Milan, Itali bulan depan.

Nur Shamira Haris, pelajar tahun dua Bahagian Rekabentuk Produk, Pusat Pengajian Seni (PPS), menghasilkan kerusi santai modular dikenali sebagai Bench yang boleh dicantum dan dibawa dengan mudah.

Rekaan itu terpilih ke Salon International del Mobile 2010 Milan International Furniture Show selepas memenangi kategori utama pada Pertandingan Reka Bentuk Perabot Pelajar Institusi Pengajian Tinggi (NEXTUS) 2010 baru-baru ini.

Pada pertandingan yang diadakan di Malaysia Agro Exposition Park, Serdang, Selangor itu, rekaan tersebut menewaskan 100 penyertaan lain daripada pelbagai Institusi Pengajian Tinggi (IPT) di seluruh negara.

Beliau menerima hadiah wang tunai RM5,000, trofi, sijil dan tiket penerbangan untuk mempamerkan produk ciptaan beliau di Milan.

Ketika ditemui pada sidang media di kampus USM baru-baru ini, Nur Shamira memberitahu, idea dan konsep perabot itu sesuai dengan gaya hidup semasa yang inginkan perkakasan yang mudah tetapi serba guna.

Menurut Nur Shamira, Bench yang diperbuat daripada lapisan plat besi dengan kos RM450 itu mempunyai berat kurang daripada dua kilogram dan mampu menampung berat pengguna hampir 100 kilogram (kg).

Hadir sama pada sidang media berkenaan ialah Timbalan Naib Canselor USM, Profesor Omar Osman dan Dekan PPS, Profesor Madya A. Rahman Mohamed.

Sementara itu, Omar memberitahu ... Nur Shamira ... memberi ... terasa ...

OMAR (kiri) menyerahkan sijil penghargaan kepada Nur Shamira sambil disaksikan A.Rahman.

A lounge chair designed by USM student to be exhibited in Italy, *KOSMO!*, 13 April 2010

USM wakili Malaysia ke Imagine Cup di Poland

PULAU PINANG - Empat mahasiswa Universiti Sains Malaysia (USM) mewakili Malaysia ke Pertandingan Akhir Imagine Cup di Warsaw, Poland Julai ini.

Chen Jeng Yang, Lee Heng Wei, Wu Kuan Heong dan Wong Poh Lee akan bersaing dengan empat pasukan lain dalam kategori Envisioning 2020 Award.

Di bawah seliaan Pensyarah Pusat Pengajian Sains Komputer, Mohd Azam Osman, mereka mempertaruhkan idea 'Tec4Life' yang mengkhususkan kepada penelitian hubungan dan komunikasi antara manusia, haiwan dan tumbuhan serta kesannya kepada persekitaran.

USM menewaskan 30 institusi pengajian tinggi (IPT) dalam pertandingan akhir Imagine Cup 2010 peringkat negara yang diadakan di Pulau Langkawi, Mei lalu.

Imagine Cup 2010 dianjurkan syarikat perisian terkenal, Microsoft Corporation.

Tahun lalu, dua kumpulan pelajar USM mencatat kejayaan cemerlang apabila berjaya memenangi tempat pertama dan ketiga di pertandingan Imagine Cup 2009 di Mesir menewaskan sejumlah 142 pasukan lain dari 70 negara.

Wakil Malaysia yang membawa idea 'Tec4Life' pada pertandingan akhir Imagine Cup di Poland.

USM to represent Malaysia in the Imagine Cup in Poland, *Sinar Harian*, 14 July 2010

The CONCLUSION

Time to deliver

The 850-day ride in laying the foundation has been full of trials and tribulations. Sweat and tears have been our companions, weekends and public holidays hardly set aside for rest. Nevertheless, triumph meets us at the end. Sincerity, commitment as well as hard work from all levels of the USM community have made us proud of what we can turn around for the university. "Turn around" were the two seemingly innocent words that the then Minister of Education YB Tan Sri Musa Mohamed urged me to plan for as the in-coming Vice Chancellor at the turn of the century, in December 2000.

Indeed with some sense of pride, the "turning around" has started to take place embedded in a firm foundation with deep rootings that are ready to blossom into the next phase of the APEX growth to "deliver excellence". Like a fast growing tree that bears fruits, its roots extend into several key areas that further anchor it to the ground as evident in the capacity of USM to meet its planned future needs. It has been able to attract talent who shares its vision, ranging from post-doctoral candidates whose presence has now increased many folds, to top cutting-edge researchers from among the best to spur and lead several world's first initiatives as part of delivering excellence come 2011. These have also being able to create new templates that drive the governance to the next level where schools, centres and institutes as well as the various departments will be accorded with more and more flexibility and trust in configuring and implementing their respective policies, guidelines and procedures in the various portfolios in education, research and community engagement. This is despite the fact that USM has yet to gain full autonomy as an APEX status university in the way that YB Dato' Seri Mohamed Khaled Nordin, in his annual address in 2011, envisaged as the nurturing of a "true" academic culture.

There is no better example than to point to the fact that USM is the first, and only, Malaysian university to set up a fully independent Student Parliament in recognition of the rights of students to be heard in matters of decision making in policy

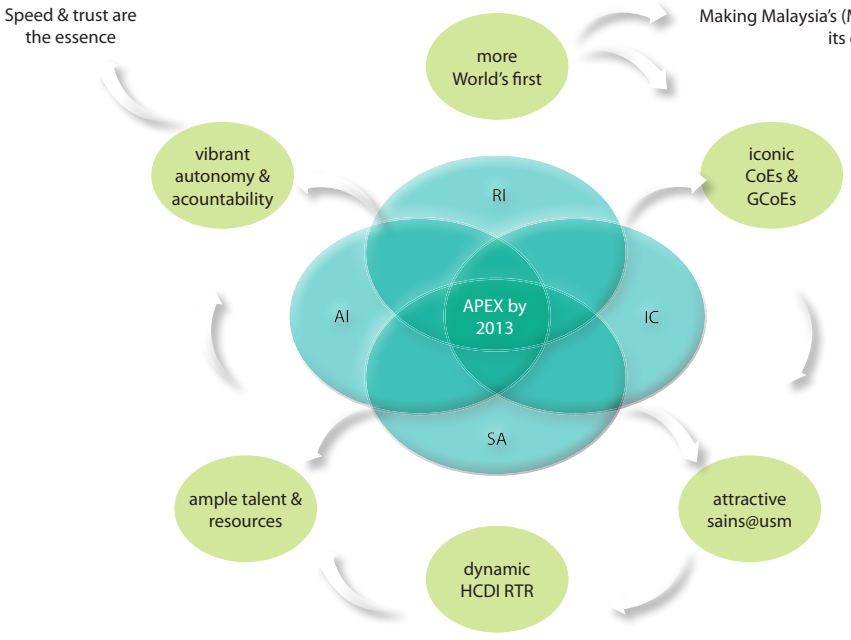


Figure 1: The journey to deliver excellence – a conceptual overview

RI : Research and Innovation
IC : The Industry Community Network
SA : Student Affairs & Development
AI : Academic & International Affairs

formulation and implementation. This bold initiative, first mooted in 2004, has opened up a new precedent towards building a more conducive environment for intellectual debate and discourse as part of nurturing more responsive and sensitive talent pools in articulating the demands and expressions of the future. This without doubt is closely coupled with a keen sense of accountability and audit to ensure that autonomy is neither misconstrued nor abused.

It must be specially highlighted that during the periods of laying the foundation, the alumni development of the university has not only been actively expanding its vast pool of talents but many have also been engaged in the exchange of ideas particularly in the areas of change management with respect to administrative and managerial issues, including the deployment of technologies, talent and resources, namely financial, development. Never before has the university at any one time benefitted from a total of more than 50 years of collective experiences contributed by its alumni. Such a commitment is historic and augurs well for USM as it taps upon extensive specialised-readily-available expertise when moving forward to realise APEX in the shortest possible time. Indeed the change management exercise, in tandem with the other initiatives, is rapidly giving way to a paradigm shift that would further assist in making the APEX university a reality with an even stronger and broad based foundation.

As a result of such wider support, we are proud to note that the vision and mission of the university are very much expedited in the direction where they are emphatically advocated and embraced by the USM community and that of its alumni which stands at more than 100,000. The intermingling of the two creates a momentum that results in an even stronger drive to achieve the APEX targets.

Today, the greater USM community appreciates that APEX education cannot be devoid of "soul" with its attending values as promulgated in the concept and status of "*sejahtera*" – its overarching long-term goal. Encapsulated in the university's vision of "transforming higher education for a sustainable tomorrow," the "soul" is underscored by being conscious of the sustainability factors that would ensure the levelling up of the generations to come for the sake of humanity. As the students step into the USM campus, they are engrained with this sense of value and innate responsibility that would tell them apart from the others as a new breed of educated citizenry. They would have a global outlook and

be ready to play their role in articulating a more symmetrical world. They are prime testimonies that the foundation laid for the past two years can lead to a community, be it in- or off-campus, that is vigilant, caring and sensitive to societal needs. They are themselves agents of change who are ready to assist and provide support towards empowering the society, in particular the *bottom billion*, in charting the course of their own destiny.

Closely linked to this is the pro-active effort to create a dynamic Human Capital Development Initiative (HCDI). Better known as the Regional Talent Repository (RTR), it is a bottom up approach towards building partnership between the university, the Northern Economic Corridor Implementing Agency (NCIA) and a leading consultancy firm, Deloitte Malaysia. It aims at providing and improving the quality and quantity talents and resources needed to make the change in a consistent and continuous manner. This initiative has been singled out in the concluding part of the New Economic Model where it notes:

Employers should have a greater say in the vocational and skills-training curriculum. It is essential that a cluster approach be adopted to take advantage of the scale economies and proximity to the industry, for example, the Human Capital Development Initiative of USM - NCIA - Deloitte.

In other words in the past two years, most pieces of the jigsaw assembled largely towards laying the foundation have been fitted in, although some critical pieces are still missing. Even then, new pieces are beginning to emerge hinting at some strong images of the kind of excellence that will be better delivered. At this stage, we are quite encouraged that some would come close to blazing new trails as future global leaders who would enhance the APEX reputation. In the course of the following year, the greater significance of these will be more apparent as a bigger picture of the entire APEX jigsaw becomes clearer. Some might even epitomise the jigsaw pieces as the crown jewels in delivering excellence by constructing several world's first achievements. Besides, they will also be the firsts in Asia and certainly in Malaysia – such as the two HiCoE recently announced for USM, out of the six available nationally.

All of these, however, are not just academic achievements of recognised "impact factors." More importantly, each of them is able to create meaningful impact on learning and the society in the most profound way that most of them that have made it into this 2010 volume hold such a promise, some as new updates moving from the previous years, while others are fresh endeavours of promising discoveries and/or innovations. Among them are notable achievements by the students, at all levels, as leaders in their own rights. In other words, these are not limited to mere technical and scientific hallmarks of excellence; rather, they include socio-cultural dimensions as well. Some are the result of translational or transdisciplinary outcomes as insights derived from thought processes spurred by the Blue Ocean Strategy which in the main has been adopted within the APEX framework.

Metaphorically speaking, thus, the trees the grew out of the foundation that were toiled upon in earnest beginning in September 2008 and continued into 2009 and 2010 (despite the shortened two years as highlighted earlier), have been able to bear some low hanging fruits. These will be the early harvests in the delivering excellence phase as evident in our flagship projects featured in APEX 2009 and in the current APEX 2010. We expect a greater and smoother momentum in 2011 and more so for the next two years as USM passes the APEX threshold to become the first and only full-fledged APEX university of Malaysia. This level of confidence is in many respects captured and reiterated in the independent Academic Performance Audit report referred to throughout the pages in this volume; recognition has also been accorded for example, in terms of prizes won, by various international bodies and credible authorities.

Finally, as 2010 fades into the horizon, we eagerly await the dawning of 2011, a year when it is time to deliver. Suffice to say for now, speed and trust with respect to autonomy in all aspects would be the lynchpin of what lies ahead.

The view outside the Dewan Tuanku Syed Putra

Designated by United Nations University UNU/IAS Institute of Advanced Studies
A UNU Regional Centre of Expertise Education for Sustainable Development

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ISBN 978-983-861-507-5