Synthesis

R&D Digest of Universiti Putra Malaysia

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What's Next

Highlights from the next issue –

- Virtual Clock Scheduler
- Teaching & Learning University Calculus
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A Premier Research University – *future directions!*

".....the university-industry link is a step in right direction and must be promoted vigorously", says Deputy Vice-Chancellor (Research & Innovation), Professor Dr. Nik Mustapha Raja Abdullah

The year 2006 marks a new chapter of research and development (R&D) activities in UPM. The Ministry of Higher Education Malaysia (KPTM) has redesignate the portfolio of the Deputy Vice Chancellor (Development) to the Deputy Vice Chancellor (Research and Innovation) for all public institutions of higher learning (IPTA) in Malaysia. The change in the portfolio indicates the seriousness of the KPTM on R&D work at IPTA level. Without exception, UPM had to respond to this change.

UPM, once again, received the highest research grant from IRPA for the *Rancangan Malaysia Kelapan* (RMK8) or 8th Malaysia Plan (2001-2005), as compared to other research institutions. Research has very much become a culture in UPM. I must admit that we have done exceptionally well in our research activities to date and we must congratulate our researchers for their job well done. However, not many of our research findings and results scale up completely along the research supply chain. Commercialization of our R&D products remains much to be desired. With the new Deputy Vice Chancellor solely responsible for the research and innovation, the focus will be on the quality research which ultimately leads towards commercialization of research results, consistent with the call from the Ministry. In this respect the university-industry link is a step in right direction and must be promoted vigorously.

Currently, there are 8 research clusters that guide research activities at UPM. Some are working well while others are slow in taking off the ground. Although it was a noble idea to classify research activities into their respective clusters, we must also revisit this idea to ensure successful implementation as research resources are constraining its execution. Human and financial resources are limited at UPM and we therefore have to find ways to optimize the use of these resources to bring research outcomes to the forefront. New strategic research planning at the macro level must be done immediately if we are to quantum leap into the elites of research universities in the world. This idea of classifying some IPTA into research university (RU) has been mooted for some times now. The criteria have been set for it and that leaves us with little choice but to work hard to achieve the Key Performance Index (KPI) identified for RU. I am very confident that as far as research is concerned, UPM has fulfilled some criteria and is now well on its way to be considered as one of RU's in Malaysia.

Good Luck!

Double Antibody Sandwich Enzyme Linked Immunosorbent Assay Kit for Infectious Bursal Disease

Mohd Hair bin Bejo, Phong Su Fun, Abdul Rahman bin Omar and Aini binti Ideris

Award Winner

Infectious bursal disease (IBD) is one of the most threatening and highly contagious viral diseases in chickens in the country causing significant economic losses, estimated more than 72 million per year due to high mortality and immunosuppression. IBD outbreak due to very virulent IBD virus (vIBDV) was first reported in Malaysia in 1991. Since then the disease continues to occur despite of vaccination against the disease. IBD can only be controlled and prevented by proper biosecurity and vaccination programmes.

Assay Kit – for Infectious Bursal Disease (IBD)

Recently, we have successfully developed a highly specific and sensitive Double Antibody Sandwich (DAS) Enzyme Linked Immunosorbent Assay (ELISA) Kit for the detection of both the antigen (IBD virus) and antibody against IBD. The kit was developed using local isolate of vIBDV (UPM 97/302). The ELISA plate was coated with purified rabbit hyperimmune serum (IgG) prepared in New Zealand White rabbits using the purified virus. The regression line equation of

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Editorial

A reflection of varsity strength!

Public universities do more than educate students. They also offer world-class research and consultancy services. Research has always been a public university's forte. With experienced teaching staff, most public universities, through their research and consultancy offer services to link the university's research findings with industries in the public and private sectors to seek product commercialisation.

Universities in Malaysia have been in focus owing to their contribution to the development of the country's human resources and wealth creation. UPM, probably one of the most comprehensive universities in the country, offers courses ranging from social sciences and medicine to science and technology. A university's academic standing not only depends on the quality of its graduates but also in the quality and research leadership of its academic staff mainly professors.

The year saw yet another increase in the number of staff promotions who benefited at large. The table below indicates a list of newly promoted professors.

To Full Professorship (1/3/05 – 1/11/05)

1.	Nor Aripin Shaman	*Biotechnology & Biomolecular Sciences / RMC*
2.	Samsinar Md. Sidin	*Economics and Management*
3.	Zakaria Kasa	*Educational Studies*
4.	Shattri Mansor	*Engineering*
5.	Chan Swee Heng	*Modern Languages & Communication*
6.	Musa Abu Hassan	*Modern Languages & Communication*
7.	Zulkarnain Zainal	*Science*

Congratulations go to one and all the above faculty members who were promoted from 1st March 2005.

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Spotlight

UPM: Great Expectations

Making of a Research University

The heart of a great university is talent – the knowledge, the imagination and the passion to discover, to invent, to innovate, to educate, and to create opportunities and wealth.

Universiti Putra Malaysia (UPM) has made significant progress since it started as a agriculture school in 1931. Over the past few decades, the University has grown progressively. The curriculum has broadened and transformed into an extensive range of disciplines in agriculture, forestry, food and basic sciences to health, and computer sciences, engineering, education, humanities and veterinary medicine. UPM began as an undergraduate institution that emphasized teaching excellence. Today, UPM has transformed itself into a premier institution embracing research as an integral part of its mission. Our departments and faculties have achieved high levels of competence in their fields. We instil in our students diligence and discipline, and we can take great pride that our graduates are pragmatic and proficient in their areas of specialization. UPM degrees in the professional disciplines are now recognized in this region and the rest of the world as proof of strong academic achievement.

Malaysia has progressed rapidly and has reached a high level of development. Today, our nation stands at the edge of a new frontier: the frontier of a new economy, the frontier of opportunities.

In the new economy, wealth is not only generated by mass production and assembly lines. Wealth is also generated from ideas, patents, software and control and ownership of knowledge. Knowledge is in turn, created by talent. Opportunities and wealth now arise from knowledge, talent and entrepreneurial spirit – and all these are found in the UPM community of students, staff and faculty.

Educating able graduates to meet the complex needs of our economy has always been our primary role as Malaysia's comprehensive university. But now, an additional and equally important role is the discovery, creation, and application of new knowledge in the service of our nation and beyond.

We can learn valuable lessons from the best universities. They are rapidly breaking down established structural and disciplinary boundaries. This has allowed for exchange of ideas and flow of people across departments and faculties. Opening of borders has led to lively, exciting scholarly exchanges that advance intellectual, scientific and technological frontiers. This process has also spawned new knowledge areas, and inspired curriculum innovation.

We should also leverage on the scientific and technological expertise found within our faculties and research institutes sitting right on our campus. They are actively engaged in transforming new knowledge, discoveries and inventions into commercial applications. With these research organizations on board, we are well positioned to develop stronger partnerships with local and global corporations. These diverse collaborations will allow both students and faculty members to experience the complexities of the world beyond the university, a world they will help to change.

The healthy mix of research and curricular ventures, alliances with universities, and collaborations with local and global organizations will foster a vibrant intellectual and entrepreneurial climate. This climate nourishes our community of students, staff and faculty. And they, in turn, will enrich our society and create wealth in our country.

The true measure of our success is not how well our students score in examinations, but how well prepared they are for life.

Managing Editor
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Natural food colourant from petals of *Melastoma malabathricum* and *Tibouchina semidecandra*

Award Winner

Janna Ong A., Khairul Annuar K., Rohidin, R., Maziah, M., Ramani P., Muhajir, H., Mohd. Yunus, S.

Physical appearance plays a very important role in all food products promotion. This means the addition of a colourant to restore original appearance of food or to ensure uniformity, as indicator of food quality. Everyone is sensitive to the colour of foods. Appetite is stimulated or dampened in almost direct relation to the observer's reaction to colour.

Public awareness in food safety has encouraged a great number of studies on potential natural sources of food colourants. Anthocyanin is among the permitted pigments that can be used as food colourants, and having been considered a potential replacement for synthetic dyes. Biochemical analyses of extracts obtained from the petals of both *Melastoma malabathricum and Tibouchina semidecandra* revealed high anthocyanins content.

There are two classes of added food colourants, synthetic and natural food colourants. History shows that natural food colourants have been used for centuries and are only recorded in biblical form. As new technologies develop, more synthetic colourants appear, such as 100 Curcumin (yellow), Blue No. 2 (blue) and Canthaxanthin (orange). However, currently the safety of synthetic food colourants has been questioned, resulting in a reduction in the number of permitted colourants. Subsequently, this leads to a worldwide move towards more usage of natural food colourants. Among the natural pigments use as colourant is anthocyanin. Anthocyanins provide the attractive red colour for many fruit juices, wines and jam. Studies have shown that anthocyanins have nutritional and therapeutic values.

Agar-agar containing extract from petals of Melastomataceae sp.

Melastoma sp. belongs to the family *Melastomataceae* that consists of herbs, shrubs and trees, which are well represented in Malaysia's flora. It has been identified as a major family consisting of many flowering species, which can be cultivated into ornamental plants. *Melastoma malabathricum* and *Tibouchina semidecandra* are two of the commonly found species of this family. Each bears pink and purple flowers, respectively. In this study, biochemical analyses of extracts obtained from the petals of both species taken from the wild plants and tissue cultured plants revealed high anthocyanins content with no differences in their constituents. Comparison of the cytotoxicity dose between synthetic dye and the *Melastomataceae* anthocyanins extract showed that the anthocyanins extract is ten times lower in cell cytotoxicity level compared to synthetic dye when tested in human cell lines. The anthocyanins are easily extracted and are best maintained in acidic conditions. Being water-soluble also facilitates their incorporation into aqueous food system. Due to limited availability of red synthetic colourant in the market because of prohibition on synthetic dyes Red No. 2, Red No. 40 and Red No. 3, the red colour extracted from the two *Melastomataceae* spp. above has big potential to be constructed into one of the natural food colourants for acidic foods and drinks.

SILVER – *Biotechnology Asia 2005 Innovation Awards.*

Reader Enquiry

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Process and Production of Novel "All Natural" Sunscreen Agents

O.M. Lai, C. Kong, C.T. Low, S.K. Lo, Rosfarizan Mohd., K. Long and Rosnah Ismail

There has been growing interest in fat and oil modification to form structured lipids, which confers desirable properties for cosmetic, nutritional and pharmaceutical purposes. Structured lipids synthesized can have sun-screening capability and also act as a solvent for dissolving fat-soluble aromatics, steroids or dyes, such as gamma oryzanol, vitamins and phospholipids in respective fields. The exposure to ultraviolet (UV) radiation originating from sunlight can cause harmful effects on human health, such as erythema (sunburn), melanoma (skin cancer), and premature skin aging. These effects are caused by UVA (320nm to 400nm) and UVB (290nm to 320nm) radiations. Despite the availability of diverse choices of sunscreens, the search for new and improved sunscreens still continues. This is because limitations of current products such as water solubility of sunscreen, irritation and allergic reaction caused by chemical based sunscreens and oiliness skin feel of the sunscreen itself.

This research provides two alternatives in producing structured lipids that has sun-screening effect. The first method involves the enzymatic esterification

Fig. 1: All Natural Sunscreen Agent

reaction between an active compound known as ethyl ferulate with an oil deodorizer distillate to produce a novel sunscreen agent. Ethyl ferulate is a scavenger and is able to neutralize any free radicals generated through long exposure to the UVA and UVB radiations. The second method requires the production of a carrier phase in sunscreen formulation that contains high purity medium-chain triglycerides (MCT) with gamma-oryzanol as sunscreen agent. This novel method is considerably less expensive than currently known methods as it utilizes relatively inexpensive oil byproducts from the refining process of palm kernel and rice bran oil as starting materials, respectively. The oil byproducts chosen contain both medium-chain free fatty acids and sunscreen agent. This work involves optimization of parameters for the esterification reaction, formulation of sunscreen and final evaluation of the end product to determine the stability and its effectiveness as a natural sunscreen. This project has two patent-pending products in Malaysia.

GOLD – *Biotechnology Asia 2005 Innovation Award.*
SILVER – *UPM Invention & Research Exhibition Award 2005 (PRPI 2005).*

Reader Enquiry

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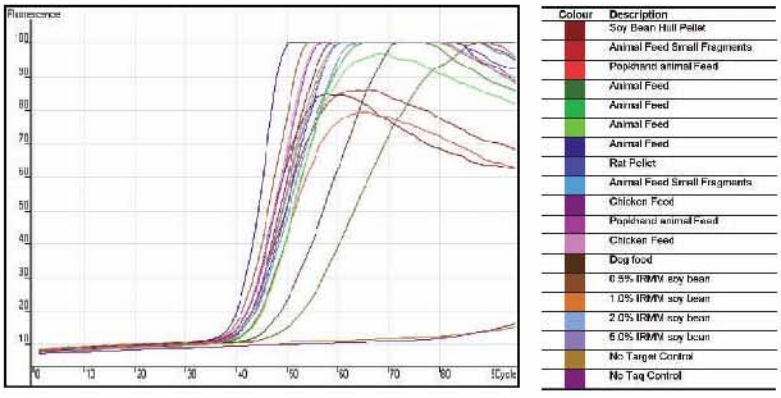
Amplifluor Universal GMO Detection System

Cheah Yoke Kqueen, Son Radu and Tan Chin Ping

A Genetically Modified Organism (GMO) is usually defined as a living organism whose genetic composition has been altered by means of gene technology. Issues related to detection and traceability of GMOs are gaining worldwide interest due to the ever-increasing global diffusion and the related socio-economical implications. More than 50% of the world's planted soybean acreage is genetically modified (GM), and Roundup Ready soybean (RRS) from Monsanto is the world's most important crop. RRS is the soybean that has been genetically altered to be herbicide resistance. Besides that, various countries require mandatory labeling of genetically modified foodstuffs. To reinforce this policy, a reliable detection and quantification technique has to be available and operational.



The Amplifluor Universal GMO Detection System offers a closed-tube fluorometric detection format for the detection and quantitation of nucleic acids in real-time and endpoint applications using the polymerase chain reaction. This technology facilitates high throughput analysis and reduces the chances of false-positive results due to carry-over contamination. The fluorescence signal produced with each PCR cycle directly correlates to the amount of amplified DNA generated, allowing for quantitation over a wide target range.

The Amplifluor Universal GMO Detection System developed was capable to detect the modified gene of RRS in various raw and processed foods. Besides that, the system developed also managed to detect the GM materials in the animal feeds such as dog food and chicken feed. The incorporation of the Amplifluor Universal GMO Detection System in realtime Polymerase Chain Reaction (PCR) gives rise to a rapid, sensitive and reliable technique in detection of GM material especially in food industries.

Bronze – *Biotechnology Asia 2005 Innovation Awards.*
GOLD – *UPM Invention and Research Exhibition Award 2002 (PRP2002).*

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The Novel Feed Additives produced by Beneficial Lactic Acid Bacteria, *Lactobacillus plantarum* I-UL4, Isolated from Fermented Tapioca *(Manihot esculanta)*

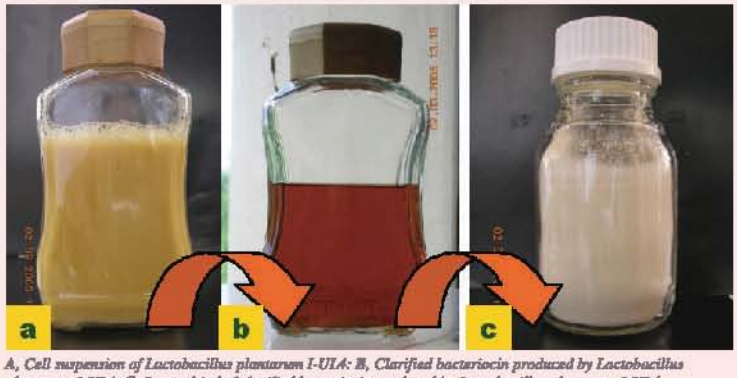
Foo Hooi Ling, Loh Teck Chwen, Raha Abdul Rahim, Lim Yin Sze, Law, Fang Lin, Chong Shi Wei and Gulam Rusul Rahmat Ali

Award Winner

Increasing awareness of the high risk of the antibiotic usage as growth promoter in animal feeds has driven the objectives of this study to explore the potential application of locally isolated beneficial lactic acid bacteria, *Lactobacillus plantarum* I-UL4 and its naturally occurring metabolites, which were designated as bacteriocin UL4, as feed additive to replace hazardous antibiotics.

Tapai ubi: The source of Lactobacillus plantarum I-UL4

Lb. plantarum I-UL4 was isolated from Malaysian fermented tapioca, *"Tapai ubi"*. The bacteriocin UL4 is an environmental friendly proteinaceous metabolite that can be readily hydrolyzed by proteolytic enzymes. It also has capability to withstand high temperature (stable at 121°C for 15 min) and broad pH range (pH 2 to 10). The bacteriocin UL4 exhibited broad antagonistic activity, which has capability to inhibit many species of pathogens including Gram positive (e.g. *Bacillus cereus, Staphylococcus aerues, Listeria monocytogenes, Streptococcus pneumoniae, Enterococcus faecalis, Enterococcus faecium* and *Pediococcus acidilactici*) and Gram negative bacteria (e.g. *Escherichia coli* and *Salmonella typhimurium*).



A, Cell suspension of Lactobacillus plantarum I-UL4; B, Clarified bacteriocin produced by Lactobacillus plantarum I-UL4; C, Spray-dried of clarified bacteriocin produced by Lactobacillus plantarum I-UL4

The feeding trial had demonstrated the *Lb. plantarum* I-UL4 and its bacteriocin UL4 possessed vast potential to be employed as growth promoter in animal feed since the growth rate was better in rats fed with either *Lb. plantarum* I-UL4 or bacteriocin UL4 than control rats. The faecal Lactic Acid Bacteria counts for the rats fed with either *Lb. plantarum* I-UL4 or bacteriocin UL4 was also higher than the control rats, whereas the control rats had a higher faecal Enterobactericeae counts than the rats fed with either *Lb. plantarum* I-UL4 or bacteriocin UL4.

GOLD – *Biotechnology Asia 2005 Innovation Awards.*
Bronze – *UPM Invention & Research Exhibition Award 2005 (PRPI 2005).*
GOLD – *Expo S&T Invention & Innovation Awards 2003 (Expo S&T 2003).*

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Double Antibody Sandwich Enzyme Linked Immunosorbent...

From Page One

the DAS ELISA was Log10 Titre = 2.6527Log10 (sp) + 3.0853 with R2 = 0.93 which was calculated from the standard curves. A significant correlation ($p<0.01$) between DAS ELISA and commercial IDEXX ELISA with R= 0.93 was demonstrated when the kit was evaluated using serum samples obtained from both the commercial and specific pathogen free (SPF) chickens.

The developed DAS ELISA for antigen (IBD virus) detection is also highly specific, sensitive and cheap. It can detect IBDV isolates from the bursa tissue and IBDV vaccine strains and replaces the usage of the conventional techniques in detection of the virus using specific pathogen free (SPF) embryonated chicken eggs or chicken fibroblast cell cultures (CEF).

This highly rapid, sensitive and specific DAS ELISA kit is vital in diagnosis and monitoring programmes of IBD. The kit is capable of high throughput of samples analysis and is safe without using mutagenic and carcinogenic reagents.

GOLD – *International Invention, Innovation, Industrial Design & Technology Invention (I-TEX 2005).*
GOLD – *UPM Invention & Research Exhibition Award 2005 (PRPI 2005).*

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ResearchHappenings

British Invention Show 2005 *(20-23 October 2005)*

INNOVATION & CREATIVITY: Out of the 5 R&D products exhibited, UPM Scientists won 7 awards comprising 4 gold, 1 silver & 2 special awards

OVERWHELMING RESPONSE: UPM Recipients of awards with the official representatives of British Invention Show held at Alexandra Palace in London.

FEELING SUCCESS: A great sense of self achievement

Vice-Chancellor's Fellowship Awards 2005 *(3rd October 2005)*

SERVING THE COMMUNITY: UPM's top officials at the Vice-Chancellor's Fellowship 2005 awards presentation ceremony

A CAUSE OF PRIDE: Assoc. Prof. Dr. Maznah Ismail receiving "Excellence in Research" award from the Vice-Chancellor

KEEN INTEREST: Former Deputy Vice-Chancellor (Academic Affairs), Prof. Dr. Muhamad Awang receiving an award from the Vice-Chancellor

RECOGNISED: Assoc. Prof. Dr. Rita Muhamad Awang receiving an award

Expo R&D IPTA 2005 *(30 Sept-2 Oct 2005)*

PEOPLE WITH FORESIGHT: Prof. Zulkifli (left) with Professor Dato' Zohadie (centre) and Assoc. Prof. Fakhru'l-Razi (right)

A FAIR EVENT: Deputy Vice-Chancellor (Research & Innovation), Prof. Dr. Nik Mustapha (right), Prof. Zulkifli Idrus and En. Jamsari assessing UPM's participation impact

GETTING IT RIGHT: Professor Zulkifli (left) with Professor Dato' Zohadie (centre) and Assoc. Prof. Raha (right) with all smiles

GAINING A BETTER IMAGE: Prof. Kalda (left) recipient of a Gold medal at the Expo R&D IPTA 2005

EARNEST IN RESEARCH: Prof. Fatimah Yusoff focuses her R&D on her kit for high quality Microalgal production

PLAYING ITS ROLE: Dr Jalaluddin receiving a Gold medal from Professor Nik Mustapha for his well-recognized work on oil palm fibre while Prof. Zulkifli looks on

TOWARDS PROGRESS: Mrs Aini Mat Said wins Gold for her inventive work on Malaysian Socio-technical disaster model

WELL FOCUSED: Dr. Shamala receives Gold for her innovative R&D on Dynamic rate based virtual clock scheduler for output bussered IP switches

EXULTATION: Assoc.Prof. Dr. Rustem Sunchaleev receives GOLD for his innovative educational software on teaching & learning University Introductory Calculus

RAISING ITS PROFILE: Assoc. Prof. Dr.Ishak being congratulated by Professor Nik on his wining a Bronze

DEDICATION: Assoc. Prof. Dr. Rita Muhamad Aweng receiving a Bronze from Professor Nik Mustapha

TEAM PLAYERS: Prof. Nik motivating the researchers on their winning awards

NEW RESPONSIBILITIES: Promoting research skills among young researchers

AIMING FOR BREAKTHROUGH TECHNOLOGIES: Professor Nor Aripin presenting two bronze medals to Assoc. Prof. Fakhru'l-Razi for his pioneering R&D

OPENING NEW AVENUES: Prof. Nor Aripin – an intellectual input required for holistic learning

PROUD MOMENT: A postgraduate student receiving an award

LOOKING FORWARD: Dr. Noorhana Yahya won Gold for her novel R&D

TEAM WORK: Mr Beh Hoe Guan won Gold at the Expo R&D IPTA 2005

Down the Memory Lane
(Newsmakers around the campus)

FOR A GOOD CAUSE: Dato' Zohadie with a mock cheque for *"Mercy Malaysia"* amounting to RM7,425.70

CUTTING EDGE R&D: Award winners – the picture speaks for itself

FLYING HIGH: Dato' Zohadie (centre) with Prof. Radin Umar (right) and Prof. Nik Mustapha (left) at the launch of UPM's 75 years of establishment insignia

REWARDED: Dato' Zohadie and Prof. Nik presenting a mock cheque for RM1,000 and an air ticket to En.Abdul Hadi for modeling the special 75 years UPM insignia

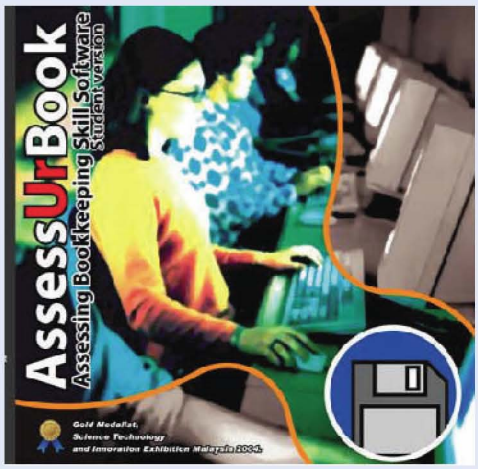
ITMA CONGRESS 2005: Dato' Zohadie presenting a token of appreciation to Professor Wan Ishak, Director, ITMA

AssessUrBook™ — Assessing Accounting Cycle Skill Software

Arfah Salleh

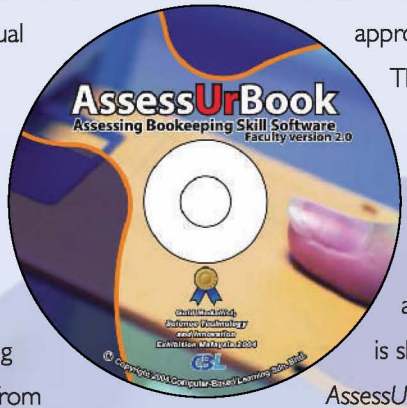
Award Winner

Accounting cycle skill is fundamental to the mastery of accounting. It is long established that one way to enhance this skill is for learners to continually practice akin to the learning of mathematics. And in order to gauge one's performance, a feedback system from examiners is essential. Given the mass of data, assessing learners' work accurately is very challenging to examiners especially in situation where the number of scripts is large.



Till today, assessment software in accounting education is uncommon, and even if available, is designed to deal with only objective answer-type questions. *AssessUrBook* paves the way forward for e-assessment both as formative and summative evaluation tool.

AssessUrBook revolutionises accounting education by offering a technology-based solution to mark students' work while providing valuable immediate performance feedback. More specifically, the software provides a question bank, flexible and easily maintained by individual instructor and with questions capable to be randomly generated during examination setting. It offers a comprehensive examination format covering all bookkeeping processes from journalizing to preparing financial statements. It also gives a user-friendly interface as medium for instructors to build their answer schemes and for students to key in answers.



AssessUrBook breakthrough features include providing instant / real-time feedback with:

- detailed, individualised performance evaluation by question for each examination candidate;
- overall performance report for each specific assessment exercise;
- reduction in examiners' assessment marking time while increasing marking accuracy and standardization; and
- flexibility to accept different grading systems.

The software also incorporates access control features to ensure that user groups are able to perform only designated tasks.

The *AssessUrBook* initiative is an invention that opens up a new dimension in examination and assessment approaches for basic accounting. The feedback mechanism which is superior than traditional approach should contribute to students' learning. Almost all of the usual marking time is shown to be saved using *AssessUrBook* with increased accuracy, while some possible unethical examination practices can be contained through individualised randomly generated questions.

Given that accounting cycle is fundamental to basic accounting, this software is suitable for use by many user groups and at all levels of education, formal and informal, face-to-face or remote. User to benefit from this software include not only accounting school teachers and students, but also those pursuing degree programs whether accounting on non-accounting and also professional courses. Examination bodies are also to benefit from *AssessUrBook*.

Gold Medallist, Science Technology and Innovation Exhibition Malaysia 2004

GOLD – *International Exhibition of Inventions, New Techniques & Products (Geneva Palexpo 2005).*

GOLD – *Expo Science, Innovation & Technology Award 2004 (Expo S&T 2004).*

Reader Enquiry

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Unmanned Aerial Vehicle (UAV)

Projects in Universiti Putra Malaysia

AwardWinner

Zairil A. Zaludin, Muhamad Zohadie Bardaie and Ahmad Samsuri Mokhtar

Unmanned Aerial Vehicles (UAVs) have been part of the military arsenal since before the Wright brothers ushered in the age of manned flight. The first UAV may have been used by both sides in the United States Civil War – balloons filled with explosives, launched in the hope that it would come down on enemy supply or ammunition depots and explode.

The first nation generally acknowledged to have made UAVs a standard military weapon is Israel. It was far better, the Israelis argued, to use- and lose- a comparatively inexpensive UAV on dangerous reconnaissance missions than to lose a pilot and a multimillion-dollar plane. Today, at least three dozen nations have active UAV development or acquisition programs under way (Aerospace America, AIAA June 2003).

In Malaysia, there are currently a number of UAV projects conducted in the government as well as private sectors. The need for UAV in Malaysia and the region is better reflected at the end of this year when the LIMA Langkawi Airshow 2005 will highlight the important role that UAVs can play in the modern day battlefield. Traders from both local and international organisations are expected to show off the capabilities of their flying machines to the policy makers in the country(LIMA 05 Langkawi Airshow Newsletter, March 2005).

Universiti Putra Malaysia started UAV projects in the Department of Aerospace Engineering. Though the aerospace program began in 1996, the UAV projects became active in early 2003 when the need for UAVs in the country became apparent. Funding from the University coupled with grants from the Ministry of Science, Technology and Innovation (MOSTI) fuel the projects for 3 years. Although many would think that the motivation of UAV projects in UPM is solely military, the university's approach is inclined towards understanding and developing the technology to make successful UAVs for generic applications. The results from the research will enable to cater the needs of the country on a more global scope, not restricted to military applications only but can be suited for other applications such as weather monitoring, crop dusting, traffic flow monitoring on highways and the Straits of Malacca, to name a few. With this spirit in mind, two projects drove the UAV programs ahead. They are titled, ***Long Endurance Unmanned Aerial Vehicle*** and ***High Speed Unmanned Aerial Vehicle***.

Long Endurance Unmanned Aerial Vehicle

This project started in early 2003 and has three objectives to accomplish; to investigate and determine the size and shape of the UAV to perform basic surveillance mission lasting for 24 hours; to design and install the Automatic Flight Control System for the UAV and perform autonomous flight-tests; and to demonstrate the 24-hour operation cycle of the ARV system.

UPMX Pemalsuri: One of the prototypes produced and experimented by the UPM UAV team

The colourful history behind this project is due to its low cost. With a grant of RM150,500.00 from MOSTI, the UPM UAV team had to work out a successful working plan to produce a UAV capable to achieve the objectives in 3 years. Unlike many UAVs sold by manufacturers today, the price tag of the UAVs built in the university is kept low through the use of items which mostly can be found in Malaysia. Off-the-shelf items were found to be cheap but interestingly sufficient for the operation in mind. Through this vision, it was possible for the Malaysian users to offer this technology, at an affordable price. With the Malaysian market satisfied, it is quite possible to approach neighbouring countries which cannot afford to pay a high price to acquire such aircraft.

Digital Still Shots from UAV: Aerial Shot Showing the UPM Mosque and the Faculty of Engineering New Complex

It is expected that the project will be completed in the 1st quarter of 2006. A number of prototypes have been designed successful and flown for this project. Some prototypes are suitable for long endurance operations whilst others are more suitable for other operations such as 'quick' reconnaissance and payload delivery.

Digital Still Shots from UAV: An aerial view of UPM Serdang Campus

High Speed Unmanned Aerial Vehicle

Another UAV project conducted at UPM focuses on studying a UAV which uses a miniature turbine engine as propulsion system. The main aim of this project is to study a suitable airframe for the UAV which can accommodate a miniature turbine engine as its propulsion system. Again, with the low cost vision in mind, the project utilises off-the-shelf materials where possible. With the aircraft flying at speeds close to 100km/h, it became a challenge for the UPM UAV team to program the onboard autopilot system during flight. The project is expected to be completed in the 2nd quarter of 2006.

Digital Still Shots from UAV: An aerial view of a road junction in the Campus

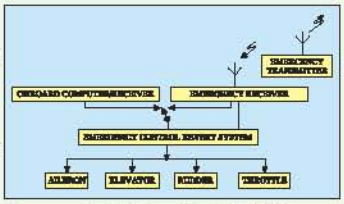
UPMX1 PUTRA: A prototype used as a test bed for High Speed Unmanned Aerial Vehicle project

Emergency Control Revert System (ECRS)

Any flight test engineers would agree that part and parcel of working with experimental aircraft is to sometimes damage the plane, accidentally or purposely. The UPM UAV team is not short from that truth. However through the experience of losing control over the experimental aircraft, the team learned and sometimes discovered a precious solution to some of the most interesting questions that have never been asked. For example, on a few occasions whilst flight testing experimental UAVs, the aircraft lose control due to power system failure or major system failure. The team discovered then that there was no available 'safety system' in the market today that could recover the control over these aircraft. Hence, the team invented one.

ECRS (Emergency Control Revert System) is a device invented in UPM that can revert the controls of primary flight control system to an emergency remote control system. The primary flight control system in this case is the onboard computer. The device can be activated remotely by the operator from as far away as 2kms from the aircraft. For unmanned aerial vehicles, the lost of control may be due to lost of power to the onboard computer system, radio interference or system malfunction such as faulty sensor readings. If the aircraft is remotely piloted at the time, the lost of control may be due to radio interference, frequency jamming, faulty onboard radio receiver or total loss of power.

The device invented by the UPM team is capable of reverting aircraft controls to a backup control system allowing the pilot on the ground to take over control using an independent system, during flight.



Emergency Control Revert System (ECRS): The block diagram describing its basic working principal

With this product, expensive experimental UAVs can be made to land safely by the test pilot and hence, there is no damage or loss of expensive UAVs through crashes and emergency landings. More importantly, the aircraft will not cause any damage to the property on the ground or cause any injuries to human beings.

This product has won a number of awards and recognition locally and internationally, and is copyright protected and being filed for a patent.

GOLD – *Invention & New Product Exposition 2005, Pittsburgh, USA (INPEX 2005).*

SILVER – *International Invention, Innovation, Industrial Design & Technology Invention (I-TEX 2005).*

Bronze – *UPM Invention, Research and Innovation Exhibition Awards (PRPI 2005).*

Excellent Scientist Award – *Saintis Cemerlang 2005, awarded by the Ministry of Higher Education, Malaysia.*

Reader Enquiry

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NewsBriefs

Prince Michael International Road Safety Awards, UK

Professor Ir. Dr. Radin Umar Radin Sohadi, Deputy Vice-Chancellor (Academic and International Affairs) has been bestowed with the prominent Institute of Road Traffic Education (IRTE) and Prince Michael International Road Safety Awards 2005, UK. The award presentation ceremony would be held on 6th January 2006 in New Delhi, India.

The awards appreciate his sheer dedication and commitment to build a positive road culture through various road safety interventions in Malaysia.

Eureka 2005

The 54th World Exhibition of Innovation Research & New Technologies, (Eureka 2005) was held in Brussels, Belgium from 16-20 November 2005.

The 5 exhibits displayed by UPM's vibrant scientists and researchers, all won awards comprising 4 gold and 1 bronze medals, and three special awards — a showcase of some of the finest minds from our scientific community at UPM. Many of these products obviously have great potential for commercialization.

Associate Prof. Dr. Mohd. Khazani Abdullah from the Faculty of Engineering won a GOLD medal and a Special Award "Organization Mondiale De La Presse Periodique (OMPP), Bruxelles" for his innovative research, "Dual-Core Erbium Doped Fiber Amplifier".

Dr. Ahmad Samsuri Mokhtar, Faculty of Engineering won a GOLD medal and a Special Award "Russian Federation (Federal Agency for Industry)" for his innovative research, "Composite Energy-Absorbing Keel Beam for General Aviation Aircrafts".

Dr. Abdul Halim Ghazali and En. Mohd. Hanif Yaacob also from the Faculty of Engineering won a GOLD medal each for their innovative research, "Bio-Composite Revetment Block" and "Wireless Remote Data Acquisition Using Bluetooth Technology", respectively.

Prof. Dr. Shattri Mansor, Faculty of Engineering received a Bronze medal for his novel research on "Oil Scan".

In addition, the UPM delegacy received a Special Recognition Award from Bosnia Herzegovina.

BIS 2005

The betfair.com British Invention Show (BIS 2005) was held at Alexandra Palace in London, UK from 20-23 October 2005. UPM scientists showcased 5 of its novel R&D products and garnered 7 awards comprising 4 gold, 1 silver, and 2 special awards.

Turn to centre page for pictorial news.

2005 UNESCO-Carlos J. Finlay Prize

Datin Dr. Khatijah Yusoff, Professor of Microbiology and Deputy Dean (Research), Faculty of Biotechnology and Biomolecular Science received a prestigious '2005 UNESCO-Carlos J. Finlay Prize for Microbiology' at a ceremony for UNESCO Science at Budapest, Hungary on 10th November 2005 in the presence of the UNESCO's Director-General, Mr. Koichiro Matsuura.

Since its inception in 1980, the Prize has always been awarded in odd years (2001, 2003, etc.) to coincide with the year of UNESCO's General Conference. The laureate travels to Paris, France, (this time to Budapest, Hungary) as a guest of UNESCO to collect their prize, which consists of US$ 5,000 donated by the Government of Cuba and a UNESCO Albert Einstein Silver Medal.

IUPAC Fellowship Award

Dr. Nordin Hj. Lajis, Professor of Chemistry of Natural Products at the Faculty of Science has been invited to become an IUPAC Fellow by the International Union of Pure and Applied Chemistry (IUPAC), USA.

The Fellows program recognizes past service to the Union and facilitates continuing dialogue with individuals active in prior IUPAC programs who are not currently members of any IUPAC body. The Union's project-based operating system is designed to encourage broad participation by the world's scientists.

Promoting Academic Writing at UPM

Professor Emeritus M.R. Jainudeen, consultant on academic writing with Research Management Centre (RMC), UPM conducted Road shows across the university covering 15 faculties including the Bintulu campus.

He offered help to all academic staff including tutors and graduate students at UPM on how to publish their research findings in quality journals. He stressed the importance on the Science Citation Index and has received responses from various academic staff members who are struggling to publish their research findings in the reputable international journals.

UPM academic staff seeking assistance in academic writing for publishing his or her R&D work in any journals may contact Prof. Jainudeen who would be more than willing to offer his assistance. Prof. Jainudeen can be contacted via email at MRJ@rmc.upm.edu.my or from Tuesdays to Thursdays at telephone 03 8946 6031.

IPTA R&D Expo 2005

IPTA R&D EXPO 2005 is the platform to congregate researchers, industry players, investors, venture capitalists, technopreneurs, students and researchers on innovation and creation of new products by Malaysian Institutions of Higher Learning.

The exhibition is in support of Ministry of Higher Education to enhance the capacity building towards development of Human Capital in R&D, innovations, competitive enterprises and to leverage on the assets that can be garnered from Universities towards strengthening economic competitiveness.

Organised by the Ministry of Higher Education & Universiti Teknologi Malaysia from 30th September to 2nd October 2005, it was held at PWTC, Kuala Lumpur. A total of about 283 innovative R&D products were on display during the exhibition from various national universities across the country. UPM exhibited about 40 products, out of which it won 29 medals in various categories of gold, silver and bronze.

Turn to centre page for pictorial news.

FactFile

For the record

1 Dr. Raha Abd. Rahim, Assoc. Prof. in the Faculty of Biotechnology and Biomolecular Sciences, and Deputy Director, Research Management Centre recently won the Excellent Service Award 2005.

In addition, Dr. Raha continues to be the President of Malaysian Society for Microbiology for another year.

Assoc. Prof. Dr. Raha Abd. Rahim

2 Mrs. Junainah A. Manan, Assistant Administrative (Secretary N17), Research Management Centre, has also won the Excellent Service Award 2005.

The Excellent Service Award carries a cash prize of RM1,000 and a certificate.

Mrs. Junainah A. Manan

3 Mr. Jamsari Tamsir, Deputy Registrar, Research Management Centre also received an Excellent Service Award 2005 for his outstanding services with the University.

Mr. Jamsir Tamsir

4 Mr.Mohd. Razif Ahmad, clerical services, Research Management Centre received a *"Anugerah Setia Putra 2005"* award that is given to those who have completed over 20 years of service with the university.

Mr. Mohd. Razif Ahmad

Check it out

UPM R&D Directory, Part 2: Satff Profile—Faces of Innovation, Edition 2005, published by the Publication, Promotion and System Unit, Research Management Centre, UPM. Editors: Nayan Deep S. Kanwal, Zulkifli Idrus and Raha Abd. Rahim. ISSN 1675-7823 is now available for distribution.

Read this – a call for contributions!!

If you have any contributions comprising feature articles or research write-ups that you would like us to publish in the esteemed columns of Synthesis, or any suggestions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, Synthesis, Publication, Promotion and System Unit, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my or rschinfo@admin.upm.edu.my

The editor reserves the right to edit articles for clarity and space before publication.

A Glance at Research Inventions & Innovations at UPM[1]

Continued from Issue 10, 3rd Quarter (Sept. 2005)...

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	Allocation
266.	Medicine and Health Sciences	Sabariah Abdul Rahman	The frequency of altered expression of oncogenes and tumor suppressor genes and their relationship to chemokines and angiogenic factors in cellular proliferative activities of gynaecological cancers in the Malaysian population	HAS	06-02-04-0218 EA001	RM193,500
267.	Medicine and Health Sciences	Sabrina Sukardi	A novel immunocontraceptive immunization of male paddy rats with a recombinant calcium-binding protein gene (cbp) construct	AFF	09-02-04-0447 EA001	RM119,000
268.	Medicine and Health Sciences	Seow Heng Fong	Comparison of possible tumours markers in blood, biological fluids or tissue	HAS	09-02-04-0449 EA001	RM157,000
269.	Medicine and Health Sciences	Sharida Fakurazi	The effect of zerumbone treatment against hepatotoxicity following carbon tetrachloride administration	HAS	06-02-04-0806-EA001	RM117,500
270.	Medicine and Health Sciences	Wan Omar Abdullah	Development of nucleic acid vaccine against Brugia malayi infected Meriones ungiculatus	HAS	06-02-04-0221 EA001	RM146,216
271.	Medicine and Health Sciences	Zalilah Mohd. Shariff	Health and nutrition intervention for Orang Asli households - A focus on intrahousehold factors	HAS	06-02-04-0595-EA001	RM103,000
272.	Modern Languages Studies and Communication	Rosli Talif	Representation of Malays and Malay Culture in Malaysian-Singaporean Literature in English	SSH	07-02-04-0539-EA001	RM182,000
273.	Science and Environmental Studies	Abdul Halim Abdullah	Metal Oxide supported on modified activated carbon as catalysts for the oxidation of organic compounds	BAB	09-02-04-0747-EA001	RM189,500
274.	Science and Environmental Studies	Abdul Halim Abdullah	Photo assisted regeneration of activated carbon using semiconductor photo catalyst	SAE	09-02-04-0255 EA001	RM231,000
275.	Science and Environmental Studies	Abu Bakar Salleh	Enhanced production of organic solvent tolerant protease through genetic manipulation	BAB	09-02-04-0258 EA001	RM100,300
276.	Science and Environmental Studies	Adem Kilicman	Neutrix modeling for distributional differential equations and convulation product	ITM	09-02-04-0259 EA001	RM168,000
277.	Science and Environmental Studies	Ahmad Ismail	Pollution impacts on bioresources in the straits of Malacca	MEE	08-02-04-0237 EA001	RM179,400
278.	Science and Environmental Studies	Ahmad Makmom Hj. Abdullah	Evaluation of Industrial air pollution from Prai Industrial Zone and its impacts on Paddy Plantation in MADA(Muda Agricultural Development Authority) Area.	MEE	08-02-04-0613-EA001	RM237,240
279.	Science and Environmental Studies	Anuar Kassim	Association behavior and physicochemical properties of dihydroxystearic acid (DHSA) and their derivatives in osmetic application	BAB	09-02-04-0748-EA001	RM158,500
280.	Science and Environmental Studies	Anuar Kassim	Synthesis and characterization of new composite conducting polymers to microelectrodes, microsensors and ion-exchange membranes.	MEE	09-02-04-0261 EA001	RM220,000
281.	Science and Environmental Studies	Aziz Arshad	Soft bottom communicates of the Littoral and Sublittoral environments	EAM	08-02-04-0239 EA001	RM152,700
282.	Science and Environmental Studies	Azizi Muda	Environmental education planning in Malaysia	SSH	07-02-04-0423 EA001	RM187,160
283.	Science and Environmental Studies	Azmi Zakaria	Photo thermal spectroscopic analysis of transition metal materials	MEE	02-02-04-0132 EA001	RM249,600
284.	Science and Environmental Studies	Chong Fai Kait/ Abdul Halim Abdullah	Preparation, characterization and reaction studies on supported trimetallic Pt-Re-Sn catalysts	SAE	09-02-04-0269 EA001	RM101,000
285.	Science and Environmental Studies	Chow Sai Pew	Synthesis and characterization of tellurium borate and borophosphate glasses	SAE	09-02-04-0270 EA001	RM216,500
286.	Science and Environmental Studies	Dzulkefly Kuang Abdullah	Chemical modification of sago starch by using palm oil based oleochemicals for production of active compounds	BAB	01-02-04-0019 EA001	RM217,080
287.	Science and Environmental Studies	Elias Saion	Development and characterization of high performance reusable ion exchange polymeric metal composites (IPMCs) as biomimetic sensors, actuators and artificial muscles	BAB	09-02-04-0814-EA001	RM86,000
288.	Science and Environmental Studies	Faridah Abdullah	Immunodiagnostics of ganoderma boninense	AFF	09-02-04-0629-EA001	RM193,120
289.	Science and Environmental Studies	Faridah Abdullah	Early detection and biological treatment as strategies in integrated disease management of management of Ganoderma Boninenese	AFF	01-02-04-0020 EA001	RM180,000
290.	Science and Environmental Studies	Fatimah Md.Yusoff	Culture of Indigenous microalgae and zooplankton for the production of high quality live-feed for Penaeus Monodon larvae	AFF	01-02-04-0392 EA001	RM203,400
291.	Science and Environmental Studies	Faujan Hj. Ahmad	Synthesis of some Betulinic Acid Derivatives using enzymes	BAB	09-02-04-0276 EA001	RM200,000

to be continued...

[1] **Data presented IRPA RM-8 (as at Cycle 1, 2004); Total 416 EAR Grants, sorted by PTJ & Name.**

†The description of the some of the above Inventions and Innovative research products available for commercialisation at UPM are contained in the books — "**R&D at UPM**: *Creating New Frontiers of Innovative Research*", First Edition, and "**R&D at UPM**: *Research Snapshots*", First Edition, ISSN. 1675-1248, Editors: Nayan Deep S. Kanwal, Mohd. Shahwahid Hj. Othman and Sidek Hj. Abd. Aziz, Published by Research Management Centre (RMC), UPM, available from Publications, Promotion & Syetem Unit, Administration Building, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia, Tel: +603 8946 6028 / 8946 6192, Fax: +603 8942 6539, e-mail: rschinfo@admin.upm.edu.my

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- CRFNanopath: A Novel Nanocomposite-Based Controlled Release Formulation
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- Intelligent Asphalt Mix Tester (Turamesin)
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- Down the Memory Lane—Newsmakers around the Campus

Letters to the Editor

If you have any comments about the content of the publication or any contributions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, *Synthesis*, Publication and Promotion Unit, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my. The editor reserves the right to edit articles for clarity and space before publication.

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Synthesis is the first and only quarterly R&D digest at Universiti Putra Malaysia published in March, June, September and December with the focus on award-winning innovations. It covers research happenings emerging from the various faculties and institutes across the university and provides a brief summary of some of the important research findings of the study conducted at UPM. It brilliantly features special topics that are of national interest in various fields and disciplines.

Scientists must be made aware of how important the impact of their work is and its possible applications on society and public opinion. It is hoped that this digest will provide the opportunity to interact particularly through feedback or direct mail to the scientist from either the private sector or by scientists from other government research institutions.

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