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KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

AKADEMI SAINS MALAYSIA

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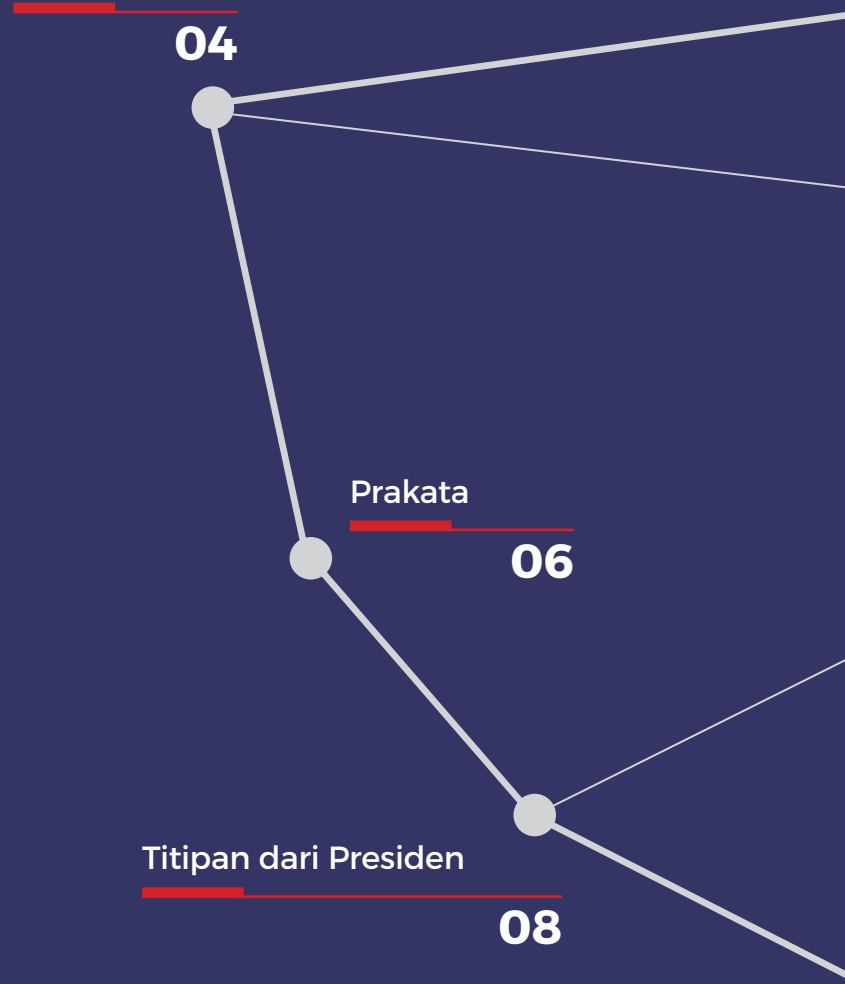
Titipan dari Presiden 08



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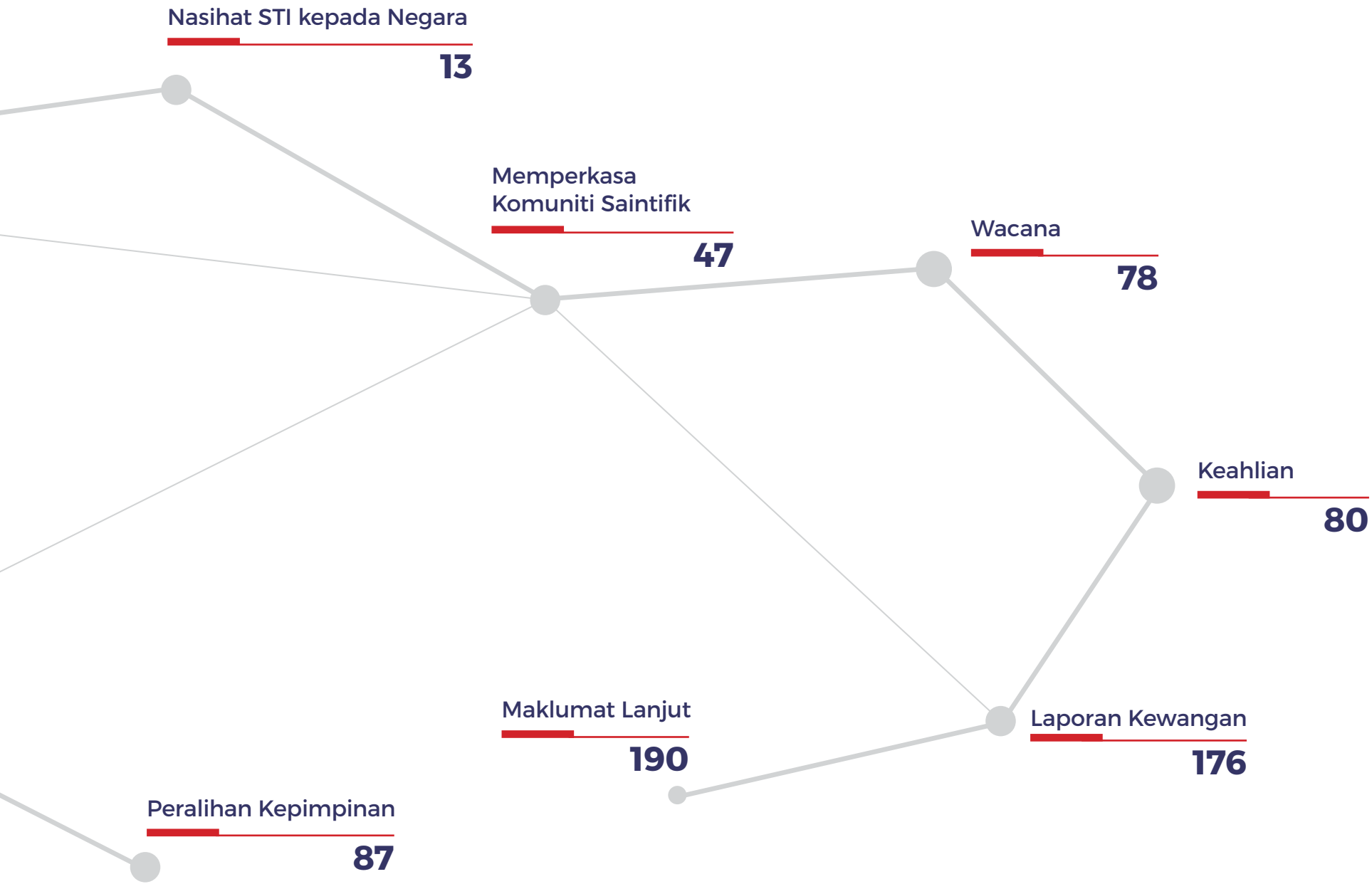
Akademi Sains Malaysia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Kami berusaha

1. Menjadi Peneraju Pemikir yang diiktiraf bagi isu berkaitan sains, kejuruteraan, teknologi dan inovasi

2. Memupuk kecemerlangan dalam bidang sains, kejuruteraan dan teknologi untuk kebaikan masyarakat keseluruhannya.

Misi

- Menjadi Peneraju Pemikir
- Menjadi Badan Penasihat Apex dalam hal berkaitan Sains Teknologi dan Inovasi (STI)
- Menjadi penggalak yang efektif terhadap kesedaran dan pemahaman awam tentang STI
- Menjadikan STI sebagai asas bagi pembangunan ekonomi dan kesejahteraan rakyat

Fungsi

- Menasihati Kerajaan berkenaan hal STI yang berkepentingan kepada negara dan antarabangsa
- Memupuk budayaa kecemerlangan SET di Malaysia
- Membantu meningkatkan keupayaan teknologi sektor industri di Malaysia
- Menggalakkan kesedaran dan pemahaman umum mengenai kepentingan STI dalam kehidupan seharian
- Menjalin jaringan dan kerjasama antarabangsa
- Penerbitan saintifik

Strategi

- Memanfaatkan pemikiran saintifik untuk menentukan hala tuju STI negara
- Memupuk budaya kecemerlangan STI
- Memberikan input STI yang berwibawa dan tepat pada masanya
- Menggalakkan penggunaan dan aplikasi sains untuk kesejahteraan rakyat
- Memudahcara pelaksanaan strategi ekonomi berasaskan inovasi

Pihak Berkepentingan

Dalaman

- Felo
- Associates
- Young Scientists Network (YSN-ASM)
- Pengurusan ASM

Luaran

- Jabatan Perdana Menteri dan Agensi Pusat
- MOSTI dan agensinya
- Kementerian lain dan agensi berkaitan
- Industri
- Institusi penyelidikan
- Badan profesional S&T
- Organisasi antarabangsa STI
- Komuniti bandar dan luar Bandar

Aktiviti Kami

Kajian Strategi STI

- Malaysia 2050
- Imbasan Horizon
- Penjelmaan Teknologi Baru
- Kelestarian Sains

Program Strategik STI

- Pembangunan Bakat
- Pengantara
- Konsortium Sains
- Fora perundingan

4 Teras Piagam Pelanggan

- Memberi khidmat nasihat yang bebas, boleh dipercayai berasaskan data yang tepat pada masanya
- Komited dalam mewujudkan program yang berkualiti ke arah pembangunan asas STI negara yang kukuh
- Mewakili Malaysia dan komuniti saintifiknya di arena antarabangsa
- Menyebarkan pengetahuan saintifik

Prakata



Sebagai kementerian yang menerajui kemajuan sains dan teknologi di Malaysia, MOSTI sentiasa berpegang teguh kepada misi untuk meneroka, membangun dan memanfaatkan STI untuk menjana ilmu pengetahuan, mencipta kekayaan dan menjamin kesejahteraan masyarakat ke arah mencapai ekonomi berpendapatan tinggi yang kompetitif, mampan dan terangkum. Akademi Sains Malaysia (ASM) sentiasa komited dalam mendokong matlamat, strategi dan pelan tindakan MOSTI.

Penerbitan tahunan ini melaporkan pencapaian ASM sepanjang tahun secara komprehensif. Saya bangga untuk menyatakan bahawa ASM telah berjaya menyiapkan sembilan kajian dan 23 program pada 2016. Beberapa kajian ASM yang dijangka siap pada 2017 juga sedang dijalankan.

Generasi muda memainkan peranan yang penting dalam mencapai visi Transformasi Nasional 2050 (TN50) yang akan membawa perubahan terutamanya dalam tadbir urus, pembangunan, ekonomi, daya tahan masyarakat dan pendidikan. Dengan perkembangan ini, MOSTI perlu memastikan sains, teknologi dan inovasi (STI) membawa peranan penting dalam memacu TN50. Dalam merangka strategi dan pelan tindakan ke arah TN50, senario masa hadapan perlu dibina.

Oleh itu, saya amat menantikan laporan Malaysia 2050: Foresight Initiative pada tahun 2017, yang selari dengan aspirasi TN50.

Kita perlu mempunyai gambaran yang jelas dan pemahaman yang mendalam mengenai prestasi STI nasional dan global, serta ciri-ciri struktur dan tadbir urus. Oleh itu, advokasi STI untuk Polisi amatlah diperlukan. Komponen STI perlu diambil kira dalam proses penggubalan semua polisi bagi mencapai TN50. Kementerian dan agensi perlu memastikan keberkesanan pelaksanaan dasar dan strategi mereka. Polisi STI perlu dipantau dan dikaji semula secara berkala untuk mengenal pasti dan memperbaiki sebarang kelemahan. Akses kepada petunjuk prestasi yang sesuai dan maklumat yang tepat, disokong oleh kapasiti berasaskan pengetahuan untuk penggubalan polisi STI berasaskan bukti adalah penting.

Pemerkasaan kapasiti dan keupayaan STI dari segi institusi, mandat, kakitangan, pengurusan, dana dan jaringan dapat dicapai melalui strategi dan pelaksaan program yang berkesan di peringkat nasional. Oleh itu, Polisi untuk STI memerlukan kerjasama holistik kesemua kementerian dan pihak-pihak berkepentingan. Majlis Sains Negara (MSN) bertindak sebagai jawatankuasa yang memantau sains telah menyatukan MOSTI, KPM dan KPT dalam satu platform, dengan tujuan yang sama iaitu perkembangan bakat STEM demi masa hadapan. Saya yakin kita berada di landasan yang betul untuk menjadi sebuah negara yang maju.

Aktiviti ASM adalah selari dengan Polisi untuk STI dan STI untuk Polisi. Antara program flagship yang boleh dipuji adalah Mega Science, Science Outlook, Foresight, Konsortium Sains, Young Scientist Network, dan Program Pembangunan Bakat. Saya berharap agar ASM meneruskan usaha sebagai badan pemikir STI negara yang berkhidmat untuk pelbagai kementerian demi kesejahteraan rakyat. Input ASM yang bebas, boleh dipercayai dan tepat pada masanya amat dihargai.

YB Datuk Seri Panglima Wilfred Madius Tangau
Menteri Sains, Teknologi dan Inovasi

Prakata



Tahniah kepada ASM di atas penerbitan Laporan Tahunan yang memaparkan pencapaian bagi 2016. Sebagai sebuah badan berkanun di bawah MOSTI, ASM dimandatkan untuk menyediakan input nasihat strategik kepada pihak Kerajaan serta pihak berkepentingan dan terus berusaha untuk memartabatkan kecemerlangan sains, kejuruteraan dan teknologi (SET) untuk manfaat bersama.

Sebagai Kementerian yang bertanggungjawab memacu agenda STI negara untuk memastikan perkembangan ekonomi yang mampan, MOSTI komited dalam melaksanakan Dasar STI Negara ke-2 (NPSTI2) yang menyasarkan STI untuk transformasi sosio-ekonomi dan pertumbuhan yang inklusif. Pelaksanaan polisi ini memerlukan kerjasama yang bersepadu antara kementerian, agensi kerajaan, pihak swasta dan NGO. Aktiviti ASM, antaranya; membangun, memupuk dan menggiatkan bakat; merangsang industri; mentransformasi tadbir urus STI; mempromosi STI; dan mempertingkatkan pakatan strategik antarabangsa, adalah selari dengan lima dari enam teras strategik NPSTI2.

Pada 2016, ASM telah membentangkan beberapa laporan nasihat di Kabinet melalui MOSTI. Salah satunya adalah 'Transforming the Water Sector: National Integrated Water Resources Management Plan: Strategies and Road Map', yang dirasmikan oleh YB Menteri STI. Laporan ini memberi gambaran keseluruhan isu dan cabaran yang dihadapi dalam pengurusan sumber air bersepadu di Malaysia. Ia menyeru kerjasama kolaboratif pelbagai kementerian dalam melaksanakan cadangan yang diketengahkan, selari dengan Strategi Lautan Biru Kebangsaan (NBOS).

ASM mempromosikan sains kepada semua melalui program utamanya. Chapter ASM dan Young Scientists Network of ASM (YSN-ASM) kini mewakili ASM untuk menjalankan program jangkauan luar seperti kem industri, seminar dan ceramah. ASM juga menggalakkan amalan sains yang baik di kalangan penyelidik setanding dengan standard antarabangsa. Sehubungan dengan itu, Top Research Scientists Malaysia (TRSM) mengenalpasti dan mengiktiraf penyelidik yang aktif sebagai penghargaan sumbangan mereka dalam P&P.

Dalam menginsankan sains, ASM menggalakkan penglibatan aktif pihak berkepentingan dan orang awam melalui forum dan seminar seperti Persidangan Antarabangsa Science for Peace dengan tema *'More for Peace, Less for War'.*

Saya sangat menghargai penglibatan ASM dalam inisiatif MOSTI seperti Inovasi Sosial MOSTI (MSI), Tahun Pengkomersilan Malaysia (MCY), Program Tabung Amanah Penyelidikan Perubatan Dr Ranjeet Bhagwan Singh, Projek Agensi P,P&P dan lain-lain.

Saya ingin merakamkan penghargaan kepada ASM kerana berjaya menjalankan pelbagai program yang berimpak tinggi serta menghasilkan penerbitan yang berkualiti. Kementerian ini komited untuk terus menyokong ASM dalam menjalankan mandatnya sebagai Badan Pemikir STI negara dengan cekap dan berkesan.

Datuk Seri Dr Mohd Azhar Haji Yahaya
Ketua Setiausaha
Kementerian Sains, Teknologi dan Inovasi



Titipan dari Presiden

2016 terus memberikan nafas baru dalam perkembangan sains di negara ini. Akademi amat menghargai penubuhan MSN sebagai satu platform yang menyatukan sebelas Menteri Kabinet yang berkaitan dengan sains, teknologi dan inovasi (STI) dengan matlamat yang sama, iaitu untuk menyelia pembangunan dan pelaksanaan agenda Penyelidikan, Pembangunan dan Pengkomersilan (P,P&P) negara.

Laporan tahunan 2016 menceritakan aktiviti-aktiviti ASM sepanjang tahun bersama pencapaiannya. Laporan ini akan mencetus pemikiran anda untuk terus meneroka dan membaca.

Nasihat STI

Akademi meneruskan usaha untuk menyediakan laporan bagi cadangan polisi menerusi kajian dalam bidang berkepentingan. Tahun ini, melalui MOSTI, ASM telah membentangkan kertas bertajuk 'Mengarusperdana STI untuk Pembangunan Sosio-Ekonomi Negara'. Kelemahan yang dikenal pasti dalam kajian Science Outlook 2015 serta beberapa cadangan telah dikemukakan. Hasilnya, cadangan tersebut telah dipersetujui oleh MSN dan memohon agar MOSTI, KPM, KPT, bersama-sama dengan Jabatan Perangkaan Malaysia untuk mengambil tindakan yang sewajarnya. Sehubungan dengan itu, ASM telah diberi mandat oleh MOSTI untuk membantu dalam membangunkan Pelan Induk STI Negara dan NPSTI.

MSN telah meminta agar ASM dan Majlis Profesor Negara (MPN) bekerjasama dalam mengenal pasti peluang ekonomi baru yang memfokuskan kepada STI. Kajian New Economic Opportunities (NEO) menggesa kerajaan untuk mengguna pakai jaringan kerjasama sebagai platform asas. Ekonomi masa kini dipacu oleh pengetahuan dan teknologi yang berkembang pesat serta rangkaian digital. Ini membolehkan perkongsian idea merentas sempadan bagi memudahkan kerjasama dalam proses penciptaan. Kajian ini mengenal pasti empat bidang strategik iaitu, Industri Halal, Industri Kesihatan dan Perubatan, Industri Pembuatan dan Industri Perkhidmatan sebagai sektor yang berpotensi untuk menggalakkan pertumbuhan ekonomi di arena global.

Tahun ini, kemuncak bagi sepuluh kajian berkaitan sektor air oleh Jawatankuasa Air ASM adalah pelancaran Pelan Pengurusan Sumber Air Bersepadu Negara (NIWRM). Pelan ini mengenengahkan 25 cadangan yang dapat mentransformasikan sektor air di Malaysia jika diterima pakai.

Malaysia 2050 merupakan salah satu inisiatif ASM yang meramal kedudukan Malaysia sebagai sebuah negara dengan kualiti hidup yang tinggi menjelang tahun 2050 di mana rakyat hidup dalam keadaan harmoni, makmur dan mampan. Di bawah inisiatif ini, Mega Sains 3.0 mengkaji ekosistem yang perlu dipupuk dan pelaburan STI yang perlu diberi keutamaan untuk mencapai masa depan yang diinginkan. Kajian ini mencakupi sektor ekonomi tertentu dan mencadangkan bidang yang memanfaatkan STI. Lima industri yang dibincangkan dalam kajian Mega Sains 3.0 adalah Perabot, Automotif, Kreatif, Pelancongan, dan Plastik dan Komposit.

Menyedari kepentingan kajian yang inklusif dan holistik, ASM mewujudkan Pakatan Foresight Malaysia yang telah membawa pelbagai pakar dan badan pemikir untuk mengendalikan Malaysia2050: Inisiatif Foresight. Hasil kajian ini amat berguna bagi menghadapi cabaran perancangan yang sukar dijangka dengan perubahan yang drastik. Laporan ini dijadualkan siap pada 2017.

ASM meneruskan usahanya dalam mengkaji isu-isu kelestarian dan alam sekitar. Salah satu kajian yang boleh dibanggakan adalah Jerebu Merentasi Sempadan bagi menangani isu jerebu merentasi sempadan yang belaku saban tahun. Cadangan yang dikemukan terdiri dari rangka kerja perundangan dan dasar, pengaturan institusi, sosio-ekonomi dan S&T. ASM bertekad untuk berkongsi penemuan dan cadangan ini melalui rangkaian kerjasama saintifik di peringkat ASEAN. Tahun ini juga, ASM telah menerbitkan dua Kertas Posisi iaitu Hakisan dan Pemendapan serta Perlombongan Mapan berdasarkan kajian kes perlombongan bauksit di Pahang.

Walaupun ASM merupakan akademi yang masih baru, ASM telah memperolehi kemahiran untuk menyampaikan input saintifik, intelektual dan strategik yang berkualiti tinggi. **Proses penjanaan idea, perundingan serta analisis data telah melahirkan pendekatan kreatif yang futuristik dan melangkau disiplin konvensional.** Namun, masih banyak yang boleh dipelajari dari akademi sedunia lain yang lebih berpengalaman melaksanakan aktiviti berimpak tinggi.

Di bawah kepimpinan YB Datuk Seri Panglima Wilfred Madius Tangau, ASM telah memainkan peranan yang lebih dinamik dan berkesan sebagai peneraju pemikir kepada kementerian dan negara. ASM dapat memberi pandangan berkaitan STI terus kepada Kabinet melalui MOSTI termasuk cadangan yang melibatkan kementerian lain. ASM harus kekal komited untuk memberi khidmat nasihat yang berwibawa, bebas dan tepat pada masanya untuk kekal relevan dalam ekosistem STI negara.

Jaringan Pakar

Kejayaan kajian ASM adalah hasil komitmen dan sumbangan masa dan kepakaran Felo secara pro-bono. Kepakaran, pengetahuan dan rangkaian kerjasama Felo merperkayakan lagi sumber ASM. Felo dikategorikan kepada enam kumpulan disiplin iaitu Sains Perubatan dan Kesihatan; Kejuruteraan & Sains Komputer; Biologi, Sains Pertanian & Alam Sekitar; Matematik, Fizik & Sains Bumi; Sains Kimia; dan Pembangunan S&T dan Industri. Tahun ini, bilangan Felo ASM telah mencapai 301 orang dengan 27 Felo Kanan dan enam Felo Kehormat. ASM juga telah mula melantik ahli sains sosial yang telah menyumbang kepada kemajuan sains di negara ini dan mempunyai matlamat seiring dengan objektif ASM. ASM berharap ia akan dapat menarik minat ahli sains sosial untuk melibatkan diri dalam khidmat nasihat saintifik dan seterusnya membolehkan pewujudan kumpulan disiplin sains sosial di ASM.

Selain Felo, ASM turut melantik 29 *Associates* yang merupakan pakar-pakar dari pelbagai bidang sains dan sains sosial untuk memenuhi permintaan pengetahuan dan kepakaran antara disiplin yang semakin meningkat. Perkembangan jaringan pakar ASM bertambah dengan ahli-ahli Young Scientists Network (YSN-ASM) dan *Top Research Scientists Malaysia* (TRSM) yang menyumbang menerusi penglibatan dalam jawatankuasa kerja serta meneraju program ASM terpilih.

Kajian dan program ASM diuruskan melalui Jawatankuasa Kerja atau Badan Bertindak yang dipimpin oleh seorang Felo. Mereka bertanggungjawab untuk menyelia pengendalian program atau kajian selain dari memimpin dan membimbing kakitangan pengurusan ASM dalam melaksanakan sebarang aktiviti. Tahun ini, ASM telah bekerja dengan 41 Jawatankuasa Kerja dan 20 Badan Bertindak.

Mengukuhkan kapasiti dan keupayaan STI

Penumpuan kepada perkembangan bakat STI untuk masa depan merupakan sebahagian penting usaha ASM. Oleh itu, ASM menyokong kepentingan pendidikan sains seawal sekolah rendah. Pendidikan Sains Berasaskan Inkuiri (IBSE) terbukti berjaya menarik minat pelajar sekolah rendah untuk meneroka dan mempelajari sains. ASM terus memberi bimbingan yang berterusan kepada empat sekolah perintis dan memantau guru-guru yang terlibat dalam program ini.

Program ini diperluaskan lagi dengan pelantikan 'Duta Sains' di tiga kawasan parlimen iaitu Jerlun, Setiu dan Tuaran. Guru-guru yang terpilih dari setiap kawasan parlimen telah dilatih untuk mengaplikasi kaedah IBSE dalam pengajaran sains dan matematik. Duta Sains yang bertindak sebagai agen perubahan dapat menyebarluaskan inisiatif ASM di kawasan lain bagi mewujudkan impak yang lebih besar.

Program Duta Sains dilaksanakan melalui Dana Inovasi Sosial MOSTI. Selain IBSE, Duta Sains juga memainkan peranan penting dalam membantu usahawan di Tangga Batu untuk mengkomersilkan dan menambah nilai produk mereka. Selain itu, Duta Sains di Jerlun mengenal pasti masalah tanah jerlus di kawasan tanah pertanian, yang mana ASM kini bekerja rapat dengan Lembaga Kemajuan Pertanian Muda (MADA) untuk menyelesaikan masalah ini. ASM akan terus bekerjasama dengan Duta Sains yang dilantik dan mengembangkan rangkaian ini dalam usaha untuk mencapai kepada komuniti.

ASM berusaha untuk memupuk bakat rakyat Malaysia untuk mencapai taraf dunia serta melibatkan diri dalam agenda STI negara. Sejak 2004, jumlah penyertaan dalam program saintis muda antarabangsa semakin meningkat. ASM sebagai rakan panel pencalonan untuk Malaysia, bangga dalam menjalankan pemilihan calon dari seluruh Negara berasaskan merit. Tahun ini, ASM terus menyokong saintis muda untuk mengambil bahagian dalam beberapa program antarabangsa seperti Mesyuarat Tahunan Lindau, *IIASA Young Scientists Summer Programme* (YSSP), *CERN Summer Student Programme* (CSSP) dan Program Kepimpinan IAMP. Program seperti ini memberi peluan untuk menimba ilmu pengetahuan, meningkatkan interaksi dan inspirasi. Sebagai contoh, program YSSP memberi peluang kepada rakyat Malaysia untuk menjalankan penyelidikan bebas di bawah pengawasan pakar IIASA manakala CSSP memberi peluang kepada para pelajar untuk menyertai pasukan penyelidikan yang menjalankan kajian dalam bidang fizik zarah.

Saintis muda yang berbakat ini telah mendorong penubuhan YSN-ASM, iaitu kumpulan individu yang berbakat, bermotivasi dengan semangat yang tinggi untuk menyumbang kepada agenda sains negara. ASM meletakkan harapan yang tinggi terhadap generasi muda ini, kerana mereka merupakan pemimpin masa depan.

Selain memupuk bakat saintis muda, integriti turut menjadi ciri yang penting. Hasil penyelidikan yang boleh dipercayai dan tepat adalah penting untuk meningkatkan keyakinan orang ramai terhadap penyelidikan Malaysia. ASM memulakan inisiatif Responsible Conduct of Research (RCR) pada 2013 selepas penyertaan dalam bengkel RCR yang dijalankan oleh US National Academy of Sciences (AS NAS). Sejak itu, ASM telah menyokong YSN-ASM untuk membangun dan menerajui modul pendidikan RCR yang bertujuan untuk melatih jurulatih RCR bertauliah serta mewujudkan kesedaran dan penggunaan modul RCR di universiti.

Malaysia di Arena Antarabangsa

Akademi-akademi sains melalui jaringan kolaborasi serantau dan global bekerjasama menggembleng sumber dan kepakaran bagi menyediakan nasihat bebas yang berasaskan bukti mengenai isu-isu global kepada penggubal dasar dan kerajaan. Pengaruh mereka telah membentuk dasar-dasar sains global dan meningkatkan kemajuan penyelidikan.

ASM berusaha untuk terus meletakkan Malaysia sebagai peneraju dalam sains melalui penyertaan aktif dalam mesyuarat saintifik dan inisiatif kerjasama. Felo ASM menerajui pelbagai jawatan dalam organisasi antarabangsa, seperti Council of International Institute for Applied Systems Analysis (IIASA), Association of Academies and Societies in Asia (AASSA), InterAcademy Partnership (IAP), International Council of Science dan lain-lain. ASM juga menerajui penubuhan Network of ASEAN Science Academies (NetASA).

Penglibatan secara aktif membolehkan ASM mendapatkan maklumat terkini berkaitan sains dan teknologi serta membuka pelbagai peluang kepada saintis Malaysia. Saban tahun, rangkaian dan hubungan ASM yang terus berkembang luas membawa kepada pengiktirafan ASM sebagai sebuah akademi sains terkemuka di rantau ASEAN.

Komunikasi Sains

ASM terus meneroka kaedah terbaik untuk berkomunikasi dengan masyarakat awam, pihak berkepentingan dan penggubal dasar. **Input saintifik dan cadangan polisi disampaikan dalam bentuk yang lebih menarik, mudah difahami dan lebih jelas.** Ini termasuklah pembentangan, penerbitan dan siaran-siaran media sosial. ASM aktif di media sosial seperti Facebook, Instagram, Twitter, dan saluran YouTube untuk menyebarkan maklumat dan pengumuman terkini. Penglibatan secara kerap bersama media juga dijalankan dengan menawarkan kepakaran felo sebagai rujukan dan sumber.

Forum dan seminar dirangka secara khusus untuk meningkatkan penglibatan peserta untuk berkongsi input dan idea mereka. Topik perbincangan digariskan dengan teliti untuk memberikan pemahaman yang lebih baik mengenai perkara yang dibincangkan dan akan digunakan sebagai bahan rujukan. ASM akan terus berusaha untuk mencari kaedah penyampaian sains yang berinovatif untuk mewujudkan masyarakat celik sains.

Cabaran

Selepas memegang jawatan sebagai presiden ASM selama enam tahun, saya mendapati bahawa cabaran yang ditempuhi hari ini tetap sama. Dana yang mencukupi dan berterusan merupakan salah satu penyumbang utama kejayaan ASM. Walaupun kekurangan dana, kami berjaya meneruskan pelbagai aktiviti dalam tempoh beberapa tahun yang lepas berbekalkan dana simpanan kami. Walaubagaimanapun, kami percaya tindakan ini adalah penting dan perlu untuk membuktikan keupayaan dan kapasiti ASM sebagai Peneraju Pemikir negara. Saya ingin memetik kata-kata Socrates, 'Cara untuk mendapat reputasi yang baik adalah dengan berusaha untuk menjadi apa yang anda inginkan.'

Pelbagai kementerian dan agensi kerajaan telah mula mengiktiraf ASM sebagai sumber yang berwibawa. Saya berharap ASM akan meneruskan usaha merapatkan jurang dengan kementerian-kementerian berkaitan untuk kolaborasi dan impak yang positif. Saya ingin merakamkan ucapan terima kasih kepada semua rakan-rakan ASM dan pihak berkepentingan untuk kerjasama dan penglibatan dalam aktiviti ASM. Input anda membolehkan kami untuk menyediakan nasihat komprehensif kepada kerajaan dan menjadi suara yang berpengaruh dalam STI. ASM akan terus menawarkan platform bebas untuk semua peringkat masyarakat bagi memudahkan mereka memberi sebarang maklum balas dan idea.

Saya berbangga dengan usaha, komitmen dan kepimpinan yang tidak berbelah bagi daripada Felo ASM yang telah membantu membina kredibiliti ASM. Saya berharap semangat ini akan berterusan dan sokongan penuh diberikan kepada pengganti saya, Profesor Datuk Dr Asma Ismail FASc. Saya yakin bahawa kepimpinan, dedikasi dan kebijaksanaan beliau akan membawa kejayaan yang lebih besar untuk ASM.

Sekalung penghargaan saya tujukan kepada pihak pengurusan yang komited dan berdedikasi, serta semua kakitangan di atas kesungguhan dan semangat mereka dalam mencapai matlamat ASM.

Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc





Nasihat STI kepada Negara

+

Kajian strategik ASM bertujuan untuk memberi nasihat yang bebas, berwibawa, relevan dan tepat pada masanya dalam isu berkaitan STI di peringkat nasional dan antarabangsa. Kajian-kajian ini dikategorikan dalam empat tema iaitu Malaysia 2050, teknologi baru muncul, kelestarian sains, dan sosio-ekonomi. Aspek asas ekosistem, keupayaan S&T dan sumber kewangan diteliti dalam setiap kajian bagi memastikan penyampaian cadangan yang holistik.

Malaysia 2050

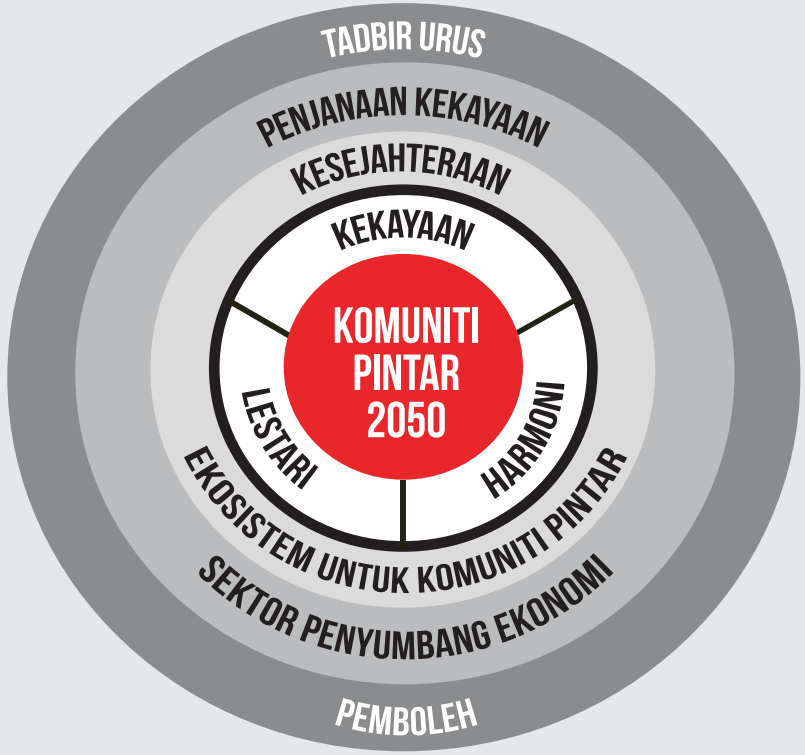
KOMUNITI PINTAR

ASM menjangkakan Malaysia menjadi sebuah negara yang mempunyai Komuniti Pintar menjelang tahun 2050. Visi ini telah diilhamkan pada 2014 apabila ASM memulakan inisiatif foresight untuk membangunkan rangka kerja antara status quo dan masa depan Malaysia.

Komuniti Pintar merangkumi masyarakat bandar dan luar bandar, di mana rakyat hidup dalam persekitaran makmur, mampan dan harmoni. Dalam senario ini, hak asasi seperti pendidikan, kesihatan dan keselamatan rakyat terjamin, kekayaan dijana melalui aktiviti ekonomi yang mampan, dan negara ditadbir dengan prinsip-prinsip yang kukuh.

ASM telah memulakan empat kajian berikut di bawah Malaysia 2050:

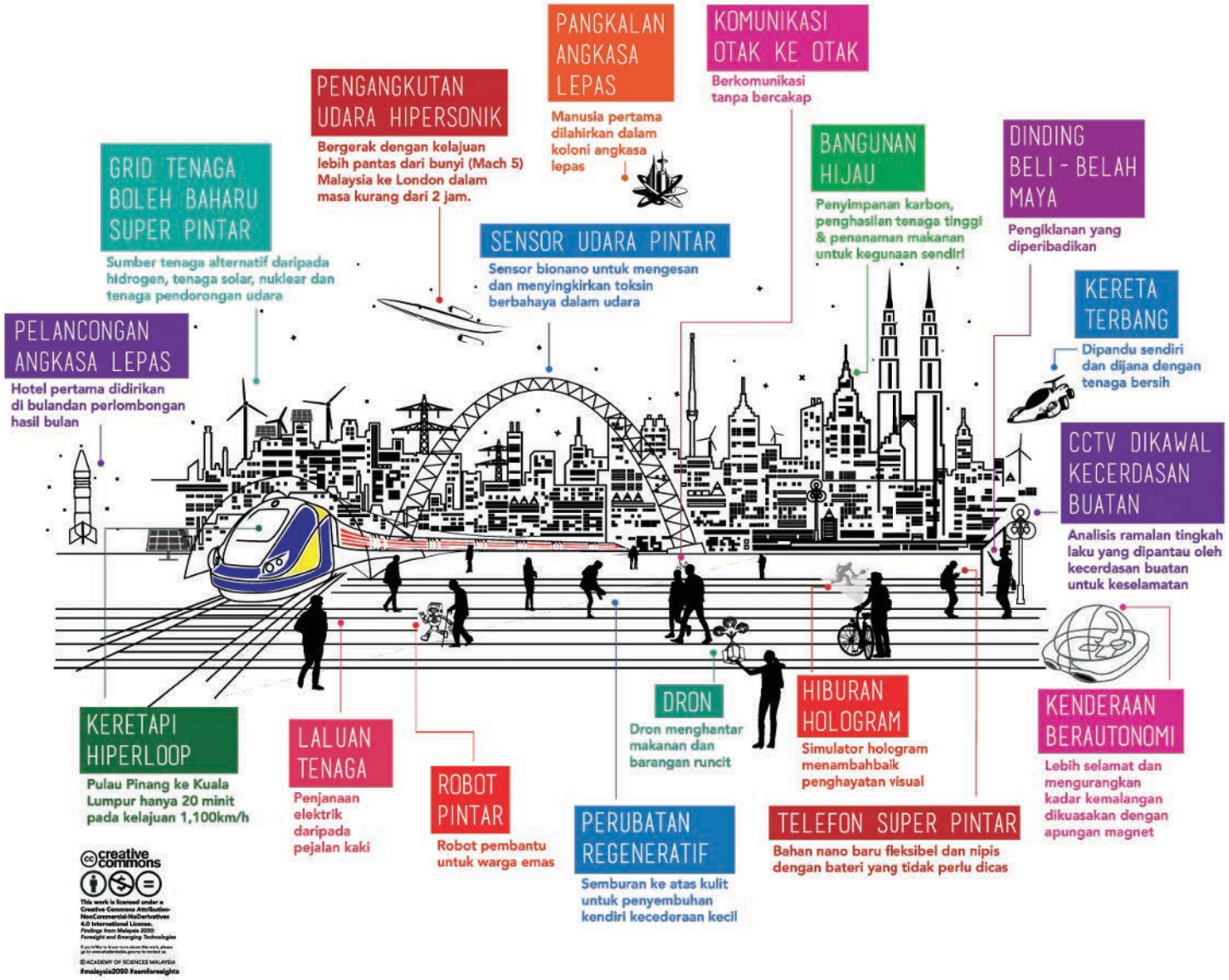
1. Malaysia 2050: Inisiatif *Foresight*
2. Sains, Kejuruteraan dan Teknologi Memuncul (ESET)
3. Mega Sains 3.0
4. Peluang Ekonomi Baru dalam Industri berasaskan STI



"Kita perlu bertindak sekarang untuk memastikan tahap kehidupan yang tinggi, mampan, makmur dan harmoni dicapai di masa hadapan"

Tan Sri Ir Dr Ahmad Tajuddin Ali FASc

Malaysia 2050: Komuniti Pintar
Memanfaatkan Kapasiti STI Termaju



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Findings from Malaysia 2050: Foresight and Emerging Technologies
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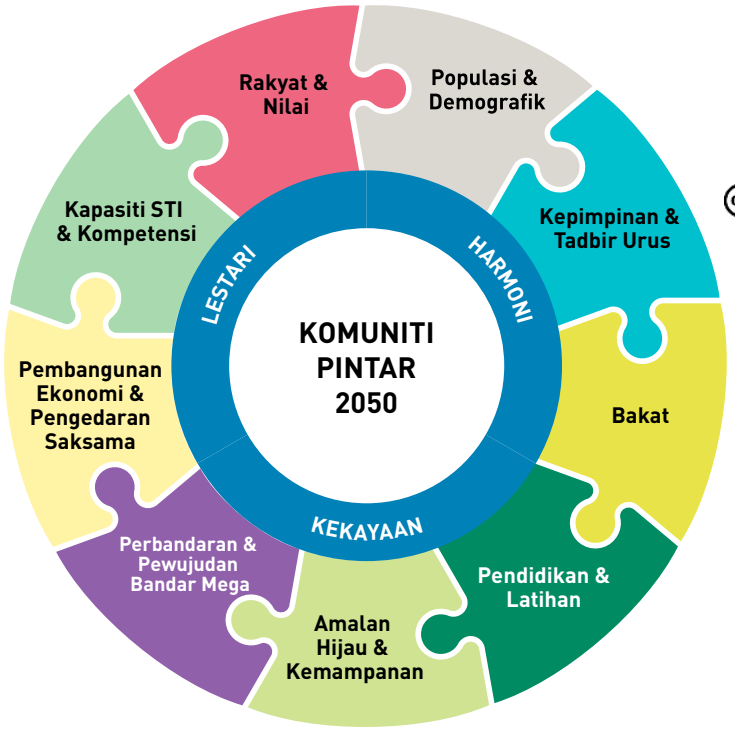
#malaysia2050 #asmforesights

Inisiatif *Foresight*

Melalui pakatan *Foresight*, ASM mengumpulkan pakar dan badan pemikir dalam bidang S&T, Masyarakat & Budaya, Geopolitik, dan Ekonomi & Kewangan bagi meramalkan kedudukan negara menjelang tahun 2050. Inisiatif ini memberi peluang kepada badan-badan berkepentingan untuk mengguna pakai paradigma imaginatif tetapi realistik dalam merangka pelan strategik melalui F*oresight* atau pemikiran masa hadapan.

Melalui insiatif ini , sembilan faktor utama yang mungkin akan menentukan masa depan negara telah dikenalpasti:



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Kaedah Inisiatif
Input yang inklusif diterima dari penggubal dasar, komuniti saintifik, ahli akademik, peneraju industri, badan profesional STI, ahli sains sosial, ahli ekonomi, sejarawan, ahli agama dan NGO.

lembaran fakta

34 Bengkel, Latihan, Perbincangan Kumpulan Fokus, Ceramah melibatkan pihak-pihak berkepentingan
200+ Organisasi dan
300+ Pakar/ Pemimpin terlibat dalam kaji selidik, temuramah, & perbincangan kumpulan fokus
3 Futuris Antarabangsa

Pakatan Inisiatif *Foresight* adalah:
- MOSTI
- ASM
- University Malaya (UM)
- *Malaysian Industry-Government Group for High Technology* (MiGHT)
- *Malaysian Foresight Institute* (myForesight)
- Institut Integriti Malaysia (INTEGRITI)
- Institut Penyelidikan Pembangunan Belia Malaysia (IYRES)
- Institut Kajian Strategik dan Antarabangsa (ISIS)
- Institut Kefahaman Islam Malaysia (IKIM)

Sains, Kejuruteraan dan Teknologi Memuncul (ESET)

Kajian Sains, Kejuruteraan dan Teknologi Memuncul bertujuan untuk mengenalpasti teknologi penting yang mendorong pencapaian visi *Komuniti Pintar* 2050. Fasa pertama kajian ini telah mengenalpasti 284 teknologi memuncul, produk dan perkhidmatan yang memberi impak kepada Malaysia ke arah 2050. Melalui kajian yang lebih terperinci berdasarkan inisiatif *foresight*, 95 teknologi memuncul telah disenarai pendek mengikut kelebihan dan keperluan negara. Teknologi ini seterusnya diklasifikasikan berdasarkan dua kriteria: tarikan and kebolehlaksanaan bagi mengenalpasti senarai teknologi yang kritikal untuk fokus P&P Malaysia ke arah 2050.

95 teknologi memuncul dibahagikan kepada 13 kategori:

- **18** Bahan Termaju & Nanomaterial
- **15** Kecerdasan Buatan & Robotik
- **10** Genomik
- **10** Komunikasi & Jaringan
- **9** Bioproses
- **8** Algoritma & Pengaturcaraan
- **6** Tenaga & Bahan Api
- **5** Kognitif
- **5** Sensor & Nanosensor
- **3** Teknologi Jitu
- **2** Pengkomputeran
- **2** Realiti Berperantara (AR) & Realiti Maya (VR)
- **2** Keselamatan Siber

Sumber dari MASTIC berdasarkan sistem klasifikasi P&P Malaysia

lembaran fakta

Kajian ESET menumpukan kepada **5** teknologi memuncul mega yang akan memberi impak positif kepada sosio-ekonomi Malaysia ke arah 2050

- Bioteknologi
- Teknologi Digital
- Teknologi Hijau
- Nanoteknologi
- Neuroteknologi

Teknologi ini dijangkakan menyumbang **29.1%** kepada KDNK Malaysia pada 2050.

Mega Sains 3.0

ASM telah menjalankan beberapa siri kajian Mega Sains sejak 2010. Kajian Mega Sains 3.0 (MS 3.0) yang telah bermula pada 2015 dan tamat pada 2016. MS 3.0 merangkumi lima industry iaitu Perabot, Automotif, Kreatif, Pelancongan, dan Plastik & Komposit.

Lima industri ini dipilih setelah mengambil kira aspirasi "Komuniti Pintar" 2050. Kajian ini mengenalpasti isu dan cabaran, merangka strategi dan cadangan, membina hala tuju industri untuk jangka pendek, sederhana dan panjang hingga 2050.

Strategi dan cadangan yang dikemukakan diharapkan dapat membantu kelima-lima industri ini untuk bersaing di arena tempatan dan antarabangsa, dengan menawarkan intervensi yang bersesuaian, terutamanya dalam hal pembangunan bakat, STI, dan tadbir urus.

lembaran fakta

Forum dan Pameran Nasional MS 3.0 yang diadakan pada 10 November di Kuala Lumpur telah dirasmikan oleh Menteri Sains, Teknologi dan Inovasi, Datuk Seri Panglima Wilfred Madius Tangau. Dapatan dari kelima-lima laporan industri telah dibentangkan.

Pelbagai aspek industri kreatif telah dipamerkan termasuk dron buatan sendiri dan pencetak 3D, hasil seni, fesyen dan peralatan perubatan yang dihasilkan dengan pencetak 3D, kerusi roda antara muka berkomputer, paparan VR dan AR, dan dua buah kereta yang menggunakan bahan gentian kaca & karbon dan fenestron berasaskan komposit sebagai bahan binaan badan kereta.

Industri MS 3.0



Perabot



Automotif



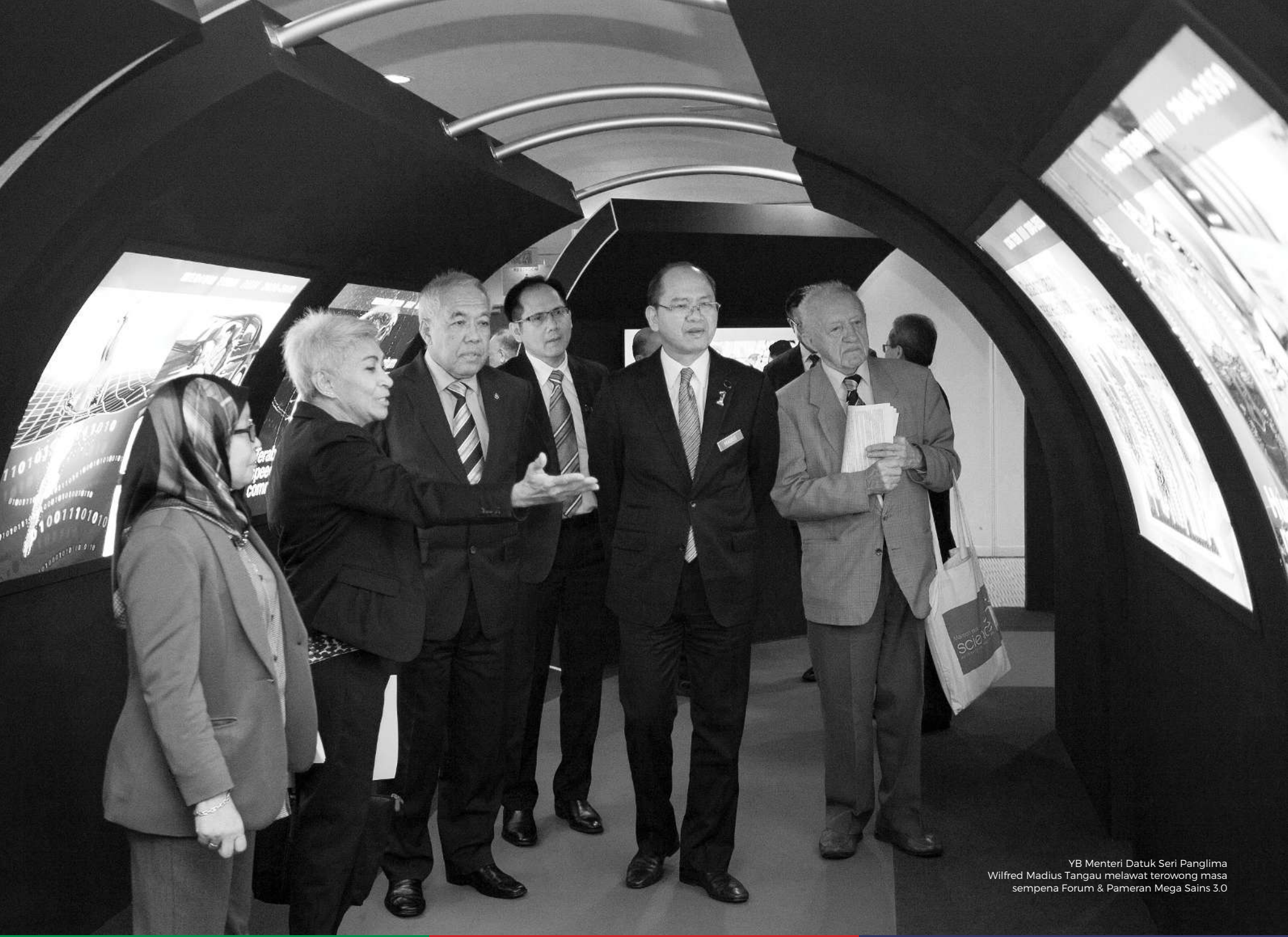
Kreatif



Pelancongan



Plastik & Komposit



YB Menteri Datuk Seri Panglima
Wilfred Madius Tangau melawat terowong masa
sempena Forum & Pameran Mega Sains 3.0

Industri **Perabot**

Bidang Fokus

Rekabentuk – Pembuatan – Pemasaran – Kelestarian

Selepas kegawatan ekonomi pada 2011, industri perabot terus berkembang pesat mencecah USD128 bilion pada 2013. Secara purata, penggunaan perabot per kapita di seluruh dunia bernilai USD83 bilion setahun. Strategi Malaysia untuk bersaing dengan pasaran perabot yang semakin berkembang pesat adalah melalui peralihan dari pembuatan berasaskan peralatan asli (OEM) ke pembuatan berasaskan reka bentuk asli (ODM).

Vietnam telah mengatasi Malaysia dalam senarai pengeksport perabot dunia pada 2009 dan berada di kedudukan kelima pada 2014. Sebaliknya, China sebagai pengeksport utama mempunyai kapasiti untuk menghasilkan perabot dalam jumlah yang tinggi. Di Malaysia pula, permintaan pasaran dalam negara adalah rendah berbanding pasaran antarabangsa. Pengeluar Malaysia percaya bahawa permintaan pasaran tempatan yang tinggi merupakan faktor utama penjimatan kos dalam pelaksanaan automasi secara menyeluruh.

Selain itu, impak hasil kajian ESET terhadap industri perabot Malaysia turut diteliti. Secara khususnya, kemunculan specis baru pokok untuk kegunaan perabot, pemasaran melalui internet, IoT dalam industri perabot, bahan buangan yang berkurangan dan sistem automasi akan memberi impak yang besar kepada industri perabot. Ekonomi dan kewangan, sosial dan kebudayaan, dan geopolitik menjelang tahun 2050 juga akan menentukan hala tuju industri ini. Pada masa ini, Malaysia akan mampu bersaing dengan negara-negara maju.



Mempertingkatkan Nilai Proposisi Malaysia

Strategi & Cadangan

Rekabentuk

Memperkasa jaringan universiti-industri-kerajaan
- Meningkatkan program untuk pereka

P&P untuk perabot inovatif
- IoT untuk perabot
- Mengguna pakai teknologi maju (CAD/CAE/CAM, Prototaip Pantas))
- Rekaan berfungsi

Mempelbagaikan bahan mentah
- Spesis kayu baru, bio-plastik, bio-komposit, fiber semula jadi, atau komposit kayu plastik sebagai bahan alternatif

Pembuatan

Pembuatan Tangkas
- Teknologi pembuatan yang menjimatkan kos

Pendidikan tinggi dalam bidang rekaan dan pembuatan perabot
- Melatih belia dengan kemahiran di pelbagai peringkat
- Mengurangkan kebergantungan kepada pekerja asing

Kesedaran terhadap kelestarian

P&P dalam bahan alternatif, teknologi pembuatan maju
- P&P untuk alat pemotong, mesin dan teknologi pemprosesan
- Mengguna pakai atau membangunkan teknologi maju (Pencetak 3D, Mesin Kawalan Berangka Berkomputer)

Pemasaran

Sinergi untuk pertumbuhan perniagaan
- Mengkaji semula polisi negara (Pekerja asing dan industri hiliran)
- Memperkasakan sokongan institusi dan sistem penyampaian

Peralihan dari pembuatan peralatan tulen (OEM) ke pembuatan reka bentuk asli (ODM) ke pembuatan nama jenama asli (OBM)
- Membangunkan model perniagaan baru
- Menghubungkan syarikat ODM baru dengan syarikat terkemuka
- Platform pemasaran baru (Realiti Maya)

Kelestarian

Pensijilan melalui rantaian penjagaan (CoC)
- Mengkaji semula polisi negara dalam industri bernilai tinggi, kelestarian getah dan kayu balak

Kesedaran terhadap kelestarian
- Memperkenalkan spesis kayu baru
- Bekalan kayu yang konsisten
- Kelestarian kayu yang diperakui
- Kelestarian sumber

P&P dalam bahan alternatif, bahan mentah yang lestari dan spesis baru
- Kultur tisu untuk baka pokok baru (tempoh matang yang singkat, berkualiti tinggi)
- Pusat Ujian Perabot untuk kualiti perabot yang diperakui

Industri **Automotif**

Bidang Fokus

Kejuruteraan Digital Bersepadu – Sistem Keselamatan Aktif Bersepadu yang Maju – Pergerakan Dataraya – Bahan Termaju Hijau

Penglibatan syarikat IT merevolusikan industri automotif. Kini, industri automotif melangkau teknologi tradisional, seperti enjin dan sistem *powertrain*, dengan mengintegrasikan teknologi komunikasi yang mampu menggantikan komponen mekanikal dalam konfigurasi kenderaan, dan didominasi komponen eletrik. Kenderaan masa hadapan akan dilengkapi dengan IoT, menyumbang kepada pergerakan dataraya.

Pada fasa permulaan wawasan 2020, industri automotif disasarkan untuk merangsang permintaan bagi alat ganti dan komponen, serta menggalakkan pertumbuhan industri kecil dan sederhana dalam ekosistem industri. Selain menjadi penyumbang utama pekerjaan, industri ini turut menyumbang kepada ekonomik Negara iaitu sejumlah 2.5% KDNK yang menyumbang 8.5% dalam sektor pengilangan.

Jumlah pemilikan kenderaan di seluruh dunia dijangka melebihi 2.5 bilion menjelang 2050. Kini, kenderaan berinovasi mula memasuki pasaran dan menjanjikan ciri-ciri mesra alam dan penjimatan bahan bakar. Kenderaan baru, seperti; Kenderaan Elektrik Hibrid (HEV), Kenderaan *Plug-in-Hybrid* (PHEV), Kenderaan Elektrik dengan Bateri (BEV) dan Kenderaan Sel Bahan Api (FCV) telah mula memasuki pasaran.



Mempertingkatkan Nilai Proposisi Malaysia

Strategi

1 Menggubal polisi, peraturan dan insentif kerajaan yang bersesuaian dalam aspek berikut:
- Persekitaran
- Perniagaan dan perdagangan
- Bakat
- Piawaian
- Kepelbagaian insentif untuk mempromosikan e-mobiliti

2 Membangunkan kerjasama perniagaan dalam rangkaian nilai e-mobiliti

3 Mengenalpasti sikap pelanggan terhadap faedah dan penggunaan kenderaan baru untuk mengurangkan kebimbangan dan meningkatkan tahap penerimaan.

4 Menginstitusikan penyelarasan infrastruktur sokongan yang relevan

5 Membina komuniti P&P yang kukuh untuk meneroka pembangunan e-mobiliti

Cadangan



Mempertingkatkan ekosistem automotif secara berterusan



Menggubal instrumen polisi baru untuk e-mobiliti



Memacu perniagaan e-mobiliti di masa hadapan



Meningkatkan pembangunan teknologi dan P&P



Membina komuniti P&P, persatuan, dan program bakat muda e-mobiliti



Menyelaras penerimaan masyarakat terhadap e-mobiliti

Industri **Kreatif**

Bidang Fokus

Warisan – Seni – Media – Ciptaan Berfungsi

Ekonomi kreatif dipacu oleh industri kreatif dan kebudayaan yang berpaksikan seni, budaya, perniagaan dan teknologi. Pelbagai Negara telah mengenalpasti ekonomi kreatif dan kebudayaan sebagai penyumbang utama kepada perkembangan ekonomi, dan seterusnya beranjak ke arah perkembangan ekonomi kreatif. Berikutan dengan itu, 'Ekonomi Kreatif' telah diperkenalkan dan polisi digubal untuk pelaksanaan yang lebih strategik dan berstruktur. Negara-negara dari Kesatuan Eropah, UK, China dan Indonesia adalah antara negara terawal yang melaksanakan Ekonomi Kreatif ini.

Penggerak utama industri kreatif adalah bakat, kemahiran dan kreativiti individu yang dapat menyumbang kepada penjanaan kekayaan dan peluang pekerjaan melalui hak milik intektual. Industri ini merangkumi 13 sektor; pengiklanan, seni bina, pasaran seni dan antik, kraftangan, rekaan, fesyen, filem, perisian interaktif (contohnya, permainan video), muzik, seni persembahan, penerbitan, perisian, dan televisyen dan radio.

Bidang kajian Sektor Kreatif Mega Sains 3.0 memfokuskan kepada:

- **Warisan:**
  Galeri, Perpustakaan, Arkeologi dan Muzium (GLAM)

- **Seni:**
  Seni Visual, Seni Persembahan dan Seni & Kraftangan Tradisional

- **Media:**
  Penerbitan, Audiovisual & Media Baru

- **Ciptaan Berfungsi:**
  Persekitaran Binaan, Fesyen & Barang Kemas dan Grafik & Pengiklanan



Mempertingkatkan Nilai Proposisi Malaysia

Strategi & Cadangan

Institusi dan Tadbir Urus

- Pelaburan dalam perkembangan bakat
- Penggunaan teknologi maju oleh Galeri, Perpustakaan, Arkib dan Muzium (GLAM); Seni dan Kraftangan Tradisional
- Pengemaskinian Polisi Industri Kreatif Negara setara dengan keperluan masa kini
- Penubuhan Majlis Seni Negara
- Pemberian insentif kepada industri
- Penubuhan Muzium Sejarah Negara
- Pelaburan dalam produk dan perkhidmatan industri kreatif
- Penubuhan institut latihan dan P&P

Penentududukan Industri

- Penggabungan AR/VR dan pengalaman multisensor ke dalam produk
- Pengunaan teknologi baru dalam industri
- Pertingkatkan rantaian nilai dengan teknologi baru

P & P

- Memfokuskan kepada kandungan digital dan hiburan yang imersif, inklusif dan interaktif
- Mengenalpasti dan membangunkan petunjuk statistik

Perkembangan Bakat

- Pertingkatkan kemahiran seiring dengan kemajuan teknologi
- Pembangunan keusahawanan
- Pertingkatkan program perintis, bimbingan dan program pendidikan tinggi

Hak Milik Intelektual (IPR)

- Mewujudkan kesedaran terhadap teknologi baru yang disruptif kepada IPR
- Menggalakan pereka industri kreatif untuk mendaftar

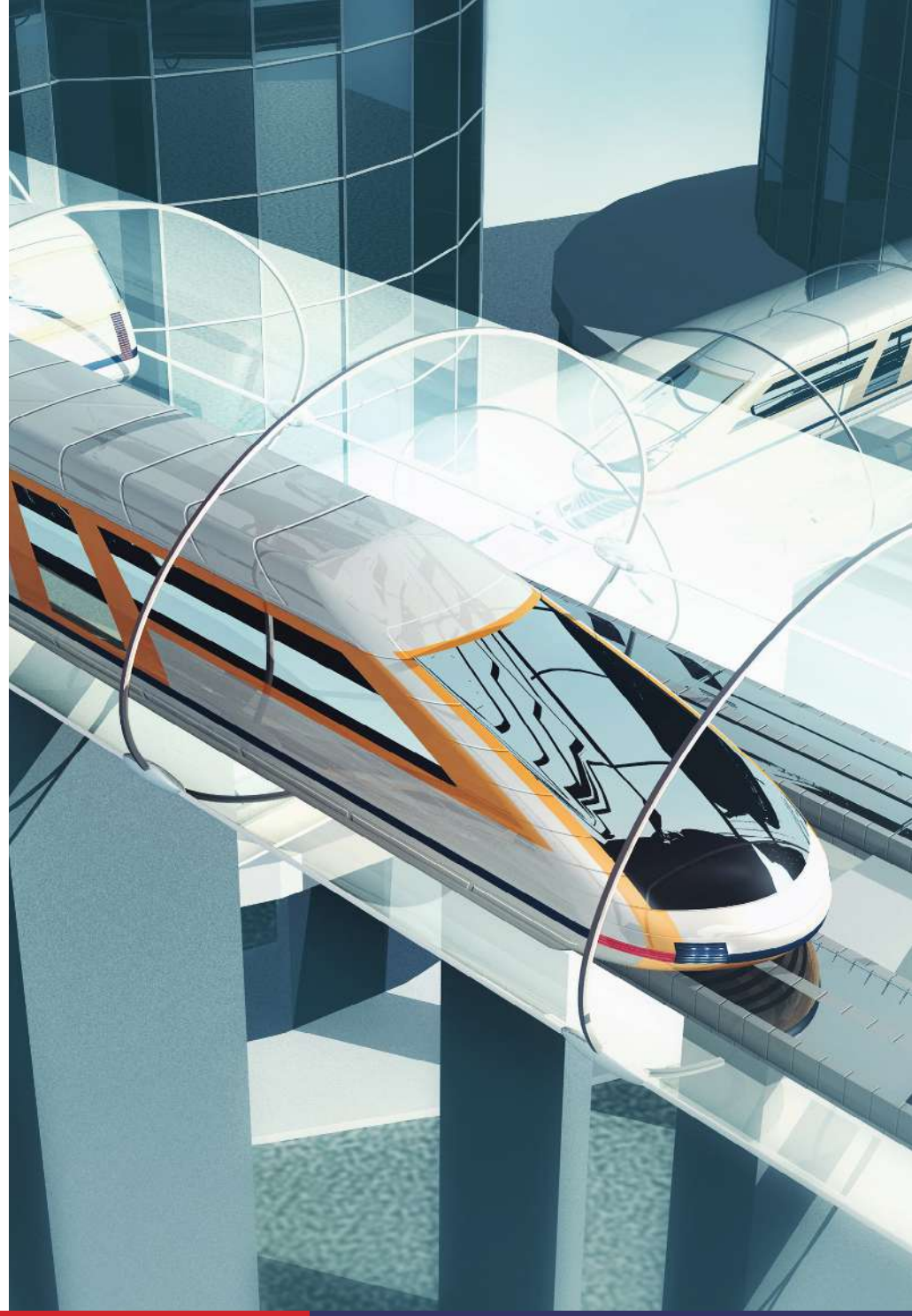
Industri
Pelancongan

Bidang Fokus

Trend Berkaitan dengan Pengurusan Destinasi - Pembangunan Pengangkutan dan Perhubungan - Perubahan Iklim dan Isu Berkaitan dengan Kelestarian - Perubahan Demografik - Pelancongan Tanpa Sempadan

Menjelang 2020, pelancongan akan menjadi industri terbesar dunia. Majlis Pelancongan dan Pengembaraan Dunia (WTTC) menjangkakan bahawa Amerika Syarikat dan China akan menjadi ekonomi pelancongan dan pengembaraan terbesar di dunia. Menjelang 2025, sektor pelancongan dan pengembaraan dijangka akan menyumbang 357 juta peluang pekerjaan dengan jangkaan ketibaan pelancong seramai 1.8 bilion pada 2030. Asia Timur Laut akan menjadi sub-rantau yang paling kerap dilawati dengan 16% jumlah ketibaan pelancong, manakala ketibaan pelancong di Asia Tenggara akan meningkat tiga kali ganda ke 210 juta pada 2030.

Malaysia menyaksikan peningkatan ketibaan pelancong yang ketara sejak 30 tahun yang lalu, dengan peningkatan yang paling tinggi direkodkan dalam tempoh 15 tahun yang lepas. 25.7 juta pelancong telah memasuki Malaysia dengan RM69.1 bilion pendapatan pelancongan pada 2015. Di samping itu, Malaysia mencatatkan sejumlah 169.3 juta pelawat domestik pada 2014, dengan jumlah perbelanjaan sebanyak RM62.2 bilion. Dianggarkan 14% dari tenaga kerja adalah dalam industri pelancongan. Di bawah Program Transformasi Ekonomi (ETP), ketibaan pelancong disasarkan seramai 36 juta dan pendapatan pelancongan sebanyak RM168 bilion bagi 2020. Sasaran ini ditetapkan berdasarkan kepada fokus untuk meningkatkan hasil dari seorang pelancong dengan meningkatkan perkhidmatan dan tawaran, serta mempertingkatkan perhubungan dengan kawasan tarikan pelancongan utama.



Mempertingkatkan Nilai Proposisi Malaysia

Strategi

Tadbir urus

- Mengukuhkan pelaksanaan undang-undang dan peraturan
- Memantau, mengesan dan menilai impak aktiviti pelancongan
- Menyelaras produk dan perkhidmatan di semua peringkat

Implikasi S&T dan Keperluan P&P

- Meluaskan penggunaan ICT untuk meningkatkan pengalaman pelancong
- Revolusi teknologi dan impaknya kepada pelancongan masa hadapan

Jangkauan luar dan Advokasi

- Tindakan pemulihan pencemaran dan cabaran persekitaran sedia ada
- Mengguna pakai amalan terbaik antarabangsa untuk mempromosi dan membangunkan pelancongan yang mampan
- Penglibatan komuniti tempatan dalam pembangunan pelancongan untuk membasmi kemiskinan

Pembangunan Kapasiti

- Tadbir urus yang baik, pengurusan, kepimpinan, dan dana meningkatkan piawaian dan produktiviti

Cadangan

- Menggunakan teknologi untuk meningkatkan pengalaman pelancong
- Memperkasakan pelancongan bandar
- Mengatasi kekurangan bakat
- Melaksanakan Akta Orang Kurang Upaya 2008 dalam semua sektor
- Menanam penghargaan terhadap kelestarian dalam pendidikan dan masyarakat
- Menggalakkan penglibatan masyarakat dalam seni dan kebudayaan tradisional
- Mempromosikan pembangunan teknologi hijau dalam pelancongan
- Menggunakan dana HRDF secara efektif untuk perkembangan bakat
- Meningkatkan keselamatan dalam eko-pelancongan dengan mengguna TV litar dan alat pengesan
- Meningkatkan perlindungan persekitaran
- Melaksanakan undang-undang
- Pengurusan sumber sektoral untuk tenaga boleh diperbaharui
- Menyusun semula model pelancongan untuk memberikan pulangan tinggi kepada masyarakat tempatan
- Memperkasakan mekanisma tadbir urus di peringkat nasional, negeri dan tempatan.

Industri
Plastik & Komposit

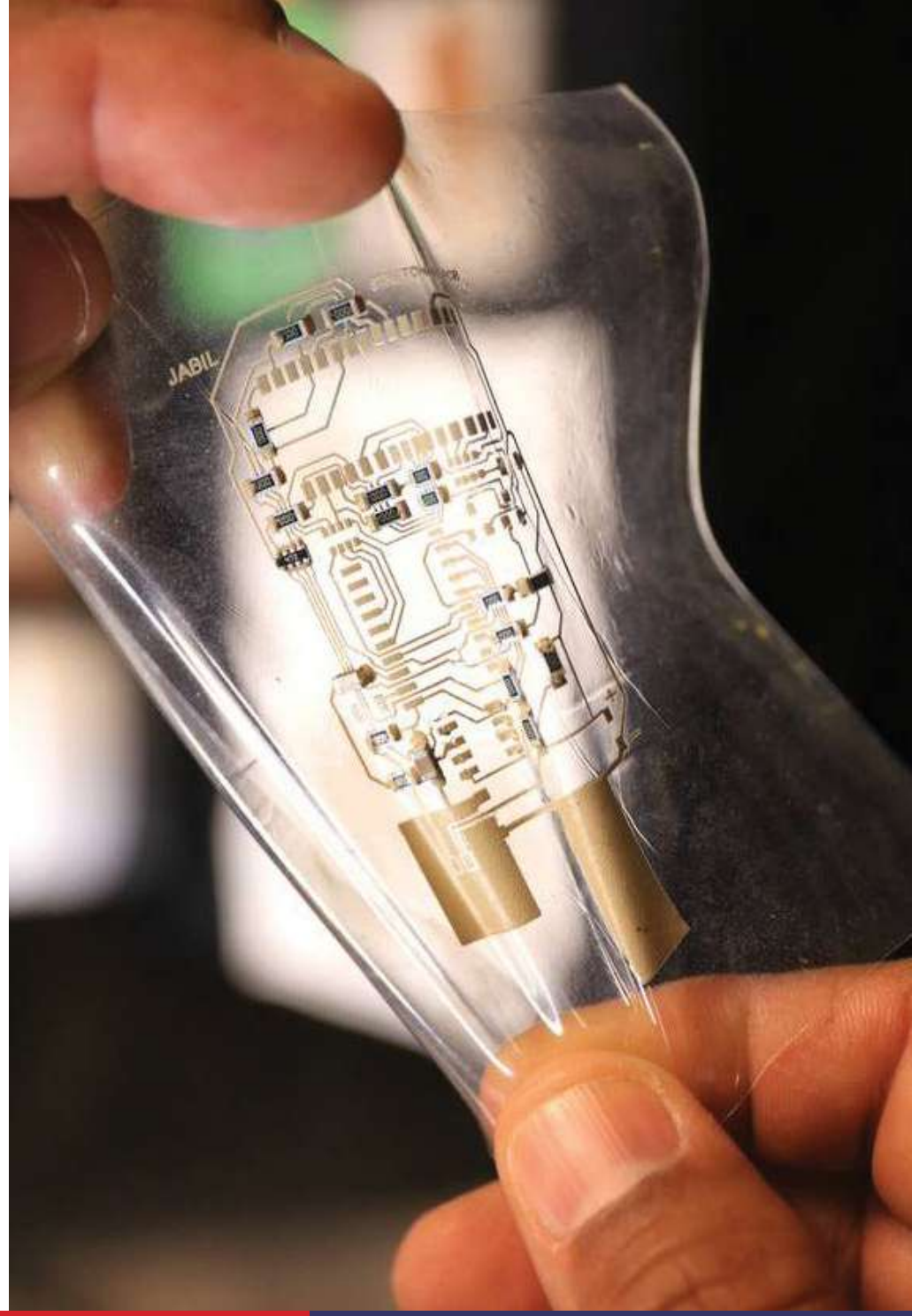
Bidang Fokus

Trend Bahan Termaju - Pembangunan Produk Baru - Trend Teknologi Pembuatan Termaju - Alam Sekitar dan Pembangunan Lestari

Lumbar plastik dan komposit bakal mendapat permintaan yang tinggi kerana daya tahannya yang tahan lama, daya rintangan terhadap degradasi dan serangan serangga, penyelenggaraan yang minima, dan boleh diproses seperti kayu asli. Ia juga mesra alam kerana diproses dari bahan-bahan yang dikitar semula. Faktor ini akan meningkatkan lagi keyakinan pengguna dan merangsang permintaan terhadap bahan ini.

Industri komposit dijangka meningkat sebanyak 4% pada 2015 di seluruh dunia. Pada tahun 2019, pasaran komposit dunia dijangka akan terus meningkat dan bernilai sekitar USD35 bilion. Menjelang 2050, pasaran komposit dilihassssst akan mengalami perkembangan yang signifikan dengan peluang-peluang yang tercipta dalam sektor yang berlainan. Ia mampu mencapai sehingga USD285 bilion.

Sejak kebelakangan ini, industri plastik di Malaysia telah beralih dari pembuatan produk murahan yang digunakan bagi menggantikan barangan import, kepada pembuatan berasaskan eksport dan aplikasi industri bertaraf tinggi. Persatuan Pengeluar Plastik Malaysia (MPMA) telah menyatakan bahawa nilai eksport berbanding keuntungan jualan meningkat dari 40% dalam tahun 1990-an kepada 60%. Pada 2015, industri plastik Malaysia terus berkembang pesat. Jumlah keuntungan jualan pada tahun tersebut meningkat kepada RM25 bilion, peningkatan 27% berbanding RM19 bilion pada 2014. Bagi industri komposit Malaysia pula, keuntungan dianggarkan berjumlah RM3.5 bilion dari sejumlah 70 pengilang. Pada masa ini, sektor pembinaan, aeroangkasa dan marin merupakan pengguna terbesar bahan ini.



Mempertingkatkan Nilai Proposisi Malaysia

Strategi

- Menyediakan suasana yang kondusif bagi menggalakkan inovasi dalam industri plastik dan komposit.
- Membina kapasiti dan kebolehan dalam plastik dan komposit.
- Menyediakan dana kerajaan untuk P,P&P, seiring dengan negara-negara membangung, iaitu 2% dari KDNK.
- Memperkasa industri untuk menyumbang kepada industri plastik dan komposit dengan sokongan kuat kerajaan.
- Memupuk jaringan antara aktiviti upstream, midstream, dan downstream.
- Menubuhkan skim kitar semula untuk mempromosikan kecekapan serta pemeliharaan sumber dan pengurangan bahan cemar.
- Memastikan kelestarian industri plastik dan komposit melalui pendekatan circular economy.
- Melibatkan penggubal dasar untuk memahami kepentingan industri plastik dan komposit
- Membantu industri dalam meningkatkan kualiti pengeluaran untuk terus bersaing di peringkat global.

Cadangan

- Menyediakan peluang kerjaya dalam industri plastik dan komposit kepada graduan Institut Pendidikan Teknikal & Latihan Vokasional (TVET).
- Menubuhkan dan membiayai Badan Bertindak Pemandu Industri Plastik dan Komposit di bawah MITI.
- Menyediakan dana seiring dengan negara-negara membangun (2% KDNK) untuk penyelidikan bagi tempoh 35 tahun akan datang.
- Menggalakkan industri untuk menggunakan plastik dan komposit untuk meningkatkan prestasi dan memenuhi keperluan kelestarian *(Life Cycle Assessment* (LCA) dan pendekatan holistik).
- Menggalakkan industri plastik & komposit dan sektor awam untuk menggunapakai *Circular Economy*, termasuk *"Waste to Wealth* (W2W)" dan 4R *(Reduce, Reuse, Recycle, Recover).*

Peluang Ekonomi Baru

Kajian bersama ini adalah hasil mandat Majlis Sains Negara (MSN) kepada ASM dan Majlis Profesor Negara (MPN) pada 2016. Ia bertujuan untuk mencadangkan mekanisma yang sesuai dan penting ke arah perkembangan peluang pembangunan ekonomi di peringkat global melalui industri berasaskan STI.

Ekonomi baru dipacu oleh pengetahuan dan teknologi yang berkembang pesat serta rangkaian digital yang membolehkan perkongsian idea baru merentasi sempadan. Ia membuka peluang kepada rangkaian kerjasama untuk inovasi disruptif yang menghasilkan produk dan perkhidmatan yang bernilai tinggi di pasaran.

Kajian ini mencadangkan hala tuju bagi Malaysia dengan mengambil kira potensi ini, untuk terus berdaya saing dengan menggunapakai pendekatan ekonomi kolaboratif melalui rangkaian kerjasama industri tertentu. Empat bidang telah dikenalpasti sebagai bidang khusus yang berpotensi tinggi untuk kemajuan ekonomi. Bidang tersebut adalah Industri Halal, Industri Kesihatan dan Kesejahteraan, Industri Pembuatan dan Perkhidmatan Sampingan serta Industri Perkhidmatan. Kajian ini juga mengenalpasti dan memanfaatkan kelebihan, kekurangan dan peluang bagi setiap sektor.

Dapatan dan cadangan kajian ini akan dibentangkan kepada Majlis Sains Negara (MSN) pada suku pertama 2017.

Pembuatan dan Perkhidmatan Sampingan

Industri pembuatan menyumbang sehingga 23% kepada KDNK Malaysia dan ianya perlu berubah untuk terus bersaing. Dengan Revolusi Industri ke-4, industri ini mengalami transformasi yang ketara. Kemajuan dalam teknologi memuncul seperti kecerdasan buatan, robotik, IoT, kenderaan autonomi, pencetakan 3D, teknologi nano, bioteknologi, sains bahan, penyimpanan tenaga dan pengkomputeran kuantum terus memacu sektor ini.

Perkhidmatan

Pada 2015, sektor perkhidmatan menyumbang 53.8% KDNK Malaysia dan terus menjadi penyumbang utama kepada perkembangan ekonomi dalam RMKe-11. Pelan Tindakan Sektor Perkhidmatan dan RMKe-11 memfokuskan kepada industri perkhidmatan berasaskan inovasi dan ilmu pengetahuan. Perancangan transformasi sektor perkhidmatan perlu menitik beratkan teknologi kewangan (fintech), di mana inovasi berimpak tinggi terhasil di seluruh dunia. Dengan menggalakkan pertumbuhan fintech dalam bahagian pasaran yang belum diterokai, Malaysia mampu berada di barisan hadapan pasaran tertentu.

Halal

Malaysia dilihat sebagai peneraju pasaran halal disebabkan kesediaan ekosistem halal negara yang dilengkapi polisi dan pelan pembangunan yang menyeluruh dan proaktif. Industri ini menyumbang kepada pertumbuhan ekonomi negara dengan 7.5% KDNK. Pada 2016, 1,401 syarikat Malaysia telah mengeksport produk halal bernilai RM205.1 bilion. Selain itu, negara-negara lain turut mengambil peluang pasaran ini termasuk Negara dengan populasi minoriti Muslim.

Perubatan dan Kesihatan

Transformasi industri perubatan dan kesihatan memfokuskan sistem penyampaian kesihatan maya (eHealth). Kini, infrastruktur penjagaan kesihatan lebih canggih berbanding permulaan teleperubatan di negara ini dua dekad lalu. Sistem eHealth dijangka akan merangsang industri pelancongan kesihatan di mana perkhidmatan perubatan dan kesihatan diberi secara atas talian, dengan rangkaian doktor pakar yang dipercayai untuk khidmat perundingan dan rawatan susulan. Dengan kemudahan perubatan yang canggih, Malaysia mampu menjadi destinasi perubatan dan kesihatan utama di ASEAN.

lembaran fakta

Perwakilan Berdasarkan Organisasi
Industri - **35%**
Kerajaan - **26%**
Akademik - **22%**
Awam - **17%**

Tempoh Projek
Mei 2016 - Januari 2017

164 orang

82 organisasi

10 Penglibatan (perbincangan, bengkel perancangan strategik, mesyuarat kumpulan fokus dan mesyuarat kumpulan pakar)

Persekitaran Lestari

Pemodenan merangsang kemajuan ekonomi dan teknologi dalam meningkatkan kualiti hidup. Kemajuan ini memberi kesan negatif kekal kepada persekitaran seperti penyusutan sumber asli, perubahan iklim dan kepupusan spesis.

Walaupun bumi mampu mengalami pemulihan secara semulajadi, tetapi manusia telah menyebabkan kerosakan yang melampaui batas. Pencemaran dari aktiviti manusia memberi kesan kepada planet ini. Oleh itu, kita bertanggungjawab melindungi planet ini dari terus dicemari. Ini dapat dicapai melalui penggunaan dan penghasilan yang mampan, pengurusan sumber asli yang baik, serta mengambil tindakan ke atas perubahan cuaca.



“Kita bertanggungjawab untuk menyerahkan bumi ini dalam keadaan yang baik dan tidak terjejas kepada keturunan masa depan sepertimana yang kita memperolehinya.”

YAB Dato’ Sri Mohd Najib Tun Abdul Razak

Jerebu Merentasi Sempadan

Kajian ini dijalankan bagi mengenalpasti dan membangunkan pendirian ASM dalam isu berkaitan jerebu merentasi sempadan yang merangkumi pelbagai pihak berkepentingan dan komuniti yang terjejas di Malaysia dan di rantau ini. Laporan kajian ini bertujuan untuk memberi cadangan dan input polisi kepada kerajaan Malaysia melalui badan-badan yang relevan. Aspek berikut dikenalpasti:

- Rangka kerja dasar-perundangan
- Pengaturan institusi
- Sosio-ekonomi
- S&T

lembaran fakta

- Jerebu merentasi sempadan telah dilaporkan pertama kali di Asia Tenggara pada 1972 dan ia menjadi isu alam sekitar di rantau ini selama lebih dari tiga dekad. Fenomena jerebu semakin kerap sejak 1982 di mana kebarangkalian kejadian jerebu meningkat dari sekali setiap sembilan tahun ke setiap tahun.

- Kadar asap, habuk, kelembapan dan wap dalam jerebu yang mencukupi boleh menjejaskan penglihatan. Jerebu dikatakan 'merentasi sempadan' apabila ketumpatannya yang tinggi masih boleh diukur selepas ia merentasi ruang udara Negara lain.

- Kebakaran separa kawasan gambut mengeluarkan lebih asap dan partikel yang mengambil jangkamasa lebih lama untuk reda. Ini membolehkan ia terapung di udara, dihanyutkan oleh angin merentasi sempadan menyumbang kepada 90% kejadian jerebu merentasi sempadan ASEAN. (Heli, 2007)

Tiga isu utama yang difokuskan adalah:

Jerebu dan Kualiti Udara

Impak jerebu ke atas kesihatan, ekonomi, pertanian, persekitaran, dan kepelbagaian bio, bukan sahaja memberi kesan kepada negara yang terlibat, malah kepada seluruh dunia, serta melibatkan usaha masyarakat antarabangsa dalam mencari penyelesaian isu ini. Jerebu bukanlah satu fenomena semulajadi. Ia terdiri daripada bahan cemar atmosfera yang terhasil akibat daripada aktiviti manusia. Walaupun fenomena El Nino dan arah tiupan angin mampu meningkatkan tahap pencemaran jerebu, El Nino bukanlah penyebab jerebu.

Pengurusan Kawasan Tanah Gambut dan Air

Pembakaran tanah gambut berkait rapat dengan jerebu. Komposisi tanah gambut tropika mempunyai kandungan organik yang tinggi. Tanah ini mudah terbakar sekiranya dibiarkan kering dan menyebabkan penyebaran partikel seni ke udara. Tahap kesedaran yang rendah serta kekurangan pengetahuan dan kefahaman tentang pengurusan tanah gambut menyumbang kepada kebakaran tanah gambut. Selain itu, pengurusan dan pentadbiran agro-alam sekitar tanah gambut yang lemah, polisi yang kurang berkesan, dan isu sosio-ekonomi juga menyumbang kepada masalah ini.

Kitaran Sisa kepada Sumber: Tenaga atau Bahan

Proses pembersihan tanah, penanaman, penuaian, dan penanaman semula menghasilkan sisa biomass dalam jumlah yang besar. Sisa ini sering dilupuskan melalui kaedah pembakaran yang cepat, mudah dan murah. Kajian ini meneroka potensi sisa biomass yang terhasil melalui pembersihan tanah atau pertanian, untuk dijadikan produk yang bernilai tinggi, dan memberi pulangan kepada petani.

Cadangan

Tebang, bukan untuk dibakar, tetapi meraih pendapatan

- Menggalakkan kerajaan untuk melabur dalam membangunkan kemudahan untuk menukarkan biomass kepada produk atau tenaga melalui kerjasama swasta-awam.

- Menyediakan persekitaran pelaburan yang kondusif termasuk kadar faedah yang rendah, harga produk berasaskan bio yang kompetitif atau disubsidikan, pembelian dari pihak kerajaan, dan kawasan perniagaan yang sesuai bagi menggalakkan pelaburan dalam fasiliti yang dicadangkan.

- Menggalakkan sektor swasta untuk menerajui pelaburan dengan penglibatan pelaburan Agensi kerajaan dan komuniti tempatan yang terdiri daripada petani, penduduk, peniaga kecil-kecilan, dan syarikat perladangan yang berdekatan.

Urus tanah gambut, elakkan kebakaran

- Syarikat perladangan yang menguruskan kawasan tanah gambut mengambil langkah keselamatan untuk mengurangkan risiko kebakaran.

- Aktiviti perladangan dalam kawasan tanah gambut perlu memastikan aliran dan saluran air yang baik dalam sistem pengairan ladang.

- Kawasan tanah gambut terbiar perlu dikenalpasti dan dipromosikan untuk pelaburan dan pemuliharaan.

- Pembangunan kawasan tanah gambut dan air dijalankan di pinggiran lembangan tanah gambut bebas.

Melihat melangkaui jerebu

- Agensi penguatkuasa meningkatkan larangan pembakaran terbuka terutamanya semasa Monsun Barat Daya dari bulan Jun hingga Oktober.

- Pelan kontigensi setempat yang menggunakan kaedah pembahagian sumber perlu dibangunkan dan dipraktikkan semasa tahap pencemaran jerebu yang tinggi (API melebihi 500) bagi mengurangkan sumber pencemaran tempatan.

- Ramalan cuaca dan sistem amaran perlu disebarkan dengan lebih berkesan berserta produk ramalan cuaca tambahan bagi meningkatkan keberkesanan sistem ini.

Penyampaian Sains kepada semua

- Polisi komunikasi yang baik boleh direalisasikan dengan koordinasi penyelidikan yang lebih efektif oleh institusi penyelidikan.

- Penglibatan orang awam melalui media sosial, dialog mengenai isu kritikal dan aktiviti pelbagai pihak berkepentingan bersama agensi kerajaan boleh mempengaruhi proses polisi secara positif.

Bidang P&P

- Bagi merangka langkah-langkah pengawalan sumber pencemaran setempat, kajian perlu dijalankan ke atas sistem dan aspek sosio-ekonomi serta kesan perundangan pelan kontigensi setempat.

- Menjalankan P&P dalam pengesanan dan pemodelan radioisotop ke atas bahan pencemar yang hadir dalam julat tinggi dan tidak dapat dikenalpasti.

- Menjalankan kajian ke atas kesihatan yang memfokuskan ciri-ciri toksikologi partikel jerebu serta menilai kesihatan dan bebanan penyakit disebabkan jerebu secara sistematik. Ini perlu merangkumi kajian epidemiologi bebanan penyakit disebabkan pencemaran udara, penilaian ketoksikan bahan partikel kebakaran hutan, dan penilaian persekitaran dalaman sekolah ketika jerebu.

- Semua maklumat kajian seperti lokasi, kawasan dan status tanah gambut tropika perlu dikongsi secara terbuka. Data ini perlu diintegrasikan dalam peta *Geographic Information Systems* (GIS).

- Penyelidikan strategi pengurusan masa hadapan perlu meliputi; tinjauan dan pemetaan tanah gambut; kajian hidrologi ekosistem gambut; rekaan infrastruktur kawasan gambut yang inovatif; mengenalpasti spesis tumbuhan yang sesuai di kawasan berair; dan pembangunan variasi tanaman berhasil tinggi di kawasan gambut.

Hakisan dan Pemendapan

Hakisan tanah dan enapan merupakan penyebab utama pencemaran laluan air di seluruh dunia. Kesan buruknya terhadap laluan air adalah kemusnahan ekologi dan kehidupan ikan, pengangkutan bahan toksik (racun serangga dan racun rumput) yang melekat pada enapan dan pengurangan kapasiti laluan air untuk mengalirkan air hujan dan seterusnya mengakibatkan banjir.

Kajian ini membincangkan aktiviti manusia yang mengakibatkan pencemaran mendapan. Kerja-kerja pengendalian tanah akan menyebabkan hakisan tanah dan pemendapan ketika hujan lebat. Hakisan air akan membawa lebih banyak enapan jika tanah ditinggalkan terbiar. Kesemua sektor utama ekonomi negara melibatkan kerja tanah yang ekstensif seperti perladangan, pertanian, pembangunan kawasan perumahan, pembinaan infrastruktur, perlombongan dan perhutanan.

lembaran fakta

- Banjir kilat di negara ini adalah akibat dari hakisan dan pemendapan tanah. Keluasan tanah sebesar **29,000** km per segi terjejas akibat banjir setiap tahun (Jabatan Pengairan dan Saliran, 2011).

- Panduan Pencegahan dan Pengawalan Hakisan dan Pengelodakan (lampiran I) merupakan dokumen rasmi yang telah diterbitkan pertama kalinya pada 1978 di Malaysia untuk membantu juruperancang dan syarikat pembangunan mengawal hakisan. Dokumen ini seterusnya telah dikemaskini pada 1978, 1992 dan 1996 (Jabatan Persekitaran, 1996).

Hala Tuju

- Pengawalselia yang berkebolehan dan terlatih dalam pengawalan hakisan dan pemendapan adalah penting untuk melaksanakan penguatkuasaan autonomi.

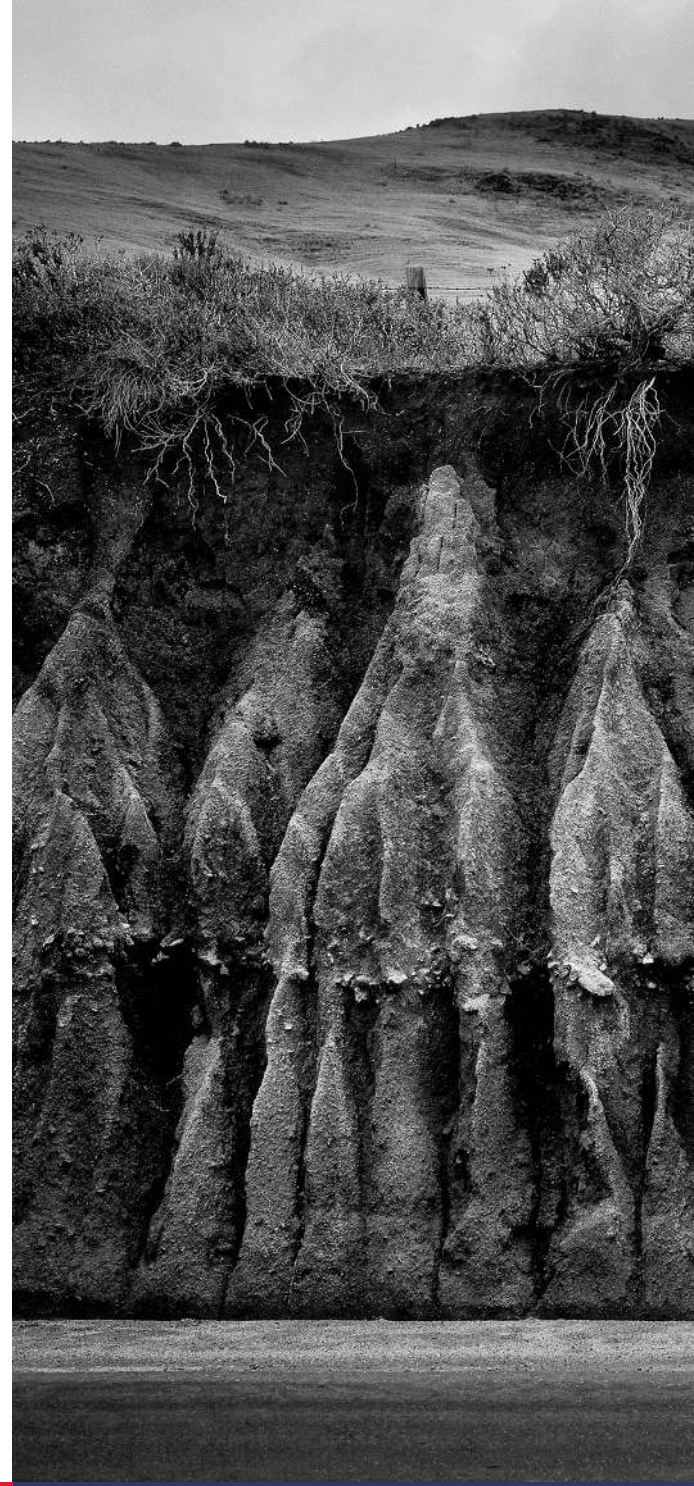
- Syarat baru bagi Pelan Kawalan Hakisan dan Kelodak (ESCP) perlu dirangka dan dilaksanakan untuk semua kerja tanah melibatkan semua sektor.

- Proses kerja dalam industri pembinaan yang tidak lestari berdasarkan penilaian Kawalan Hakisan dan Kelodak (ESC) perlu dihentikan. Pengamal industri ini perlu diberi kesedaran mengenai keperluan penambahbaikan proses kerja. Ini termasuk kerja-kerja penyelenggaraan yang dijalankan oleh pihak berkuasa tempatan.

- Selain perundangan, kesedaran tentang Amalan Tadbir Urus yang Baik (BMP) dan latihan kecekapan adalah perlu untuk mengatasi masalah ini.

- Pensijilan profesional adalah perlu untuk memastikan kecekapan.

- Penyelidikan kaedah membaik pulih dan mengalihkan mendapan terampai dari sungai dan saliran perlu dijalankan.



Perlombongan Lestari

Bagi Negara yang kaya dengan sumber asli, bahan mineral berpotensi menjana kekayaan dan perlombongan masih menjadi kaedah utama untuk mendapatkannya. Jika tidak diuruskan dengan baik, perlombongan akan menjadi penyebab kepada degradasi alam sekitar dan sosial. Dasar Mineral Negara Kedua (NMP2) yang diperkenalkan pada 2009 menegaskan keperluan penjagaan alam sekitar yang akan memastikan sumber mineral negara dilombong secara mesra alam, bertanggungjawab dan lestari.

Perlombongan bauksit di Kuantan, Pahang bermula pada 2013 secara kecil-kecilan di Balok dan kemudiannya berkembang ke Bukit Goh, Bukit Sagu dan Sungai Karang. Perkembangan pesat yang tidak terkawal ditambah pula dengan perlombongan tidak lestari, samada secara sah atau haram, mengakibatkan kemusnahan alam sekitar.

ASM menubuhkan satu Badan Bertindak bagi menganalisa isu-isu berkaitan perlombongan bauksit di Kuantan dan mengutarakan cadangan untuk mengatasi masalah akibat aktiviti ini. Ini adalah untuk mengurangkan kemusnahan alam sekitar, dalam masa yang sama memberi imbangan kepada kesejahteraan masyarakat dan penjanaan kekayaan.

lembaran fakta

- Eksport bauksit Malaysia ke China meningkat dari **343,000** tan ke **3.72** juta tan, dari Januari ke September 2015 (The Star, Disember 2015).

- Bijih bauksit mengandungi aluminium oksida (alumina), yang merupakan elemen utama untuk logam aluminium. Lebih **95%** dari penghasilan alumina di dunia diperolehi dari proses *Bayer (International Aluminium Institute, 2015).*

Kertas Posisi bertajuk Perlombongan Lestari: Kajian Lapangan Perlombongan Bauksit di Pahang mencadangkan perkara berikut:

- Semua aktiviti perlombongan bauksit perlu dikawal di bawah Enakmen Mineral Negeri (SME). Kelemahan seperti meletakkan perlombongan bauksit di bawah Kod Tanah Nasional dalam konteks aktiviti pemindahan tanah perlu diatasi
- Pembersihan stok sedia hendaklah diuruskan mengikut amalan terbaik
- Kawalan pencemaran, hakisan dan mendapan secara efektif perlu diamalkan di kawasan perlombongan, kawasan simpanan stok, pelabuhan dan pemindahan stok dari pelabuhan ke tongkang
- Pengawasan alam sekitar merangkumi kualiti air, udara dan bunyi perlu dijalankan secara berkala
- Memastikan lori yang digunakan untuk memindahkan bauksit adalah bersih dengan mempraktikkan operasi standard (SOP) termasuk pembersih roda di setiap kawasan perlombongan, kawasan penyimpanan stok dan pelabuhan, selaras dengan garis panduan Suruhanjaya Pengangkutan Awam Darat (SPAD)
- Menyediakan kawasan penyimpanan stok berpusat beserta sistem keselamatan berdasarkan spesifikasi yang diluluskan oleh Kerajaan Negeri
- Menggalakkan badan bukan kerajaan (NGO) untuk membantu memberi pendedahan berkenaan isu perlombongan bauksit kepada komuniti dan pihak berkepentingan
- Pelan Pemuliharaan Lombong perlu dirangka secara strategik untuk memastikan pemuliharaan dijalankan setelah aktiviti perlombongan berhenti bagi memastikan kelestarian kawasan tersebut.





Pengurusan Intipati Kehidupan

"Air dan sanitasi merupakan teras kepada pembangunan lestari yang penting untuk kehidupan manusia dan planet. Matlamat ke-6 bukan hanya untuk menyelesaikan isu berkaitan air bersih, sanitasi dan kebersihan diri, tetapi juga menumpukan kepada kualiti dan kelestarian sumber air di seluruh dunia"

UN SDG, 2015

Hidupan bergantung kepada air. Air adalah mencukupi untuk semua tetapi disebabkan pengurusan dan infrastruktur yang lemah, jutaan manusia tidak mempunyai akses kepada air bersih. Pengurusan kitaran air yang holistik penting dalam pengendalian tegasan air yang memberi kesan kepada manusia di seluruh dunia. 41 buah negara dilaporkan mengalami tegasan air dalam tahun 2011. Tegasan air memberi kesan buruk terhadap kelestarian sumber asli, ekonomi dan pembangunan sosial.

Pengurusan sektor air di Malaysia berpecah-belah mengikut negeri dan wilayah dan telah kekal sebagai kebiasaan sejak kemerdekaan dari penjajahan British pada 1957. Walaupun bekalan air mencukupi bagi menampung keperluan yang semakin bertambah, kita sering menghadapi kekurangan air. Tegasan air di Malaysia akan bertambah teruk jika cara penggunaan, pengurusan dan perkongsian air tidak diubah. Krisis air sedunia adalah disebabkan tadbir urus, dan bukannya kekurangan sumber.

Jawatankuasa Air ASM telah ditubuhkan pada 2008 untuk membincangkan pelbagai isu dan cabaran berkaitan sektor air di Malaysia. Jawatankuasa ini telah mengenalpasti beberapa bidang utama untuk mengutarakan strategi dan cadangan kepada kementerian dan agensi yang berkaitan. Cadangan ini terhasil dari sesi perundingan bersama institusi, komuniti dan pihak berkepentingan dari sektor swasta yang relevan.



Perhimpunan Agung Bangsa-Bangsa Bersatu 1993 telah menetapkan bahawa 22 Mac sebagai Hari Air Sedunia, dan diuruskan oleh UN-Water dengan kerjasama pihak kerajaan dan rakan strategik seluruh dunia.



Pelan Pengurusan Sumber Air Bersepadu Negara

Di Malaysia, pengurusan sumber air terbahagi mengikut Negeri. Sehubungan dengan itu, Pelan Pengurusan Air Bersepadu Negara (IWRM) perlu dijalankan secara menyeluruh di seluruh negara.

Malaysia menyatakan komitmennya untuk melaksanakan IWRM di *Rio Earth Summit* 1992. Seterusnya, konsep IWRM telah dijalankan di Malaysia melalui Rangka Rancangan Jangka Panjang Ketiga (RRJP3) 2001-2010, dan menjadi sebahagian dari Dasar Sumber Air Negara (DSAN) yang dilancarkan pada 2012. Walaubagaimanapun, selepas lebih dari dua dekad, IWRM masih belum diinstitusikan oleh kementerian, agensi dan pengurusan negeri seluruh negara.

Beberapa siri kajian berkaitan IWRM telah dijalankan oleh Badan Bertindak yang dilantik. Hasil kajian ini menjadi asas formulasi laporan Pelan IWRM Negara ini. Pelan ini bertujuan menyatukan ke semua pihak berkepentingan berkaitan pengurusan air di seluruh negara untuk memastikan pengurusan sumber air yang lestari.

Penyatuan ini adalah perlu bagi memastikan IWRM dapat dilaksanakan dalam usaha mencari penyelesaian bersepadu kepada pelbagai isu dan cabaran yang dihadapi oleh sektor air. Penggalakkan *participatory management* dan menangani isu merentasi sempadan melalui perbincangan yang berterusan merupakan elemen yang penting dalam anjakan paradigma ini, menjadikan "urusan berkaitan air, urusan semua".

Pelan Pengurusan Sumber Air Bersepadu Negara (IWRM)

"Proses untuk menggalakkan pembangunan dan pengurusan air, tanah dan sumber berkaitan secara bersepadu, bagi mengoptimumkan kesan ke atas ekonomi dan kesejahteraan sosial dengan cara yang munasabah tanpa mengganggu kelestarian ekosistem" - Global Water Partnership

lembaran fakta

- Pelan IWRM merangkumi **14** sub-tema IWRM, selain dari **10** laporan yang telah disiapkan oleh ASM dalam bentuk ringkasan, laporan dan ulasan pakar untuk menghasilkan laporan yang menyeluruh.

Rumusan Cadangan

Pelan NIWRM menggariskan 25 cadangan seperti berikut:

- Transformasi sektor air Malaysia demi masa depan perlu diterajui melalui penggunaan dan pelaksanaan Pelan NIWRM. Pelan ini dapat memastikan transformasi sektor air sejajar dengan sektor ekonomi yang lain seperti yang telah dikenalpasti sebagai NKEA di bawah ETP.

- Pelan komponen dan program yang dicadangkan dalam laporan ini dijalankan secara serentak di seluruh negara oleh kementerian yang relevan, sama ada di bawah "pengurusan sumber air" atau "pengurusan utiliti air".

Persekitaran Pemboleh
Mengandungi 10 cadangan berkaitan polisi, perundangan, peraturan dan kewangan yang diperlukan bagi Dasar Sumber Asli Bersepadu yang menyeluruh; pengesahan Akta Sumber Air Negara semasa perlu dipercepatkan; dan keperluan dana dan protokol terutamanya berkaitan kerja-kerja pemuliharaan alam sekitar.

Rangka Institusi
Lima cadangan di bawah kategori ini memfokuskan penilaian dan pemerkasaan tadbir urus melalui satu jawatankuasa pemerhati dan pelaksanaan struktur pengurusan di peringkat negara, negeri, lembangan sungai dan hierarki tempatan, termasuk mengukuhkan integrasi intra-kementerian.

Instrumen Pengurusan
Lima cadangan di bawah kategori ini memberi penekanan kepada penubuhan pangkalan data berpusat IWRM yang dibina di sekitar platform lembangan sungai; penggunaan instrumen ekonomi, kewangan dan teknikal untuk penjimatan penggunaan air dan kebolehpercayaan untuk mengelak salah laku; pelaksanaan agenda negara untuk penyelidikan air bersepadu; mekanisma untuk mempromosikan pertumbuhan hijau; dan penubuhan pusat sehenti untuk pembinaan kapasiti bagi mempertingkatkan kemahiran dan kecekapan di setiap peringkat.

Pelaburan dalam Infrastruktur Air
Merangkumi cadangan berpusat untuk pelaburan segera dalam Infrastruktur Air untuk menyediakan keperluan sektor air negara dan menggalakkan tranformasi sektor air.

Selari dengan 95 EPP, 15 program utama telah dikenalpasti dan dikategorikan kepada tiga sub-program; lima program menyeluruh melibatkan 14 EPP, limaprogram berkaitan "Air sebagai Sumber" melibatkan 48 EPP, dan lima program berkaitan "Air untuk Kehidupan" melibatkan 33 EPP.

Struktur Pengurusan Pelaksanaan Pelan
Dicadangkan bahawa pelan ini diuruskan di peringkat nasional oleh MSAN, dan MSANg bagi peringkat negeri. Majlis Sains Kebangaan perlu mengawasi pelaksanaan sistem pengurusan sokongan dan dibantu oleh Jawatankuasa Teknikal Negara (NTC). Mesyuarat yang kerap perlu untuk menyelesaikan isu-isu teknikal dan pengurusan operasi.

Penubuhan Unit Pelaksanaan IWRM (IWRM-IU) di bawah Majlis Sains Kebangsaan yang bertanggungjawab untuk memastikan pelaksanaan pelan ini berjalan lancar. Unit ini juga akan memantau pelaksanaan program di semua peringkat.

Menerajui Agenda IWRM Negara
Menteri NRE, KeTTHA, and MOA dicadangkan untuk bekerjasama bagi menerajui agenda ini.

lembaran fakta

Berikut adalah laporan nasihat yang telah disiap-kan oleh Jawatankuasa Air ASM:

-

2009

Integrated Lake Basin Management
- Dikemukakan kepada NRE pada 2010 dan MSAN 07 pada 2012

2011

Integrated Aquifer Systems Management
- Dikemukakan kepada NRE pada 2012

ASM Mega Science Study: Water Sector
- Dikemukakan kepada Kabinet pada 2012

2014

National Agenda for Integrated Water Research
- Dikemukakan kepada NRE, MOSTI pada 2015 dan MSAN 10 pada 2015

Climate Change and Water
- Dikemukakan kepada NRE, MOSTI pada 2015 dan MSAN 10 pada 2015

2015

NKPA on Water

2016

Water Demand Management
- Dikemukakan kepada EPU, NRE, KeTTHA, MOA pada 2016

Water Supply and Wastewater Management
- Dikemukakan kepada KeTTHA pada 2016

Integrated River Basin Management
- Dikemukakan kepada NRE pada 2016

Water and Agriculture
- Dikemukakan kepada MOA pada 2016

Perubahan Iklim: Atribut Kapasiti Adaptif Dasar-Dasar Air Terpilih di Malaysia

Kapasiti adaptif adalah keupayaan penyesuaian sistem dengan perubahan iklim. Ia penting dalam menyokong pengurusan sumber air negara dalam kepelbagaian iklim. Tahap bencana banjir dan tegasan air yang semakin meningkat di negara ini akibat dari perubahan iklim perlu diberi perhatian melalui polisi dan perundangan yang lebih tegas. ASM telah menjalankan kajian mengenai Perubahan Iklim: Atribut Kapasiti Adaptif Dasar-Dasar Air Terpilih di Malaysia bagi membantu Kerajaan menggubal undang-undang dan polisi yang lestari yang membolehkan adaptasi kepada perubahan iklim.

Pelan Pengurusan Lembangan Sungai Selangor yang menyediakan 60% bekalan air bagi kegunaan domestik dan industri di Selangor dan Lembah Klang adalah antara lima dokumen polisi dan pelan pembangunan utama yang digunakan sebagai asas dalam kajian ini untuk melihat keberkesanannya dalam membantu meningkatkan kapasiti adaptif. Empat dokumen yang lain adalah Dasar Perubahan Iklim Negara, Dasar Sumber Air Negara, Rancangan Malaysia ke-10, Rancangan Struktur Negeri Selangor dan Pelan Pengurusan Lembangan Sungai Selangor.

Usaha berikutnya perlu mengambil kira penilaian keadaan semasa persekitaran yang membolehkan Pengurusan Sumber Air Bersepadu (IWRM) dan Pengurusan Lembangan Sungai Bersepadu (IRBM). Rangka yang dicadangkan dalam kajian ini adalah berguna dalam mengkaji polisi sediaada atau dirujuk semasa penggubalan polisi baru. Kajian ini memberi cadangan untuk meningkatkan kapasiti adaptif institusi air.

lembaran fakta

- Indeks kapasiti adaptif Dasar Sumber Air Negara adalah **0.77**. Ia mempunyai tahap adaptif kapasiti yang tinggi berbanding dokumen polisi lain yang telah dinilai dalam kajian ini. Walaubagaimanapun, pembaikan boleh dilakukan dengan mengukuhkan sumber ekonomi.

- Indeks kapasiti adaptif bagi empat dokumen polisi yang lain adalah **0.40** dan kurang. Majoriti dokumen ini menunjukkan kelemahan dalam maklumat dan pengetahuan, urus tadbir dan institusi, bakat dan sumber ekonomi.



6 Cadangan

Maklumat dan Pengetahuan
- Pengumpulan dan perkongsian data saintifik dan teknikal antara pihak berkepentingan perlu disediakan dan diberi akses melalui sistem pengurusan maklumat bersepadu.

Institusi dan Tadbir Urus
- Kolaborasi dan kerjasama antara Kerajaan Persekutuan dan Kerajaan Negeri adalah penting dalam meningkatkan adaptif kapasiti.

- Menggalakkan pengurusan secara bersama dengan memberi kuasa kepada masyarakat tempatan dalam membuat keputusan boleh menjadi strategi yang berkesan.

Bakat
- Kapasiti pegawai pengurusan air perlu dipertingkatkan dalam semua bidang pengetahuan dan perkembangan saintifik berkaitan pengurusan air (sains, sains sosial dan kemanusiaan), termasuk pemahaman amalan pengurusan di peringkat lembangan.

Sumber Ekonomi
- Sokongan dari pihak kerajaan adalah penting bagi pengusaha air untuk mendapatkan dana dari pelbagai sumber untuk meningkatkan kelestarian operasi bagi membolehkan pembangunan infrastruktur yang tahan kepada perubahan iklim.

Teknologi dan Infrastruktur
- Perisian yang khusus untuk iklim setempat boleh memberikan ramalan yang lebih dipercayai dan tepat berbanding dengan perisian yang dibangunkan di peringkat antarabangsa.

- Keperluan untuk menilai data hidrologi negara menggunakan teknologi perolehan data yang terkini.

- Menggalakkan pendekatan dan pengurusan solusi seperti memelihara kawasan tadahan air dan ekosistemnya, mengenalpasti dan memelihara sumber bekalan dan tadahan air, mengawal sumber pencemaran, memberi kesan positif kepada adaptasi perubahan iklim.

Keteradaptasian Institusi
- Institusi Persekutuan dan Negeri perlu mengambil kira kepentingan sumber dan kegunaan sumber alternatif semasa iklim yang mencabar di dalam polisi, enakmen dan garis panduan pentadbiran.

- Institusi juga perlu menilai prestasi mereka secara berkala untuk mengenalpasti dan memperbaiki kelemahan.

- Pendekatan IWRM dan IRBM dalam perancangan, pengurusan, pelindungan dan pemuliharaan sumber air perlu dipertingkatkan kerana pendekatan ini membantu dalam tindak balas adaptasi yang berkesan, dan membantu penggubal dasar dalam merangka kaedah tadbir urus dan fungsi institusi bagi persediaan menghadapi perubahan iklim.

Cadangan yang diutarakan ini dapat menjadi rujukan untuk penggubal dasar dalam merangka polisi yang inklusif dan berkesan bagi mempertingkatkan kesediaan dalam menghadapi iklim yang ekstrem.

Perkhidmatan Air untuk Pertanian bagi Perniagaan Tani

Malaysia berada di ambang untuk menjadi sebuah negara maju yang berpendapatan tinggi. Walaubagaimanapun, kekurangan polisi dan strategi yang utuh bagi perkhidmatan air untuk pertanian dalam dasar utama pembangunan Negara boleh menjejaskan keselamatan makanan negara.

Sejak 1932, fungsi Perkhidmatan Air untuk Pertanian (AWS) telah menjadi salah satu faktor kejayaan sektor pertanian negara. Kemiskinan di kawasan luar bandar dapat diatasi dalam skala yang besar dengan Tahap Sara Diri Komoditi Agromakanan Negara yang terjamin.

Kajian ini telah mengenalpasti kekurangan tenaga kerja dalam AWS pada tahap yang membimbangkan dan kekurangan program pembinaan kapasiti untuk pelbagai kumpulan pengguna dan pengurus air. Permintaan air dalam sektor pertanian yang semakin meningkat menjelang 2050 serta impak perubahan iklim menandakan terdapat keperluan untuk pengurusan sumber air dalam sektor pertanian yang lestari.

lembaran fakta

- Mengikut Bahagian Pengairan dan Saliran Pertanian (BPSP) Kementerian Pertanian dan Industry Asas Tani, kapasiti sumber manusia dalam AWS di peringkat kerajaan pusat telah berkurangan dari **1,000** ke 60 kakitangan.

- Tiada polisi dan strategi untuk AWS di dalam pelan dan pembangunan dasar Negara seperti Dasar AgroMakanan Negara 2010-2020 dan Dasar Sumber Air Negara 2012.

38 Cadangan Strategi

Tadbir Urus

1) Merangka Struktur Tadbir Urus AWS yang khusus.

2) Membangunkan penilaian sumber air pertanian dan pengauditan air dan sistem maklumbalas.

Polisi

3) Mengintegrasikan Polisi Perkhidmatan Air untuk Pertanian dengan Polisi Pertanian dan pelan pembangunan utama.

4) Semua pembangunan aktiviti pertanian dan AWS perlu berasaskan prinsip IRBM.

5) Memperuntukkan bidang penghasilan berfokus untuk semua sub-sektor (tanaman makanan bukan padi, tanaman komoditi dan industri, akuakultur, dan ternakan).

6) Membangun dan mengaplikasikan Pendekatan Neksus WEF dalam proses membuat keputusan berkaitan AWS dan keperluan sumber air untuk pembangunan pertanian.

7) Pembangunan STI untuk AWS memfokuskan kepada pemilikan teknologi negara.

Undang-undang, Panduan dan Peraturan

8) Mengisytihar dan mempromosikan Akta Perkhidmatan Air untuk Pertanian.

Institusi

9) Menubuhkan jabatan khusus untuk perkhidmatan air untuk pertanian bagi melaksanakan sistem tadbir urus, membangun dan menguruskan kawasan pengairan dan saliran untuk tanaman (makanan, industri dan komoditi), akuakultur dan ternakan pada skala yang besar.

10) Menubuhkan Pusat Kecemerlangan yang menjalankan kajian untuk AWS, termasuk latihan dan program pembinaan kapasiti untuk petani dan pengurus.

11) Menubuhkan Platform Dialog antara Pengguna Air, Platform Dialog Bersepadu Pengguna Air – Pengurus Air dan mengembangkan platform ini ke semua bidang berkaitan AWS. Rangkaian kerjasama dengan MOA, Majlis Sumber Air Negeri dan Negara, serta kementerian perlu diwujudkan.

Operasi dan Penyelenggaran

12) Membangunkan sistem operasi dan penyelenggaraan berdasarkan tahap penyampaian kepada pengguna termasuk penanda ukur kos perkhidmatan dengan mengambil kira ganjaran untuk perkhidmatan air di masa hadapan.

Data and Maklumat

13) Mengintegrasikan pengumpulan data dan maklumat serta perkongsian sistem dengan semua pengurus dan pengguna sektor air.

STI

14) Membangunkan penilaian sumber air, pengauditan dan sistem penilaian prestasi.

15) Membangunkan instrumen kelestarian pembangunan sumber air dalam pertanian dan pengurusan

16) Membangunkan sistem perisian maju untuk perancangan, rekabentuk dan pengurusan AWS

17) Membangunkan peranti untuk mengukur dan mengawal kuantiti dan kualiti air dalam semua sub-sektor pertanian

18) Membangunkan instrumen penilaian Neksus Air-Tenaga-Makanan (WEF).

19) Membangunkan instrumen jejak air untuk semua sektor pertanian bagi menyokong penilaian Neksus WEF

20) Menilai semula Sistem Pengairan Jelapang sedia ada dan baru serta komponen untuk mengukuhkan sistem graviti menggabungkan keperluan adaptasi perubahan iklim.

21) Membangunkan kriteria dan rekabentuk perancangan untuk tanaman bukan padi, ternakan dan akuakultur untuk meningkatkan hasil, menstabilkan pengeluaran, daya tahan banjir dan pembangunan mampan.

22) Membangunkan kriteria dan rekabentuk perancangan pengairan dan saliran untuk sistem perkhidmatan pertanian berskala besar bagi kelapa sawit, getah, buah-buahan dan tanaman makanan yang lain, tanaman industri dan komoditi, ternakan dan akuakultur.

23) Membangunkan kilang untuk menukarkan bahan buangan kepada tenaga untuk industri kelapa sawit, getah dan ternakan.

24) Membangunkan teknologi tanpa bahan buangan untuk industri kelapa sawit, getah dan ternakan.

25) Membangunkan Pusat Kitar Semula Air untuk industri padi dan getah.

26) Membangunkan teknologi guna sama air permukaan dan air bawah tanah untuk pengurusan air untuk pertanian.

27) Membangunkan rangkaian sistem saliran dan pengairan jelapang sedia ada untuk kegunaan semua sektor dan menggunakannya sebagai grid air di negara dan rantau ini.

28) Membangunkan kriteria dan rekabentuk perancangan untuk kawasan pertanian sebagai sebahagian daripada sistem banjir bersepadu di peringkat tempatan, Negara dan serantau.

Kewangan

29) Membangun dan melaksanakan model kewangan kerjasama awam-swasta untuk Perkhidmatan dan Infrastruktur Air untuk Pertanian.

30) Membangunkan model kewangan merentas sektor sebagai sebahagian dari pengurusan Neksus WEF serta infrastruktur pelbagai guna sedia ada dan baru.

Penjanaan Kekayaan

31) Membantu kumpulan pengguna untuk meningkatkan sumber pendapatan bukan pertanian di dalam dan luar kawasan AWS.

32) Mengenalpasti dan menggalakkan pembangunan industri pembekal AWS dan peluang perniagaan baru.

33) Mengeksport industri AWS untuk bekerjasama dengan negara yang masih dalam proses pembangunan sistem pengairan dan saliran berskala besar untuk aktiviti penanaman padi dan bukan padi.

Penyertaan Awam

34) Menggalakkan penubuhan Kumpulan Pengguna Air dalam kawasan AWS untuk bekerjasama secara terus dengan penggubal dasar dan pengurus air.

35) Menyerahkan sistem pengurusan dan operasi pihak ketiga kepada Kumpulan Pengguna Air.

Pembinaan Kapasiti

36) Membangunkan program pembinaan kapasiti yang komprehensif untuk pengurus air dan penyedia perkhidmatan air untuk pertanian.

37) Membangunkan program pembinaan kapasiti yang komprehensif untuk Kumpulan Pengguna Air dan penyedia perkhidmatan yang berkaitan dengan pengurusan air untuk pertanian.

Kolaborasi dan Penyertaan Antarabangsa

38) Keahlian jangka panjang dan penyertaan aktif di organisasi antarabangsa terkemuka.

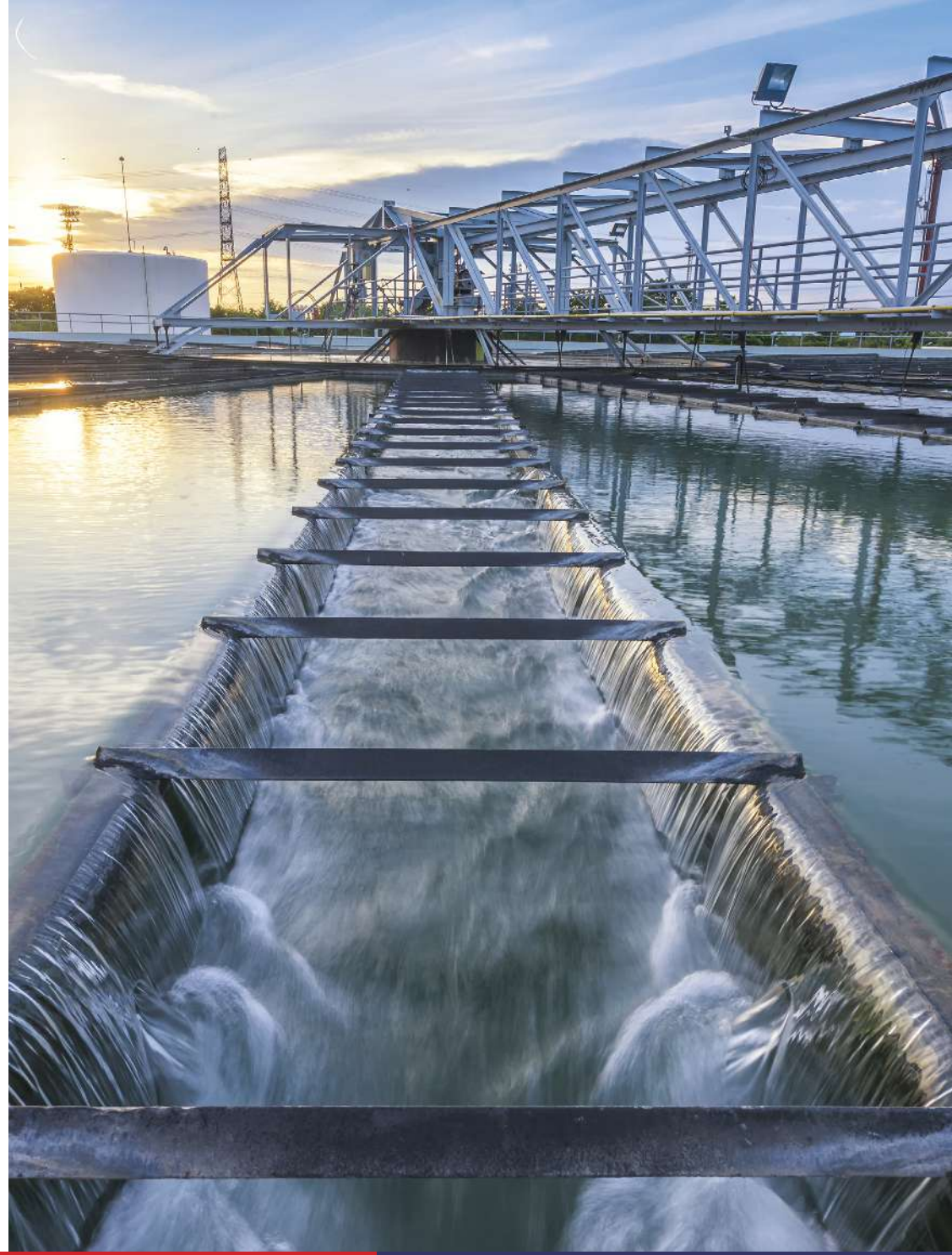
Pengurusan Air Bandar Bersepadu

Penempatan Bandar – Perancangan Bandar

Perangkaan (2010) menjangkakan menjelang tahun 2050, 80% dari 42 juta rakyat Malaysia tinggal di kawasan bandar. Oleh itu, pelan pengurusan dan pemeliharaan strategik yang efektif adalah penting untuk menghadapi cabaran pada masa hadapan serta memastikan kelestarian sumber air di kawasan bandar.

Kajian Pengurusan Air Bandar Bersepadu (IUWM) yang sedang dijalankan mengambil kira kesan buruk pembangunan yang pesat terhadap perkhidmatan dan kemudahan bandar. Kajian ini akan mengenalpasti status pengurusan air di bandar semasa di empat konurbasi bandar berikut:

- Kuala Lumpur
- George Town
- Kuantan
- Koridor Iskandar dan Johor Bahru



Science Outlook 2017

Science Outlook 2015 memaparkan penilaian bebas berasaskan bukti dalam trend utama STI di Malaysia. Laporan ini telah menjadi pencapaian utama untuk ASM. Selepas pembentangan laporan ini di mesyuarat Majlis Sains Negara yang pertama dalam bulan Januari 2016, terdapat permintaan untuk menerbitkan kajian *Science Outlook* dua tahun sekali untuk mengekalkan momentum dalam mengenalpasti trend utama dan membincangkan kelemahan dalam lanskap STI.

Meneruskan kesinambungan edisi sebelumnya, *Science Outlook* 2017 terus menjalankan usaha untuk mengumpul data dan bukti berkaitan ekosistem STI negara melalui analisis dan penilaian yang komprehensif. Kajian ini akan mengekalkan enam teras strategik berdasarkan NPSTI 2013 – 2020.



Tadbir Urus STI

Bahagian ini bertujuan untuk mengemaskini senarai polisi nasional di Malaysia. Ia juga mengambil kira polisi STI dan kepimpinan tadbir urus di peringkat negeri. Kajian lapangan mengenai rasional penubuhan Majlis Sains Negara sebagai jawatankuasa tertinggi yang dipengerusikan oleh YAB Perdana Menteri dengan tujuan mentadbir STI di Malaysia, mempromosi dan melaksanakan agenda STI nasional.



P, P & P

Fokus bahagian ini adalah lanskap pelaburan dan produktiviti P, P & P negara, ekosistem keutamaan penyelidikan dan keberkesanan strategi pengkomersilan. Ia bertujuan untuk memberikan pemahaman terhadap kolaborasi, mengoptimumkan sumber dan kadar pengkomersilan, dan mengelakkan *valley of death* semasa pengkomersilan produk P&P bagi membolehkan negara mencapai ekonomi yang dipacu oleh inovasi.



Bakat STI

Salah satu cadangan daripada edisi terdahulu telah direalisasikan melalui penubuhan Pelan Tindakan STEM yang diketuai oleh MOSTI, KPT dan KPM. Pelan Tindakan STEM juga telah mentakrifkan STEM sebagai 'Pembelajaran Sains, Teknologi, Kejuruteraan dan Matematik bersepadu dalam konteks menghubungkan institusi pendidikan, masyarakat dan industri untuk menghasilkan bakat dan masyarakat celik STEM ke arah memacu pembangunan ekonomi negara.

Kajian ini membincangkan persoalan pembangunan bakat berikutan pengambilan mata pelajaran STEM yang rendah di peringkat sekolah. Ia juga akan meneliti tarikan pekerjaan berasaskan STEM dari segi gaji dan faedah lain.



Pencergasan Industri

Selari dengan pembangunan yang pesat, bahagian ini akan membincangkan fungsi PKS dalam menetapkan kedudukan Malaysia sebagai penyedia teknologi demi mencapai visi industri 4.0, melalui penglibatan dewan-dewan perniagaan.



Pembudayaan STI

Pembudayaan sains merupakan usaha untuk meningkatkan kesedaran terhadap sains dalam kehidupan masyarakat, di luar pendidikan formal. Pengetahuan sains, pemikiran dan rasional saintifik dalam kalangan rakyat Malaysia akan dihuraikan dalam bahagian ini. Selain itu, indeks pembudayaan STI akan dicadangkan.



Hubungan Strategik Antarabangsa

Hubungan strategik antarabangsa merupakan faktor utama dalam memperkasakan inisiatif STI. Diplomasi sains akan diperkenalkan sebagai salah satu usaha Malaysia bagi mengatasi isu global selain mempertingkatkan kerjasama antarabangsa. Bagi menentukan kedudukan Malaysia dalam arena S&T global, impak dan hasil dari kerjasama antarabangsa akan dianalisa.

Keselamatan Siber

Berdasarkan Laporan Risiko Global 2015 oleh World Economic Forum (WEF), serangan siber disenaraikan antara 10 risiko global dari segi kebolehjadiannya. Kini, serangan siber dalam skala yang besar semakin kerap berlaku dan berpotensi untuk menyebabkan kerosakan teruk kepada infrastruktur digital dan fizikal. Oleh itu, keselamatan siber bukan hanya isu teknologi maklumat, tetapi melibatkan keselamatan negara. Maka, infrastruktur dan ruang siber perlu dilindungi.

Badan Bertindak Keselamatan Siber ditubuhkan untuk mencadangkan strategi dalam mengatasi isu keselamatan siber yang memberi kesan pada infrastruktur, perniagaan serta kesejahteraan rakyat. Laporan nasihat ini akan membincangkan cabaran dalam perundangan, peraturan dan penguatkuasaan kes jenayah siber. Laporan ini juga akan mengenengahkan isu-isu keselamatan siber secara holistik di mana lanskap keselamatan siber di Malaysia dan global diambil kira.

Salah satu petunjuk ancaman siber ialah penyebaran dan evolusi perisian hasad. Pada 2015, rakyat Malaysia telah berhadapan dengan 5,000 serangan perisian hasad atau 14 serangan sehari. Berdasarkan analisa dari Symantec Corporation, pada 2016, Malaysia berada di kedudukan ke-47 di dunia, dan ke-12 di Asia Pasifik dan Jepun, dari segi serangan perisian hasad.

Keselamatan ruang siber mampu dicapai dengan rekaan yang cermat, pembangunan dan pelaksanaan di setiap peringkat rangkaian peranti yang saling bersambung, tanpa mengira skala penyelesaiannya. Cadangan strategi dari pihak pengurusan tertinggi perlu dikuatkuasakan oleh pihak pentadbir dan penguatkuasa di peringkat negara dalam menjalankan usaha bersepadu bagi mewujudkan dan mengekalkan ekosistem siber yang selamat.

lembaran fakta

Pasaran keselamatan siber dianggarkan meningkat dari **USD122.45 bilion** pada 2016 ke **USD202.36 bilion** pada 2021 (MDEC).

15%

responden kajian : **jenayah terancang** sebagai punca kejadian

+12%

dari tahun 2014



Jenayah terancang mengikut negara



35%



22%



18%

Global State of Information Security Survey 2015 oleh PWC, CIO dan CSO

Memperkasa Komuniti Saintifik

+

ASM memperkasakan komuniti saintifiknya melalui Program STI. Empat platform utama, iaitu pembangunan keupayaan, konsortium sains, pengantara dan fora perundingan disasarkan untuk memudahcara elemen pengiktirafan, bakat dan pakatan kerjasama dalam lanskap STI.





Pembangunan Bakat

Pembangunan Profesional

Tenaga kerja yang inovatif dan progresif boleh dicapai melalui peningkatan ilmu dan kemahiran. Oleh itu, program pembangunan profesional yang dirancang secara teliti adalah penting. Justeru, Program Kerjasama Teknikal Malaysia (MTCP) memfokuskan kepada pembangunan sumber manusia melalui program latihan dalam pelbagai bidang kepada penjawat awam dari negara-negara membangun, ASM menjalankan dua program dibawah MTCP.

Pengurusan Geopark Global - *"Natural Heritage Protection towards Sustainable Development"*

Kepelbagaian geo adalah asas kepada ekosistem dan interaksi manusia dengan persekitaran. Sebagai sebahagian daripada pembangunan mampan, pengurusan *geopark* merujuk kepada kemampuan individu atau negeri untuk bertindak dalam pembangunan dan pengurusan geopark dengan strategi dan polisi bagi menguruskan geopark dengan lebih baik.

Global Geopark Management 2016 bertemakan *"Natural Heritage Protection towards Sustainable Development"* memfokuskan kepada pengalaman, cabaran dan amalan pengurusan yang baik dalam menguruskan geopark sedia ada dan kawasan berpotensi bagi mencapai matlamat pembangunan mampan. Bengkel yang julung kali diadakan ini telah dianjurkan oleh ASM dengan kerjasama MOSTI, Kementerian Luar Negeri (KLN), NRE, Suruhanjaya Kebangsaan UNESCO Malaysia (SKUM), Lembaga Pembangunan Langkawi (LADA) dan Sahabat Geopark Langkawi (SAGEL) di bawah MTCP. Bengkel ini bertujuan untuk meningkatkan pengetahuan dan kemahiran peserta dalam mengenalpasti kaitan antara warisan geologi dengan aspek keseluruhan warisan budaya dan semulajadi geopark.

Analisis dan dapatan daripada bengkel ini dibentangkan kepada wakil dari Jabatan Mineral dan Galian (JMG), Jabatan Kimia Kedah, Jabatan Meteorologi Kedah, SAGEL, LADA dan MOSTI.

lembaran fakta

19 peserta dari **12** buah negara
14-20 Mei, Langkawi

sekilas

- MTCP telah ditubuhkan pada tahun 1978 semasa berlangsungnya *Commonwealth Heads of Government Meeting* (CHOGM) bagi rantau Asia Pasifik yang pertama dan dilancarkan secara rasminya pada tahun 1980 di *Commonwealth Heads of State Meeting.*

- Sejak pelancarannya, lebih dari 20,000 peserta dari 138 buah negara telah menerima manfaat

- Bidang keutamaan adalah pentadbiran awam, tadbir urus yang baik, perkhidmatan kesihatan, pendidikan, pembangunan mampan, pertanian, pembasmian kemiskinan, pelaburan, ICT, dan perbankan.

- Langkawi UNESCO *Global Geopark* yang terletak di Barat Laut Semenanjung merupakan geopark pertama yang ditubuhkan di Malaysia. Terdiri daripada 99 pulau, geopark ini juga merupakan yang pertama di Asia Tenggara di bawah UNESCO's *Global Geoparks Network.* Geopark ini diuruskan dengan pendekatan berasaskan komuniti.

Essentials in STI Policy and Management
Memahami kedinamikan S&T dalam konteks perkembangan ekonomi dan pasaran adalah penting dalam perancangan dan pelaksanaan strategik untuk memacu transformasi negara. S&T merupakan salah satu pemacu strategik yang menyumbang kepada anjakan aktiviti ekonomi yang sederhana kepada aktiviti dengan nilai tambah yang tinggi. Oleh yang demikian, Polisi STI merupakan sebahagian daripada dasar pembangunan negara.

ASM dengan kerjasama KLN dan *UTM Perdana School* telah menganjurkan ASM-UTM *Certified Professional in STI Policy and Management for OIC Countries* (AUCPS) bertemakan *"Essentials in STI Policy and Management".* Program latihan selama empat hari ini memberi pendedahan kepada para peserta tentang Polisi STI dan pengurusan, dan membangunkan keupayaan untuk penggubalan dan pelaksanaan polisi STI negara.

Peserta diberi pengiktirafan sebagai Profesional dalam Polisi STI dan Pengurusan oleh *UTM Perdana School* setelah melengkapkan tugasan individu dalam masa tiga bulan sejurus selepas latihan tamat. Dengan perakuan ini, peserta layak untuk melatih dan membimbing penggubalan Polisi STI.

lembaran fakta

11 peserta dari **9** negara.

16-20 Mei, Kuala Lumpur



Pembangunan Saintis Muda

ASM menyedari kepentingan saintis muda menonjolkan potensi mereka dalam menyelesaikan isu global serta memacu Malaysia ke arah daya saing STI. Menerusi kerjasama ASM dengan institusi dan organisasi STI global, saintis muda diberi peluang untuk mengembangkan potensi mereka untuk menjadi saintis yang berkaliber dan mampu untuk menyumbang kepada kemajuan STI global dan seterusnya diiktiraf di peringkat antarabangsa. Pelbagai program telah dijalankan, antaranya ialah:

- Lawatan sambil belajar
- Penempatan di organisasi terpilih
- Program mentor-mentee

Musim Panas di LHC

CERN *Summer Student Programme* (CSSP) menawarkan pengalaman bekerja bersama kumpulan penyelidik CERN di Geneva, Switzerland selama lapan minggu. Pelajar dari bidang fizik, pengkomputeran, dan kejuruteraan yang dicalonkan oleh ASM perlu melalui proses saringan yang ketat sebelum dipilih. Melalui program ini, para pelajar dapat memperluas jaringan kerjasama antarabangsa serta memperoleh pengalaman berharga bekerja dalam persekitaran yang terdiri daripada pelbagai budaya dan disiplin.

lembaran fakta

15 pelajar telah menyertai Program CERN *Summer Student* sejak 2012

278 pelajar dari **87** negara telah menyertai Program CERN *Summer Student*

sekilas

3 pelajar yang dipilih daripada **11** pemohon:
- Chin Yuk Ming (UMP)
- Muhammad Amirullah Miswan (UKM)
- Muhammad Safwan Zaini (UPM)

Perluasan Penyelidikan dengan Analisis Sistem

International Institute for Applied Systems Analysis (IIASA) telah menganjurkan IIASA *Young Scientists Summer Program* (YSSP) iaitu program tahunan yang dijalankan selama tiga bulan. IIASA YSSP menawarkan peluang yang unik kepada saintis muda Malaysia untuk menjalankan penyelidikan bebas di bawah seliaan saintis berpengalaman IIASA.

lembaran fakta

7 saintis muda Malaysia telah menyertai program ini sejak 2011

Rachel Hoo Poh Ying (UTM) terpilih untuk menghadiri IIASA YSSP 2016 dibawah *Mitigation of Air Pollution and Greenhouse Gases Programme* (MAG)

sekilas

- IIASA merupakan sebuah institusi sains antarabangsa yang menjalankan penyelidikan berorientasikan dasar dalam menangani permasalahan global seperti perubahan iklim, neksus air-tenaga-makanan serta kemiskinan dan agihan kekayaan yang sama rata yang terlalu kompleks untuk diselesaikan oleh hanya sebuah negara.
- ASM mewakili Malaysia sebagai sebuah Organisasi Negara Ahli (NMO) dalam IIASA sejak tahun 2011.


Bimbingan


Hala Tuju


Latihan


Misi

Interaksi Bersama Penerima Nobel
Setiap tahun, saintis muda yang terpilih dari seluruh dunia berpeluang untuk bertemu dengan penerima Hadiah Nobel dari bidang Fizik, Kimia dan Fisiologi & Perubatan. Dialog inter-generasi ini menawarkan satu platform yang baik untuk perkembangan saintis muda negara dengan menyediakan peluang untuk mereka berinteraksi dengan penerima Hadiah Nobel dan rakan-rakan saintifik dari seluruh dunia. Para peserta Mesyuarat Lindau dipilih antara yang terbaik dari institusi akademik dan yayasan.

lembaran fakta

5 Saintis Muda Malaysia dipilih:
- Dr Lim Kok Sing (UM)
- Dr Suhaila Sepeai (UKM)
- Dr Tan Sin Tee (UKM)
- Dr Yap Wing Fen (UPM)
- Dr Farah Diana Muhammad (UPM)

sekilas

- Mesyuarat Lindau ke-66 (khusus untuk Fizik) diadakan pada 26 Jun - 1 Julai di Lindau, Jerman. Delegasi Malaysia diketuai oleh Profesor Dato' Dr Rosihan Mohamed Ali FASc.

- Mesyuarat selama empat hari itu merangkumi kuliah pleno, perbincangan saintis muda, kelas pakar dan perbincangan tiga panel mengenai *"Glimpses Beyond the Standard Model", "Is Quantum Technology the Future of the 21st Century?"* dan *"The Future of Education in Sciences".*

Membentuk Pemimpin Masa Hadapan dalam bidang Kesihatan Global
Sebagai ahli IAMP, ASM memberi peluang kepada pengamal perubatan muda untuk mengasah kemahiran kepimpinan mereka dengan mengambil bahagian dalam program IAMP *Young Physician Leaders.* Program ini merangkumi tiga bahagian termasuk:

- Program pembangunan kepimpinan;

- Lawatan akademik ke makmal penyelidikan kesihatan di Jerman; dan

- Penyertaan sebagai penceramah dan tetamu khas dalam acara *World Health Summit.*

lembaran fakta

7 peserta Malaysia telah menghadiri program IAMP *Young Physician Leaders* sejak 2011.

24 peserta terpilih dari seluruh dunia telah mengambil bahagian dalam Program IAMP Y*oung Physician Leaders* pada 6 Oktober.

Super Science Highschool Student Fair
Pelajar Malaysia telah menyertai Pesta *Super Science High School* (SSH) yang bukan sahaja bermatlamat meningkatkan minat di kalangan generasi muda tetapi juga mendedahkan mereka secara global kepada pendidikan STEM.

Program ini mengumpulkan pelajar sekolah menengah dari pelbagai Negara untuk mempamerkan ilmu pengetahuan saintifik melalui rekaan poster dan pembentangan lisan. Penganjuran pesta ini bertujuan untuk membina rangkaian saintis muda yang akan bekerjasama menjalankan kerja P&P secara kolaboratif untuk mengatasi masalah global dan menggalakkan kesejahteraan rakyat.

Tahun ini, ASM dengan kerjasama JST telah menaja pemenang Cabaran Aplikasi STEM untuk menyertai SSH. Peserta Malaysia mempamerkan aplikasi telefon pintar yang direka semasa pertandingan tersebut.

lembaran fakta

Penyertaan pelajar dari **9** buah Negara
10 – 11 Ogos, Pusat Konvensyen Kobe, Jepun

sekilas

STEM Apps Challenge dianjurkan oleh ASM, MaGIC-X UTM dan PERINTIS

Pemenang – SM Islam Hidayah, Johor



Penglibatan

National Science Challenge

Menyedari keperluan kemahiran STEM dalam kalangan generasi muda untuk mencapai kejayaan dalam ekonomi yang pesat ini, ASM dengan kerjasama Exxon Mobil Subsidiaries menganjurkan pertandingan sains untuk pelajar sekolah menengah. Pertandingan ini bertujuan untuk menggalakkan pemahaman, kesedaran dan penghayatan STEM dalam kalangan pelajar sekolah menengah di seluruh negara. Program ini dijayakan dengan sokongan daripada YSN-ASM, MOE, MARA, JST, UKM, UPM, UTM dan UiTM.

Pada tahun ini, Cabaran Sains Nasional telah dilaksanakan mengikut tiga peringkat; Peringkat Saringan, Peringkat Negeri, dan Peringkat Akhir, dengan format yang ditambah baik. Pertandingan peringkat negeri telah dijalankan di universiti-universiti tempatan dengan penyertaan lima buah pasukan dari setiap negeri berentap untuk menjadi juara. Pemenang peringkat negeri seterusnya mara ke peringkat akhir (Kem Sains) yang dijalankan selama 10 hari. Pada peringkat ini, pelajar dikehendaki menjalankan eksperimen di makmal universiti serta membangunkan aplikasi permainan dalam talian sebagai projek mereka. Empat pasukan disenarai pendek daripada 16 pasukan seterusnya bertanding dalam peringkat akhir.

Pemenang membawa pulang Piala Cabaran Perdana Menteri dan lawatan sambil belajar ke Stockholm, Sweden bagi menyaksikan majlis penyampaian Hadiah Nobel. Para finalis pula berpeluang mengikuti lawatan sambil belajar ke Jepun selama seminggu tajaan JST.

lembaran fakta

Daripada **13,563** pendaftaran, seramai **12,560** telah menyertai Peringkat awal.

Finalis NSC
- SMK Labuan (Pemenang)
- MRSM Langkawi (Tempat Ke-2)
- MRSM Tun Abdul Razak (Tempat Ke-3)
- SMS Sultan Mahmud (Tempat Ke-4)

12, 560 pelajar telah menyertai Peringkat awal
National Science Challenge



Perak
338



Sabah
648



Selangor
1,440



Terengganu
1,542



Kedah
1,359



Kelantan
561



Melaka
630



Negeri Sembilan
771



Perlis
231



Pulau Pinang
1,143



W.P Putrajaya
138



W. P Labuan
78



Johor
1,341



Sarawak
942



Pahang
846



W.P Kuala Lumpur
552

Innovati Sosial MOSTI – Program DUTA SAINS

Kefahaman dan pengetahuan yang tinggi masyarakat dalam STI membolehkan penyampaian, adaptasi dan penggunaan ilmu saintifik yang berkesan dalam sesebuah negara. Oleh yang demikian, ASM memperkenalkan program Duta Sains yang bertujuan memperkasakan komuniti melalui STI. Bagi melaksanakan inisiatif ini, ASM melantik wakil dalam kalangan ahli komuniti. Wakil yang dikenali sebagai Duta Sains ini akan bekerjasama dengan komuniti tempatan dibawah seliaan pakar-pakar dari ASM bagi memenuhi objektif seperti berikut:

- **Meningkatkan kefahaman & kesedaran sains** dalam kalangan komuniti
- **Membentuk komuniti berpengetahuan** yang dilengkapi dengan kemahiran dan ilmu untuk menyelesaikan masalah tempatan
- **Meningkatkan minat dalam kalangan generasi muda untuk memilih pendidikan dan kerjaya dalam sains**

ASM telah melaksanakan program Duta Sains di empat kawasan parlimen iaitu Jerlun, Kedah; Setiu, Terengganu; Tangga Batu, Melaka; dan Tuaran, Sabah.



Hasil utama program Duta Sains adalah;

Menyelesaikan masalah tanah jerlus di Jerlun
Jaringan kerjasama telah dibentuk antara penyelidik Lembaga Kemajuan Pertanian Muda (MADA), dan juga penyelidik dari USM dan UPM bagi mencari penyelesaian kepada masalah tanah jerlus di Jerlun. Tanah yang sebelum ini ditetapkan bagi tujuan pertanian adalah di bawah seliaan MADA. Melalui kerjasama ini, laporan awal telah disediakan. Cadangan penyelesaian ini diharap dapat meningkatkan pengeluaran padi di kawasan ini serta menambah pendapatan komuniti yang terlibat.

Bengkel latihan IBSE di Jerlun, Setiu dan Tuaran
Bengkel latihan IBSE telah melatih 52 orang guru sekolah rendah. Guru-guru yang terlatih akan memainkan peranan sebagai fasilitator dan menggalakkan para pelajar meneliti dan mengkaji elemen sains di sebalik sesuatu kejadian dalam persekitaran mereka. Para guru juga menjadi lebih kreatif, serba boleh dan inovatif semasa mengajar subjek sains kepada pelajar. Dengan ini, diharapkan para pelajar akan lebih berminat untuk mengikuti pembelajaran STEM. ASM akan terus memantau dan menyediakan bimbingan kepada para guru pada tahun 2017.

Pengkomersilan produk tempatan di Tangga Batu
Perusahaan Kecil dan Sederhana (PKS) telah mendapat manfaat dari program ini terutamanya dalam aspek pembangunan dan pengkomersilan produk tempatan. ASM membantu dalam membentuk jaringan kerjasama antara PKS dan institusi penyelidikan. Di samping itu, permohonan untuk tanda dagangan, logo, portal e-perniagaan dan analisis produk telah dihantar bagi produk yang mempunyai nilai komersil untuk memenuhi piawaian Malaysia.

sekilas

Inovasi Sosial MOSTI (MSI) merupakan cetusan idea yang diwujudkan bagi menggantikan *Community Innofund* (CIF). Melalui MSI, MOSTI mensasarkan peningkatan tahap kesejahteraan rakyat dengan menyelesaikan isu-isu yang dihadapi masyarakat. Ini boleh dicapai melalui usaha kolaboratif, peningkatan kemahiran dan inovasi bagi menambahbaik idea, produk atau perkhidmatan semasa.

Kelas Bimbingan Sains
Di samping itu, ASM juga telah menjalankan kelas bimbingan subjek sains kepada pelajar-pelajar Tingkatan 4 dan 5 bagi sekolah sekitar Putrajaya. Program ini dijalankan dengan kerjasama PUSPANITA. Selain kelas bimbingan, tiga seminar intensif telah diadakan sebagai langkah persediaan bagi calon-calon yang akan menduduki peperiksaan. Para peserta diharap dapat mencapai keputusan cemerlang dalam peperiksaan utama negara.

lembaran fakta

Duta Sains yang dilantik
8 guru di Jerlun, Kedah

16 guru di Setiu, Terengganu

4 usahawan di Tangga Batu, Melaka

40 guru di Tuaran, Sabah

Pendidikan Sains Berasaskan Inkuiri (IBSE) 2.0

Pada tahun 2012 dan 2013, ASM telah menjalankan projek rintis IBSE di empat buah sekolah rendah yang terpilih di Daerah Hulu Langat. Tujuan utama projek rintis ini adalah untuk melihat kebolehlaksanaan IBSE dan bagaimana ia dapat meningkatkan keberkesanan pengajaran dan pembelajaran sains serta merangsang prestasi murid dalam subjek sains. Dapatan dari laporan kajian ini menunjukkan bahawa IBSE boleh dilaksanakan di sekolah rendah dan menunjukkan impak positif kepada guru dan murid.

Berikutan dari kejayaan ini, ASM telah memperkenalkan IBSE 2.0 (2016-2017) bagi memberikan bimbingan dan pemantauan yang berterusan kepada guru-guru terlatih dari sekolah terlibat. Pada tahun 2016, ASM berjaya menjalankan empat Bengkel Hujung Minggu dan satu Bengkel Residensi melibatkan 49 orang guru termasuk lima guru dari Sekolah Sri Bestari, Sri Damansara (sekolah swasta).

Jerayawara: Draf Kod Tatalaku Biosekuriti 2016

Pada peringkat awalnya, biosekuriti merujuk kepada kebimbangan golongan petani dan pencinta alam sekitar terhadap risiko penyebaran penyakit berjangkit kepada hasil tani dan ternakan. Kini, ia menjadi kebimbangan utama dalam kalangan saintis, penggubal dasar, agensi keselamatan dan penguatkuasaan undang-undang.

Selari dengan usaha Malaysia untuk mempromosikan bidang bioteknologi, langkah-langkah keselamatan perlu diambil sebagai perlindungan dari kehilangan, kecurian, salah guna, penyelewengan dan pelepasan patogen dan toksin secara sengaja. Walaubagaimanapun, langkah-langkah ini tidak sepatutnya merencat kemajuan penyelidikan biologi.

Oleh itu, di bawah *International Framework of the Biological and Toxin Weapons Convention,* program jerayawara telah dianjurkan bagi meningkatkan kesedaran pelaksanaan *Code of Conduct* (CoC) Biosekuriti. CoC telah diilhamkan oleh STRIDE, dengan konsultasi daripada pengamal dan pihak berkepentingan dalam kajian sains hayat dari kalangan akademia, industri dan kerajaan. CoC bertujuan untuk menggalakkan ketelusan dalam penyelidikan biologi dan bidang sains hayat yang lain bagi mengurangkan risiko penyalahgunaan. Ia juga menggariskan panduan bagi RCR dan menguatkuasakan piawaian sedia ada dalam mempraktikkan akauntabiliti dan komunikasi yang beretika.



lembaran fakta

300 peserta

7 penceramah daripada pelbagai insititusi dan agensi

6 program
- STRIDE – 17 Februari
- USM Kubang Kerian – 21 Februari
- UIAM Kampus Kuantan – 11 Mac
- USM Pulau Pinang – 4 April
- QIUP – 6 April
- UMS – 25 April

Wilayah Utara: Program Perkembangan Belia

Program bimbingan dalam projek penyelidikan dapat memberikan pembelajaran berasaskan pengalaman kepada para pelajar dan merupakan satu cara yang berkesan untuk memupuk minat mereka terhadap STEM. Kem Industri Belia telah menambahbaik format dan skop program yang kini dikenali sebagai Program Kejuruteraan, Sains dan Teknologi Belia Wilayah Utara. Program ini membolehkan para pelajar untuk menjalankan projek penyelidikan selama enam bulan. Program ini merupakan anjuran USM dengan kerjasama *Chapter* ASM Wilayah Utara dan pihak industri dari utara Semenanjung.

Pada awalnya, pelajar menjalankan kajian secara bebas tanpa bimbingan dari pakar. Seterusnya, jurutera industri, penyelidik universiti dan ahli YSN-ASM memberikan bimbingan dan panduan kepada mereka terutamanya dalam kemahiran menyelesaikan masalah dan metodologi teknikal. Pelajar membentangkan hasil kajian mereka kepada panel juri pada penghujung program. MRSM Taiping dipilih sebagai pemenang untuk projek *"Hands-free Bicycle Turn Signal"*.

lembaran fakta

- Melibatkan pelajar tingkatan 2 hingga 4
- **36** kumpulan dengan **36** projek berasaskan STEM

Wilayah Selatan: Kemajuan Sains dalam Katalisis

UTM dengan kerjasama *Chapter ASM* Wilayah Selatan telah menganjurkan Seminar Antarabangsa dalam Katalisis (iCAT) 2016 bertemakan *"Frontier, Challenges and Opportunities in Catalysis"*. Pemenang Hadiah Nobel, Akira Suzuki, telah menyampaikan ucaptama di seminar ini. Ahli akademik, saintis, penyelidik dan para pelajar bertukar-tukar idea dan pengetahuan tentang kemajuan terkini dalam penyelidikan katalisis.

Bersempena dengan seminar ini, pemenang Hadiah Nobel Akira Suzuki telah menyampaikan syarahan umum. Beliau berkongsi 40 tahun pengalaman dan kajian dalam 'Tindakbalas Suzuki' yang dibangunkan berdasarkan pembentukan ikatan karbon-karbon yang merupakan proses penting dalam kimia.

lembaran fakta

iCAT
- Anjuran UTM dan *Chapter ASM* Wilayah Utara
- 20 – 21 September di UTM Johor Bahru
- **7** penceramah
- **100** peserta

Syarahan Nobel Laureate
- Anjuran UTM dan *Chapter ASM* Wilayah Utara
- 22 September di UTM Johor Bahru
- **200** peserta

Wilayah Selatan: Memupuk Pelajar Berinovatif

Cabaran Inovasi Sains dianjurkan bagi menggalakkan pelajar menghasilkan produk berinovatif yang dapat menyelesaikan masalah harian. Program ini diilhamkan untuk merealisasikan Lembah Inovasi Iskandar di Johor. Produk inovatif pelajar diadili oleh panel hakim dari IKM dan UTM. Pelajar berpeluang memenangi pelbagai hadiah termasuk Anugerah Khas ASM yang dimenangi oleh SMK Infant Jesus untuk projek mereka bertajuk *"Reduction of Plastic Waste Using New Fabricated Infinite Spoon"*.

lembaran fakta

- Anjuran UTM, *Chapter ASM* Wilayah Utara, Jabatan Pendidikan Negeri Johor (JPN), American Chemical Society Malaysia (ACS), dan Institut Kimia Malaysia (IKM)
- 22 September di UTM Johor Bahru
- Penyertaan dari **96** pasukan, **40** pasukan dipilih ke peringkat akhir

sekilas

ASM berhasrat untuk meningkatkan keterlihatannya dalam kalangan komuniti saintifik, mengeratkan hubungan kerjasama antara golongan profesional dan ASM, serta menguatkan jaringan kerjasama ahli ASM di seluruh Malaysia. Kini, ASM telah menubuhkan dua *Chapter* iaitu di Wilayah Utara dan Wilayah Selatan.

Anugerah & Geran



Anugerah dan geran penting untuk memberi motivasi kepada penyelidik dalam membangunkan idea dan penerokaan ilmu baru serta menyelesaikan isu-isu tempatan melalui pendekatan inovatif dan praktikal. Justeru, kepakaran ASM sering dimanfaatkan oleh pelbagai organisasi untuk menjalankan proses pemilihan anugerah dan geran. ASM memanfaatkan kepakaran anggotanya dalam menyediakan ulasan, penilaian dan cadangan bebas berdasarkan merit.

Mahathir Science Award

Anugerah antarabangsa oleh *Mahathir Science Award Foundation* (MSAF) ini mengiktiraf penyelidikan yang menyumbang kepada pengetahuan baru dalam mencari penyelesaian kepada masalah-masalah di kawasan tropika. Kajian tersebut perlulah menunjukkan impak yang besar terhadap sosio-ekonomi selain dari menyumbang kepada dasar dan tadbir urus yang membawa kepada peningkatan kualiti hidup dalam bidang Pertanian Tropika, Senibina dan Kejuruteraan Tropika, Perubatan Tropika dan Sumber Asli Tropika.

lembaran fakta

192 pencalonan telah diterima dari **30** buah negara (2005-2016)

10 penerima setakat ini, dengan jumlah hadiah bernilai **RM2,000,000**



MAKNA Cancer Research Award

Majlis Kanser Nasional (MAKNA) menganugerahkan geran ini kepada penyelidik muda Malaysia dengan rekod yang cemerlang dalam penyelidikan kanser. Anugerah ini bertujuan untuk menggalakkan penyelidikan kanser dalam kalangan saintis muda dan meningkatkan sumbangan Malaysia dalam rawatan pelbagai jenis kanser.

lembaran fakta

Penerima *MAKNA Cancer Research Award*:
- Dr Asrul Akmal Shafie (USM)
- Dr Oon Chern Ein (USM)
- Dr Teow Sin Yeang (Sunway University)

Penerima Anugerah *MAKNA Cancer Research* menerima geran penyelidikan berjumlah
RM89,800.00

488 permohonan telah diterima dari 2001-2016

47 pemohon telah dianugerahkan setakat ini dengan jumlah geran sebanyak
RM1,534,635

Anugerah Inovasi Bioekonomi

Anugerah Inovasi Bioekonomi (BIA) adalah pertandingan tahunan yang dianjurkan sejak tahun 2008. Anugerah ini mengiktiraf universiti atau institusi penyelidikan yang telah mencipta penyelesaian inovatif bagi cabaran-cabaran teknikal, sosial dan alam sekitar melalui teknologi berasaskan bio.

BIA 2016 telah dianjurkan oleh *Malaysian Bioeconomy Development Corporation Sdn Bhd* dengan kerjasama ASM untuk menghubungkan peserta dengan rakan perniagaan dan pelabur. Tumpuan yang diberikan adalah untuk meningkatkan pengkomersilan teknologi dalam kategori berikut:

i) Pertanian/Industri Asas Tani
ii) Teknologi Bio-industri
iii) Kesihatan
iv) Teknologi Hijau dan Teknologi Boleh Diperbaharui

lembaran fakta

77 permohonan telah diterima

Seorang pemenang bagi pingat emas, perak dan gangsa dipilih untuk setiap kategori

3 Anugerah Khas:
- Inovasi Bioekonomi Terbaik Tahunan
- Inovasi Paling Berpotensi
- Teknologi Paling Inovatif



Pencalonan bagi Anugerah Antarabangsa

Sebagai badan yang bertanggungjawab membuat pencalonan, ASM telah menamakan beberapa saintis cemerlang Malaysia untuk anugerah antarabangsa seperti berikut:

2016 *Islamic Development Bank (IDB)* Prize oleh IDB Arab Saudi
Anugerah ini menggalakkan persaingan sihat antara pusat penyelidikan dan pendidikan S&T dalam Negara Ahli IDB ke arah kecemerlangan. Ia juga meningkatkan kesedaran terhadap polisi di kalangan penggubal dasar tentang sumbangan S&T kepada pembangunan mampan. Kategorinya adalah seperti berikut:
1. Institusi yang menyumbang kepada kemajuan saintifik atau teknologi bagi pembangunan negara ahli
2. Institusi yang menyumbang kepada bidang sains yang berikut: Kejuruteraan; Pertanian; Perubatan; Bioteknologi; Teknologi Maklumat; Optronik; Sains Bahan; Farmaseutikal; Mikroelektronik Industri; Nanoteknologi; dan Sumber Tenaga Alternatif
3. Institusi Penyelidikan Sains yang terkemuka dalam negara ahli IDB yang kurang membangun (LDMCs)

2016 *Science & Technology Award* oleh *Malaysia Toray Science Foundation (MTSF)*
Anugerah ini mengiktiraf saintis Malaysia yang telah membuat penemuan saintifik unggul dan berjaya menyelesaikan masalah teknologi utama secara mesra ekonomi melalui ciptaan yang asli, berevolusi dan penting.

2016 *Nikkei Asia Prize* oleh Nikkei Inc. Jepun
Anugerah ini mengiktiraf pencapaian cemerlang yang menyumbang kepada pembangunan mampan rantau ini serta masa depan yang lebih cerah untuk Asia. Terdapat tiga kategori iaitu:
1. Inovasi Ekonomi dan Perniagaan
2. Sains, Teknologi dan Persekitaran
3. Komuniti dan Kebudayaan

2016 *Mustafa Prize Award* oleh *Al Seraj Technology Centre, Pardis Technology Park*, Iran
Pengiktirafan ini dianugerahkan kepada para saintis yang telah menghasilkan inovasi canggih dalam bidang sains dan menemukan kaedah saintifik baru ke arah kehidupan yang lebih baik. Ia bertujuan untuk meningkatkan jalinan kerjasama antara para akademia dan penyelidik bagi meningkatkan pertumbuhan sains dalam kalangan negara ahli OIC. Terdapat empat kategori iaitu:
1. Sains dan Teknologi Komunikasi dan Informasi
2. Sains dan Teknologi Perubatan dan Hayat
3. Nanoteknologi dan Sains Nano
4. Pencapaian Saintifik Unggul dalam bidang lain

2016 *TWAS Prizes oleh The World Academy of Sciences (TWAS)*
Anugerah ini mengiktiraf saintis dari negara membangun bagi menghargai sumbangan mereka kepada pengetahuan dalam sembilan bidang sains dan/atau kepada aplikasi S&T untuk pembangunan yang mampan. Sembilan bidang tersebut adalah, sains pertanian, biologi, kimia, sains bumi, astronomi & angkasa, sains kejuruteraan, matematik, sains perubatan, fizik, sains sosial.

Dana Penyelidikan Perubatan Dr Ranjeet Bhagwan Singh

Mendiang Dr Ranjeet Bhagwan Singh merupakan penyelidik perubatan terkemuka yang mewariskan hartanya kepada Tabung Pembiayaan Dr Ranjeet Bhagwan Singh. Tabung ini ditubuhkan bagi menggalakkan pendidikan kepada golongan yang memerlukan, tanpa mengira bangsa, warna kulit dan agama. Beliau telah menyumbang kepada bidang penyelidikan perubatan dan saintifik, dan juga kepada pembangunan makmal diagnostik di Malaysia.

MOSTI adalah pemegang amanah untuk Tabung Amanah Penyelidikan Perubatan Dr Ranjeet Bhagwan Singh (RBS). Tabung amanah ini bertujuan menggalakkan penyelidikan perubatan dan biomedikal di Malaysia. ASM diamanahkan oleh MOSTI untuk melaksanakan program seperti:

Geran Penyelidikan RBS
Geran Penyelidikan RBS adalah program tahunan di bawah Tabung Amanah Penyelidikan Perubatan RBS yang dianugerahkan kepada seorang saintis muda Malaysia untuk menjalankan kajian perubatan / biomedikal.

Geran Bengkel Penyelidikan RBS
Geran Bengkel Penyelidikan RBS ialah program dwi-tahunan di bawah Tabung Amanah Penyelidikan Perubatan RBS. Geran ini diberikan kepada seorang saintis atau institusi Malaysia untuk menjalankan bengkel bagi memperkenalkan teknik-teknik penyelidikan baru atau meningkatkan teknologi penyelidikan dalam bidang perubatan atau biomedikal.

lembaran fakta

Geran Penyelidikan RBS 2015 telah dianugerahkan kepada Dr Dharmani Devi Murugan dari UM pada tahun 2016 untuk penyelidikan beliau yang bertajuk *"Mechanism of actions of the direct vasorelaxant actions of des-Aspartate-angiotensin I (DAA-I), a potential antihypertensive peptide"*.

Geran Bengkel Penyelidikan RBS 2015 telah dianugerahkan kepada Assoc Prof Ir Dr Abdul Manaf Hashim dari UTM untuk bengkel beliau yang bertajuk *"RBS Workshop on Biocompatible Nanomaterials and Nanodevices for Bio-Medical Applications"*.

Geran Penyelidikan RBS 2016 telah dianugerahkan kepada Dr Yee Pin Tsin dari Sunway Universiti untuk kajian beliau bertajuk *"Design of a live attenuated vaccine (LAV) for the prevention of severe hand. foot and mouth disease (HFMD) caused by Enterovirus 71 (EV-A71)"*.

Program Flagship, Peruntukan Khas Agensi dan ScienceFund melalui Platform ASM

MOSTI menawarkan beberapa geran P&P untuk menggalakkan pembangunan penyelidikan dan pengkomersilan di Malaysia. Geran-geran ini menyokong perkembangan pengetahuan asas yang kukuh dalam bidang sains selain dari memperkasakan penyelidikan gunaan yang menyumbang kepada pertumbuhan ekonomi negara. Melalui ASM, Felo boleh mengemukakan cadangan penyelidikan yang penting kepada negara serta menerapkan konsep kolaboratif yang sama seperti konsortium.

lembaran fakta

Program DSTIN Flagship
Moving up the Value Chain and Environmentally Friendly Processes in Silicon Photovoltaic Technology: Non-toxic Processes, Wafering and Crystal Growth

Dana Khas untuk Agensi
Development of Yeast System for Flavonoid Production

Projek ScienceFund
Time Dependent Changes of Morphology and Molecular Characterization around the Intracerebellar Haemorrhage (ICbH) Penumbra in C57B6/J Mice Brain Slices

Kumpulan Pemantauan Projek

MOSTI telah melantik ASM sebagai Kumpulan Pemantauan Projek (PMT) untuk memantau pelaksanaan projek P&P yang diluluskan di bawah RMKe-9 dan RMKe-10 sejak 2008. Felo ASM bertindak sebagai ahli panel PMT untuk menilai dan memantau kemajuan projek.

lembaran fakta

3 projek *Flagship*

10 projek *TechnoFund*

3 projek *Community Innovation Fund*

Dana *Newton-Ungku Omar*

Kerajaan UK telah melancarkan Dana Newton pada tahun 2014 memfokuskan kepada perkongsian sains dan teknologi untuk menggalakkan pertumbuhan ekonomi dan kebajikan sosial negara-negara sekutu. Ia dijalankan melalui perkongsian di mana kedua-dua negara menyumbang secara bersama kepada dana. Buat masa ini, terdapat 16 negara-negara sekutu.

Bermula dari tahun 2015, Kerajaan Malaysia telah bekerjasama dengan Kerajaan UK sebagai satu inisiatif di bawah *Science to Action* (S2A). Oleh itu, Dana Newton dikenali sebagai Dana Newton-Ungku Omar di Malaysia. Sebagai penaja, MiGHT menyediakan geran sepadan sementara ASM, MOE dan MetMalaysia bertindak sebagai badan pelaksana.

Aktiviti NUOF meliputi perkembangan komuniti sains dan inovasi Malaysia melalui fellowship, skim mobiliti dan pusat kerjasama; membentuk kerjasama penyelidikan untuk topik pembangunan; dan mewujudkan rakan kongsi inovasi dan dana cabaran untuk membentuk penyelesaian inovatif dalam topik pembangunan.

ASM menjalankan tujuh aktiviti dengan kerjasama tiga institusi UK. Aktiviti tersebut adalah:

Program bersama British Council
Jaringan Penyelidik (Geran Bengkel) – Dana bagi menganjurkan bengkel penyelidikan untuk mewujudkan jaringan dan menyokong pembinaan kapasiti dalam kalangan penyelidik muda di Malaysia dan UK.

lembaran fakta

Newton Researcher Links
Geran sehingga **£85,000**/setahun

Panggilan kedua- **14** permohonan

6 penerima (**1** tajaan Kerajaan Malaysia & **5** tajaan Kerajaan UK)

Program bersama Royal Society, British Academy dan Royal Academy of Engineering
a) *Advanced Fellowships:*
Memberi peluang kepada penyelidik antarabangsa untuk membangunkan kekuatan dan kebolehan kumpulan penyelidik mereka melalui latihan, kolaborasi dan lawatan kerja dua hala dengan rakan penyelidik di UK.

lembaran fakta

Newton Advanced Fellowships for Natural Sciences
Geran sehingga **£111,000**/setahun

Panggilan pertama - **3** permohonan

2 penerima (tajaan bersama oleh kedua-dua Kerajaan)

Newton Advanced Fellowships for Social Sciences & Humanities
Geran sehingga **£111,000**/setahun

Panggilan pertama - **4** permohonan

Panggilan kedua - **2** permohonan

4 penerima (tajaan bersama oleh kedua-dua Kerajaan)

b) Geran Mobiliti

Memperkukuhkan kapasiti penyelidikan dan inovasi penyelidik Malaysia dengan peluang membuat lawatan atau menghantar kakitangan dan pelajar ke UK. Inisiatif ini dapat membina jaringan dan kolaborasi projek penyelidikan dengan institusi dan komuniti penyelidik dan inovasi di UK.

lembaran fakta

Newton Mobility Grants for Natural Sciences

Geran sehingga **£18,000**/setahun

Panggilan pertama - **2** permohonan

Panggilan kedua - **4** permohonan

3 penerima (tajaan bersama oleh kedua-dua Kerajaan)

Newton Mobility Grants for Engineering (known as Newton Research Collaboration Programme

Geran sehingga **£36,000**/setahun

Panggilan pertama - **5** permohonan

Panggilan kedua- **10** permohonan

4 penerima (tajaan bersama oleh kedua-dua Kerajaan)

Newton Mobility Grants for Social Sciences and Humanities

Geran sehingga **£15,000**/setahun

Panggilan pertama - **8** permohonan

4 penerima (tajaan bersama oleh kedua-dua Kerajaan)

Program bersama Medical Research Council UK

Menyediakan dana kolaborasi penyelidikan selama 2 tahun untuk projek yang memfokuskan penyakit tidak berjangkit (NCDs) di Malaysia.

lembaran fakta

UK-Malaysia Bilateral Medical and Health Research Collaboration

Dana berjumlah **£2,000,000** bagi pelaksanaan projek yang diluluskan bagi tahun 2017 - 2018

Panggilan pertama - **34** permohonan

12 penerima (**9** adalah tajaan bersama oleh kedua-dua Kerajaan & **3** adalah tajaan Kerajaan UK)





Pengiktirafan

Mengiktiraf Minda Saintifik Negara

Saban tahun, Malaysia telah melahirkan ramai saintis ulung yang telah memberi sumbangan besar kepada kemajuan pengetahuan sains dan menghasilkan output penyelidikan berimpak tinggi. Top Research Scientists Malaysia (TRSM) berfungsi sebagai pangkalan data yang menjadi kayu ukur kepada lingkungan saintis terkemuka. Dengan ini, kita dapat mengenal pasti saintis Malaysia yang akan memacu negara ke arah ekonomi berasaskan inovasi serta menonjolkan mereka sebagai penggerak agenda STI negara. Melalui TRSM, ASM mengiktiraf saintis dengan pencapaian cemerlang dalam tempoh 6 tahun yang lalu. Sehingga kini, ASM telah mengiktiraf 120 orang saintis.

Inisiatif ini merupakan platfom bagi saintis Malaysia untuk menerajui agenda STI negara dan menjadi idola kecemerlangan. Mereka juga bertindak sebagai rujukan dalam bidang kepakaran mereka.

Penerima TRSM mengikut bidang:

- 33 Sains Kejuruteraan
- 12 Sains Kimia
- 9 Bioteknologi
- 8 Sains Biologi
- 11 Sains Gunaan & Teknologi
- 3 Sains Fizikal

Kriteria Pemilihan
Setiap permohonan akan melalui proses saringan yang ketat berpandukan kriteria pemilihan dan mekanisma pemarkahan standard. Kriteria utama adalah seperti berikut:
- Penghasilan ilmu
- Penyebaran ilmu
- Impak hasil penyelidikan

lembaran fakta

Pengguna berdaftar

3,581 pengguna berdaftar dalam pangkalan data TRSM (2012 – 2016)
- Awam **272**
- Pemohon **3,209**
- Pentadbir **6**

957 pengguna berdaftar dalam pangkalan data TRSM (2016)
- Awam **40**
- Pemohon **92**

Input Data ke dalam pangkalan data TRSM
- **1284** telah disiapkan (2012 – 2016)
- **453** telah disiapkan (2016)
- *http://www.mytopscientists.org*

sekilas

Kelayakan
- Pengiktirafan diberikan kepada saintis yang memegang kerakyatan dan bekerja di Malaysia dengan pencapaian cemerlang dalam STI dan diiktiraf di peringkat nasional dan antarabangsa.
- Semasa permohonan, calon perlu aktif dalam aktiviti penyelidikan dalam tempoh 5 tahun lalu dengan sekurang-kurangnya 10 tahun sumbangan kumulatif terhadap perkembangan STI.





Pengantara

Young Scientists Network

Young Scientists Network (YSN) telah diasaskan oleh ASM bertujuan mewujudkan jaringan saintis yang berbakat dan bermotivasi yang mampu berinteraksi, menyelaras dan melaksanakan program STI yang relevan. Melalui jaringan ini, saintis muda mampu menyuarakan pendapat secara berintegrasi dalam hal-hal berkaitan STI yang signifikan terutamanya dalam mempengaruhi penggubalan dasar.

Ahli YSN-ASM dilantik oleh Ahli Majlis ASM dari kalangan saintis muda cemerlang yang memiliki keupayaan untuk menyumbang kepada pemerkasaan komuniti saintifik di Malaysia. Berikut merupakan aktiviti yang dijalankan oleh YSN-ASM tahun ini:

lembaran fakta

20 ahli baru dipilih

28 ahli gabungan dipilih

18 ahli Exco baru dipilih bagi penggal 2016/2017

9 kumpulan kerja ditubuhkan

Jumlah ahli: **73** dengan, **47** ahli gabungan

http://ysn-asm.org.my/

Program Jangkauan Luar Sains
Program Jangkauan Luar Sains YSN-ASM bertujuan memupuk minat pelajar dalam bidang sains melalui pembelajaran interaktif dan pengalaman yang menyeronokkan serta mempromosikan sains sebagai pilihan kerjaya.

sekilas

Transmission of Scientific Community - Program untuk masyarakat Orang Asli 19 - 21 Februari, SMK Muhibbah, Sg Siput, Perak

Whizz Kids Science Workshop Series I and II – Program untuk kanak-kanak kurang berkemampuan dan ceramah sains 7 Mei & 27 Ogos, *Eden Handicap Service Centre*, Pulau Pinang & Rumah Kebajikan Seri Cahaya

Energy Explore Race, 11 Mei, SM Sains Kota Tinggi, Kota Tinggi, Johor

Karnival Creativity & Science 4U 2016, Negeri Sabah, 17-18 Mei, Dewan Tun Hamdan, Tamparuli, Sabah

Karnival Creativity & Science 4U 2016, Negeri Johor, 29- 30 Julai, Kluang Mall, Johor

*Kuala Lumpur Engineering Science Fair (*KLESF), 4 - 6 November, The Mines International Convention Center

Penang International Science Fair (PISF), 12- 13 November, The SPICE Arena Pulau Pinang

Kepimpinan Penyelidikan
Di bawah program ini, YSN-ASM menganjurkan dua aktiviti iaitu Young Investigator Award dan Meet the Expert Session. Program ini bertujuan mempromosikan kecemerlangan sains dalam kalangan penyelidik muda, selain mempromosikan YSN-ASM kepada komuniti saintifik.

Penganugerahan Young Investigator Award ini adalah sebagai pengiktirafan kepada kecemerlangan saintis muda. Calon anugerah ini dipilih dari kalangan saintis yang telah membentangkan kertas penyelidikan di seminar terpilih yang dianjurkan secara bersama oleh YSN-ASM.

sekilas

IEEE 6th International Conference on Photonics, 14-16 Mac

International Conference on Beneficial Microbes, 31 Mei-2 Jun

9th Regional Conference on Chemical Engineer (RCCHe), 21- 22 November

29th Symposium of Malaysian Chemical Engineers, 1- 3 Disember

Pan-Asian Biomedical Science Conference, 7 – 8 Disember

Dua sesi *Meet the Expert Session* dijalankan seperti berikut:
41st *MSBMB Annual Scientific Meeting,* 17– 8 Ogos

9th Regional Conference on Chemical Engineer (RCCHe), 21- 22 November

Memperkasakan Saintis Muda Malaysia
YSN-ASM turut memfokuskan kepada latihan saintis muda dalam penulisan artikel sebagai medium untuk menyampaikan hasil kajian, usaha dan ilmu saintifik serta kesan-kesannya kepada masyarakat. Ini juga membolehkan mereka berkongsi penyelidikan saintifik dan menyalurkan idea-idea konstruktif untuk membentuk masa depan ekosistem saintifik Malaysia.

lembaran fakta

Bengkel Science Journalism II
17 - 18 April

15 peserta

2 artikel diterbitkan dalam media

Kolokium YSN-ASM 2016 bertemakan *Maximise the impact!*
16 -18 Disember

82 peserta

Ahli Exco baru dipilih

Perancangan aktiviti **2017**

Mesyuarat Antarabangsa
YSN-ASM telah menempatkan dirinya di arena antarabangsa dengan menghadiri pelbagai mesyuarat dan bengkel dibawah naungan *Global Young Academy* (GYA)

lembaran fakta

4 mesyuarat antarabangsa

1 bengkel



Pelaksanaan Penyelidikan Beretika

Seiring dengan perkembangan sains dan profesionalisma, persoalan sama ada betul atau salah (dilema etika) mengenai bagaimana pengetahuan dijana, disahkan, disebarkan dan digunakan telah dibangkitkan. Kehidupan menjadi lebih sukar kepada individu yang beretika kerana mereka mungkin perlu melakukan tugas tambahan. Prinsip etika bertujuan untuk mengurangkan atau menyelesaikan dilema etika, menggariskan panduan kepada para saintis dan golongan profesional serta melindungi hak-hak dan keselamatan bahan kajian. Bioetika, agroetika, etika perniagaan, ekoetika, teknoetika dan roboetika adalah antara contoh kepada etika kepenggunaan.

Di Malaysia, isu etika dan integriti telah diketengahkan oleh MOHE melalui Malaysia Education Blueprint (2015-2025) dan juga oleh Pejabat Penasihat Sains kepada Perdana Menteri melalui *Malaysia Code Responsible Conduct of Research* (MCRCR).

YSN-ASM menerajui inisiatif RCR di Malaysia untuk menggalakkan penyelidikan yang berintegriti dalam kalangan saintis serta memastikan penyampaian hasil kajian yang tepat dan diyakini kepada umum. Ianya amat penting untuk memupuk keyakinan umum terhadap penyelidikan di Malaysia. Oleh itu, YSM-ASM telah mengendalikan bengkel kesedaran di universiti tempatan sejak 2015.

Topik bengkel termasuk salah laku dalam penyelidikan, hak pengarang, penyelidikan yang mempunyai dwi kegunaan yang membimbangkan dan sains kolaborasi. Selain itu, modul pendidikan juga telah dihasilkan oleh YSN-ASM dengan kerjasama Akademi Kepimpinan Pendidikan Tinggi (AKEPT) dan MOHE melalui siri bengkel konsultatif iaitu RCR *Malaysian Educational Institute*. Modul ini bertujuan melatih para pelatih yang diiktiraf untuk RCR melalui kaedah pembelajaran aktif.

lembaran fakta

Bengkel kesedaran di Universiti Malaysia Sarawak (UNIMAS)
27-28 April
Topik yang dibincangkan termasuk Salah Laku Penyelidikan, Penulisan & Penerbitan, Sains Kolaboratif dan Penyelidikan yang Mempunyai Dwi Kegunaan (DURC)

6 fasilitator mengendalikan bengkel

19 peserta

Pembangunan Modul Pendidikan RCR
19-23 September

44 peserta

***Mahathir Science Award Foundation* -**
Menerajui Sains Tropika

Mahathir Science Award Foundation (MSAF) telah ditubuhkan pada tahun 2010 bagi mentadbir Mahathir Science Award.

MSAF mengiktiraf penyelidik yang telah menjalankan kajian dan penyelidikan yang menyumbang kepada penerokaan ilmu pengetahuan dalam mencari penyelesaian kepada masalah di kawasan tropika, dengan impak yang jelas terhadap sosio-ekonomi serta sumbangan terhadap polisi dan tadbir urus yang menjurus kepada peningkatan kualiti hidup.

MSA 2015 telah dianugerahkan kepada Dr Rita Colwell di atas sumbangan yang tidak ternilai dalam bidang penyelidikan dan inovasi yang berimpak tinggi serta kepimpinan beliau di arena sains. Beliau juga berjaya mengubah kefahaman semasa terhadap ekologi penyakit berjangkit dan penggunaan teknologi canggih untuk menghalang penyebarannya. Beliau merupakan penerima wanita yang pertama untuk anugerah ini. Dr Colwell adalah pemegang Ijazah Sarjana Muda Sains Bakteriologi dan Ijazah Sarjana Genetik dari Purdue University, serta Ijazah Kedoktoran Oseanografi dari University of Washington.

Sebelum majlis penyampaian anugerah diadakan, MSAF telah menganjurkan Minggu Laureate sebagai medium untuk Dr Colwell berkongsi kepakaran dan pengetahuan dengan audiens dari pelbagai peringkat. Dr Colwell telah menyuntik semangat saintis muda semasa sesi perbincangan intelektual ini.

Selain dari Minggu Laureate, MSA juga telah menganjurkan Siri Syarahan MSA memfokuskan kepada isu-isu penting dalam bidang sains tropika.

sekilas

Siri Syarahan MSA
Post COP21: *Translating the Paris Agreement through Strategic Investment in Science and Technology* oleh Emeritus Professor Lord Julian Hunt, salah seorang pemegang amanah MSA
8 Mac

Minggu Laureate MSA
Majlis Penganugerahan MSA
26 Oktober

Perbincangan Intelektual
Magnifying the Impact of Science
27 Oktober

Syarahan Umum
Beyond the Lab: Breaking New Ground
28 Oktober

lembaran fakta

192 Pencalonan diterima dari **30** negara (2005 – 2016)

10 penerima anugerah, dengan hadiah berjumlah **RM2,000,000**

Penerima MSA 2016 diumumkan pada bulan Mac

Hadiah : **USD100,000.00**, medal emas dan sijil

Lawatan Pengarah *Moroccan Teachers Training School (Ecole Normale Supérieure)* ke Malaysia

ASM dan *Hassan II Academy of Science and Technology (AHIIST)* telah bekerjasama sejak 2010 dalam program pertukaran pengetahuan antara akademi. Melalui program ini, pegawai kerajaan dan pendidik sains dari kedua-dua negara berpeluang untuk bertukar-tukar pengetahuan berkaitan kaedah pengajaran, sistem pendidikan, pembangunan kurikulum dan program kesedaran sains.

Sebagai kesinambungan dari kerjasama ini, ASM telah menerima kunjungan perwakilan *Moroccan Teachers Training School (Ecole Normale Supérieure)* diketuai oleh Profesor Mohammed Belaïche dari AHIIST.

sekilas

Institusi yang dilawati:
- Institut Pendidikan Guru – Kampus Pendidikan Teknik, Negeri Sembilan
- Institut Pendidikan Guru - Kampus Perempuan Melayu, Melaka
- Universiti Pendidikan Sultan Idris (UPSI)
- Universiti Sains Islam Malaysia (USIM)
- Pusat Permata Insan
- SK Bandar Baru Bangi
- SM Agama Persekutuan Kajang

The International Science, Technology & Innovation Centre for South-south Coorporation (ISTIC)

Dalam usaha untuk mencapai tujuan utama penubuhannya, *International Science, Technology and Innovation Centre for South-south Cooperation under the Auspicious of UNESCO* (ISTIC) terus menjalankan beberapa program pembinaan kapasiti dalam pengurusan STI untuk negara-negara membangun. ISTIC bertindak sebagai pemudahcara bagi mengintegrasikan pendekatan pembangunan ke dalam dasar STI, pembangunan kapasiti STI, membentuk jaringan antara pusat-pusat kecemerlangan serta menyokong pertukaran pengetahuan.

ISTIC menganjurkan program pembinaan kapasiti yang memfokuskan kepada sistem tadbir urus STI bersepadu, teknokeusahawanan, mendidik pemimpin wanita dalam STI, penyelenggaraan infrastruktur, dasar dan tadbir urus STI, serta pengajaran dan pembelajaran sains melalui IBSE. Program-program ini adalah selaras dengan Matlamat Pembangunan Lestari (SDG) 4 dan 5.

ISTIC telah menganjurkan program *"Embracing the Future: Improving Quality of Science Instruction in Schools"* di Ibu Pejabat UNESCO, Perancis. Program ini membincangkan kaedah IBSE sebagai pedagogi inovatif bagi merangsang sifat ingin tahu dan membentuk kemahiran berfikir murid. Kaedah ini melibatkan pertanyaan soalan, membuat hipotesis, menyiasat, membuat penemuan, mencari penyelesaian dan berkomunikasi dengan berkesan. Ia telah dirasmikan oleh Ketua Pengarah UNESCO, HE Irina Bokova dan Menteri Pendidikan Malaysia, YB Dato' Seri Mahdzir Khalid.

ISTIC telah berjaya meningkatkan jaringan rakan strategiknya melalui memorandum persefahaman dengan *National Institute of Science Technology and Innovation* (NISTI), Seychelles; *Centre for Science and Technology of Non-Aligned and Other Developing Countries* (NAM S&T Centre), India; dan *Isfahan Regional Center for Technology Incubators and Science Park Development* (IRIS), Iran.

sekilas

SDG 4 – memastikan pendidikan yang menyeluruh dan berkualiti kepada semua dan menggalakkan pembelajaran sepanjang hayat

SDG 5 – mencapai kesamarataan jantina dan memperkasakan wanita

lembaran fakta

ISTIC merupakan pusat *United Nations Educational, Scientific and Cultural Organization* (UNESCO) kategori 2. Pada tahun ini, ISTIC telah bekerjasama dengan **23** organisasi.

ISTIC menjalankan **8** program pembangunan kapasiti yang memberi manfaat kepada **356** peserta dari **49** buah negara.

Program ISTIC memberi manfaat kepada **34.3%** negara ahli G77, merangkumi **46** dari **134** negara ahli.



ICSU Regional Office for Asia and the Pacific

ICSU Regional Office for Asia and the Pacific (ICSU ROAP) terus memainkan peranan penting dalam *Future Earth* melalui program *Sustainability Initiative in the Marginal Seas of South and East Asia* (SIMSEA) yang terus berkembang. Antara pencapaian utama program ini adalah pernubuhan SIMSEA *Research Node* di UMS. Simposium Serantau SIMSEA juga telah dianjurkan di Manila pada bulan Oktober.

Sumbangan kewangan ICSU terhadap program ini berakhir pada tahun ini dengan penutupan Pejabat Serantau SIMSEA pada hujung bulan Disember. SIMSEA merupakan salah satu sumbangan utama ROAP kepada kemajuan *Future Earth* di Asia, dan akan terus memainkan peranan penting dalam perkembangan *Future Earth Oceans Knowledge – Action Networks* (OCEANS KAN). Selain itu, satu lagi pencapaian *Future Earth* di Asia adalah pelancaran *Future Earth* Korea pada bulan April. ICSU ROAP memainkan peranan penting dalam langkah ke arah penubuhan *Future Earth* Korea semasa ICSU ROAP *Regional Consultation* di Asia dan Pasifik ke-5 pada bulan November 2013.

Usaha penting ICSU ROAP dalam isu bencana adalah penganjuran *International Workshop on Psychological Intervention after Disasters* (PIAD) ke-5 pada bulan November di Manila. Bengkel ini bertujuan untuk membincangkan kajian dan amalan psikologi berkaitan bencana dan bagaimana komuniti menghadapi kesan bencana terhadap kesejahteraan biopsikososial mereka. ICSU ROAP menganjurkan bengkel ini bagi pihak *International Union of Psychological Science* (IUPsyS), dengan dana sumbangan daripada program antarabangsa *Integrated Research on Disaster Risk of the International Center of Excellence* (IRDR ICOE) di Taipei, IUPsyS, dan *United Nations University International Institute for Global Health*. Bengkel ini diadakan di *Department of Psychology, University of the Philippines,* Diliman dengan sokongan daripada *Psychological Association of the Philippines* (PAP), the *Center of Applied Development Science* (CADS), *University of Jena*, dan *Chinese Psychological Society* (CPS).

Tahun ini, ICSU ROAP memulakan langkah pembangunan program epigenetik. *Science Planning Group on Epigenetics* bermesyuarat untuk kali pertama di Kuala Lumpur pada bulan Oktober, untuk merangka pelan epigenetik dan kaitannya terhadap kesihatan dan kesejahteraan persekitaran bandar di Asia dan Pasifik. Pelan ini bertujuan untuk mengkaji semula lanskap epigenetik, mendokumentasikan penemuan berkenaan pencetus dan pengubahsuaian epigenetik, mengenalpasti bidang penyelidikan baru termasuk penyelidikan dalam perubahan produk genetik dan jalur biokimia serta kaitannya dengan penyakit dalam populasi bandar yang semakin berkembang.

Dalam hal tadbir urus, ICSU ROAP mengadakan dua mesyuarat *Regional Committee for Asia and the Pacific* (RCAP), di Seoul, Korea dan di Kota Kinabalu, Sabah. Semasa mesyuarat di Kota Kinabalu, ROAP menganjurkan seminar dengan kerjasama *Sabah Park* sebagai sebahagian dari program interaksi bersama saintis tempatan.

Tahun ini juga menandakan berakhirnya perjanjian ICSU ROAP dengan Kerajaan Malaysia pada bulan September. Proses pembaharuan kontrak sedang berjalan. Selain itu, pada tahun ini juga, Pengarah Pengasas ICSU ROAP sejak tahun 2006, Mohd Nordin Hasan, telah menamatkan perkhidmatan beliau. ICSU ROAP akan terus berusaha untuk mencapai kejayaan yang lebih signifikan bagi memenuhi komitmennya dalam memperkasakan bidang sains di peringkat antarabangsa demi kesejahteraan masyarakat.

Konsortium



Konsortium Sains Kebangsaan

Konsortium sains menerajui usaha bersepadu dalam memperkasakan bidang-bidang strategik STI. Konsortium ini disasarkan untuk menjadi institusi penyelidikan negara berpusat yang menjadi titik tumpu kepada kolaborasi inter-institusi dan antarabangsa.

Pusat Fizik Zarah Kebangsaan

Pusat Fizik Zarah Kebangsaan (NCPP) dihoskan oleh UM sejak 2013 dan dipantau oleh Jawatankuasa Pemandu Bersama antara ASM dan UM. NCPP terlibat dengan penyelidikan, pertukaran teknologi dan perkembangan bakat melalui kerjasama dengan CERN di Switzerland, *Deutsch Elektronen-Synchrotron* (DESY) di Jerman, *High Energy Accelerator Research Organization* (KEK) di Jepun dan *COMET Experiment* di Universiti Osaka, Jepun. Tahun ini, lapan orang pelajar Malaysia ditempatkan di CERN, Universiti Osaka dan KEK.

Aktiviti utama NCPP ialah *National School for Particle Physics* (NSPP). NSPP merupakan bengkel tiga hari yang menjadi platform latihan kepada calon-calon CERN *Summer Student Programme (*CSSP) bagi menyediakan mereka dengan pengetahuan dan pemahaman yang menyeluruh dalam bidang nuklear dan fizik zarah. Bengkel ini berfungsi sebagai satu saluran bagi menilai pemohon CSSP berdasarkan kesesuaian, kecekapan, minat dan komitmen mereka. Calon yang disenarai pendek akan dipilih oleh panel pemilihan dan hanya seorang pelajar yang akan terpilih untuk menyertai CSPP.

Selain itu, aktiviti lain turut dijalankan seperti kelas mingguan, ceramah bulanan dan program jangkauan luar.

lembaran fakta

Kakitangan DNCPP

2 Profesor

4 Felo Pelawat

1 Felo Penyelidik

1 Pensyarah Kanan

2 Pegawai Penyelidik

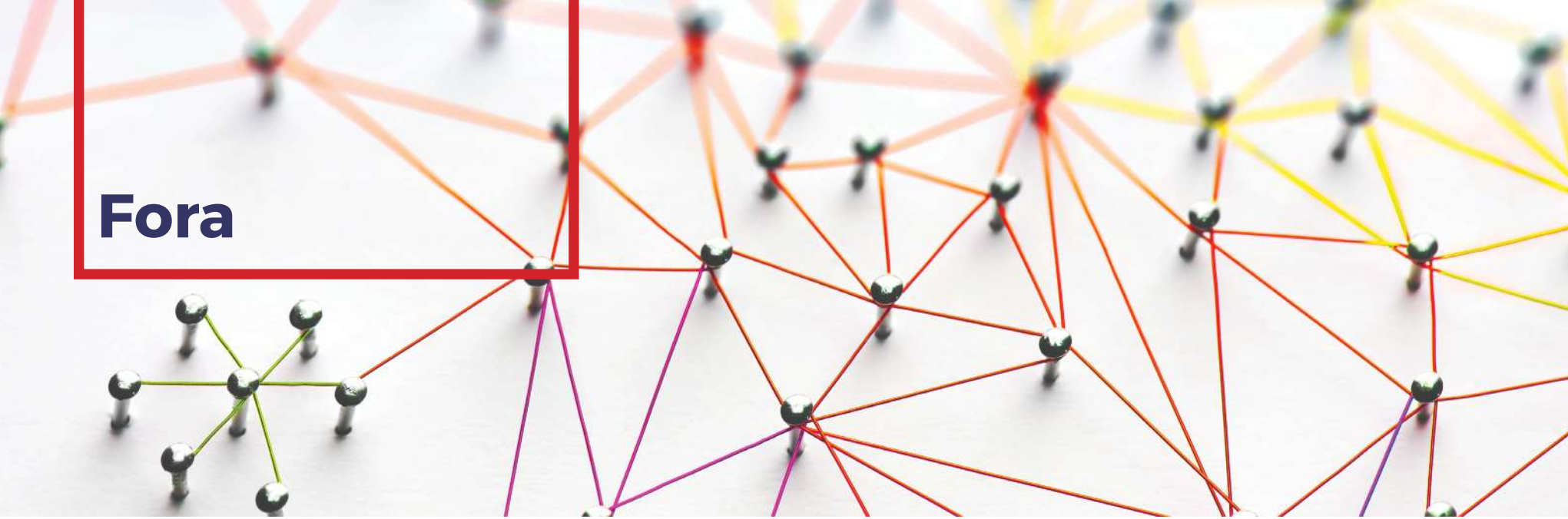
9 PhD dan **11** MSc

Malaysia Institute for Innovative Nanotechnology

Sebagai salah satu konsortium yang diasaskan oleh ASM dengan kerjasama MOHE dan UTM, NanoMITe terus berusaha untuk meneraju penyelidikan nanoteknologi berimpak tinggi dalam pelbagai domain. Konsortium ini menyediakan platform bagi penyelidikan kolaboratif global untuk membangun dan memperkasakan solusi berasaskan nanoteknologi kepada masalah kemiskinan, kekurangan air bersih, pertanian yang kurang cekap, rawatan dan diagnostik perubatan yang mahal dan lain-lain.

Di bawah pimpinan lima ketua projek, 19 projek sedang dijalankan dalam bidang Tenaga; Kesihatan dan Perubatan; Makanan dan Pertanian; Elektronik, Peranti dan Sistem; dan Alam Sekitar. Projek-projek NanoMITe ditaja oleh MOHE dan dijangka siap menjelang tahun 2020. Kemajuan projek-projek ini dibentang dan dibincangkan semasa Simposium NanoMITe setiap tahun.





Fora

Persidangan Antarabangsa *Science for Peace*

Saban hari kita dihidangkan berita berkaitan keganasan, jenayah, peperangan dan bencana. Sejarah telah membuktikan bahawa peperangan menjadi kaedah utama bagi menyelesaikan pertelingkahan. Dalam dunia moden, negara seantero dunia telah membuat pelaburan besar dalam membina peralatan ketenteraan yang canggih dan mempunyai kuasa pemusnah yang besar, dikuasakan oleh S&T. Telah tiba masanya bagi komuniti saintifik untuk mengutamakan P&P untuk keamanan.

S&T memberi keajaiban dalam pelbagai bidang; tetapi, masalah asas manusia masih berlarutan. Namun, kemajuan material tidak bermakna kerana kita masih gagal membawa keamanan dan kestabilan kepada dunia. Sains mampu menyumbang kepada genjatan senjata, pembasmian kemiskinan, melawan penyakit dan kebuluran, dan mengawal perubahan iklim.

Saintis tidak dapat melakukannya secara bersendirian; ahli ekonomi, saintis sosial, dan manusia sejagat perlu bekerjasama merealisasikannya melalui kerjasama dari kerajaan, ahli akademi, industri dan masyarakat. Oleh itu, persidangan ini bertindak sebagai platform bagi membincangkan peranan STI dalam mencapai keamanan global.

Persidangan antarabangsa Science for Peace yang bertemakan ***"More for Peace, Less for War"*** ini berlandaskan usaha menyalurkan sumber dan bakat untuk memberi keutamaan kepada STI dalam memperkasakan keamanan global. DYMM Sultan Perak, Sultan Nazrin Muizzuddin Shah telah mencemar duli merasmikan persidangan ini dan menyampaikan ucaptama bagi menentukan hala tuju. Baginda menggesa penggunaan STI untuk tujuan keamanan dalam memenuhi tujuh keperluan asas manusia untuk keselamatan. Baginda mencadangkan pendekatan sosio-ekonomi dipraktikkan dalam menangani masalah pengangguran akibat kemajuan bidang robotik. DYMM Sultan Nazrin percaya bahawa bakat STI mampu menyumbang kepada agenda keamanan menerusi dialog bersama pihak-pihak berkepentingan melalui Sains Diplomasi dalam pendidikan, komunikasi dan perbincangan.

Bidang fokus persidangan ini adalah:

- Menangani Risiko Perubahan Iklim
- Mengetengahkan Ideologi, Geopolitik dan Sekuriti
- Mencapai Keamanan melalui Ekonomi, Pembasmian Kemiskinan dan Inklusiviti
- Memupuk Kesedaran dan Persetujuan melalui Konvensyen, Dasar, Pendidikan dan Komunikasi

Hala Tuju dalam memupuk dan memperkasakan keamanan global:

- Tadbir urus yang baik dan usaha bersepadu dalam perkongsian dan kerjasama memberi impak besar dalam STI
- Mengemudi pembangunan saintifik dan teknologikal ke arah keamanan
- Melangkau batas tradisional dengan pendekatan berorientasikan nilai kerjasama dalam menangani cabaran tadbir urus global. Pemikiran maju, perancangan bersepadu dan tindakan sinergistik amat penting
- Memperkasa dan melibatkan golongan muda dalam agenda sains untuk keamanan terutamanya penyelesaian masalah kemanusiaan, demi membentuk pemikiran dan kemahiran mereka.
- Penglibatan bakat STI melalui diplomasi sains seperti pendidikan, komunikasi dan penglibatan

lembaran fakta

5-16 Ogos, Kuala Lumpur

4 sesi dikendalikan oleh **4** moderator

18 ahli panel

160 peserta



Ketibaan DYMM Sultan Nazrin Muizzudin Shah di persidangan antarabangsa Science for Peace disambut oleh Presiden ASM dan YB Menteri STI



Bengkel ICT-Bio Asia

Kerajaan Perancis telah menubuhkan jaringan ICT-Bio Asia untuk menonjolkan kepakaran Perancis dan Asia dalam tema-tema tertentu. Ia menjadi platform untuk memupuk kerjasama antara negara tuan rumah dan negara peserta.

Pada tahun 2016, ASM telah bekerjasama dengan Kerajaan Perancis untuk menganjurkan Bengkel ICT-Bio Asia. Bengkel ini bertemakan Biomas dan Tenaga Boleh Baharu, Keselamatan Siber, Bandar Hijau Pintar, dan Kesihatan & Kesejahteraan. Penyelidik, penggubal dasar dan ketua industri dari rantau Asia dan Perancis telah menghadiri bengkel ini. Peserta bangkel berpeluang memperoleh geran penyelidikan kolaboratif bernilai €200,000.

ASM dan Kementerian Luar Negeri dan Pembanguanan Antarabangsa Perancis melalui Kedutaan Perancis di Malaysia telah menandatangani surat niat bagi mengiktiraf ASM sebagai rakan kongsi untuk program ICT-Asia dan Bio-Asia. Ini mengukuhkan lagi hubungan ASM dan Kerajaan Perancis, terutamanya dalam membangunkan jalinan saintifik antara rantau Asia dan Perancis dalam bidang Teknologi Informasi dan Komunikasi dan kajian berkaitan biologi.

lembaran fakta

Lebih **90** kertas cadangan diterima.

11 penceramah dan **14** pembentangan poster.

200 peserta dari **10** negara.

Bengkel ini merupakan salah satu program di bawah *French Festival 2016.*

Siri ke-3 Seminar Penyelidikan Australia-Malaysia

Suruhanjaya Tinggi Australia telah menganjurkan siri seminar penyelidikan Australia-Malaysia yang mengumpulkan penyelidik dan peserta dari bidang sains persekitaran untuk berkongsi kepakaran dan ilmu serta membincangkan isu-isu perubahan iklim. Siri ketiga seminar bagi tahun 2016 adalah usaha kolaboratif antara ASM, UM dan Suruhanjaya Tinggi Australia. Seminar ini bertemakan *"Climate change and its impact on Ecosystems and Bioresources".*

lembaran fakta

3 penceramah

100 peserta

Menghubungkan Sains dan Industri

Kemunculan teknologi baru terus mempengaruhi dan membawa perubahan kepada ekonomi global. Teknologi disruptif telah menjadi kebimbangan utama kepada industri dan pasaran sedia ada. Oleh itu, pihak industri perlu menerapkan teknologi dan pengetahuan baru sebagai nilai tambah untuk kekal relevan. Untuk itu, empat pihak berkepentingan utama iaitu pihak kerajaan, industri, institusi penyelidikan dan ahli akademik perlu sentiasa bekerjasama.

Sehubungan itu, ASM telah menganjurkan forum tahunan bertujuan untuk menghubungkan serta mewujudkan jaringan kerjasama antara komuniti saintifik dan penggiat industri. Dua siri forum telah dianjurkan memfokuskan kepada industri Teknologi Hijau dan ICT & Bioteknologi.

lembaran fakta

Forum Teknologi Hijau
19 Mei, Universiti Teknikal Malaysia Melaka (UTeM)

20 peserta

Forum on ICT/ Biotechnology
17 November, ASM

26 peserta





Wacana

Penjanaan pengetahuan seringkali datangnya dari wacana minda yang membolehkan pembelajaran, pengembangan rangkaian, pewujudan informasi dan perkongsian. ASM menganjurkan pelbagai wacana yang berteraskan objektif ini dan ianya diterima dengan positif.

Perhimpunan Tahunan ke-9: National STI Masterplan

Berdasarkan kepada dapatan laporan *Science Outlook* 2015, terdapat keperluan bagi membentuk kesinambungan antara dasar berkaitan STI untuk memperjelas agenda STI nasional bagi pembangunan negara dan perkembangan ekonomi. Sehubungan itu, Majlis Sains Negara memutuskan untuk merangka Pelan Induk STI Negara.

Pelan ini berperanan sebagai Pelan Strategik STI utama negara yang melangkaui tahun 2020. Ini adalah untuk menyokong pelaksanaan semua dasar berkaitan STI yang penting bagi memastikan Malaysia menggunakan sebaiknya peluang-peluang berkaitan STI untuk mencapai perkembangan ekonomi yang mampan.

Topik-topik berikut dibincangkan semasa Perhimpunan Tahunan ke-9 pada 30 April:

Ucaptama oleh YB Datuk Seri Panglima Wilfred Madius Tangau
Menteri STI

'Development of STI Talent through a Holistic Approach'
Profesor Datuk Dr Asma Ismail FASc
Naib Presiden, ASM

'New Economic Areas and Financial Systems to Support STI Development'
Liew Siew Lee
Pengarah,Industri Pembuatan, Bahagian Sains dan Teknologi, Unit Perancang Ekonomi (EPU)

'Synergising STI Policies and Management'
Dato' Dr Mohd Azhar Hj Yahaya
Timbalan Ketua Setiausaha (Dasar), MOSTI

'Enhancing Collaboration: Forging the Quadruple Helix of Government – Academia – Industry – Community'
Academician Emeritus Profesor Tan Sri Dr Zakri Abdul Hamid FASc
Penasihat Sains kepada Perdana Menteri Malaysia

Dikendalikan oleh Syed Farradino Omar

Perhimpunan Tahunan ke-10: Pelaksanaan Penyelidikan Beretika

RCR acap kali dibincangkan, bukan hanya di negara ini tetapi di seluruh dunia. Dengan peningkatan sokongan orang awam, terdapat kebimbangan tentang bagaimana penyelidikan dijalankan. ASM menerajui RCR dan merangka garis panduan untuk dilaksanakan oleh penyelidik di institusi penyelidikan dan pendidikan tinggi.

Topik-topik berikut dibincangkan semasa Perhimpunan Tahunan ke-10 pada 24 September:

Current RCR status in Malaysian Institute of Higher Learning
Profesor Madya Dr Norhayati Mohamed
Pengarah, Pejabat Pengurusan Program, KPT

Malaysian Code of Responsible Conduct of Research (MCRCR)
Profesor Kanan Dato' Dr Khalid Yusoff FASc
Pengerusi, Malaysian Code of Responsible Conduct of Research

Global and Islamic Worldview on Ethics
Profesor Dato' Dr Abu Bakar Abdul Majeed
Pengerusi, Majlis Bioetika Kebangsaan Malaysia

RCR Education Module
Dr Chau De Ming
Pengerusi Bersama, Program RCR, Young Scientists Network (YSN-ASM)

Researcher Perspective on RCR
Profesor Dr Raymond Ooi Chong Heng FASc
Profesor, Jabatan Fizik, UM

IdeaXchange

Forum ini merupakan platform bagi komuniti saintifik terutamanya ahli ASM untuk bertukar pandangan, membincangkan perkara antara disiplin dan membahaskan isu-isu STI. Pada tahun ini, topik berikut telah dibincangkan:

sekilas

IdeaXchange ke-22: ***STI Implication on Trans-Pacific Partnership***

15 Februari
- Harjit Kaur, Bahagian Perundingan Strategik, Kementerian Perdagangan Antarabangsa dan Industri
- Shaharul Sadri Alwi, Pengarah Akreditasi, Jabatan Standard Malaysia

IdeaXchange ke-23: ***National Internet of Things (IoT) Roadmap***

25 Julai
- Ahmad Helmi Abdul Halim, Pengarah Kanan, Portfolio Teknologi & Pasaran, MIMOS Berhad





Keahlian

Tadbir Urus dan Keahlian

ASM ditadbir oleh Ahli Majlis yang terdiri daripada 16 orang Felo. Presiden dilantik oleh SPB Yang di-Pertuan Agong dan 15 ahlinya dipilih semasa Mesyuarat Agung Tahunan. Ahli Majlis yang bertanggungjawab dalam hal kepimpinan dan arah tuju polisi bermesyuarat sekurang-kurang lima kali setahun. Jawatankuasa Eksekutif pula bermesyuarat empat hingga lima kali setahun dan bertanggungjawab dalam menasihati pihak pengurusan ASM. Jawatankuasa Kewangan yang bertanggungjawab dalam pengurusan dan prestasi kewangan ASM bermesyuarat sekurang-kurangnya empat kali setahun.

Mesyuarat Agung Tahunan ASM yang ke-21 pada 30 April mengumpulkan 104 orang Felo. Semasa mesyuarat ini, Laporan Tahunan 2015 dan penyata kewangan (berakhir 31 Disember 2015) telah diluluskan serta juruaudit luar ASM telah dilantik. Ahli Majlis bagi penggal 2016 – 2018 dan Felo baru juga dilantik. Perlantikan Felo Kanan juga diumumkan semasa mesyuarat ini.

Felo Kehormat
Pengiktirafan ini dianugerahkan kepada individu yang memainkan peranan penting kepada pembangunan STI negara. Felo Kehormat dilantik dari kalangan bukan felo, yang telah memberikan sumbangan cemerlang kepada SET dimana ianya akan memberi manfaat kepada usaha ASM.

Felo Kanan
Felo Kanan dilantik dari kalangan Felo ASM oleh Ahli Majlis. Felo Kanan diiktiraf berdasarkan kepada sumbangan individu dan kepimpinan yang cemerlang di peringkat nasional dan antarabangsa mahupun kepada ASM. Mereka juga akan membawa gelaran Academician.

Felo
Pemilihan Felo adalah satu pengiktirafan bagi pencapaian unggul dan signifikan dalam bidang SET. Setiap tahun, Felo ASM akan mengenalpasti dan mencalonkan rakyat Malaysia yang berkaliber untuk dipertimbangkan sebagai Felo baru. Keahlian sepanjang hayat ini dianugerahkan berdasarkan proses pemilihan yang ketat dalam enam bidang yang berbeza.

lembaran fakta

Jumlah felo yang dilantik: **334**

Jumlah felo semasa: **301**

Felo Kanan: **27**

Lelaki: **82**% (**247**)

Wanita: **18**% (**54**)

sekilas

25 orang Felo baru dan seorang Felo Kanan dilantik pada AGM ke-21 yang diadakan pada 30 April. Majlis Penganugerahan Felo diadakan pada 13 Disember.

Felo Kanan 2016
Academician Emerita Professor Datuk Dr Mazlan Othman FASc telah dilantik sebagai Felo Kanan, untuk sumbangan beliau sebagai perintis bidang astrofizik serta pembangunan sain angkasa di Malaysia.

Felo 2016

Sains Perubatan dan Kesihatan
- Profesor Dato' Dr Balwant Singh Gendeh FASc
- Profesor Dr Lee Way Seah FASc
- Profesor Dr Mary Anne Tan Jin Ai FASc
- Profesor Dr Wan Ariffin Abdullah FASc

Sains Kejuruteraan dan Komputer
- Profesor Dr Abdullah Gani FASc
- Profesor Dr Borhanuddin Mohd Ali FASc
- Dato' Ir Lim Chow Hock FASc
- Profesor Dato' Ir Dr Mahyuddin Ramli FASc
- Profesor Dr Mohamed Ibrahim Abdul Mutalib FASc
- Profesor Dr –Ing Ir Renuganth Varatharajoo FASc
- Profesor Dr Zainab Abu Bakar FASc

Biologi, Sains Pertanian dan Alam Sekitar
- Profesor Dr Ahmad Ismail FASc
- Dr Ahmad Parveez Ghulam Kadir FASc
- Dr Chow Keng See FASc
- Profesor Dr Mohd Ali Hassan FASc
- Dr Rajinder Singh Harminder Singh FASc

Sains Matematik, Fizik dan Bumi
- Profesor Dr Ramesh T. Subramaniam FASc
- Profesor Dr Zainuriah Hassan FASc

Sains Kimia
- Profesor Dr Md Pauzi Abdullah FASc
- Profesor Dr Mohd Kamal Harun FASc
- Profesor Dr Wan Ahmad Kamil Che Mahmood FASc
- Profesor Dr Zanariah Abdullah FASc

Pembangunan S&T dan Industri
- Dr Ahmad Hezri Adnan FASc
- Profesor Dato' Dr Aishah Bidin FASc
- Dato' Dr Sharifah Maimunah Syed Zin FASc

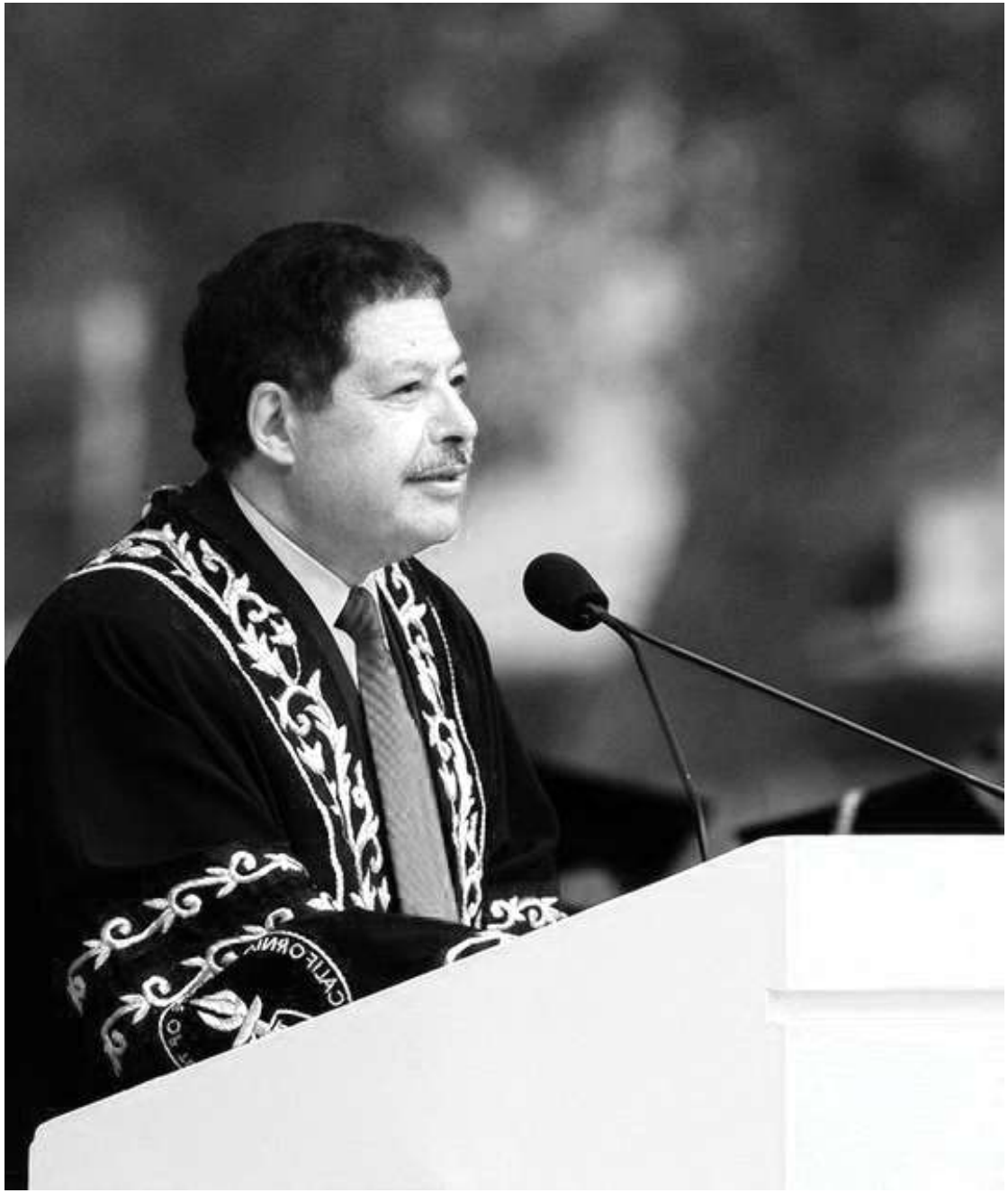
sekilas

Felo yang baru dilantik adalah digalakkan untuk menyampaikan syarahan dalam bidang kepakaran masing-masing kepada orang awam dan komuniti saintifik.

Syarahan Felo 2016:
- *Haemoglobin Disorders in a Multiracial Population: Challenges in Diagnosis* oleh Profesor Dr Mary Anne Tan Jin Ai FASc, 11 Ogos, UM
- *Mobile Cloud Computing: Leveraging Capability for Value Creation* oleh Profesor Dr Abdullah Gani FASc, 26 Oktober, UM
- *Heterocycles: From Fluorogenic to Bioactive Compounds*, oleh Profesor Dr Zanariah Abdullah FASc, 25 November, UM
- *Innovative Developments in GaN-BASED Technology* oleh Profesor Dr Zainuriah Hassan FASc, 7 Disember, USM
- *Polymer Electrolyte: A New Hope* oleh Profesor Dr Ramesh T. Subramaniam FASc, 14 Disember, UM

Associates
Perkembangan ilmu pengetahuan yang bersifatkan antara disiplin meningkatkan permintaan kepakaran pelbagai bidang sains dan sains sosial. Oleh itu, pada 2010, keahlian ASM telah diperluaskan untuk merangkumi *Associates* bagi meningkatkan fungsi ASM sebagai Badan Pemikir kepada kerajaan. Ahli Majlis ASM melantik *Associates* bagi tempoh dua tahun. *Associates* menyumbang dan mengambil bahagian dalam pelbagai jawatankuasa dan program. Pada 2016, jumlah *Associates* adalah 29 orang.

Dalam Kenangan



Dr Ahmed H. Zewail

(26 Februari 1946 – 2 Ogos 2016)

Dr Ahmed H Zewail lebih dikenali sebagai pengasas femtochemistry. Beliau merupakan penerima Hadiah Nobel Kimia pada tahun 1999 bagi kajiannya terhadap keadaan peralihan tindak balas kimia menggunakan spektroskopi femto saat. Beliau telah membuat pemerhatian tentang pergerakan atom dalam femto saat (10-15 saat). Ini menjurus kepada kewujudan disiplin Femtochemistry dan bidang-bidang berkaitan.

Dr Zewail telah dilahirkan di Damanhur, Mesir dan memegang kerakyatan Amerika. Beliau memperoleh ijazah sarjana muda dan sarjana di Universiti Alexandria, dan menerima ijazah doktor falsafah dari Universiti Pennsylvania. Selepas menamatkan ijazah kedoktoran pada tahun 1974, Dr Zewail bekerja di University of California, Berkeley. Beliau dilantik sebagai Profesor di California Institute of Technology (Caltech) pada tahun 1976. Beliau terus berkhidmat bersama Caltech selama empat dekad. Beliau merupakan Profesor Kimia Linus Pauling Chair, Profesor Fizik dan Pengarah Physical Biology Center for Ultrafast Science and Technology di Caltech.

Dr Zewail menerima penghormatan dari seluruh dunia bagi sumbangannya terhadap sains dan khidmat awam. Beliau dianugerahkan dengan 50 Ijazah Kehormat dalam bidang sains, seni, falsafah, undang-undang, perubatan dan humane letters. Beliau merupakan penerima Orders of State and Merit dan setem pos juga dikeluarkan bagi memperingati sumbangan beliau dalam bidang sains dan kemanusiaan. Beliau juga telah menerima pelbagai anugerah dan hadiah antarabangsa termasuk Albert Einstein World Award, Benjamin Franklin Medal, Leonardo da Vinci Award dan Wolf Prize. Beberapa penganugerahan antarabangsa telah diwujudkan bersempena nama beliau di Amsterdam, Kaherah, Detroit, Trieste, and Washington (DC). Di Kaherah, Yayasan Ahmad Zewail menerajui penyebaran ilmu dan penganugerahan dalam bidang sains dan seni. Kerajaan Mesir telah menubuhkan 'Zewail City of Science and Technology' sebagai projek nasional bagi kebangkitan saintifik pada tahun 2011. Dr Zewail telah dilantik sebagai Pengerusi Pengasas, Lembaga Pemegang Amanah projek ini.

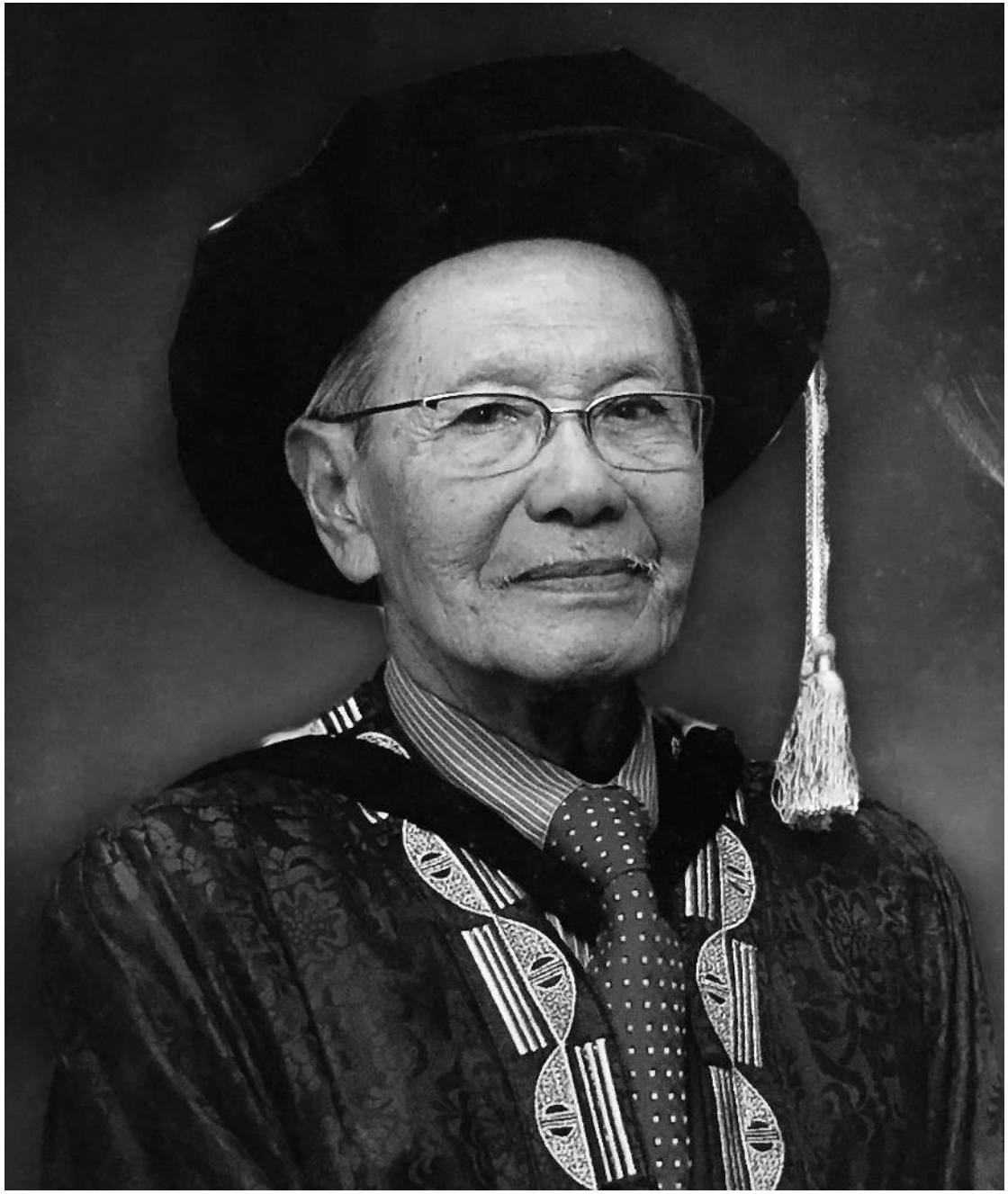
The Washington Post dan Universiti Harvard telah menganugerahkan beliau dengan Top American Leaders Award. Pada tahun 2009, Presiden Barack Obama melantik beliau sebagai ahli dalam Council of Advisors on Science and Technology. Pada tahun yang sama, beliau telah dinamakan sebagai Utusan Sains U.S. di Timur Tengah. Setiausaha Agung Pertubuhan Bangsa-Bangsa Bersatu (UN), Ban Ki-moon, menjemput Dr Zewail untuk menyertai Badan Penasihat Sains UN. Di Mesir, beliau telah berkhidmat dalam Majlis Penasihat kepada Presiden.

Dr Zewail telah menerbitkan lebih dari 600 artikel dan 14 buah buku. Beliau juga dikenali melalui syarahan dan penulisan yang berkesan dalam bidang sains dan isu-isu dunia.

ASM telah melantik Dr Zewail sebagai Felo Kehormat pada tahun 2006. Hubungan baik antara ASM dan Dr Zewail bermula apabila beliau menerima jemputan ke sebuah program anjuran ASM pada tahun 2002. Sejak itu, beliau sentiasa berkomunikasi rapat dengan ASM. Beliau telah menyumbang idea dan pandangan untuk aktiviti dan kajian ASM. Beliau juga merupakan salah seorang ahli panel antarabangsa untuk menilai calon yang disenarai pendek untuk Mahathir Science Award. ASM juga telah diberi keistimewaan untuk menterjemah dan menerbitkan buku Voyage Through Time dalam Bahasa Malaysia: Pengembaraan Merentasi Masa, tambahan kepada 14 edisi yang telah diterbitkan.

Sumbangan Dr Zewail telah memberi impak yang besar kepada bidang kimia dan bidang sains yang lain. Ia membolehkan kita untuk memahami dan meramal reaksi kimia yang penting. Beliau telah meninggalkan satu legasi. Beliau akan dikenang dan sumbangannya akan sentiasa dalam ingatan.

Dalam Kenangan



Tan Sri Dato' Ir Abu Zarim Hj Omar FASc

(26 Januari 1924 – 30 Julai 2016)

Tan Sri Dato' Ir Haji Abu Zarim Hj Omar FASc telah mendedikasikan hidup beliau untuk memberikan kehidupan yang lebih baik dan berkualiti kepada masyarakat. Beliau merupakan seorang pemimpin yang luar biasa. Kebolehan ini dibuktikan melalui kepimpinan beliau dalam sektor awam dan swasta.

31 Ogos 1957 merupakan detik permulaan Malayanisasi. Bagi memastikan kejayaan Malayanisasi, jurutera dan teknokrat tempatan amat diperlukan bagi menggantikan kepakaran asing dalam Lembaga Letrik Negara (LLN). Oleh itu, pada tahun 1951, Tan Sri Abu Zarim merupakan salah seorang jurutera yang dihantar untuk menjalani latihan di British Electrical Authority, United Kingdom untuk mendapatkan pensijilan profesional selari dengan keperluan LLN.

Semasa dalam perkhidmatan di LLN, sekarang dikenali sebagai Tenaga Nasional Berhad (TNB), beliau telah menabur khidmat bakti kepada Malaysia dalam membangunkan penjanaan kuasa yang mampu menampung keperluan industri. Beliau merupakan pelopor kepada penubuhan Institut Latihan Sultan Ahmad Shah (ILSAS).

Tan Sri Abu Zarim merupakan salah seorang Felo Pengasas ASM. Beliau juga merupakan salah seorang ahli terawal Institut Jurutera Malaysia (IEM) dan dilantik sebagai presidennya pada 1970-1972 serta ahli pengasas kepada Lembaga Jurutera Malaysia (BEM). Beliau telah memperkenalkan terma "Ir" untuk Ingenieur yang digunakan di Malaysia.

Beliau telah dianugerahkan dengan ijazah kehormat Doctor of Technology dari Loughborough University of Technology pada tahun 1999 dan Doctor of Engineering dari Universiti Tenaga Nasional (UNITEN) pada tahun 2000 sebagai pengiktirafan kepada sumbangan cemerlang beliau. Beliau merupakan pemegang Felo Kehormat IEM, Fellowship Institution of Electrical Engineers, United Kingdom, dan Fellowship of the Association of Electrical Supply Industries of East Asia and Pacific (AESIEAP).

Tan Sri Abu Zarim merupakan ahli majlis dalam beberapa syarikat sendirian berhad. Beliau adalah Pengerusi Malaysian National Committee of the World Energy Conference (WEC) antara tahun 1974 hingga 1984, Naib Pengerusi International Executive Council of WEC dari tahun 1980 hingga 1982, dan Naib Pengerusi Kehormat Tetap WEC. Tan Sri Abu Zarim memainkan peranan penting dalam pembangunan dan kemajuan UNITEN. Beliau telah berkhidmat sebagai Pro-Canselor UNITEN dari tahun 2005 hingga 2015.

Tan Sri Abu Zarim telah menjadi sumber inspirasi dan idola kepada ramai jurutera. Kebaikan dan dedikasi beliau akan sentiasa diingati.

Memberi kepada Sains



Endownment Fund

Sejak penubuhannya, ASM telah menerajui program flagship berkaitan STEM yang memberi manfaat kepada pelajar, belia dan saintis. Di ASM, kami percaya bahawa kebergantungan kepada dana kerajaan adalah tidak memadai untuk pembangunan sains, kejuruteraan dan teknologi. Sumbangan dari pihak perseorangan dan sektor korporat adalah penting dalam mendokong pendidikan STEM. Oleh itu, Ahli Majlis ASM telah bersetuju untuk melancarkan ASM Endowment Fund bagi memberi galakan kepada rakyat Malaysia untuk menyumbang kepada sains.

Dana ini menyeru komitmen para saintis kerana merekalah yang paling mengetahui nilai sains dan memahami kepentingannya kepada pembangunan negara. Saintis bertindak sebagai duta yang mampu membawa mesej ini kepada sektor korporat dan golongan bukan saintis bagi impak yang lebih besar. Adalah menjadi harapan agar komuniti dapat menyumbang kepada pembangunan STEM pada masa akan datang.

Dana yang disumbangkan merupakan dana terkumpul. Penyumbang mampu mencapai peringkat pengiktirafan yang lebih tinggi apabila dana yang disumbangkan mencapai nilai tertentu. ASM akan mengiktiraf semua penyumbang selain melaporkan aktiviti yang dijalankan di bawah dana ini.

Program yang dijalankan di bawah dana ini akan dirancang berdasarkan visi dan misi ASM. Walaubagaimanapun, penyumbang boleh menentukan kegunaan sumbangan mereka ke arah mencapai matlamat bersama. Sebagai permulaan, adalah dicadangkan dana ini digunakan untuk aktiviti P&P, program kesedaran, biasiswa, *fellowship*, anugerah dan program bimbingan.

Kategori Sumbangan

i. **Penyokong** – Kurang dari RM1,000
ii. **Penderma** - RM1,000 hingga RM9,999
iii. **Penyumbang** - RM10,000 hingga RM29,999
iv. **Penyumbang Utama** :
  Tahap 1 – RM30,000 hingga RM49,999
  Tahap 2 – RM50,000 hingga RM99,999
  Tahap 3 – RM100,000 hingga RM149,999
  Tahap 4 – RM150,000 hingga RM199,999
  Tahap 5 – RM200,000 hingga RM249,999
  Tahap 6 – RM250,000 hingga RM299,999
v. **Penaung** :
  Tahap 1 – RM300,000 hingga RM399,999
  Tahap 2 – RM400,000 hingga RM499,999
vi. **Gabenor** – RM500,000 hingga RM999,999
vii. **Pemegang Amanah** – RM1 juta ke atas
viii. **Penamaan** - Program akan dinamakan bersempena nama penderma jika jumlah derma terkumpul bernilai RM2 juta. Mereka akan menerima sijil dan pengecualian cukai.

Semua sumbangan yang diberikan kepada ASM adalah dikecualikan dari cukai .

sekilas

Penyumbang sehingga 31 Disember:

Penyumbang
Academician Professor Emerita Datuk Dr Mazlan Othman FASc

Penderma
Dato' Ir Dr Gue See Sew FASc

Penyokong
Seetha Ramasamy



Passing the Baton

Peralihan Kepimpinan

4th President
28/12/2010 - 27/12/2016

Tan Sri Datuk Dr Ir Ahmad Tajuddin Ali FASc telah menerajui ASM sebagai Presiden yang ke-4 selama enam tahun. Sepanjang kepimpinan beliau, ASM terus mengukuhkan kedudukannya sebagai Badan Pemikir negara serta mengembangkan jaringan tempatan dan antarabangsa.

Beliau telah memperkenalkan beberapa inisiatif untuk menggalakkan penyertaan ahli secara aktif, iaitu Wacana, IdeaXchange dan forum.

Beliau percaya kebolehan perlu dibuktikan untuk memperoleh kepercayaan dan kehormatan. Sepanjang tempoh perkhidmatan beliau, ASM terus memperuntukkan dana dan sumber yang mencukupi untuk menjalankan kajian. Usaha yang berterusan ini telah membuahkan hasil. Beberapa kementerian dan agensi kerajaan mula mencadangkan kajian secara kolaboratif bersama ASM dan memohon nasihat berkaitan STI.

Beliau juga telah membentuk beberapa jaringan baru termasuk bersama CERN, NUOF, IIASA, Konsortium Sains Nasional yang dihoskan oleh UM dan UTM. Ini dapat memperkasakan golongan penyelidik Malaysia.

Seluruh warga ASM akan sentiasa menghargai komitmen Tan Sri Datuk Dr Ir Ahmad Tajuddin Ali FASc yang tinggi dan berterusan.

Tan Sri Datuk Dr Ir Ahmad Tajuddin Ali FASc led ASM as its fourth President for six years. Under his leadership, ASM grew stronger as national Thought Leader expanding its network nationally and internationally.

He encouraged active participation of members and introduced several initiatives in order to gain their input through General Assembly, IdeaXchange and fora.

He strongly believed in showcasing capability first, in gaining trust and respect. During his tenure, ASM continued to fund studies and allocate sufficient resources. This relentless effort and belief has begun bearing fruits, with many government agencies and ministries starting to approach ASM for collaborative studies seeking ASM's advice in STI-related matters.

He also helped forge many new partnerships. Among the notable ones were with CERN, NUOF, IIASA, National Science Consortiums hosted by UM and UTM respectively, which has helped strengthen the capacity of Malaysian researchers.

Tan Sri Datuk Dr Ir Ahmad Tajuddin's tireless and unwavering commitment to the Academy is much appreciated by ASM members.



Tan Sri Datuk Dr Ir Ahmad Tajuddin Ali FASc

5th President
28/12/2016 - 27/12/2019



Professor Datuk Dr Asma Ismail FASc

Professor Datuk Dr Asma Ismail FASc was appointed as the 5th President of ASM, effective 28 December 2016 by Yang di-Pertuan Agong XIV. She helms the position from her predecessor, Tan Sri Datuk Dr Ir Ahmad Tajuddin Ali FASc.

She is well known for her leadership and outstanding contribution in both the scientific and education fraternity. She is an expert in medical microbiology, medical biotechnology and rapid diagnostics for infectious diseases. She was the Vice-Chancellor of three public universities and Director General of Higher Education Department (2014-2016).

She is passionate in bringing the benefit of science to the bottom billion. This is evident with the translation of her scientific discovery into four rapid diagnostic kits for typhoid which has been commercialised in more than 18 countries.

She was elected as a Fellow in 2003, and served as ASM Council member (2007-2011) and Vice-President (2012-2015). ASM looks forward in working with Professor Datuk Dr Asma Ismail FASc towards strengthening its position as the national Thought Leader in science, engineering and technology.

Yang di-Pertuan Agong XIV telah memperkenankan pelantikan Profesor Datuk Dr Asma Ismail FASc sebagai Presiden ASM ke-5 pada 28 Disember 2016. Beliau menggantikan Tan Sri Datuk Dr Ir Ahmad Tajuddin Ali FASc.

Beliau terkenal dengan kepimpinan dan sumbangan cemerlang dalam bidang sains dan pendidikan. Bidang kepakaran beliau adalah mikrobiologi perubatan, bioteknologi perubatan dan diagnostik pantas untuk penyakit berjangkit. Beliau merupakan mantan Naib Canselor bagi tiga universiti awam dan Ketua Pengarah Pendidikan Tinggi (2014-2016).

Beliau bertekad untuk membawa manfaat sains kepada golongan miskin tegar. Ini terbukti dengan penghasilan empat kit diagnostik untuk demam kepialu yang telah dikomersilkan di 18 buah negara.

Beliau telah dilantik sebagai Felo pada tahun 2003 dan telah berkhidmat sebagai Ahli Majlis ASM (2007-2011) dan Naib Presiden (2012-2015). Dengan kepimpinan Professor Datuk Dr Asma Ismail FASc, diharapkan agar ASM dapat terus mengukuhkan kedudukannya sebagai Badan Pemikir negara dalam bidang sains, kejuruteraan dan teknologi.

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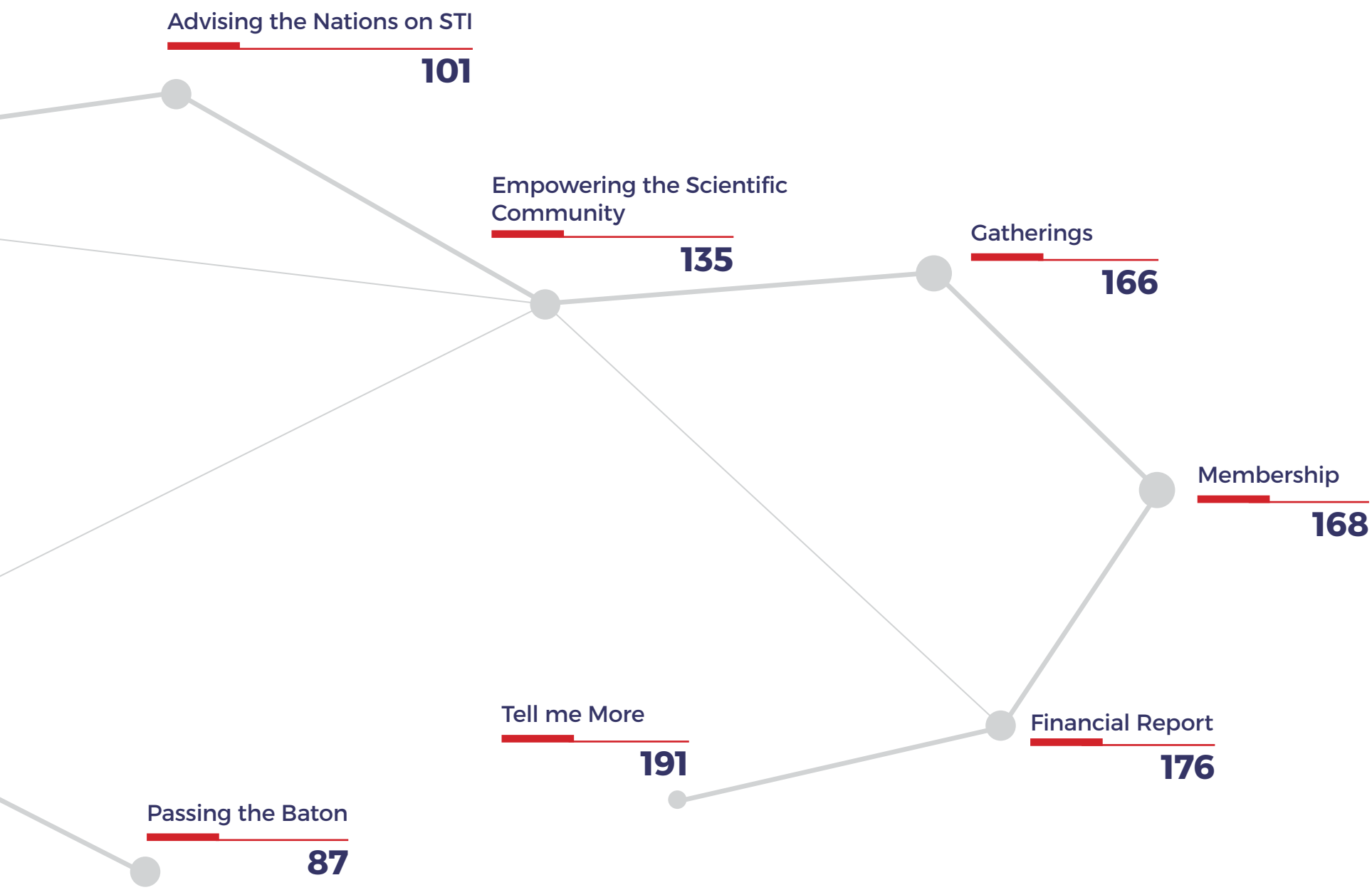
Written & Designed by the
Academy of Sciences Malaysia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We Strive

1. To be the nation's Thought Leader for matters related to science, engineering, technology and innovation.

2. To pursue excellence in the fields of science, engineering and technology (SET) for the benefit of all.

Mission

- To be a Thought Leader
- To be an Apex Advisory Body on STI matters
- To be an effective promoter of public understanding and awareness of STI
- To make STI a basis for economic development and societal well-being

Function

- Providing advice to the Government on matters related to STI of national and international importance
- Fostering a culture of excellence in science, engineering and technology in Malaysia
- Assisting in upgrading technological capabilities of Malaysian industrial sectors
- Promoting public awareness in understanding of science
- Enhancing international networking and collaborations
- Scientific publications

Strategies

- Harnessing scientific minds to charter STI direction for the country
- Fostering culture of excellence in SET
- Ensuring independent, authoritative and timely STI input
- Promoting the utilisation and application of STI for societal well-being
- Facilitating the implementation of innovation-led economy strategy

Stakeholders

Internal

- Fellows
- Associates
- Members of Young Scientists Network (YSN-ASM)
- ASM Management

External

- Prime Minister's Department and Central Agencies
- MOSTI and its agencies
- Other Ministries and relevant agencies
- Industry organisations
- Research institutions
- Higher Learning Institutions
- STI Professional Bodies
- International STI Organisations
- Urban and Rural communities

Our Work

STI Strategic Studies

- Malaysia 2050
- Socio-Economics
- Emerging Technology
- Sustainability Science

STI Strategic Programmes

- Capacity Building
- Gateway
- Science Consortiums
- Consultative Fora

4 Point Client Charter

- Provide independent, evidence-based, reliable and timely advice
- Committed in initiating quality programmes towards developing strong STI foundation for the nation
- Represent Malaysia and its scientific community at the international arena
- Disseminate scientific knowledge

Foreword



As a ministry championing the advancement of science and technology in Malaysia, Ministry of Science, Technology and Innovation (MOSTI) strongly upholds its mission to explore, develop and utilise science, technology and innovation (STI) to generate knowledge, create wealth and ensure societal well-being towards achieving a competitive, sustainable and inclusive high income economy. The Academy of Sciences Malaysia (ASM) is committed in supporting the ministry's goals, strategies and action plans.

This annual publication is a comprehensive report of ASM's achievements. I am proud to note that ASM has completed nine studies and 23 programmes in 2016. Work on a number of ASM studies which are scheduled to be completed in 2017 has also begun.

The *Transformasi Nasional* 2050 (TN50) is expected to bring changes especially in governance, development, economy, resilience of the people and education, with the young generation leading the way forward. With this development, indeed, it is crucial for MOSTI to bring STI to the centre stage to play an effective and significant role in driving TN50. In developing strategies and action plans towards achieving TN50, future scenarios are needed.

Thus, I look forward to the ASM's Malaysia 2050: Foresight Initiative report in 2017, which is aligned with the aspirations of TN50.

We need to have a clear picture and understanding of national and global STI performance along with our structure and governance characteristics. Therefore, this calls for advocation of STI for Policy. STI components must be factored into the formulation process of all policies in achieving TN50. Ministries and agencies must ensure effective implementation of their policies and strategies. STI policy instruments that are in place need to be monitored and reviewed on a periodic basis in order to identify and fill the missing gaps. Access to adequate indicators and accurate information, supported by knowledge-based capacities for evidence-based STI policy recommendation is vital.

The national level strategies and programmes implemented must be able to strengthen STI capacity and capability in terms of institutions, mandates, personnel, management, funding and linkages. Therefore, Policy for STI requires a holistic collaboration of all ministries and stakeholders. The National Science Council acting as an over-arching committee overseeing science has brought together MOSTI, Ministry of Education (MOE), and Ministry of Higher Education (MOHE) into one platform with the common goal of developing science, technology, engineering and mathematics (STEM) talent for the future. I am confident that we are on the right track towards becoming a developed nation.

ASM programmes are very much aligned in supporting Policy for STI and STI for Policy. Flagship programmes such as Mega Science, Science Outlook, Foresight, National Science Consortium, Young Scientists Network, Talent Development Programmes, are commendable. I hope ASM will continue working towards strengthening its expertise to become the national STI Think Tank serving various ministries for the betterment of the people. ASM's independent, credible and timely inputs are much appreciated.

YB Datuk Seri Panglima Wilfred Madius Tangau
Minister of Science, Technology and Innovation

Foreword



I would like to congratulate ASM for producing this Annual Report as a measure of 2016 achievements. As a statutory body under MOSTI, ASM is mandated to provide strategic advisory inputs to the Government and stakeholders as well as pursue excellence in science, engineering and technology (SET) for the benefit of all.

As a ministry responsible to spearhead the STI agenda for the nation's economic growth, MOSTI is committed in implementing National Policy on Science, Technology and Innovation 2 (NPSTI2) which aims to harness STI for socio-economic transformation and inclusive growth. The implementation of this policy requires integrated effort by various ministries, government agencies, private sectors and NGOs. ASM's activities augur well with five of the six strategic thrusts of NPSTI2 especially in developing, harnessing and intensifying talents; energising industries; transforming STI governance; promoting and sensitising STI; and enhancing strategic international alliances.

In 2016, many of ASM's advisory reports were presented to the Cabinet through MOSTI. A notable one would be the 'Transforming the Water Sector: National Integrated Water Resources Management Plan: Strategies and Road Map', which was launched by YB Minister of MOSTI. The report provides a comprehensive overview of integrated water resources management in Malaysia, issues and challenges faced. It brings together various ministries to undertake the recommendations collaboratively which is aligned with the Government's National Blue Ocean Strategy (NBOS).

ASM's flagship programme promotes excellence in science at all levels. Outreach programme such as industry bootcamps, seminars and talks are now conducted by ASM through ASM Chapters and Young Scientists Network of ASM (YSN-ASM). At researcher's level, ASM earnestly calls for good science on par with international standards. As such, the Top Research Scientists Malaysia (TRSM) identifies and selects active top research scientists and recognises them for their

significant contribution in R&D. In humanising scientific inputs, ASM continuously engages stakeholders and public through fora and seminars. The highlight of the year was the International Conference on Science for Peace themed 'More for Peace, Less for War'.

I am glad that ASM also took part in MOSTI's initiative such as MOSTI Social Innovation (MSI), Malaysian Commercialisation Year (MCY), Dr. Ranjeet Bhagwan Singh Medical Research Trust Fund Programmes, R,D&C Project Agency and many others.

I would like to express my appreciation to ASM for producing high quality publications and implementing various impactful programmes. The Ministry is committed in providing full support to ASM in delivering its mandate as the National STI Think Tank effectively and efficiently.

Datuk Seri Dr Mohd Azhar Haji Yahaya
Secretary General
Ministry of Science, Technology and Innovation



A word from our President

The year breezed in with new energy, bringing changes that revitalised the science in the country. The establishment of the National Science Council is a platform that the Academy values. The Council brought together eleven Cabinet Ministers related to STI with a common goal that is to oversee the development and execution of Research, Development and Commercialisation (R, D & C) agenda of the country.

2016 annual report encapsulates activities of ASM in a story form that will enlighten you on the achievements. It will also provoke your thoughts on the subject for further exploration and reading.

STI Advice

The Academy has been persistently producing studies of national importance with the aim to provide policy recommendations. This year, ASM through MOSTI presented a paper entitled 'Mainstreaming STI for the Nation's Socio-Economic Development'. The gaps identified in the Science Outlook 2015 and its recommendations were presented in this paper. As a result, National Science Council agreed on the recommendations and requested for MOSTI, MOE, MOHE, together with the Department of Statistics Malaysia to take necessary actions. Following this, MOSTI engaged ASM to assist in developing the National STI Master Plan as well as the review of the National Policy on STI (NPSTI).

ASM together with the National Council of Professors (MPN) was tasked by National Science Council to identify new economic opportunities that focus on STI based industries. The New Economic Opportunities (NEO) study urges the government to adopt their collaborative network mechanism for distruptive innovation. The new economy is driven by knowledge, enabled by fast-paced technology and digital connectivity. It allows sharing of ideas across borders which facilitates co-creation. The study identified four strategic areas namely the Halal Industry, Health and Wellness Industry, Manufacturing and Ancillary Services and value-added Services industries as potential sectors that could provide global opportunities for economic growth.

Ten studies related to the water sector by ASM Water Committee culminated this year with the launching of National Integrated Water Resource Management (NIWRM) Plan. The Plan provides 25 recommendations that would transform the Malaysian water sector for a better future if adopted.

ASM's Malaysia 2050 Agenda envisions Malaysia by year 2050 as a Nation with a high quality of life consisting of Smart Communities that is characterised by being harmonious, prosperous and sustainable. One of the initiatives under this agenda is the Mega Science 3.0 study which looks into an ecosystem that needs to be nurtured and STI investments that need to be prioritised in order to achieve the future we desire. The study links specific economic sectors and recommends ways to leverage STI. The five industries deliberated in the Mega Science 3.0 study are Furniture, Automotive, Creative, Tourism and Plastics & Composites.

Acknowledging the importance of conducting an inclusive and a holistic study, ASM initiated the Malaysian Foresight Alliance that brought together various experts and think tanks to conduct the Malaysia 2050: Foresight Initiative. The findings of this initiative are useful in addressing the challenges of long-term planning in the face of uncertainty and accelerating change. The report is scheduled to be completed in 2017.

ASM also worked on sustainability and environmental issues related studies. A commendable study is the Local and Transboundary Haze which addresses the annual regional transboundary issues. The recommendations comprise legal-policy framework, institutional arrangements, socio-economics and S&T. ASM is keen to share the findings and recommendations at the ASEAN level to resolve issues through science diplomacy. This year, ASM produced two Position Papers namely Erosion & Sedimentation and a Sustainable Mining based on the case study of Bauxite Mining in Pahang.

As a growing young academy, ASM has learnt over the years the formula to deliver the highest quality of scientific, intellectual and strategic input. **Robust ideation process, consultative approach and data analytics has resulted in creative approaches that are futuristic and transcend conventional disciplines.** However, there is much to be learned from sister academies that are in the forefront of science doing impactful work.

Under the leadership of YB Datuk Seri Panglima Wilfred Madius Tangau, ASM has played a much dynamic and effective role as a thought leader for STI in the nation. We are able to provide advisory inputs directly to the Cabinet through MOSTI. ASM values the cooperation and commitment given, which enables ASM to forward recommendations that would involve various ministries. ASM should remain persistent and committed towards providing credible, independent and timely advisory input of national priority in order to remain relevant in the national STI ecosystem.

Expert Network

All these studies were only possible with the commitment, time and expertise contributed by ASM Fellows on a pro-bono basis. Fellows' expertise, knowledge and linkages enrich the Academy with unparalleled resources. To date, Fellows are categorised into six discipline groups, namely the Medical and Health Sciences, Engineering & Computer Sciences, Biological, Agricultural & Environmental Sciences, Mathematics, Physical & Earth Sciences, Chemical Sciences, and the S&T Development and Industry discipline group. This year, ASM Fellowship has reached 300 comprising 27 Senior Fellows, while Honorary Fellows sums to six members. ASM has also begun electing social scientists who have contributed to the advancement of science in the country as well as have close affinity to ASM's objectives. ASM is hopeful that it will be able to garner much interest among the social scientists to be involved in the scientific advisory inputs leading to a dedicated discipline group for the social scientists to be established within the Academy.

Apart from Fellows, ASM has 29 Associates in its member category. They are experts from various fields ranging from science to social sciences appointed to fulfil the rising demand of inter-disciplinary knowledge and expertise. ASM's expert network is further expanded with the members of Young Scientists Network (YSN-ASM) and the Top Research Scientists Malaysia (TRSM) recipients. They contribute through working committees and by leading selected ASM programmes.

ASM's studies and programmes are managed through a Working Committee or a Task Force, led by a Fellow. The committees are responsible to oversee the conduct of the programmes or studies apart from providing leadership and valuable guidance to ASM Management staff in implementing the activities. This year, ASM worked with 41 Working Committees and 20 Task Forces.

Strengthening STI capacity and capabilities

An important part of our work is focused towards developing the STI talent for the future. As such, ASM advocates the importance of science education as early as primary schools. The Inquiry Based Science Education proved to be successful instilling the interest among children to explore and learn science. ASM continued to engage with the four pilot project schools and provided teachers involved in the programme with continuous mentoring and coaching.

This programme was further expanded through the appointed Science Ambassadors of ASM, called Duta Sains in three constituencies, namely Jerlun, Setiu and Tuaran. Selected teachers from the constituencies were trained to use the IBSE method in teaching Science and Mathematics. The Duta Sains act as agents of change for ASM and are able to replicate ASM's initiatives in various localities, creating larger impact.

The Duta Sains programme was implemented with funding assistance received from MOSTI under the MOSTI Social Innovation Fund. Apart from IBSE, the Duta Sains was also instrumental in assisting entrepreneurs in Tangga Batu constituency to commercialise and add value to their products.

The Duta Sains in Jerlun constituency identified sinkholes problems in agricultural land, whereby ASM is now working closely with the Muda Agriculture Development Authority (MADA) to resolve the problem. ASM will continue to work closely with the appointed Duta Sains and expand this network in order to reach out to the communities.

ASM strives to nurture Malaysians towards becoming world class talents and to be involved in moving the STI agenda of the country. Since 2004, many have participated in international young scientists programmes. ASM as the nominating partner for Malaysia takes pride in conducting a nationwide screening and selecting candidates by merit. This year, ASM continued to support young scientists to participate in the Lindau Young Scientists Meeting, IIASA Young Scientists Summer Programme (YSSP), CERN Summer Student Programme (CSSP) and IAMP Leadership programme. These programmes offer excellent avenues to gain knowledge, enhance interaction and to be inspired. Programmes such as YSSP provides opportunities for Malaysians to conduct independent research under the supervision of IIASA experts while CSSP offers undergraduate students the oppurtunity to join the day-to-day work of research teams working on theoretical and experimental particle physics.

These talented young scientists were instrumental in the establishment of the YSN-ASM, a group of talented individuals who are eager and motivated to contribute to the national agenda of science. ASM has high hopes on the young generation, as they will become the leaders of tomorrow.

As important as it is to groom talented scientists, it is crucial to maintain the integrity among them. Credible and accurate communication of research output is equally essential to instil public confidence in Malaysian research. ASM began the initiatives on responsible conduct of research (RCR) in 2013 when we participated in the RCR workshop conducted by the US National Academy of Sciences (US NAS). Since then, ASM has been supporting the YSN-ASM to develop and champion RCR education module which aims to produce certified trainers on RCR as well as create awareness and adoption of RCR module in universities.

Malaysia in the Global Arena

Science academies through regional and global networks collaborate and mobilise resources and expertise to provide independent, evidence-based advice on issues of global concern to policy makers and governments. Their influential voice has shaped the global science policies promoting research advancement.

ASM continuously endeavours to position Malaysia as a leader in science through active participation in scientific meetings and collaborative initiatives. ASM Fellows helm numerous leadership positions in international organisations, such as the Council of International Institute for Applied Systems Analysis (IIASA), Association of Academies and Societies in Asia (AASSA), InterAcademy Partnership (IAP), International Council of Science and many others. ASM also champions the establishment of Network of ASEAN Science Academies (NetASA).

ASM's active involvement has enabled us to acquire updated science and technology related information and tap opportunities available for Malaysian scientists. The network and linkages of ASM has further expanded over the years giving rise to ASM being recognised as a leading science academy in the ASEAN region.

Science Communication

ASM continues to explore ways to effectively communicate its work to the public, stakeholders and policy makers. **Scientific inputs and policy recommendations are presented in a more attractive, easy to understand and clearer form to get the message across.** This includes presentations, publications and social media postings. ASM is active in social media postings such as Facebook, Instagram, Twitter, YouTube channel which offer updates and announcements. Frequent engagements with media are also done offering Fellows expertise as reference and resource.

Fora and conferences are designed to engage participants effectively in order to harness their input and thoughts. The conference materials are prepared carefully to provide greater understanding on the subject discussed and to be used as reference materials. ASM will continue to find innovative ways in communicating science in order to create a scientific literate community.

Challenges

After leading the Academy for six years as the President, I find that today the challenges have remained the same. Sufficient sustainable funding is a key to the performance of ASM. We have been able carry out studies and programme over the last few years, as we had courageously decided to utilise the reserve that we have saved. This action was pertinent and necessary in order to prove the capability and capacity of ASM as the national Thought Leader. I would like to remind through a quote by Socrates that 'The way to gain good reputation is to endeavour to be what you desire to appear'.

Ministries and government agencies have begun to recognise ASM as a credible resource. I hope ASM will continue the momentum of bridging the ministries for more positive collaborations and outcomes. I wish to thank all ASM partners and stakeholders for the cooperation and participation in ASM activities. Your input has enabled us to provide comprehensive advisory input to the government and become an influential voice in STI. ASM will continue to offer an independent platform for all to provide feedback and thoughts.

I am proud to acknowledge the tireless work, commitment and leadership of ASM Fellows that has been crucial in building ASM's credibility. I hope this spirit and passion will continue and full support is given to my successor, Professor Datuk Dr Asma Ismail FASc. I am confident that her leadership, dedication and wisdom will steer ASM to a glorious path.

My appreciation is also extended to the diligent and dedicated management team and all staff members for their passion and commitment towards achieving ASM's goals.

Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc





Advising the Nation on STI

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ASM's strategic studies aim to provide independent, credible, relevant and timely advice on STI related issues of national and international importance. The studies are categorised into four themes namely Malaysia 2050, emerging technology, sustainability science, and socio-economics. The underlying aspects of the ecosystem, S&T capacity and financial resources are addressed in each of the studies in a holistic manner.

Malaysia 2050

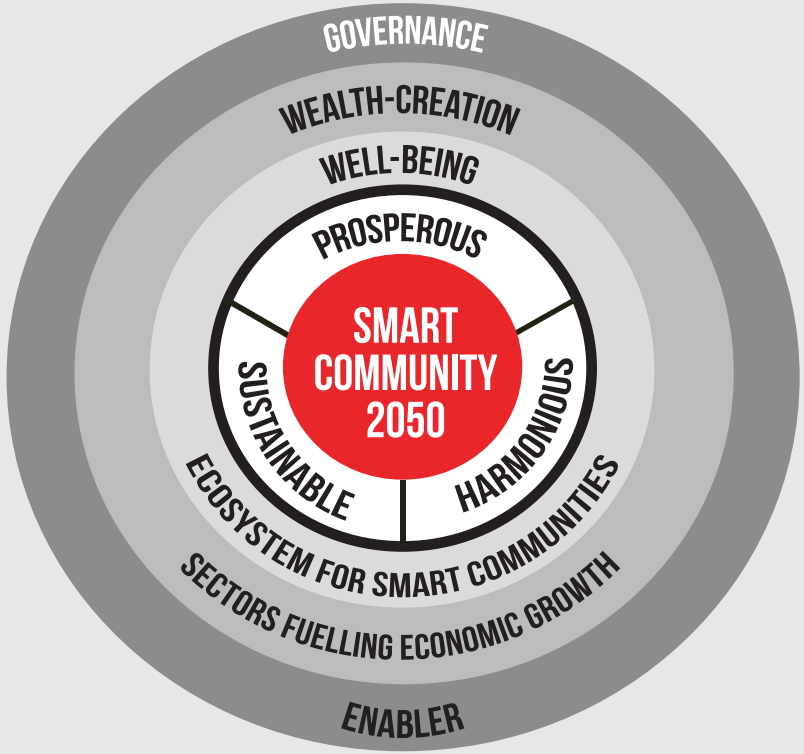
SMART COMMUNITIES

ASM envisions Malaysia to become a nation of Smart Communities by the year 2050. This vision was coined by ASM in 2014 when ASM embarked on a foresight exercise to develop a framework for the bold journey between Malaysia's status quo and its future destination.

The Smart Communities encompasses both urban and rural communities, where the inhabitants live in a harmonious, prosperous and sustainable milieu. In this scenario, basic rights such as education, healthcare and security are guaranteed, wealth is generated through sustainable economic activities and the nation is governed by sound principles.

Under this exercise, ASM has embarked on four studies namely:

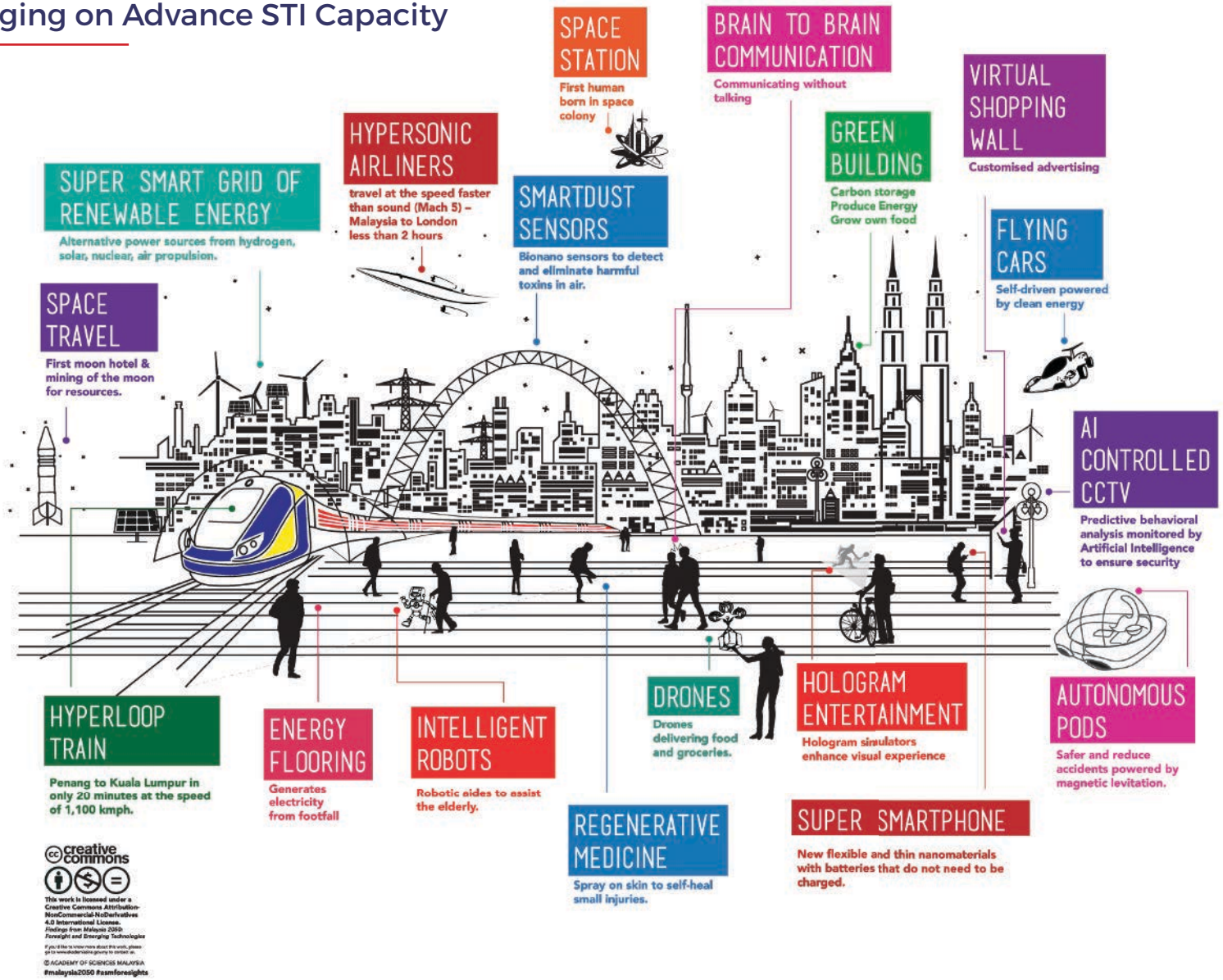
1. Malaysia 2050: Foresight Initiative
2. Emerging Science Engineering and Technology (ESET) Study
3. Mega Science 3.0
4. New Economic Opportunities in STI-based Industries to serve Emerging Markets (NEO)



"It is about acting now to ensure sustainability, connectivity, prosperity, peace and harmony to ensure a high quality of life for all in the future"

Tan Sri Ir Dr Ahmad Tajuddin Ali FASc

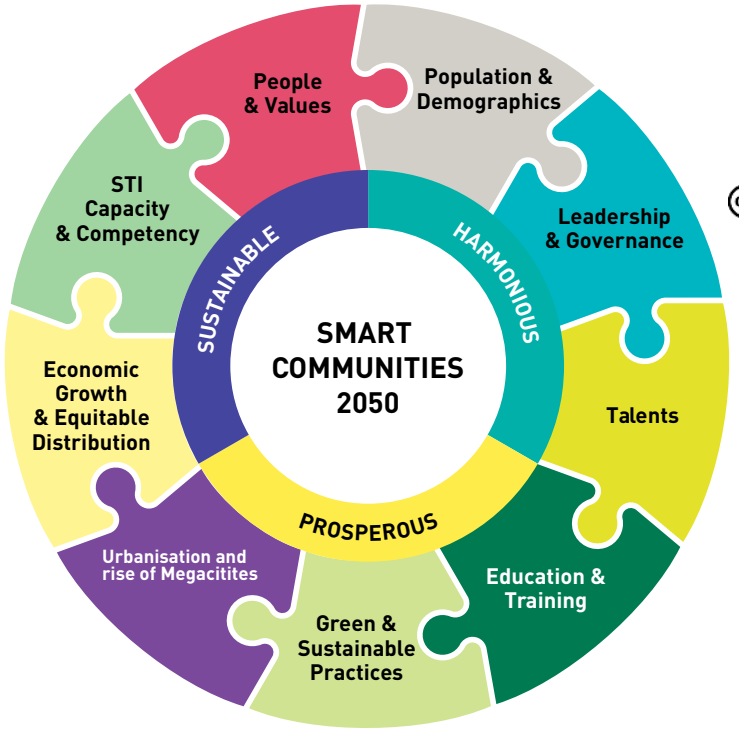
Malaysia 2050: Smart Communities
Leveraging on Advance STI Capacity



Foresight Initiative

ASM through the Malaysian Foresight Alliance brought together various experts and think tanks from the fields of S&T, Society & Culture, Geopolitics, and Economy & Finance to envision the state of the Nation as it moves towards 2050. This initiative presents an opportunity for stakeholders to embrace an imaginative yet realistic paradigm for strategic planning through the use of foresight or futures thinking.

Through the Foresight Initiative, nine key drivers that might significantly shape Malaysia's future were identified.



creative commons

Conduct of Initiative
Inclusive input from policy makers, scientific community, academia, industry leaders, STI professional bodies, social scientists, economists, historians, religious experts and NGOs

factsheet

34 Stakeholder Engagements
Workshops, Trainings, Focus Group Discussions, Talks
200+ Organisations and
300+ Experts / Leaders
Involved in Surveys, Interviews, & Focus Group Discussions
3 International Futurists

The Malaysian Foresight Alliance consists of:
- MOSTI
- ASM
- University of Malaya (UM)
- Malaysian Industry-Government Group for High Technology (MiGHT)
- Malaysian Foresight Institute (myForesight)
- The Malaysian Institute of Integrity (INTEGRITI)
- Institute for Youth Research Malaysia (IYRES)
- Institute of Strategic and International Studies (ISIS)
- Institut Kefahaman Islam Malaysia (IKIM)

Emerging Science, Engineering and Technology (ESET)

The Emerging Science, Engineering and Technology Study aims to identify critical emerging technologies that enable the realisation of the envisioned Smart Communities in 2050. The first phase of the study identified 284 emerging technologies, products and services impactful to Malaysia moving towards 2050. Upon further narrowing through the findings from the Foresight Initiative, 95 emerging technologies were identified based on Malaysia's needs and strength. These technologies were further prioritised based on two criteria: attractiveness and feasibility to identify a list of critical technologies for Malaysia's R&D focus areas towards 2050.

95 emerging technologies classified into 13 categories:

- **18** Advanced Materials & Nanomaterials
- **15** Artificial Intelligence (AI) & Robotics
- **10** Genomics
- **10** Communications & Networks
- **9** Bioprocessing
- **8** Algorithm & Programming
- **6** Energy & Fuels
- **5** Cognitive
- **5** Sensors & Nanosensors
- **3** Precision Technology
- **2** Computing
- **2** Augmented Reality (AR) & Virtual Reality (VR)
- **2** Cybersecurity

Based on MASTIC's Malaysian R&D Classification System

factsheet

The ESET study looked into **5** emerging mega technologies that will positively impact Malaysia's socio-economy moving towards 2050

- Biotechnology
- Digital Technology
- Green Technology
- Nanotechnology
- Neurotechnology

Together, these technologies are projected to contribute **29.1%** to Malaysia's GDP in 2020.

Mega Science 3.0

ASM undertook a series of Mega Science (MS) studies beginning 2010. The third in the series, MS 3.0 began in 2015 and was completed in 2016. MS 3.0 covers five industries: Furniture, Automotive, Creative, Tourism, and Plastics & Composites.

The five industries took into account the desired national aspiration of "Smart Communities" 2050. The study identified issues and challenges, formulated strategies and recommendations, developed industry road maps for short-, medium- and long-term until 2050.

The strategies and recommendations that were identified are expected to help these five industries position themselves globally and nationally by offering appropriate interventions, especially in terms of talent development, STI, and governance.

factsheet

The MS 3.0 National Forum and Exhibition was held on 10 November in Kuala Lumpur and officiated by the Honorable Minister of Science, Technology and Innovation, Datuk Seri Panglima Wilfred Madius Tangau. The five Industry Sectoral Report findings were presented to the public for feedback.

Various creative aspects of the industries were exhibited including a made-in-the-garage drone and 3D printer, art pieces, 3D printed fashion pieces and medical devices, a brain-computer interfaced wheelchair, VR and AR displays, and two cars with bodies made of carbon and glass composites as well as a composite-based fenestron.

MS 3.0 Industries



Furniture



Automotive



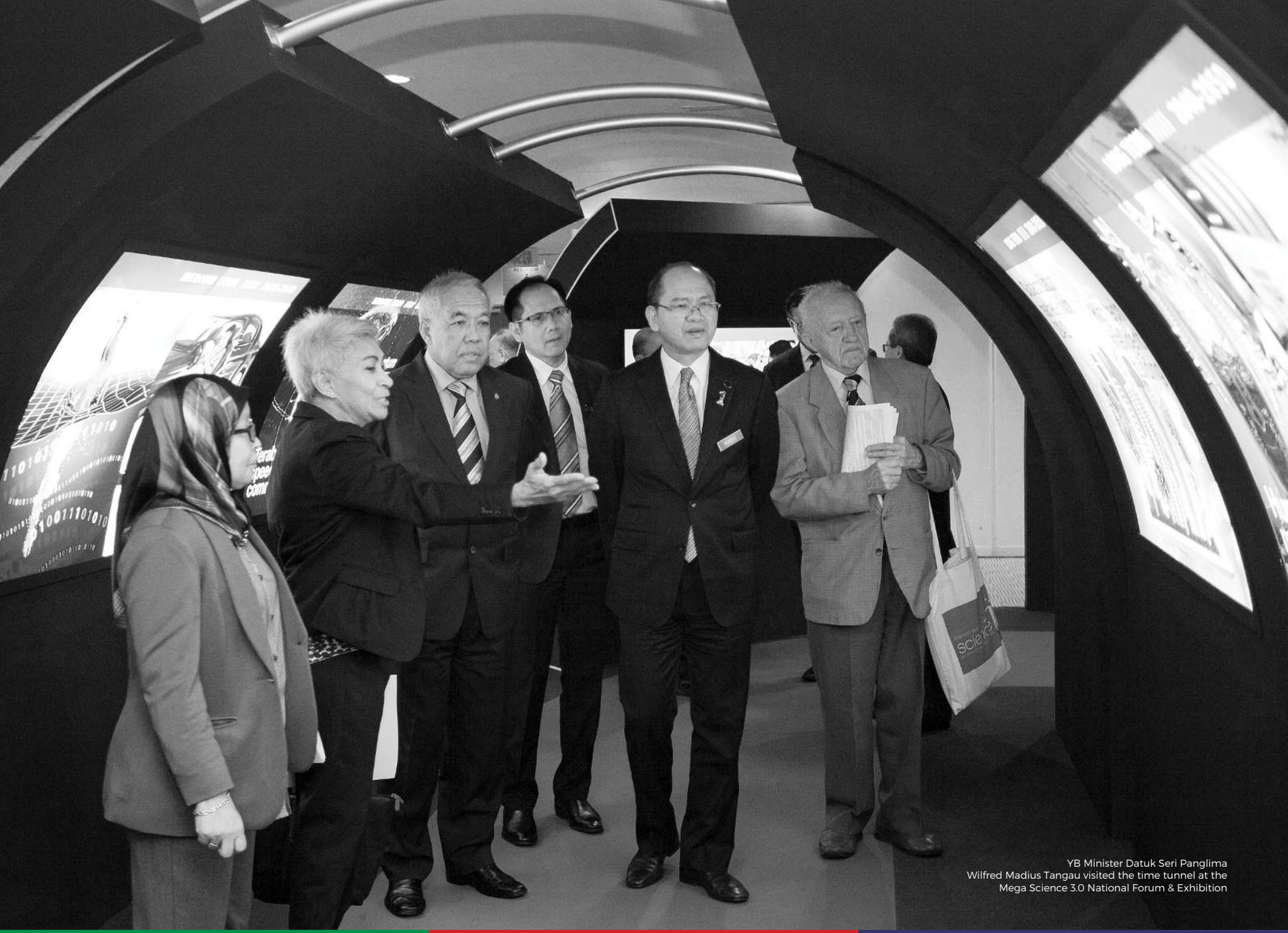
Creative



Tourism



Plastics & Composites



YB Minister Datuk Seri Panglima
Wilfred Madius Tangau visited the time tunnel at the
Mega Science 3.0 National Forum & Exhibition

Furniture Industry

Focus Areas

Design – Manufacturing – Marketing – Sustainability

Since the pre-recession in 2011, the world furniture trade has continued to grow until it reached USD128 billion in 2013. Worldwide consumption per capita of furniture averages USD83 billion annually. The strategy for Malaysia to keep up with the emerging furniture market is to move from original equipment manufacturing-based (OEM) to original design manufacturing-based (ODM).

Vietnam had surpassed Malaysia in the world ranking of furniture exporters in 2009 and has continued rising to fifth place in 2014. Meanwhile, China being the main player in the industry has the capability to produce furniture at high volume. In contrast, the demand in the Malaysian domestic market is not as high as the international markets. Malaysian manufacturers believe that high demand of domestic market is the key to the cost effectiveness of full automation implementation.

Subsequently, the impact of ESET findings on the Malaysian furniture industry was examined. In particular, it is expected that emerging new species of wood tree for furniture use, marketing through internet, Internet of Things (IoT) in the furniture, less waste produced in furniture manufacturing and automated manufacturing system will have a significant impact on the furniture industry. Economy and finance, social and culture, and geopolitics in 2050 will also shape the direction of the furniture industry. Malaysia's economy and finance by then will catch up with current advanced nations.



Enhancing Malaysia's Value Proposition

Strategies & Recommendations

Design

Strengthen university-industry-government link.
- Enhance programmes for designers

R&D on innovative furniture
- IoT of furniture
- Adopt advanced technologies (CAD/CAE/CAM, Rapid Prototyping)
- Functional design

Diversify raw materials
- New wood species, bio-plastics,bio-composites, natural fibre, or wood plastic composite (WPC) as substitute materials

Manufacturing

Agile manufacturing
- Cost-saving manufacturing technologies

Higher education in furniture design and manufacturing
- Train youth with skill sets for all levels
- Reduce dependence on foreign labour

Awareness on sustainability

R&D on alternative materials, advanced manufacturing technology
- R&D on cutting tools, processing machineries and technology
- Adopt or develop advanced technologies (Computer Numerical Control Machine, 3D printing)

Marketing

Synergy for business growth
- Review of national policies (foreign labour and downstream industries)
- Strengthen institutional support and delivery system

Original Equipment Manufacturer (OEM) to Original Design Manufacturer (ODM) to Original Brand Manufacturer (OBM)
- Develop new business model
- New ODM companies linked to recognised brand companies
- New marketing platform (VR)

Sustainability

Certification through Chain of Custody (CoC)
- Review national policies on high value added industries, rubber and timber wood sustainability

Create awareness on sustainability
- Introduce new wood species
- Consistent supply of planted wood
- Certified sustainable timber
- Sustainability of resources

R&D on alternative materials, sustainable raw material and new species
- Tissue culture for new breed trees (shorter maturing age, high quality)
- Furniture Testing Centre for certified quality furniture

Automotive Industry

Focus Areas

Integrated Digital Engineering - Advanced Integrated Active Safety - Big Data Movement - Advanced Green Materials

The involvement of IT companies are revolutionising the automotive industries. The industry is now going beyond traditional technologies, such as engine and powertrain system, by incorporating communication technologies which will potentially reduce mechanical components in vehicle configuration while electrical components will be dominant. Cars in future will be autonomous embedded with IoT contributing to big data movement.

At the initial stage, under the vision 2020 to industrialise Malaysia, automotive industry was intended to spur the demands for parts and component and thereby encouraging the development of small and medium industries within the industrial ecosystem. Apart from being major employment contributor, the industry currently contributes 8.5% to the manufacturing sector of the nation's economy accounting 2.5% of the GDP.

Total global vehicle ownerships is expected to exceed 2.5 billion by 2050. New vehicle innovations are now creeping into the market places promising environmental friendly and mileage efficient characteristics. New vehicles, such as; Hybrid Electric Vehicle (HEV), Plug-in-Hybrid Vehicle (PHEV), Battery Electric Vehicle (BEV) and Fuel Cell Vehicles (FCV) are making their way into the market.



Enhancing Malaysia's Value Proposition

Strategies

1 Formulate appropriate government policy, regulations and incentives in the following aspects:

- Environment
- Businesses and trades
- Talent
- Standardisation
- Incentive options to help promote e-mobility

2 Develop business collaborations within the e-mobility value chain

3 Identify customers' attitude towards new vehicle usage and benefits thereby reducing anxieties and increase acceptability

4 Institute relevant support infrastructure coordination

5 Create a strong R&D community to explore the development of e-mobility

Recommendations



Continue to enhance the automotive ecosystem



Formulate new policy instruments for e-mobility



Spearhead future e-mobility businesses



Improve technology development and R&D



Create e-mobility R&D community, associations and young talent programmes



Adjust for cultural simulation towards e-mobility

Creative Industry

Focus Areas

Heritage - Arts - Media - Functional Creations

The creative economy is fuelled by cultural and creative industries which encompass arts, culture, business and technology at its hub. The growing global economy is slowly moving towards energising the creative economy as many governments around the world have identified cultural and creative economy as principal contributor to the national economic growth. Thus, they have introduced 'Creative Economy' and formalised policies for a more strategised and structured adoption and implementation. Among the early adopters are countries from the European Union, UK, China and Indonesia.

Individual creativity, skill and talent contributing to wealth and job creation through the generation and exploitation of intellectual property are the key-drivers of a creative industry. The creative industry encompasses 13 sectors; advertising, architecture, the art and antiques market, crafts, design, fashion, film, interactive leisure software (i.e. video games), music, the performing arts, publishing, software, and television and radio.

The Mega Science 3.0 study under the Creative Sectors adopted the following focus areas:

- **Heritage:**
  Galleries, Libraries, Archaeology and Museums (GLAM);

- **Arts:**
  Visual Arts, Performing Arts, Traditional Arts & Crafts

- **Media:**
  Publishing, Audiovisual and New Media

- **Functional Creations**
  Built environment, Fashion & Jewellery and
  Graphic & Advertising.



Enhancing Malaysia's Value Proposition

Strategies & Recommendations

Governance and Institutions

- Invest in talent development
- Adoption of advance technologies by GLAM Traditional Arts and Crafts
- Update National Creative Industry Policy to match current trends
- Establish National Arts Council
- Create incentives for industry
- Establish National History Museum
- Invest in creative industry products and services
- Establish training and R&D institutes

Industry Positioning

- Incorporate AR/VR, multisensory experience into products
- Assimilate new technologies in industry
- Improve value chain with adaptation of new technologies

R & D

- Focus on immersive, inclusive and interactive digital content and entertainment
- Identify and develop statistical indicators

Talent Development

- Upgrade skills to match technological advancement
- Develop entrepreneurship
- Increase apprenticeship, mentorship and higher education programme for IPR

Intellectual Property Rights (IPR)

- Create awareness on new technology that is disruptive to IPR
- Promote creative industry designer to register

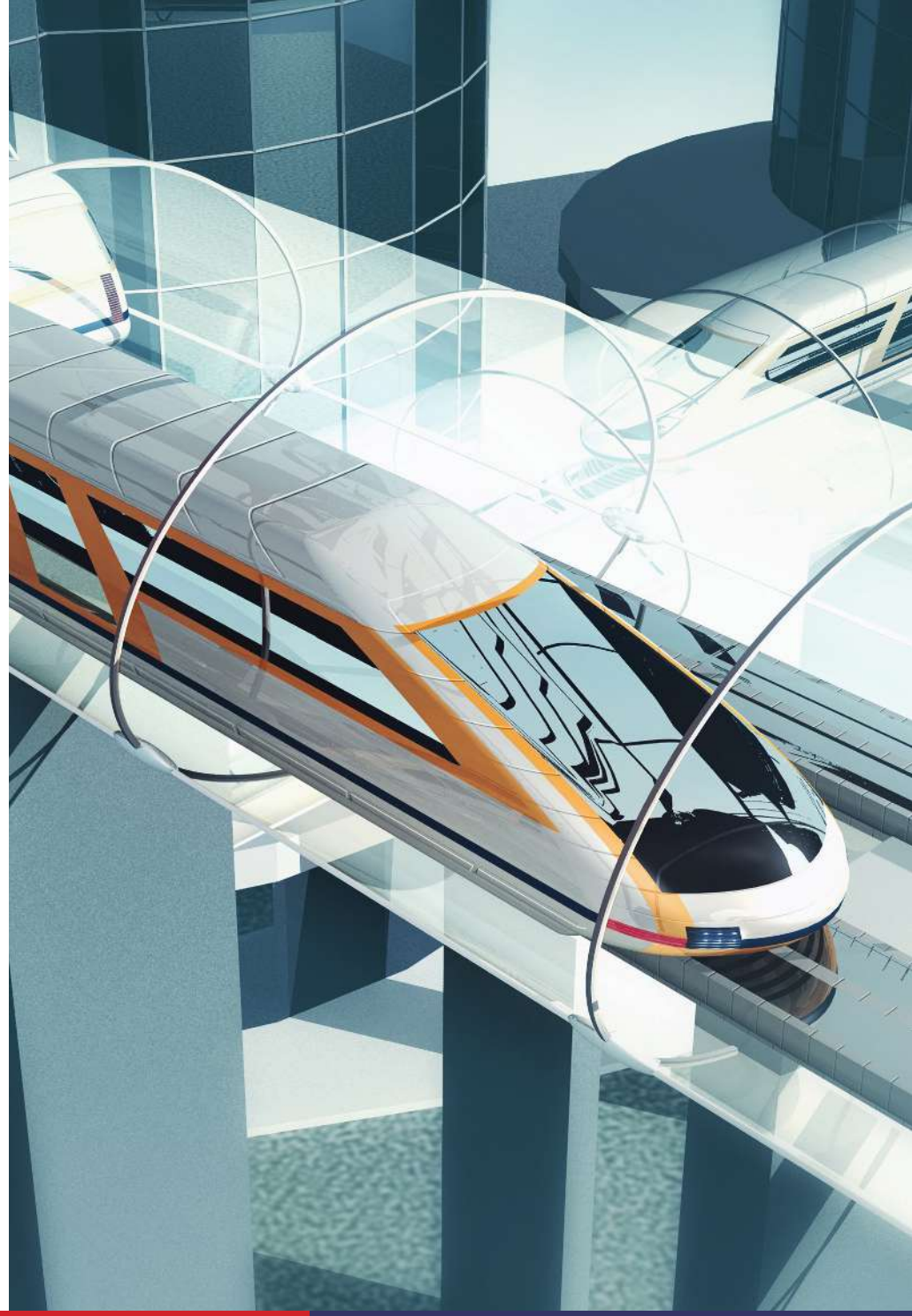
Tourism Industry

Focus Areas

Trends Related to Destination Management - Transportation and Connectivity Developments - Climate Change and Sustainability Issues - Demographic Changes- Barrier-free Tourism

By the year 2020, tourism will be the world's largest industry. The World Travel and Tourism Council (WTTC) anticipates that the United States and China will hold on to their positions as the two biggest travel and tourism economies worldwide. By 2025, the global travel and tourism sector is expected to contribute 357 million jobs with the expected arrival of 1.8 billion tourists in 2030. Northeast Asia will be the most visited sub-region representing 16% of total arrivals while Southeast Asia arrivals will triple to 210 million in 2030.

Malaysia has experienced significant growth in terms of tourist arrivals in the last 30 years, with the strongest increase recorded during the last 15 years. In 2015, Malaysia received 25.7 million visitors and RM69.1 billion receipts. In addition, Malaysia registered a total of 169.3 million domestic visitors in 2014, with a total expenditure of RM62.2 billion. The tourism industry employs a significant number of workers, estimated at 14% of the workforce. Under the Economic Transformation Program (ETP), the tourism sector's target are 36 million tourist arrivals and RM168 billion tourist receipts for 2020. These targets are premised upon shifting its focus to raising the yield per tourist by improving and upgrading tourist offerings and services, and enhancing connectivity to key priority markets.



Enhancing Malaysia's Value Proposition

Strategies

Governance

- Strengthen enforcement of laws, rules and regulations
- Monitoring, tracking and evaluating impact of tourism activities
- Coordination of products and servies at all levels

S&T Implications and R&D Needs

- ICT usage expansion to enhance tourist experience
- Technological revolution and impact on future tourism

Outreach and Advocacy

- Remedial actions against pollution and existing environmental challenges
- Adopt international best practices to promote and develop sustainable tourism
- Involvement of local communities in tourism development to eradicate poverty

Capacity building

- Good governance, management, leadership and funding increases standards and productivity

Recommendations

- Use technology to enhance tourist experience
- Strenghten city tourism
- Address talent deficit
- Implementation of Disability Act 2008 in all sectors
- Embed sustainability appreciation in education and society
- Encourage community participation in traditional arts and culture
- Promote green technology development in tourism
- Effective use of Human Resource Developement Fund (HRDF) for talent development
- Circuit TV and tracking device to increase safety in eco-tourism areas
- Strenghten environmental protection
- Enforcement of laws
- Sectoral resource management for renewable energy
- Revamp community tourism model to give higher yields to rural communities
- Strengthen governance mechanism at national, state and local levels

Plastic and Composite Industry

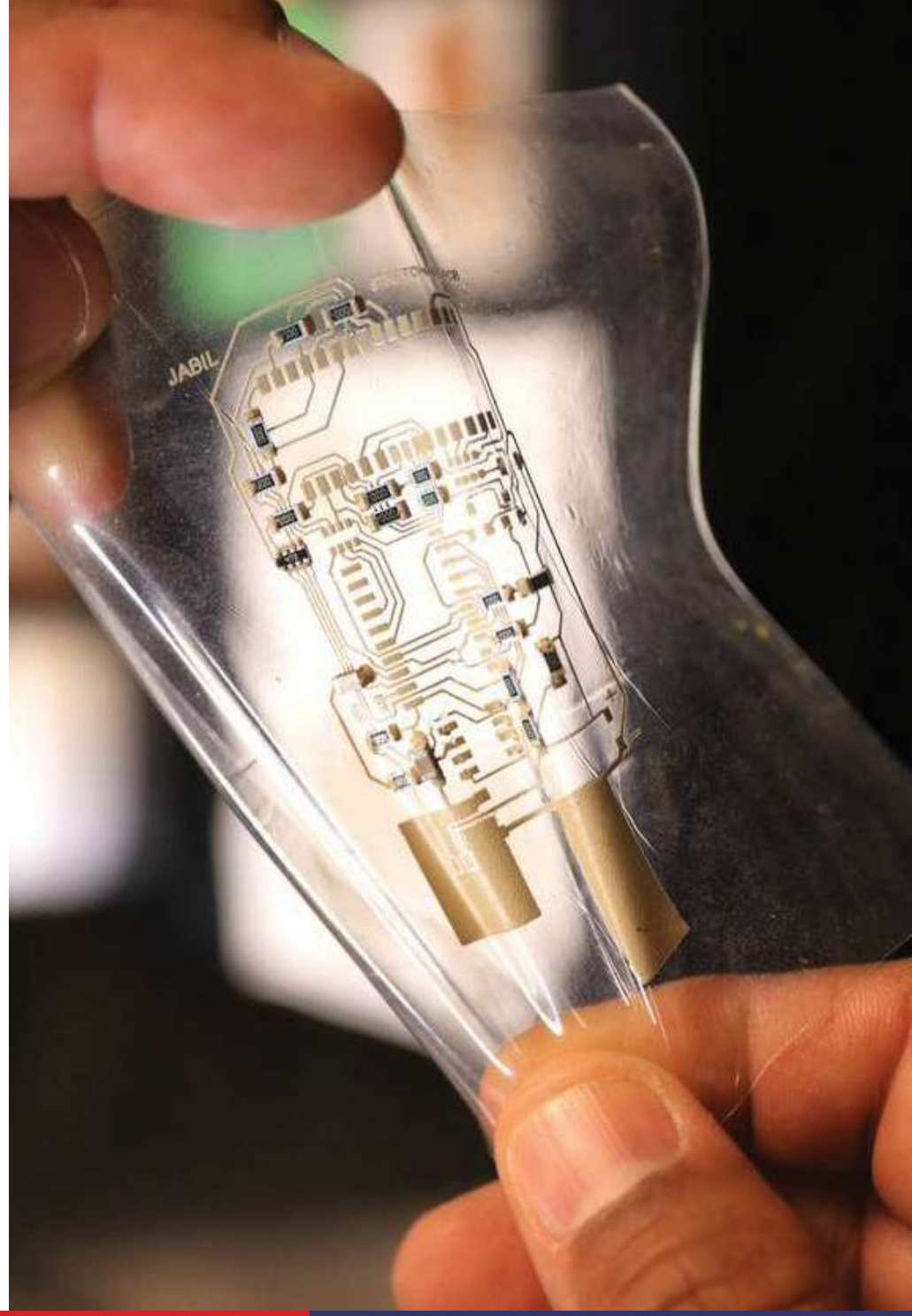
Focus Areas

Trends for Advanced Materials - New Product Development - Trends for Advanced Manufacturing Technology - Environment and Sustainable Development

Composites and plastics lumber will witness increasing demands because of their long lifespans, resistance to degradation caused by exposure to the elements and insect attack, minimal maintenance requirements, and capacity to be cut and handled like natural wood. Moreover, the increase in demand will be driven further by the growing viewpoint that these materials are environmental friendly since they incorporate recycled materials.

Globally, the composites industry is expected to grow by about 4% in 2015. By 2019, the global composites market is expected to experience exceptional growth and even be valued at approximately USD35 billion. By 2050, the composites market is seen to experience significant growth given the new developments created in different sectors. It could even reach USD285 billion.

Through the years, the plastics industry of Malaysia has gone from manufacturing low-end consumer products that are used for import-substitutions to manufacturers for the export-oriented sector and other high-end industrial applications. The Malaysian Plastics Manufactures Association (MPMA) has stated that in recent years, the share of exports against sales turnover rose from approximately 40% in the late 1990s to about 60%. As of 2015, there has been continuous growth in the Malaysian plastics industry. Its total sales turnover that year went up to RM25 billion, a 27% increase compared to the RM19 billion earned in 2014. As for the Malaysia composite industry turnover, it was estimated to be RM3.5 billion from a total of 70 fabricators. Currently, the largest application is in construction, aerospace and marine sectors.



Enhancing Malaysia's Value Proposition

Strategies

- Create a conducive environment to enhance innovation culture within the plastics and composites industry.
- Build people capacity and capability in plastics and composites.
- Generous government funding and incentives to R, D & C, at par with developed nations, i.e. 2% of GDP.
- Empower the industry to develop the plastics and composites industry with strong backing of government.
- Foster linkages between upstream-, midstream- and downstream activities.
- Establish newer recycling schemes for the promotion of efficiencies as well as the conservation of resources and the reduction of polluting wastes.
- Ensure sustainability of the plastics and composites industry via a circular economy approach.
- Engage key policy makers to understand the needs of the plastics and composites industry.
- Facilitate industrial initiatives to move firms up value chains and differentiate them from their worldwide rivals.

Recommendations

- Match the output of the Technical Vocational Education & Training (TVET) institutions with the manpower requirements of the plastics and composites industries.
- Endorse and fund industry association as plastics and composites Industry Steering Task Force (ISTF) under MITI.
- Commit financial investment at par with advanced nations (2% of GDP) for research funding to be made available over the next 35 years.
- Encourage all industries to use more plastics and polymer composites to improve performance and meet sustainability requirement (Life Cycle Assessment (LCA) and holistic approaches).
- Encourage the plastics and composites industry and public sector to embrace the "Circular Economy" which includes "Waste to Wealth (W2W)" and 4R (Reduce, Reuse, Recycle, Recover).

New Economic Opportunities

This joint study was mandated by the National Science Council to ASM and the National Council of Professors (MPN) in 2016. The aim is to propose the most appropriate and vital mechanism for Malaysia to leverage on, towards expanding global opportunities for economic growth by developing STI-based industries.

The new economy is driven by knowledge and enabled by fast-paced technology and digital connectivity, allowing radical sharing of ideas across borders. This has given rise to collaborative networks for disruptive innovation that result in knowledge-intensive products and services that offer better value propositions compared with products from market incumbents.

Realising this huge potential as an economic boost, this study proposes the way forward for Malaysia to remain competitive adopting holistic collaborative economy model through establishing industry specific collaborative networks. Four strategic focus areas, namely the Manufacturing and ancillary services industry, value-added Services industry, the Halal Industry and the Health and Wellness Industry, were identified as high potential niche areas for economic advancement. The study will recognise and leverage on strengths, lags and gaps, as well as opportunities in all sectors.

The findings and recommendations of this study will be presented to the NSC in the first quarter of 2017.

Manufacturing and Ancillary Services

Manufacturing sector contributed up to 23% to Malaysia's GDP. There is a strong need for the manufacturing sector to evolve in order to remain competitive. Globally, this sector is seeing phenomenal change in the form of the Fourth Industrial Revolution. Emerging technology breakthroughs such as in artificial intelligence, IoT, autonomous vehicles, 3D printing, nanotechnology, materials science, energy storage and quantum computing are driving the manufacturing sector.

Services

The services sector contributed 53.8% of Malaysia's GDP in 2015 and will continue to be the primary driver of economic growth in the 11MP. Both the 11MP and Services Sector Blueprint place great emphasis on knowledge intensive and innovation-led services industries. The transformation envisaged shall focus on financial-technology (fintech), where tremendous innovations across the globe are taking place. Malaysia can position itself as a leader by encouraging the development of fintech in the untapped market segments.

Halal

Malaysia is perceived as one of the leaders in the global halal marketplace, largely due to the proper halal ecosystem that is equipped with comprehensive and proactive policies and development frameworks. The Halal industry is a significant contributor to the economy, accounting for 7.5% of the GDP. As of 2016, there are 1,401 Malaysian companies exporting RM205.1 billion worth of halal products. Nonetheless, other countries in the region including countries without a majority Muslim population are also seizing the opportunity in this market.

Health and Wellness

The transformation for health and wellness will focus on e-health delivery system, where the infrastructure at present is far more accommodating than two decades ago when telemedicine was first introduced in this country. It is envisaged that the e-health delivery system will boost health tourism, where health and wellness services can be provided online with a trusted network of experts for first and follow-up consultations and treatments. With excellent medical facilities, Malaysia is well positioned to be a leading health and wellness destination in ASEAN.

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Representation Based on Organisation
Industry - **35%**
Government - **26%**
Academia - **22%**
Civil Society - **17%**

Project Duration
May 2016 - January 2017

164 people

82 organisations

10 engagements (roundtable discussion, stategic planning workshop, focus group meetings and expert group meetings)

Sustainable Environment

Modernisation brings economic and technological advancement in improving the standard of living. As humanity progresses, environment pays the price of irreversible damage such as depletion of natural resources, climate change and extinction of species.

Earth has a great capacity for regeneration, but people are causing damage far more than earth can cope with. Pollution due to human activities impacting our planet occurs at different levels. Therefore, people are responsible to protect the planet from further degradation. This is possible through sustainable consumption and production, and management of natural resources as well as urgent action on climate change.



"It is our moral obligation to bequeath to posterity and environment that is as pristine as we inherited from our forefathers"

YAB Dato' Sri Mohd Najib Tun Abdul Razak

Local and Transboundary Haze

A study was conducted to identify and establish a specific position for ASM in relation to the regional transboundary haze issue, addressing various stakeholders and the affected communities in Malaysia and the region. The report aims to provide policy inputs and recommendations on the transboundary haze issue to the Government of Malaysia and its relevant authorities, particularly on the following aspects:

- Legal-Policy Framework;
- Institutional Arrangements;
- Socio-Economics; and
- S&T

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- Transboundary haze was first reported in Southeast Asia in 1972 and has been one of the major environmental issues plaguing Southeast Asia for more than three decades. Since 1982, the haze episodes have become more frequent from once in nine years to every year.

- Haze consists of sufficient smoke, dust, moisture, and vapour suspended in air to impair visibility. Haze pollution can be said to be "transboundary" if its density and extent is so great at source that it remains at measurable levels after crossing into another country's air space (ASEAN).

- The partial combustion from peat fires produces more smoke and the particles released from these fires takes longer time to settle, allowing it to float in the air and drifting with the wind crossing boundaries, and contributed **90%** to the ASEAN transboundary haze (Heli, 2007).

The three main issues identified in the studies are:

Air Quality and Haze Episodes

The impacts of haze on human health, the economy, agriculture, the environment and biodiversity have not only affected countries within the region but even beyond, thus challenging international attempts to address these issues. Despite its perpetuity, haze is not a natural event but is made up of atmospheric pollutants that are mainly the result of anthropogenic activities. El Niño cannot be said to be the cause of haze, although El Niño event along with prevailing wind directions does intensify the severity of a haze episode.

Peat Area and Water Management

Peat fires are closely linked to episodes of haze. Tropical peat deposits have a very high organic content and if improperly drained and left to dry can catch fire easily, releasing particles into the atmosphere. Ineffective communication and lack of knowledge and understanding of peatlands are among the contributors of peat fire. Other contributors include poor land preparation, insufficient agro-environmental peatland management, ineffective policies, and socio-economic issues.

Waste to Resources: Energy or Materials

There are substantial amounts of biomass residue generated at various stages of land clearing, planting, harvesting, and replanting processes throughout the life of a plantation. These residues are often burnt in an attempt to get rid of them quickly, easily and cheaply. This study explores the possibility of utilising the biomass residue produced either by land clearing or on plantations to become higher value bio-products, with monetary returns to the plantations and farmers.

Recommendations

Slash, not to burn, but to earn

- Government to invest in the development of biomass-to-material or biomass-to-energy conversion facilities through private-public equity partnership.

- Conducive investment environment, including low interest rates, competitive or subsidised pricing of bio-products, procurement and well-planned concession areas are required in order to promote investment in the proposed facilities.

- Encourage private sectors to lead the investments with the participation of government investment arms along with local communities made up of farmers, settlers, smallholders, and adjacent plantation companies.

Manage peat, keep the fire away

- Plantation companies developing peat areas or agro-forestry land should carry out measures to reduce fire risk.

- Plantations developed in the peat areas to maintain a high water table by containing stream flows throughout the plantation irrigation systems.

- Disturbed, abandoned, or underdeveloped peat areas should be id entified and promoted for investments and rehabilitation.

- Development in peat areas including water management is carried out on an Independent Peat Basin (IPB) periphery.

Seeing through the haze

- Enforcement agencies to enhance measures restricting open burning particularly during the Southwest Monsoon period from the months of June to early October.

- A local contingency plan to be developed and put into operation during any severe haze episodes (emergency of higher than 500 API) in order to reduce local sources of pollution by the source apportionment method.

- Forecasts and alerts should be more efficiently disseminated by incorporating additional forecast products to further enhance weather forecasting system.

Communicating the sciences, for all

- A better communication policy could be realised with effective coordination of research conducted by research institutions.

- Public engagements through social media, dialogues on critical issues, multi-stakeholder activities and active public engagement with governmental agencies may influence the policy process positively.

R&D Areas

- Studies on system, socio-economic and legal implications of the proposed local contingency plans undertaken in order to formulate detailed measures to control local sources of pollution.

- R&D in radioisotope tracing and modelling studies, on the high percentage of unidentified sources of pollution should also be carried out.

- Studies on health should focus on the toxicological properties of haze particles and systematically assess the health and social burden of diseases due to haze episodes. This should cover epidemiological study on the burden of diseases of air pollutants; toxicity assessment of particulates from forest fires; and evaluation of the indoor school environment during haze episodes.

- All types of information and previous works on tropical peats to be made available particularly the basics such as locations, areas and status of peatlands, supported by Geographic Information Systems (GIS) maps.

- Future research on management strategies could include; peat soil survey and mapping; hydrological studies of the peat ecosystems; effective and innovative infrastructure design on peat; identification of plant species that are well-adapted for waterlogged conditions; and development of high yielding crop varieties on peat.

Erosion and Sedimentation

Sediment pollution is one of the major causes of waterway pollution in the world caused by soil erosion and deposition of the sedimentation in waterways. Its detrimental effect on waterways include destruction of ecology and fish life, conveyance of toxic compounds (pesticides, weed-killers etc.) attached to the sediments and the reduction of the waterway capacity to carry storm runoff, leading to flooding.

This study addresses the anthropogenic causes of sediment pollution. With heavy rainfall, any related earthworks will result in erosion and sedimentation. The longer the land is left unprotected, the more sediment is eroded out. Almost all the primary sectors in the country's economy are involved in extensive earthworks: plantations, agriculture, housing development, infrastructure construction, mining and forestry.

factsheet

- Erosion and sedimentation are one the main causes of flash floods in urban areas of the country. Around **29,000** sq. km of the total land area are affected by flooding per annum (Department of Irrigation and Drainage, 2011).

- The first formal document published in Malaysia specifically drawn to assist planners and developers in controlling erosion was the 1978 document Guidelines for Prevention and Control of Erosion and Siltation (Annex I), which was subsequently amended and reviewed in 1978, 1992 and 1996 (Department of Environment, 1996).

Way Forward

- Competent regulators who are trained in erosion and sediment control are critical in exercising autonomous enforcement.

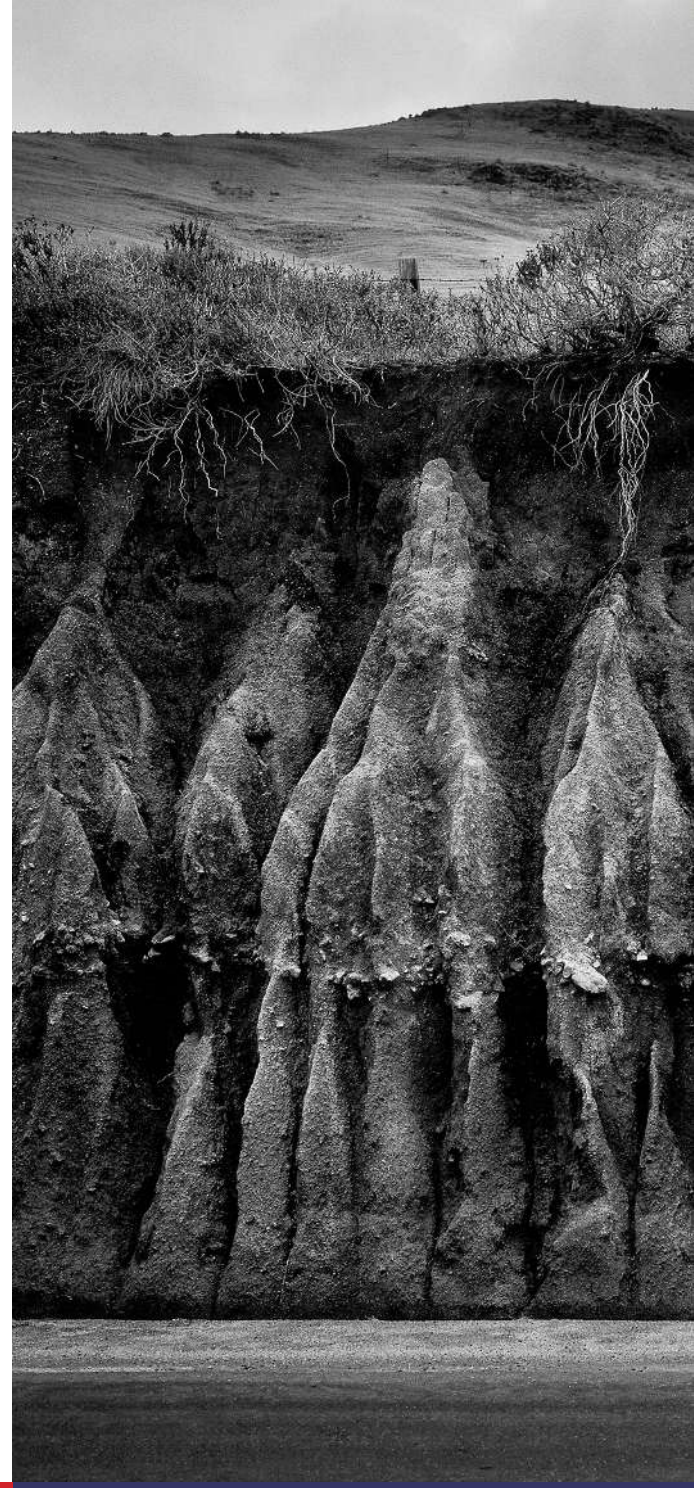
- New requirements for Erosion and Sedimentation Control Plan (ESCP) to be designed and implemented for every major earthwork, in every sector concerned.

- Entrenched practices in the construction industry which are not sustainable from the Erosion and Sedimentation Control (ESC) point of view will need to be eliminated and proponents educated on the need to reform their practices. The same holds for maintenance practices especially those by local authorities.

- Awareness on available Best Management Practices (BMP) and competency training is necessary in addition to legislation to tackle the problem.

- Professionals Certification is a necessary tool to ensure competency.

- Research is needed on curative measures to remove suspended sediments or colloidal suspension, in streams and rivers.



Sustainable Mining

Minerals could be a potential source of wealth creation for highly resourced nations, and mining is still the primary method of their extraction. Unless properly managed, mining activities could become sources of degradation for societal and environmental well-being. The Second Mineral Policy (NMP2), introduced in 2009 places strong emphasis on the need for environmental stewardship that will ensure the nation's mineral resources are developed in an environmentally sound, responsible and sustainable manner.

Bauxite mining in Kuantan, Pahang started in early 2013 with small-scale mining in Balok and later expanded to Bukit Goh, Bukit Sagu and Sungai Karang. The rapid expansion coupled with uncontrolled and unsustainable legal and illegal mining activities has resulted in an environmental disaster.

A Task Force was established by ASM to analyse the issues related to bauxite mining in Kuantan and provide recommendations to remediate and mitigate the problems arising from the activity. This is to ensure minimal damage to the environment while balancing between societal well-being and wealth creation.

factsheet

- Malaysia's bauxite exports to China rise from **343,000** tonnes to **3.72** million tonnes from January to September 2015 (The Star, December 2015).

- Bauxite ore contains aluminium oxide (alumina) which is the precursor to aluminium metal. Over **95%** of the alumina manufactured globally is derived from bauxite using Bayer process (International Aluminium Institute, 2015).

The Position Paper entitled Sustainable Mining: Case Study for Bauxite Mining in Pahang proposes the following:

- All bauxite mining activities must be regulated under the State Mineral Enactment (SME). Loopholes such as mining bauxite under the National Land Code on the pretext of soil transport activities must be addressed;

- Clearance of the existing stockpile must be conducted based on best practices;

- Effective pollution, erosion and sediment control should be set up particularly at the mining sites, stockpile yards, ports and from port to barge;

- Proper environmental monitoring should be conducted on a regular basis encompassing water and air quality and noise levels;

- Ensure that lorries transporting bauxite are relatively clean by practising standard operating procedure (SOP) incorporating wheeler washer at every mining site, stockpile and port in line with the Land Public Transport Commission (SPAD) guidelines;

- Set up a centralised stockpile yard according to the specification approved by the State Government with in-built environmental safe guards;

- Promote community awareness and engagement by inviting local NGOs to assist in giving all stakeholders more exposure regarding issues on bauxite mining; and

- Mine Rehabilitation Plan should be thoroughly strategised to ensure successful rehabilitation is conducted once mining ceases in the area to ensure sustainability.





Managing the Essence of Life

"Water and sanitation are at the very core of sustainable development, critical to the survival of people and the planet. Goal six not only addresses the issues relating to drinking water, sanitation and hygiene, but also the quality and sustainability of water resources worldwide"

UN SDG, 2015

Water sustains life. There is enough water for everyone but due to poor management and infrastructure, millions of people do not have access to clean water. Holistic management of the water cycle is required to manage the water stress that affects people around the world. 41 countries have been recorded to have experienced water stress in 2011. Water stress will hinder the sustainability of natural resources, economic and social development.

The management of water sector in Malaysia both at the Federal and State levels has been fragmented and remained as an institutional norm since the country achieved independence from the British rule in 1957. Even though there is enough water to meet the growing needs, we often face water scarcity. Without dramatically changing the way water is used, managed and shared, water stress in Malaysia will aggravate. The global water crisis is a governance issue, much more than of a resource availability.

ASM Water Committee was established in 2008 to address many issues and challenges in water sector in Malaysia. This committee identified key areas in order to provide strategies and recommendations to the relevant ministries and agencies. These recommendations were developed in consultation with relevant institutions, community and private sector stakeholders.



United Nations General Assembly 1993 officially designated March 22 as World Water Day coordinated by UN-Water in collaboration with governments and partners worldwide.



National Integrated Water Resources Management Plan

With the fragmented management of water resources in Malaysia, there is an urgent need for concerted efforts to implement a nationwide Integrated Water Resources Management (IWRM) Plan.

Malaysia first made the commitment to implement IWRM nationally at the Rio Earth Summit 1992. The IWRM concept was subsequently adopted by Malaysia through the Third Outline Perspective Plan, 2001 – 2010 (OPP3) and became an integral part of the National Water Resources Policy launched in 2012. However, after more than two decades, IWRM has yet to be institutionalised by water related ministries, line agencies and state administrations nation-wide.

A series of Integrated Water Resources Management (IWRM)-related thematic studies were undertaken by designated Task Forces. The outcome of the completed studies formed the central basis to the formulation of this National IWRM Plan (NIWRMP) aimed at bringing all water-related stakeholders nationwide onto a common platform and mission, that is, to ensure the sustainable management of the country's water resources.

Business as usual following past fragmented lines must make way to IWRM in seeking integrated solutions to the multiplicity of issues and challenges faced by the water sector. Promoting participatory management and addressing trans-boundary issues through continuing dialogue are all important elements of this paradigm shift towards "making water everybody's business".

Integrate Water Resources Management (IWRM)

"A process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" – Global Water Partnership

factsheet

- Aside from the **10** completed reports by ASM, **14** additional IWRM sub-themes were included into the report in the form of Summary Briefs, Reports and Expert Reviews to enhance its comprehensiveness.

Summary Recommendations

The NIWRM Plan has put forward 25 recommendations summarised as below:

- The transformation of the Malaysian water sector for a better future to be anchored by the adoption and implementation of NIWRM Plan. The Plan would provide the correct stimulus to ensure that the transformation of the sector advances in tandem with other sectors of the economy identified earlier as NKEAs under the ETP.
- Component plans and programmes included in this report be implemented concurrently nationwide and led by the key ministries identified in the plan according to their entrusted responsibilities, be it under "water resource management" or "water utility provision".

Enabling Environment
Comprises 10 recommendations addressing policies, legislation, regulations and finance among which are needed for an overarching Integrated Natural Resources Policy; the legislation of a contemporary National Water Resources Act be expedited; and the need for funding arrangements and protocols especially pertaining to environment rehabilitation works.

Institutional Framework
Five recommendations under this category focus on the review and strengthening of governance through institution of oversight and implementation management structures at national, state, river basin and local hierarchical levels, and including a call for greater intra-ministerial integration.

Management Instruments
There are five recommendations under this header stressing on the establishment of a central IWRM database built around river basin platforms; the use of economic, financial and technical instruments for greater water use efficiency and accountability and to curb abuse; implementing a national agenda for integrated water research; mechanisms for promotion of green growth; and the pooling of resources to establish one-stop capacity building centres to improve skills and raise competency at all levels.

Investments in Water Infrastructure
Comprises a central recommendation for urgent investments in Water Infrastructure to cater for the national water sector needs and to spur the transformation of the water sector.

15 major programmes with corresponding 95 EPPs were identified broken down into three sub-programmes, namely five Cross-cutting programmes involving 14 EPPs, five programmes related to "Water as a Resource" involving 48 EPPs, and five programmes related to "Water for Livelihood" involving 33 EPPs.

Plan Implementation Management Structure
It is recommended that the Plan be managed nationally at the highest political level by MSAN, while at the state level by MSANg. Supporting management systems require NSC to oversee the implementation assisted by National Technical Committee (NTC), meeting frequently to resolve technical issues and streamlining operational matters.

A dedicated IWRM Implementation Unit (IWRM-IU) reporting to NSC that would be responsible to ensure the timely and coordinated implementation of the Plan to be established. It would also monitor on a regular basis the implementation programme at all hierarchical levels.

Championing the National IWRM Agenda
Honorable Ministers of NRE, KeTTHA, and MOA are recommended to jointly assume this role and to champion the true spirit of IWRM.

factsheet
Completed reports by ASM Water Committee are:

-

2009
Integrated Lake Basin Management
- Submitted to NRE in 2010 and MSAN 07 in 2012

2011
Integrated Aquifer Systems Management
- Submitted to NRE in 2012

ASM Mega Science Study: Water Sector
- Submitted to Cabinet in 2012

2014
National Agenda for Integrated Water Research
- Submitted to NRE, MOSTI in 2015 and MSAN 10 in 2015

Climate Change and Water
- Submitted to NRE, MOSTI in 2015 and MSAN 10 in 2015

2015
NKPA on Water

2016
Water Demand Management
- Submitted to EPU, NRE, KeTTHA, MOA in 2016

Water Supply and Wastewater Management
- Submitted to KeTTHA in 2016

Integrated River Basin Management
- Submitted to NRE in 2016

Water and Agriculture
- Submitted to MOA in 2016

Climate Change: Adaptive Capacity Attributes of Selected Water-related Policies in Malaysia

Adaptive capacity is the ability of a system to adjust to climate change. It is fundamental in supporting the management of the country's water resources when facing climatic adversity. The rising intensities of flood and water stress in the country due to the severe impacts of climate change calls for stronger policy and legislation. ASM conducted a study on Climate Change: Adaptive Capacity Attributes of Selected Water-related Policies in Malaysia to assist the Government in formulating sustainable laws and policies that would enable adaptation to the changing climate.

The Sungai Selangor River Basin Management Plan for the Selangor River Basin, which provides 60% of the domestic and industrial water supply in Selangor and Klang Valley, was among the five key policy and planning documents used as case study and assessed for their effectiveness in facilitating adaptive capacity. The other four key policy and planning documents were the National Policy on Climate Change, National Water Resources Policy, Tenth Malaysia Plan and Selangor State Structure Plan.

Future work should consider the evaluation of the state of the enabling environment for Integrated Water Resources Management (IWRM) which includes Integrated River Basin Management (IRBM). The framework recommended in this study could be proven useful when reviewing existing policies or during the formulation of new policies. The study provides recommendations to intensify the level of adaptive capacity of water institutions.

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- The National Water Resources Policy showed an adaptive capacity index of **0.77**. It has the greatest level of adaptive capacity amongst all policy documents evaluated in the study. However, improvement could be made through the strengthening of economic resources.

- The other four policy documents have an adaptive capacity index of **0.40** and lower. Majority of these documents exhibit weaknesses in information and knowledge, institutions and governance, talent and economic resources.



6 Recommendations

Information and Knowledge
- Collection and sharing of scientific and technical data among stakeholders must be made available and accessible through an integrated information management system.

Institutions and Governance
- Collaboration and cooperation between Federal and State Government is critical in raising the adaptive capacity.

- Encouraging participatory management by empowering the local community in organisational decision making may also be an effective strategy.

Talent
- The capacity of water resource managers have to be enhanced to take cognizance of all types and sources of knowledge and scientific pursuits (science, social sciences and humanities), including traditional and local understanding as well as practices relevant to the sector at the basin level.

Economic Resources
- Support from the Government for water operators to explore alternative financing options and models to improve business sustainability will also be crucial in enabling the development of climate change resilient infrastructures.

Technology and Infrastructure
- Software development specifically for localised climate modelling may provide more reliable and accurate predictions compared to software developed internationally.

- There is also a need to review the country's hydrological data using the latest data acquisition technologies.

- Promotion of soft approaches and management solutions such as conserving water catchment forests and ecosystems, identifying and reserving sources of water supply and catchment areas, and controlling polluting sources have positive influence on adapting to the stresses of climate change.

Institutional Adaptability
- The Federal and State Institutions may include prioritisation of resources and usage of alternative source during extreme climates in their policies, enactment and guidelines.

- Institutions will also have to review their performances regularly to identify gaps and make room for continuous improvement.

- The IWRM and IRBM approaches in planning, managing, protecting and rehabilitating water resources should be enhanced as they facilitate successful adaptation responses and provide guidance to decision makers in designing institutional arrangements and governance measures in preparing for and responding to climate change.

ASM anticipates that the recommendations for enhancing adaptive capacity will be useful to equip policymakers with insights to formulate effective and inclusive policies designed to reduce exposure and vulnerability and strengthen preparedness for extreme climates.

Agriculture Water Services for Agribusiness

Malaysia is on the verge of becoming a high-income developed nation. However, the nation still lacks affirmative policy and strategy for agriculture water services in key national development policies and plans that could very well affect the food security of the nation.

Over the past 80 years since 1932, the role of Agriculture Water Services (AWS) has been one of the success factors for the admirable achievements by the Malaysian agriculture sector. Poverty in rural areas has largely been resolved with the National Food Self-Sufficiency Level maintained at comfortable levels.

The study has identified an alarming decrease in AWS human resource over the years and the lack of capacity building programme for various water user groups and water managers. As the water demand by the agriculture sector increases towards 2050 and the impacts of climate change, there is a need to look into the sustainable management of water resources for the agriculture sector.

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- Agricultural water services human resource capacity at the Federal level was reduced from nearly **1,000** to just about **60** personnel based on the Irrigation and Agricultural Drainage Division (BPSP) of the Ministry of Agriculture and Agro-based Industries.

- There is no affirmative policy and strategy for agricultural water services in the key national development policies and plans like the National Agro-Food Policy 2010-2020 and the National Water Resources Policy 2012.

38 Proposed Strategies

Governance

1) Form a dedicated Agriculture Water Services Governance Structure

2) Develop and instal a comprehensive agriculture Water Accounting, Water Auditing and Feedback System

Policy

3) Incorporate Agriculture Water Services Policy in Agriculture Policy and key development plans

4) All Agriculture and Agriculture Water Services development shall be based on the principals of IRBM approach

5) Designate focused production areas for all sub-sectors (non-paddy food crops, industrial and commodity crops, aquaculture and livestock)

6) Develop and apply the WEF Nexus Approach for medium and long-term decision making in relation to Agriculture Water Services and water resources needs for agriculture development

7) STI development for agriculture water services to be focus towards National ownership of the technology

Laws, Rules and Regulations

8) Promulgate an Agriculture Water Services Act

Institutions

9) Form a dedicated department for Agriculture Water Services to implement the Governance system, develop and manage large-scale irrigation and drainage areas for all crops (food, industrial and commodity crops), aquaculture and livestock

10) Establish a Centre of Excellence that carries out applied research for Agriculture Water Services, including training and capacity programme for farmers and managers

11) Establish Water User Group Dialogue Platform, Water User – Water Manager Integrated Dialogue Platform and extend this to all areas with Agriculture Water Services and establish formal linkages with MOA, State and National Water Resources Councils, and other Ministries

Operations and Maintenance

12) Develop operations and maintenance system based on service level delivery for end-users that include measurement indicators for cost of service with a view of remuneration for water services in the future

Data and Information

13) Integrate data and information collection and sharing system with all other Water Sector managers and end-users

STI

14) Develop agriculture water accounting, water auditing and performance feedback tools and systems

15) Develop agriculture water development and management sustainability tools

16) Develop advance software for agriculture water services planning, design and management tools

17) Develop and instal water quantity and quality measurement and control devices for all subsectors of agriculture

18) Develop Water-Energy-Food (WEF) Nexus assessment tools

19) Develop Water Footprint Tools for all agricultural sectors to support the WEF Nexus Assessment tools.

20) Redesign existing and new Granary Irrigation Systems and components to strengthen the gravity system and to incorporate climate change adaptation needs

21) Develop planning and design criteria for non-paddy crops, livestock and aquaculture to increase yields, stabilise production, flood resilience and sustainable development

22) Develop irrigation and drainage planning and design criteria for large-scale agricultural services system for oil palm, rubber, fruits and other food crops, industrial and commodity crops, livestock and aquaculture.

23) Develop Waste-to-Energy plants in Oil Palm, Rubber and Livestock industry

24) Develop Zero Discharge technologies for Oil Palm, Rubber and Livestock industries

25) Develop Water Recycling Plants in the Paddy Granaries and Rubber Industry

26) Develop surface water – groundwater conjunctive use of water technologies for agriculture water management

27) Develop existing Granary irrigation and drainage system network for multi-use to service all sectors and ultimately plan for this as a regional and national water management grid

28) Develop planning and design criteria for agriculture area to be part of the local, regional and national integrated flood system

Financing

29) Develop and implement Public-Private Partnership financing models for Agricultural Water Infrastructure and Services

30) Develop cross-sector Financing Models as part of the WEF Nexus management and multi-use of existing and new infrastructure

Wealth Creation

31) Facilitate Water User Groups to increase non-farm income sources within and outside of the Agriculture Water Service Areas

32) Identify and encourage the development of Agriculture Water Services providers industry and new business opportunities

33) Export Agriculture Water Services industry to cooperate with countries still in the development stages of large-scale irrigation and drainage system for paddy and other non-paddy agriculture activities

Public Participation

34) Encourage the formation of Water User Groups in Agriculture Water Services Areas with formal linkages to Policymakers and Water Managers

35) Planned handover of tertiary systems operations and management to Water User Groups

Capacity Building

36) Develop comprehensive capacity building programme for agriculture water managers and agriculture water services providers

37) Develop comprehensive capacity building programme for Water User Groups and Service Providers related or have impact on agriculture water management

International Participation and Collaboration

38) Long-term membership and active participation in internationally renowned organisations

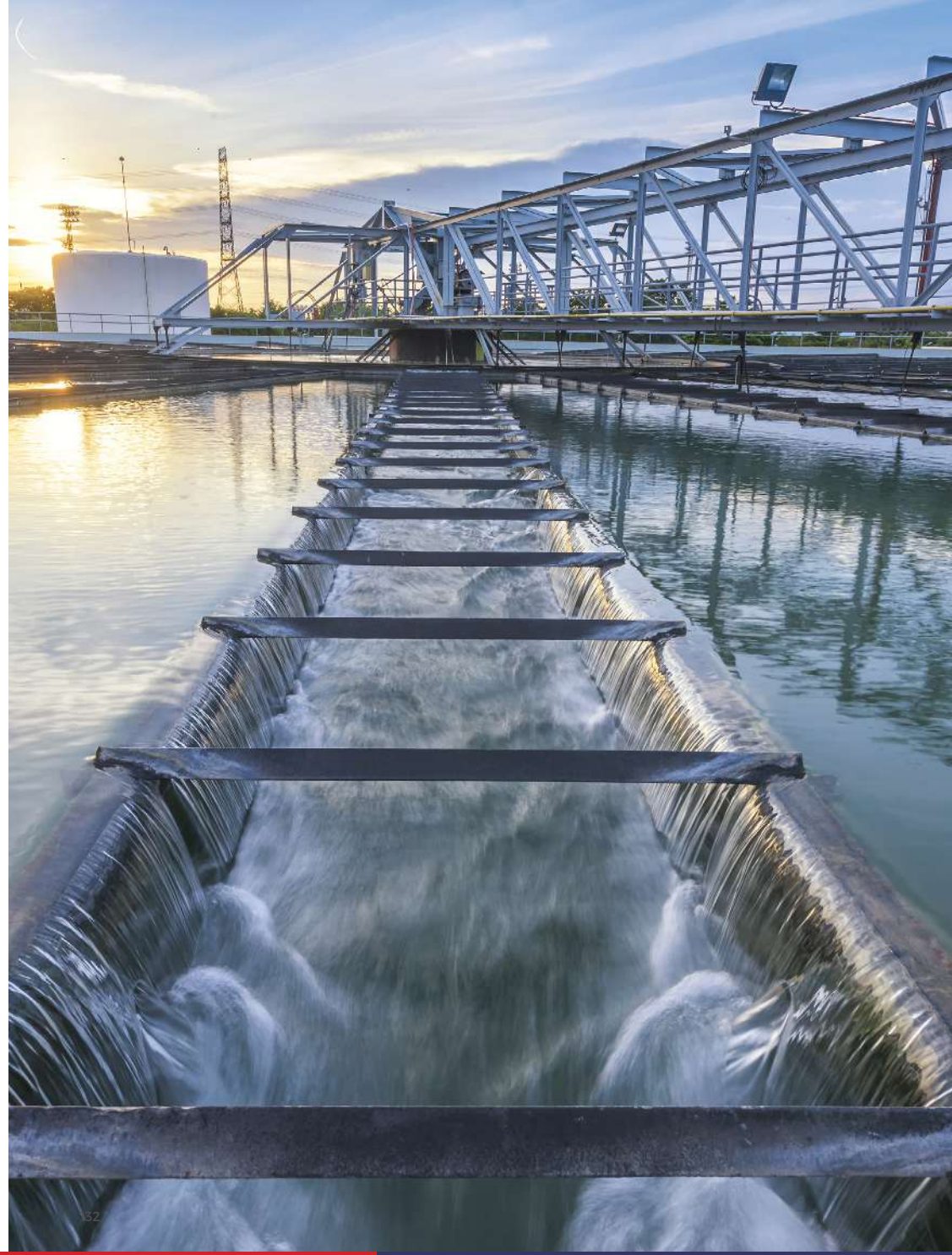
Integrated Urban Water Management

Urban Settling – Urban Setting

Census (2010) predicted that by 2050, 80% of the 42 million Malaysian populations will be living in cities. Therefore, an effective management and strategic conservation plan is crucial in dealing with the complex challenges ahead and ensuring sustainable water supply in urban settling.

Integrated Urban Water Management (IUWM) study is looking into the dire ramifications on urban amenities and services due to rapid urbanisation. This study seeks to identify the current status of urban water management in the four conurbations as below:

- Greater Kuala Lumpur
- George Town
- Kuantan
- Iskandar Corridor and Johor Bahru



Science Outlook 2017

The Science Outlook 2015 presented an evidence-based independent review on key trends in STI in Malaysia. This report is a key achievement in ASM milestone. Upon presentation at the first NSC meeting in January 2016, it was requested that the Science Outlook be published biennially to keep the momentum on identifying key trends and addressing the gaps in the STI landscape.

Taking off from the previous edition, the Science Outlook 2017 continues to scan the horizon and gather evidences on the national STI setting through thorough evaluation and analysis. This study will retain the six strategic thrusts based on the NPSTI 2013 -2020.



STI Governance

This chapter aims to update the list of all national policies in Malaysia. It will also look into the STI policies and governance leadership at the State level. A case study on the establishment and rational of the NSC will be carried out. The National Science Council chaired by YAB Prime Minister as the highest committee at the national level to govern STI in Malaysia is much needed to promote and implement the national STI agenda.



R, D & C

The national R,D&C investment and productivity landscape, research prioritisation ecosystem and efficacy of commercialisation strategy will be the three areas addressed under this chapter. This chapter seeks to provide an insight on promoting greater collaboration, optimisation of resources allocation and commercialisation rate, and bridging the commercialisation valley of death for R&D to enable the nation to strive towards an innovation-driven economy.



STI Talent

The STEM Action Plan proposed in the 2015 outlook has been undertaken by MOSTI, MOHE and MOE. The Action Plan has defined STEM as 'Learning integrated disciplines of Science, Technology, Engineering and Mathematics in the context of connecting educational institutions, communities and industries to produce STEM literate talent.

In this edition, the match between supply and demand of STEM talent will be investigated. The chapter will also look into the attractiveness of the current STEM-based jobs in terms of its remuneration scheme and other benefits.



Energising Industries

As the country continues to develop at a rapid pace, this chapter, through engagements with the business chambers, will look into the roles of SMEs in positioning Malaysia as a technology provider and towards realising the shift to Industry 4.0.



STI Enculturation

Science enculturation is an effort to bring the awareness of science and its derivatives out of the walls of formal education into the daily life of the society. Science literacy, scientific thinking and reasoning among Malaysians will be the indicators explored in this chapter. This chapter also aims to propose STI enculturation index.



Strategic International Alliance

Strategic international alliance is one of the most important pillars in strengthening STI initiative. It will capture science diplomacy as one of Malaysia's efforts in addressing global issues and enhancing existing international alliances. In order to determine where Malaysia is positioned in the global S&T arena, the impact and output of international alliances will be assessed thoroughly.

Cyber Security

In the World Economic Forum (WEF) Global Risks Report 2015, cyberattack ranked among the top 10 global risks in terms of likelihood. These days, we are seeing large-scale cyberattacks that could potentially inflict severe damage to physical and digital infrastructure. As such, cybersecurity is not merely an information technology issue but a national security matter. Therefore, there is an urgent need to protect our cyberspace and infrastructure.

Task Force on Cyber Security was established with the aim to propose strategies in dealing with cybersecurity issues that affect the national infrastructure, business environment and well-being of citizens. This advisory report will address the challenges in legislative, regulatory and enforcement of cyber-based criminal cases. The report also addresses cybersecurity issues in a holistic manner where cybersecurity landscape in Malaysia and global outlook are taken into account.

One of the indicators for cyber threat is malware propagation and evolution. In 2015, Malaysians experienced around 5,000 ransomware attacks or 14 attacks per day. In 2016, according to Symantec Corporation, Malaysia ranks 47th globally, and 12th in the Asia Pacific and Japan region, in terms of ransomware attacks.

In achieving a safer cyber space, careful design, development and implementation need to take place at every layer of any interconnected network devices, regardless how miniaturised or large scale the solution is. The strategy needs to come from the top which then relies heavily on the governance and enforcement at national level to facilitate a concerted effort in creating and maintaining a healthy cyber ecosystem.

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The cyber security market is estimated to grow from **USD122.45 billion** in 2016 to **USD202.36 billion** by 2021 (MDEC).

15%

survey respondents: **organised crime** as source of incidents

+12%

from the year 2014



Organised crime thefts by country



35%



22%



18%

Global State of Information Security Survey 2015 by PWC, CIO and CSO

Empowering the Scientific Community

ASM empowers the scientific community through its STI programmes channelled through four major platforms which are capacity-building, science consortium, gateway and consultative fora. These channels are targeted to facilitate the elements of recognition, talent and alliance in the STI landscape.





Talent Development

Professional Developments

A progressive and innovative workforce can be achieved through upgrading of knowledge and skillsets. Thus, a well-planned professional development programme is essential.

The Malaysian Technical Cooperation Programme (MTCP) focuses on the development of human resources through training programme in various fields for civil professionals among developing countries. ASM conducted two programmes under MTCP.

Global Geopark Management - "Natural Heritage Protection towards Sustainable Development"

Geodiversity is the foundation of all ecosystems and the basis of human interaction with the landscape. As an integral part of sustainable development, geopark management refers to the ability of individuals and states to respond to the development and maintenance of geoparks with strategies and policies for better management of geoparks.

Global Geopark Management 2016 themed "Natural Heritage Protection towards Sustainable Development" focuses on experiences, challenges, and best practices in steering the present and potential geoparks towards achieving sustainable development goal. An inaugural workshop was organised by ASM, in collaboration with MOSTI, Ministry of Foreign Affairs (MOFA), Malaysian National Commission for UNESCO (MNCU), NRE, Langkawi Development Authority (LADA) and Friends of Langkawi Geopark (FLAG) under MTCP. This course enhances the knowledge and skills of participants to identify and promote the links between geological heritage and all other aspects of the geopark's natural and cultural heritage.

The final analysis and observations from the workshop were presented to representatives from the Department of Mineral and Geoscience (JMG), Department of Chemistry Kedah, Kedah Meteorological Department, FLAG, LADA and MOSTI.

In Brief

- MTCP was established in 1978 at the First Commonwealth Heads of Government Meeting (CHOGM) for Asia Pacific Region and officially launch in 1980 at the Commonwealth Heads of State Meeting.
- Since its launching, more than 25,000 participants from 140 countries have benefited.
- Focus areas are public administration, good governance, health services, education, sustainable development, agriculture, poverty alleviation, investment promotion, ICT and banking.
- Langkawi UNESCO Global Geopark is Malaysia's first established geopark located in the north-western corner of Peninsular Malaysia. Consisting of 99 islands, Langkawi UNESCO Global Geopark is also the first geopark in South-east Asia under the banner of UNESCO's Global Geoparks Network. The park is managed using community led approach.

factsheet

19 participants from **12** countries

14-20 May, Langkawi

Essentials in STI Policy and Management
Understanding the dynamics of S&T within the context of economic and market development is critical in designing blueprints and strategic implementation framework in driving the transformation of a country by design. S&T is one of the strategic drivers that contribute toward the shift from relatively lower end economic activities into high value added activities. Therefore, STI Policy is an integral part of national development policies.

ASM in partnership with MOFA and UTM Perdana School organised the ASM-UTM Certified Professional in STI Policy and Management for OIC Countries (AUCPS) themed "Essentials in STI Policy and Management". The four-day training programme exposes participants to the basic principle in STI Policy and management, and develops capacity for national STI Policy formulation and implementation.

Participants were certified as Professional in STI Policy and Management by UTM Perdana School upon submission of individual assignment within three months after the training. With this certification, participants are qualified to train and lead on STI Policy formulation.

factsheet

11 participants from **9** countries.

16-20 May, Kuala Lumpur



Young Scientists Development

ASM recognises the importance of young scientists in portraying their potential in solving global issues, as well as to drive Malaysia to the forefront of global STI competitiveness. Malaysian young scientists are given opportunities to expand their potential to become high-calibre scientists capable of international recognition and contributing to global STI advancement, via ASM's active partnership with global STI institutions and organisations. These programmes take various forms, such as:

- Study visits
- Organisational attachments
- Mentor-mentee engagements

A Summer at the LHC
The CERN Summer Student Programme (CSSP) offers undergraduate students eight weeks of working with research teams at CERN in Geneva, Switzerland. Students from the fields of physics, computing and engineering are selected through a stringent selection exercise and nominated by ASM. Participants will gain valuable experience working in a multidisciplinary and multicultural environment, while also extending their network of international contacts.

factsheet

15 students have participated in the CERN Summer Student Programme since 2012.

278 students from **87** countries participated in CERN Summer Student Programme 2016.

In Brief

3 students were selected from **11** applicants
- Chin Yuk Ming (UMP)
- Muhammad Amirullah Miswan (UKM)
- Muhammad Safwan Zaini (UPM)

Augmenting Research with Systems Analysis
The IIASA Young Scientists Summer Program (YSSP) is an annual three-month programme organised by the International Institute for Applied Systems Analysis (IIASA). IIASA YSSP offers a unique chance for Malaysian young scientists to conduct independent research under the direct supervision of experienced IIASA scientists.

factsheet

7 Malaysian young scientists have attended the program since 2011.

Rachel Hoo Poh Ying (UTM) was selected to attend the IIASA Young Scientists Summer Program 2016 under the Mitigation of Air Pollution and Greenhouse Gases Programme (MAG).

In Brief

- IIASA is an international scientific institute that conducts policy-oriented research which tackles global problems like climate change, water-energy-food nexus as well as poverty-equity that are too complex to be solved by a single country.
- Malaysia is represented by ASM as one of the National Member Organizations (NMO) of IIASA since 2011.


Coaching


Direction


Training


Goal

Lindau Nobel Laureate Meetings

Every year, selected young scientists from all over the world have the opportunity to meet Nobel Prize Winners from the fields of Physics, Physiology & Medicine, and Chemistry. This inter-generational dialogue offers an excellent avenue to develop our young scientists by providing them with an opportunity to interact with Nobel Laureates and scientific peers from around the world. Participants at the Lindau Nobel Laureate Meeting are chosen from among the best in academic institutions and foundations.

factsheet

5 Malaysian Young Scientists were selected

- Dr Lim Kok Sing (UM)
- Dr Suhaila Sepeai (UKM)
- Dr Tan Sin Tee (UKM)
- Dr Yap Wing Fen (UPM)
- Dr Farah Diana Muhammad (UPM)

In Brief

- The 66th Lindau Nobel Laureate Meeting 2016 (Dedicated to Physics) was held from 26 June to 1 July at Lindau, Germany. The Malaysian delegation was led by Professor Dato' Dr Rosihan Mohamed Ali FASc.
- The meeting featured four days of plenary lectures, young scientist discussions, master classes and three panel discussions on "Glimpses Beyond the Standard Model", "Is Quantum Technology the Future of the 21st Century?" and "The Future of Education in Sciences".

IAMP Young Physician Leaders Programme

As one of the member academies under IAMP, ASM gives the opportunity for young physicians to magnify their leadership skills by participating in IAMP Young Physician Leaders Programme. The three-part programme includes:

- A leadership development programme;
- An academic visit to health research laboratories in Germany; and
- Participation as speakers and special guests in the events of the World Health Summit.

factsheet

7 Malaysian participants had attended the IAMP Young Physician Leaders Programme since 2011.

24 selected participants from all over the world participated in the IAMP Young Physician Leaders Programme on 6 October.

Super Science Highschool (SSH) Student Fair

Malaysian students participate in the Super Science High School (SSH) Student Fair which aims to foster the interest in STEM education among younger generation apart from exposing them internationally.

This programme is a convergence of high school students from various countries to showcase their scientific knowledge through poster and oral presentation. It is premised upon building an international young scientists network for the future which will carry out collaborative R&D work to solve global problems and promote societal well-being.

This year, ASM in partnership with JST supported the winners of STEM Apps Challenge to participate in SSH. Malaysian participant showcased mobile apps developed by them at the fair.

factsheet

SSH was participated by student from **9** countries. 10-11 August, Kobe Convention Centre, Japan.

In Brief

STEM Apps Challenge organised by ASM, MaGIC-X UTM and PERINTIS.

Winner - SM Islam Hidayah, Johor



Engagement

National Science Challenge

Recognising the importance of strong STEM skills among younger generation to be successful in the fast changing economy, ASM in partnership with ExxonMobil Subsidiaries in Malaysia organised the annual science competition for secondary school students. The competition aims at promoting the understanding, awareness and appreciation of STEM among secondary school students nationwide. This programme was made possible with the support from YSN-ASM, MOE, MARA, JST, UKM, UPM, UTM and UiTM.

In 2016, National Science Challenge (NSC) was conducted with improved format, in three levels which were Preliminary Level; State Level; and Grand Final. The state level was conducted mostly in local universities where five teams from each states competed in a science quiz. Winners of the state level competed at the Grand Finals which was conducted as a 10-day Residential Science Camp programme. In this level, students were required to carry out experiments at universities' lab as well as develop apps for online games as their project. Four teams were further shortlisted from among 16 teams to compete in the last round of the Grand Final.

The champions won the Prime Minister's Challenge Trophy and a study visit to Stockholm, Sweden to witness the Nobel Prize Ceremony borne by ASM. The runners-up had the opportunity for a week-long study visit to Japan sponsored by JST.

factsheet

Out of **13,563** registered, **12,560** participated in the Preliminary level.

NSC Grand Finalists are:
- SMK Labuan (Winner)
- MRSM Langkawi (2nd Prize)
- MRSM Tun Abdul Razak (3rd Prize)
- SMS Sultan Mahmud (4th Prize)

12, 560 students participated in the National Science Challenge Preliminary level



Perak
338



Sabah
648



Selangor
1,440



Terengganu
1,542



Kedah
1,359



Kelantan
561



Melaka
630



Negeri Sembilan
771



Perlis
231



Pulau Pinang
1,143



W.P Putrajaya
138



W. P Labuan
78



Johor
1,341



Sarawak
942



Pahang
846



W.P Kuala Lumpur
552

Mosti Social Innovation – DUTA SAINS **Programme**

Society that maintains high level of understanding and literacy in STI will enable effective diffusion, adaptation and use of scientific knowledge in a country. ASM initiated the Duta Sains programme with the aim to empower community through STI. To carry out this initiative, ASM appoints selected ambassadors among the community called 'Duta Sains'. Duta Sains will work with their communities under the guidance of ASM experts to fulfil the following objectives;

- **Improve science literacy and awareness** among communities;
- **Create a knowledgeable community** that is equipped with skills and knowledge to create solutions to local problems; and
- **Increase interest amongst the younger generation** to choose education and career in science.

ASM implemented Duta Sains Programme at four constituencies namely Jerlun, Kedah; Setiu, Terengganu; Tangga Batu, Melaka; and Tuaran, Sabah.



Major outcomes of Duta Sains programme are;

Sinkhole problem at Jerlun
A collaboration network was formed between Muda Agricultural Development Authority (MADA) and researchers from USM and UPM in finding a solution to solve sinkhole problem in Jerlun. The land which was under the purview of MADA, was designated for agricultural purposes. Through this collaboration, a preliminary report was completed. It is hoped that the proposed solution will increase the production of paddy in the area and subsequently increase the income of the community involved.

IBSE training workshop at Jerlun, Setiu and Tuaran
The IBSE training workshop has trained 52 primary school teachers and two State Education Department officers. They are now able to play a role as facilitator and encourage students to observe and discover science in their environment. Teachers are more creative, versatile and innovative in teaching the subjects to the student. Through this, it is hoped that more student will be interested in STEM education. ASM will continue to monitor and provide mentoring to these teachers in 2017.

Commercialisation of local product at Tangga Batu
The Small Medium Enterprise (SMEs) has benefited greatly from this programme, especially from the aspect of product developments and commercialisation of local products. ASM has facilitated forming a collaborative network between SMEs and research institutions. In addition, product with commercialisation value submitted for trademark application, logo creation, e-business portal and product analysis to meet Malaysian standard.

In Brief

MOSTI Social Innovation Fund (MSI) is a brainchild of MOSTI created by replacing Community Innofund (CIF). Through MSI, MOSTI hopes to solve community issues by improving societal well-being. This could be done through collaborative efforts, skill enhancement and innovation to enhance existing ideas, product or services.

Coaching Students for Excellence
In addition, ASM also conducted tuition classes in science subject for form 4 and form 5 students from schools around Putrajaya. This programme was conducted in collaboration with PUSPANITA. On top of tuition classes, three intensive seminars were also conducted to prepare students who will be sitting for examination. It is hoped that participating students will be able to achieve good results in national examination.

factsheet

Appointed Duta Sains

8 teachers at Jerlun, Kedah

16 teachers at Setiu, Terengganu

4 entrepreneurs at Tangga Batu, Melaka

40 teachers at Tuaran, Sabah

Inquiry Based Science Education (IBSE) 2.0

In 2012 and 2013, ASM conducted an IBSE pilot project in four selected primary schools in Hulu Langat. The aim of this pilot project was to look at the feasibility of implementing IBSE and how it could enhance the effectiveness of teaching and learning of science in primary schools and subsequently improve the performance of students in science. The findings of the project report reveals that IBSE can be implemented in primary schools and shows positive impact on teachers and students.

Following the success, ASM initiated IBSE 2.0 (2016 – 2017) to provide continuous mentoring and monitoring to the trained teachers from the participating schools. For the year 2016, ASM has successfully conducted four weekend workshops and one Residential Workshop involving 49 teachers which include five science teachers from Sekolah Sri Bestari, Sri Damansara (private school).

Roadshow on Draft Code of Conduct on Biosecurity 2016

Biosecurity started as a concern among agriculturalists and environmentalists especially in reducing the risk of transmission of infectious diseases in crop and livestock. It has now become a major concern among scientists, policymakers, security and law enforcement agencies.

As Malaysia is promoting the biotechnology field, it is important for safety and security measures to be in place to protect against loss, theft, misuse, diversion and intentional release of pathogens and toxins. But, the measures must not hinder the advancement of biological research.

Therefore, under the International Framework of the Biological and Toxin Weapons Convention, series of outreach programme were organised to increase the awareness on the implementation of the Code of Conduct (CoC) on Biosecurity. This CoC was developed by STRIDE, in consultation with practitioners and stakeholders in life sciences research from academia, industry, and government. CoC aims to promote transparency in biological and other life sciences research to minimise risk of misuse. It also provides guidelines for responsible conduct of research and enforces existing standards for ethical practices of accountability and communications.



factsheet

300 participants

7 speakers from different institutions and agencies

6 programmes
- STRIDE – 17 February
- USM Kubang Kerian – 21 February
- UIAM Kuantan Campus – 11 March
- USM Penang – 4 April
- QIUP – 6 April
- UMS – 25 April

Northern Region: Youth Development Programme

Mentoring students in conducting research projects is an effective way to nurture their interest in STEM as it provides experiential learning and guidance from the experts. Northern Region Engineering Science and Technology Youth Programme, formerly known as the Industry Youth Boot Camp, has expanded its scope and format allowing students to work on a research project for a period of six months. The programme is organised by USM with the support of ASM Northern Region Chapter and the industries from the Northern region.

During the first part of the programme, students worked independently on a given research topic focusing on engineering. Engineers from industries, university researchers and members of YSN-ASM provided guidance and mentorship to these students especially on problem solving skills and technical methodologies. At the end of the programme, students presented their research project to a group of panel in which the best project was selected as the winner. MRSM Taiping was announced as the winner for their project entitled "Hands-free Bicycle Turn Signal".

factsheet

- Involved form 2 to form 4 students
- **36** teams with **36** different mini STEM-based projects

Southern Region: Frontier Science in Catalysis

UTM in collaboration with ASM Southern Region Chapter organised the International Conference on Catalysis (iCAT) 2016, themed "Frontier, Challenges and Opportunities in Catalysis". Nobel Laureate Akira Suzuki delivered the keynote at ASM Plenary Session during the conference. The conference provided a platform for academics, scientists, researchers and students to exchange ideas and knowledge on the latest advancement in catalysis research.

In conjunction with the conference, Nobel Laureate Akira Suzuki delivered a lecture. He shared his 40 years' experience and research work on 'Suzuki reaction' that was developed based on the carbon-carbon bond-formation which is an important process in chemistry.

factsheet

iCAT

- Organised by UTM and ASM Southern Region Chapter
- 20 – 21 September at UTM Johor Bahru
- **7** speakers
- **100** participants

Nobel Laureate Lecture

- Organised by UTM and ASM Southern Region Chapter
- 22 September at UTM Johor Bahru
- **200** participants

Southern Region: Nurturing Innovative Students

Science Innovation Challenge was organised to inspire and encourage students to produce innovative products that will solve problems in daily life. This programme was initiated towards realising the Innovation Valley Iskandar in Johor. Students' innovative products were evaluated by judges from IKM and UTM. The challenge rewards students with various levels of prizes which include the ASM Special Award which was won by SMK Infant Jesus for their project on "Reduction of Plastic Waste Using New Fabricated Infinite Spoon".

factsheet

- Organised by UTM, ASM Southern Region Chapter, Jabatan Pendidikan Negeri Johor (JPN), American Chemical Society Malaysia (ACS), and Institut Kimia Malaysia (IKM)
- 22 September at UTM Johor Bahru
- Participation of **96** teams, **40** teams shortlisted to the final level

In Brief

ASM Chapters were established with objectives to increase the visibility of ASM, attract the scientific community and professionals to collaborate with ASM as well as strengthening the networking among ASM members at the particular region. To date, ASM has established two chapters, Northern and Southern Region Chapter.

Awards & Grants



Awards and grants are important to motivate researchers in developing new ideas, discovering new knowledge and solving the problems of society through innovative and practical approach. ASM's expertise is often sourced by various organisations to carry out selection process of these awards and grants. ASM harnesses the expertise of its members in providing independent review, evaluation and recommendation based on merit.

Mahathir Science Award

This international award by the Mahathir Science Award Foundation (MSAF) recognises remarkable research contributing to new knowledge in solving problems in the tropics. The research must demonstrate evidence of significant socio-economic impact as well as contribute to policy and governance leading to sustainable life quality improvement in the field of Tropical Agriculture, Tropical Architecture and Engineering, Tropical Medicine, and Tropical Natural Resources.

factsheet

192 nominations received from **30** countries (2005 – 2016)

10 awardees to date, with total prize worth **RM2,000,000**



MAKNA Cancer Research Award

The National Cancer Council (MAKNA) awards this grant to Malaysian young researchers with an excellent track record in cancer research. The award aims to promote cancer research among young scientists as well as to increase Malaysia's contribution to improving treatment of various cancers.

factsheet

The Recipients of the 2016 MAKNA Cancer Research Award are as follows:

- Dr Asrul Akmal Shafie (USM)
- Dr Oon Chern Ein (USM)
- Dr Teow Sin Yeang (Sunway University)

The 2016 recipients received a total of **RM89,800.00** worth of research grant

488 applications were received from 2001 to 2016

47 applicants have been awarded to date with a total worth of **RM1,534,635**

Bioeconomy Innovation Awards

Bioeconomy Innovation Award (BIA) is an annual competition initiated in 2008. The award recognises universities or research institutions that have developed outstanding innovative solution to technical, social and environmental challenges in bio-based technologies.

The 2016 BIA was organised by Malaysian Bioeconomy Development Corporation Sdn Bhd in collaboration with ASM to match participants with prospective business partners and investors. Focus was given to accelerate commercialisation of novel technologies in the following categories:

i) Agriculture / Agro-based Industry
ii) Bio-Industrial Technology
iii) Healthcare and Wellness
iv) Green and Renewable Technology

factsheet

77 applications were received

1 gold, **1** silver and **1** bronze winner selected for each category

3 Special Awards:

- Bioeconomy Innovation of the Year
- Most Promising Innovation
- Most Innovative Technology



Nomination for International Awards

ASM has nominated several outstanding Malaysian scientists in its capacity as nominating institution for the following international awards:

2016 Islamic Development Bank (IDB) Prize by IDB Saudi Arabia
The award promotes healthy competition among S&T education and research institutions in IDB Member Countries towards achieving excellence. It also raises awareness of policy among decision makers about the present and potential contribution of S&T to sustainable development. The award categories are:

1. Institutions that contribute outstanding scientific or technological advancement to the development of a member country

2. Institutions that contribute to a given scientific discipline: Engineering; Agriculture; Medicine; Biotechnology; Information Technology; Optronics; Material Sciences; Pharmaceutical; Industrial Microelectronics; Nanotechnology; and Alternative Energy Sources

3. Prominent scientific research institutions in IDB least developed member countries.

2016 Science & Technology Award by Malaysia Toray Science Foundation (MTSF)
The award recognises Malaysian scientists who have made outstanding scientific discovery and successfully solved a major technological problem with an economically viable solution through an original, revolutionary and important invention.

2016 Nikkei Asia Prize by Nikkei Inc Japan
The award recognises outstanding achievements that contribute to the region's sustainable development and to the creation of a better future for Asia. There are three categories:
1. Economic and Business Innovation
2. Science, Technology and Environment
3. Culture and Community

2016 Mustafa Prize Award by Al Seraj Technology Centre, Pardis Technology Park, Iran
The award is granted to scientists who have made tangible cutting-edge innovations on the boundaries of science and presented new scientific methodology for the betterment of human life. It aims to improve scientific network between academics and researchers in order to facilitate the growth of science in the OIC member states. There are four categories:
1. Information and Communication S&T
2. Life and Medical Science and Technology
3. Nano Science and Nanotechnology
4. Top Scientific Achievement in other fields

2016 TWAS Prizes by the World Academy of Sciences (TWAS)
The award recognises scientist from developing countries in recognition of their outstanding contribution to scientific knowledge in nine fields of sciences and/or to the application of S&T to sustainable development. The nine fields are agricultural sciences, biology, chemistry, earth, astronomy & space sciences, engineering sciences, mathematics, medical sciences, physics and social sciences.

Dr Ranjeet Bhagwan Singh Medical Research Grant

The late Dr Ranjeet Bhagwan Singh was a prominent medical research scientist who bequeathed his entire estate to the Dr Ranjeet Bhagwan Singh Endowment Fund. His funds were primarily established to promote the education of the poor and needy, irrespective of race, colour and religion. He made many invaluable contributions to the field of medical and scientific research and to the development of diagnostic laboratories in Malaysia.

MOSTI is the custodian of the Dr Ranjeet Bhagwan Singh (RBS) Medical Research Trust Fund. This trust fund promotes medical and bio-medical research in Malaysia. ASM is entrusted by MOSTI to implement the following programmes under this trust fund:

RBS Research Grant
RBS Research Grant is an annual programme under the RBS Medical Research Trust Fund to be awarded to one young Malaysian scientist to undertake medical or biomedical research.

RBS Research Workshop Grant
RBS Research Workshop Grant is a biennial programme under the RBS Medical Research Trust Fund. A workshop grant will be awarded to one Malaysian scientist or institution to conduct a workshop to introduce new research techniques or enhance research technologies in medical or biomedical fields.

factsheet

The 2015 RBS Research Grant was awarded to Dr Dharmani Devi Murugan from UM in 2016 for her research entitled "Mechanism of actions of the direct vasorelaxant actions of des-Aspartate-angiotensin I (DAA-I), a potential antihypertensive peptide".

The 2015 RBS Research Workshop Grant was awarded to Associate Professor Ir Dr Abdul Manaf Hashim from UTM for his workshop entitled "RBS Workshop on Biocompatible Nanomaterials and Nanodevices for Bio-Medical Applications".

The 2016 RBS Research Grant was awarded to Dr Yee Pinn Tsin from Sunway University for her research entitled "Design of a live attenuated vaccine (LAV) for the prevention of severe hand. foot and mouth disease (HFMD) caused by Enterovirus 71 (EV-A71)".

Flagship Programmes, Special Allocation for Agencies and ScienceFund through ASM Platform

MOSTI offers several R&D grants to encourage the development of research and commercialisation in Malaysia. These grants support the development of strong basic knowledge in science apart from enhancement of applied research which contributes to the economic development of the country. Through ASM, Fellows can submit research proposal which are of national importance adopting collaborative concept similar to that of a consortium.

factsheet

DSTIN Flagship Programme
Moving up the Value Chain and Environmentally Friendly Processes in Silicon Photovoltaic Technology: Non-toxic Processes, Wafering and Crystal Growth

Special Allocation for Agencies
Development of Yeast System for Flavonoid Production

ScienceFund Project
Time Dependent Changes of Morphology and Molecular Characterization around the Intracerebellar Haemorrhage (ICbH) Penumbra in C57B6/J Mice Brain Slices

Project Monitoring Team

ASM is appointed by MOSTI as a Project Monitoring Team (PMT) to monitor the implementation of approved R&D projects under the 9th and 10th MP since 2008. ASM Fellows serve as PMT panel members to evaluate and advice on the progress of the projects.

factsheet

3 Flagship projects with 13 subprojects

10 TechnoFund projects

3 Community Innovation Fund projects

Newton-Ungku Omar Fund

The UK Government launched the Newton Fund in 2014 and uses S&T partnership to promote economic development and social welfare of partner countries. This is done through partnership whereby both countries invest equally to the fund. Currently, there are 16 partnering countries.

In taking this opportunity, Malaysian Government partnered with UK Government since 2015 as an initiative under the Science to Action (S2A). Thus, the Newton Fund is known as the Newton-Ungku Omar Fund in Malaysia. While ASM, MOE and MetMalaysia participates as the delivery partner, MiGHT provides the matching fund required in its capacity as the funder.

NUOF covers activities ranging from growing capacities of the Malaysian science and innovation community through fellowships, mobility schemes and joint centres; forging research collaborations on development topics; and establishing innovation partners and challenge funds to develop innovative solutions on development topics.

ASM carries out seven activities, in collaboration with three UK institutions. The activities are:

- **Programme with British Council**
  Newton Researcher Links (Workshop Grants): Funding for organising a research workshop to stimulate initial links between, and support capacity building among early career researchers in Malaysia and UK.

factsheet

Newton Researcher Links
Grants up to **£85,000**/year

2nd call - **14** applications

6 recipients (**1** application funded by Malaysian Government & **5** applications funded by UK Government)

- **Programmes with Royal Society, British Academy and Royal Academy of Engineering**
  a) Advanced Fellowships:
  Provide established international researchers with opportunities to develop research strengths and capabilities of their research groups through training, collaboration and reciprocal visits with a partner in the UK.

factsheet

Newton Advanced Fellowships for Natural Sciences
Grants up to **£111,000**/year

1st call - **3** applications

2 recipients (jointly funded by both Governments)

Newton Advanced Fellowships for Social Sciences & Humanities
Grants up to **£111,000**/year

1st call - **4** applications

2nd call - **2** applications

4 recipients (jointly funded by both Governments)

b) Mobility Grants
Help strengthen the research and innovation capacity of researchers by assisting them in visiting or sending staff and students to the UK. This initiative helps to develop networks, research projects and partnerships with their UK hosts, counterparts and the wider UK research and innovation community.

factsheet

Newton Mobility Grants for Natural Sciences
Grants up to **£18,000**/year

1st call - **2** applications

2nd call - **4** applications

3 recipients (jointly funded by both Governments)

Newton Mobility Grants for Engineering (known as Newton Research Collaboration Programme)
Grants up to **£36,000**/year

1st call - **5** applications

2nd call - **10** applications

4 recipients (jointly funded by both Governments)

Newton Mobility Grants for Social Sciences and Humanities
Grants up to **£15,000**/year

1st call - **8** applications

4 recipients (jointly funded by both Governments)

Programme with Medical Research Council UK
Provide funding for 2-year collaborative research projects which focused on addressing Non-communicable Diseases (NCDs) of relevance to Malaysia.

factsheet

UK-Malaysia Bilateral Medical and Health Research Collaboration
Grants of **£2,000,000** for implementation of approved projects in 2017-2018

1st call - **34** applications

12 recipients (**9** applications are jointly funded by both UK and Malaysian Governments & **3** applications are funded by UK governments only)





Recognition

Recognising our Scientific Minds

Over the years, Malaysia has produced many outstanding scientists who has contributed greatly to the advancement of scientific knowledge and delivered impactful research outputs. TRSM serves as a database for us to gauge on a good whole spectrum of leading research scientists. In doing so, this enables us to identify Malaysian research scientists with pioneer mindset to move the country forward in an innovation-led economy and showcase them as drivers of the national STI agenda. Through TRSM, ASM recognises research scientists with outstanding contribution for the last 6 years. To date, ASM has recognised 120 research scientists.

This initiative aims to provide a platform for Malaysian research scientists to lead national STI agenda and become role model of excellence. They also serve as reference point in their area of expertise.

Penerima TRSM mengikut bidang:

- 33 Engineering Science
- 12 Chemical Science
- 9 Biotechnology
- 8 Biological Science
- 11 Applied Sciences & Technologies
- 3 Physical Science

Selection Criteria
Applications will go through a stringent selection process through a standardised selection criteria and scoring mechanism. The main criteria are as below:
- Knowledge generation
- Knowledge dissemination
- Impact of research output

factsheet

Registered User

3,581 user registered in the TRSM Database (2012-2016)
- Public **272**
- Applicant **3,209**
- Administrator **6**

957 user registered in the TRSM Database (2016)
- Public **40**
- Applicant **92**

Input Data into the TRSM Database
- **1284** completed input data into the TRSM Database (2012-2016)
- **453** completed input data into the TRSM Database (2016)
- http://www.mytopscientists.org

In Brief

Eligibility
- The recognition is given to research scientists holding Malaysian citizenship and working in Malaysia whose outstanding achievements in STI have been nationally and internationally recognised.
- At the time of application, the candidate should be actively involved in research in the last 5 years with at least 10 years cumulative contribution towards the progress of STI.



Material Technologies



Agricultural Sciences



Medical & Health Sciences



Forestry Science



Information, Computer & Communication



Environmental Sciences



Gateway

Young Scientists Network

The Young Scientists Network was established by ASM with the aim to create a pool of highly talented and motivated young scientists who can interact, coordinate and implement relevant STI programmes. The young scientists can voice their opinion in a consolidated representation on significant STI matters especially in influencing policy making through this network.

Members of YSN-ASM are appointed by ASM Councils from among outstanding young scientists who have the capability to contribute towards strengthening the Malaysian scientific community. Following are the activities carried out by YSN-ASM:

factsheet

20 new members selected

28 new affiliates nominated and selected

18 new Exco members elected for term 2016/2017

9 working groups established

To date YSN-ASM comprise of **73** members, **47** affiliates

http://ysn-asm.org.my/

Science Outreach Programmes
YSN-ASM Science Outreach aims to nurture student's interest in science via interactive learning and attractive experiences as well as to promote science as the chosen future career.

In Brief

Transmission of Scientific Community - Indigenous people (Orang Asli) programme
19- 21 February, SMK Muhibbah, Sg Siput, Perak

Whizz Kids Science Workshop Series I and II – Underprivileged kids programme and Science Talk
7 May & 27 August, Eden Handicap Service Centre, Penang & Rumah Kebajikan Seri Cahaya

Energy Explore Race
11 May, SM Sains Kota Tinggi, Kota Tinggi, Johor

Karnival Creativity & Science 4U, Negeri Sabah
7- 18 May, Dewan Tun Hamdan, Tamparuli Sabah

Karnival Creativity & Science 4U, Negeri Johor
29- 30 July, Kluang Mall, Johor

Kuala Lumpur Engineering Science Fair (KLESF)
4- 6 November, Mines International Convention Center

Penang International Science Fair (PISF)
12- 13 November, SPICE Arena Penang

Research Leadership
Under the Research Leadership Programme, YSN-ASM organises two activities namely the Young Investigator Award and Meet the Expert Session. The programme aims at promoting science excellence among young researchers apart from promoting the network to the scientific community.

The Young Investigator Award is awarded on a competitive basis as recognition to the outstanding work of young scientists. Individuals competing for this award are selected from among those who have presented papers at selected conferences co-organised by YSN-ASM.

In Brief

IEEE 6th International Conference on Photonics, 14-16 March

International Conference on Beneficial Microbes, 31 May-2 June

9th Regional Conference on Chemical Engineer (RCCHe), 21- 22 November

29th Symposium of Malaysian Chemical Engineers, 1- 3 December

Pan-Asian Biomedical Science Conference, 7 – 8 December

Two Meet the Expert Session were held as follows:
41 MSBMB Annual Scientific Meeting, 17 – 18 August

9th Regional Conference on Chemical Engineer (RCCHe), 21- 22 November

Empowering Malaysian Young Scientists
YSN-ASM also focuses on training young scientists in writing articles as a medium to communicate their research, scientific work and knowledge and how it applies to the society. This also allows them to share their scientific research and channel constructive ideas towards shaping the future of Malaysian scientific ecosystem.

factsheet

Science Journalism II Workshop, 17 - 18 April

15 participants

2 articles published in the media

2016 YSN-ASM Colloquium themed Maximise the impact!
16 -18 December

82 participants

New Exco members elected

2017 Calendar outlined

International Meetings
YSN-ASM has positioned itself internationally, participating in various meetings and workshops under the purview of Global Young Academy (GYA).

factsheet

4 international meetings

1 workshop



Responsible Conduct of Research

As science and professional practice develop, questions are raised on the rightness and wrongness (ethical dilemmas) in the way knowledge is generated, validated, disseminated and utilised. Life is difficult for those who choose to be ethical as they may need to do extra work and walk extra mile. Ethical principles are aimed to allay or solve ethical dilemmas, providing guidance to scientists and professionals and protecting the rights and safety of subjects. Bioethics, agroethics, business ethics, ecoethics, technoethics, and roboethics are among the examples of applied ethics.

In Malaysia, issues of ethics and integrity are being addressed by MOHE through the Malaysian Education Blueprint (2015-2025) and also by Science Advisor's Office to the Prime Minister through the Malaysia Code Responsible Conduct of Research (MCRCR).

YSN-ASM champions the RCR initiative in Malaysia to encourage research integrity among scientists as well as ensuring credible and accurate communication of research output to the public. This is important to instil public confidence in Malaysian research. Therefore, awareness workshop is conducted by YSN-ASM in local universities since 2015.

Apart from that, an education module is also being developed by YSN-ASM in collaboration with Akademi Kepimpinan Pendidikan Tinggi (AKEPT) and MOHE through a series of consultative workshop called "RCR Malaysian Educational Institute". The module aims to train certified trainers for RCR through active learning pedagogy.

factsheet

Awareness workshop in Universiti Malaysia Sarawak (UNIMAS)

27 - 28 of April

Workshop topics include Research Misconduct, Authorship & Publication, Collaborative Science, and Dual Use Research of Concern (DURC).

6 facilitators conducted the workshop

19 participants

RCR Education Module development

19 - 23 September

44 participants

Mahathir Science Award Foundation - Championing Tropical Science

The Mahathir Science Award Foundation (MSAF) was established in 2010 to manage and administer the Mahathir Science Award.

The Foundation recognises researchers who have conducted significant research and studies contributing to new knowledge in solving problems in the tropics, with demonstrable evidence of significant socio-economic impact and contribution to policy and governance leading to sustainable improvement to quality of life.

The 2015 MSA was awarded to Dr Rita Colwell under the Tropical Medicine category for her breakthrough achievement in developing the ground-breaking research, innovations and decades of scientific leadership. She also defined our current understanding of ecology of infectious diseases and developing the use of advanced technologies to halt their spread. She is the first woman to receive the award. Dr Colwell holds a BSc in Bacteriology and an MSc in Genetics, from Purdue University, and a PhD in Oceanography from the University of Washington.

Prior to the award presentation ceremony, MSAF organised Laureate Week as a medium for Dr Colwell to share her expertise and knowledge with audience of all level. Dr Colwell inspired many young scientists during the intellectual discourse.

Apart from the Laureate Week, MSAF also organised MSA Lecture Series which focused on discussing pressing issues on science in the tropics.

In Brief

MSA Lecture Series
Post COP21: Translating the Paris Agreement through Strategic Investment in Science and Technology by Emeritus Professor Lord Julian Hunt, a Trustee of the Foundation.
8 March

MSA Laureate Week
Presentation Ceremony of MSA
26 October

Intellectual Discourse
Magnifying the Impact of Science
27 October

Public Lecture
Beyond the Lab: Breaking New Ground
28 October

factsheet

192 nominations received from **30** countries (2005 – 2016)

10 awardees to date, with total prize worth **RM2,000,000**

2016 MSA Winner was announced in March

Prize : **USD100,000.00**, a gold medal and a certificate

Visit of Directors of Moroccan Teachers Training School (Ecole Normale Supérieure) to Malaysia

ASM and the Hassan II Academy of Science and Technology (AHIIST) have been collaborating since 2010 in this inter-academy knowledge exchange programme. Through this programme, science educators and government officials of both countries has the opportunity to learn from each other on teaching methodologies, education systems, curriculum development and STEM awareness programme.

As a continuation of this partnership, ASM received a delegation of officials from Moroccan Teachers Training School (Ecole Normale Supérieure) led by Professor Mohammed Belaïche from AHIIST.

In Brief

Institutions visited:

- Institute of Teacher Education - Technical Education Campus, Negeri Sembilan
- Institute of Teacher Education - Malay Women Teachers Education Campus, Melaka
- Universiti Pendidikan Sultan Idris (UPSI)
- Universiti Sains Islam Malaysia (USIM)
- Pusat Permata Insan
- SK Bandar Baru Bangi
- SM Agama Persekutuan Kajang

The International Science, Technology and Innovation Centre for South-south Cooperation
The International Science, Technology and Innovation Centre for South-South Cooperation under the Auspicious of UNESCO (ISTIC) continues to execute its programmes towards achieving its primary objective which is the capacity building in STI management for developing countries. This involves facilitating the integration of a developmental approach into national STI policies, capacity building in S&T, creating a network of centres of excellence as well as supporting knowledge exchange.

ISTIC organised a number of capacity building programme focused on integrated STI governance system, technopreneurship, developing women leaders in STI, maintenance of infrastructure, STI policy and governance, as well as teaching and learning science through IBSE. These programmes are in line with the Sustainable Development Goals (SDG) 4 and 5.

ISTIC organised a one-day event on "Embracing the Future: Improving Quality of Science Instruction in Schools" at UNESCO Headquarters, Paris, France. This event discussed on, IBSE as an innovative pedagogy that encourages pupil to use their inquiring minds and develop thinking skills. This method involves questioning, making hypothesis, investigating, discovering, seeking solutions and communicating effectively. It was co-officiated by UNESCO Director-General, HE Irina Bokova and Malaysian Minister of Education, YB Dato' Seri Mahdzir Khalid.

ISTIC was able to add its strategic partners through MOU with National Institute of Science Technology and Innovation (NISTI), Seychelles; Centre for Science and Technology of Non-Aligned and Other Developing Countries (NAM S&T Centre), India; and Isfahan Regional Center for Technology Incubators and Science Park Development (IRIS), Iran.

In Brief

SDG 4 – ensure inclusive and quality education for all and promote life-long learning

SDG 5 – achieve gender equality and empower all women and girls

factsheet

ISTIC is a United Nations Educational, Scientific and Cultural Organization (UNESCO) category II Centre. This year, ISTIC collaborated with 23 organisations.

ISTIC implements **8** capacity building programmes benefitting **356** participants from **49** countries.

ISTIC's programmes benefited **34.3%** of G77 member countries, which comprises **46** countries out of total **134** members.



ICSU Regional Office for Asia and the Pacific

It has been another exciting and productive year at the ICSU Regional Office for Asia and the Pacific (ICSU ROAP). Its role in the development of Future Earth continues to flourish with the development of the Sustainability Initiative in the Marginal Seas of South and East Asia (SIMSEA) programme. Among ICSU's achievements are the establishment of the UMS SIMSEA Research Node and organising the SIMSEA Regional Symposium in October in Manila.

This year marks the end of the funding support from ICSU for the programme and the hosting of the SIMSEA Regional Office. Being one of ROAP's main contributions to the growth of Future Earth in Asia, SIMSEA is recognised as a Future Earth activity in the region and will play a bigger role in the development of the Future Earth Oceans Knowledge – Action Networks (OCEANS KAN). Another milestone in the development of Future Earth in Asia is the launch of Future Earth Korea in April. ICSU ROAP was instrumental in the move towards the establishment of Future Earth Korea, having laid the groundwork for its development during the 5th ICSU ROAP Regional Consultation in Asia and the Pacific in November 2013.

The highlight of ICSU ROAP's work in hazards and disasters was the 5th International Workshop on Psychological Intervention after Disasters (PIAD) that was held in Manila in November. This workshop is the 5th in a series of similar workshops dealing with psychological research and practice concerning disasters and how people and communities deal with the effects of disasters on their biopsychosocial well-being. It is organised by ICSU ROAP on behalf of the International Union of Psychological Science (IUPsyS), funded by the international programme of Integrated Research on Disaster Risk of the International Center of Excellence (IRDR ICOE) in Taipei, IUPsyS, and the United Nations University International Institute for Global Health. It is hosted by the Department of Psychology, University of the Philippines, Diliman with additional support from the Psychological Association of the Philippines (PAP), the Center of Applied Development Science (CADS), University of Jena, and the Chinese Psychological Society (CPS).

This year, ICSU ROAP embarks on the development of a new programme on epigenetics. This newly constituted Science Planning Group on Epigenetics met for the first time in Kuala Lumpur in October to develop a science plan on epigenetics and its relations to urban health in Asia and the Pacific. The Plan will review the epigenetic landscape in urban health, document what is known about triggers and epigenetic modifications, identify emerging research areas, including research on genetic products change, biochemical pathways and their relations to diseases in rapidly expanding urban populations.

In governance, ICSU ROAP held two meetings of its Regional Committee for Asia and the Pacific (RCAP), one in Seoul, South Korea and the other in Kota Kinabalu, Sabah. During the meeting in Kota Kinabalu, as part of its programme to interact with scientists in the local area, ICSU ROAP organised a short seminar with Sabah Parks.

This year also marks the end of ICSU ROAP's agreement with the Government of Malaysia in September. The process of contract renewal is currently on-going. Also stepping down at the end of the year is Professor Emeritus Dr Mohd Nordin Hasan FASc the Founding Director of ICSU ROAP, who has served the Office since 2006.The office is looking forward to greater success in the coming years and will continue to fulfil its commitment in strengthening international science for the benefit of the society.



Consortium

National Science Consortium

National Science Consortium champions national concerted effort in STI strategic areas. The consortium aims to be a centralised national research centre which becomes a focal point for inter-institutional and international collaboration.

National Centre for Particle Physics

National Centre for Particle Physics (NCPP) is hosted by UM since 2013. The consortium is overseen by a Joint Steering Committee between ASM and UM. NCPP is currently managing research, transfer of technology and talent development through international collaboration with CERN in Switzerland, Deutsch Elektronen-Synchrotron (DESY) in German, High Energy Accelerator Research Organization (KEK) in Japan and COMET Experiment in Osaka University, Japan. This year, a total of eight students were attached with CERN, Osaka University and KEK.

A major activity under NCPP is the National School for Particle Physics (NSPP). NSPP is a three-day workshop that serves as a training ground for candidates of the CERN Summer Student Programme (CSSP) to prepare themselves with further understanding and deeper knowledge on nuclear and particle physics. The workshop serves as an avenue where CSSP applicants will be evaluated based on their suitability, competence, interest level and commitment. Shortlisted candidates will then go through the selection panel and only one best student will join the CSSP.

In addition, other activities were also conducted such as weekly classes, monthly talks and outreach programme.

factsheet

Personnel at NCPP

2 Professors

4 Visiting Fellows

1 Research Fellow

1 Senior Lecturer

2 Research Officers

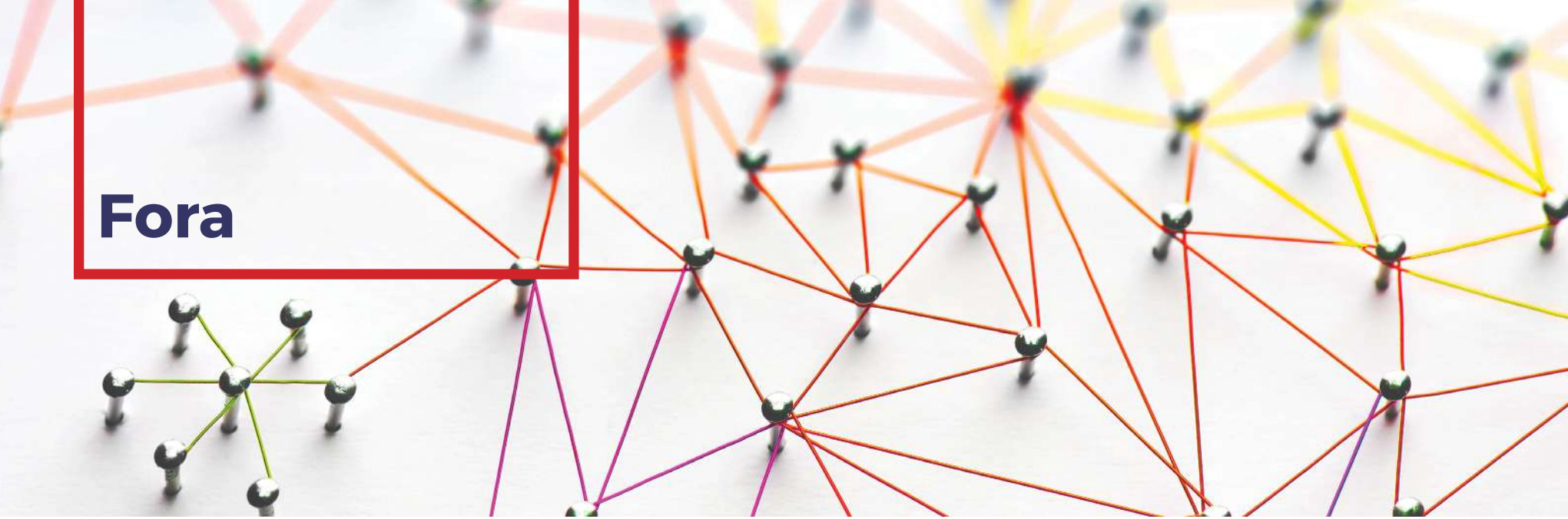
9 PhDs and **11** MScs

Malaysia Institute for Innovative Nanotechnology

NanoMITe, as one of the consortiums initiated by ASM in collaboration with MOHE and UTM, continues to ace high impact nanotechnology research of different domains. This consortium provides a platform for global collaborative research to develop and strengthen the nanotechnology-enabled solution to address issues of poverty, lack of clean water supply, low agricultural efficiency, expensive medical diagnostic & treatment and many more.

Currently, 19 projects are ongoing under the leadership of five project leaders, in the area of Energy; Wellness, Medical and Healthcare; Food and Agriculture; Electronics, Devices and Systems; and Environment. The NanoMITe projects are funded by MOHE and expected to be completed by 2020. Progress of these projects was presented and deliberated at the Annual NanoMITe Symposium.





Fora

International Conference on Science for Peace

Every day we are confronted with the same sad news: violence, crime, war, and disasters. War has been the primary means by which nations have settled disputes throughout history. In the modern warfare, nations worldwide are investing heavily on developing sophisticated and destructive military hardware empowered by STI. It is time for the science community to take a stand to prioritise R&D for peaceful means.

S&T have worked wonders in many fields, but the basic human problems remain. Somehow, this material advancement is not sufficient as we have not yet succeeded in bringing peace and stability to the world. Disarmament, alleviating poverty, fighting diseases and hunger, and countering climate change are examples of what science can do for the world.

However, scientists alone cannot make it happen; economists, social scientists, and humanities need to cooperate as well to realise the impact through the quadruple helix of government, academia, industry and community. Thus, this conference aims to facilitate a much needed discourse among relevant stakeholders on the role of STI in forging global peace.

The International Conference on Science for Peace themed "**More for Peace, Less for War**" is premised upon channelling resources and talent to prioritise STI in nurturing and strengthening global peace. His Royal Highness Sultan Nazrin Muizzuddin Shah, Sultan of Perak officiated the conference and delivered the keynote address which set the tone of the conference. He urged the use of STI for peace and not war in addressing the seven basic human needs for security. One of the solutions he proposed is through socio-economic approaches to address mass unemployment due to advancement in robotics. HRH Sultan Nazrin recommended that STI talents can contribute to the peace agenda through more dialogues and engagement with stakeholders using Science Diplomacy via education, communication and engagement.

The conference focus areas were:

- Mitigating Climate Change Risk
- Addressing Ideology, Geopolitics and Security
- Forging Peace through Economics, Poverty Alleviation and Inclusivity
- Building Awareness and Consensus through Conventions, Policies, Education and Communication

Way Forward in nurturing and strengthening global peace:

- STI can create a bigger impact through collaboration and partnership with good governance and a concerted effort.
- We must make deliberate choices and take purposeful actions to navigate scientific and technological progress towards forging the agenda of peace.
- We must transcend conventional boundaries and adopt a more collaborative and value-oriented approaches to global governance and its challenges. Transformative thinking, integrated planning and synergistic action are required to achieve this.
- We must empower and engage youth in the science for peace agenda in order to shape their skillset and mindset to become active contributors in solving humanity's grand challenges.
- STI talent to contribute to the peace agenda through more dialogues and engagement with stakeholders using Science Diplomacy via education, communication and engagement.

factsheet

5-16 August, Kuala Lumpur

4 panel sessions moderated by **4** moderators

18 panellists

160 participants



Arrival of HRH Sultan Nazrin Muizzudin Shah at the International Conference on Science for Peace received by ASM President and YB Minister STI.



ICT-Bio Asia Workshop

ICT-Bio Asia network is an initiative by French Government established to highlight French and Asian expertise in the chosen themes. It offers a platform to foster multilateral cooperation opportunities between host country and participating countries.

In 2016, ASM and the French Government collaborated to organise the ICT-Bio Asia Workshop. The workshop themes were Biomass and Renewable Energies, Cybersecurity, Green Smart Cities and Health & Wellbeing. Researchers, policy makers and industry captains from both France and Asian region attended the workshop. Participants of the workshop had the opportunity to pitch for collaborative research grants worth €200,000.

ASM and the French Government further established a stronger partnership, particularly in developing high-level scientific network between France and Asia in the fields of Information and Communication Technologies studies and biology-related studies. A letter of intent between ASM and the French Ministry of Foreign Affairs and International Development through the Embassy of France in Malaysia was signed to recognise ASM as a full-fledge partner of ICT-Asia and Bio-Asia programmes.

factsheet

Over **90** proposals received

11 speakers and **14** poster presentations

200 participants from **10** countries

The workshop was one of the flagship programmes of the 2016 French Festival.

The 3rd Series of the Australia-Malaysia Research Seminar

The Australia-Malaysia Research Seminar Series organised by the Australian High Commission brings together researchers and participants in the field of environmental science to share their knowledge and expertise, as well as to discuss climate change issues. The 3rd series for 2016 was a collaborative effort by ASM, UM and the Australian High Commission. The seminar was themed "Climate change and its impact on Ecosystems and Bioresources".

factsheet

3 speakers

100 participants

Bridging Science with Industry

The emerging technology continues to influence and change the global economy. Disruptive technologies are now a major concern of the existing industries and markets. Industries need to apply new knowledge and technology to add value in order to sustain their businesses. This brings to a greater need for smart partnership between the quadruple helix players namely government-industry-research institution-academia.

Addressing this need, ASM organised annual forum aimed to connect and initiate collaborative network among scientific community and industry players. As such, two forums were organised focusing on Green Technology and ICT & Biotechnology industry.

factsheet

Forum on Green Technology
19 May, Universiti Teknikal Malaysia Melaka (UTeM)

20 participants

Forum on ICT/ Biotechnology
17 November, ASM

26 participants





Gatherings

Knowledge generation often comes from gathering of minds to enable learning, networking, content-creation and sharing. ASM hosted various intellectual discourses throughout the year and to date it has been very receptive in achieving our objectives.

9th General Assembly: National STI Masterplan

Based on the findings from ASM's Science Outlook 2015 report, there is a dire need to have a tool to synergise all STI-related policies in order to crystalise the national STI agenda for nation building and economic development. Thus, National Science Council decided to formulate a National STI Masterplan.

The National STI Masterplan will serve as an overarching Strategic Plan for STI in the nation over the long-term beyond 2020. This is to support the implementation of all policies that are related to STI and essential to ensure Malaysia leverages on STI opportunities to achieve sustainable economic growth.

The following topics were deliberated at the 9th General Assembly held on 30 April:

Keynote Address by YB Datuk Seri Panglima Wilfred Madius Tangau
Minister of Science, Technology and Innovation

'Development of STI Talent through a Holistic Approach'
Professor Datuk Dr Asma Ismail FASc
Vice President, ASM

'New Economic Areas and Financial Systems to Support STI Development'
Liew Siew Lee
Director, Manufacturing Industry, S&T Section, EPU

'Synergising STI Policies and Management'
Dato' Dr Mohd Azhar Hj Yahaya
Deputy Secretary General (Policy), MOSTI

'Enhancing Collaboration: Forging the Quadruple Helix of Government – Academia – Industry – Community'
Academician Emeritus Professor Tan Sri Dr Zakri Abdul Hamid FASc
Science Advisor to the Prime Minister of Malaysia

Moderated by Syed Farradino Omar

10th General Assembly: Ethics and Responsible Conduct of Research

Ethics and RCR has been much debated, not only in this country but globally. With growing public support for research, there is an understandable concern about the way it is conducted. ASM is championing RCR and developing guidelines to be implemented by researchers in IHLs and RIs.

The following topics were deliberated at the 10th General Assembly held on 24 September:

Current RCR status in Malaysian Institute of Higher Learning
Associate Professor Dr Norhayati Mohamed
Director, Programme Management Office, MOHE

Malaysian Code of Responsible Conduct of Research (MCRCR)
Senior Profesor Dato' Dr Khalid Yusoff FASc
Chairman, Malaysian Code of Responsible Conduct of Research

Global and Islamic Worldview on Ethics
Professor Dato' Dr Abu Bakar Abdul Majeed
Chairman, the National Bioethics Council Malaysia

RCR Education Module
Dr Chau De Ming
Co-chairman, YSN-ASM RCR Programme

Researcher Perspective on RCR
Professor Dr Raymond Ooi Chong Heng FASc
Department of Physics, UM

IdeaXchange

This is a platform for scientific community especially ASM Members to exchange ideas, discuss interdisciplinary matters and debate on STI topical issues. The following topics were discussed:

In Brief

22nd IdeaXchange: STI Implication on Trans-Pacific Partnership

15 February

- Harjit Kaur, Strategic Negotiations Division, MITI
- Shaharul Sadri Alwi, Director of Accreditation, Department of Standards Malaysia

23rd IdeaXchange: National Internet of Things (IoT) Roadmap

25 July

- Ahmad Helmi Abdul Halim
  Senior Director, Technology & Market Portfolio, MIMOS Berhad





Membership

Governance and Membership

ASM is governed by a Council of 16 Fellows, with 15 members elected at Annual General Meeting while President is appointed by SPB Yang di-Pertuan Agong. Council is responsible to provide leadership and policy direction meets at least five times a year. Executive Committee advices ASM management on day-to-day operation and meets four to five times a year. Finance Committee is responsible to look into management of ASM funds and overall financial performance of ASM meets at least four times a year.

The 21st Annual General Meeting of ASM held on 30 April gathered 104 ASM Fellows. The meeting approved the 2015 Annual Report, the financial statements (ending 31 December 2015) and appointed external auditors for ASM. ASM Council members for the term 2016 – 2018 and new Fellows were also elected. The newly appointed Senior Fellow was also announced during this meeting.

Honorary Fellows
This is a recognition given to an individual who has been instrumental in the nation's STI development. Honorary Fellow is elected from such persons, not being a Fellow, who have made or are making a distinguished contribution to the practice of science, engineering or technology which will benefit or will be able to contribute to the work of ASM.

Senior Fellows
ASM Council appoints Senior Fellows from among Fellows of the Academy. Senior Fellows, who are entitled to be addressed as an Academician, are recognised for their outstanding individual contributions and leadership, both nationally and internationally as well as to the Academy.

Fellows
ASM Fellowship is awarded to individuals of exceptional merit and distinction representing the field of SET. Each year, Fellows of ASM identify highly distinguished Malaysian and nominates them for consideration as a Fellow. Fellowship is awarded based on the stringent selection process in six different disciplines; and membership is for life.

factsheet

Total elected Fellows: **334**

Current number of Fellows: **301**

Senior Fellows: **27**

Male: **82**% (**247**)

Female: **18**% (**54**)

In Brief

25 new Fellows were elected at the 21st AGM, held on 30 April and one Senior Fellow was appointed for the year 2016. They were conferred at the Conferment Ceremony held on 13 December.

2016 Senior Fellow
ASM conferred the Academician Emerita Professor Datuk Dr Mazlan Othman FASc, in recognition of her contributions in pioneering the field of astrophysics as well as the development of space science in Malaysia.

2016 Fellows

Medical and Health Sciences
- Professor Dato' Dr Balwant Singh Gendeh FASc
- Professor Dr Lee Way Seah FASc
- Professor Dr Mary Anne Tan Jin Ai FASc
- Professor Dr Wan Ariffin Abdullah FASc

Engineering and Computer Sciences
- Professor Dr Abdullah Gani FASc
- Professor Dr Borhanuddin Mohd Ali FASc
- Dato' Ir Lim Chow Hock FASc
- Professor Dato' Ir Dr Mahyuddin Ramli FASc
- Professor Dr Mohamed Ibrahim Abdul Mutalib FASc
- Professor Dr –Ing Ir Renuganth Varatharajoo FASc
- Professor Dr Zainab Abu Bakar FASc

Biological, Agricultural and Environmental Sciences
- Professor Dr Ahmad Ismail FASc
- Dr Ahmad Parveez Ghulam Kadir FASc
- Dr Chow Keng See FASc
- Professor Dr Mohd Ali Hassan FASc
- Dr Rajinder Singh Harminder Singh FASc

Mathematics, Physics and Earth Sciences
- Professor Dr Ramesh T. Subramaniam FASc
- Professor Dr Zainuriah Hassan FASc

Chemical Sciences
- Professor Dr Md Pauzi Abdullah FASc
- Professor Dr Mohd Kamal Harun FASc
- Professor Dr Wan Ahmad Kamil Che Mahmood FASc
- Professor Dr Zanariah Abdullah FASc

Science & Technology Development and Industry
- Dr Ahmad Hezri Adnan FASc
- Professor Dato' Dr Aishah Bidin FASc
- Dato' Dr Sharifah Maimunah Syed Zin FASc

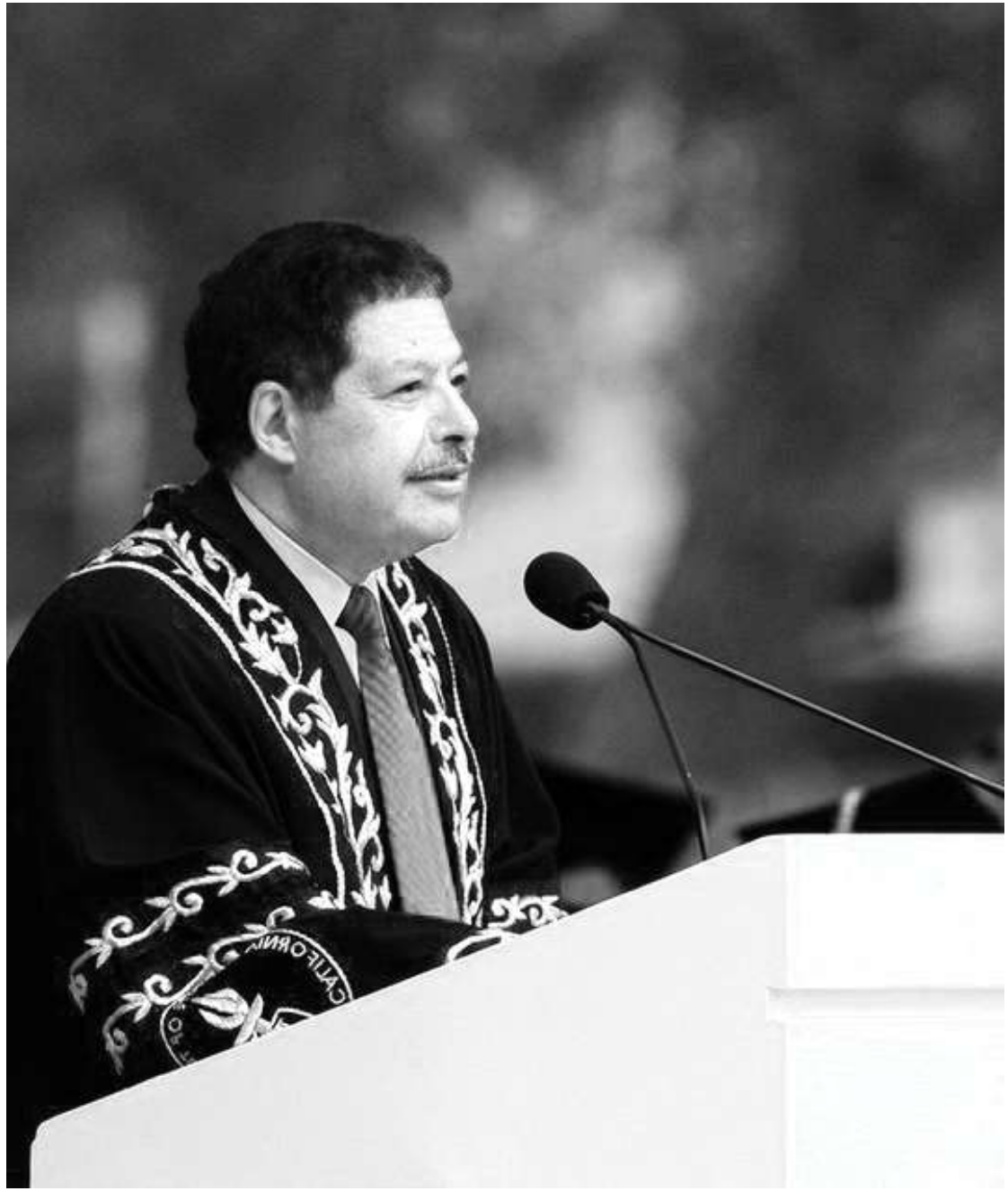
In Brief

The newly elected Fellows are encouraged to deliver Fellows Lecture within their field of expertise to the public and scientific community.

2016 Fellows' Lecture:
- Haemoglobin Disorders in a Multiracial Population: Challenges in Diagnosis by Professor Dr Mary Anne Tan Jin Ai FASc, 11 August, UM
- Mobile Cloud Computing: Leveraging Capability for Value Creation by Professor Dr Abdullah Gani FASc, 26 October, UM
- Heterocycles: From Fluorogenic to Bioactive Compounds by Professor Dr Zanariah Abdullah FASc, 25 November, UM
- Innovative Developments in GaN-BASED Technology by Professor Dr Zainuriah Hassan FASc, 7 December, USM
- Polymer Electrolyte: A New Hope by Professor Dr Ramesh T. Subramaniam FASc, 14 December, UM

Associates
The increasing interdisciplinary nature of knowledge demands expert from various fields, ranging from science to social sciences. Thus, to further enhance the role of ASM as a think tank for the government, ASM extends its membership to include Associates category since 2010. Associates are appointed by ASM Council for a two-year term. Associate contributes their expertise through ASM working committees and programmes. At the end of 2016, the Academy comprised of 29 Associates.

In Memoriam



Dr Ahmed H. Zewail

(26 February 1946 – 2 August 2016)

Dr Ahmed H. Zewail was known as the 'father of femtochemistry'. He was the recipient of the 1999 Nobel Prize in chemistry for his studies of the transition states of chemical reactions using femtosecond spectroscopy. He made observations of atoms in motion on the femtosecond (10–15 second) time scale possible. This led to the establishment of the discipline of 'Femtochemistry' and its related fields.

Ahmed Zewail, an Egyptian-American was born in Damanhur, Egypt. He completed his bachelor and master degrees at Alexandria University, and received a PhD from the University of Pennsylvania. After completing his doctorate in 1974, Dr Zewail worked at the University of California, Berkeley. He was appointed as a Professor at the California Institute of Technology (Caltech) in 1976. He continued to serve Caltech for four decades. He was the Linus Pauling Chair Professor of Chemistry, Professor of Physics, and the Director of the Physical Biology Center for Ultrafast Science and Technology at Caltech.

For his contributions to science and public service, Dr Zewail has garnered honours from around the world. Fifty Honorary Degrees in the sciences, arts, philosophy, law, medicine, and humane letters have been conferred on him. He has been decorated with Orders of State and Merit, and Postage stamps have been issued in commemoration of his contributions to science and humanity. He received numerous international prizes and awards, including the Albert Einstein World Award, Benjamin Franklin Medal, Leonardo da Vinci Award and Wolf Prize. In his name, international prizes have been established in Amsterdam, Cairo, Detroit, Trieste, and Washington (DC). In Cairo, the Ahmed Zewail Foundation provides support for dissemination of knowledge and awards in arts and sciences. In 2011, the Egyptian government established 'Zewail City of Science and Technology' as the national project for scientific renaissance, and Dr Zewail became the founding Chairman of the Board of Trustees.

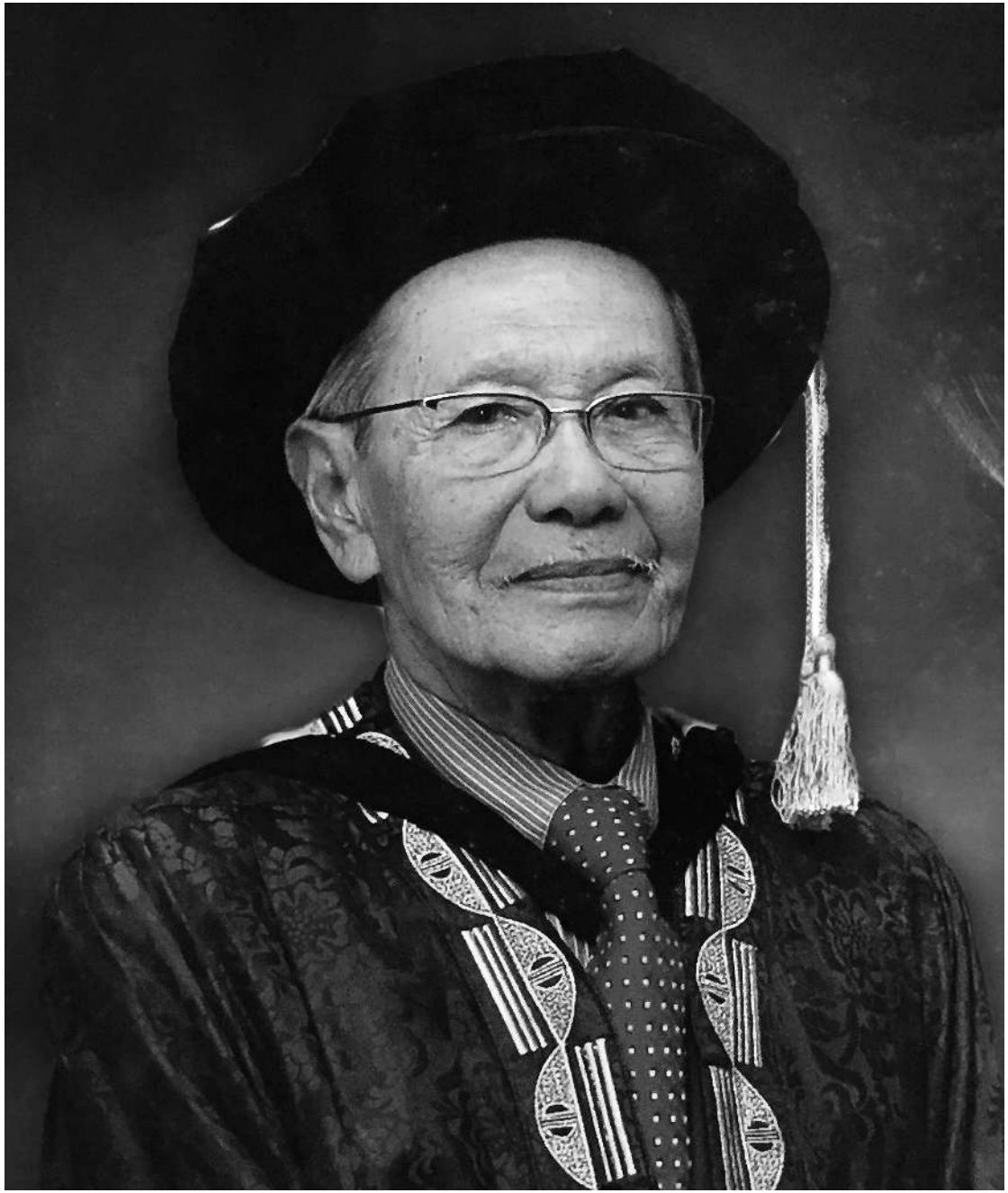
He was among the 'Top American Leaders Award' recipients from The Washington Post and Harvard University. In 2009, President Barack Obama appointed him as a member to the Council of Advisors on Science and Technology. In the same year, he was named the first U.S. Science Envoy to the Middle East. Subsequently, the Secretary General of the United Nations Ban Ki-moon invited Dr Zewail to join the UN Scientific Advisory Board. In Egypt, he served in the Council of Advisors to the President.

Dr Ahmed Zewail has published more than 600 articles and 14 books. He is known for his effective public lectures and writings, not only in science but also in global affairs.

Ahmad Zewail was appointed as ASM Honorary Fellow in 2006. He has been connected with ASM since 2002 when he addressed the Malaysian scientific community at an event organised by ASM. Since then, he has remained close in communication with ASM. He has contributed his thought and view on ASM reports and activities. He has also served as the international panel to review the shortlisted nominees of Mahathir Science Award. ASM was also privileged to translate and publish Ahmed Zewail's book 'Voyage Through Time' into Bahasa Malaysia: 'Pengembaraan Merentasi Masa', adding to the 14 editions and languages in which it is already available.

Dr Zewail's contributions have brought about a revolution in chemistry and adjacent sciences, since it allows us to understand and predict important reactions. He has left a lasting legacy. His absence will be greatly missed and contributions fondly remembered.

In Memoriam



Tan Sri Dato' Ir Abu Zarim Hj Omar FASc

(26 January 1924 – 30 July 2016)

Tan Sri Dato' Ir Haji Abu Zarim Hj Omar FASc dedicated his life towards providing better and quality life to society. He was an exceptional leader. These capabilities were shown in his various capacities in public and private offices.

The 31 August 1957 was the beginning of Malayanisation. In order to materialise the success of Malayanisation, more local engineers and technocrats were needed in this demanding field to replace expatriates in the Lembaga Letrik Negara (LLN) Board. Hence, in 1951, Tan Sri Abu Zarim was among three local Shift Engineers left for training in the British Electrical Authority, United Kingdom to acquire professional qualifications relevant to the LLN's needs.

During his tenure at LLN, which now known as Tenaga Nasional Berhad (TNB), he contributed outstanding service to Malaysia in developing power generation capable of meeting industrialisation needs of the country. He also pioneered in the establishment of Institut Latihan Sultan Ahmad Shah (ILSAS).

Tan Sri Abu Zarim was a Founding Fellow of ASM. He was also one of the earliest members of the Institution of Engineers Malaysia (IEM) and elected as the President of IEM from 1970-1972. He was instrumental in the adoption of the term "Ir" for Ingenieur used in Malaysia. He was a founding member of the Board of Engineers Malaysia (BEM).

In recognition of his outstanding contributions, he was conferred the honorary degrees of Doctor of Technology by Loughborough University of Technology in 1999 and Doctor of Engineering by the Universiti Tenaga Nasional (UNITEN) in 2000. He held an Honorary Fellowship of IEM, Fellowship of the Institution of Electrical Engineers, UK and Fellowship of the Association of Electrical Supply Industries of East Asia and Pacific (AESIEAP).

Tan Sri Abu Zarim sat on the boards of several private limited companies. He was the Chairman of the Malaysian National Committee of the World Energy Conference (WEC) from 1974 to 1984, Vice-Chairman of International Executive Council of WEC from 1980 to 1982 and Permanent Honorary Vice-Chairman of WEC. Tan Sri Abu Zarim has been instrumental in the development and progress of UNITEN where he served as Pro-Chancellor from 2005 to 2015.

Tan Sri Abu Zarim is a role model and inspiration to many successful engineers. His compassion and dedication will be truly missed.

Giving to Science

Endownment Fund
Since its establishment, ASM has been taking the lead in championing flagship programme related to STEM benefiting students, youth and scientists. At ASM, we believe that, for a sustained growth of SET, we must seek the support of funds beyond the government. Contribution from individuals and the corporate sectors are essential to ensure that there is sufficient support for STEM. ASM Council has therefore, decided to launch the ASM Endowment Fund which will encourage Malaysians to start giving to science.

The Fund begins with a call for commitment from among scientists as they know the true value of science and deeply understand the importance of it for the nation's development. Scientists as the ambassadors could drive the message home to the non-scientists and corporate sectors for a greater impact. It is hoped that this act of contributing for the development of STEM will one day become a trend among community.

The Fund's unique set up allows donors to accumulate their contribution over the years and move up the ladder of recognition. ASM Council agrees for donors to be recognised each year with activities carried out under the Fund to be reported.

Programmes under the Fund will be carried out in line with ASM's vision and mission. However, donors can determine the purpose and usage of their donations within the common goals of both parties. To begin with, it was proposed that the Fund supports activities, but not limited to, R&D, awareness and promotion, scholarships, fellowships, awards, and mentor-mentee programme.

Donation Categories

i. **Supporter** – less than RM1,000
ii. **Donor** - RM1,000 to RM9,999
iii. **Benefactor** - RM10,000 to RM 29,999
iv. **Major Donor** :
    Level 1 – RM30,000 to RM49,999
    Level 2 – RM50,000 to RM99,999
    Level 3 – RM100,000 to RM149,999
    Level 4 – RM150,000 to RM199,999
    Level 5 – RM200,000 to RM249,999
    Level 6 – RM250,000 to RM299,999
v. **Patron** :
    Level 1 – RM300,000 to RM399,999
    Level 2 – RM400,000 to RM499,999
vi. **Governor** – RM500,000 to RM999,999
vii. **Trustee** – RM1 million and above
viii. **Named Recognitions** - the programme is named after the donors' name with donation more than RM2 million. Donor will receive a certificate.

All donations given to ASM are tax-exempted.

In Brief

Donors as of 31 December are:

Benefactor
Academician Professor Emerita Datuk Dr Mazlan Othman FASc

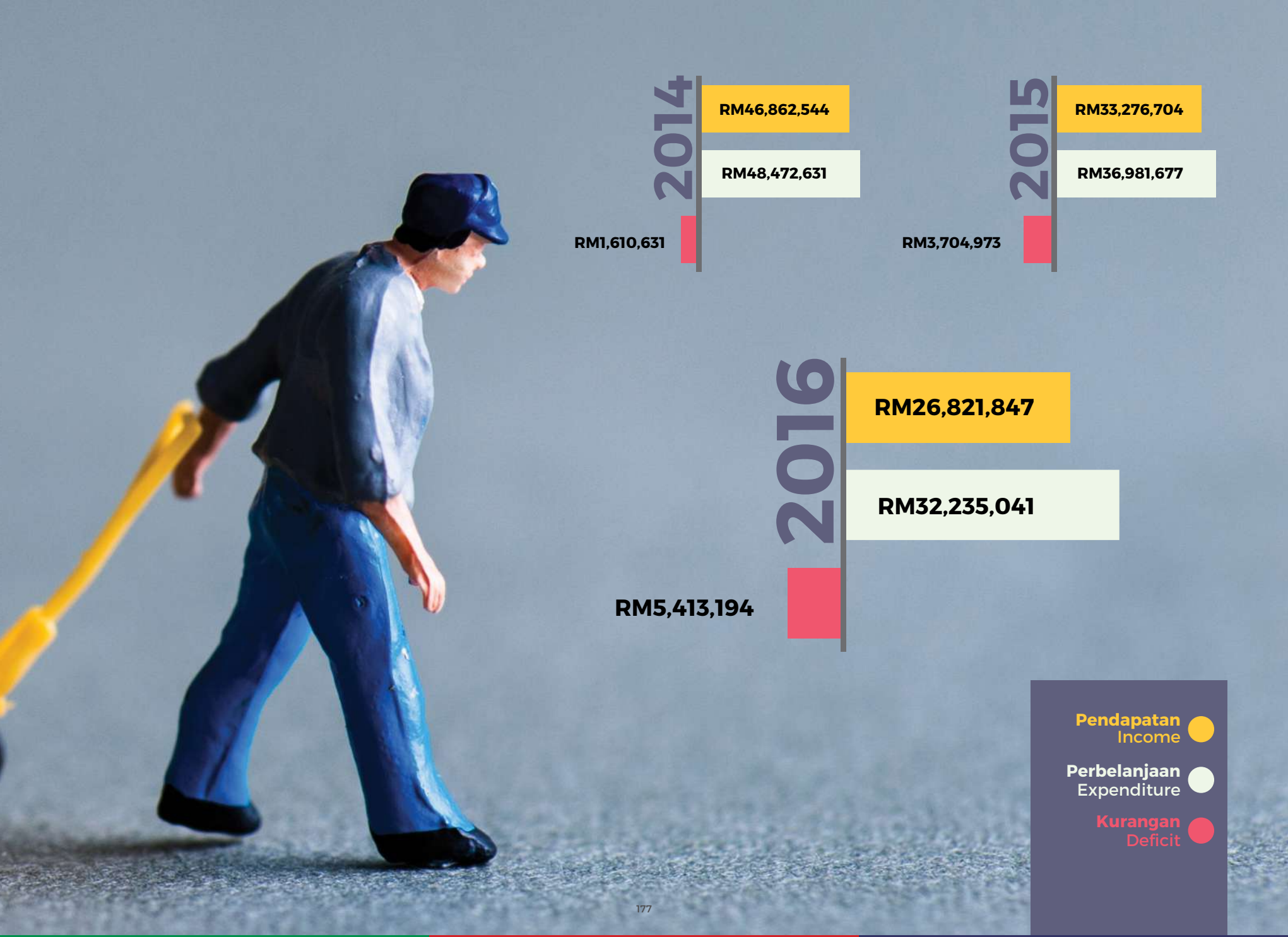
Donor
Dato' Ir Dr Gue See Sew FASc

Supporter
Seetha Ramasamy



FINANCIAL REPORT
LAPORAN KEWANGAN




2014
RM46,862,544
RM48,472,631
RM1,610,631
2015
RM33,276,704
RM36,981,677
RM3,704,973
2016
RM26,821,847
RM32,235,041
RM5,413,194
Pendapatan
Income
Perbelanjaan
Expenditure
Kurangan
Deficit

LAPORAN KETUA AUDIT NEGARA
MENGENAI PENYATA KEWANGAN
AKADEMI SAINS MALAYSIA
BAGI TAHUN BERAKHIR 31 DISEMBER 2016

Laporan Mengenai Penyata Kewangan

Penyata Kewangan Akademi Sains Malaysia telah diaudit oleh wakil saya yang merangkumi Penyata Kedudukan Kewangan pada 31 Disember 2016 dan Penyata Prestasi Kewangan, Penyata Perubahan Dalam Aset Bersih, Penyata Aliran Tunai serta Penyata Perbandingan Bajet Dan Sebenar bagi tahun berakhir pada tarikh tersebut, ringkasan polisi perakaunan yang signifikan dan nota penjelasan lain.

Tanggungjawab Majlis Terhadap Penyata Kewangan

Majlis bertanggungjawab terhadap penyediaan dan persembahan penyata kewangan tersebut yang saksama selaras dengan piawaian pelaporan kewangan yang diluluskan di Malaysia dan Akta Akademi Sains Malaysia 1994 (Akta 524). Majlis juga bertanggungjawab terhadap kawalan dalaman yang ditetapkan perlu oleh pengurusan bagi membolehkan penyediaan penyata kewangan yang bebas daripada salah nyata yang ketara sama ada disebabkan oleh fraud atau kesilapan.

Tanggungjawab Juruaudit

Tanggungjawab saya adalah memberi pendapat terhadap penyata kewangan tersebut berdasarkan pengauditan yang dijalankan. Pengauditan telah dilaksanakan mengikut Akta Audit 1957 dan piawaian pengauditan yang diluluskan di Malaysia. Piawaian tersebut menghendaki saya mematuhi keperluan etika serta merancang dan melaksanakan pengauditan untuk memperoleh jaminan yang munasabah sama ada penyata kewangan tersebut bebas daripada salah nyata yang ketara.

Pengauditan meliputi pelaksanaan prosedur untuk memperoleh bukti audit mengenai amaun dan pendedahan dalam penyata kewangan. Prosedur yang dipilih bergantung kepada pertimbangan juruaudit, termasuk penilaian risiko salah nyata yang ketara pada penyata kewangan sama ada disebabkan oleh fraud atau kesilapan. Dalam membuat penilaian risiko tersebut, juruaudit mempertimbangkan kawalan dalaman yang bersesuaian dengan entiti dalam penyediaan dan persembahan penyata kewangan yang memberi gambaran yang benar dan saksama bagi tujuan merangka prosedur pengauditan yang bersesuaian tetapi bukan untuk menyatakan pendapat mengenai keberkesanan kawalan dalaman entiti tersebut. Pengauditan juga termasuk menilai kesesuaian polisi perakaunan yang diguna pakai dan kemunasabahan anggaran perakaunan yang dibuat oleh pengurusan serta persembahan penyata kewangan secara menyeluruh.

Saya percaya bahawa bukti audit yang saya peroleh adalah mencukupi dan bersesuaian untuk dijadikan asas bagi pendapat audit saya.

Pendapat

Pada pendapat saya, penyata kewangan ini memberikan gambaran yang benar dan saksama mengenai kedudukan kewangan Akademi Sains Malaysia pada 31 Disember 2016 dan prestasi kewangan serta aliran tunainya bagi tahun berakhir pada tarikh tersebut selaras dengan piawaian pelaporan kewangan yang diluluskan di Malaysia.

(ZIRAWATI BINTI HJ. KADIR)
b.p. KETUA AUDIT NEGARA
MALAYSIA

PUTRAJAYA
18 APRIL 2017

Academy of Sciences Malaysia

PENYATA PRESIDEN DAN BENDAHARI KEHORMAT AKADEMI SAINS MALAYSIA

Kami, **PROFESSOR DATUK DR. ASMA BINTI ISMAIL F.A.Sc** dan **PROFESSOR EMERITUS DATO' DR. MOHAMED MAHYUDDIN MOHD DAHAN F.A.Sc,** yang masing-masing merupakan Presiden dan Bendahari Kehormat AKADEMI SAINS MALAYSIA (ASM) dan juga Ahli-Ahli Majlis, dengan ini menyatakan bahawa, pada pendapat Majlis ASM, Penyata Kedudukan Kewangan, Penyata Prestasi Kewangan, Penyata Perubahan Aset Bersih, Penyata Aliran Tunai dan Penyata Perbandingan Bajet dan Sebenar ASM berserta dengan nota-nota didalamnya adalah disediakan mengikut Piawaian Perakaunan Sektor Awam Malaysia bagi memberikan pandangan yang benar dan saksama mengenai kedudukan kewangan ASM pada 31 Disember 2016 dan hasil kedaliannya serta perubahan kedudukan kewangan bagi tempoh yang berakhir pada tarikh tersebut.

Bagi pihak Majlis

PROFESSOR DATUK DR. ASMA BINTI ISMAIL F.A.Sc

Presiden
Akademi Sains Malaysia

Bagi pihak Majlis

PROFESSOR EMERITUS DATO' DR. MOHAMED MAHYUDDIN MOHD DAHAN F.A.Sc
Bendahari Kehormat
Akademi Sains Malaysia

KUALA LUMPUR, MALAYSIA

Tarikh : 06 APR 2017

Menara MATRADE
Tingkat 20, Sayap Barat
Jalan Sultan Haji Ahmad Shah
Off Jalan Tuanku Abdul Halim
50480 Kuala Lumpur

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Academy of Sciences Malaysia

PENGAKUAN OLEH KETUA PEGAWAI EKSEKUTIF KE ATAS PENGURUSAN KEWANGAN AKADEMI SAINS MALAYSIA

Saya, **HAZAMI BINTI HABIB**, No. K/P 660619-08-5516 pegawai utama yang bertanggungjawab ke atas pengurusan kewangan AKADEMI SAINS MALAYSIA (ASM), dengan ikhlasnya mengakui bahawa Penyata Kedudukan Kewangan, Penyata Prestasi Kewangan, Penyata Perubahan Aset Bersih, Penyata Aliran Tunai dan Penyata Perbandingan Bajet dan Sebenar ASM berserta dengan nota-nota didalamnya, mengikut sebaik-baik pengetahuan dan kepercayaan saya, adalah betul, dan saya membuat ikrar ini dengan sebenarnya mempercayai bahawa ianya adalah benar dan atas kehendak-kehendak Akta Akuan Berkanun 1960.

Sebenarnya dan sesungguhnya diakui oleh penama di atas di Kuala Lumpur, Malaysia

HAZAMI BINTI HABIB

Pada : 06 APR 2017

PESURUHJAYA SUMPAH
No: W465
Nama: KAPT (B) JASNI BIN TURON
MALAYSIA

Di hadapan saya,

Lot 1.08, Tingkat 1,
Bangunan KWSP, Jln Raja Laut
50350 Kuala Lumpur.
Tel: 019-6680745

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PENYATA KEDUDUKAN KEWANGAN

	Nota	2016 RM	2015 RM
			Seperti yang dinyatakan semula
ASET			
Aset Semasa			
Tunai dan Kesetaraan tunai	3	81,200,977	88,194,299
Akaun Belum Terima	4	1,148,149	138,881
Aset semasa lain	5	997,498	692,753
Jumlah Aset Semasa		**83,346,624**	**89,025,933**
Aset Bukan Semasa			
Hartanah, Loji dan Peralatan	6	550,242	725,649
Jumlah Aset Bukan Semasa		550,242	725,649
Jumlah Aset		**83,896,866**	**89,751,582**
LIABILITI			
Liabiliti Semasa			
Pemiutang	7	11,187,075	8,625,445
Jumlah Liabiliti Semasa		**11,187,075**	**8,625,445**
Liabiliti Bukan Semasa			
Geran Tertunda	9	71,022,676	74,067,151
Manfaat Pekerja	8	190,311	34,375
Jumlah Liabiliti Bukan Semasa		**71,212,987**	**74,101,526**
Jumlah Liabiliti		**82,400,062**	**82,726,971**
Aset Bersih		**1,496,804**	**7,024,611**
ASET BERSIH/EKUITI			
Kumpulan Wang Pengurusan	10	413,104	5,826,298
Kumpulan Wang Amanah	11	50,000	50,000
Kumpulan Wang Projek	12	977,050	1,090,633
Kumpulan Wang Rezab Modal	13	56,650	57,680
Jumlah aset bersih/ekuiti		**1,496,804**	**7,024,611**

PENYATA PRESTASI KEWANGAN

bagi tahun berakhir 31 Disember 2016

	Nota	2016 RM	2015 RM
			Seperti yang dinyatakan semula
HASIL			
Urus Niaga Bukan Pertukaran	14	25,479,343	31,843,780
Urus Niaga Pertukaran	15	310,199	385,058
Lain-lain Hasil	16	1,032,305	1,047,866
JUMLAH HASIL		**26,821,847**	**33,276,704**
PERBELANJAAN			
Emolumen		713,763	770,558
Perkhidmatan & bekalan		5,482,648	5,150,150
Pemberian dan kenaan bayaran tetap		4,679,439	4,398,043
Manfaat kakitangan / ganjaran		155,936	3,435
Perbelanjaan-perbelanjaan lain		171,403	60,826
Susutnilai hartanah, loji dan peralatan	6	216,504	328,033
Perbelanjaan program sains		20,815,348	26,270,632
JUMLAH PERBELANJAAN		**32,235,041**	**36,981,677**
(KURANGAN) BAGI TAHUN		**(5,413,194)**	**(3,704,973)**

PENYATA ALIRAN TUNAI
bagi tahun berakhir 31 Disember 2016

	2016 RM	2015 RM
		Seperti yang dinyatakan semula
ALIRAN TUNAI DARI AKTIVITI OPERASI		
(Kurangan) Pendapatan Atas Perbelanjaan	(5,413,194)	(3,704,973)
Pelarasan:		
Susutnilai hartanah, loji dan peralatan	222,222	336,162
Faedah dari Deposit Jangka Pendek, Simpanan Tetap & Pelaburan	(310,199)	(385,058)
Pelarasan dari Hartanah dan Peralatan Dihapuskira	(5,718)	154,451
Keuntungan daripada Pelupusan	(4,800)	-
(Kurangan) pendapatan dari operasi sebelum Perubahan modal kerja	**(5,511,689)**	**(3,599,418)**
(Lebihan) Penghutang	(1,314,013)	(135,221)
Lebihan Pemiutang	2,717,566	3,984,445
Tunai bersih digunakan untuk Aktiviti Operasi	**(4,108,136)**	**249,806**
ALIRAN TUNAI DARI AKTIVITI PELABURAN		
Terimaan daripada Pelupusan Hartanah, Loji & Peralatan	5,000	-
Pembelian Hartanah dan Peralatan	(41,297)	(89,123)
Faedah Diterima	310,199	385,058
Tunai bersih dari Aktiviti Pelaburan	**273,902**	**295,935**
ALIRAN TUNAI DARI AKTIVITI PEMBIAYAAN		
Kumpulan Wang Projek	(113,583)	(471,053)
Kumpulan Wang Rezab Modal	(1,030)	(1,030)
Pendapatan Belum Iktiraf	(3,044,475)	(20,551,715)
Tunai bersih (ke) Aktiviti Pembiayaan	(3,159,088)	(21,023,798)
(KURANGAN) BAKI TUNAI DAN KESETARAAN TUNAI	(6,993,322)	(20,478,057)
TUNAI DAN KESETARAAN TUNAI PADA AWAL TAHUN KEWANGAN	88,194,299	108,672,356
TUNAI DAN KESETARAAN TUNAI PADA AKHIR TAHUN KEWANGAN	**81,200,977**	**88,194,299**
TUNAI DAN KESETARAAN TUNAI		
Simpanan Tetap	79,006,012	87,252,574
Wang Tunai dan Baki di Bank	2,194,965	941,725
	81,200,977	**88,194,299**

PENYATA PERUBAHAN DALAM ASET BERSIH

bagi tahun berakhir 31 Disember 2016

	Nota	Kumpulan Wang Pengurusan RM	Kumpulan Wang Amanah RM	Kumpulan Wang Projek RM	Kumpulan Wang Rezab Modal RM	Jumlah RM
Baki pada 01 Januari 2015		9,562,211	50,000	1,561,686	58,710	11,232,607
- Seperti yang dinyatakan Terdahulu						
Pelarasan bagi manfaat pekerja	8	(30,940)	-	-	-	(30,940)
Baki pada 01 Januari 2015		**9,531,271**	**50,000**	**1,561,686**	**58,710**	**11,201,667**
- Seperti yang dinyatakan semula						
Terimaan dalam tahun 2015		-	-	-	-	-
Geran Pembangunan dilunaskan		-	-	-	-	-
Pelunasan pajakan					(1,030)	(1,030)
Kurangan pendapatan atas perbelanjaan		(3,704,973)	-	-	-	(3,704,973)
Perbelanjaan bagi tahun 2015		-	-	(471,053)	-	(471,053)
Baki pada 31 Disember 2015		5,826,298	50,000	1,090,633	57,680	7,024,611
- Seperti yang dinyatakan semula						
Terimaan dalam tahun 2016		-	-	-	-	-
Pelunasan pajakan		-	-	-	(1,030)	(1,030)
Kurangan pendapatan atas perbelanjaan		(5,413,194)	-	-	-	(5,413,194)
Perbelanjaan bagi tahun 2016		-	-	(113,583)	-	(113,583)
Baki pada 31 Disember 2016		**413,104**	**50,000**	**977,050**	**56,650**	**1,496,804**

PENYATA PERBANDINGAN BAJET DAN SEBENAR

bagi tahun berakhir 31 Disember 2016

	Jumlah Bajet		Jumlah Sebenar	Varian Bajet
	Asal	Akhir		
	RM	RM	RM	RM
PENERIMAAN				
Pemberian Kerajaan	8,641,500	7,000,000	7,000,000	-
Pendapatan faedah	450,000	450,000	310,199	(139,801)
Sumbangan luar	8,188,555	8,188,555	9,737,152	1,548,597
Pelbagai penerimaan	886,203	886,203	1,032,305	146,102
	18,166,258	**16,524,758**	**18,079,656**	**1,554,898**
PEMBAYARAN				
Emolumen	927,524	900,086	713,763	(186,323)
Perkhidmatan & bekalan	11,975,079	11,975,079	11,975,079	-
Aset	27,000	41,000	40,750	(250)
Pemberian dan kenaan bayaran tetap	2,978,391	2,466,464	4,670,921	2,204,457
Manfaat kakitangan / ganjaran	-	-	155,935	155,935
Perbelanjaan-perbelanjaan lain	538,100	285,600	262,425	(23,175)
	16,446,094	**15,668,229**	**17,818,873**	**2,150,644**
PENERIMAAN / (PEMBAYARAN) BERSIH	**1,720,164**	**856,529**	**260,783**	**(595,746)**

NOTA KEPADA PENYATA KEWANGAN
bagi tahun berakhir 31 Disember 2016

1 a) Aktiviti Utama

Akademi Sains Malaysia (ASM) telah ditubuhkan di bawah Akta 524. Objektif utama ASM adalah untuk mencapai, menggalak dan meningkatkan kecemerlangan dalam bidang sains, kejuruteraan dan teknologi khusus untuk kemajuan dan pembangunan negara serta untuk kebaikan manusia sejagat.

b) Pembentangan Penyata Kewangan

Penyata kewangan Akademi bagi tahun kewangan berakhir 31 Disember 2016 diluluskan oleh Majlis Akademi pada 6 April 2017.

2 Dasar-dasar Perakaunan

a) Asas Perakaunan

Penyata Kewangan ASM telah disediakan mengikut kelaziman kos sejarah dan mengikut Piawaian Perakaunan Sektor Awam Malaysia (MPSAS).

Penyata Kewangan ASM ini adalah merupakan penyata kewangan pertama yang disediakan mengunakan MPSAS. Oleh itu tarikh peralihan ASM adalah pada 1 Januari 2015. Sebelum ini penyata kewangan ASM telah disediakan mengunakan Piawaian Pelaporan Entiti Persendirian (PERS). ASM telah mengunapakai MPSAS ini lebih awal dari tarikh kuatkuasanya seperti yang dinyatakan pada Nota 2(h) kepada Penyata Kewangan. Peralihan kepada MPSAS tidak memberi kesan yang signifikan keatas penyata kewangan ASM bagi tahun berakhir 31 Disember 2016.

b) Pengiktirafan Hasil

Hasil daripada Urus Niaga Bukan Pertukaran

Urus niaga bukan pertukaran akan diiktiraf sebagai aset apabila terdapat manfaat ekonomi masa depan atau potensi perkhidmatan dijangka mengalir ke dalam entiti, ianya berpunca daripada peristiwa lampau serta nilai saksama aset dapat diukur dengan munasabah. Urusniaga bukan pertukaran yang diiktiraf sebagai aset hendaklah diiktiraf sebagai hasil, kecuali setakat liabiliti yang juga diiktiraf berkenaan dengan aliran masuk yang sama sebagai tertunda di dalam penyata kedudukan kewangan. Apabila obligasi terhadap sesuatu liabiliti telah dipenuhi, entiti hendaklah mengurangkan amaun bawaan liabiliti yang diiktiraf itu dan mengiktiraf amaun hasil yang sama dengan pengurangan itu.

i. Geran kerajaan yang tidak dikenakan dengan syarat-syarat prestasi masa depan yang tertentu seperti geran mengurus diambilkira sebagai hasil di dalam penyata prestasi kewangan.

ii. Peruntukan yang diterima bagi program/projek yang merangkumi tempoh kurang daripada setahun diiktiraf sebagai hasil dalam tahun berkenaan. Bagi penerimaan untuk mengendalikan program/projek yang melebihi satu tahun, terimaan akan dimasukkan ke dalam Kumpulan Wang Projek berkenaan dan lebihan penerimaan atas perbelanjaan akan diiktiraf sebagai pendapatan bagi tahun penutupan program/projek apabila habis tempoh atau hayat program/projek tersebut. Sebaliknya jika terdapat lebihan perbelanjaan atas penerimaan ianya akan diiktiraf sebagai perbelanjaan ASM.

iii. Pendapatan belum diiktiraf adalah lebihan pendapatan/peruntukan yang diterima dari perbelanjaan yang dibuat pada tahun semasa di bawa ke hadapan bagi menanggung perbelanjaan bagi tahun berikutnya (program/projek yang meliputi tempoh masa melebihi satu tempoh perakaunan).

Hasil daripada Urus Niaga Pertukaran

Hasil daripada urus niaga pertukaran yang diiktiraf apabila terdapat kemungkinan bahawa manfaat ekonomi masa hadapan atau potensi perkhidmatan akan mengalir kepada entiti dan manfaat ini boleh diukur dengan pasti.

i) Pendapatan Faedah Dan Pendapatan Dari Pelaburan

Hasil keuntungan daripada simpanan tetap diiktiraf atas dasar perkadaran masa yang mengambil kira kadar pulangan hasil efektif atas aset tersebut. Kadar pulangan hasil efektif ke atas aset ialah kadar keuntungan yang diperlukan untuk mendiskaunkan jangkaan aliran penerimaan tunai masa hadapan sepanjang hayat aset tersebut untuk disamakan dengan amaun bawaan awal aset tersebut.

Pendapatan faedah dari simpanan dan deposit konvensional serta pendapatan dari pelaburan diiktiraf mengikut asas akruan.

Lain-lain Hasil

i. Hasil sewaan diiktiraf apabila hasil itu diperoleh mengikut syarat perjanjian penyewaan.
ii. Lain-lain hasil diiktiraf apabila sesuatu perkhidmatan itu telah diberikan.

c) Hartanah, Loji dan Peralatan

Hartanah, loji dan peralatan dinyatakan pada kos setelah ditolak susut nilai terkumpul.

Susut nilai bagi hartanah dan peralatan dikira berasaskan kaedah garis lurus di atas kos di sepanjang tempoh hayat kegunaan aset tersebut pada kadar yang berikut:-

Tanah (milik pajakan)	Mengikut tempoh pajakan
Pengubahsuaian Pejabat	10%
Kenderaan	20%
Peralatan dan kelengkapan pejabat	20%
Komputer	20%

Tanah milik pajakan bernilai RM 61,800.00 diperolehi pada 21 Jun 2012 dengan tempoh pajakan selama 60 tahun dan bayaran sebanyak RM 1,030.00 setahun dan perlu dibayar sebelum 7hb Januari setiap tahun.

Hartanah, loji dan peralatan didefinasikan sebagai barang-barang tak luak yang bernilai RM1,000.00 atau lebih setiap unit.

Susut nilai penuh dikenakan dalam tahun pembelian bagi hartanah dan peralatan. Baki bersih setiap hartanah dan peralatan hendaklah tidak kurang daripada RM1.00.

d) Penjejasan Nilai Hartanah dan Peralatan

Nilai buku bersih hartanah dan peralatan ASM telah dianalisis pada tarikh imbangan disediakan untuk menentukan sama ada terdapat tanda-tanda berlakunya penjejasan nilai hartanah dan peralatan. Sekiranya wujud tanda-tanda kerosakan nilai hartanah dan peralatan yang boleh diperoleh semula didapati kurang daripada nilai buku bersih, maka nilai buku bersih hartanah dan peralatan tersebut akan diturunkan nilainya kepada nilai jumlah hartanah dan peralatan yang boleh diperoleh semula.

Amaun tersebut (yang dikenali sebagai penjejasan nilai hartanah dan peralatan) akan dicatatkan sebagai perbelanjaan dan direkodkan di dalam penyata pendapatan dan perbelanjaan tahun berkenaan.

e) Instrumen Kewangan

Instrumen kewangan dinyatakan dalam lembaran imbangan termasuk simpanan tetap, baki tunai dan bank, belum terima dan belum bayar. Kaedah pengiktirafan instrumen kewangan yang diterima pakai telah didedahkan dalam polisi perakaunan penyata kewangan secara berasingan.

i) Penghutang

Penghutang dinyatakan pada nilai yang dijangka boleh direalisasi. Hutang lapuk dilupuskan apabila ia dikenal pasti. Hutang ragu diperuntukkan bagi hutang yang tidak terbayar melebihi tempoh tiga tahun.

ii) Pemiutang

Pemiutang dinyatakan pada kos iaitu nilai saksama bayaran dan perkhidmatan yang telah diterima.

iii) Objektif Dan Polisi Pengurusan Risiko Kewangan

Polisi pengurusan risiko kewangan ASM adalah untuk memastikan sumber-sumber kewangan yang mencukupi bagi pembangunan operasi ASM sementara menguruskan risiko-risiko kewangannya, termasuk risiko kredit, risiko kadar faedah, risiko pinjaman tidak berbayar, risiko kecairan dan aliran tunai.

iv) Risiko Kredit

Risiko kredit ASM adalah daripada akaun-akaun belum terima. Akaun-akaun ini dipantau dari semasa ke semasa melalui prosedur dalaman yang sedia ada dan tindakan akan diambil terhadap hutang-hutang tertunggak.

v) Risiko Kadar Faedah

ASM menyelenggarakan satu had tunai dan simpanan tetap untuk memenuhi keperluan modal kerja. Risiko ini wujud akibat kadar turun naik kadar faedah di pasaran.

vi) Risiko Kecairan dan Aliran Tunai

ASM menguruskan dengan teliti urusan keluar masuk tunai dan juga urusan pengutipan semula hutang-hutang pelanggan yang mencapai tempoh matang bagi menjaga kecairan dan aliran tunainya.

f) Tunai dan Kesetaraan Tunai

Tunai dan kesetaraan tunai merangkumi tunai di tangan, baki di bank dan simpanan tetap.

g) Maklumat Bajet

Bajet tahunan disediakan pada asas tunai. Memandangkan penyata kewangan disediakan menggunakan asas akruan, maka satu Penyata Perbandingan Bajet dan Sebenar didedahkan secara berasingan. Penyata ini telah disediakan menggunakan asas penyediaan bajet tahunan dan hanya merujuk kepada bajet mengurus sahaja.

Jumlah bajet hanya dibentangkan bagi pihak ASM sahaja. Jumlah bajet ini telah diluluskan oleh Majlis ASM.

h) Pemakaian Awal MPSAS

ASM telah menggunapakai lebih awal MPSAS yang berkenaan seperti di bawah daripada tarikh kuatkuasa sebenar.

		Tarikh kuatkuasa
MPSAS 1 -	Pembentangan Penyata Kewangan	1 Januari 2017
MPSAS 2 -	Penyata Aliran Tunai	1 Januari 2017
MPSAS 3 -	Dasar Perakaunan, Perubahan dalam Anggaran Perakaunan dan Kesilapan	1 Januari 2017
MPSAS 17 -	Hartanah, Loji dan Peralatan	1 Januari 2017
MPSAS 19 -	*Provisions, Contingent Liabilities and Contingent Assets*	1 Januari 2017
MPSAS 20 -	Pendedahan Pihak Berkaitan	1 Januari 2017
MPSAS 24 -	*Presentation of Budget Information in Financial Statements*	1 Januari 2017
MPSAS 25 -	Manfaat Pekerja	1 Januari 2017
MPSAS 30 -	*Financial Instruments: Disclosure*	1 Januari 2017
MPSAS 33 -	*First-time Adoption of Accrual Basis MPSAS*	1 Januari 2017

3 Tunai dan Kesetaraan Tunai

	2016 RM	2015 RM
ASM		
Simpanan Tetap	7,179,315	10,254,254
Deposit Jangka Pendek	504,544	-
Wang Tunai dan Baki di Bank	1,940,080	577,508
	9,623,939	**10,831,762**
Research, Development & Commercialisation Fund (R,D &C)		
Simpanan Tetap	71,322,153	76,998,320
Wang Tunai dan Baki di Bank	254,885	364,217
	81,200,977	**88,194,299**

4 Akaun Belum Terima

	2016 RM	2015 RM
Akaun Belum Terima	1,148,149	138,881
	1,148,149	**138,881**

5 Aset Semasa Lain

	2016 RM	2015 RM
Pendahuluan	9	10,015
Penghutang	1,042,922	747,244
Tolak: Peruntukan Hutang Ragu	(45,433.00)	(64,506.00)
	997,498	**692,753**

6 HARTANAH, LOJI DAN PERALATAN

	Pengubahsuaian Pejabat	Kenderaan	Peralatan Dan Kelengkapan Pejabat	Komputer	Tanah Pajakan	2016	2015
	RM	RM	RM	RM	RM	RM	RM
KOS							
Pada 1 Januari 2016	3,727,414	477,148	1,045,309	440,002	61,800	5,751,673	5,825,130
Tambahan	5,500		15,750	20,047		41,297	89,123
Pelupusan/Pengkelasan			(172,600)			(172,600)	(162,580)
Pada 31 Disember 2016	**3,732,914**	**477,148**	**888,459**	**460,049**	**61,800**	**5,620,370**	**5,751,673**
SUSUTNILAI TERKUMPUL							
Pada 1 Januari 2016	3,586,092	375,524	765,091	295,195	4,122	5,026,024	4,697,991
Tambahan	24,068	32,854	106,104	58,164	1,032	222,222	336,162
Pelupusan/Pengkelasan			(172,400)	(5,718)		(178,118)	(8,129)
Pada 31 Disember 2016	**3,610,160**	**408,378**	**698,795**	**347,641**	**5,154**	**5,070,128**	**5,026,024**
NILAI BUKU							
Pada 31 Disember 2016	**122,754**	**68,770**	**189,664**	**112,408**	**56,646**	**550,242**	**-**
Pada 31 Disember 2015	**141,322**	**101,624**	**280,218**	**144,807**	**57,678**	**-**	**725,649**
Susutnilai pada tahun berakhir 31 Disember 2015	**99,844**	**33,078**	**140,600**	**53,479**	**1,032**	**-**	**328,033**

7 Pemiutang

	2016 RM	2015 RM
Pemiutang Am	1,452,654	1,905,762
Cek belum ditunaikan	-	40,916
Peruntukan Yuran Audit	7,467	7,467
	1,460,121	1,954,145
Faedah R,D & C	9,726,954	6,671,300
	11,187,075	**8,625,445**

Faedah Research, Development & Commercialization Fund (R,D & C) adalah faedah yang dijana dari peruntukan R,D & C yang disimpan di dalam simpanan tetap yang manaianya perlu dibayar kepada kerajaan.

8 Manfaat Pekerja

	2016 RM	2015 RM Seperti Dinyatakan Semula
Liabiliti bukan semasa	190,311	34,375

Peruntukan manfaat pekerja telah dibuat peruntukan sebanyak RM190,311.00 pada tahun-tahun

	RM
Tahun 2014 dan tahun sebelumnya	30,940
Tahun 2015	3,435
Tahun 2016	155,936
	190,311

9 Geran Tertunda

Program dalam pelaksanaan adalah seperti berikut:-

	2016 RM	2015 RM
Pameran Islam	1,455,000	1,455,000
Brain Gain	1,540,814	1,540,814
Rare Earth	207,707	208,668
Asean Journal	31,784	68,301
MOSTI Social Innovation (MSI) - Duta Sains	2,746	48,445
MOSTI Social Innovation (MSI) - Puspanita	-	46,374
MOSTI Commercialisation Conference Exhibation (MCCE)	2,000	2,000
Project Monitoring Team R,D & C	199,676	145,721
Biologi Betik	-	90,000
DSTIN Flagship	1,020,000	-
Bibliometrik	48,000	-
Newton Ungku Omar Fund (NUOF)	4,893,387	-
	9,401,114	3,605,323
Research, Development & Commercialisation Fund (R,D &C)	61,621,562	70,461,828
	71,022,676	**74,067,151**

Pendapatan belum diiktiraf adalah peruntukan bagi 'special program' yang dipertanggungjawabkan kepada ASM oleh MOSTI yang meliputi tempoh masa melebihi satu tempoh perakaunan.

10 Kumpulan Wang Pengurusan

Kumpulan Wang Pengurusan adalah seperti berikut:-

	2016 RM	2015 RM Seperti Dinyatakan Semula
Baki pada 1 Januari	5,826,298	9,531,271
(Kurangan) / Lebihan pendapatan atas perbelanjaan	(5,413,194.00)	(3,704,973.00)
Baki pada 31 Disember	**413,104**	**5,826,298**

11 Kumpulan Wang Amanah

Kumpulan Wang Amanah adalah seperti berikut:-

	2016 RM	2015 RM
Baki pada 1 Januari	50,000	50,000
Penerimaan tahun semasa	-	-
Perbelanjaan tahun semasa	-	-
Baki pada 31 Disember	**50,000**	**50,000**

Kumpulan Wang ini diwujudkan bagi sumbangan yang diterima daripada Felo bagi menjalankan aktiviti ASM.

12 Kumpulan Wang Projek

Kumpulan Wang Projek adalah seperti berikut:-

	2016 RM	2015 RM
Baki pada 1 Januari	1,090,633	1,561,686
Perbelanjaan tahun semasa	(113,583.00)	(471,053.00)
Baki pada 31 Disember	**977,050**	**1,090,633**

Projek yang termasuk dalam Kumpulan Wang Projek adalah Projek-projek Rancangan Malaysia Ke Sepuluh (RMK-10), Ke Sembilan (RMK-9) dan Projek Rancangan Malaysia Ke Lapan (RMK-8) – SAGA.

	2016 RM	2015 RM
Program Penyelidikan Antartika Kebangsaan dan Program Antarabangsa	1,016	1,016
Ekspedisi Saintifik	96,898	103,423
Program Nobel Laureate Kebangsaan dan Scientific Advancement Grant Allocation	561	698
Penerbitan Saintifik	1,248	1,248
Program Pendidikan Sains & Kuiz Sains	737,115	771,570
Program Latihan Pengurusan S&T	127,146	199,612
Mega Science Framework II	13,066	13,066
Baki pada 31 Disember	**977,050**	**1,090,633**

13 Kumpulan Wang Rezab Modal

Kumpulan Wang Rezab Modal adalah seperti berikut:-

	2016	2015
	RM	RM
Baki pada 1 Januari	57,680	58,710
Pajakan Tanah	-	-
	57,680.00	**58,710.00**
Tolak:		
Pelunasan Pajakan	1,030.00	1,030.00
Baki pada 31 Disember	**56,650.00**	**57,680.00**

Kumpulan Wang Rezab Modal ini mewakili kos tanah milik pajakan yang diperolehi pada 21 Jun 2012 dengan tempoh pajakan selama 60 tahun. Pelunasan pajakan dibuat setiap tahun pada kadar RM1,030.00.

14 Urus Niaga Bukan Pertukaran

	2016	2015
	RM	RM
Geran Mengurus	7,000,000	8,317,900
Geran Program	18,479,343	23,525,880
	25,479,343	**31,843,780**

15 Urus Niaga Pertukaran

	2016	2015
	RM	RM
Faedah Akaun Semasa	9,779	11,030
Faedah Simpanan Tetap	300,420	374,028
	310,199	**385,058**

16 Lain-lain Hasil

	2016	2015
	RM	RM
Pelbagai Penerimaan	257,235	473,996
Yuran Latihan & Seminar	182,960	296,020
Caj Pengurusan Program	532,110	277,850
Sewaan	60,000	-
	1,032,305	**1,047,866**

17 Percukaian

ASM dikecualikan daripada cukai pendapatan di bawah Seksyen 44 (6) Akta Cukai Pendapatan 1967, selaras dengan surat pengecualian cukai bertarikh 2 Mac 1996 yang bernombor rujukan JHDN. 01/35/42/51/179-6.4357 yang diperolehi daripada Ketua Pengarah Hasil Dalam Negeri.

18 Cukai Barangan dan Perkhidmatan (GST)

Pelaksanaan Cukai Barang dan Perkhidmatan berkuatkuasa pada 1 April 2015. ASM telah mendaftar dengan Jabatan Kastam Di Raja Malaysia pada 29 Disember 2014 dengan nombor rujukan 001836703744.

19 Manfaat Kakitangan ASM

a. Manfaat Pekerja Jangka Pendek

ASM sebagai sebuah badan berkanun persekutuan tertakluk kepada peraturan-peraturan perjawatan yang ditetapkan oleh Jabatan Perkhidmatan Awam (JPA). Manfaat pekerja jangka pendek yang digariskan oleh JPA adalah gaji pokok, elaun-elaun tetap, elaun-elaun berubah, pelbagai cuti termasuk cuti tahunan dan kemudahan perubatan serta insuran.

Upah, gaji, elaun dan sumbangan berkanun diiktiraf sebagai perbelanjaan pada tahun di mana perkhidmatan yang diberikan oleh kakitangan ASM.

b. Pelan Caruman Wajib

ASM mencarum kepada Kumpulan Wang Simpanan Pekerja dan Kumpulan Wang Pencen Kerajaan bagi kakitangannya mengikut skim yang dipilih mereka. Caruman tersebut diiktiraf sebagai perbelanjaan dalam penyata pendapatan apabila ia berlaku. Pihak ASM membayar caruman pada kadar 17.5% bagi skim pencen, 11% bagi caruman Kumpulan Wang Simpanan Pekerja (KWSP) dan 4% bagi caruman Kumpulan Wang Simpanan Pekerja (KWSP) untuk kakitangan yang berumur 60 tahun ke atas secara bulanan.

Caruman tersebut diambil kira sebagai perbelanjaan di dalam Penyata Pretasi Kewangan apabila caruman tersebut dilakukan.

c. Manfaat Jangka Panjang

Kakitangan Tetap

Bagi kakitangan tetap ASM sama ada memilih skim berpencen mahupun KWSP akan mendapat ganjaran gantian cuti rehat (GCR) apabila tiba umur persaraan mereka. Ganjaran ini berdasarkan Pekeliling Perkhidmatan yang dikeluarkan oleh Jabatan Perkhidmatan Awam dan digunapakai oleh ASM.

Ganjaran gantian cuti rehat adalah dikira berdasarkan formula berikut:

1/30 X Bilangan hari cuti rehat yang hingga maksimum sebanyak 150 X gaji + imbuhan tetap yang akhir diterima

(tertakluk kepada had maksimum 150 hari).

Kakitangan Kontrak

Pihak ASM juga memberikan ganjaran kepada kakitangan kontrak.Ganjaran akan dibayar setelah kakitangan menyempurnakan perkhidmatan kontrak dengan memuaskan. Ganjaran yang akan Gaji (tidak termasuk elaun) X bulan perkhidmatan/12

Had maksimum ganjaran gantian cuti rehat bagi kakitangan kontrak adalah 6 hari.

Selain itu, pihak ASM akan menggunapakai pekeliling-pekeliling berkaitan dengan manfaat atau ganjaran kepada kakitangan yang diluluskan oleh pihak Majlis ASM termasuk pekeliling-pekeliling perkhidmatan Awam yang berkaitan dari semasa ke semasa.

20 Maklumat Kakitangan

Jumlah kakitangan ASM pada 31 Disember 2016 adalah seramai 70 orang (31.12.2015: 67 orang).

21 Pendedahan Pihak Berkaitan

	2016 RM	2015 RM
Ahli Majlis ASM		
Jumlah Elaun Ahli Majlis	40,000	28,750
Lain-lain Kakitangan Pengurusan Utama		
Manfaat Jangka Pendek	201,523	179,493

Ahli Majlis adalah termasuk Pengerusi dan lain-lain Ahli Majlis. Termasuk dalam lain-lain kakitangan pengurusan utama adalah Ketua Pegawai Eksekutif yang mempunyai kuasa dan tanggungjawab untuk merancang, mengarah dan mengawal aktiviti-aktiviti ASM sama ada secara langsung atau tidak langsung.

21 Angka Perbandingan

Sepanjang tahun kewangan, ASM mengelaskan semula angka perbandingan berikut untuk mematuhi pembentangan tahun kewangan semasa:

	Seperti Dinyatakan Sebelum Ini	Seperti Dinyatakan Semula
	2016 RM	**2015** RM
Penyata Kedudukan Kewangan		
LIABILITI BUKAN SEMASA		
Manfaat Pekerja	-	34,375
ASET BERSIH/EKUITI		
Kumpulan Wang Pengurusan	5,860,673	5,826,298
Penyata Prestasi Kewangan		
PERBELANJAAN		
Manfaat kakitangan/ganjaran	-	3,435


Maklumat
Lanjut


Tell Me More

Ahli Majlis
Council Members (2016 - 2017)

2016-2017



Tan Sri Datuk Ir
Dr Ahmad Tajuddin Ali FASc
President
2010 – 2016
Mathematics, Physics and Earth Sciences



YM Tengku Datuk
Dr Mohd Azzman Shariffadeen FASc
Vice-President
2016 – 2018
Engineering and Computer Sciences



Academician Tan Sri Dato' Ir
Dr Hj Ahmad Zaidee Laidin FASc
Secretary General
2015 – 2017
Engineering and Computer Sciences



Emeritus Professor Dato'
Dr Mohamed Mahyuddin Mohd Dahan FASc
Honorary Treasurer
2015 – 2017
Biological, Agricultural and Environmental Sciences

Ahli Majlis
Council Members (2016 - 2017)



Professor Dato' Ir
Dr A. Bakar Jaafar FASc
2016 - 2018
Engineering and
Computer Sciences



Professor Ir Dr Ahmad Faizal
Mohd Zain FASc
2016 - 2018
Engineering and
Computer Sciences



Professor Datin Paduka
Dr Aini Ideris FASc
2015 - 2017
Biological, Agricultural and
Environmental Sciences



Professor Dr Awg Bulgiba
Awg Mahmud FASc
2016 - 2018
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Ir Choo Kok Beng FASc
2016 - 2017
Science & Technology Development
and Industry



Academician Professor Dato'
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Medical and Health Sciences



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Dr Khalid Yusoff FASc
2015 – 2017
Medical and Health Sciences



Professor Datin Paduka
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Biological, Agricultural and
Environmental Sciences



Academician Distinguished
Professor Datuk
Dr Looi Lai Meng FASc
2015 – 2017
Medical and Health Sciences



Academician Emerita
Professor Datuk
Dr Mazlan Othman FASc
2015 – 2017
Science & Technology Development
and Industry



Professor Dato'
Dr Rahmah Mohamed FASc
2016 - 2018
Biological, Agricultural and
Environmental Sciences



Professor Datuk
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2015 – 2017
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ASM Northern Region Chapter
Professor Dr Abdul Rahman Mohamed FASc

ASM Southern Region Chapter
Professor Dr Ahmad Fauzi Ismail FASc

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Task Force on Cybersecurity
Dr Mohamed Awang Lah FASc

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Task Force on Sustainable Mining
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Academician Datuk Fateh Chand FASc
(Pengerusi Bersama/ Co-chair)

Mega Science 3.0
Academician Emerita Professor Datuk Dr Mazlan Othman FASc
(Pengarah Projek / Project Director)

Envisioning Malaysia 2050 Foresight Initiative
YM Tengku Datuk Dr Mohd Azzman Shariffadeen FASc &
Academician Professor Emerita Datuk Dr Mazlan Othman FASc
(Pengerusi Bersama/ Co-chair)

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ASM PROGRAMME COMMITTEES

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Science Awards Steering Committee
Academician Tan Sri Dato' Ir Ahmad Zaidee Laidin FASc

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Flagship Project Monitoring Team
Emeritus Professor Dato' Dr Md Ikram Mohd Said FASc

Jawatankuasa Sektor Biodiversiti
Sectoral Committee on Biodiversity
Academician Professor Emeritus Dr Yong Hoi Sen FASc

Jawatankuasa Sektor Cybersecurity
Sectoral Committee on Cybersecurity
Professor Dr Tengku Mohd Tengku Sembok FASc

Jawatankuasa Sektor Keselamatan Tenaga
Sectoral Committee on Energy Security
Academician Tan Sri Dato' Ir Ahmad Zaidee Laidin FASc

Jawatankuasa Sektor Alam Sekitar dan Perubahan Iklim
Sectoral Committee on Environmental and Climate Change
Professor Dato' Ir Dr A. Bakar Jaafar FASc

Jawatankuasa Sektor Keselamatan Makanan
Sectoral Committee on Food Security
Dr Tan Swee Lian FASc

Jawatankuasa Sektor Perubatan dan Penjagaan Kesihatan
Sectoral Committee on Medical and Healthcare
Academician Tan Sri Datuk Dr M Jegathesan FASc

Jawatankuasa Sektor Tanaman Perladangan dan Komoditi
Sectoral Committee on Plantation Crops and Commodities
Dr K Harikrishna Dr K Kulaveerasingam FASc

Jawatankuasa Sektor Pengangkutan dan Pembandaran
Sectoral Committee on Transport and Urbanisation
Professor Dr Nasrudin Abd Rahim FASc

Jawatankuasa Sektor Keselamatan Air
Sectoral Committee on Water Security
Dr Low Kwai Sim FASc

Panel Penyaringan Anugerah Penyelidikan Kanser MAKNA
MAKNA Cancer Research Award Vetting Panel
Professor Datin Paduka Dr Khatijah Mohd Yusoff FASc

Jawatankuasa Pemantauan TRSM
TRSM Monitoring Committee
Professor Dr Noorsaadah Abd. Rahman FASc

Panel Pemilihan TRSM
TRSM Selection Panel
Academician Tan Sri Datuk Dr Yusof Basiron FASc

Jawatankuasa Kajian Semula TRSM
TRSM Review Committee
Senior Professor Dato' Dr Khalid Yusoff FASc

Jawatankuasa Pemandu Program Tabung Peyelidikan Perubatan Dr Ranjeet Bhagwan Singh
Dr Ranjeet Bhagwan Singh Medical Research Trust Fund Programme Steering Committee
Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc

Panel Pemilihan Keahlian YSN-ASM
YSN-ASM Membership Selection Panel
YM Tengku Datuk Dr Azzman Shariffadeen FASc

Jawatankuasa Dana Newton-Ungku Omar (NUOF) untuk Program bersama British Council
Newton-Ungku Omar Fund (NUOF) Committee for Programmes with British Council
Emeritus Professor Dato' Seri Dr Mashkuri Yaacob FASc

JAWATANKUASA PROGRAM ASM
ASM PROGRAMME COMMITTEES

Jawatankuasa Dana Newton-Ungku Omar (NUOF) untuk Program bersama Royal Society
Newton-Ungku Omar Fund (NUOF) Committee for Programmes with Royal Society
Academician Tan Sri Dato'
Ir Hj Ahmad Zaidee Laidin FASc

Jawatankuasa Dana Newton-Ungku Omar (NUOF) untuk Program bersama Medical Research Council UK
Newton-Ungku Omar Fund (NUOF) Committee for Programmes with Medical Research Council UK
Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc

Jawatankuasa Rangkaian Sains & Teknologi dan Industri
Science & Technology and Industry Linkages Committee
Ir Choo Kok Beng FASc

Jawatankuasa Pendidikan Sains
Science Education Committee
Academician Datuk Dr Abdul Aziz SA Kadir FASc

Jawatankuasa Pemandu Pusat Kebangsaan Fizik Zarah (NCPP)
Steering Committee on National Centre for Particle Physics (NCPP)
Emeritus Professor Dato'
Ir Abang Abdullah Abang Ali FASc &
Professor Dr Noorsaadah Abd Rahman FASc
(Pengerusi Bersama/ Co-chair)

Jawatankuasa Pemandu Pusat Kebangsaan Nanomite
Steering Committee on National Centre for Nanomite
Professor Datuk Dr Halimaton Hamdan FASc

Badan Bertindak Penubuhan Pusat Kebangsaan Sains Bahan
Task Force for the Establishment of National Centre for Material Sciences
Academician Emeritus Professor Dato'
Dr VG Kumar Das Govinda Panicker FASc

Badan Bertindak Penubuhan Pusat Kebangsaan Perusahaan Saintifik dan Quran
Task Force for the Establishment of National Centre for Scientific Enterprise and Quran
Professor Dato' Dr Musa Ahmad FASc

Badan Bertindak Penubuhan Pusat Kebangsaan Polisi STI
Task Force for the Establishment of National Centre for STI Policy
Academician Professor Emeritus Tan Sri Dr Omar Abdul Rahman FASc

Badan Bertindak Penubuhan Majlis Penyelidikan Perubatan dan Kesihatan
Task Force for the Establishment of Medical and Health Research Council
Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc

Jawatankuasa Pemandu National Science Challenge
National Science Challenge Steering Committee
Professor Dr Yang Farina Abdul Aziz FASc

Badan Bertindak Penyelidikan dan Program Latihan Hutan Hujan Imbak Canyon (ICRRTP)
Imbak Canyon Rainforest Research & Training Programme (ICRRTP) Task Force
Academician Tan Sri Dr Salleh Mohd Nor FASc
& Professor Datuk Dr Ghazally Ismail FASc
(Pengerusi Bersama / Co-chair)

Jawatankuasa Young Scientists Network (YSN-ASM)
Young Scientists Network (YSN-ASM) Committee
Dr Abhimanyu Veerakumarasivam

Jawatankuasa Pemandu Persidangan Antarabangsa Sains untuk Keamanan
International Conference on Science for Peace Steering Committee
Academician Tan Sri
Ahmad Mustaffa Babjee FASc
Dato' Dr Hashim Abd Wahab FASc
(Pengerusi Bersama/ Co-chair)

Jawatankuasa Pemandu 'Duta Sains'
Steering Committee on 'Duta Sains'
Professor Datin Paduka
Dr Khatijah Mohd Yusoff FASc

Jawatankuasa Penganjuran Malaysian Technical Cooperation Programme (MTCP)
Malaysian Technical Cooperation Programme (MTCP) Organising Committee
Emeritus Professor Dr Jalani Sukaimi FASc

WAKIL ASM DALAM MESYUARAT DAN JAWATANKUASA ANTARABANGSA DAN NASIONAL

ASM REPRESENTATIVES IN INTERNATIONAL AND NATIONAL MEETINGS AND COMMITTEES

Association of Academies and Societies in Asia (AASSA)
Professor Dato' Dr Khairul Anuar Abdullah FASc

Inter Academy Medical Panel (IAMP)
Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc

Inter Academy Panel (IAP)
Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc

International Council for Science (ICSU)
Professor Datuk Dr Sukiman Sarmani FASc

International Institute for Applied Systems Analysis (IIASA)
Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc

ISTIC Executive Committee
YM Tengku Datuk Dr Mohd Azzman Shariffadeen FASc

Network of Academies of Sciences in the Islamic Countries (NASIC)
Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc

Science Council of Asia (SCA)
Emeritus Professor Dr Mohd Nordin Hj Hasan FASc

The World Academy of Science (TWAS)
Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc

IAP-Science Education Programme (IAP-SEP)
Academician Dato' Ir Lee Yee Cheong FASc

Network of ASEAN Sciences Academies (NetASA)
Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc

Global Science and Innovation Advisory Council (GSIAC)
Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc

MESYUARAT ANTARABANGSA
INTERNATIONAL MEETINGS

Courtesy visit to Taiwan STI Institutes
Delegation led by Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc
18 – 20 January
Taiwan

InterAcademy Partnership (IAP) Conference and General Assembly
Represented by Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc
28 February – 2 March
Hermanus, South Africa

IAP SEP Global Council Meeting
Represented by Academician Dato' Ir Lee Yee Cheong FASc, Dato' Dr Sharifah Maimunah Syed Zin FASc and Hazami Habib
16 April
Santiago, Chile

APEC 7th PPSTI Meeting
Nitiavathy Samuel represented Hazami Habib, Co-chair of PPSTI
10 - 12 May
Arequipa, Peru

AASSA - Seminar on Economic Prosperity Through Research & Development in Natural Products
Represented by Academician Professor Dato' Dr Khairul Anuar Abdullah FASc
29 – 31 March
Nepal

16th SCA Conference –Science for the People: Mobilizing Modern Technologies for Sustainable Development in Asia
Represented by Emeritus Professor Dr Mohd Nordin Hj Hasan FASc
30 May - 1 June
Ankara, Turkey

88th IIASA Council Meeting
Represented by Academician Tan Sri Dato' Ir Hj Ahmad Zaidee Laidin FASc
6 – 7 June
Vienna

AASSA Meeting on the IAP Project "Food and Nutrition Security and Agriculture"
Represented by Dr Tan Swee Lian FASc
18 – 19 July
Seoul, Korea

10th ACGS Board of Directors Meeting
Attended by Seetha Ramasamy, representing MOSTI
23 - 24 August
Nonthaburi, Thailand

Joint Meeting ICSU-ISSC/ICSU GA
Represented by Emeritus Professor Dr Mohd Nordin Hj Hasan FASc
24 October
Oslo, Norway

Science and Technology in Society (STS) Forum
Represented by Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc
2-4 October
Kyoto, Japan

Innovation for Cool Earth (ICEF) Forum
Represented by Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc
5 - 6 October
Tokyo, Japan

AASSA General Assembly & AASSA International Symposium on Refugees and Migrants: A Global Problem or Asset?
Represented by Academician Professor Dato' Dr Khairul Anuar Abdullah FASc
20-23 October
Ankara, Turkey

IAP for Health Conference and General Assembly
Represented by Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc
25 – 29 September
Beijing, China

Alpbach – Laxenburgh IIASA Group Meeting
Represented by Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc
28 – 30 August
Alpbach – Laxenburgh

APEC 8th PPSTI Meeting
Attended by Hazami Habib,
Co-chair of PPSTI
15-17 August
Peru

Meeting with National STEM Learning Centre, York
Represented by Hazami Habib
23 August
United Kingdom

AASSA–NAST PHL Workshop on the Role of Science Academies in Sustainable Development
Represented by Professor Dr Ahmad Ismail FASc
28 – 29 September
Tagaytay City, Phillipines

TWAS 27th General Meeting
Represented by Professor Datin Paduka
Dr Khatijah Mohd Yusoff FASc
12 November
Rwanda

89th IIASA Council Meeting
Represented by YM Tengku Datuk
Dr Mohd Azzman Shariffadeen FASc
7 – 8 November
Austria

IAMP Workshop on Addressing Inequities in Health: Fostering Action on Social Determinants
Represented by Senior Professor Dato'
Dr Khalid Yusoff FASc
3 – 4 October
Manila, Philippines

Science Forum South Africa (SFSA)
Represented by Jagdish Kaur Chahil
8-9 November
Pretoria, South Africa

Meeting with top management of S&T Institutes in ROK and signing of MoU with KISTEP
YB Datuk Seri Panglima Wilfred Madius Tangau
(Minister of Science, Technology and Innovation) &
Tan Sri Datuk Dr Ahmad Tajuddin Ali FASc
12-15 October
Korea

2nd Asian Innovation Forum (AIF)
Represented by Professor Datuk
Dr Halimaton Hamdan FASc
30 - 31 August
Seoul

UK-Malaysia Joint Health Research Collaboration in Non-Communicable Diseases Panel Meeting
Represented by Academician Distinguished
Professor Datuk Dr Looi Lai Meng FASc
5 - 6 October
MRC Conference Center, London

MEMORANDUM PERSEFAHAMAN
MEMORANDUM OF UNDERSTANDING

Letter of Intent between ASM & French Ministry of Foreign Affairs and International Development through the Embassy of France in Malaysia
29 July

MoU between ASM & Korea Institute of S&T Evaluation and Planning (KISTEP)
13 October

25
Mesyuarat Antarabangsa yang diwakili oleh ASM
International Meetings represented by ASM

PENERBITAN
PUBLICATION

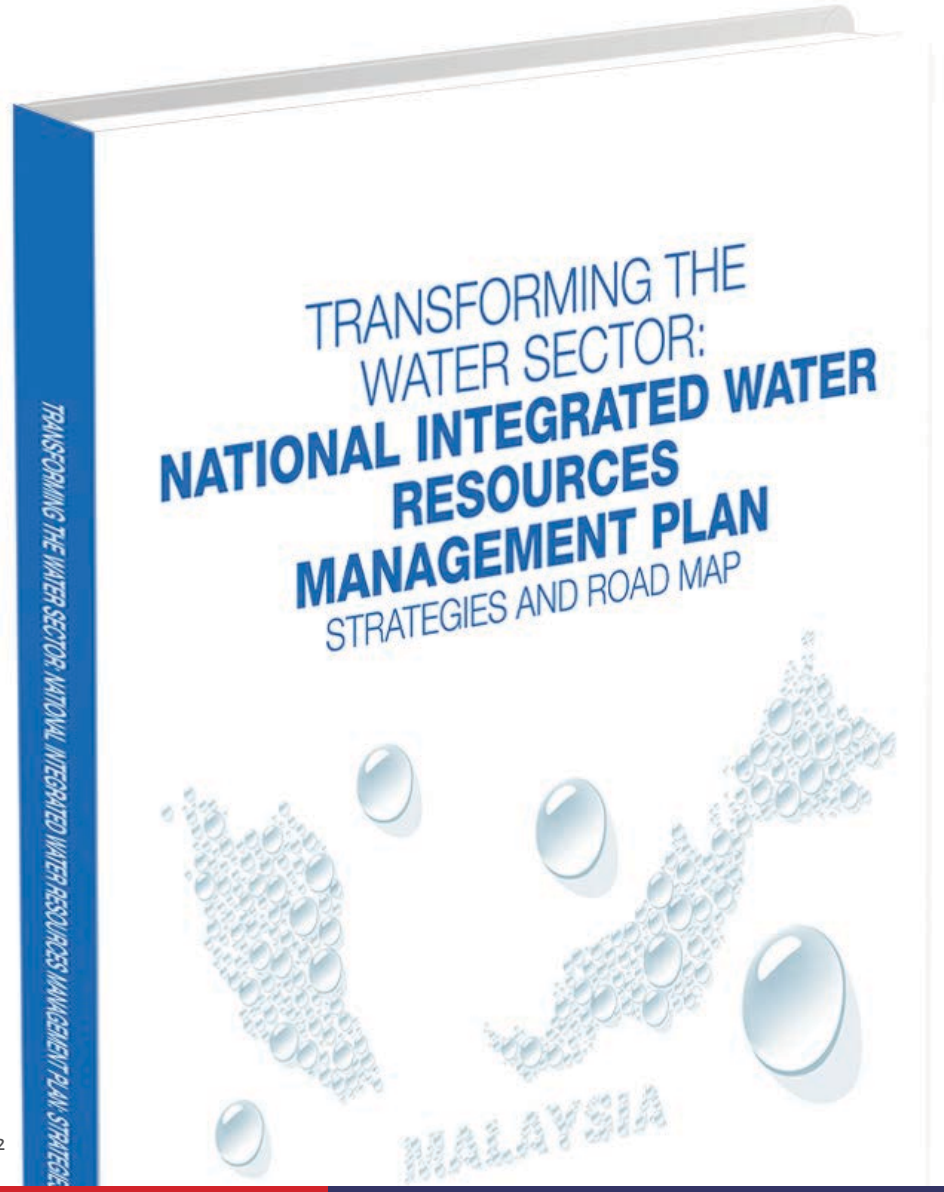
ADVISORY REPORTS

- Mega Science 2.0 Sectoral Report:
  - Environment
  - Housing
  - Infrastructure
  - Electrical & Electronics
  - Transportation
- Strategies to Enhance Water Demand Management in Malaysia
- Energy Usage and Energy Efficiency in Transportation
- National R&D Survey Report
- National Integrated Water Resource Management: Volume 1 & 2

JOURNALS

- ASM Science Journal
  - Online multi-disciplinary journal cited in Elsevier Scopus
  - 4 articles
- ASEAN Journal on Science and Technology for Development (AJSTD)
  - Volume 32, No.2 - 5 articles
  - Volume 33, No.1 - 5 articles

2015 ANNUAL REPORT





Launching of the National Integrated Water Resource Management Plan by YB Minister of MOSTI.

PROGRAM ASM
ASM PROGRAMMES

JAN

S&T Development & Industry Discipline Group
1/2016 Meeting
8 January, ASM

Annual Staff Meeting with Acting CEO, ASM
7 January, ASM

MOSTI: Bengkel Pembangunan Kerangka RMK-11
11-13 January, Port Dickson, Negeri Sembilan

Haze Task Force Workshop (Air Quality and Haze Episode)
12 January, UKM

MSAF ASM Award Steering Committee Meeting
12 January, ASM

Puspanita Meeting
21 January, ASM

FEB

IBSE Rendential Workshop for Parliament Setiu and Jerlun
1-6 February, Langkawi, Kedah

UK-Malaysia Bilateral Medical & Health Research Collaboration Workshop
2-3 February, Istana Hotel Kuala Lumpur

Workshop on Science Outlook for MOSTI Agencies
4 February, MATRADE Tower

Membership Committee Meeting
5 February, ASM

112th Finance Meeting
5 February, ASM

Medical and Health Sciences Vetting Committee Meeting
11 February, ASM

Biological, Agricultural and Environmental Sciences Vetting Committee Meeting
12 February, ASM

Engineering and Computer Sciences Vetting Committee Meeting
15 February, ASM

22nd IdeaXchange - STI Implication on TransPacific Partnership Initiative
15 February, ASM

Math, Physics and Earth Sciences Vetting Committee Meeting
16 February, ASM

S&T Development and Industry Vetting Committee Meeting
16 February, ASM

Chemical Sciences Vetting Committee Meeting
17 February, ASM

Roadshow Draft Code of Conduct for Biosecurity within the International Framework of the Biological and Toxin Weapons Convention (BTWC)
17 February, STRIDE Kajang

NanoMITe Research Evaluation Seminar
17 February, ASM

Meeting YSN-ASM with Euraxess (Dr Susanne Rentzow-Vasu)
17 February, KL Sentral

Transmission of Scientific Community by Science Outreach Working Group YSN-ASM
19-21 February, SMK Muhibbah, Sungai Siput, Perak

51st EXCO Meeting
19 February, ASM

MAR

IBSE 2.0 1st Weekend Workshop
20 February, SK Bandar Seri Putra, Kajang

Workshop on TRSM Initiative & Database Enhancement
20-21 February, ASM

Roadshow Draft Code of Conduct for Biosecurity within the International Framework of the Biological and Toxin Weapons Convention (BTWC)
21 February, USM Kubang Kerian

Workshop on the Enhancement of BioMalaysia's Innovation Awards
24 February, ASM

MOSTI Social Innovation (MSI): Duta Sains Program Follow-up Workshop on IBSE for Setiu
27 February, ASM

13th STIPAC Meeting
3 March, ASM

IBSE 2.0 2nd Weekend Workshop
5 March, SK Bandar Tasik Kesuma, Beranang

MSA Lecture Series - Post Cop 21 - Translating the Paris Agreement through Strategic Investment in Science & Technology
8 March, MIDA, KL Sentral

4th Plastics and Composites Sector Workshop
8 March, Kota Kinabalu, Sabah

5th Plastics and Composites Sector Workshop
10 March, Kuching, Sarawak

118th Council Meeting
12 March, Penang

Visit to Penang Botanical Garden (Council Members)
12 March, Penang

MOSTI Social Innovation (MSI): Duta Sains Program IBSE Workshop for Trainers
14 - 16 March, Tuaran, Sabah

Creative Industry Sector's Teh Tarik Talk Series (II) on the "Future of Malaysian Arts"
15 March, ASM

Gathering of Fellows of Northern Region Chapter
18 March, Equatorial Hotel, Penang

Visit of Directors of Moroccan Teachers Training School (Ecole Normale Supérieure) to Malaysia
20 - 26 March, ASM

6th Creative Industry Sector Workshop, Kuala Terengganu
22 March, Terengganu

"The Future of Malaysian Arts and Crafts" Forum
24 March, ASM

113th Finance Meeting
25 March, ASM

IBSE 2.0 3rd Weekend Workshop
26 March, SK Seksyen 7 Bandar Baru Bangi

MOSTI Social Innovation (MSI): Duta Sains Program Science Carnival for Setiu Parliamentary
26-27 March, Terengganu

6th Plastics and Composites Sector Workshop
30 March, Johor Bahru

APR

Program Duta Sains Tangga Batu - Workshop on Commercialization
4-5 April, Tangga Batu, Melaka

"The Future of Museums" Forum
6 April, ASM

Science Journalism II Workshop
17-18 April, ASM

2016 NSC Preliminary Level
18-21 April, by Zone

Workshop on Water Supply & Wastewater Management
18 April, ASM

Envisioning Malaysia 2050 Foresight Initiative (S&T) Workshop
21 April, ASM

MAKNA Cancer Research Award 2015
22 April, ASM

ICSU ROAP: 21st RCAP Meeting and Regional Consultation
22-24 April, Kota Kinabalu, Sabah

RCR Awareness Workshop
27-28 April, UNIMAS

21st Annual General Meeting
30 April, ASM

9th General Assembly
30 April, ASM

MAY

MSAF Board of Trustees 12th Meeting
4 May, ASM

YSN-ASM: Whizz Kids Science Workshop Series I and II – Underprivileged Kids Programme and Science Talk
7 May, Eden Handicap Service Centre, Penang

2016 NSC Perak, Selangor & Pahang State Level
9 May, UTP, UKM, IIUM Pahang

MOSTI Social Innovation (MSI): Duta Sains Program Science Carnival for Jerlun Parliamentary
10 May, Kedah

2016 NSC Penang, Kelantan & K.L State Level
10 May, USM, UMK, UM

ASM-YSN: Energy Explore Race
11 May, SM Sains Kota Tinggi, Kota Tinggi, Johor

2016 NSC Johor State Level
11 May, SM Sains Kota Tinggi, Johor

2016 NSC Perlis & Putrajaya State Level
12 May, UNIMAP, Pusat Permata Pintar UKM

Sakura Exchange Programme in Science
8-13 May, Tokyo, Japan

114th Finance Meeting
13 May, ASM

Global Geopark Management 2016 - "Natural Heritage Protection Towards Sustainable Development"
14-20 May, Meritus Pelangi Beach Resort, Langkawi

ASM-UTM Certified Professional in STI Policy and Management for OIC Countries (AUCPS): Essentials in STI Policy and Management
16-20 May, Istana Hotel, Kuala Lumpur

YSN-ASM: Karnival Creativity and Science4U
17-18 May, Tamparuli, Sabah

Science and Technology in Society (STS Forum) on Green Technology
19 May, UTEM, Melaka

52nd EXCO Meeting
20 May, ASM

016 NSC Melaka State Level
27 May, UTEM, Melaka

2016 NSC Terengganu State Level
28 May, UMT

ICT-BioAsia Workshop 2016
30-31 May, UM

JUN

14th STIPAC Meeting
2 June, ASM

Presentation Session on 'Top 50 Emerging Technologies: Growth Opportunities of Strategic Imperative' by Frost & Sullivan
2 June, ASM

2016 Young Scientists Summer Student Programme &
Dr Ranjeet Bhagwan Singh Grant Recipients Media Announcement
9 June, ASM

3rd STILC Meeting
16 June, ASM

STEM Movement Meeting
16 June, ASM

STILC Model Meeting
17 June, ASM

120th Council Meeting
17 June, ASM

Meeting with Siemens
20 June, ASM

Science Outlook 2017: 1st Steering Committee Meeting
20 June, ASM

2016 NSC Negeri Sembilan State Level
21 June, USIM

Imbak Canyon RRTP Meeting
23 June, ASM

Meeting With British Council On Science Media Centre
23 June, ASM

YSN-ASM New Membership Selection Committee Meeting
23 June, ASM

Meeting with NRE on Biodiversity Expert Directory
24 June, ASM

Foresight S&T (1) Meeting
27 June, ASM

New Economic Opportunities Meeting
27 June, ASM

1st Task Force on Cyber Security Meeting
28 June, ASM

2016 NSC Sabah Level
28 June, Sabah

Science Outlook - STI Governance 1st Meeting
29 June, ASM

JUL

115th Finance Meeting
1 July, ASM

BAES Search Committee Meeting
4 July, ASM

ICSU ROAP: Preparations for Succession Plan of ICSU ROAP
10 July, Kuala Lumpur

Special Council Meeting
12 July, ASM

2016 NSC Kedah State Level
13 July, SMK Sultan Badlishah, Kedah

STEM Movement Meeting
15 July, ASM

Science Outlook 2016 WG3: STI Talent
18 July, ASM

Science Outlook 2016-2017: WG6-Strategic International Alliance
18 July, ASM

1st Meeting Of Energising Industries Working Group
19 July, ASM

MSA 2016 3rd Search Committee Meeting
19 July, ASM

3rd Monitoring Meeting of Flagship Projects FP0712E012 & 4th Monitoring Meeting Of Flagship Project FP1213E037 (Part 1)
20 July, ASM

2016 NSC Sarawak State Level
20 July, Sarawak

Talk on Schuelerlabore Professor Petra Skibe-Corrette
20 July, ASM

YSN-ASM RCR Module Development Workshop
21-22 July, ASM

YSN-ASM 2nd Selection Panel 2016
21 July, ASM

Strategic Planning Workshop on Developing New STI-based Industries
23 July, ASM

IBSE 2.0 4th Weekend Workshop
23 July, SK Semenyih

23rd ideaXchange & Eid Fitr Gathering
25 July, ASM

Evaluation of The 5th Cycle of The TRSM
25 July, ASM

4th Monitoring Meeting of Flagship Project FP1213E037
27 July, ASM

2nd TF Meeting on Cyber Security
28 July, ASM

3rd Sustainable Mining Meeting
29 July, ASM

2016 NSC Labuan State Level
29 July, Sabah

YSN-ASM: Exhibition Booth Creativity & Science4U 2016
29-30 July, Kluang Mall, Johor

AUG

1st Meeting Working Group Energising Industries
1 August, ASM

ASM Science Journal Editorial Board Meeting; 2/2016
1 August, ASM

ICSU ROAP: Preparation and Finalisation of Exit Report for ICSU ROAP
1 - 4 August, Kuala Lumpur

26th ASM Water Committee Meeting
3 August, ASM

Meeting on Top STEM Talent Malaysia (TSTM)
3 August, ASM

Mega Science Teh Tarik Talk - Film Industry
4 August, ASM

2nd Steering Committee Meeting on Science Outlook
5 August, ASM

Envisioning Malaysia 2050 - Foresight Initiative Meeting with Myforesight Partner
5 August, ASM

Envisioning Malaysia 2050 - S&T Expert Review
5 August, ASM

1st Meeting of ASM Science Awards Steering Committee 2016
8 August, ASM

New Economic Opportunities Meeting
9 August, ASM

Science Outlook:Research, Development & Commercialisation Working Group Meeting
9 August, ASM

Science Outlook: Strategic International Alliance (2nd Meeting)
10 August, ASM

Super Science Highshool Fair
10-11 August, Japan

1st Audit Committee Meeting
11 August, ASM

ASM Fellow's Lecture: Haemoglobin Disorders in a Multiracial Population: Challenges in Diagnosis by Professor Dr Mary Anne Tan Jin Ai FASc
1 August, UM

ASM Integrated Urban Water Management (IUWM)
12 August, ASM

2016 Announcement of Top Research Scientists Malaysia (TRSM)
15 August, Kuala Lumpur

International Conference on Science for Peace
15-16 August, Kuala Lumpur

2016 NSC Grand Final Level
18 August, UKM

2nd Energising Industries Working Group Science Outlook Meeting
22 August, ASM

3rd STI Talent Working Group Science Outlook Meeting
22 August, ASM

MSAF 13th Board of Trustees Meeting
24 August, ASM

Envisioning Malaysia 2050 - Foresight Initiative (S&T) Sharing of Study Findings with S&T Experts
25 August, ASM

MSA 2016 Evaluation Committee Meeting
25 August, ASM

Resolution Workshop & Annual Report National STEM Movement
25 August, ASM

ASM-YSN: Whizz Kids Science Workshop Series I and II – Underprivileged kids programme and Science Talk
27 August, Rumah Kebajikan Seri Cahaya

Focus Group Meeting (Manufacturing Sector) on Developing New STI-Based Industries for Malaysia to Serve Emerging Markets in Asean and TPPA Member Countries
28 August, ASM

Envisioning Malaysia 2050 - Foresight Initiative: Foresight Alliance Workshop
30 August, ASM

SEP

Responsible Conduct of Research Module Development Preparatory Workshop
1-3 September, ASM

121st Council Meeting
2 September, ASM

Foresight & Scenario Planning for MOSTI Personel Workshop
5 September, ASM

Visit by Dr Markus Amann - Study on Haze Affecting ASEAN Countries
5 September, ASM

Futures Thinking Talk on "Anticipating a Radically Better Future" by Mr David Wood
6 September, ASM

Visit by University of Manchester
6 September, ASM

Envisioning Malaysia 2050 Foresight Initiative: Stakeholder Consultation Workshop
7 September, ASM

15th STIPAC Meeting
9 September, ASM

Workshop on Malaysian Educational Institute of Responsible Conduct of Research
19-23 September, AKEPT, Nilai

Science of Halal (A Halal Innitiative) Meeting
19 September, ASM

Delegation Visit by Beijing Academy of Science and Technology
19 September, ASM

ICSU Teleconference Meeting
19 September, ASM

Establishment of Collaborative Efforts in Commercialisation and Entrepreneurship Education Workshop
20 September, MOHE, Putrajaya

ASM-UTM: iCat2016 - Frontiers, Challenges and Opportunities in Catalysis
20-21 September, Johor Bahru

ASM-UTM: Nobel Laureate Public Lecture - Cross Coupling Reactions of Organoboranes An Easy Way for Carbon-carbon Bonding
22 September, UTM Skudai

STEM Seminar by Science Bridge Academy
22 September, ASM

116th Finance Meeting
23 September, ASM

10th General Assembly Ethics and Responsible Conduct of Research
24 September, ASM

Meeting With SIEMENS on The Possible Collaboration Programmes
27 September, ASM

2nd Selection Panel Meeting for Anugerah Saintis Muda
27 September, ASM

NanoMITe Annual Symposium 2016
28 September, UTM, Kuala Lumpur

New Economy Opportunities: Halal Industry Meeting
28 September, ASM

New Economy Opportunities: Services Sector Meeting
29 September, ASM

National STEM Movement Meeting
29 September, ASM

ICSU ROAP: Closing Meeting of End of 2nd 5-year Period of Hosting of ICSU ROAP by the Government of Malaysia
30 September, Kuala Lumpur

OCT

National STEM Movement and Engagement of Parents & Community
1 October, ASM

Establishing the STEM Centre and Media Science Centre under the Newton Fund Meeting
4 October, ASM

NASIC-UiTM Workshop on Drug Development from Indigenous Plants in Developing Countries
4-6 October, UiTM Puncak Alam

Visit of NASIC Delegates
7 October, ASM

16th STIPAC Meeting
10 October, ASM

Meeting on PERMATA
10 October, ASM

ESET Nanotechnology Focus Group Meeting
11 October, ASM

Science Outlook WG6: Strategic International Alliance 3rd Meeting
12 October, ASM

RCUK-Mental Health Video Conference
13 October, ASM

10th National STEM Movement Meeting
14 October, ASM

ESET Digital Technology Focus Group Meeting
14 October, ASM

ASM-AAS: Research Seminar Series - Climate Change and Its Impact on Ecosystems and Bioresouces
17 October, UM

ESET Neuro Technology Focus Group Meeting
17 October, ASM

54th Exco Meeting
18 October, ASM

YSN-ASM 3rd Exco Meeting
19 October, ASM

1st MGI-UKM-COSMOSID Microbial Metagenomics Conference & Workshop
24-25 October, Malaysia Genome Institute,Bangi

MSA 2015 Laureate Week :Welcome Dinner with Rita Colwell
24 October, Kuala Lumpur

Science Outlook 2017 Working Group 1-3rd Meeting
24 October, ASM

Medical Research Council Task Force Meeting
24 October, ASM

ASM Local and Transboundary Haze: WG2 Peat Area and Water Management 3rd Working Group Meeting
25 October, ASM

2016 NRF Capacity Building Workshop
25-28 October, Korea

ASM Fellow's Lecture by Professor Dr Abdullah Gani FASc - Mobile Cloud Computing: Leveraging Capability for Value Creation
26 October, UM

MSA 2015 Laureate Week : Presentation Ceremony
26 October, Kuala Lumpur

MSA 2015 Laureate Week : Intellectual Discourse with Young Scientists
27 October, ASM

RCR Working Committee Meeting with Rita Colwell
27 October, ASM

ESET Green Technology Focus Group Meeting
27 October, ASM

MSA 2015 Laureate Week : Public Lecture
28 October, ASM

Evaluation Meeting for Newton Researcher Links 2016
30 October, ASM

NOV

Foresight Youth Forum
1 November, ASM

Selection Meeting for the 67th Lindau Meeting (Chemistry)
2 November, ASM

Selection Meeting for MAKNA Cancer Research Award
3 November, ASM

Kuala Lumpur International Engineering Science Fair,
4-6 November, Serdang

Duta Sains Tuaran - 2nd IBSE Workshop
7-11 November, Tuaran

Meeting with Royal Society Of Edingurgh
7 November, ASM

Signing of MoU between ASM and ICMC
8 November, Kota Kinabalu

National Innovation Council Meeting
9 November, UM

Malaysia 2050 Mega Science 3.0 National Forum & Exhibition
10 November, ASM

Penang International Science Fair
12 - 13 November, Penang

4th Meeting of ASM Task Force on Cyber Security
15 November, ASM

STILC-TRSM: Science and Technology in Society (STS Forum): Niche SMEs (ICT and Biotechnology)
17 November, ASM

17th Finance Meeting
18 November, ASM

Meeting With JST and KAIST
21 November, ASM

National Centre for Material Sciences Task Force Meeting
22 November, ASM

17th STIPAC Meeting
23 November, ASM

11th STEM Movement Meeting
25 November, ASM

ASM Fellows' Lecture by Professor Dr Zanariah Abdullah FASc
25 November, UM

Northern Region Engineering, Science, and Technology Youth Program
26 November, USM

Evaluation Meeting for Newton Advanced Fellowships & Mobility Grants 2016
28 November, ASM

National Centre for Particle Physics Task Force Meeting
28 November, ASM

IBSE 2.0 Residential Workshop
28 November - 2 December, Selangor

Evaluation Meeting for Newton Researcher Links
30 November, ASM

ASM Science Award Steering Committee Meeting: Mustafa Prize Award 2017
30 November, ASM

Selection Meeting for Dr Ranjeet Bhagwan Singh Research Grant 2016
30 November, ASM

DEC

Sustainable Construction Excellence for a Better Future in conjuction with the Launch of Centre of Excellence for Sustainable Construction Seminar
1 December, Kuala Lumpur

Sending off Ceremony and Luncheon with NSC 2016 Winners and Exxon Mobil
6 December, Kuala Lumpur

Study Visit to Stockholm and Nobel Prize Ceremony
6 - 12 December, Sweden

Medical and Health Science Discipline Group Meeting
7 December, ASM

ASM Fellows' Lecture by Professor Dr Zainuriah Hassan FASc
7 December, USM

Exhibition of Mega Science 3.0 Time Tunnel at the Malaysian Commercialisation Year (MCY)
8 December, Kuala Lumpur

122nd Council Meeting,
9 December, Kuala Lumpur

Conferment of Fellowship and Launching of NIWRM Report
13 December, Kuala Lumpur

ASM Fellows' Lecture by Professor Dr Ramesh T. Subramaniam FASc
14 December, UM

2016 YSN-ASM Colloquium
16 -18 December, Genting

Meeting with Academy of Medical UK
19 December, ASM

5th Meeting of Task Force Cyber Security
20 December, ASM

Dengue Conference, Puri Pujangga
22 December, UKM

12th National STEM Movement Meeting
23 December, ASM

Haze Task Force Steering Meeting
28 December, ASM

2017 MSA 1st Search Committee Meeting
28 December, ASM

Meeting to Review the Water Supply and Waste Water Management Report
30 December, ASM

PROGRAM ISTIC
ISTIC PROGRAMMES

InterAcademy Panel (IAP) General Assembly
2 March Hermanus, South Africa

Workshop on Building an Integrated STI Governance System for Seychelles,
11 March, Victoria, Seychelles

UN Broadband Commission Meeting
13 March, Dubai, UAE

ISTIC One-Day Event on "Embracing the Future: Improving Quality of Science Instruction in Schools"
5 April, Paris, France

9th ISTIC Governing Board Meeting
6 April, Paris, France

International Conference for "Improving the Learning of Biology and Related Experimental Sciences at the K-12 School Levels"
14-15 April, Santiago, Chile

Training Workshop on Technopreneurship for Developing Countries
10-14 May, Isfahan Iran

UNESCO Science Centres Coordination Meeting
15-18 May, Beijing China

The Honorable MOSTI Minister Visits UK National STEM Learning Centre
18 May, York England

Hari UNESCO Malaysia 2016: "Inclusiveness"
28 May, Putrajaya

OECD Ministerial Meeting on the Digital Economy: Innovation, Growth and Social Prosperity
21-23 June, Cancun, Mexico

Training Workshop on Developing Leadership Talents of Women in STI
18-22 July, Kuala Lumpur

UNESCO Science Cooperation Meeting
21-24 July, Bali, Indonesia

Training Workshop on Maintenance of Infrastructure
24-28 July, Kuala Lumpur

International Training Programme on STI Policy and Management for Developing Countries (ITPS)
8-12 August, Kuala Lumpur, Malaysia

Training Workshop on Technopreneurship for Women in STI
5-9 September, Kuala Lumpur

Training Workshop on Innovative Teaching & Learning of Science through IBSE for Science Teacher Trainers (Workshop II)
19-23 September, Kuala Lumpur

2016 KISTEP-ISTIC S&T Innovation Policy Training Program for High Level Policy Makers
26-30 September, Kuala Lumpur

IKCEST International Training Workshop 2016 on Big Data Technology Application and Knowledge Service
3-9 November, Hangzhou, China

Programme for Visitors from Federación Colombiana de la Industria de Software y IT (FEDESOFT) Colombia
9 November, Kuala Lumpur

2nd Joint Committee Science, Technology and Innovation South Africa-Malaysia,
14-16 November, Melaka

1st International Conference on Science, Technology and Innovation Policy and Management (STIPM-2016),
16-17 November, Karachi, Pakistan

International High Level Policy Forum on Accreditation and Certification of Engineers and Technicians in Latin America and the Caribbean
2 December, Lima, Peru

Public Lecture by Dr Phumzile Mlambo-Ngcuka, United Nations Under-Secretary-General and Executive Director of UN Women
28 November, Putrajaya

Short Training Course for Delegates from UNDP Bangladesh
6-8 December, Kuala Lumpur

PROGRAM ICSU
ICSU PROGRAMMES

Discussion with Prof Annadel & Lourdes at SIMSEA Office Manila for the 1st SIMSEA Symposium
16-18 February, Manila, Philippines

5th Steering Committee Meeting on Hazards and Disasters
23-24 February, Kuala Lumpur

Symposium on Regional Perspective of Future Earth
29 Feb-1 March, Taipei, Taiwan

4th SIMSEA Steering Committee Meeting
21-22 March, Manila, Philippines

21st Regional Committee Meeting & Inauguration of Future Earth Korea
24-28 April, Seoul, Korea

16th Science Council of Asia
30 May-2 June, Colombo, Sri Lanka

ASEAN-JAPAN Workshop on Innovation, Science & Technology Sustainable Development
8-10 June, Bangkok, Thailand

23rd Pacific Science Congress
13-17 June, Taipei, Taiwan

Discussion with Prof Annadel & Lourdes at SIMSEA Office Manila for the 1st SIMSEA Symposium
22-23 August, Manila, Philippines

1st Workshop to Strengthen National-Level Scientific Advisory Capacity for Disaster Risk Reduction
25-26 August, Bangkok, Thailand

6th Steering Committee Meeting on Hazards & Disasters
21-22 September, Jakarta, Indonesia

1st SIMSEA Regional Symposium
26-28 September, Manila, Philippines

1st Science Planning Group on Epigenetics
10-11 October, Kuala Lumpur

5th PIAD 2016
14-17 November, Manila, Philippines

22nd Regional Committee Meeting for Asia & the Pacific
21-22 November, Kota Kinabalu, Sabah

FELO KEHORMAT
HONORARY FELLOWS

1995
Tun Dr Mahathir Mohamad
Mantan Perdana Menteri Malaysia
Former Prime Minister of Malaysia

2005
Tun Abdullah Ahmad Badawi
Mantan Perdana Menteri Malaysia
Former Prime Minister of Malaysia

2009
Tun Ahmad Sarji Abdul Hamid
Mantan Ketua Setiausaha Negara
Former Chief Secretary to the Government

2010
Nobel Laureate Professor Lee Yuan Tseh
Pemenang Hadiah Nobel 1986 (Kimia)
Nobel Laureate 1986 (Chemistry)

2011
Tan Sri Dato' Seri Law Hieng Ding
Mantan Menteri, Kementerian Sains, Teknologi dan Alam Sekitar Malaysia
Former Minister of the Ministry of Science, Technology and Environment Malaysia

2014
Dato' Sri Mohd Najib bin Tun Abdul Razak
Perdana Menteri Malaysia
Prime Minister of Malaysia

FELO KANAN
SENIOR FELLOWS

1999
- Academician Emeritus Professor Tan Sri Datuk Dr Haji Omar Abdul Rahman FASc
- Academician Dato' Ir Lee Yee Cheong FASc
- Academician Emeritus Professor Tan Sri Datuk Dr Augustine Ong Soon Hock FASc

2001
- Academician Tan Sri Dato' Dr Mohd Rashdan Haji Baba FASc

2002
- Academician Emeritus Professor Dr Yong Hoi Sen FASc
- Academician Tan Sri Dato' Seri Ir Shamsuddin Abdul Kadir FASc

2004
- Academician Tan Sri Dr Salleh Mohd Nor FASc

2005
- Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc

2006
- Academician Tan Sri Dr M Jegathesan FASc

2007
- Academician Datuk Dr Abdul Aziz SA Kadir FASc

2008
- Academician Tan Sri Ir Hj Shahrizaila Abdullah FASc

2009
- Academician Tan Sri Dr Ahmad Mustaffa Babjee FASc

2010
- Academician Emeritus Professor Dato' Dr VG Kumar Das Govinda Panicker FASc
- Academician Emeritus Professor Tan Sri Dato' Dr Syed Jalaludin Syed Salim FASc

2011
- Academician Tan Sri Dato' Ir Hj Ahmad Zaidee Laidin FASc
- Academician Emeritus Professor Dato' Dr CP Ramachandran FASc
- Academician Professor Dato' Ir Dr Chuah Hean Teik FASc

2012
- Academician Dr C. Devendra FASc
- Academician Datuk Fateh Chand FASc
- Academician Dr Ho Chee Cheong FASc

2013
- Academician Dr Chia Swee Ping FASc
- Academician Tan Sri Datuk Dr Yusof Basiron FASc

2014
- Academician Datuk Ir Hong Lee Pee FASc
- Academician Professor Dato' Dr Khairul Anuar Abdullah FASc

2015
- Academician Emeritus Professor Tan Sri Dato' Sri Dr Zakri Abdul Hamid FASc
- Academician Emeritus Professor Dato' Dr Lam Sai Kit FASc

2016
- Academician Emerita Professor Datuk Dr Mazlan Othman FASc

FELO
FELLOWS

54 FASc

SAINS PERUBATAN DAN KESIHATAN
MEDICAL AND HEALTH SCIENCES

*Academician Distinguished Professor Datuk Dr Looi Lai Meng FASc
*Academician Tan Sri Dato' Dr M Jegathesan FASc
Academician Emeritus Professor Dato' Dr CP Ramachandran FASc
Academician Professor Dato' Dr Khairul Anuar Abdullah FASc
Academician Emeritus Professor Dato' Dr Lam Sai Kit FASc
*Professor Dr Mak Joon Wah FASc
*Datuk Dr Hussein Awang FASc
*Emeritus Professor Dato' Dr Khalid Abdul Kadir FASc
*Tan Sri Dato' Dr Yahya Awang FASc
Tan Sri Dato' Dr Abu Bakar Dato' Suleiman FASc
Tan Sri Dato' Seri Hj Musa Mohamad FASc
Emeritus Professor Dato' Paduka Dr Mustaffa Embong FASc
Emeritus Professor Puan Sri Datin Dr Wan Nafisah Hj Nik Mohd Adeeb FASc
Emeritus Professor Dato' Dr Hashim Yaacob FASc
Professor Dr Yap Sook Fan FASc
Emeritus Professor Dr Cheong Soon-Keng FASc
Professor Datuk Dr Asma Ismail FASc
Professor Dato' Dr Anuar Zaini Md Zain FASc
Professor Dr Victor Lim Kok Eow @ Azman Lim FASc
Senior Professor Dato' Dr Khalid Yusoff FASc
Emerita Professor Tan Sri Dato' Wira Dr Sharifah Hapsah Syed Hasan Shahabudin FASc
Emeritus Professor Dr Mohd Ismail Noor FASc
Tan Sri Datuk Dr Mohd Ismail Merican FASc
Professor Dr Cheah Phaik Leng FASc
Dr Mary Jane Cardosa FASc
Emeritus Professor Dr Boo Nem Yun FASc
Professor Dr Subramaniam Krishnan FASc
Professor Dato' Dr Jafri Malin Abdullah FASc
Professor Dato' Dr Goh Khean Lee FASc
Professor Dr Adeeba Kamarulzaman FASc
Professor Dr Rosnah Mohd Zain FASc
Professor Dr Rahmah Nordin FASc
Emeritus Professor Dato' Dr Ikram Shah Ismail FASc
Emeritus Professor Dato' Dr Lian Chin Boon FASc
Tan Sri Professor Dr Mohd Amin Jalaludin FASc
Professor Dato' Dr Tan Chong Tin FASc
Professor Dr Norazmi Mohd Nor FASc
Professor Dr Salmaan Hussain Inayat Hussain FASc
Professor Dr Awg Bulgiba Awg Mahmud FASc
Emeritus Professor Dr Khor Geok Lin FASc
Professor Dr Mustafa Ali Mohd FASc
Professor Dr Jamunarani S Vadivelu FASc
Professor Datuk Dr Rohana Yusof FASc
Professor Datuk Paduka Dr Wan Azman Wan Ahmad FASc
Dr Teo Soo Hwang FASc
Professor Dr Balbir Singh Mohan Singh FASc
Datuk Dr Lokman Hakim Sulaiman FASc
Professor Dr Sazaly Abu Bakar FASc
Professor Dr Suresh Kumar P Govind FASc
Professor Dr Zhari Ismail FASc
Professor Dato' Dr Balwant Singh Gendeh FASc
Professor Dr Lee Way Seah FASc
Professor Dr Mary Anne Tan Jin Ai FASc
Professor Dr Wan Ariffin Abdullah FASc

Nota: Nama yang bertanda '*' adalah Felo Asas
Nama yang berhuruf **tebal** adalah Felo 2016
Note: Names marked '' are Foundation Fellows*
Names in ***bold*** *are 2016 Fellows*

KEJURUTERAAN DAN SAINS KOMPUTER
ENGINEERING AND COMPUTER SCIENCES

71 FASc

*Academician Dato' Ir Lee Yee Cheong FASc
*Academician Tan Sri Dato' Seri Ir Shamsuddin Abdul Kadir FASc
*Academician Tan Sri Dato' Ir Haji Shahrizaila Abdullah FASc
Academician Tan Sri Dato' Ir Dr Haji Ahmad Zaidee Laidin FASc
Academician Datuk Ir Hong Lee Pee FASc
*Dato' Dr Muhammad Ridzuan Haji Salleh FASc
*YM Tengku Datuk Dr Mohd Azzman Shariffadeen FASc
*Emeritus Professor Dato' Ir Dr Mohd Zawawi Ismail FASc
Emeritus Professor Dato' Dr Tan Wang Seng FASc
Ar Hijjas Kasturi FASc
Datuk Dr Mohamed Arif Nun FASc
Dr Mohamed Awang Lah FASc
Dr Mohamad Zahran Dato' Sheikh Abdul Halim FASc
Professor Dr Zaharin Yusoff FASc
Dato' Dr Mohd Ariffin Haji Aton FASc
Ir Dr Ting Wen Hui FASc
Emeritus Professor Dato' Ir Dr Zainul Abidin Md Shariff FASc
Professor Dato' Ir Dr A. Bakar Jaafar FASc
Emeritus Professor Dato' Seri Ir Dr Mashkuri Yaacob FASc
Emeritus Professor Dato' Wira Ir Dr Mohammad Noor Haji Salleh FASc
Emeritus Professor Dato' Ir Abang Abdullah Abang Ali FASc
Emeritus Professor Tan Sri Dato' Sri Ir Dr Sahol Hamid Abu Bakar FASc
Professor Dr Mohd Ali Hashim FASc
Professor Dato' Dr Goh Sing Yau FASc
Tan Sri Professor Ir Dr Mohd Zulkifli Tan Sri Mohd Ghazali FASc
Professor Dr Tan Hong Siang FASc
Datuk Ir Dr Ow Chee Sheng FASc
Dato' Ir Dr Gue See Sew FASc
Dr Ir Salmah Zakaria FASc
Professor Dr Zahari Taha FASc
Emeritus Professor Dr Tengku Mohd Tengku Sembok FASc
Datuk A Rahman Abdullah FASc
Tan Sri Dato' Ar Haji Esa Haji Mohamed FASc
Professor Dato' Seri Ir Dr Zaini Ujang FASc
Professor Dr Shah Nor Basri FASc
Professor Dato' Dr Halimah Badioze Zaman FASc
Professor Dr Nasrudin Abd Rahim FASc
Tan Sri Dato' Ir Syed Muhammad Shahabudin FASc
Tan Sri Dato' Ir Omar Ibrahim FASc
Professor Ir Dr Ahmad Faizal Mohd Zain FASc
Professor Ir Dr Ahmad Fadzil Mohamad Hani FASc
Professor Dr Ahmad Fauzi Ismail FASc
Dato' Sri Ir Dr Judin Abdul Karim FASc
Professor Ir Dr Wan Abu Bakar Wan Abas FASc
Dato' Ir Mohd Yusof Ibrahim FASc
Professor Ir Dr Ruslan Hassan FASc
Professor Dr Zulkifli Yusop FASc
Professor Dato' Ir Dr Wan Ramli Wan Daud FASc
Professor Ir Dr Mohd Jailani Mohd Nor FASc
Professor Dr Hanafi Ismail FASc
Professor Ir Dr Abd Halim Shamsuddin FASc
Professor Dr Abdul Latif Ahmad FASc
Professor Dr Hamdani Saidi FASc
Professor Dato' Dr Kamaruzzaman Sopian FASc
Datuk Ir Mohd Adnan Mohd Nor FASc
Datuk Ir Abdul Rahim Hj Hashim FASc
Professor Dr Abdul Rahman Mohamed FASc
Professor Dato' Ir Dr Abdul Wahab Mohammad FASc
Professor Dato' Ir Dr Badhrulhisham Abdul Aziz FASc
Professor Dato' Dr Burhanuddin Yeop Majlis FASc
Ir Lalchand Gulabrai FASc
Professor Dr Ewe Hong Tat FASc
Datuk Professor Dr Mohd Ruddin Ab Ghani FASc
Professor Ir Dr Noor Azuan Abu Osman FASc
Professor Dr Abdullah Gani FASc
Professor Dr Borhanuddin Mohd Ali FASc
Dato' Ir Lim Chow Hock FASc
Professor Dato' Ir Dr Mahyuddin Ramli FASc
Professor Dr Mohamed Ibrahim Abdul Mutalib FASc
Professor Dr –Ing Ir Renuganth Varatharajoo FASc
Professor Dr Zainab Abu Bakar FASc

SAINS BIOLOGI, PERTANIAN DAN ALAM SEKITAR
BIOLOGICAL, AGRICULTURAL AND ENVIRONMENTAL SCIENCES

67 FASc

*Academician Emeritus Professor Dr Yong Hoi Sen FASc
*Academician Tan Sri Dr Salleh Mohd Nor FASc
*Academician Tan Sri Dr Ahmad Mustaffa Babjee FASc
*Academician Emeritus Professor Tan Sri Dato' Dr Syed Jalaluddin Syed Salim FASc
Academician Dr C Devendra FASc
*Academician Tan Sri Emeritus Professor Dato' Sri Dr Zakri Abdul Hamid FASc
*Emeritus Professor Datuk Dr Abdul Latif Ibrahim FASc
*Emeritus Professor Dr Chin Hoong Fong FASc
Dr Francis SP Ng FASc
Professor Dr Mak Chai @ Mak Lian Fong FASc
Professor Dr Ho Yin Wan FASc
Professor Dr Koh Chong Lek FASc
Emeritus Professor Dr Mohd Nordin Hasan FASc
Dr Rajanaidu Nookiah FASc
Emeritus Professor Dato' Dr Sheikh Omar Abdul Rahman FASc
Emeritus Professor Dr Muhamad Awang FASc
Emeritus Professor Dato' Dr Mohamed Mahyuddin Mohd Dahan FASc
Dato' Dr Yeang Hoong Yeet FASc
Emeritus Professor Dato' Dr Abdul Latiff Mohamad FASc
Professor Datuk Dr Mohamed Ghazali Ismail FASc
Emeritus Professor Dato' Dr Haji Mohamed Abdul Majid FASc
Dr Helen Nair FASc
Professor Dr Soh Aik Chin FASc
Professor Datin Paduka Dr Khatijah Mohd Yusoff FASc
Dr Lim Boo Liat FASc
Dr Tan Swee Lian FASc
Dr Yap Thoo Chai FASc
Professor Datin Paduka Dr Aini Ideris FASc
Dr Heong Kong Luen FASc
Professor Dr Phang Siew Moi FASc
Dr Ravigadevi Sambanthamurthi FASc
Dato' Dr Sim Soon Liang FASc
Professor Dato' Dr Azizan Abu Samah FASc
Dato' Dr Hashim Abd Wahab FASc
Professor Dr Mohd Sanusi Jangi FASc
Professor Dr Low Pak Sum FASc
Dr Chan Ying Kwok FASc
Professor Dato' Dr Mohamed Shariff Mohamed Din FASc
Professor Datin Dr Faridah Hanum Ibrahim FASc
Dato' Dr Makhdzir Mardan FASc
Dr Harikrishna Kulaveerasingam FASc
Professor Dr Wickneswari Ratnam FASc
Dr Tan Keng Hong FASc
Professor Dr Normah Mohd Noor FASc
Datuk Seri Lim Chong Keat FASc
Professor Dr Fatimah Md Yusoff FASc
Professor Dato' Dr Haji Ibrahim Che Omar FASc
Professor Dato' Dr Mohd Tajuddin Abdullah FASc
Professor Dr Ng Wing Keong FASc
Dr Saw Leng Guan FASc
Dato' Dr Abd Latif Mohmod FASc
Professor Dr Agamutu Pariatamby FASc
Professor Dr Jinap Selamat FASc
Professor Dr Shamshuddin Jusop FASc
Professor Dr Tan Soon Guan FASc
Profesor Dr Abdul Manaf Ali FASc
Datuk Dr Abdul Rahim Nik FASc
Professor Dato' Dr Mazlin Mokhtar FASc
Professor Dato' Dr Mohd Azmi Mohd Lila FASc
Dr Rahimatsah Amat FASc
Professor Dato' Dr Rahmah Mohamed FASc
Professor Dr S Vikineswary Sabaratnam FASc
Professor Dr Ahmad Ismail FASc
Dr Ahmad Parveez Ghulam Kadir FASc
Dr Chow Keng See FASc
Professor Dr Mohd Ali Hassan FASc
Dr Rajinder Singh Harminder Singh FASc

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*Names in **bold** are 2016 Fellows*

MATEMATIK, FIZIK DAN SAINS BUMI
MATHEMATICS, PHYSICS AND EARTH SCIENCES

40 FASc

*Academician Datuk Fateh Chand FASc
Academician Professor Dato' Ir Dr Chuah Hean Teik FASc
Academician Dr Chia Swee Ping FASc
*Dato' Dr Chatar Singh FASc
*Tan Sri Datuk Ir Dr Ahmad Tajuddin Ali FASc
*Emeritus Professor Dato' Dr Mohd Sham Mohd Sani FASc
*Dato' Dr R Ratnalingam FASc
Dr Shaharir Mohamad Zain FASc
Emeritus Professor Dato' Dr Hassan Said FASc
Emeritus Professor Dato' Dr Ibrahim Komoo FASc
Dr Bahrom Sanugi FASc
Distinguished Professor Datuk Dr Harith Ahmad FASc
Professor Dr Kurunathan Ratnavelu FASc
Professor Dr Tou Teck Yong FASc
Emeritus Professor Dato' Dr Muhammad Yahaya FASc
Professor Dr Lim Ming Huat FASc
Professor Dr Wong Chiow San FASc
Professor Dato' Dr Roslan Abd-Shukor FASc
Professor Dato' Dr Rosihan Mohamed Ali FASc
Emeritus Professor Dr Lim Koon Ong FASc
Emeritus Professor Dr Fun Hoong-Kun FASc
Professor Dr Ong Seng Huat FASc
Professor Dr Abdul Halim Shaari FASc
Professor Dr Felix Tongkul FASc
Professor Dr Fredolin Tangang FASc
Professor Dr Mohd Shafee'a Leman FASc
Professor Dr Joy Jacqueline Pereira FASc
Professor Dr Wan Ahmad Tajuddin Wan Abdullah FASc
Emeritus Professor Dato' Dr Kamel Ariffin Mohd Atan FASc
Dr Low Kwai Sim FASc
Dr Mazlan Madon FASc
Professor Dr Norani Muti Mohamed FASc
Professor Dr Ng Kwan Hoong FASc
Dato' Dr Yap Kok Seng FASc
Professor Dato' Dr Mohd Yusof Hj Othman FASc
Professor Dr Ishak Hashim FASc
Professor Dr Raymond Ooi Chong Heng FASc
Dr Selliah Paramananthan FASc
Professor Dr Ramesh T Subramaniam FASc
Professor Dr Zainuriah Hassan FASc

SAINS KIMIA
CHEMICAL SCIENCES

35 FASc

*Academician Emeritus Professor Tan Sri Datuk Dr Augustine Ong Soon Hock FASc
*Academician Emeritus Professor Dato' Dr VG Kumar Das Govinda Panicker FASc
Academician Professor Dr Ho Chee Cheong FASc
Emeritus Professor Dr Ng Soon FASc
Datuk Dr Mohinder Singh S Sucha Singh FASc
Dr Goh Swee Hock FASc
Professor Datuk Dr Halimaton Hamdan FASc
Emeritus Professor Dato' Dr Md Ikram Mohd Said FASc
Dr Lee Chnoong Kheng FASc
Professor Datuk Dr Sukiman Sarmani FASc
Datuk Dr Choo Yuen May FASc
Professor Dr Ibrahim Abdullah FASc
Professor Dato' Dr Muhammad Idiris Saleh FASc
Dr Lai Yoong Wong FASc
Professor Dr Lee Soo Ying FASc
Professor Datin Dr Zuriati Zakaria FASc
Professor Dr Loh Teck Peng FASc
Professor Dr Rauzah Hashim FASc
Professor Dato' Dr Mohd Jamil Maah FASc
Professor Dr Ng Seik Weng FASc
Dato' Dr Laily Din FASc
Professor Dr Bohari Mohd Yamin FASc
Professor Dr Lee Hian Kee FASc
Professor Dr Yang Farina Abdul Aziz FASc
Professor Dato' Dr Musa Ahmad FASc
Professor Dr Noorsaadah Abd Rahman FASc
Professor Dr Lim Yau Yan FASc
Professor Dr Mohd Basyaruddin Abdul Rahman FASc
Professor Dr Sharifah Bee OA Abd Hamid FASc
Professor Dr Taufiq Yap Yun Hin FASc
Emeritus Professor Dato' Dr Wan Md Zin Wan Yunus FASc
Professor Dr Md Pauzi Abdullah FASc
Professor Dr Mohd Kamal Harun FASc
Professor Dr Wan Ahmad Kamil Che Mahmood FASc
Professor Dr Zanariah Abdullah FASc

Nota: Nama yang bertanda '*' adalah Felo Asas
Nama yang berhuruf **tebal** adalah Felo 2016
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*Names in **bold** are 2016 Fellows*

PEMBANGUNAN SAINS & TEKNOLOGI DAN INDUSTRI
SCIENCE & TECHNOLOGY DEVELOPMENT AND INDUSTRY

34 FASc

*Academician Emeritus Professor Tan Sri Dr Omar Abdul Rahman FASc
*Academician Emeritus Professor Tan Sri Dato' Dr Mohd Rashdan Baba FASc
*Academician Datuk Dr Abdul Aziz Sheikh Abdul Kadir FASc
*Academician Tan Sri Datuk Dr Yusof Basiron FASc
Academician Emerita Professor Datuk Dr Mazlan Othman FASc
*Tan Sri Dato' Ir Wan Abdul Rahman Wan Yaacob FASc
Tan Sri Datuk Yong Poh Kon FASc
Tan Sri T Ananda Krishnan FASc
Datuk Alladin Hashim FASc
Ir Mohamed Zohari Mohamed Shaharun FASc
Datuk Dr Saharan Haji Anang FASc
Dato' Dr Ong Eng Long FASc
Emeritus Professor Dr Jalani Sukaimi FASc
Datuk Dr Abdul Razak Mohd Ali FASc
Dato' Ir Lai Pin Yong FASc
Datuk Dr Soon Ting Kueh FASc
Datuk Dr Mohd Basri Wahid FASc
Professor Dato' Dr Ahmad Ibrahim FASc
Datuk Dr Ahmad Tasir Lope Pihie FASc
Tan Sri Professor Dato' Dr Dzulkifli Abdul Razak FASc
Dato' Dr Samsudin Tugiman FASc
Dr Wan Abdul Rahaman Wan Yaacob FASc
Dr Kalyana Sundram P Manickam FASc
Dr Kamarudin Ab Malek FASc
Datuk Dr Salmiah Ahmad FASc
Dato' Ir Andy Seo Kian Haw FASc
Dr Amir Hashim Md Yatim FASc
Ir Choo Kok Beng FASc
Datuk Fadilah Baharin FASc
Datuk Dr Mohd Yusoff Sulaiman FASc
Goh Peng Ooi FASc
Dr Ahmad Hezri Adnan FASc
Professor Dato' Dr Aishah Bidin FASc
Dato' Dr Sharifah Maimunah Syed Zin FASc

Nota: Nama yang bertanda '*' adalah Felo Asas
Nama yang berhuruf **tebal** adalah Felo 2016
Note: Names marked '' are Foundation Fellows*
*Names in **bold** are 2016 Fellows*

ASSOCIATES

29
members

Datuk Ir Abdul Kadir Mohd Din
Associate Professor Abdul Manaf Hashim
Associate Professor Dr Ahmad Fariz Mohamed
Associate Professor Dr Asan Ghani Abdul Muthalif
Associate Professor Dr Azmi Aris
Ir C Kamalesen Chandrasekaran
Dr Cheong Sok Ching
Professor Dr Chu Wan Loy
Professor Dr Darah Ibrahim
Associate Professor Ir Dr Goh Hui Hwang
Dato' Ir Haji Hanapi Bin Mohamad Noor
Professor Dr Khor Cheng Seong
Associate Professor Dr Leong Chee Onn
Professor Ir Dr Lim Yun Seng
Professor Dr Manickam Ravichandran
Professor Ir Mohamed Haniffa Hj Abdul Hamid
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ACRONYMS
AKRONIM

AHIIST – Hassan II Academy of Science and Technology
AI – Artificial Intelligence
AKEPT – Akademi Kepimpinan Pendidikan Tinggi
AR – Augmented Reality
ASEAN – Association of Southeast Asian Nations
ASM – Academy of Sciences Malaysia
BEM – Board of Engineers
BEV - Battery Electric Vehicle
CERN – European Organization for Nuclear Research
CIF – Community Innofund
CoC – Code of Conduct
CSSP – CERN Summer Student Programme
DURC – Dual Use Research of Concern
ESET – Emerging Science, Engineering and Technology
FASc – Fellow of Academy of Sciences Malaysia
FCV - Fuel Cell Vehicles
fintech – Financial Technology
FLAG – Friends of Langkawi Geopark
GDP – Gross Domestic Product
GLAM – Galleries, Libraries, Archives and Museums
GYA – Global Young Academy
HEV – Hybrid Electric Vehicle
HRDF – Human Resource Development Fund
ICSU – International Council for Science
ICSU ROAP – ICSU Regional Office for Asia and the Pacific
IDB – Islamic Development Bank
IIASA – International Institute for Applied Systems Analysis
IKM – Institut Kimia Malaysia
INTEGRITI – Malaysian Institute of Integrity
IoT – Internet of Things
IPR – Intellectual Property Rights
IRIS – Isfahan Regional Center for Technology Incubators and Science Park Development
ISIS – Institute of Strategic and International Studies
ISTF – Industry Steering Task Force
ISTIC – International Science, Technology and Innovation Centre for South-South Cooperation
IT – Information Technology
IYRES – Institute for Youth Research Malaysia
JMG – Department of Mineral and Geoscience
JST – Japan Science and Technology Agency
LADA – Langkawi Development Authority
LCA – Life Cycle Assessment
LLN – Lembaga Letrik Negara
MAG – Mitigation of Air Pollution and Greenhouse Gases Programme
MAKNA – Majlis Kanser Nasional/National Cancer Council Malaysia
MARA – Majlis Amanah Rakyat
MASTIC – Malaysian Science and Technology Information Centre
MCRCR – Malaysia Code Responsible Conduct of Research
MCY – Malaysia Commercialisation Year
MiGHT – Malaysian Industry-Government Group for High Technology
MITI – Ministry of International Trade and Industry
MNCU – Malaysian National Commission for UNESCO
MOE – Ministry of Education
MOFA – Ministry of Foreign Affairs
MOHE – Ministry of Higher Education
MOSTI – Ministry of Science, Technology and Innovation
MP – Malaysia Plan
MPMA – Malaysian Plastics Manufactures Association
MPN – Majlis Profesor Negara
MSAF – Mahathir Science Award Foundation
MSI – MOSTI Social Innovation
MTCP – Malaysian Technical Cooperation Programme
MyForesight – Malaysian Foresight Institute
NBOS – National Blue Ocean Strategy
NCDs – Non-Communicable Diseases
NCPP – National Centre for Particle Physics
NMD – National Member Organizations
NPSTI – National Policy on Science, Technology and Innovation
NRE – Ministry of Natural Resources and Environment
NSC – National Science Challenge
NSPP – National School for Particle Physics
NUOF – Newton Ungku Omar Foundation

PHEV – Plug-in-Hybrid Vehicle
PIAD – Psychological Intervention after Disasters
PISF – Penang International Science Fair
PMT – Project Monitoring Team
PUSPANITA – Persatuan Suri dan Anggota Wanita Perkhidmatan Awam Malaysia
R&D – Research and Development
R,D&C – Research, Development & Commercialisation
RBS – Ranjeet Bhagwan Singh
RCAP – Resilient Cities Asia-Pacific
RCR – Responsible Conduct of Research
S2A – Science to Action
SDG – Sustainable Development Goals
SIMSEA – Marginal Seas of South and East Asia
SME – Small Medium Enterprises
SSH – Super Science Highschool
STEM – Science, Technology, Engineering and Mathematics
STI – Science, Technology and Innovation
STRIDE – Science Technology Research Institute for Defence
TN50 – Transformasi Nasional 2050
TNB – Tenaga Nasional Berhad
TRSM – Top Research Scientists Malaysia
TVET –Technical Vocational Education & Training
UiTM – Universiti Teknologi MARA
UK – United Kingdom
UKM – Universiti Kebangsaan Malaysia
UM – Universiti Malaya
UNESCO – United Nations Educational, Scientific and Cultural Organization
UNIMAS – Universiti Malaysia Sarawak
UPM – Universiti Putra Malaysia
USM – Universiti Sains Malaysia
UTM – Universiti Teknologi Malaysia
VR – Virtual Reality
W2W – Waste to Wealth
WTTC – World Travel and Tourism Council
YSN-ASM – Young Scientists Network-Academy of Sciences Malaysia
YSSP – Young Scientists Summer Program

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