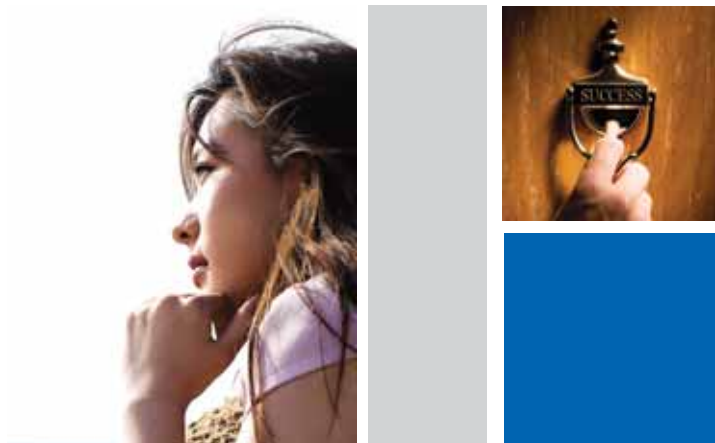


DIVISION OF ENGINEERING & TECHNOLOGY MANAGEMENT

FACULTY OF ENGINEERING

THE NUS ENGINEER - THINKER, INVENTOR, ENTREPRENEUR, LEADER





Mission

To educate global-leaders to lead technological innovation in industry and to promote interdisciplinary research with real world impact in Engineering/ Technology Management and Policy Development.

Vision

To be a globally distinguished, interdisciplinary department which pioneers education and research in engineering, technology and innovation management.



>> ABOUT D-ETM

A gem of an invention, discovery or new process is just that. It stays there, just as good as being on the shelf, unless it is developed further and refined, its commercial applications brought to the best use, and valued by the market.

This is exactly what the Division of Engineering & Technology Management (D-ETM) seeks to address – to better educate engineers/scientists to contribute to the management activities associated with bringing technology and innovation to the marketplace. A crucial objective is to instill the ability to see academic studies and research projects in broader contexts in a “user driven” approach, making their eventual usefulness to industry even more likely. The purpose - to provide thought leadership in areas such as Technology Strategy, Innovation Strategy, R&D Management, Intellectual Property Management, Systems Thinking, etc, and during the research process train PhD level graduates and create local case-studies which could be used to enhance the education programmes. The Centre for Management of Science and Technology (CMOST) was established in mid 2004 to lead this initiative. In 2007, CMOST was upgraded to be a full-fledge interdisciplinary academic department: D-ETM. The Division will in addition develop Engineering & Technology Management (ETM) modules for the undergraduate double-major in Engineering and Management of Technology.

In D-ETM, experienced lecturers in the Faculty of Engineering and School of Business are roped in to teach the key modules and do research. Academics from overseas and experienced managers from industry and research institutes, who are experts in their disciplines and experienced in bringing innovations to the marketplace, contribute to the programme by sharing their knowledge, leading case studies and motivating students, as Visiting Professors, Adjunct Professors or Associate Professors.

The Purpose -

to provide thought leadership in areas such as Technology Strategy, Innovation Strategy, R&D Management, Intellectual Property Management, Systems Thinking, etc, and during the research process train PhD level graduates and create local case-studies which could be used to enhance the education programmes.



Three coursework based programmes are offered. They are:

- Master of Science in *Management of Technology (MOT)*
- Master of Science in *IP Management (IPM)*
- Master of Science in *Systems Design & Management (SDM)*

Together they cover the following broad areas:

- Core modules in MOT
- Strategic Aspects of Technology Management
- Organizational Aspects of Technology Management
- Management of R&D, IP and Manufacturing
- Systems Engineering and Management

Through the programmes, students will gain and develop basic understanding and strategic thinking skills on a wide range of topics. They will learn how to:

- Manage technology planning and execution
- Project the impact of emerging technologies
- Analyse opportunities created by discontinuous innovation
- Plan and execute IP management strategies
- Design and implement key corporate strategies
- Apply Systems Engineering to design and manage complex systems
- Make decisions under uncertainty
- Build and lead effective teams



www.eng.nus.edu.sg/etm/Program/msc-mot.htm

MASTER OF SCIENCE IN MANAGEMENT OF TECHNOLOGY

The purpose of this programme is to train scientists, engineers or technology professionals, who are involved in decision-making teams for research and development, design, manufacturing, marketing and planning, with advanced business and technology management education, thus equipping them with the "Science" of technology and business innovation. They will contribute better to the management activities associated with bringing technology and innovations to the marketplace with attractive returns on investment.

Applicants should have a Bachelor's Degree in Science, Computing or Engineering with 2nd class Honours or its equivalent from a university with recognized standing. Those with relevant working experience are considered favourably.

A full-time or part-time candidate for the degree of MSc in MOT must successfully complete a programme of study consisting of 40 Modular Credits (MCs).

At least 16 MCs from the list of core modules:

- Management of Technological Innovation
- Finance for Engineering & Technology Management
- Systems Approach to Project Management
- IP Management
- Management of Industrial R&D

24 MCs from list of core and elective modules, including:

- Decision Analysis
- Strategic & New Product Development
- Management and Organization
- Systems Engineering
- Knowledge Management
- Creativity and Innovation
- User-centred Engineering and Product Development
- Corporate Entrepreneurship
- Analyzing High Tech Opportunities
- Technology Intelligence & IP Strategy

APPLICATION

DETAILS

Applicants should have a **Bachelor's Degree in Science, Computing or Engineering with 2nd class Honours or its equivalent from a university with recognized standing**. Those with relevant working experience are considered favourably.

Each module is typically 4 MCs and the class meets 3 hours per week in the evenings for 13 weeks. Part-time students normally take 2 years to complete the programme, while full-time students would be able to complete in 1 year.

For more information, please visit the programme website:

<http://www.eng.nus.edu.sg/etm/Program/msc-mot.htm>



www.eng.nus.edu.sg/etm/Program/msc-ipm.htm

MASTER OF SCIENCE IN IP MANAGEMENT

In today's knowledge economy, intellectual properties (IP) are business assets that must be effectively managed in order to unlock their commercial potential for the sustained growth of technology-related businesses.

This programme, jointly offered by the Faculty of Engineering and the Faculty of Law, NUS and administered by the IP Academy, Singapore, is an interdisciplinary post graduate programme in IP management which bridges law, technology, science, engineering and management. It is targeted at mid to senior management professionals with a background in science, technology or engineering who wish to specialize in the management of IP in a technology related business.

Applicants must have completed a Bachelor's Degree with 2nd Class Honours or its equivalent from a university with recognized standing. Candidates with relevant working experience are considered favorably.

A full-time or part-time candidate for the degree of MSc in IP Management must successfully complete a programme of study of 40 Modular Credits (MCs) consisting of the following two key components:

PROGRAMME	I) Intellectual Property Law (IP Law)	II) Management of Technology
MODULES	<p>Students will have to take all the modules in this list, equivalent to 20 MCs. They provide detailed coverage of the relevant laws.</p> <ul style="list-style-type: none"> • Introduction to Law • The Law of Trade Marks and Unfair Competition • The Law of Copyright and Design • The Law of Patents and Trade Secrets • Special Topics 	<p>Students will have to complete 20 MCs, selected from a list which includes:</p> <ul style="list-style-type: none"> • Management of Technological Innovation • IP Management • Management of Industrial R&D • Strategic & New Product Development • Creativity and Innovation • Knowledge Management • Corporate Entrepreneurship • Analyzing High Tech Opportunities • Technology Intelligence & IP Strategy

APPLICATION

Applicants must have completed a **Bachelor's Degree with 2nd Class Honours or its equivalent from a university with recognized standing**. Candidates with relevant working experience are considered favorably.

Students are able to complete the programme within 1 ½ (full time) to 2 years (part time).

For more information, please visit the programme website:
<http://www.eng.nus.edu.sg/etm/Program/msc-ipm.htm>



www.eng.nus.edu.sg/etm/Program/msc-sdm.htm

MASTER OF SCIENCE IN SYSTEMS DESIGN & MANAGEMENT

Engineering systems is an important new field of study focusing on the complex engineering systems in a broad human, societal and industrial context. It takes an integrative holistic view of large-scale, complex, technologically enabled systems which have significant enterprise-level interactions and socio-technical interfaces.

The programme is targeted to train candidates with a background in a technical field like engineering, science or computing with knowledge that enables them to deal with the complexity of issues, look at problems in a broader perspective and acquire specific management skills. At the same time, it enables them to consolidate and validate their project management experience through key engineering system concepts and methodology, hence significantly reducing the time to gain develop expertise.

A full-time or part-time candidate for the degree of MSc in SDM must successfully complete a programme of study consisting of 40 Modular Credits (MCs).

Core Modules

Candidates have to take all the modules in this list.

- Systems Architecture
- Systems Engineering
- Knowledge Management
- Systems Approach to Project Management

Electives

The electives are organized into 2 different foundation areas.

Candidates have to take at least 2 modules from the list in each foundation area.

Systems Methodology and Management

- Management & Organization
- Management of Technological Innovation
- Cost analysis & Engineering Economy
- Applied Forecasting Methods
- Decision Analysis
- Large Scale Systems Engineering
- Topics in Systems Engineering
- Applied Policy Analysis

Systems Application

- Transportation Management & Policy
- Intermodal Transportation Operations
- Global Infrastructure Project Management
- Manufacturing Systems Engineering
- Industrial Logistics
- Strategic & New Product Development
- Project Engineering
- Sludge & Solid Waste Management

Part-time students normally take 2 years to complete the programme while full-time students would be able to complete in 1 year.

For more information, please visit the programme website:

<http://www.eng.nus.edu.sg/etm/Program/msc-sdm.htm>

APPLICATION

DETAILS

Applicants should have a **Bachelor's Degree in Science, Computing or Engineering with 2nd class Honours or its equivalent from a university with recognized standing**. Those with relevant working experience are considered favourably.

Graduate Certificate (GC) in Management of Technology (MOT)

The main objective of introducing the Graduate Certificate (GC) Programme in Management of Technology (MOT) is to supplement the scientific or technical capabilities of graduate students and practising engineers/managers in Design, R&D and other technology-related functions. It will provide them with sufficient basic knowledge of MOT which will help them to accelerate their career development in technology and innovation management in due course.

The programme is open to all research-based graduate students in the Faculty of Engineering, School of Business, Faculty of Science and School of Computing of NUS. Applications are also open to Non-NUS Graduate Students by Research who meet the graduate admission criteria for course-work or research-based graduate programmes in the Faculty of Engineering. Applicants from industry and research institutes will also find this programme attractive as it is conducted in the evening.

Students must complete a total of 16 MCs (i.e. 4 modules) from the following list of modules. At least 8 MCs (2 modules) must come from Set 1, while the remaining MCs (or modules) from Set 2. If they pass with a satisfactory grade, they will earn the Graduate Certificate. Students are expected to complete the programme within 1 year.

Set 1 Modules

Students must take at least 8 MCs (2 modules) from the following:

- IP Management
- Management of Industrial R&D
- Management of Technological Innovation

Set 2 Modules

8 MCs to come from either Set 1 or the following:

- Creativity and Innovation
- User-centred Engineering and Product Development
- Strategic and New Product Development
- Corporate Entrepreneurship
- Analyzing Hi-Technology Opportunities
- Systems Architecture
- Systems Engineering
- Knowledge Management

For more detail, please refer to:

http://www.eng.nus.edu.sg/etm/educational_program_gc.htm



Undergraduate Programmes in Engineering & Technology Management

Minor in Management of Technology

The objective of the Minor programme is for graduates to improve their appreciation of effective management functions in a technical and interdisciplinary environment typical to technology oriented business. Graduates would know business implications of technology and be able to appropriately use technology. This programme is offered to undergraduates in the Faculty of Engineering, Faculty of Science and School of Computing. Graduates who complete the programme will be able to understand market forces and the financial implications of technology investment.

The Minor in MOT programme is open to undergraduates in Faculty of Business, Science and School of Computing who will be in their second or third year of studies. Students must complete 6 modules, equivalent to 24 modular credits. Students will be exposed to foundation knowledge that cover management and organization, marketing, accounting, and legal, as well as areas in technological innovation, technology management strategy, systems thinking and product development.

Double (Second) Major in Management (Technology)

The purpose of the Double Major programme is to equip engineering students with a good foundation of engineering and technology management principles so that they could quickly understand decision making in the organization when they start working, and hence enhance their appreciation and learning of technology management skills. They would also be recognized as potential engineer-leaders in the emerging knowledge-based economy as the knowledge learnt would accelerate their development of management interests and skills. Students who are more entrepreneurial will also be exposed to broader, complex issues of innovation challenges that will better prepare them in the execution of their business plans.

Students may be admitted to the programme by invitation just after they had been offered admissions to NUS, or by students during their first or second year of study. To fulfill the requirements of the Major in Management (Technology) programme, students are to complete 12 modules worth 48 modular credits in total. In addition to the topics covered in the Minor in MOT programme, students will take modules that cover project management, technopreneurship, decision sciences, finance, applied mathematics, systems engineering and management of technology.



For more detail, please refer to:

http://www.eng.nus.edu.sg/etm/educational_program_undergraduate.htm

Research in ETM

The Engineering & Technology Management (ETM) research programme will produce PhDs who will become future research leaders in academia or in industry. Students may be full-time research scholars or part-time graduate students who are working on related technology innovation challenges in companies.

The following table gives a sample of the current PhD level research interests/projects in ETM.



Broad Area	Topics
Technology Change	Understanding the evolutionary perspective of technology in high-tech industries. The roles of technological discontinuities and vertical integration and/or disintegration in the evolution of industries, and then implications for both incumbents and entrepreneurs.
Innovation Policy	<p>The dynamics of emergence and growth of high-tech industrial clusters.</p> <p>Singapore's role as the centre and hub of innovation in Asia, especially in new areas such as Interactive & Digital Media, Solar Energy and Environmental Engineering.</p> <p>Commercialization of university technology.</p>
Innovation Strategy	<p>Barriers and facilitators of Discontinuous Innovation (including Disruptive Technologies and Innovator's Dilemma); to identify opportunities in new fields such as MEMS, OLEDs, VLSI, Specialty Chemicals, Biomedical Devices, Solar Cells, etc.</p> <p>Secondary Innovation with a focus on process innovation; case studies of companies in Singapore and China.</p> <p>Core competence, Open Innovation and Disruptive Innovation; IPs in Disruptive Innovation.</p>



Example of specific research projects:

A Framework for Analyzing Disruptive Technologies

This project aims to address two important questions:

- (1) What types of technologies are more likely to facilitate disruptive innovation?
- (2) Is there a systematic method for creating such technologies?

Academic research on disruptive innovation has in the past focused rightly on business model and other management issues. We shall instead explore the front-end issue of creating and managing the development of such technologies.

Doctor of Philosophy (PhD) and Research Based Degrees

Research degree programme includes an element of coursework in the same or related fields. This provides a graduate-level foundation and prepares the students for research. The doctoral coursework component comprises not less than 24 MCs (typically 6 graduate modules). There is also a required coursework of "seminars" where doctoral students are expected to attend at least 20 seminars and also deliver at least 2 presentations of his/her research work. Participation in seminars is an integral part of graduate study as it helps to enhance knowledge, broaden research outlook, sharpens thinking and improves communications skills.

A doctoral candidate must complete the prescribed set of modules before proceeding to the Ph.D Qualifying examination (QE). The QE comprises a comprehensive written examination and a Ph.D proposal which include an oral presentation. The comprehensive written examination is typically taken within the 1st year of studies while the Ph.D proposal is done within the 2nd year.

For more details, please refer to:

http://www.eng.nus.edu.sg/etm/educational_program_postgraduate_meng_and_phd.htm



Modules offered in undergraduate Programmes

▶▶ **MT3001 Systems Thinking and Engineering**

This module offers students a foundation for analyzing diverse elements of a complex problem as a coherent, interacting system. The major topics covered include comparison of reductionist to systems thinking, characteristics of systems thinking, frameworks and tools of Systems Thinking and Systems Engineering, applied in the context of Engineering and Technology Management.

▶▶ **MT4002 Technology Management Strategy**

Students will learn about the nature of technology and innovation, the related management strategies including marketing aspects – all illustrated by cases. Technology concepts will be explained: - “S curves” (which model how technology develops over the years) discontinuities – with their threats and innovation opportunities; the disruptive, sustaining, incremental and radical developments, and the diffusion of technology throughout the world. Technology and product road mapping, and the various ways that technology becomes incorporated, or gives rise to, new products and services will be explained. The management of technologists, idea creation, creative organizations, managing technology discontinuities, intellectual property will also be covered.

▶▶ **MT4003 Engineering Product Development**

The module objectives are for the students to learn about the fundamentals of the engineering management of new product development and R&D commercialization including the management of product definition, design, the technology, concurrent engineering development, prototyping, testing, and product. An overview of the full development process will also be explained so that the students understand the related activities of marketing and finance – including total life-cycle costing.



Modules offered in postgraduate Programmes

▶▶ **MT5001 IP Management**

This module focuses on the management of IP assets which have become more valuable than conventional physical assets in a knowledge economy. It will present the different needs and strategies of IP owners and those who own the complementary assets such as manufacturing, marketing and distribution. Both the commercialisation strategies for maximization of IP values and the feedback to management to improve decision making at the R&D and corporate strategy levels will be addressed.

▶▶ **MT5002 Management of Industrial R&D**

The first part of this module will introduce the 3rd generation R&D practice which is used currently by successful industrial organisations. The strategic role of R&D in innovation, organisation issues in R&D and the evaluation of returns and risks will be presented. The second part of this module will introduce the emerging 4th generation R&D practice which will augment the current practice in addressing news issues due to discontinuous innovation, increasing importance of tacit knowledge and the need to embrace knowledge management in R&D.

▶▶ **MT5003 Creativity and Innovation**

The first part covers the fundamentals of creativity and includes topics on different ways of thinking, understanding and communications, methods for inventive thinking and problem solving (e.g., TRIZ). The second part studies innovation and how creativity can lead to innovation. Examples, case studies (e.g, "breakthroughs") and exercises are used throughout to demonstrate concepts in practice. The course aims to equip the students with knowledge and provide an avenue for students to practice concepts learned so as to enhance the students' creative thinking ability and thereby facilitate the student's ability to realize innovations.

▶▶ **MT5004 User-Centred Engineering & Product Development**

The first part covers fundamentals of User-Centred Engineering, various techniques and tools for obtaining Voice of Customers, Data analyses, Utilization of multi-source data, and application of these to create decision support tools for product Design and implementation of Product Development roadmaps. The second Part covers case studies in different product domains with relevant small projects to familiarize students with the various usability-engineering processes and reinforce classroom learning. The course aims to provide the students with knowledge of user-centred engineering principles and tools and equip them to manage and better leverage User-centred Engineering resources in product development.

▶▶ **MT5005 IP Law for Engineers and Scientists**

The fields of science and engineering have a direct correlation to the creation and protection of intellectual property (IP). This module intends to offer the engineering and science students an introduction of Intellectual Property Law, emphasizing more on patent related subjects like patentability, IP rights and patent rights. It aims to equip the students with a practical IP knowledge which leads to a handy resource for them to use in the professional career. The main topics covered are: Overview of IP Law, Technological Aspect of Patent law and Practice, and Business Aspect of IP Management.

▶▶ **MT5006 Strategic and New Product Development**

This module introduces students to new, emerging concepts in the management of new product development. The entire new product development process, from the initial idea generation and screening phase to the final commercialization and monitoring phase, is examined. Project selection models, project organization, interdepartmental interface, technical and marketing issues are included in the topics discussed. Materials will be drawn from real-life industrial practices and state-of-the-art research findings. Lectures, case study readings and discussions will be used.

▶▶ **MT5007 Management of Technological Innovation**

The aim of this module is to help students develop a strong conceptual foundation for managing technological innovation. It introduces concepts and frameworks for how firms can create, commercialize and capture value from technology-based products and services. The module is designed for business managers and engineers who are involved in the research and development, marketing, acquisitions, and strategic assessments of new technologies. Topics covered include (1) the evolution of industries; (2) technological discontinuities and vertical disintegration; (3) network effects and standards; 4) profiting from innovation and intellectual property (IP); 5) R&D management; and 6) managing knowledge and learning.





nurture engineer- leaders with a global outlook

▶▶ **MT5008 Corporate Entrepreneurship**

Entrepreneurship is to the company what speed is to the athlete. In the quest for sustainable competitive advantage, companies are finding that lower costs, higher quality and better customer service are not enough - they must be faster, more flexible, more aggressive and more innovative. Most managers acknowledge this, but few seem to understand how to make it happen. Thus, the focus of this module will be on creating work environments where entrepreneurship is not the controversies, and students will be challenged to develop and defend their opinions regarding these matters. Students will take their ideas, concepts, tools and frameworks to which they are exposed and apply them both in a series of real world cases to perform an entrepreneurial audit of the company they are working for, and also come up with proposals of how their company could become more entrepreneurial.

▶▶ **MT5009 Analyzing Hi-Technology Opportunities**

The aim of this module, unlike entrepreneurship courses, is not to teach students the financial and legal processes involved with creating a firm, acquiring funding, hiring people, and protecting intellectual property. Rather, it is to help students identify and analyze entrepreneurial opportunities in high technology industries through the use of multidisciplinary problem solving in complex systems. After introducing key concepts and using them to describe the history of five industry sectors/systems, students will be asked to focus on analyzing and review specific entrepreneurial opportunities.

▶▶ **MT5010 Technology Intelligence & IP Strategy**

This module aims to equip students with strategic insights and analytical skills of technology, intellectual property and business competition. Effective collection and transformation of information into competitive intelligence requires a comprehensive awareness of enterprise niches and alternatives, as well as the search and analytical skills of data / information. It needs a thorough understanding of the strategic frameworks and decisions with regard to business, technology and IP. This module covers four main topics: (1) Theory and practice of strategic analysis, (2) Technology competition models, (3) In-house IP management and strategy, and (4) Hands-on training of information search and intelligence analysis.



▶▶ **MT5011 Finance for Engineering and Technology Management**

The objective of this course is to train technical professionals to grasp the “big picture” of finance and understand important financial concepts. Students will be able to understand how business decisions and market events affects cash flow, profits and financial position, use numbers for effective management decisions, analyze the real performance of a business unit, improve business planning, evaluate forecasts of sales, spending, profits, and the viability of business opportunities. At the end of the course, students will learn why managers need to be proficient with numbers and be equipped with finance knowledge to better manage a business division or company.

▶▶ **MT6001 Research in Tech & Innovation Management**

This course surveys theory and research on innovation and technology management. This includes models of technological change, technological discontinuities, vertical integration versus disintegration, organizational design, competencies / capabilities, and management of R&D. Through readings, papers, and discussions, students will know about conceptual and methodological issues, how innovations are developed over time, and the processes leading to successful / unsuccessful development, adoption and implementation of innovations.

▶▶ **SDM5001 Systems Architecture**

Systems Architecture deals with principles of implementation and evaluation of complex systems. Developing architecture is the most abstract function in system/product development. The course examines various notions of systems architecting (including aspects of organizational and information architecture) and offers principles and tools for its development. A wide variety of real-world case studies (including examples of transportation, utility, electronic, mechanical, enterprise, etc.) will be drawn upon. The course addresses issues such as dealing with legacy and change, enterprise-wide interoperability as well as support for knowledge management.



▶▶ **SDM5002 Systems Engineering**

Systems Engineering is an interdisciplinary approach to realize the successful creation of systems that meet customer and stakeholders requirements with due consideration of the system's performance and impact over the entire life-cycle. The module covers the fundamental methods and concepts of this approach including those to surface system requirements; architect options and alternatives; model systems; evaluate performance; and analyze tradeoffs.

▶▶ **SDM5003 Knowledge Management**

As the knowledge economy and globalization intensifies, the field of knowledge management is becoming crucial to corporate competitiveness. Knowledge Management (KM) is conceptualized as a strategy for improving organizational performance through a set of processes, tools and incentives designed to help people create, share, and integrate knowledge. The main idea is that knowledge can be purposefully managed in order to improve knowledge transfer, its re-use, adaptation to rapidly changing environments, and the creation of new products and services. Module covers: (i) basic concepts of the nature of knowledge and its creation; (ii) organizational culture and learning organizations; (iii) explicit and tacit knowledge as well as knowledge artifacts; (iv) technology and its role in knowledge creation, sharing and management; (v) the information professional and ethical considerations.

Advisors

International Advisory Panel

- To advise and provide a mechanism for regular exchange of views relating to both medium and long term planning and development of the division's programmes covering both teaching and research.
- To foster closer relationship and cooperation with overseas institutions.

Professor Mike Gregory

Head, Division of Manufacturing and Management, Department of Engineering
University of Cambridge

Professor Ho Teck Hua

William Halford Jr. Family Professor of Marketing
Marketing Group, Haas School of Business
University of California, Berkeley

Professor Granger Morgon

Lord Chair Professor in Engineering
Head, Department of Engineering and Public Policy
Carnegie Mellon University

Department Consultative Committee (DCC)

- To foster closer relationship and cooperation with private and public sector institutions
- To provide a mechanism for regular exchange of views relating to the long term planning and development of the Department in both teaching and research

Dr Jeffrey Chi

Managing Director, Vickers Venture Partners

Mr Ho Cheng Huat

Executive Vice President, Exploit Technologies Pte Ltd

Dr Thomas Hies

Head of R&D/PD, Seimens Medical Instruments Pte Ltd

Dr Richard Kwok Wai Onn

Executive Vice-President/ Chief Technology Officer, ST Kinetics

Mr Tan Hong San

Chief Operating Officer, BBS Access Pte Ltd

Mr Keith Leong

Manager, Public Sector, Tech. Solutions Group, Hewlett-Packard Singapore Pte Ltd

Internal Members:

Prof Hang Chang Chieh (Chair of DCC)

Head of Division

A/Prof Marcelo Ang

Deputy Head of Division

PROFILE OF **STAFF**

Geared For The Millennium's Challenges -
Thinker, Inventor, Entrepreneur, Leader



Professor Hang Chang Chieh (Head)

Professor Hang Chang Chieh worked as a Control Systems Engineering in the Shell Petroleum Co. from 1974 to 1977. In the National University of Singapore (NUS) he served in various positions from 1977 to 2000, including being the Deputy Vice-Chancellor (1994-2000). He completed a 3-year full-time secondment as Executive Deputy Chairman of the Agency for Science, Technology and Research from 2001 to 2003. He has been appointed Head, Division of Engineering & Technology Management, and Chairman of Management Board, Interactive & Digital Media Institute of NUS since July 2007.

He received the Ph.D degree in control engineering from the University of Warwick, England, in 1973. He was

elected Fellow of the Institute of Electrical and Electronics Engineers USA, in 1998 and Foreign Member of the Royal Academy of Engineering, UK, in 2000. He was awarded the 1998 Public Administration Medal (Gold) and the 2000 National Science and Technology Medal. He was awarded the IES/IEEE Medal of Excellence in 2004, and Singapore Public Service Medal in 2008.

His experience in technology management is increasingly tapped by industry. He has served as Board Member of three public listed companies since 2000. He was appointed Chairman of Autron Corporation in 2001. He has continued to serve in public service. He has been Chairman, Intellectual Property Office of Singapore, since 2001.



Associate Professor Marcelo H Ang Jr (Deputy Head)

A/Prof Marcelo H. Ang, Jr. received the B.S. degrees (Cum Laude) in Mechanical Engineering and Industrial Management Engineering from the De La Salle University, Manila, Philippines, in 1981; the M.S. degree in Mechanical Engineering from the University of Hawaii at Manoa, Honolulu, Hawaii, in 1985; and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Rochester, Rochester, New York, in 1986 and 1988, respectively.

In 1989, A/Prof. Ang joined the Department of Mechanical Engineering of the National University of Singapore, where he is currently an Associate Professor. In addition to academic and research activities, he is actively involved in the Singapore Robotic Games as its founding chairman. His research interests span the areas of robotics, mechatronics, automation, computer control, creativity and innovation, and applications of intelligent systems methodologies.



Associate Professor Jeffrey Lee Funk

A/Prof Funk graduated with a Bachelor of Science in Physics at California Polytechnic State University in 1978. He then moved on to obtain his Masters and PhD degree with Carnegie Mellon University in 1985, specializing in Engineering and Public Policy.

A/Prof Funk was in Japan for more than a decade before joining NUS in August 2007. He has extensive teaching experience at Hitotsubashi University's Innovation Research Centre and Kobe University's Research Institute of Economics and Business & Graduate School of Business. He has planned and taught various courses on Entrepreneurship and New Industry Creation, Innovation and Technology Management, Network and Information Industries and Internet Strategy to many Japanese students in these educational institutes. Prior to his stay in Japan,

he has also taught courses on Organizational Design, Quality Control, and Manufacturing Strategy at The Pennsylvania State University.

A/Prof Funk's research focuses on the evolution of technology and industry from strategic, economic, and entrepreneurial viewpoints. He is the author of four books and his papers have appeared in journals such as Organization Science, Research Policy, IEEE Transactions on Engineering Management and Telecommunications Policy. In 2004, A/Prof Funk received the DoCoMo Mobile Science Award for lifetime contributions to the social science aspects of mobile communications. He had also done consulting work for various companies such as Nokia, Bouygues Telecom, Hutchison Telecom, NTT DoCoMo, Panasonic, etc.



Visiting Professor Frans Carpay

Professor Frans Carpay obtained his PhD in Chemistry (1968) from Utrecht University in the Netherlands. He has almost 40 years of experience in Research & Development in many different positions. He joined Philips Corporate Research in Eindhoven, the Netherlands in 1964, spent one year in Bell Labs, Murray Hill, New Jersey (USA) in 1973/74. During this period in research, he held the positions of researcher, senior researcher and research manager (group leader), respectively. From 1980 till 1988, he was responsible within Philips and the Philips JVs with Control Data Corporation (now Seagate) and later with DuPont for the development of the optical discs, like VLP (video long play), CD, CD-ROM, etc. The first CDs in the world have been produced under his leadership. His position in these JVs was, respectively, Director, Vice President and CTO. The R&D Groups, he managed, were located in the Netherlands, England, Germany and the USA. As CTO of the Philips-DuPont venture (PDO) he had the worldwide responsibility

for technology in all PDO R&D centers and factories (7 locations in Europe and in the USA).

From 1993 to 2002, Prof Carpay was seconded to Singapore as the Managing Director of Gintic Institute of Manufacturing Technology (now Singapore Institute of Manufacturing Technology) to help Singapore to put in place R&D to upgrade the local manufacturing industry and to further develop Singapore's indigenous technological capabilities. He was then attached to A*Star-Exploit Technologies Pte Ltd as the Director responsible for Technology Transfer to the Local Industry.

In September 2001, Prof Frans Carpay was awarded the National Science and Technology medal of A*Star for his outstanding contributions in leading the institute to benefit industry in Singapore.



Visiting Professor Joseph Kasser

Before joining NUS, Prof Kasser gave up his positions as a Deputy Director and DSTO Associate Research Professor at the Systems Engineering and Evaluation Centre at the University of South Australia in early 2007 to move back to the UK to develop the world's first immersion course in systems engineering as a Leverhulme Visiting Professor at Cranfield University. Prior to joining academia, he was a practicing systems engineer and manager for 30 years in the domains of space flight hardware, telemetry tracking and control, control electronics and ground station data processing systems. He has a Doctor of Science in Engineering Management from The George Washington University, a certified Membership of the Association for Learning Technology (CMALT), and an International Council on Systems Engineering (INCOSE) Fellow.

Prof Kasser's recent awards include receiving the Best Paper, Systems Engineering Technical Processes track, at the 16th Annual Symposium of the INCOSE, 2006, and the 17th Annual Symposium of the INCOSE, 2007. He also received letters of commendation and certificates of appreciation from various employers and satisfied customers, including the Australian Defence Materiel Organization, University of South Australia, Systems Engineering Society of Australia (SESA), United States Office of Personnel Management (OPM), University System of Maryland, Computer Sciences Corporation (CSC), Communications Satellite Corporation (Comsat), American Society for Quality (ASQ), Association for Quality and Participation (AQP) and the American Radio Relay League (ARRL).



Visiting Professor Charles Lee

Prof Charles Lee grew up in mainland China and Taiwan, but has since lived his adult life in America from 1963. He began his business career at Sperry Univac and AT&T, where he did corporate strategy and business development work. In 1977, he joined Exxon Enterprises, and two years later switched to XDC (Xerox Development Corporation) - venture capital offspring of their parent firms.

In 1981, he founded his own venture capital firm, Abacus Ventures. Over the years, his team has developed Abacus (now Charles Lee Enterprises) into a leading

venture capital firm specializing in information technology with an international scope. The team has helped launch new technology firms such as Pliant Systems (formerly BroadBand Technologies), TranSwitch, and OTI (now a part of MCI Worldcom).

Prof Lee attributes his success to being a bicultural person – deeply Chinese and yet successfully American - and his mission for ameliorating Chinese-American relations. He is also the author of the book "Cowboys and Dragons: Shattering cultural myths to advance Chinese/American Business".



Visiting Professor Liu Shang-Jyh

Professor Liu Shang-Jyh is currently the Professor and Director of the Graduate Institute of Technology Law, Director of Legal Center for Enterprise and Entrepreneurship, National Chiao Tung University (NCTU), Taiwan. Prof Liu obtained his Ph.D in Industrial Engineering from Texas A & M University in 1984 and LLB from National Taiwan University in 1992.

Prof Liu established the first University IP Program in Taiwan in 1994 and have trained more than 3000 patent engineers in Taiwan. The patent engineers are from various organization in turn have contributed significantly to the aggressive IPR portfolio of Taiwanese companies.

In year 2000 he created the Graduate Institute of Technology law which was the first of its kind in Taiwan's legal education. The Institute introduced a new paradigm of legal research emphasizing the empirical study instead of the statute interpretation which the traditional civil law system has taken as a core of legal study for a long time.

He has established collaborations with IP Academy Singapore, John Marshall Law School (Chicago), Duke University, University of Illinois-Urbana Champagne (UIUC), USA, and other top universities in Europe and China.

Prof Liu is an Advisor and Consultant to more than 50 technology-based private companies in Taiwan, Hsinchu's Science Park, as well as 15 government agencies and research institutes.



Visiting Professor Ron Sanchez

Ron Sanchez is Professor of Management at Copenhagen Business School (Department of Innovation and organisational Economics. Prior to these positions, Dr. Sanchez was Professor of Strategy and Technology Management at IMD (International Institute for Management Development), Lausanne, Switzerland.

Prof. Sanchez has a PhD in Technology Strategy, MS in Civil Engineering, BS in Architecture and BS in

Humanities and Science from MIT and an Executive MBA (with honors) from Saint Mary's College of California. His research interests include theory and practice of competence-based strategic management; modularity in product, process, and knowledge architectures; knowledge management and strategic organizational learning; options theory in strategic management; and strategic flexibility.



Adjunct Research Professor Charanjit S Bhatia

Prof Bhatia was appointed Temasek Professor with the NUS Faculty of Engineering in 2001. An eminent research/advance technologist who has worked with IBM and later with Hitachi Global Storage Technologies (HGST), he also spent 20 years collaborating with UC Berkeley, CA and other premiere search labs worldwide in Data Storage research. He was the first researcher from industry to be appointed as the Temasek Professor where he spearheaded the setting up of a new-state-of-the-art clean room facility, Information Storage Materials Laboratory (ISML) in ECE department, NUS. ISML has enabled extensive research to develop capabilities in the fabrication of small features for studies for Spintronics and Magnetic media applications. For the last 15 years, Prof Bhatia has been a team leader of the US based

Information Storage Industry Consortium (INSIC), Extremely High Data Recording (EHDR)'s Tribology project.

Prof Bhatia joined NUS and IMRE in August, 2007. He has recently received the IBM Faculty Award 2008 for his project on Fabrication, Characterization and Performance of Thin film Si Photovoltaic (PV) cells. He also received a Distinguish Contribution Award from INSIC for his long term contribution to Data Storage research and road mapping for 10 Terabit/in². He is currently working on a Joint Study Agreement (JSA) with IBM which would facilitate additional research projects where NUS can collaborate with a team of world-class research scientists at IBM's T J Watson Research Centre at Yorktown Heights, NY.



Adjunct Research Professor Low Teck Seng

Dr. Low Teck Seng graduated with the B.Sc. (First Class) and Ph.D, in 1978 and 1982 from Southampton University, United Kingdom. He founded the Magnetics Technology Centre in 1992, which was the predecessor of Data Storage Institute. Under Dr. Low's leadership the Institute grew, and is now recognized as one of leading research institutions in this area of research. In 1998, he became the Dean of the Faculty of Engineering, NUS. During his tenure, he initiated four faculty level multi disciplinary laboratories, the Laboratory for Concurrent Engineering and Logistics (LCEL), the Laboratory for Biomedical Engineering (LBME), the Large Scale Systems Laboratory (LSSL) and the Information Storage Materials Laboratory (ISIM). In 2002 he led a team to start the Republic Polytechnic, and was appointed its Principal/CEO. He recently joined Parkway Holdings as Group Senior Vice President and CEO of Parkway Education.

Dr. Low is well networked both locally and internationally. He was a Director of the Institution of Electrical and Electronics Engineer (IEEE) in 2001 and 2002, and chaired the IEEE's Strategic Planning Committee in 2004. He was also a Director of Semicaps Corporation, and was instrumental in spinning out another company, Laser Research. He now chairs the A*STAR's Thematic Strategic Research Programs and Singapore's national initiative in Nanoelectronics. He is also a Board member of the Health Science Authority (HSA) and the National Community Leadership Institute (NACLI).

For his leadership in Science and Technology Management and the development of research in Data Storage Technologies in Singapore, he was awarded Singapore's highest honor- the National Science and Technology Medal in 2004. At the 2007 Singapore National Day he was awarded the Public Administration Medal (Gold) by the government of Singapore.



Adjunct Research Professor Budiman Sastra

Prof Budiman graduated cum laude as MSc at the Delft University of Technology, Faculty of Mechanical Engineering in 1978. He started his career as a research scientist at Philips Research Laboratories in Eindhoven in 1978. For his contributions in the field of mechatronics he was awarded the "KIVI Speurwerkprijs" in 1995.

Since 1988 his career in technology management evolves at MNC's in the Netherland, Japan and Korea in the area of information storage, precision engineering and displays. His last position in industry was Executive Vice

President and Chief Technology Officer of LG.Philips LCD (1999-2007).

Since 2007 he was responsible for Technology Planning as Programme Director of the Science and Engineering Research Council (SERC) of the Agency for Science, Technology and Research (A*STAR) in Singapore, In this responsibility he is developing the next 5 year plan in Science & Technology based on Social and Economic themes relevant to Singapore.



Adjunct Professor Soo Kok Leng

Prof Soo was with Hewlett-Packard Singapore (Pte) Ltd for about 20 years during which he was involved for 15 years in various aspects of management in the integrated circuits business. This included being responsible for worldwide operations based on Oregon, U.S.A. from Sep'89 to Feb'92 after which he was HR Director for HP South East Asia. Since 1996 to 2002, Prof Soo was the Ex Dir/Group GM of Falmac Ltd and later the Managing Director of 3 Com Technologies.

Prof Soo is currently the Chairman/Director of ST Electronics Ltd and Mt Faber Leisure Group (Pte) Ltd. He also acts as the Director of Cradance Services (Pte) Ltd, MediaCorp

Singapore (Pte) Ltd and Tiger Airways (Pte) Ltd. In addition, he is the Corporate Advisor to Temasek Holdings (Pte) Ltd and ST Engineering Ltd. Prof Soo has also held appointments as Chairman and Director of many corporations in the past, including JTC Corporation, 3 Com Asia Pacific (Pte) Ltd, Singapore Cruise Centre (Pte) Ltd, Wildfire Reserve Singapore (Pte) Ltd and APS (Pte) Ltd.

Prof Soo's main interests are in Systemic Strategic Management and Cultural Fluency. He had presented seminars and provided consultancy to various local and multinational companies both here and as far as Nigeria, Africa.



Adjunct Associate Professor John Bauly

Dr John Bauly (FIEE, FIMech.E) has a track record of over 30 years of hands-on commercially successful technology management and new product development (NPD). He holds the "Certification of NPD Practitioner" awarded by the Product Development and Management Association of the USA. He was a key member of the founding group that set up the NPD and Technology Management "Time to Market Association" in the UK, in collaboration with the UK Government's Department of Trade and Industry. His career in industry covers technology management and development, NPD and business management.

His international experience includes time working in the USA and Japan as well as the UK and several European countries as director for technical, R&D and business management, and as a consultant. At NUS for the past 5 years, his publications, research, teaching and administration work are on the management of technology, NPD and technopreneurship – with emphasis on the status of those in Singapore.



Adjunct Associate Professor Stanley Lai

Dr Stanley Lai graduated from the University of Leicester with an LLB (Hons) degree in 1992. He obtained an LLM from the University of Cambridge in 1994, and commenced his PhD research at the University of Cambridge in the field of technology law and computer software copyright. He completed his doctorate in three years, and is the first Singapore-born lawyer to have been conferred a PhD in Law from the University of Cambridge.

Dr Lai is currently the head of Intellectual Property & Technology at Allen & Gledhill. He practises corporate and commercial litigation as well as intellectual property and information technology law, with a particular emphasis on e-commerce transactions, telecommunications regulatory compliance, intellectual property and technology litigation, licensing (including open-source licensing), franchising

and on-line and off-line enforcement against piracy and counterfeiting. He regularly advises clients on branding strategy, trade mark portfolio management and trade mark dilution. More recently, Dr Lai has been active in advising clients on the regulatory regime governing all aspects of clinical trials, the supply of medical equipment to clinical trial sites, as well as the promotion of approved/non-approved drugs. His clients include Amgen, Mundipharma, UCB, Abbot Labs and Pfizer.

Dr Lai sits on the panel of adjudicators for the resolution of domain name disputes under the Singapore Domain Name Dispute Resolution Policy. He is also a non-executive director of Singapore Technologies Aerospace Ltd and also serves as a member of the Board of Governors of the Intellectual Property Academy of Singapore.



Adjunct Associate Professor Andrew Ng

A/Prof Andrew Ng is a certified Management Consultant and CEO of GREATER CHINA CONSULT, a leading consultancy group that specialises in strategic business development consultancy in the China Market as well as assisting China based companies in their global business development ventures. Before he started his own consulting practice, he spent 10 years in the high technology industry as Managing Director, Asia Pacific for Control Data Corporation (CDC) and Seagate Technology, and as Area Vice President (Asia Pacific) of Schwan Stabilo.

A/Prof Ng has over 20 years of international marketing and business development experience working with various Fortune 500 MNCs in the high technology and fast moving consumer goods industries. A veteran in the China market, he has spent the last 21 years in various

business development appointments. He was solely responsible for setting up the distribution network in 28 cities and building up the businesses profitably for Control Data, Seagate & Schwan Stabilo in China. He has vast experience in spearheading High Tech Start-ups, Joint Venture negotiations and management of various China Ventures.

A/Prof Ng's fortes are strategic business development, International Marketing, nurturing High Tech start-ups and E Business. He holds a Master in Business Administration degree from National University of Singapore and is also a Fellow of The Chartered Institute of Marketing, UK. He was also honoured with the "Spirit of Enterprise" award 2003 for outstanding entrepreneurial achievements.



Adjunct Associate Professor Tham Ming Po

Dr Tham Ming Po has a BA (Hons) in Psychology from the University of Calgary, and an MA in Experimental Psychology and PhD in Engineering Psychology from the University of Illinois at Urbana-Champaign.

He has held senior R&D management positions in MNCs, including serving as Motorola's Manager for Human Factors Engineering in Singapore and China; Regional Director of Human Factors Engineering for Dell Global BV; Director of Honeywell's Advanced Technology Labs in Singapore and Beijing ; Chief Technology Officer in Honeywell's Automation and Control Solutions business in Asia Pacific. He has also served as a consultant to clients in the Defence, Manufacturing, Web business and Banking industries.

His early training and research activities were in the Human Factors Engineering domain and centered on information displays, error analyses, usability engineering and operator's performance in complex systems. His current research interest focuses on the socio-cultural elements and expertise sharing processes vital to sustaining innovative New Product Development and R&D organizations which are heavily dependent on offshore resources. In a related area of interest, he focuses on user-centered design and ethnographic techniques that would enable Product Development teams to capture "unarticulated needs" and create the desired user experience for global consumers.

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