ITEM FOR FINANCE COMMITTEE

HEAD 47 – GOVERNMENT SECRETARIAT:
OFFICE OF THE GOVERNMENT CHIEF INFORMATION
OFFCIER

Subhead 700 General non-recurrent New Item "Enriched IT Programme in Secondary Schools"

Members are invited to approve a new commitment of \$75 million under Head 47 – Government Secretariat: Office of the Government Chief Information Officer for the implementation of Enriched Information Technology Programme in Secondary Schools.

PROBLEM

With the development of Information Technology (IT) in almost all spheres of economic activity, we expect an increasing demand for IT talents in all respects. We need to identify and cultivate young IT talents early to meet the development needs of a digital society.

PROPOSAL

- 2. The Government Chief Information Officer (GCIO), with the support of the Secretary for Commerce and Economic Development and the Secretary for Education, proposes to create a new commitment of \$75 million to implement, on a pilot basis, a two-pronged Enriched IT Programme in Secondary Schools (Programme) to be launched in the 2015/16 school year for eight years until 2022/23. The proposed Programme comprises two elements
 - (a) enriched IT classes (IT Class) in up to eight selected secondary schools (partner schools) for providing intensive IT training to students who are interested and talented in IT; and

(b) enriched IT activities (IT Activities) to be organised by secondary schools to foster a pro-IT atmosphere and stimulate interest in IT in the school community.

JUSTIFICATION

Grooming IT Talents

- 3. Early exposure and interest nurturing through interesting and practical IT training is a means to sustain students' continuing interest in IT. Through participating in project-based learning and competitions, students can appreciate the creative nature and versatility of computing in everyday lives. There are many examples of renowned IT talents around the world who were inspired at a young age before they became leading figures in the IT sector. To identify such gifted young people earlier, the Financial Secretary announced in the 2014-15 Budget that we plan to incorporate enrichment programmes in secondary schools which are outstanding in IT education. By so doing, we hope to cultivate young IT professionals and even entrepreneurs to meet the development needs of a digital society.
- 4. Schools are the best ground to scout and develop IT talents. Early exposure coupled with intensive training on logical thinking and creative problem solving in students' formative years is conducive to nurturing them into innovative and capable IT professionals and tech entrepreneurs. In recent years, many cities are making IT studies a rigorous academic discipline in the secondary curriculum, and some advanced economies have set up special secondary schools to groom IT talents through collaboration with the IT industry and tertiary institutions. A brief summary of these reference cases is at Enclosure 1.

Provision of intensive IT training to students through IT Class

IT Class

Encl. 1

5. We propose to select up to eight partner schools which will set aside one class of normal size in each form from Secondary 2 to Secondary 6 for more intensive IT training. While IT Class students will study the school curriculum alongside their peers in other classes, they will devote two to three extra hours a week for a more structured and advanced IT curriculum, seasoned with professional exposures and project-based learning to develop their computational thinking, problem-solving ability, creativity and innovative talents. The advanced IT curriculum will be jointly developed by the partner schools, tertiary institutions, IT professional bodies and renowned IT industry corporations.

6. IT Class students will gain more in-depth and technically-advanced IT knowledge as well as relevant project-related experience and exposure. Some if not all are expected to be able to attain industry-recognised certificates such as Java Programming, Cisco Certified Network Associate and Oracle Database Administration. If they choose to pursue a vocational career, i.e. not attending post-secondary studies, they can readily join the employment market; if they pursue post-secondary studies, they would have a certain edge over the others. Either way, the pool of IT practitioners and talents would be enlarged.

- 7. Having gone through such structured and focused training and with hands-on experience at an early age, the potential of these students would be better realised and it is more likely that they would have a continuing interest in the subject as they pursue further studies or embark on their careers. They would be proficient in computational thinking and capable of using such ability to innovate and design solutions at a young age, which would enable them to move further and faster with higher achievements in their studies and careers.
- 8. The proposed learning targets and the proposed curriculum Encl. 2 framework for IT Class students are set out at Enclosure 2.

Partner Schools

- 9. The partner schools will be tasked to provide intensive training to the IT classes according to a custom-designed curriculum (paragraph 5 above refers), and organise IT Activities for the benefit of IT Class students as well as students from other schools. The support of the tertiary institutions, IT professional bodies and renowned IT corporations would be enlisted to devise the curriculum, undertake collaborative teaching, and arrange internship and exposure opportunities. In view of the intensive commitment and heavy involvement of industry bodies and tertiary institutions, we propose to confine the number of partner schools to a manageable size of eight.
- 10. All local secondary schools will be invited to submit proposals to run IT Class for eight school years from 2015/16 to 2022/23. The proposals will be assessed by an evaluation panel comprising representatives from Office of the Government Chief Information Officer, Education Bureau and the Curriculum Development Council in accordance with the criteria drawn up by the Steering Committee on Enriched IT Programme to be led by GCIO (paragraph 19 below refers). Some key criteria proposed to be adopted are outlined as follows –

/(a)

¹ Except private schools and international schools

The Curriculum Development Council (CDC) is an advisory body to give advice to the Government on matters relating to curriculum development for the local school system. The CDC comprises members from multiple stakeholders, including school principals and teachers, parents, tertiary institutions, the Hong Kong Vocational Training Council, the Hong Kong Examinations and Assessment Authority, the Education Bureau, as well as professionals from business and technology fields.

- (a) school's IT curriculum and pedagogy;
- (b) availability of Information and Communications Technology (ICT) subject for Hong Kong Diploma of Secondary Education (HKDSE) and the ICT academic results;
- (c) school's IT teaching team;
- (d) track record in organising or participating in IT activities (e.g. seminars, IT and informatics competitions, and exposures to IT facilities and companies, etc.);
- (e) school's IT facilities; and
- (f) track record in sharing of IT teaching resources and experience.

The evaluation panel will be accountable to the Steering Committee on the choice of the partner schools.

- 11. We propose to start the IT Class from Secondary 2. This would allow time for new Secondary 1 students to settle in the new secondary school learning environment and allow the partner schools to observe and to identify students with interest and talents in IT. Furthermore, partner schools which have the capacity and whose students have the ability to cope with a more advanced IT curriculum at HKDSE years would also be able to start with Secondary 4 in tandem with Secondary 2 when we roll out the Programme in the 2015/16 school year. This arrangement will ensure that higher form students with interests and talents would not be missed out.
- 12. We expect professional IT teachers to take charge of the IT Class. They will also be responsible for administering and organising activities for the IT Class and serve as mentors for IT Class students. Each partner school will be given an annual grant of \$200,000 to administer and run each IT class.
- 13. To make optimal use of IT Class resources to benefit more students, each partner school will have to run at least three IT Activities each year for students in other schools.

Provision of IT Activities to foster pro-IT atmosphere in secondary schools

14. For the school community as a whole, to create a pro-IT atmosphere and stimulate interest in IT, in addition to partner schools, we would encourage interested schools to organise IT Activities for secondary students.

15. Such activities would aim at enriching IT learning outside subject-based curriculum and providing opportunities for applying IT knowledge and nurturing creativity through IT or IT related activities such as short-term intensive programmes to prepare students for IT competitions, coding and programming workshops outside normal school curriculum, IT projects or codefest, short courses in apps development, seminars in business intelligence, those akin to 'sand-box' concepts of simply allowing students to design their own solutions, etc.

16. All local secondary schools would be invited to submit applications to organise IT Activities. Interested schools may partner with tertiary institutions, industry bodies or commercial organisations. We expect to fund up to 30 activities a year. Each proposal will be assessed and selected by the Steering Committee (paragraph 19 below refers) on individual merits, and the selected proposal will be granted up to \$50,000.

Expected Benefits

- 17. The benefits and success of the programme will be measured by a range of indicators, including
 - (a) the number of students who have gone through the IT Class;
 - (b) the number of IT Activities organised;
 - (c) the number of participating students in IT Activities; and
 - (d) curriculum and pedagogy of the IT Class and deliverables of the IT Activities shared among secondary schools.
- 18. We hope that the programme will enliven the secondary school students' (and the schools') interest in IT and the concepts behind the subject, thereby identifying talents early and enticing more students to pursue ICT as a HKDSE subject and attain better results. We recognise that whether students will take up IT as a study subject or as a career depends on many other factors including the public perception of IT as a profession and the opportunities that it offers, perceived career prospects offered by other academic disciplines, etc. We would refrain from drawing a direct relationship between students taking up IT subjects or IT as a career and the programme. Nonetheless, given the pervasiveness of IT in practically all economic and social domains, students well-equipped with advanced IT knowledge through the Programme would be more adept in applying IT in driving their business.

PROGRAMME MONITORING AND REVIEW

19. A Steering Committee would be set up to advise, co-ordinate and monitor the implementation of the Programme, including IT Class and IT Activities. It will draw up the curriculum, advise on the IT Activities to be funded under the Programme, and enlist commitment from relevant organisations to make the Programme more effective. The proposed terms of reference and composition of the Steering Committee are at Enclosure 3.

- 20. Partner schools are required to submit annual teaching plan and performance report to the Steering Committee and report progress to the Steering Committee regularly throughout the school year. To cater for unexpected changes in circumstances, covering for instance a drop in the resources of the IT teaching team, support and commitment of the school, or failure to deliver the commitment to organise three IT Activities each year for students in other schools, etc., OGCIO would consult the Steering Committee and work with stakeholders on improvement measures such as intensive coaching to the school and/or fallback options. Partner schools are also required to keep a separate ledger account for the Programme. Any unspent provision granted to the partner schools will be clawed back by the Government after the end of the pilot programme.
- As the two-pronged Enriched IT Programme in Secondary Schools is a novel arrangement, we will review its outcome and effectiveness in 2017-18, i.e. two years after the implementation of the Programme, and thereafter in 2020-21 decide on the way forward. We will report progress on the implementation of the programme regularly to the Legislative Council (LegCo) Panel on Information Technology and Broadcasting (ITB).

FINANCIAL IMPLICATIONS

Encl. 3

22. We estimate that a non-recurrent commitment of around \$75 million is required to implement the programme for five-year IT Classes for four cohorts and to support IT Activities for secondary schools starting from the 2015/16 school year. The indicative breakdown and cash flow requirements by financial years from 2014-15 to 2022-23 are as follows

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	Total
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
(a) IT Facilities	4,000	4,000								8,000
(b) IT Support Services		400	800	1,200	1,600	1,600	1,200	800	400	8,000
(c) Class Grant		2,000	4,000	5,600	6,800	6,400	4,800	3,200	1,600	34,400

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	Total
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
(d) IT Activity		1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	12,000
(e) Promotion &Facilitation	600	750	750	750	750	750	750	750	750	6,600
(f) Upgrade IT facilities				1000	1000	1000	1000	1000	1000	6,000
Total	4,600	8,650	7,050	10,050	11,650	11,250	9,250	7,250	5,250	75,000

- 23. On paragraphs 22(a) and 22(b) above, the estimate of \$16,000,000 is for provision to partner schools for acquiring, enhancing, maintaining and operating IT facilities to support the teaching and learning of a more intensive and advanced IT curriculum from 2014-15 to 2022-23.
- 24. On paragraph 22(c) above, the estimate of \$34,400,000 is for provision of class grant to eight partner schools for eight school years from 2015/16 to 2022/23 for administering IT classes, with the assumption that two partner schools will start at Secondary 4 in addition to Secondary 2 in 2015/16.
- 25. On paragraphs 22(d) and 22(e) above, the estimate of \$18,600,000 is for supporting IT Activities, as well as promotion and sharing of deliverables of IT Class and IT Activities such as the teaching materials among the school community and interested stakeholders from 2014-15 to 2022-23.
- 26. On paragraph 22(f) above, the estimate of \$6,000,000 is for necessary upgrading and addition of IT facilities, equipment, software and services in tandem with technological advancement during the relevant period.
- 27. OGCIO will oversee the implementation of the programme from within its existing resources.

IMPLEMENTATION PLAN

28. Subject to funding approval by the Finance Committee (FC) of the LegCo, we plan to invite all local secondary schools to submit proposals by the fourth quarter of 2014. We aim to announce the selected partner schools about two months after close of invitation.

29. In the first half of 2015, partner schools will work in collaboration with industry and tertiary institutions to draw up the enriched IT curriculum and programme, as well as to enhance their IT facilities to support the mode of teaching and learning. Partner schools should have selected students for the IT classes before summer, and to commence the first IT class in September 2015.

30. The proposed implementation plan is as follows –

	Activities	Target Completion
(a)	Submission of proposals	The fourth quarter of 2014
(b)	Selection of partner schools	The fourth quarter of 2014/ first quarter of 2015
(c)	Upgrading of IT facilities and drawing up enriched IT curriculum	by June 2015
(d)	Enrolment of first cohort of IT Class students	by July 2015
(e)	Commencement of the Programme	by September 2015

PUBLIC CONSULTATION

- 31. In March and April 2014, we organised five consultation and exchange sessions with relevant stakeholder groups including the school councils, IT teacher associations, tertiary institutions, IT professional bodies and IT industry corporations on the proposed implementation arrangements. There was broad support for the Programme.
- 32. We consulted the LegCo Panel on ITB on the proposal on 9 June 2014. Members were generally supportive and raised no objection to submission of the proposal to FC for funding approval.

BACKGROUND

33. Embedded in practically all economic sectors, IT is a major driving force for continuous social and economic developments, underpinning innovation, competitiveness and long-term prosperity. According to the manpower survey of

the IT sector³ conducted by Vocational Training Council in collaboration with the Census and Statistics Department in 2012, there were over 78 000 IT practitioners in Hong Kong. The manpower of IT sector grew by 18% from 2008 to 2012, which was among one of the fastest growing sectors. With increasing development of IT in almost all spheres of economic activity, we can expect an increase in the demand for IT talents in all respects: as programmers, system analysts and designers, IT architects and engineers, IT security specialists and auditors, innovators and technopreneurs.

- In Hong Kong, Computer Literacy is a subject in the junior secondary curriculum to develop students' computer literacy with an understanding of fundamental concepts of computers. For senior secondary, ICT is one of the HKDSE elective subjects. In 2013, about 7 900 candidates (9.7% of total) took ICT in the HKDSE Examination. In comparison, there were significantly more candidates taking other science subjects such as Physics (18.7%), Chemistry (21.2%) and Biology (22.0%).
- 35. Given the many competing academic and career disciplines, students with IT talents may not choose to pursue IT in senior secondary and in tertiary education. However, there is an increasing demand for IT talents and professionals. According to the above 2012 manpower survey, we need about 2 900 IT degree graduates and 1 800 IT sub-degree graduates joining the IT industry every year. The relatively small pool of secondary students showing interest in IT may not be conducive to the sustainable development of IT manpower for Hong Kong.

Office of the Government Chief Information Officer Commerce and Economic Development Bureau July 2014

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The Manpower Survey of the Information Technology Sector is a biennial survey conducted by the Vocational Training Council in collaboration the Census and Statistics Department since 1983. The main objectives of the manpower survey are to collect detailed information on existing manpower situation and training needs of the IT sector, to project manpower demand, and to recommend measures to meet industry needs.

Overseas Experience

United States

Academy of Information Technology (AOIT)

In the United States, the National Academy Foundation in 2000 launched the Academy of Information Technology (AOIT) in 12 high schools with support from major telecommunications providers and Information and Communications Technology (ICT) corporations including AT&T, Alcatel-Lucent, Verizon, Hewlett-Packard Company, Oracle Corporation, and United Technologies Corporation. At present, there are over 100 academies in different parts of the States.

- 2. The AOIT curriculum provides high school students (Grades 9 to 12, which is equivalent to Hong Kong's Secondary 3 to 6) with a series of career exploration courses, which use project-based learning techniques with an emphasis on strengthening literacy, project management, leadership, and team building skills while fostering creativity and innovation. The curriculum is vetted by industry professionals to ensure that the content is current and relevant. Academy graduates complete universities faster, earn more, and have stronger ties to their communities than their peers.
- 3. Crooms AOIT in Florida is one of the most distinguished public high schools. It has become a dedicated magnet school that provides innovative teaching and learning in a technology-enriched environment, engaging students in an academically challenging curriculum so as to prepare them for post-secondary education with industry validated technology skills. In addition to graduating with a regular high school diploma and a National Academy Foundation Certificate, every student will also attain a wide variety of industry recognised Information Technology (IT) certifications. It has close connection with leading IT companies.
- 4. Another AOIT, the Union County AOIT in New Jersey, a public high school, specialises in both information technology and business. Students are selected based on their grade point average attained in Grade 7 and Grade 8 examinations and assessments on Mathematics & Reading Comprehension, and Writing Skills. This AOIT offers students the opportunity to attain industry recognised certifications such as Microsoft Office Specialist, CompTIA A+ Certification, Oracle Database Programming and Oracle Java Programming. Through an agreement with the New Jersey Institute of

Technology (NJIT), students can earn college credit and continue their education at NJIT after graduation. Its graduates are accepted by a number of renowned colleges and universities such as Princeton University and University of California.

Pathways in Technology Early College High School (P-TECH) in New York

5. P-TECH is a career and technical education and STEM (science, technology, engineering and math) public school that weaves high school and college curriculums into a six-year program (Grades 9 to 14 comprising four years of high school and two years of college) tailored for a career in the technology industry. It is a collaborative effort with the New York City Department of Education, City University of New York, New York City College of Technology and IBM. There is no academic screening for admission. Students will work towards an associate degree in applied science in computer systems technology or electromechanical engineering technology. IBM has promised P-TECH graduates preferential hiring upon graduation.

Academy for Software Engineering (AFSE) in New York

6. AFSE is a public high school (Grades 9 to 12) designed to meet the need for computer programmers as the tech industry expands in New York City. There is no academic screening for admission. A Career and Technical Education certificate will be awarded upon graduation. AFSE has connections with companies like Google, eBay, Facebook and FourSquare with members from these companies to serve as student mentors and provide internships to students.

United Kingdom

- 7. In the United Kingdom, Mathematics and Computing Colleges were introduced in 2002 as part of the Government's Specialist Schools Programme in secondary colleges. These colleges are expected to disseminate good practice and share resources with other schools and the wider community. At present, there are about 200 Mathematics and Computing Colleges.
- 8. The Broadoak Mathematics and Computing College in North Somerset is a high performing specialist Maths and Computing School (Key Stage 4 to 5, which is equivalent to Hong Kong's Secondary 4 to 7). Students at Key Stage 4 (Secondary 4 to 5) will be required to study for the Edexcel Diploma

in Digital Applications as well as the Business and Technology Education Council Certificate in IT. Students acquire current, relevant and up-to-date knowledge of ICT which would give them a competitive edge when entering higher education and the employment market.

Australia

9. Hamilton Senior High School is a comprehensive public school (Year 8 to 12, which is equivalent to Hong Kong's Secondary 2 to 6). It won the Western Australian Top Public Schools Award for five of the last six years. Its Specialised ICT course for Year 8 to 10 students is accredited by the Western Australia Department of Education. Students of this course will be able to explore a diverse range of career pathways and access direct links to industry standard courses. Hamilton works in partnership with Murdoch University, Challenger TAFE and Communications and Design Management Australia with arrangement to allow students to access online resources of these institutions and to enhance their ability to gain entry into tertiary institutions.

Proposed Learning Targets for Students of Enriched Information Technology (IT) Classes

Junior Secondary (S2 – S3) IT Class

- 1. The learning targets of junior secondary IT Class are to develop students' interest, curiosity and aptitude in IT, and capability and capacity in problem solving, logical reasoning and abstraction, and innovation and creativity. Students will take part in programming projects and application development to practise coding, fundamental logic, abstraction and problem solving skills, as well as industrial visits to enterprises with excellent application of IT to broaden their horizon.
- 2. After two years of junior secondary education, IT Class students are expected to attain IT certifications related to programming and animation, desktop, mobile and digital media operation commonly recognised by the IT industry such as SQL Programming, Microsoft Office Specialist and Adobe Certified Associate. They will have a strong foundation for further development in IT.

Senior Secondary (S4 – S6) IT Class

- 3. After Secondary 3, students in the IT classes are encouraged to take Information and Communications Technology (ICT) for their Hong Kong Diploma of Secondary Education (HKDSE) or IT courses offered by other institutions (e.g. advanced or credit-bearing courses). As they have received vigorous IT training while in junior secondary, we expect them to be able to handle the HKDSE ICT curriculum with ease, leaving ample capacity to develop technical and business competencies required for further IT professional education or participation in the IT industry.
- 4. Students will learn advanced concepts and techniques related to writing programs and developing software. They will work with multiple levels of abstraction and implement algorithms in different programming languages. They will develop application systems to deliver practical business solutions, while capable of manipulating different computational artifacts including music, images, visualisations, textual and numerical data. In Secondary 6, training will be more focused on communication and collaboration abilities in a broader business and industrial context.

- 5. The learning targets of senior secondary IT Class are to develop their higher order thinking, logical reasoning and abstraction, problem solving skills, creativity and competencies in integrating technological know-how with business requirements. Students will be given a diversified menu of learning activities such as
 - (a) Hands-on and project-based learning in software design, visual and digital design, application development, networking and infrastructure, and applications of IT in geographic information system, business intelligence and data analytics, etc., to develop authentic problem-solving abilities;
 - (b) Participation in major local and international IT and robotic competitions such as the Asia Pacific ICT Alliance Awards (APICTA), the International Olympiad in Informatics (IOI), the IT Challenge, the Infomatrix and the FIRST Robotics Competition to stretch their creative and innovation talents and to develop their leadership and entrepreneurial skills; and
 - (c) Internship and placement opportunities tailored around students' interests to understand the IT profession and careers.
- 6. Graduates are expected to have in-depth and technically advanced IT knowledge, as well as relevant project-related experience and exposure. Some if not all, are expected to be able to attain industry recognised certificates such as Java Programming, Cisco Certified Network Associate, and Oracle Database Administration. If they choose to pursue a vocational career, i.e., not attending post-secondary studies, they can readily join the employment market; if they pursue post-secondary studies, they would have a certain edge over the others.
- 7. Having gone through such structured and focused training and with hands-on experience at an early age, the potential of these students would be better realised and it is more likely that they would have a continuing interest in the subject as they pursue further studies or embark on their careers etc. They would be proficient in computational thinking and capable of using such ability to innovate and design solutions at a young age, which would enable them to move further and faster with higher achievements in their studies and careers.

Proposed Curriculum Framework for Enriched IT Classes

Secondary 2	Computational Thinking Skills	 Programming Principles (Mobile Computer Graphics & 2D Anim Internet & Data Communication 	ation	Small Scale Projects such as Sandbox, Mobile Apps, 2D Animation				
Secondary 3	Algorithmic Problem Solving Skills	 Programming Principles (Web & 3D Modelling & Augmented Re Location-based & Wireless Tecl Radio Frequency Identification) 	eality hnologie	Small Scale Projects such as Robotics Control, Digital Map Application, e-Book, 3D Visualisation				
Secondary 4	Software Development Principles	Programming (Database & SpatComputer-aided Design3D Animation		Ligita XV Process		ation Systems Development Projects t of Sale, Geographic Information System, 3D Animation		
Secondary 5	System Management Principles	 Programming (Object Oriented Concepts) Software Testing Methodologies System Security Framework 	Ap (e.g. find custome manage	IT in Business Applications e.g. finance, logistics, customer relationship management, building management)		Advanced R Technology	Things nalytics t Virtual Reality Robotics Control & Intelligent Sensing	Internship
Secondary 6	Leadership, Collaboration & Communication B			z Business gence	•		cryption & Intrusion Detection	

Proposed Terms of Reference and Composition of the Steering Committee

Terms of Reference

- 1. To provide steer, oversee, coordinate and monitor the implementation of Enriched IT School Programme;
- 2. To consider and formulate curriculum enrichment and work-based learning activities for Enriched IT Classes;
- 3. To evaluate, select and monitor Enriched IT Activities;
- 4. To consider and resolve matters of concerns encountered during programme implementation; and
- 5. To review the Programme.

Composition

Chairman

Government Chief Information Officer (GCIO)

Members

- Representatives of Education Bureau
- Representative of Curriculum Development Council
- Representatives from universities and tertiary institutions
- Chairman, Hong Kong Academy for Gifted Education
- Chairman, Hong Kong Association for Computer Education
- Chairman, Association of I.T. Leaders in Education
- Representatives from IT professional bodies and industry corporations
- Representatives from partner schools
- Deputy GCIO, Office of the Government Chief Information Officer (OGCIO)
- Chief Systems Manager, OGCIO
