Planning for Operation:
An e-Service Approach

by Andrew Wong, Joseph Lee, and Carol Wu

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INTRODUCTION

Operations of an open and distance learning (ODL) institution cover a wide range of academic and administrative management activities that are considered very much "core business" of the institution. Traditionally, such activities involve and require a large number of staff to manage the activities. As demand for service generally grows with more sophisticated and demanding clients whilst funding tightens, ODL institutions are facing a squeeze to find ways to "do more with less". Providing student services online has been taking a central role in the operations of an academic institution especially for open and distance learning and continuing education. As argued in the "Guide to Developing Online Student Services" of WECT,

"If a student has sought the anywhere, anytime convenience offered by online courses and programs, he or she should not have to travel to campus for administrative or other support services." (Krauth, B. & Carbajal, J. 2000) http://www.wcet.info/resources/publications/guide/guide.htm

However, it should be noted from the outset that whilst most students welcome more online services, not all students are suited for online learning. Bold (2005) found in her evaluation of a master's programme that graduate students are much more capable of independent learning as they tend to be the self-

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directed sort. This suggests strongly that self-discipline is crucially important for success in studying online.

This paper outlines the range of typical operations of an ODL institution and attempts to argue for the need to adopt an integrated online services approach to design the operational systems. Where appropriate, examples based on the experience of an existing institution in Hong Kong (HKU SPACE of the University of Hong Kong) were related to illustrate the practical side of designing and managing the online environment for learning and for student services. Such an online environment suggested that supporting the learners and the teachers, and supporting the administration should be the operational systems that is fully networked and integrated

INTEGRATING OPERATIONAL AREAS & A NETWORK OF FUNCTIONS

Broadly speaking, an ODL institution, and for that matter, practically all educational institutions at the tertiary level must in one form or another provide a combination of the following services to support either the academic or administrative functions, which essentially to support the learners either directly or indirectly: (see Table on Next page)

These operational systems are needed to support a repeating cycle of services (see Figure 1) to students on an on-going basis. The early stages of programme planning and development can also be considered on a repeating cycle as the shelf-live of ODL materials are short. Therefore, continuous updating or redevelopment is often necessary

Manage Multiple Channels of Communication

As students who study at a distance are mostly part-time and do not generally have substantial on-campus component in

their study, the institution cannot rely upon face-to-face contacts to communicate with its students. Effective and efficient communication among students, between students and teachers, and between students and the administration are therefore crucially important in the successful delivery of programmes and provision of student services. Most institutions employ multiple channels of communications in communications with the students and staff, which include:

- ❖ Letters
- ❖ Delivery by couriers
- ❖ Telephone
- ❖ Fax
- ❖ Voice portal
- ❖ SMS
- ❖ Emails
- ❖ Chat room & forum (under LMS)

Judging from their feedback, students in Hong Kong favour more and more the electronic communication channels such as emails, voice portals, SMS and asynchronous channel under LMS. The synchronous channel has been less popular with HK students even though there is no barrier of different time zones, although ICQ, MSN and Google Talk are popular in their private use.   A later section of this paper will discuss a web-based strategy for information management and communication.
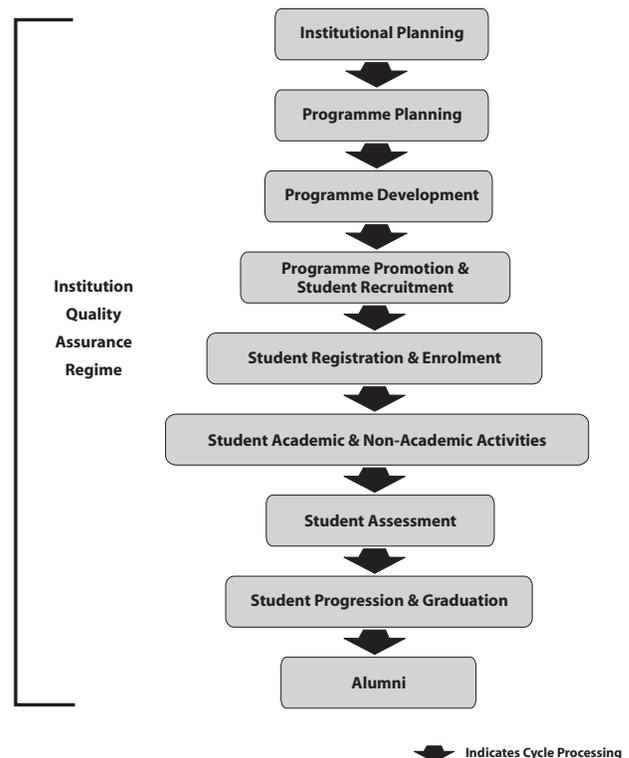
Learning Support	Administrative Support	Marketing and Financial Management
■ Learning support system/ learning management system (LMS)· ■ Library (learning resources management)	■ Student admission (pre-admission counseling) & registration· ■ Student record management (assessment results, transcripts, certification, graduation)· ■ Timetabling and scheduling of teaching resources	■ Marketing strategy ■ Financial management ■ Collaboration arrangement ■ Franchise management

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PROGRAMME PLANNING AND DEVELOPMENT

A good learning experience is possible only if the contents of study programmes are well designed and the interlinking of modules put together with appropriate learning objectives and expected outcomes defined. Whilst this is clearly academic planning and development, the operational systems should nevertheless be designed with suitable exploitation of technology to support such academic activities. Essential elements, including commitments of teaching units and policy

Figure 1. Conceptual Diagram of Programme Academic Cycle

Institution Quality Assurance Regime

- Institutional Planning
- Programme Planning
- Programme Development
- Programme Promotion & Student Recruitment
- Student Registration & Enrolment
- Student Academic & Non-Academic Activities
- Student Assessment
- Student Progression & Graduation
- Alumni

◄► Indicates Cycle Processing

support from senior management (Schauer, J. et. al. 2005), to a successful launch of an online course would depend on the following:

- ❖ Effective integration of technology and ODL.

- ❖ Teaching unit's commitment to and familiarization with online learning.

- ❖ Appropriate incentives for teachers to blend e-learning into their traditional design of programmes and delivery methods.

- ❖ Support from upper management in the school's strategic plan and policies.

- ❖ Security and reliability of technology supporting online learning.

- ❖ Appropriate instructional design and IT support.

- ❖ Effective training to learners, teachers and administrators to help them play their respective roles.

- ❖ Handling of intellectual property - both clearance of copyrights of external materials and management of internally generated materials.

Programme Promotion: Online Programme Information & e-Marketing

Delivering Programme Information Online

The main advantage of providing course and programme information online, i.e., an online prospectus, is to exploit the powerful *online search* capability of web pages as well as the dynamic nature of web. For an institution with large number of programmes, to provide comprehensive information using the print media is just not feasible. It is both costly and too bulky to handle. Successful delivery of online programme information, together with other admission and enrolment information will require:

- ❖ Build the online prospectus on the platform of a proven CMS (content management system). CMS enables course administrative staff to update the content of the their course website and ensure the content is most up-to-date.

- ❖ A strong editorial group to ensure that the quality of the web design as well as accuracy of course information. Description and content of the courses (e.g. tuition fees, entry requirements) must be clear and prominent. Web publishing is just as liable as print.

- ❖ Tone and style of the information provided must be consistent and user-friendly.

- ❖ Implement online application and enrolment system to provide a 24-hour channel for students to make enrolment. Clear guidelines and procedures are important

- ❖ Backup the online enquiries with human enquiry counter staff (face-to-face, telephone and email replies). It is a helpless feeling when students are frustrated using the online services.

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e-Marketing

An e-Marketing strategy fits in perfectly for potential students of online courses as they would be quite familiar and receptive to obtaining marketing information online. It is also used to manage alumni relationship. The main channels of e-Marketing are:

- ❖ Advertising on popular portals. For certain specialized professional courses, there are very targeted and thereby effective portals to serve that profession, e.g. advertise CPE programmes at law professional bodies sites.

- ❖ Search engine marketing. keywords may be "purchased" with major search engines and advertiser only pays for actual click-throughs. Effectiveness of advertisement can be easily measured.

- ❖ eNewsletters as bulk emails to potential clients. The mailing list could start with current and past students but also those responded to promotional campaigns.

❖ Use of a CRM (Customer Relationship Management) system to track preference and manage communication with students and alumni.

Shaik (2005) provided some good insight into strategies for marketing ODL programmes. He argued that educational service marketing should be based on relationship marketing rather than the conventional transaction marketing.

Some Practical Considerations

❖ **Course website information management.** To ensure the course information on the website is up-to-date, accurate and consistence, HKU SPACE has implemented a "content management system (CMS)" for administrative staff to put the most up-to-date information on their course website. Approval by the webmaster is required before releasing the information to the public to ensure data accuracy and consistency in terms of content, tone and the style.

❖ **Information Searching.** Course information on the web must be presented in an organized way. Students should be able to search their required information easily. To achieve that, HKU SPACE has placed a search engine on the prominent place of its website. We have also classified the course information into different categories for easy searching, which include academic units, subject, level of study, profession and partner institution.

❖ **Course Contact**. Contact point for every course must be included on every course website.

❖ **Staff Training.** Training should be provided for administrative staff not only on the usage of the CMS but also should emphasize on the importance of providing up-to-date and accurate information; and importance of data integrity and inter-relationship between the online system and the backend support systems.

❖ **Data Integration**. To enhance data accuracy and consistency, course information of the School Website should be integrated with the Course Administration Database. This ensures the information provided to the students is consistent with those available to the internal staff.

❖ **Online Enrolment and Payment.** HKU SPACE has implemented an Online Services system which provides

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online application, course enrolment and online payment service. This service provides a different channel for students to make enrolment and extends the enrolment hours from normal office hours to 24 hours a day, seven days a week.

❖ **Course Information Seminars**. Conduct regular course information seminars to the public.

❖ **Loyalty Programme.** HKU SPACE has implemented the S-MILES scheme (HKU SPACE Mileage Scheme for Learning) as an incentive mechanism whereby students can gain 'mileage' points when they enroll in the courses. These accumulated points can be used as 'discounts' for future enrolment.

E-SERVICES FOR LEARNERS: MARKETING, STUDENT ADMISSION, PAYMENT, & PRE-COUNSELING

The conceptual design of the stages of development of ODL programmes starts with institutional planning, and programme planning and development. The operational functions then begin with student recruitment (and marketing), admission and enrolment (including payment). As shown in Figure 1, the major steps in the operations leading to the completion of students' chosen study programmes and the happy moment of graduation and becoming alumni must begin with successful student admission and enrolment. Being at the very front end of the whole range of student services, these functions are critically important as the rest of the student services (assessment, timetabling), will depend on the comprehensive data collection (demographic and personal data of learners) and effective execution to establish the student database.

Student Recruitment and Admission

Admission

Chambers (2004) outlined the 'Melbourne Model' for supporting online students that put support procedures in place for each stage of their progression with the institution so that prospective and current online students have high quality experiences that are characterised by easy access to information, high quality learning experiences, and prompt, accurate and friendly responses to all enquiries. Some practical considerations are:

❖ Set up appropriate admission polices. Do not relax admission criteria because the course is delivered online. However, when dealing with matured adult students, the admission policies should be designed to consider what the adult students could bring into the program and not only academic records.

❖ For open admission courses (first-come-first-served) maximum convenience should be offered to the students. This include online enrolment and payment (e.g. online credit card) and recall of past registration details (address, email, telephone, etc) to save the students the trouble of having to enter information already existed in the student database.

❖ For admission based on selection, indicate clearly different ways to submit transcript or certification, e.g. by fax or sending an electronic copy. The institution needs to have policies regarding accepting softcopies of these certificates. Some courses might employ online entrance tests to help correct placement of students into courses suitable to their level of competency.

Online Application

❖ An online application form should contain simple and clear instructions to help students completing it. Incorporated into the application procedures should be disclaimers, policy statements as required by law or by the institution (e.g. data privacy, appropriate use of facilities, use of email as the main channel of communication with students).

❖ It would also be useful to obtain demographic and other statistics of students as well as their consent to send institution's promotional materials in the future.

❖ Acknowledge students of their application status line immediately.

❖ Always place 'contact information' for students in a prominent place.

Online Payment

❖ Before the student makes payment, any financial aids available and refund policies must be brought to student's attention.

❖ Establish various payment gateways including credit cards, bill payment service (PPS), phone banking and online banking.

❖ Support all school policies or payment scheme. For instance, if the school has some loyalty programme, online payment should allow the student to enjoy the benefit from the loyalty programme.

Pre-registration Counseling

Where appropriate (e.g. for open entry but award bearing programmes), there should be pre-registration counseling to help students to make self-assessment on whether the student would have a reasonable chance to complete and succeed in the course. It should help the student to understand what abilities and characteristics must he possess in order to achieve his goal. Based on the student's education background, potential difficulties that he may encounter could also be highlighted. Besides academic consideration, other factors like mode of teaching, academic schedule and payment schedule should also be considered.

Online pre-registration counseling can be formulated with a combination of interactive self-assessment tool, FAQ and hypothetical case study. Past statistics may also give a good insight to the student on the likelihood of his success in the course. On top of all these self-help tools, contact points (e.g. email address, telephone no.) should be provided for students to ask for specific questions and reach for help.

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Beyond general online pre-registration counseling, special Course Administrator may be employed to assess the applicants during the selection process. The Course Administrator may decide whether to accept the applicants based on their education background, academic capability, personality traits and other special skills that will be required to be successful in the course. The assessment can be in the form of online aptitude tests, online academic related tests or interview. Online tests may be purchased from agents which offer standard tests. Since these tests may require some basic computer skills, demonstrations or mock tests may be provided to help students to familiarize themselves with the test format before doing the real test. Interview can be done via phone or by making use of some online communication tools like chat board or video conference. This can give the Course Administrator the chance to access the immediate responds from the applicants.

Some Practical Considerations

❖ **Pace of implementation**. Implement online admission by phases. It can be started with a kind of courses with the simplest process, e.g. online application for an award-bearing programmes or first-come-first-served courses. Selection process of the award-bearing programme can remain to be done manually, and first-come-first-served courses required no selection. This helps colleagues to get used to the new workflow gradually and reduce the resistance for change.

❖ **Careful design of website**. Information collected from the online application must be sufficient for the later selection and registration process. Critical information like student name, identity card number, contact information, etc must be defined as a compulsory item. Validation rules need to be implemented to enhance data accuracy (e.g. validate format of HKID). To enhance user friendliness, how much information to be placed on one page is also important.

❖ **Minimize the amount of information to be entered**. HKU SPACE has provided an option in the online application system for existing student to use their student information for a new application. Function should also be provided to save, and later retrieve entered information.

❖ HKU SPACE has also set up an **online enquiry handling system** (IT Help) with designated staff to attend to student enquiries.

> Orientation in an ODL institution is just as important as it is in a traditional college. This serves a purpose of not only to let the student know what to expect in their online learning life, but also to develop a sense of belonging and pride in the ODL institution. Information management is again important.

Online Enrolment and Payment

The key to successful online registration and enrolment is thoroughness and anticipation in the design as in an online environment, it may not be able be provide human enquiry at all time. It is crucial to provide clear and detailed information in each step of online registration procedures (e.g. in the form of a flowchart). Guide student through every step. Employ online tools like a schedule planner for students to view course activities schedule and their personal academic calendar. Keep students informed of the status of their registration. Whenever student needs help during any step, ensure 'contact information' is placed in a prominent place on every page.

Online Orientation

Orientation in an ODL institution is just as important as it is in a traditional college. This serves a purpose of not only to let the student know what to expect in their online learning life, but also to develop a sense of belonging and pride in the ODL institution. Information management is again important. Tools like "Online Tour" may be employed to help students visualize the steps. Welcome message can be sent via electronic means, e.g. email, SMS. Make it personal and point to links in which students may get further information about everything they need to know. General information as well as those specific to a study should be included, for example:

❖ School policies, rules and regulations

❖ Academic calendar (time table, exam schedule, payment schedule)

❖ Financial Assistance Scheme

❖ Scholarships and awards

❖ Learning facilities and support services

❖ Tips to succeed in the course

❖ Specific news about a particular programme

❖ Links and information on how to get help

❖ Technical knowledge required and steps to access online courses

❖ Links to all other student services

❖ Links to online resources

Some practical considerations

❖ **Online enrolment and payment service.** HKU SPACE has developed an online system for student to make enrolment and payment online. Students can pay their tuition fees, miscellaneous fees and perform course selection by using the online system.

❖ We have also setup a **Learner Portal to serve as a platform and one-stop service provider** to disseminate information (news, academic calendar, etc) to students. The portal also links to all other student services and documents that students need to know.

❖ In peak enrolment days, we have opened a room in our campus to **provide students with computer and network facilities** to enable students to access the online services (in case their computer break down).

SUPPORTING THE LEARNERS & SUPPORTING THE TEACHERS: THE e-LEARNING ENVIRONMENT & LEARNING SUPPORT SYSTEMS

As its core function, the learning support system is key to success, especially if e-Learning is to be adopted on a large scale with sufficient degree of sophistication.

> As ODL students are usually geographically remote, and the scale of distance learning courses can be large, the use of information and communication technology (ICT) enables a cost effective way to deliver learning materials and support interpersonal communication during various learning activities.

Open and Distance learning has been evolving in the age of e-Learning. What was once printed on paper and sent to students' homes can now be delivered through the network; furthermore, tutoring support of students is increasingly provided online as well. The Open University (OU), UK's largest university for part-time higher education, allows its 170,000 students to send their assignments, access electronic resource materials, and perform administrative tasks via their online accounts (Thomas et al., 1998). While more and more ODL institutions want to gain benefits by following the trend to use technology, it is realized that effective integration of technology and ODL is itself a new challenge. This section presents a framework for learning support systems, which facilitates ODL institutions to organize, manage and deliver learning and supports to students. Figure 2 shows four major aspects that must be addressed by any learning support system for an ODL institution. Each of them will be discussed in this section.

Instruction Delivery

There is no doubt that instruction delivery is one of the most important activities in both traditional universities and ODL institutions. As ODL students are usually geographically remote, and the scale of distance learning courses can be large, the use of information and communication technology (ICT) enables a cost effective way to deliver learning materials and support interpersonal communication during various learning activities. A Learning Management System (LMS), to this end, provides a platform through which learning content is delivered and managed. It also allows instructors to monitor student participation, and interact with students through threaded discussion, video conferencing, and real-time chatting.

Figure 2. Major aspects to be addressed by a learning support system
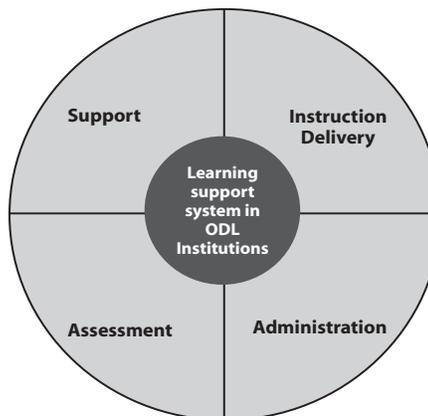
A Learning Content Management System (LCMS), on the other hand, focuses more on authoring, approval, publishing, and management of learning content. Most LCMS support the use of reusable learning objects (RLO) which act as building blocks in composing complicated instruction sets, e.g., a course. A RLO by itself is a small piece of instruction that targets a specific performance goal. They can be built in-house using content authoring tools, or bought from companies like Netg (http://www.netg.com) and SkillSoft (http://www.skillsoft.com) (merged with SmartForce in 2002) who provides off-the-shelf RLOs. For this reason it is important to employ a LCMS that supports content interoperability standards such as the Sharable Content Object Reference Model (SCORM) (http://www.adlnet.org) in order not to impose limitation on future content acquisitions. Although LMS and LCMS are different classes of products, the line between them has been blurred by products providing a mix of their functionalities. Examples of this class of products are WebCT (http://www.webct.com) and BlackBoard (http://www.blackboard.com).

Besides content management and delivery, another key feature of a LMS or LCMS is the support of interaction and communication between instructors and students, and also among peers. Discussion boards, sometimes termed as discussion forums or bulletin boards, consist of messages and replies posted by instructors and students. They are useful for open discussion, debate and collaboration and are the most widely used communication tools. A chat room, on the other hand, allows real-time discussions using a simple text interface to exchange messages instantaneously. Many LMS provide archiving features to store the text from a chat session, so that important content can be retained for later reference. A shared whiteboard, often integrates with chat tools, allows for graphical presentations. In some systems the instructor and student can edit a shared file and save it for future use.

Academic Counseling

Another area of interest is online academic counseling. The simplest way is to provide individualized support by a specific course advisor who would respond to students' calls via email or telephone. Online academic advising could also be provided on a group-basis by using 'advisory pools' with advisors on call to respond to students' queries. This can be in the form of chat room or newsgroup.

> With the emergence of Internet and increased bandwidths from homes to the Internet, delivery of educational video via streaming has been more widespread. Reisslein et al. (2005) found in a study that student satisfaction on distance video delivered via web-streaming is approximately the same with traditional methods like ITFS/cable TV.

Counseling can also be achieved by organizing formal Peer Group support. Student assigned to the same group make use of chat room and organized sharing sessions to encourage and to provide mutual support. The key is to promote a sense of community among the students. Such community spirit, if carefully fostered, can continue well after graduation help building up the Alumni bodies.

ODL institutions have a long tradition in delivering distance education courses with video. With the emergence of Internet and increased bandwidths from homes to the Internet, delivery of educational video via streaming has been more widespread. Reisslein et al. (2005) found in a study that student satisfaction on distance video delivered via web-streaming is approximately the same with traditional methods like ITFS/cable TV. In a Lecture-on-Demand environment, recorded educational video are digitized and encoded in a video streaming format such as Windows Media (http://www.microsoft.com), RealVideo (http://www.real.com), Quicktime (http://www.apple.com), etc. Streaming contents are managed and distributed by a streaming server on the Internet. Students can fetch and watch

Figure 3. Integration of video, slide, and online conferencing.
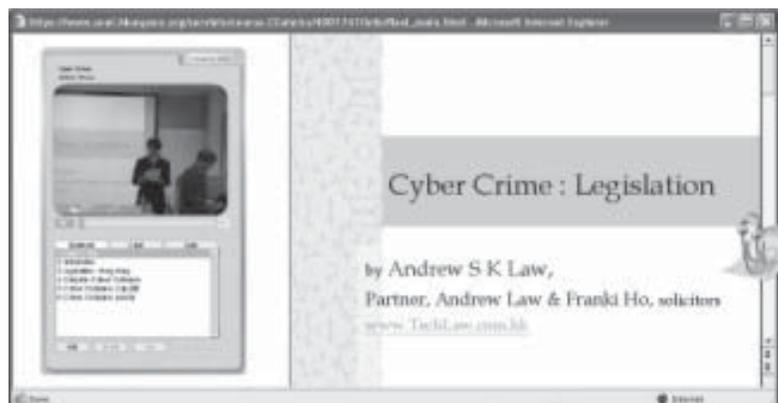
the video using their web browsers with corresponding software plug-in.

HKU School of Professional and Continuing Education (HKU SPACE) (http://hkuspace.hku.hk) has developed a proprietary multimedia-learning tool called Flexi-learning (Figure 3), which integrates lecture-on-demand with synchronized presentation slides and online conferencing. While students can watch recorded lecture and handout on the web for self-study, collaborative learning is enabled by online discussion via the embedded conferencing tool. When synchronous instruction or real-time interaction between instructor and student is needed, Virtual Classroom software provides a platform to support classroom-like experiences on the Internet. Products like Macromedia Breeze (http://www.macromedia.com) support various kinds of collaborative activities during an online presentation.

It can be seen that while a LMS (or LCMS) supports online delivery of instructions, a blended approach of learning for distant learners can also be achieved with proper use of communication and collaborative tools like discussion boards, chat rooms and virtual classrooms. Mason and Rennie reported a number of ODL institutions in UK have adopted the blended learning approach to distant learning based on separation of content and support (Mason and Rennie, 2002). Students in those institutions obtain learning materials either from web or by post, while they are assigned to a tutor group, which meets either synchronously or asynchronously in combinations of face-to-face and online.

Since pirating of digital materials is very easy, ODL institutions that have developed substantial amount of online course materials will find protecting the copyrights of their intellectual properties is a problem. On the other hand, most e-learning systems address the problem of security by applying user

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authentication and access control and leaving the problem of copyright protection unsolved. HKU SPACE has designed and developed the "Secure e-Course exchange" (eCX) as its solution for protecting the online course materials (Yau et al., 2002). It is a set of software modules designed to work together to allow learners to download and access a local copy of encrypted course materials, but at the same time prohibit the learners from making illegal copies of the downloaded materials. Both the institution and learners are benefited under this scheme. By accessing course materials on the learners' own computers, they are not required to stay online when studying the materials. This increases flexibility especially for mobile learners, and reduces operation cost of learners in some regions where Internet connection is not charged at flat rates. On the institution's side, this scheme protects its intellectual properties and has a potential to reduce system loadings since not all learners depend on the servers when they are studying.

Online Assessment

Management of assessment is another key area in operations of an ODL institution. Since the instructor and students are lacking in-class interaction, it is hard for an instructor to know how well the students are learning without some form of assessments. On the other hand, students receive feedback from their instructors that help them to improve. Race et al. has an extensive discussion on effective uses of assessment (Race et al., 2005).

Many ODL institutions use Tutor Marked Assignments (TMA) as a major tool for continuous assessment. Students are required to submit written assignments throughout the course, the tutor grades and annotates to provide essential feedback. Thomas et al., (1998) once reported that the Open University (OU) of UK has to process some 40,000 assignments per week. Although the UK Postal service is efficient enough to allow students to receive their marked assignments within a week of the tutor marking and returning them, the paper-based assignment submission system has been one of the barriers to the OU teaching outside the UK. With the emergence of networking technology, submission, marking, recording, feedback and return of assignment can be done online in order to overcome major disadvantages to the paper system. Table 1 compares the paper system to an electronic assignment handling system.

Examination is another form of assessment that is widely used in education. Electronic examination system provides a cost-

effective solution to ODL institutions having a mass population of geographically dispersed students. Bicanich et al. (1997) found from a study that, among 400 vocational learners, 75% preferred online testing to paper-based assessment.

The Open University of UK, an early adopter of electronic examination, used Internet in the examination process since 1997 (Thomas et al., 1998). At that time the invigilator first download the examination paper in the form of an encrypted document via the Web, in an appointed examination centre. The student is allowed to print the examination paper after the examination is commenced. The student composes his examination script using a word processor, and submits it via the Web using a secured and encrypted connection upon completion. It is clear that such solution only supports a limited part of the examination process. Throughout the years many institutions have put in research in this area and developed more sophisticated electronic examination systems.

There are some fundamental issues that an electronic examination system has to address. Authentication of candidates is the first challenge to be overcome. It is a common perception that if examinations are not held under face-to-

> There are some fundamental issues that an electronic examination system has to address. Authentication of candidates is the first challenge to be overcome.It is a common perception that if examinations are not held under face-to-face supervision, someone else could substitute for the candidate.

face supervision, someone else could substitute for the candidate, which is an obvious kind of cheating. If such kind of cheating is detected and reported to the public, the credibility of the whole program will be at risk. To remedy that, face-tracking technology can be employed in a real-time examination monitoring system.

The second issue relates to examination design. Some people equate electronic examination with multiple choice, true/false, and fill-in question. While such objective tests which assuming simple answers are acceptable for training purposes or for questions where the level of cognitive demand is low, higher

Table 1. Comparison between paper-based and electronic assignment handling systems

Paper-based Assignment Handling System	Electronic Assignment Handling System
The student submits an assignment in paper form by post.	The student submits the assignment in electronic format via a Web browser.
The student is not acknowledged if an assignment has been received.	The system acknowledges the student if the assignment is submitted successfully. The tutor is informed that an assignment is ready for processing.
The paper system does not protect the submitted assignment from unauthorized access.	The electronic system ensures only the student's tutor or other eligible person, who can provide a correct username and password, can download the assignment.
The tutor marks and annotates the assignment directly on the assignment.	The tutor records the marks and annotates the assignment using tools provided by the system. The system can compute overall grades of the student according to some pre-defined rules.
Marked assignments are returned to students by post, which can take a long time and possible to get lost.	Submitted assignments, tutor comments and marks are kept in database, which allows student to access via the Internet.
The turn-around time is longer (in terms of days or weeks) due to the postal process.	Turn-around time can be shortened (to hours) since no postal is required.
The variability of communications systems worldwide can make some students in some countries difficult to study effectively.	The Internet provides a cheap and fast media for student in many parts of the world to enjoy distance learning.

order skills and concepts cannot be examined effectively. Online examination can take many forms from tutor marked assignments, online completion of multiple choice questions or short questions, to labeling of online diagrams and manipulation of online graphs. The inclusion of questions having high level of cognitive demand greatly enhances the validity of an examination.

The fourth issue to be addressed is about scale. If electronic examination is a technological solution to address the problem of scale, automatic grading should be a key area that has to be developed. While answers to simple question types can be easily marked by simple or fuzzy matching, answers to complex question types like operation skills and long essays require more sophisticated and innovative methods.

The Fifth issue is training. It is essential that sufficient training materials and guidelines be provided to ensure students are able to operate the assessment system before the exam begins. Again, authentication of students via the face-tracking technology may be considered. Because there is no face-to-face support, it is imperative that a well-tested contingency plan should be in place with adequate technical support during the examination period.

Education for basic computer operating skills has been broadly launched in China. In Zhejiang Province of China, hundreds of thousands of people have taken part in different levels of computer education and testing since the late 1990's. The Computer Science Department of Hangzhou Teacher's College developed a web-based examination system for carrying out examination and auto-grading for objectives questions and operating questions (Yuan et al., 2003). The system is composed of four major components: (1) the examination preparation system, (2) the examination system, (3) the examination monitor system, and (4) the auto-grading system.

The examination preparation system supports the management of question and examination. Each question has several attributes like description, possible answers, question types, difficulty and other metadata. All questions are stored in the question database. The examination system is a Web-based testing interface for candidates. The system controls timing, security, and client-side behavior during the examination. The real-time examination monitoring system uses face-tracking technology to keep the candidates to sit in front of the computer during the examination. The auto-grading system supports a wide range of question types, from multiple choices, true/false, fill-in questions to operating questions like operation of Microsoft Office and Internet skills.

Charles Sturt University (CSU) is one of the largest providers of distance education in Australia. In 2004, CSU decided to use a global testing and certification provider, Thompson-Prometric, to deliver online examinations to students taking the Industry Masters program (Messing, 2004). Candidates book and sit their final examination in secure, supervised examination centers provided by Thompson-Prometric. The latter is responsible for both the authentication of candidates as well as the invigilation of examinations. Examinations are delivered using the Internet-Based Testing (IBT) system, which supports a wide range of question types.

The problem of time zones and scheduling is significant to courses accessed by a wide geographic area. It is obviously impractical to schedule an examination at 2am in the US in order to match the time in Australia. If synchronization is not possible, it is no longer possible to give all candidates the identical examination in different parts of the world. CSU maintains pools of examination questions that were between three and five times the size of examination were established. The pool should be reviewed and new questions added continually.

During each "instance" of an examination, specific questions are selected using heuristics, which ensure all the instances are of a comparable standard. Examinations can therefore be scheduled around the world according time zone of each region. When conducting conventional paper-based examination, there is always a portion of candidates having

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difficulties to meet the schedule. The provision of a supplementary examination at a later date creates additional works to be done. The solution to synchronization problem means that it is now possible to offer a window of examination times that could extends to several days. Candidates who are unable to attend a scheduled examination have the opportunity to re-schedule.

Issuance of Marks and Certificates Online

Institutions providing online services routinely send marks to students at the end of each semester although hardcopies are also sent eventually. To safeguard against fraud, normally institutions will stipulate that only transcripts that bear the official chops of the institution (the original) can be regarded as official. Are e-certificates or e-transcripts possible for less formal certifications? At the least, institutions should be able to accept online application for transcripts or duplicate certificates.

Some Practical Considerations

❖ To avoid high volume of transactions in examination results retrieval, examination results were announced by year in different time frame (e.g. Year1 at 9:00am, Year 2 at 11:00am).

> **Administrative process in a large ODL institution is complicated by the scale and dispersed population of students. Thus an administrative support system must provide administrators a robust, scaleable, and affordable platform for them to complete their tasks.**

❖ To strengthen security control, students were required to enter an additional password (usually a combination of their personal information e.g. HKID and birthday) to view their results.

Administrative Support to Learning

Administrative process in a large ODL institution is complicated by the scale and dispersed population of students. Thus an administrative support system must provide administrators a robust, scaleable, and affordable platform for them to complete their tasks. Table 2 examines a variety of tools that are core to such an administrative support system.

Table 2 A list of administration tools in learning support systems.

Tool	Description
Announcement tool	The administrator can post public message to different groups of members by various means, e.g., online message, e-mails, etc.
Course management tool	The course administrator performs various management functions on a particular course. Typical uses include addition and removal of students, update course schedule, post announcements and set deadlines, receive student files and review students progress, etc
Student record maintenance tool	Used by the administrator to maintain student academic records, personal records, and others.
Course catalog maintenance tool	The administrator maintains the list of available courses with syllabuses, which can be accessed by instructors and students.
Account management tool	The accounts administrator creates and maintains user accounts. For institutions having student records in database should consider to integrate account management with the registration and enrollment process.
	Used by the system administrator to perform technical and high-level system administration.

Technical Support

System Support

While we have described a range of learning support systems to facilitate operations in ODL institutions, it is obvious that adequate system support should be provided to students and staff, for both initial and long-term uses. System user support typically includes training sessions and incidental user support. Training provisions should be allocated appropriately for each user group or audience type:

❖ Administrators should receive training in all aspects of the systems. If the systems are acquired from vendors, it is advisable to obtain training from an authoritative party for administrator-level staff.

❖ Academic and other support staff may receive training from system administrators.

❖ Students may receive training from administrators or well-trained staff. Offering trainings via a LMS could be beneficial to distance learners.

Manuals and guidelines provide a detailed reference for various systems and are important tools in user support. They should be made available to users all the time. It is useful to create shorter individual guidelines on particular system features (e.g., how to upload course materials to a LMS). An example is the "1-Minute Demos" from the SPACE Online Universal Learning (SOUL) system (http://hkuspace.hku.hk/soul) developed by HKU SPACE, in which each of a selected system feature is illustrated by a short Flash movie which can be watch on the Web (Figure 4).

From time to time students may encounter problems in accessing online resources, such as forgotten login details to access an e-learning system or experiencing web browser problems. Incidental support should be provided by well-trained support staff. It is important to deliver incidental support through appropriate channels according to user groups. While a help-desk is an appropriate place to provide support services to academic staff and administrators; online help services should be established for students if the Internet is the major communication channel between them and the institution.
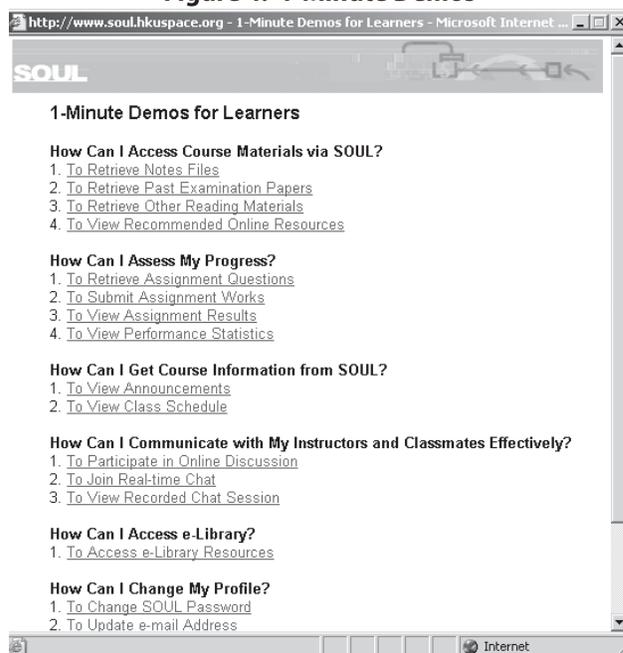
Academic Staff Support

Although IT is becoming more prevalent in the global society, it should not be assumed that all academic staffs will automatically posses IT literacy with Internet and e-Learning tools. Extensive training in the following areas should be provided to academic staff according to their roles and student groups:

❖ Electronic communication and collaboration tools, e.g., e-mail, discussion board, chat room, etc.

❖ Content management for upload and management of course content.

❖ Pedagogical training in the use of e-learning.

❖ Training in legal requirements, such as digital copyright, accessibility and plagiarism.

❖ General IT training, especially for those who are unfamiliar with core applications e.g., web browsers.

HKU SPACE adopted the policy that a blended approach to learning combining traditional face-to-face classroom learning with a certain minimum level of e-learning facilities delivered

Figure 4. 1-Minute Demos

> *Administrators should receive training in all aspects of the systems. If the systems are acquired from vendors, it is advisable to obtain training from an authoritative party for administrator-level staff.*

through its SOUL e-learning platform, termed as "Essential SOUL" should be made available to all learners of the School in award-bearing programmes. The provision of Essential SOUL as a service to all students aims at enhancing the quality of learning and teaching in the School by ensuring that all learners are provided with:

❖ A greater variety of learning experience.

❖ The means of learning in a collaborative learning model.

❖ Greater interactivity among themselves and with teachers and course administrators.

❖ Greater learning resources online.

The school has more than 2,000 part-time teachers. Its e-Learning Support Team has provided face-to-face training workshops for all teachers regularly, in addition to online courses which they can obtain training by self-learning. All teachers are invited to join the workshops on a voluntarily basis. In order to boost the participation rate of teacher training, the school is considering a number of incentive schemes:

❖ To provide mileage points to teachers who completed basic trainings. They can use the mileage points as discounts when they are enrolled as student in courses offered by the school.

❖ To include use of e-learning facilities as one of the criteria for the Best Teacher Award.

❖ To build a virtual community for teachers to share their experience on using e-learning in their teaching.

### Electronic Library Support

It is natural to distance learners using e-learning to expect that reference materials offered by libraries can be accessed online. The spectrum of these reference materials spreads from electronic books, reference tools, indexes to journal literature, to full-text journal articles. The University of Hong Kong Libraries, taken for example, has its electronic resources containing 36,215 e-journals, 821,583 e-books, and 511 electronic databases in 2005 (HKU Libraries Annual Report 2004-2005). It has spent 24.5% of its annual acquisition budget in 2004-05 in electronic resources, slightly more than printed books (23.7%) but still less than journals (43.6%).

Pricing structures of electronic resources varies from publishers to publishers. In general, commercial publishers usually sell site licenses to universities. It is common for publishers to

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offer "bundled" collections of journals, where university libraries can purchase a publisher's entire portfolio journals at a significant discount from the cost of buying journals one by one. While some university libraries are happy with the discount offered, some are not convinced to this all-or-nothing model and think that this could only increase their dependence on big publishers who have already appeared to monopolize the marketplace. It is interesting to observe that while some publishers offered electronic access at no additional charge to institutions that already purchased print subscription, some charged the electronic version higher than the print version. Bergstrom et. al. (2004) explains this phenomenon by analyzing the business model of the publications. For journals relying heavily on individual subscription and advertising revenue, wide spread of electronic access will undercut both sources of

Figure 5. An interface to electronic library
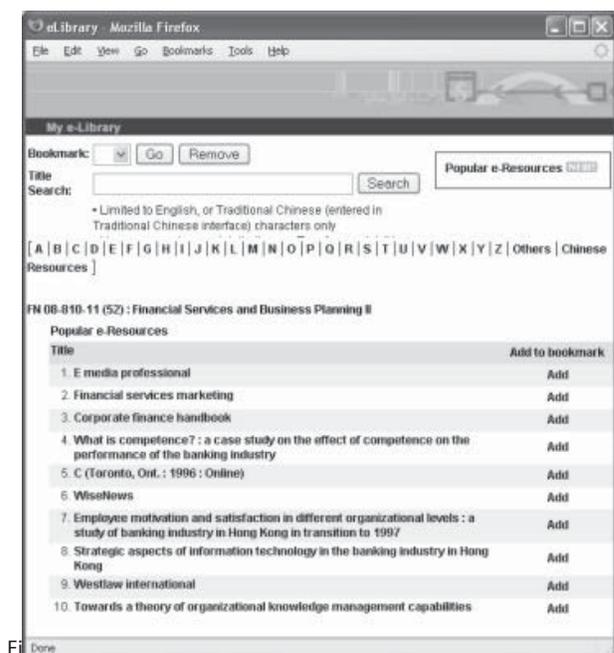
revenue. On the contrary, publishers lose little by offering electronic access if their publications featured less advertisement and not targeted for individuals.

Some institutions uses their e-learning systems as an interface for library services, where the former provides a single entry point of service to learner as well as other value-added benefits. The SOUL e-learning system developed by HKU SPACE provides its users an interface to electronic resources offered by HKU Libraries and a number of added features linked to the learner profiles. One of those features called "Popular e-resources" (Figure 5) allows learners to keep tracks of electronic journals and books that are frequently accessed by other learners taking the same courses.This feature provides another way, in addition to browsing and keyword search, for learners to discover resources that may be useful in their studies. The list of titles shown is sorted by decreasing order of their access frequencies, thus the most accessed titles will be shown near the top of the list.

Some Practical Considerations in Supporting e-Learning

HKU SPACE started developed its in-house LMS called SOUL in 1999. Other than technical issues of in-house development arising from such large-scale software development project, there are many other non-technical issues to be considered, among which:

❖ IP issues (e.g. policies governing the IP ownership of the course material).

❖ Teachers (online tutoring skills) and administrative staff training (supporting the operation of the programmes).

❖ Development of multimedia-learning tools which integrates lecture-on-demand with synchronized presentation slides and online conferencing.

Underpinning all the operational systems is a strategy for information management. The success of managing the operations of an institution depends very much on how effectively by it manages information institutionally and communicates internally and externally.

❖ Development of "Secure e-Course exchange", a tool to prohibit the learners from making illegal copies of the downloaded materials.

❖ Development and implementation of the Policy support (the Blended Learning Policy & Essential SOUL).

INFORMATION MANAGEMENT & COMMUNICATION

Underpinning all the operational systems is a strategy for information management. The success of managing the operations of an institution depends very much on how effective by it manages information institutionally and communicates internally and externally.

Figure 6 shows a web-based strategy for information management and communication.

This strategy has the following features:

❖ Top-down and fully integrated network of operational systems based on one centralized student record database.

❖ Designed to serve academic, administrative and also communication needs.

❖ Community-based concept of delivering support and services. The communities are: learners (embedded with SOUL LMS), staff, teachers (part-time and full-time), alumni and visitors.

❖ Each community has its own web site serving as gateway to the online services (e.g. e-library) provided to the community. All the sites are interlinked to facilitate those users who have multiple relationships with the institution.

❖ The Staff Intranet serves not only as the source for all operational communication (in addition to emails) and depository of function related knowledge (e.g. current enrolment and income information, announcements), it is also the vehicle for delivering online work-flow engines (e.g. staff leave management).

Figure 6. Student Services for Online Learners
A second strategy often employed in institutional information management is the establishment of a central and institutional role for information management. Whatever the name of the office is called (e.g. the Chief Information Officer (CIO)), the

roles and function of such a office[1] in the context of a university should include, among others, the following:

❖ Be a campus advocate (in the broadest sense of the term) regarding the role of information technologies in fulfilling the mission of the campus.

❖ Ensure that information technology in its many forms fully serves our teaching, research, and service missions, using a model of partnership and collaboration.

❖ Ensure an appropriate campus infrastructure in support of research and instruction.

❖ Provide leadership in incorporating technology into education at both the undergraduate and graduate levels.

In short, establishing such a role is to recognize for all facets of operations of the institution the importance of:

❖ coordination of information management;

❖ exploitation of technology; and

❖ formulation and implementation of an IT strategy.

> **ODL institutions have one important advantage over traditional institutions – there is a greater chance that the intellectual property embedded in the course materials are more portable and can be leveraged either for future offerings or for exchange with other ODL institutions.**

Programme Collaboration and Opportunities

ODL institutions have one important advantage over traditional institutions – there is a greater chance that the intellectual property embedded in the course materials are more portable and can be leveraged either for future offerings or for exchange with other ODL institutions. Often this exploitation takes the form of collaboration between institutions, and indeed, even a consortium of institutions, in sharing course materials and other learning resources. Whilst there are probably more failures than success stories, the potential benefits of such collaborations can be considerable and definitely worth pursuing.

The simplest form of collaboration is to license course materials for agreed terms. The right to modify the original materials may be granted. The collaboration could also take on the form of a joint award with each contributing institutions retain copyrights to learning materials. In the case of a legally independent consortium, the consortium may be licensed to use the materials and also with permission to modify.

An extension of such collaboration is the franchise arrangements whereby one institution authorizes another institution to offer a whole programme, together with learning materials, and the award. As often this happens in a cross-border situation, there is a need to make appropriate adaptations of the original materials to suit the local market needs.

Another often practiced form of collaboration is mutual recognition of credits that facilitates student transfer or articulation for further study. There is no business transactions involved but significant benefits can be gained in terms of enhancing attractiveness of courses and programmes to be offered.

Figure 6. Student Services for Online Learners
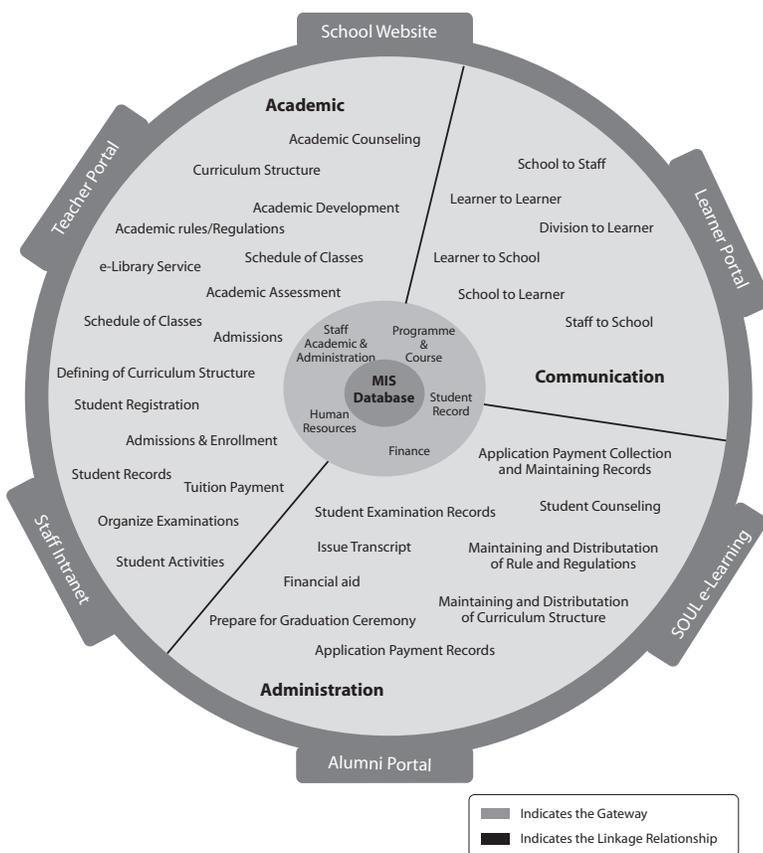
Indicates the Gateway
Indicates the Linkage Relationship

Acknowledgement

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About the Authors

Mr. ANDREW WONG is currently the Chief Information Officer of the School of Professional and Continuing Education (HKU SPACE) of the University of Hong Kong. Prior to that and over a period of 20 years, he held various appointments at The Open University of Hong Kong and the Hong Kong Polytechnic University in teaching and educational administration. He had also worked in Canada in various IT related positions for over 8 years.

With a professional background in IT, he is a Charted Engineer of UK and a Fellow of the Hong Kong Institution of Engineers. His current academic interest however has shifted to adult education. He is a firm believer of lifelong learning and has a particular passion for e- learning.

Dr. JOSEPH LEE received a PhD in computer science from The University of Hong Kong. He joined HKU SPACE in 1999 and is currently the e-Learning Support Manager. Dr. Lee is mainly responsible for the development and delivery of e-Learning in the school. His research interest includes e-learning, information retrieval and machine learning.

Ms. CAROL WU holds a BSc in Computer Science and a LLM in Information Technology Law from The University of Hong Kong. She joined HKU SPACE in 2001 and is currently the Deputy Manager in MIS. She is responsible for developing application systems and providing consultancy services. Her current focus is to provide a wide spectrum of services on the web for students and staff of HKU SPACE.