

Information Technology: Principles and Strategic Aims

As observed in the University of Cambridge IT Strategy, the University is a complex and diverse organization whose IT requirements vary depending on the constituency being served. In order to capture the on-going requirements and strategic aims, four working groups were set up to look at the needs of users from the perspective of four different themes:

- **Campus Experience:** this focuses on the general needs of students and staff, while studying and working in the University and to a lesser extent, those of alumni. Key strategic aims are movement to ubiquitous on-line information provision and universal wireless network access.
- **Teaching and Learning:** focusing on support for teaching; the aim is to make all materials available on-line, and readily accessible via the provision of wireless access. Longer term goals to be considered during the planning period include the universal adoption of 'virtual learning environments' (VLEs).
- **Support for Research:** focusing on the various and varied forms of IT support required for carrying out research within the University. The support required for research changes rapidly, and the key strategic aim is for flexible and adaptive systems. The future is considered in terms of the provision of University-wide high-performance computing; management and protection of research data; collaborative working support; and on-line bibliographic summaries for academic profiles, both for the REF and more generally.
- **Management Systems:** this focuses on University administration: finance, student records, human resources etc. The key strategic aim is to ensure that systems can interoperate, and be widely used (subject to appropriate access control). A key technical requirement is interoperation at the level of data exchange, with comprehensive data validation on input and output.

These four areas overlap, and some principles and aims are shared. The common top-level objectives which emerge are:

- (a) **ubiquitous and seamless access to the network;**
- (b) **migration of all materials on-line;**
- (c) **data-driven interoperation between all systems, whoever provides them;**
- (d) **good design and functional suitability for every user, simplicity of access, ease of use and security**
- (e) **Value for money**
- (f) **Increased "self-service" both for students (in terms of on-line learning) and researchers (in terms of grant & personnel management).**

The attached appendices contain further details from the reports of the four working groups.

Appendix 1: Campus Experience

Appendix 2: Teaching and Learning Services

Appendix 3: Support for Research

Appendix 4: Management Systems

Appendix 1

Campus Experience

Principles

- Individuals to have easy access to information and facilities whenever they need it and wherever they are.
- When a University identity is created for an individual, the identity to be the same in all contexts within the University, persisting for the lifetime of the individual even after they have left.
- The University to follow the individual, providing information and facilities that are accessible and pertinent to their current natural context and when they have left not simply to the context that they had when here.
- Information and facilities to be coordinated across the University, and consistent structures or formats to be applied where appropriate.
- and appropriate authorisation mechanisms to provided to cater for the many and complex user groupings encountered within the University context when information and facilities have to be restricted to particular audiences,
- Information to be personalised and relevant to the individual
- IT facilities to be of a standard that enhances the unique University/College experience,
- Multi-lingual versions of selected online outreach information to be supported.
- The underlying IT infrastructure to be capable of responding to emerging initiatives, be robust, fit for purpose, and anticipate future trends in IT usage.

Strategic Aims

The Campus Experience and Outreach Working Group identified the following strategic aims for the next five years:

- to move towards a paperless, online information environment for all staff and students;
- to provide easy access to information and facilities whenever and wherever needed including unified network access (e.g. wireless) throughout the Collegiate University;
- to provide more coordinated information though shared IT systems where possible, and ensuring that all IT systems (local and University-wide) provide standardised interfaces allowing the exchange of information;
- to improve the communication and collaboration tools available within the Collegiate University;
- to improve support for alumni ensuring that mass communications are managed in a segmented and yet coordinated fashion

Appendix 2

Teaching & Learning Services

Principles

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- IT provision in support of teaching and learning to be sufficiently flexible to reflect the range of styles and practices that contribute to the University's success in teaching and learning;
- value for money and efficiency savings to be primary considerations for new initiatives.
- undergraduate students to have access to their own computer
- wifi access to be available across Cambridge and future developments to be device agnostic so as not to preclude future use of new mobile and web technologies;
- to continue to provide large computing rooms equipped with computers hosting specialist software where this enables teaching efficiencies in particular subjects;
- to facilitate site licences for teaching and learning software where value for money or efficiency savings are demonstrated having taken account of the relative merits of commercial and open source software;

Strategic Aims

- Access to computing and IT provision
 - Ensure pervasive access to computing and IT provision (e.g. wifi, access to a personal computer, site licences and provision of computer rooms) as the priority area.
 - consider the arrangements to be made for those students who do not own a computer (e.g. a laptop pool or bursary etc);
 - consider virtualization (or related technologies) to allow students to use their own equipment to access specialised software
 - develop strategy for considering site licences for teaching and learning software
- identify requirements and future use of Virtual Learning Environments (VLEs)¹;
- Provision of teaching material online
 - e.g. course web pages, lecture notes and exam questions; closely related to VLE use.
 - not appropriate to prescribe what information should be published, but that where teaching materials are published in hard copy it would be reasonable to expect them to be made available online to students, staff within the Faculty or Department and to Directors of Studies and Supervisors.
 - student expectations likely to exceed what is considered desirable or feasible.

¹ At the ISSS meeting of 17 March 2011, it was noted that 'VLE's were of growing importance but not yet for the strategy', therefore section (i) of the report is not included in this paper

Appendix 3

Support for Research

Principles

Beyond generic needs of all IT users, the research community needs and expects:

- state of practice facilities for the storage and curation of high volumes of research data;
- robust technology tools to support global collaboration;
- high performance computing resource for analysis, simulation, visualisation and modelling;
- support for research grant applications, management and reporting, including recording of output & impact measures, and management of relationships with sponsors and funders; and
- a web presence which promotes the profiles of academics and their research.

Strategic Aims

- Research 1: Basic IT resources and Technical Support.
 - Avoiding significant reinvestment and training for each new research initiative by providing researchers and research support staff with a minimum level of technically competent support to facilitate research, including the sharing of data, with access to documents and expertise,
 - Provide state of practice, resilient networking within the University and externally and support University research units, especially those with considerable hardware and software resources that often are administered part time and may be poorly and/or insecurely configured.
- Research 2: Research Data stewardship and digital asset management.
 - Provide next-generation metadata techniques and archiving practices and tools to support the management of disparate, massive data sets while ensuring availability, accessibility and, where appropriate, security of data. The requirements extend to data management requirements for the outcomes of research.
- Research 3: Advanced collaborative and multi-site research tools and services.
 - Provide appropriate systems (such as 'grid' or 'cloud' computing) to support collaborative research endeavours between university departments, among universities and with the private sector that rely on shared resources located at multiple academic and for-profit institutions.
- Research 4: High-performance computing for analysis, simulation, visualisation and modelling environments including housing.
 - Develop the strategy for housing and managing high-end computer and/ or high performance computing clusters which meets researchers' requirements for analysis, simulation, visualisation and modelling tools, which balances availability and cost including the electrical and air-conditioning demands, and which is able to respond to demand.

- Research 5: Research Project Management.
 - Provide researchers and research support staff with tools they need to assist with the costing and management of research funding throughout the lifetime of the grant including:
 - Costing proposal
 - Contract management
 - Workflow
 - Award financial management for both the researcher and the department and Head of Departments housing the research to assist with strategic planning etc.
 - Recording staff time management (i.e. timesheets) where required
 - Any system(s) provided must be easy to use and provide timely information.
- Research 6: Admin Output Purposes.
 - Provide researchers and research support staff with systems to assist with the tracking of publications, impact, and other outputs such as engagement with the public when research is underway and after completion, and to support the need to comply easily with any requests made for data under the Freedom of Information requests (FOI).
- Research 7: Management of Relationships with Sponsor and Funders.
 - To assist with the University's need to manage the corporate relationships with sponsors and funders provide a system that will easily allow the sharing of suitable information with the relevant interested parties under suitable guidelines from the relevant University committees.
- Research 8: Academic Profile and Web Promotion of Research.
 - Provide structured support for academic profiles across the University, including the ability to capture up to date information needed for CV's such as publication lists and research history, ensuring that any existing profile data is used to alleviate the need to rekey etc, and enabling different levels of support

Appendix 4

Management Systems

Principles

A large number of principles were derived for the management systems. Some key ones identify the need for integration and usability, i.e.:

- All systems to be integrated where possible, (e.g. Finance, HR, Student, Research Grants) with the ability to exchange information as relevant to the system, with the ability to export data to other systems in a controlled and secure way.
- Systems to be user friendly for the occasional user as well the frequent user, with modern user interfaces that encourage the use and adoption of the systems.
- Simple access to systems; a single log in screen to access all applications as the ideal.
- Wide engagement with users and institution heads for all system developments (large and small)
- Maximise the benefits of new systems by including change management for business processes and the adoption of new working methods at the planning stage
- Lessons learned from current systems' post-implementation review to be applied when planning new systems
- All new system developments to include a clear retention and archiving policy in the context of finite storage capacity and saturated systems becoming slow and unreliable
- Data entry to be closest to source and once only. Systems to eliminate duplication of effort as part of their implementation.
- High priority to be given to reporting (both formatted reports and free data extracts) as a key component of any system
- Reporting to be on-demand, reliable, accurate and available from multiple key systems.
- Emphasis to be placed on business analysis, planning, requirements gathering, and expectation management in systems development.
- Core business processes to be identified and supported by robust business systems;

Strategic Aims

1. Promotion of a vision of the University's long-term aims, ensuring every new piece of software/application/development is a step in that direction; introduce the strong communication strategy and widespread buy-in required for this to succeed.
2. Introduce the leadership that is necessary to implement comprehensive business systems with associated process and cultural changes;
3. Accelerate the pace of change to accommodate the compounding internal and external drivers;
4. Continue to develop the University's capabilities in business analysis, defining organisational needs, developing systems for usability and change management for organisational change,
5. Systems development to be guided by the above principles and aims.

