

# **Information and Communications Technology Strategic Plan, 2005-06 to 2009-10**



**Submitted for consideration by PRAC, March  
2007**



## Contents

Distribution of the ICT Strategic Plan . . . . .	i
Executive Summary . . . . .	1
Document Route Planner . . . . .	15
Abbreviations . . . . .	17
ICT Strategy Steering Group Terms of Reference and Membership . . . . .	19
Introduction to the ICT Strategic Plan . . . . .	21
User-Oriented ICT Requirements . . . . .	25
Strategic ICT Requirements . . . . .	29
Oxford ICT Structure . . . . .	35
Integration of Enterprise Activities . . . . .	45
The ICT Budget and Priority Plan . . . . .	50
ICT Structure for Coordinated Decision Making . . . . .	62
ICT Strategy Implementation – Phase 2 . . . . .	69
ICT Strategic Plan Conclusions . . . . .	72
Appendix A: ICT Investment – Five-Year Budget and Priority Plan . . . . .	74
Appendix B: Terms of Reference of the Planning and Resource Allocation Committee Sub-Committee Structure . . . . .	81
Appendix C: Role and Responsibilities of the Director of ICT . . . . .	86
Appendix D: Organisation Structure for ICT Projects . . . . .	89
Appendix E: Scenarios for Success . . . . .	91
Appendix F: Glossary . . . . .	102
Appendix G: Consultations and References . . . . .	105



## Distribution of the ICT Strategic Plan

Report Distribution	Purpose	Timetable
PRAC	For consideration before consultation	14 Nov 2006
Collegiate University	For consultation	Nov 2006 - Feb 2007
ICT Strategy Programme Consultation Sub-Group	For evaluation of changes in response to consultation	Feb 2007
PRAC	For consideration of final Plan	20 March 2007 (17 April 2007)
Council	For consideration of final Plan	April 2007

The paper version submitted to PRAC contains the Executive Summary and a list of the Recommendations and Principles.

The full version of the Plan is available online at [http://www.ict.ox.ac.uk/strategy/plan/plan.xml.ID=executive\\_summary](http://www.ict.ox.ac.uk/strategy/plan/plan.xml.ID=executive_summary) (Web document) and [http://www.ict.ox.ac.uk/strategy/plan/ICT\\_Strategic\\_Plan\\_March2007.pdf](http://www.ict.ox.ac.uk/strategy/plan/ICT_Strategic_Plan_March2007.pdf) (PDF document)

## Executive Summary

### Introduction to ICT Strategic Plan

#### ICT Strategy Programme

The University's Corporate Plan includes a commitment to develop an Information and Communications Technology (ICT) strategy for the collegiate University. In Michaelmas Term 2005 Council gave its approval to a proposal to establish an ICT Steering Group with a remit to develop and bring forward an ICT Strategic Plan for the collegiate University. The Group<sup>1</sup> was given the task of developing a strategy which would enable the University both to 'provide high-quality and cost-effective ICT services and training that meets the needs of the University and its members' and to 'foster innovation, best practice, and value for money in the use of ICT in teaching, learning and research across the University.' The 30 members of the Steering Group were drawn from a broad range of constituencies across the collegiate University, held a series of meetings, and engaged in extensive consultation across the University, the record of which is available (<http://www.ict.ox.ac.uk/strategy/>). The ICT Strategy Programme culminated in the production of the ICT Strategic Plan (the full version of which is at <http://www.ict.ox.ac.uk/strategy/plan/>).

#### The importance of ICT

It is clear that ICT is critical to the continued success of the University. It is important to almost every member of the collegiate University. Members rely heavily on the PCs on their desks, the laptops connected to the network, email and web services, the software that drives the appliances which are used and the back-up; they must all work and do so consistently and effectively. Reliable and efficient ICT systems are also crucial to the operation of the collegiate University itself. Given the frequency with which students, academics and administrators exchange information between colleges, departments and the central University, ICT systems that can 'talk to' each other are needed and to which individuals can gain access, whether they are working in a college, a department or Faculty, or working outside of the University. Further, in an environment where there is more and more interdisciplinary work being carried out, ICT systems are needed that facilitate the sharing and exchange of ideas, information and knowledge.

#### ICT Budget

ICT also raises very significant budgetary issues. The University's expenditure on running its underlying ICT infrastructure and paying for licences is estimated to be £4m annually. The total expenditure on central ICT services (Oxford University Computing Services (OUCS), Business Services and Projects (BSP) and the IT expenditure within Oxford University Library Services (OULS) approached £20m in 2005/6. At a time when finances are tight, it is vital that the collegiate University makes the very best use of its spending on ICT. In particular, it needs clear procurement policies and a decision-making structure that can deliver the services that its ICT users need within a constrained overall budget.

#### Ambitions of the Plan

The principal aim of the ICT Strategic Plan is to offer the collegiate University an ICT framework that is appropriate for a world-leading University in the twenty-first century. This will enable colleges, departments, faculties and divisions to offer their users the best and most cost-effective ICT services and resources, to ensure that local ICT investment results in

<sup>1</sup>The Terms of Reference of the ICT Steering Group are available at <http://www.ict.ox.ac.uk/strategy/tor.xml>.

maximum benefits, and to provide the best possible environment and support for academic life within the University of Oxford.

### **Issues Addressed by the Plan**

Some of the specific issues addressed by the ICT Strategic Plan are:

- enabling those who use and depend on ICT services (e.g. researchers, lecturers, tutors, administrators) to determine the priorities for ICT investment, direction, and policy;
- enabling consensus to be reached for the development of new services which operate across the collegiate University (e.g. access to secure wireless networking, single identifier for accessing systems and resources, shared calendars, online storage of personal files) and to meet statutory requirements in areas such as freedom of information and data protection;
- improved management and delivery of mission-critical ICT services to ensure they meet the requirements of their users, are adequately resourced, have future upgrades planned and funded, can adjust quickly as requirements change, and are managed to appropriate standards;
- ensuring central ICT investment remains within appropriate limits;
- sharing best practice across the collegiate University, minimising unnecessary replication, and enabling nearly 600 ICT staff to operate more cohesively.

### **Fundamental Principles**

The collegiate University benefits from a devolved ICT framework which has ICT support provided locally, has local ICT autonomy, and is complemented by core ICT services provided centrally<sup>2</sup>. Without doubt the devolved ICT framework is appropriate for Oxford, but it is complex and requires careful coordination in order to operate effectively and cost efficiently.

Principles underlying the development of the ICT Strategic Plan are:

- the prioritization and development of ICT services driven by Oxford's teaching, learning, research, and administrative requirements, whilst ensuring that the provision of ICT services is both flexible and responsive as requirements change;
- a framework for the delivery of ICT which ensures tailored local ICT support and management, and which offers the best and most cost-effective service for staff and students;
- an environment for ICT Staff in which the cohort operates together, best practice is shared, and career development is a priority;
- an effective mechanism to appraise centrally-funded ICT provision, ensuring that overall central ICT expenditure is contained within an agreed budget specified by the University;
- central ICT expenditure to be prioritised and managed through an overall ICT Budget and Priority Plan, where prioritisation is determined by the user community and takes into account local ICT requirements and planning.

Underpinning the entire ICT Strategic Plan is a revised framework for the development, deployment and support of ICT services and infrastructure which supports the collegiate University's teaching, learning, research and administrative activities. It is important to

---

<sup>2</sup>Provided mainly by Oxford University Computing Services (OUCS), Business Services and Projects (BSP) in Central Administration, and the Oxford University Library Services (OULS).

recognise that for this framework to be effective, it must be implemented collectively by the collegiate University.

## Overview of ICT Strategic Plan

1. The Strategic Plan (<http://www.ict.ox.ac.uk/strategy/plan/>) is divided into seven main sections. The first two sections describe the current state of ICT services across the University and provide the context for the recommendations which follow (recommendations are listed in each section and collated at the end of the Executive Summary).

### Section 1: User-Oriented ICT Requirements

2. Section 1 summarises the changes to ICT that have been requested by users. This is a very important element in the plan. The approach has not been to copy the model used in many other universities where the ICT Strategic Plan has been developed by central IT providers, often following standard templates. The Oxford ICT Strategic Plan is fundamentally different in that the process, from its inception, has been wholly inclusive and has sought to respond to the needs of those who use the systems. A fundamental principle underlying the strategy is that user community must be capable of determining priorities for ICT investment.

3. The building blocks of the ICT Strategic Plan are the needs and aspirations of the diverse members of the collegiate University. These have been gathered through consultations and questionnaires and, in summary, include:

- easy access to the network for members and authorised visitors;
- a single method for accessing online resources, from any location and at any time;
- systems to support teaching, research and administration which talk to one another, are continuously available, and can be tailored for, and evolve with, individual requirements;
- a means to determine the technical feasibility for new requirements (e.g. plagiarism detection, secure electronic submission);
- a system for monitoring undergraduate and graduate academic progress throughout their time at Oxford;
- secure online storage for personal files and a digital repository for the outputs from research, teaching and administration;
- improvements to Oracle Financials, including an efficient purchasing interface, more flexible general ledger reporting, and better grants reporting;
- provision of training and support associated with each ICT service or development.

### Section 2: Strategic ICT Requirements

4. Section 2 considers Oxford's strategic ICT requirements, in particular those requirements necessary to achieve the objectives of the University as set out in its Corporate Plan 2005-6 to 2009-10. The discussion is located in the context of the University's federated institutional culture which values, among other things, subsidiarity which, in this context, equates to a devolved ICT structure. In order to benefit from local ICT provision within a devolved ICT structure, there must be improved coordination and interoperability and Oxford must be in a position to respond effectively to statutory requirements, applicable to ICT.

5. In order to meet many of its objectives, the collegiate University depends on the availability of a reliable and clearly defined ICT infrastructure in which ICT activities work together seamlessly, and where unnecessary replication can be eliminated. New ICT services must be introduced in a way which is beneficial to all parts of the collegiate University.

6. Sections 3-5 make the case for ICT change in Oxford.

### Section 3: Oxford ICT Structure

7. Section 3 sets out the elements of a proposal to refine and develop Oxford's devolved ICT structure. Three distinct types of ICT provision are identified, namely 'local' (within the college or department and generally provided without central ICT funds), shared services based on common standards (essentially a combination of central and departmental/college provision) and University wide services' (central service provision). Principles are laid down which determine the appropriate allocation of services to each of the three layers (*Figure 1*).

8. The coordination of ICT services within this framework is the collective responsibility of the collegiate University. It is essential to agree the principles and procedures by which the University can determine which ICT services should be the responsibility of divisions or colleges, and for which the responsibility should be shared with, or delegated to, the central ICT providers.

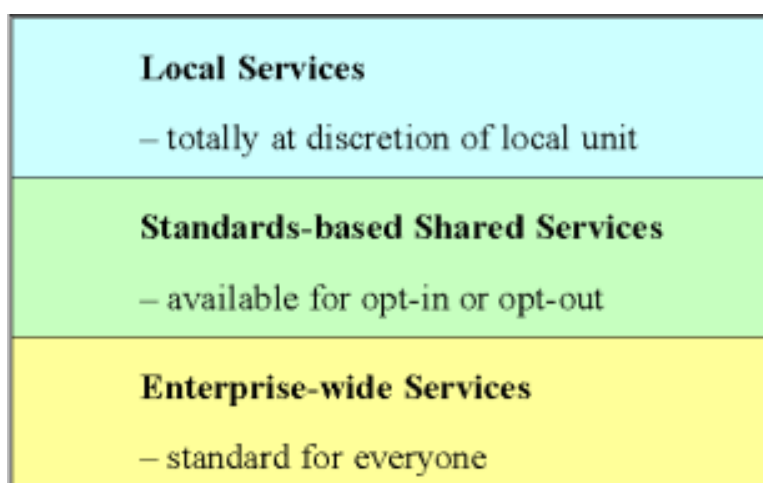


Figure 1. The Three 'layers' which together comprise the devolved ICT structure in Oxford.

9. It is proposed to create an ICT Forum which will enable the c.600 staff to operate as a cohesive and supportive professional body, able to initiate ICT projects and to exchange best practice.

### Section 4: Integration of Enterprise Activities

10. Section 4 emphasises that it is increasingly important for ICT systems to communicate with each other, both within and beyond Oxford, in order to support the full range of activities undertaken by the University. Indeed, there are some services, such as identity management, which cannot be implemented unless interoperability is enabled between the different components of the service.

11. Communication between systems is ineffective without an agreed strategy for joining together processes supporting educational, research and administration activities, and determining responsibility for controlling any given data source. As well as ensuring that the different ICT providers work together, the collegiate University must identify and agree the relevant standards with which ICT systems should conform. The overall standards framework to enable new services to be developed using data and applications from distributed systems will form an important component of a future Information Strategy.

### Section 5: ICT Budget and Priority Plan

12. Section 5 begins the process of creating a definitive 5-year expenditure plan for Oxford's central ICT investment. This gives the University the ability for the first time to set ICT priori-

ties with an affordable budget while at the same time ensuring that its critical applications are appropriately resourced. It also draws attention to the discrepancy between the requirements developed in the Plan and the current planned central capital ICT expenditure.

13. It will also assist planning for the subsequent investment which will be needed in later years (e.g. replacement of hardware, updating of software).

14. To develop an effective 5-year Plan, the University will need a consistent methodology for both costing central ICT activities and identifying the projected investment required to develop and maintain services that are critical to the operation of the University.

15. As an illustration<sup>2</sup>, an Oxford central ICT expenditure plan has been produced for the first time.

16. A new structure for the governance of ICT is required in order to deploy the 5-year Plan, to optimise expenditure, to reduce replication, to build interoperable services.

### Section 6: ICT Structure for Coordinated Decision Making

17. Section 6 outlines a new governance structure for ICT (*Figure 2*) which: is able to establish user/academic requirements, provides strategic direction for ICT, determines ICT policy, and agrees the priorities for central ICT investment. The structure will also define the standards and service levels required to ensure that those systems on which the collegiate University depend are sufficiently robust.

18. It will be essential that the new structure is directed and coordinated by a Director of ICT. It is confidently anticipated that the cost of the new Director will be more than compensated by the savings made through reduced replication of services, coordinated purchasing, improved oversight of ICT projects, shared software licences and the exchanging of best practice.

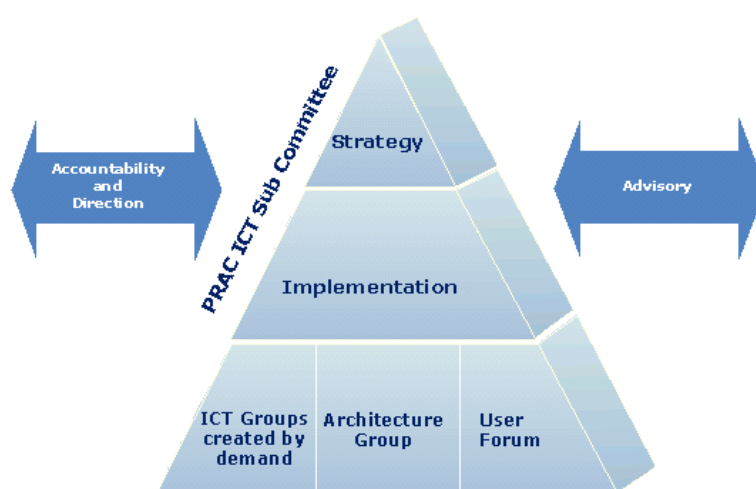


Figure 2. Representation of the proposed committee structure for ICT governance.

19. The principal elements of the ICT governance structure are the creation of :-

- a post of Director of ICT - a single point of contact for ICT, who provides leadership and coordination for ICT strategic planning and implementation;
- an ICT Sub-committee to the Planning and Resource Allocation Committee (PRAC) with;
  - a 'Strategy arm', with membership comprising representatives of the academic divisions, academic services and colleges, which sets strategy and policy;

an 'Implementation arm' which implements the ICT Strategic Plan, specifies service level definitions, oversees project delivery, undertakes risk analyses, ensures business continuity, ensures the University meets statutory requirements;

- accountability of the PRAC ICT Sub-Committee through connections to structures in the collegiate University (eg EPSC, Conference of Colleges);
- advisory connections to the PRAC ICT Sub-Committee (e.g. from ICT Forum, Web Strategy Group, etc.)
- a User Forum to ensure engagement with ICT users across the University;
- an Architecture Group to develop and maintain an interoperability framework for Oxford and to monitor the adherence of ICT projects to appropriate standards;

20. These elements established within a new ICT framework will enable the collegiate University to:

- establish academic/user requirements;
- provide strategic direction and policy for ICT;
- agree priorities for central ICT investment, and ensure mission-critical services are adequately funded;
- formulate and review the University's ICT programme for all capital projects;
- ensure business continuity and undertake end-to-end risk assessments;
- ensure the University meets its ICT statutory requirements;
- optimise overall investment in ICT and respond to changes in funding;
- undertake disaster planning;
- define the standards and service levels required to ensure that those systems on which the collegiate University depends are sufficiently robust.

### **Section 7: ICT Strategy Implementation**

21. Section 7 addresses the implementation phase of the ICT Strategic Plan. The first steps will include the setting up of the new governance structure, in particular the new PRAC ICT Sub-committee and the post of Director of ICT.

22. The ICT Strategic Plan defines the principles and processes required to deliver an ICT framework which is appropriate for a world-leading University in the twenty-first century. The success of the ICT Strategy Programme and the subsequent implementation of the ICT Strategic Plan will be measured by the improvement to existing services, the quality and cost-effectiveness of new services, the sharing of best practice, the prioritisation and adequate resourcing of central ICT services within a contained budget, and improved working methods for ICT staff.

23. Subject to agreement by PRAC and Council to proceed, preparations will begin for the implementation of the ICT Strategic Plan. The initial steps will be to create the new PRAC ICT Sub-Committee and to establish the post of Director of ICT. While developing the ICT Strategic Plan, the urgent need for an Information Strategy for the collegiate University has been apparent. The ICT Strategic Plan offers a framework to address issues relating to the management and flow of information within and beyond the collegiate University. These principles should be developed into a full Information Strategy.

## Summary of the potential benefits of implementation

24. Implementation of the ICT Strategic Plan will enable the collegiate University to coordinate and prioritise the delivery and support of ICT effectively. Subject to there being sufficient resources to implement the changes required, the main benefits which would result, grouped by section within the Plan, are:

### Strategic ICT Requirements

- **ICT policy and investment determined by research, educational and administrative needs (93, 244, 296);**
- an ICT framework capable of underpinning world-class **research (107, 202ff)** using innovative ICT to improve efficiency, functionality, and communications;
- investment to support the **student learning experience (108, 208ff)**, administrative processes associated with teaching, access to online resources, and innovative use of ICT in teaching;
- support for the most appropriate and reliable administration systems, including agreed standards to enable communication or **interoperability (188ff)** between central and local systems;
- access to suitable **ICT training and development (106)** for staff and students which integrates with their needs and aspirations, whether related to learning, research, teaching, or administration;
- a clear set of services designed to assist **alumni (115)** in remaining active members of the collegiate University.

### Oxford ICT Structure

- Agreed **sets of principles and criteria (130)** for the development, maintenance and evaluation of ICT services, especially those under the responsibility of BSP, OUCS and OULS;
- support and resources for developing local ICT services into **services more widely available (131)** – where there is demonstrable demand;
- an **ICT Forum (157ff)** to enable Oxford's c.600 ICT staff to operate as a cohesive and supportive body, and able to initiate ICT projects;
- value-for-money gained through improved support for **coordinated purchasing (181)** of ICT hardware and software and reduction of replication of services.

### Integration of Enterprise Activities

- A strategy to enable interoperability between systems, developed and maintained by an **ICT Architecture Group (Appendix B)**;
- **procurement (200)** of centrally-provided systems which match the requirements defined by the part of the collegiate University sponsoring the activity;
- availability of University-wide services which provide a **single means of accessing (198)** online systems and resources for non-resident as well as resident, part-time as well as full-time students and staff;
- virtual research and learning environments which exchange information with **administration systems (99ff, 209ff)** and **scholarly information services (176ff, 207)** provided by

OULS, allowing staff and students to tailor the systems to present the most relevant tools, data and resources.

### **The ICT Budget and Priority Plan**

- A **single consolidated view of ICT investment (Tables A1 and A2)** by the University with spending priorities specified by the user community;
- investment in central ICT services (**BSP, OUCS and OULS, 167ff**) to provide local users with the ICT services they require, and to enable local ICT services to work effectively;
- the collegiate University able to **set priorities for central ICT expenditure (244ff)**, and to contain the overall expenditure;
- adequate resources to ensure high-priority ICT services are **effective, robust and reliable (245)**, and procedures to ensure the total central ICT investment is correctly managed.

### **ICT Structure for Coordinated Decision Making**

- A **PRAC ICT Sub-Committee (Appendix B)** together with its Implementation arm, to establish the academic requirements and so determine the strategy and policy framework for ICT across the collegiate University, including oversight of the University's programme of ICT projects;
- a post of **Director of ICT (Appendix C)** to promote ICT across the collegiate University, to provide leadership and coordination for ICT strategic planning, to ensure mission-critical services deliver, and to implement the ICT Strategic Plan (where concomitant savings are expected to more than cover the cost of the post);
- a **User Forum (Appendix B)** to represent the views of the ICT user community across the departments and colleges and help facilitate the community's input to the ICT strategic planning process;
- an **ICT Architecture Group (Appendix B)** to develop and maintain the strategic framework to ensure interoperability between systems and cooperation between ICT service providers;
- **management of ICT risk** and appraisal of the quality, robustness and performance of core ICT services (**Appendices B and C**).

### Scenarios

25. **Appendix E** contains a series of brief role-based scenarios intended to illustrate examples of the practical benefits which might flow from the implementation of the ICT Strategic Plan. These include:

- **Undergraduate student** interacting with student portal which allows her, from one website, to save and retrieve her work; find bibliographic resources; discover sources of student funding; update her personal student record; and submit her chosen options.
- **Graduate student** integrating his personal computer with his research activities, including synchronising with a University-wide calendar; contributing a report to the system which monitors his academic progress; participating in a remote seminar; paying his college battels via an Oxford portal.
- **Part-time masters student** participating in Oxford life through tools which enable collaboration with tutors and fellow students together with access to the same interfaces and online resources as students resident in Oxford.
- **Researcher** discovering collaborators via an online database; keeping control over different versions of an article she is writing with a colleague; and profiling a project budget using an application integrated with the financial system.
- **Lecturer** accessing research and teaching resources from home or abroad; arranging tutorials using a University-wide calendar and submitting draft examination papers securely.
- **Departmental Administrator** easily retrieving and contacting particular groups of staff or students; making use of a departmental system for managing research reports which is integrated with University-wide systems; and submitting papers and minutes to a secure document management system.
- **Head of Division** interacting with the new governance structure for ICT in order to escalate a particular ICT requirement which subsequently becomes a programme of projects shared between her Division, other departments and central services.
- **IT Support Officer** making use of a shared helpdesk system; interacting with the ICT Forum, resulting in additional development opportunities and a proposal for project funding.
- **College Alumni Officer** enhancing her communications with her college alumni through news alerts, a shared events management system, and interoperability with the University's contacts database. These, together with a secure wireless network, help in the efficient running of an alumni event.

### Recommendations and Principles

26. A consolidated list of Recommendations and Principles from the ICT Strategic Plan is given below in the order that they appear in the document. (Several of the recommendations and principles apply to more than section of the Plan and therefore recur more than once.)

#### ICT Strategic Plan Recommendations

r1. Develop mechanisms for ensuring ongoing effective input from staff and students into ICT

strategic planning, and ensure that future ICT projects are developed according to the needs of the academic community.

R2. Implement a holistic<sup>3</sup> approach to ICT and its coordination across Oxford, which aims to offer the best possible ICT environment across the collegiate University and embraces the principle of subsidiarity.

R3. Recognise that Oxford's devolved ICT infrastructure should be a heterogeneous but coordinated set of ICT services, some run centrally, some locally, and many shared.

R4. Set up a coordinated and long term approach to the development of ICT infrastructure, information organisation, and decision making, for all parts of Oxford.

R5. Determine and ensure an appropriate and consistent investment in robust infrastructure for mission-critical ICT systems.

R6. Develop organisational and technical policies and standards for interoperability in order to fulfil shared needs within Oxford's devolved ICT environment.

R7. Establish a University-wide identity management system which provides authentication and authorisation, and enables interoperability with national and international infrastructure.

R8. Develop personalised, federated and secure access to — and management of — University information resources.

R9. Refine the devolved Oxford ICT structure through the application of a three-layer model comprising local services, standards-based shared services, and enterprise-wide services.

R10. Develop, via a new Coordinated Decision Making structure,<sup>4</sup> the principles and criteria by which ICT services are developed and provided as local, shared or enterprise services.

R11. Develop the principles and criteria by which central and shared services are regularly evaluated against user requirements and are discontinued, enhanced, or expanded as appropriate.

R12. Specify and implement the required standards for interoperability so that local units will be able to make judgements regarding the most cost-effective means of delivering services to their users within the three-layer model.

R13. Establish a process whereby local ICT services for which there is a demonstrable need beyond the originating unit may evolve into shared or enterprise services with appropriate support and resources.

R14. Create an ICT Forum in which all IT support staff within Oxford are represented, coordinated, and allocated a small but sufficient budget in order to develop a secondment scheme and fund other small-scale relevant activities.

R15. Develop the structures necessary to enable Oxford to benefit from coordinated purchasing of ICT hardware, software, and consumables.

R16. Ensure the integration of enterprise and shared ICT services through the development of an over-arching interoperability policy, including both organisational and technical aspects.

R17. Base the interoperability of enterprise systems on standards agreed via an Architecture Group (part of a new Coordinated Decision Making structure).

R18. Procure or develop enterprise-wide systems based on the functional requirements defined by the user community and value-for-money in the entire deployment life-cycle, together with adherence to appropriate agreed standards, where possible, and availability of sustainable support.

R19. Define a Service-Oriented Architecture approach to the development and provision of ICT

---

<sup>3</sup>'Holistic' in the sense of considering the requirements of the collegiate University.

<sup>4</sup>A new ICT governance structure for prioritisation, coordination, optimisation and delivery; described in detail in Section 6.

which is appropriate to the Oxford ICT Structure and which helps facilitate the funding and development of ICT services in response to local demand and innovation.

R20. Develop supporting structures for the planning and management of ICT projects, including the definition and use of appropriate methodologies.

R21. Define an approach and a set of principles to develop a five-year University ICT Budget and Priority Plan covering the services funded centrally.<sup>5</sup>

R22. Enable users across the collegiate University to specify priorities for central ICT investment; the Plan should be updated yearly, and should offer a single consolidated view of central ICT investment.

R23. Provide a breakdown of ongoing operational expenditure and a descriptive and prioritised list of major new central ICT investments.

R24. Place the new five-year University ICT Budget and Priority Plan, and the process used to maintain it, under the ownership of the Director of ICT, and oversee its development through the PRAC ICT Sub-committee.<sup>6</sup>

R25. Establish processes to appraise expenditure on ICT in teaching, learning, research and administration, to measure total cost of ownership, to prioritise expenditure on new central ICT projects, and to establish and keep within a specified budget.

R26. Address the apparent discrepancy between the resources allocated for centrally-funded ICT in the University's Capital Projects Register and the indicative amounts required for central ICT services in the five-year ICT expenditure plan.

R27. Introduce an ICT Coordinated Decision Making structure to embrace ICT in Oxford, and establish as a fundamental component of the Coordinated Decision Making structure for ICT a PRAC ICT Sub-committee consisting of both Strategy and Implementation arms.

R28. The proposed committee structure should provide strategic direction for ICT, determine ICT policy and agree the priorities for central ICT investment. The committee structure will also ensure mission-critical ICT services are resilient and reliable; identify and manage risks; ensure Oxford complies with relevant legislation; and put in place quality assurance standards for optimal ICT operational delivery. It will ensure central ICT expenditure remains within a total budget set by the collegiate University through PRAC, and will terminate services agreed to be of a lower priority or fund them by cost recovery.

R29. Establish a Director of ICT post as the executive arm of the PRAC ICT Sub-committee. The Sub-Committee and Director of ICT should direct and coordinate the strategic development of central ICT services including those managed by OUCS, BSP and OULS.

R30. The Coordinated Decision Making structure should establish bi-directional communications channels with the appropriate University committees with responsibility for education, research and administration, in order that those aspects of teaching, learning, research and administration underpinned by ICT are properly considered and given appropriate priority by the collegiate University. For research and teaching this should be achieved through the respective PVCs being members of the top-level committee.

R31. Establish an Architecture Group to develop and maintain an interoperability framework for Oxford together with the monitoring of ICT projects' adherence to appropriate standards.

R32. Create a User Forum with a cross-section of Oxford ICT users.

R33. Create ICT Project Boards for new ICT projects or service upgrades.

R34. Form other groups within the ICT structure, as needed, to report to the Strategy and Implementation arms of the PRAC ICT Sub-committee; terminate groups on project completion or completion of activity.

<sup>5</sup>Including the services provided by OUCS, BSP and OULS.

<sup>6</sup>Described in section 6.

R35. Address full Economic Costing for ICT services through the Coordinated Decision Making structure.

R36. Measure the new ICT Coordinated Decision Making structure against COBIT principles.

R37. Subject to recommendation by Council to proceed, after the forthcoming period of consultation, make preparations for implementation of the ICT Strategic Plan.

### **ICT Strategic Plan Principles**

P1. The ICT requirements of units and individuals, whatever their role within Oxford, must be addressed by the ICT Strategic Plan.

P2. These requirements, whilst primarily relating to enabling individuals to make their fullest contribution to Oxford's core aims, should be addressed within the context of academic freedom and subsidiarity.

P3. The overall ICT architecture for Oxford should comprise a combination of enterprise services, shared services and local services (including services specific to a teaching or research area).

P4. The provision of enterprise or shared ICT services must be based on the use of agreed standards in order to improve productivity through interoperation with local services and to reduce replication.

P5. ICT is critical to the fulfilment of Oxford's strategic objectives.

P6. The requirements of Oxford's teaching, learning, research and administration activities should drive the prioritization and development of ICT services.

P7. The ICT Strategic Plan, like the University Corporate Plan, must be placed within the context of a federated institutional culture which values academic freedom, subsidiarity, disciplinary diversity, parity of esteem, collegiality, and the pursuit of excellence.

P8. Oxford must be able to respond effectively and efficiently to statutory requirements, many of which depend on ICT infrastructure and require on-demand and coherent access to disparate data sources.

P9. The provision of ICT should be agile and responsive to Oxford's rapidly evolving requirements.

P10. The devolved Oxford ICT structure, which is intrinsically more complex than a centralised system, must be actively coordinated, refined, and enhanced.

P11. Locally implemented services across Oxford should be able to benefit from interoperation with centrally-offered services.

P12. Benefits from coordination between central and local services should be maximised, while ensuring an excellent response to local requirements.

P13. The University requires an effective means for setting priorities and coordinating ICT activities.

P14. Oxford (collectively) must contribute to ICT developments, decide which applications are best run centrally, ensure central applications meet the needs of users, and make it possible to develop new ICT activities located in the most appropriate part of the collegiate University.

P15. For ICT services which are anticipated to operate across a large part of the collegiate University, the first consideration should be to provide them centrally, either as enterprise or shared services, in order to avoid unnecessary replication of local solutions.

P16. It is intended that existing mission-critical enterprise services will continue to be maintained by the central ICT providers such as the Computing Services, the Business Services and Projects group, and the Enhanced Computing Environment ICT Support Team. It is expected that a significant number of shared services will also be provided by the central ICT providers.

P17. The development of a culture of interoperability within Oxford is dependent on the development of an Information Strategy which, for example, clearly defines the information available for reuse; ensures processes are in place to guarantee the quality of information; and defines responsibilities with regard to the management and use of information.

P18. Enterprise-wide ICT applications (including shared services) should interoperate, and appropriate coordination structures should be put in place to offer a uniform interface to the user.

P19. The ability to interoperate with other services must be a key requirement for new services.

P20. Software procurement, deployment, and development must be based on analysis of functional requirements, value for money, agreed standards and data interchangeability — where appropriate. Development of new and updated applications should use appropriate project management methodologies.

P21. ICT architecture and standards must be defined, agreed, documented, and regularly updated.

P22. Commitment to a Service-Oriented Architecture (SOA) approach should be considered as the optimum way forward, whereby IT systems are constructed, where possible, from loosely-coupled, interoperable, and reusable 'services'.

P23. ICT pervades Oxford academic and administrative life. It is critical to fulfilling both individual and organisational aspirations. The establishment of a central ICT expenditure plan, therefore, which enables the collegiate University to anticipate and prioritise central ICT expenditure and development, is an essential outcome from the ICT Strategy Programme.

P24. The University requires a five-year rolling plan for central ICT expenditure (hereafter referred to as 'The ICT Budget and Priority Plan'). Central ICT expenditure is an investment which has consequences for the whole collegiate University, and the investment must be managed, kept within a specified allocation, and priorities for expenditure specified, collectively.

P25. The academic community must determine the essential components within a prioritised central ICT expenditure plan; this process itself is dependent on appropriate ICT coordination and decision-making processes being in place in divisions and across the colleges.

P26. The ICT Budget and Priority Plan must take local ICT requirements and investment as its initial focus. It must identify the shared and central ICT services which are essential for the local services to operate effectively.

P27. The ICT Budget and Priority Plan must cover central expenditure on ICT in teaching, research, and administration (including services provided by OUCS, OULS and BSP). It must also foster conditions for local innovation and sustainability. Where appropriate the Plan must allow for, and fund, the scaling-up of local developments into Oxford-wide shared services.

P28. The ICT Budget and Priority Plan must take into account the University's strategic objectives and the increasingly complex statutory requirements.

P29. A structure for Coordinated Decision Making (CDM) is required for ICT, in order to contribute to meeting Oxford's values, to underpin world class research, to support learning, to facilitate first class administrative systems, to make intellectual assets accessible, to refine the Oxford ICT deployment model, to integrate enterprise activities, to define ICT priorities and focus resources on mission-critical services, to agree components within the Oxford ICT three-layer model, and to introduce new ICT applications effectively and reliably.

P30. ICT provision must offer full support for, indeed in some respects underpin, Oxford's principle of subsidiarity. The CDM structure is responsible for coordinating and refining the concomitant devolved ICT deployment model.<sup>7</sup>

---

<sup>7</sup>It should be stressed that the CDM structure will not have responsibility for, nor interfere with, ICT policy and decisions made within Divisions and Colleges.

P31. The CDM structure must coordinate ICT across the University to ensure that departments and colleges are given the services and interfaces that they require. It must provide a connection for users and IT staff with Oxford's policy makers.

P32. The CDM must set policy for, and prioritise activities across, the central ICT services, including those provided by OUCS, BSP and OULS; it must ensure that total central ICT expenditure remains within a total allocation set by the collegiate University.

P33. The CDM structure must enable Oxford collectively to establish priorities and policy, evolve and develop ICT, and ensure quality of service to the user.

P34. The CDM structure must have sufficient components (committees and groups) to meet requirements, but should be as streamlined and transparent as possible.

P35. A single individual in the University must be given responsibility to: ensure ICT can offer full support for Oxford's principle of subsidiarity, coordinate the devolved ICT deployment model, be accountable for central ICT services, and lead the implementation of the ICT Strategic Plan.

P36. Careful planning and commitment from across Oxford is required to make the step change from agreeing the principles of the ICT Strategic Plan to taking forward the implementation in Phase 2.

P37. Implementation of the ICT Strategic Plan will require new procedures, new coordination, and new prioritisations to be agreed.

## Document Route Planner

- a. Readers wishing to focus on **the changes that the ICT Strategic Plan will bring for the end user** should refer to section 1 — where user-oriented requirements are collected, section 7 — which describes the implementation of the ICT Strategy Plan, and Appendix E — Scenarios for Success, which illustrate some of the potential benefits which may be gained by a successful implementation strategy.
- b. Readers interested in the **structural changes which are needed to enable the effective delivery of ICT across the collegiate University** and in the **coordination and prioritisation of ICT investment** should look at section 3 — where the refined devolved ICT model is described, and section 6 — where a new ICT Structure for Coordinated Decision Making is presented. The scenarios in Appendix E relating to the Department Administrator, Head of Division/Department, and IT Support Officer may be of interest.
- c. Readers wishing to explore **aspects relating to Divisional ICT** should refer to section 3 — where the devolved ICT model is elaborated, section 5 where an overview of ICT expenditure is given, and section 6 where a new ICT Structure for Coordinated Decision Making is presented. The decision-making process is further illustrated by the scenario in Appendix E for a Head of Division/Department.
- d. The ICT Strategic Plan will have a direct impact on **College ICT** as the centrally funded ICT services must provide a tuned environment which enables local services to be as effective as possible. section 6 describes a new ICT Structure for Coordinated Decision Making which set priorities on central ICT investment. The co-existence of College and University ICT services and staff is explored in section 3. Scenarios in Appendix E relating to the student members, the Lecturer, and the College Alumni Officer illustrate one or more elements relevant to the college perspective.
- e. **IT support staff** will find the description of a new **ICT Forum**, in section 3, to be especially relevant, as well as the new structure for Coordinated Decision Making in section 6. Appendix E also contains a scenario for an IT Support Officer.
- f. Readers who would like to focus on how the principles and policies elaborated in the Strategic Plan will be developed into a **Plan for Implementation** should refer to the Introduction and section 7.
- g. The **evidence** on which future principles and strategic directions for ICT in Oxford are based is presented in sections 1 and 2. Readers wishing to explore this in more detail are directed to a companion report, 'ICT Strategy Programme Formal Record', available via <http://www.ict.ox.ac.uk/strategy/record/>.
- h. Readers interested in how the principles of **subsidiarity** and **devolved ICT** are encapsulated within an **Oxford ICT Structure and Model** are referred to section 3.
- i. The University offers a range of ICT services which operate across large parts of the collegiate University, and many of which are provided centrally. Readers wishing to understand **plans for better coordination of ICT services** should go to section 4. All of the scenarios in Appendix E make assumptions about coordination of, and interoperability between, ICT services.
- j. Hitherto, the University of Oxford has not been able to generate a **five-year ICT priority plan**. Readers wishing to investigate an initial ICT central investment plan and consideration of the processes required to refine this, should turn to section 5 and the supporting summary of ICT investment in Appendix A.

- k. Readers who would like to understand the new ICT **Structure for Coordinated Decision Making**, in effect a new ICT governance structure for Oxford, should read section 6 together with appendices B and C.

## Abbreviations

**AG:** Architecture Group  
**ASP:** Application Service Provider  
**ASUC:** Academic Services and University Collections  
**AV:** Audio-Visual  
**BSP:** Business Services and Projects  
**CDM:** Coordinated Decision Making  
**CMS:** Content Management System  
**ECE:** Enhanced Computing Environment  
**fEC:** Full Economic Costing  
**HE:** Higher Education  
**HFS:** Hierarchical File System  
**HR:** Human Resources  
**ICT:** Information and Communications Technology  
**ICTC:** Information and Communications Technology Committee  
**ICTF:** ICT Forum  
**ICTS-SG:** ICT Strategy Steering Group  
**IP:** Internet Protocol  
**IR:** Institutional Repository  
**ISACA:** Information Systems Audit and Control Association  
**IT:** Information Technologies  
**ITSS:** IT Support Staff  
**ITS3:** IT Support Staff Services  
**ITSSG:** IT Support Staff Group  
**JISC:** Joint Information Systems Committee  
**KPI:** Key Performance Indicator  
**MSD:** Medical Sciences Division  
**ODL:** Oxford Digital Library  
**OeRC:** Oxford e-Research Centre  
**OSC:** Oxford Supercomputing Centre  
**OUCS:** Oxford University Computing Services  
**OUED:** Oxford University Estates Directorate  
**OULS:** Oxford University Library Services  
**PC:** Personal Computer  
**PDA:** Personal Digital Assistant

**PRAC:** Planning and Resource Allocation Committee

**PRAS:** Planning and Resource Allocation Section

**PVC:** Pro-Vice-Chancellor

**PVC (RASUC):** Pro-Vice-Chancellor for Research, Academic Services and University Collections

**RAE:** Research Assessment Exercise

**RDS:** Research Discovery Service

**ROI:** Return on Investment

**S/c:** Sub-committee

**SENDA:** Special Educational Needs and Disability Act 2001

**SOA:** Service Oriented Architecture

**SRIF:** Science Research Investment Fund

**VLE:** Virtual Learning Environment

**VoIP:** Voice over IP

**VRE:** Virtual Research Environment

## ICT Strategy Steering Group Terms of Reference and Membership

27. The ICT Strategy Steering Group was established in September 2005. The terms of reference of the Group were to:

- formulate an ICT strategic plan for the collegiate University in accordance with its corporate plan together with a proposed implementation plan, and to report such recommendations to the Council by spring 2006;
- assess current ICT provision and support within the global context of higher education in the 21st century;
- ensure a co-ordinated and coherent approach to the development, deployment and support of ICT services to underpin the collegiate University's teaching, learning, research and administration systems;
- make recommendations regarding priorities and resource requirements to ensure the collegiate University is best placed to take advantage of innovations and best practice in ICT development;
- report progress at agreed regular intervals to the Information and Communications Technology (ICT) Committee and other relevant bodies within the collegiate University;
- enable appropriate communication and consultation within the wider community as appropriate;
- identify members of a smaller sub-group to prepare documentation for the Steering Group;
- establish such consultative-groups as considered necessary to carry out its responsibilities and to monitor the work of these;
- terminate the group when the strategy is in place.

28. The membership of the Group comprised:

Chair: Dr Bill Macmillan (to July 2006); Professor Ewan McKendrick (Pro-Vice-Chancellor for Research, Academic Services and University Collections)

Professor Paul Jeffreys (Acting ICT Director)

Dr Jo Ashbourn (Chair of Colleges IT Group)

Dr Pete Biggs (Chair of IT Users Group)

Professor Alan Bowman (Humanities)

Professor Keith Burnett (MPLS)

Professor Mark Clark (external, Director of Manchester Computing)

Dr Jim Davies (Continuing Education and Software Engineering)

Dr Jurgen A Doornik (Social Sciences)

Professor Bill Dutton (Vice chair of ICTC and observer)

Mr Jerry Fishenden (external, industry)

Mr Alan Gay (OUCS)

Professor Mike Giles (MPLS and Oxford Supercomputing Centre)

Mrs Annette Haworth (external, Director of Information Services, Reading University)  
Mr Nigel Herriott (external, industry)  
Mr John Ireland (Conference of Colleges)  
Mr Giles Kerr (Finance Division)  
Dr Stuart Lee (OUCS)  
Mr Dean Marriot (RSM Robson Rhodes, University Internal Auditors)  
Mr Jonathan Marks (Conference of Colleges)  
Mr Bill Olivier (external, JISC)  
Dr Stephen Parkinson (Humanities)  
Professor Ken Peach (Director, John Adams Institute for Accelerator Science University of Oxford and Royal Holloway University of London)  
Mr David Perrow (OULS)  
Dr David Popplewell (Medical Sciences)  
Mr Oliver Russell (OUSU Vice-President (Graduates))  
Sir Michael Scholar (St John's College)  
Professor Bernard Silverman (Conference of Colleges)  
Mr Michael Sibly (Academic Registrar and Secretary of Faculties)  
Mrs Margaret Taylor (Business Services and Projects)  
Dr Anne Trefethen (Oxford e-Research Centre)  
Mr Jeremy Worth (Chair of IT Support Staff Group)  
Dr David Watson (external, industry)

## Introduction to the ICT Strategic Plan

29. The University's Corporate Plan includes a commitment to develop a coherent ICT strategy for the collegiate University. The **ICT Strategic Plan** makes recommendations concerning the development, deployment, and support of ICT<sup>8</sup> across Oxford<sup>9</sup>. It focuses on establishing the correct principles to take ICT in Oxford into a new era.

30. The overall aim of the ICT Strategic Plan is to enable colleges, departments, faculties and divisions to offer their users the best and most cost-effective ICT services and resources, to ensure that local ICT investment results in maximum benefits, and to provide the best possible environment and support for academic life within the University of Oxford.

31. Underpinning the whole ICT Strategic Plan is a revised framework for the development, deployment and support of ICT services and infrastructure which support the collegiate University's teaching, learning, research and administrative activities. For this framework to be effective, it must be driven by the academic requirements and implemented collectively by the collegiate University. The level of investment in centrally-provided ICT services<sup>10</sup>, many of which are key components within the overall infrastructure, should be strictly monitored whilst adequate resourcing of mission critical ICT services should be ensured.

32. The key objectives to be met by the ICT Strategic Plan, as specified at the outset of the Programme, are:

- to develop for the collegiate University: a coordinated and coherent approach which will enable the University to both, "provide high-quality and cost-effective ICT services and training that meet the needs of the University and its members" and, "foster innovation, best practice, and value for money in the use of ICT in teaching, learning, and research across the University".<sup>11</sup>

- to define the conditions under which it will be possible to provide an optimised ICT infrastructure, with appropriate user support, and with standards agreed.

- to address the question, "What is the future direction for ICT in Oxford, and why?"

- to develop principles for an ICT Strategy for the next five years (2006-2010), identifying the priorities for investment.

33. The ICT Strategic Plan establishes the principles, structures, and priorities which are required in order to develop a coherent ICT Strategy for Oxford.

34. The Plan addresses the deficiencies in the existing ICT structure. It offers a single structure within which the academic community is able to define priorities for ICT investment, overall ICT investment can be managed and prioritised, a focus on interoperability of ICT systems across the collegiate University, and a new coordinated approach to operating Oxford's devolved ICT framework. A post of Director of ICT will drive through the implementation of the ICT Strategic Plan and ensure best possible ICT services are delivered to users.

35. A very substantial investment of effort has been made to ensure that the ICT Strategic

### The end result?

- A single way of accessing networked resources, from any location at any time
- Seamless and authorised access to the network for members and visitors alike
- Joined-up, robust, and personalised systems to support teaching, research and administration
- Personal filestore and remote access repository
- A professional forum for IT support staff
- ICT services which evolve in line with user requirements

<sup>8</sup>By 'ICT' we mean Information and Communications Technology. ICT encompasses any use of computing systems and networks to support teaching, learning, research, and administration within Oxford.

<sup>9</sup>By 'Oxford' we mean the collegiate University, and the word is used interchangeably with this throughout the Strategic Plan.

<sup>10</sup>Provided mainly by Oxford University Computing Services (OUCS), Business Services and Projects (BSP) and Information and Communications Technology Strategic Plan, 2005-06 to 2009-10 and the Oxford University Library Services (OULS).

<sup>11</sup>Quote taken from ICT Strategy Steering Group Terms of Reference.

Plan has been developed by consensus<sup>12</sup>. It is crucially important that Oxford, collectively, is responsible for, and owns, the Plan.

36. Converting the ICT Strategic Plan into a plan for implementation will be achieved through a subsequent phase of the ICT Programme, described in section 7.

37. The ICT Strategic Plan has a direct focus on, and is driven by, the needs of users across Oxford. For example, it is becoming increasingly important to address the need for: new and better ways for accessing networked resources; management and privacy of personal information; and the secure storage of data connected with the full range of Oxford's activities.

38. ICT is an essential part of Oxford's infrastructure — supporting teaching, learning, research, and its administration. These activities constitute Oxford's core activities<sup>13</sup>.

39. The ICT Strategic Plan takes, as its starting point, the requirements of the individual user. Whatever the role held by individuals within Oxford, the primary relationship with ICT is through personal devices, whether a computer on the desktop, a laptop in the briefcase, a mobile phone in the pocket, or numerous other personal devices known and not yet known. Underpinning the user's personal experience of ICT, however, are complex and rich layers of ICT infrastructure and support, much of which is (and should be) invisible to the end-user. The success of the ICT Strategy will be measured against the positive difference it can deliver for the individual users who together constitute the corporate sense of Oxford. Beneficial outcomes for staff and students should include:

- a. Continued emphasis on subsidiarity, the collegiate nature of Oxford University, and the appropriate devolving of responsibility for ICT services.
- b. Continued emphasis on mobility which combines wireless networking, integration of personal devices, and location-independent access to Oxford systems.
- c. Access to information and resources which are integrated and personalised for learning, research, or administration.
- d. Improved communication of events, expertise, and availability of resources across Oxford.
- e. Enhanced and more responsible management of information sources and data repositories.
- f. Secure data storage and access at a personal and organisational level.
- g. Support for coordinated and flexible desktop computing.
- h. Continued development of new ICT services driven by user needs.
- i. Greater reliability of ICT systems, with round-the-clock availability.
- j. Cost savings on the purchase of ICT components whether for business or personal use.
- k. Continued collaboration between, and better career development for, IT support staff across Oxford.

40. Before the individual user is able to benefit, however, Oxford must address some key concerns and issues. For example:

---

<sup>12</sup>To appreciate how the strategy was *developed by consensus* see a companion report, 'ICT Strategy Programme Record', available via <http://www.ict.ox.ac.uk/strategy/record/>. More than 50 members of the collegiate University worked over a period of 8 months to develop an ICT Strategic Plan which was owned by Oxford, and where there was a strong emphasis on reaching consensus before moving forward. The ICT Strategy Programme Record reports the information and evidence received on which the directions of the Plan were built.

<sup>13</sup>The term '*core activities*' will be used elsewhere in the ICT Strategic Plan to represent the set of activities which define Oxford.

- a. Developing better University-wide participation in the identification, planning, and deployment of ICT systems.
  - b. Appropriate levels of resilience and support for Oxford ICT systems.
  - c. Improved interoperability between distributed systems by a commitment to appropriate agreed standards at the procurement stage, where consistent with a viable business case.
  - d. Effective and consistent access to the University's ICT systems and resources irrespective of location and time.
  - e. Reduction in the replication of generic ICT systems together with more cost-effective purchasing of ICT components.
  - f. A robust Oxford ICT Structure<sup>14</sup> for planning, prioritising, funding and delivering ICT services.
  - g. Development of an integral strategy for the management of information within Oxford.
41. There are approximately 600 ICT staff across the collegiate University, and the University<sup>15</sup> expenditure on computer equipment, licences and maintenance is estimated to be £4m annually. Spend on central ICT services approached £20m in 2005/6. While the ICT Strategic Plan is not in a position to determine local ICT spending, it does have a responsibility to create an ICT environment which enables the collegiate University to achieve maximum return from its investment.
42. In a recent ICT survey, 77% of staff and 45% of students were 'very satisfied' with their ICT provision, and 23% of staff and 41% of students were 'quite satisfied'.
43. A particular source of dissatisfaction for many staff concerns the enterprise-wide services, in particular OSIRIS and ISIDORE. This reflects difficulty in specifying and deploying large enterprise-wide ICT systems that fully meet the requirements and expectations of the sponsoring part of the collegiate University.
44. The ICT Strategic Plan must ensure that the specification, design and deployment of future enterprise-wide systems do not suffer the same shortcomings. The sponsoring part of the collegiate University must retain responsibility for the deployment of a new /updated service, through the relevant Project Board.
45. The Strategic Plan will enable ICT priorities, over a five-year timescale, to be determined by the needs of staff and students in Oxford, to be measured against other University priorities, and to respond quickly to ICT developments. An ICT expenditure plan for central ICT expenditure reveals a discrepancy between the funding for ICT foreseen in the University's Capital Projects Register and the amount required for mission-critical and essential central ICT services.
46. Preparation of the ICT Strategic Plan has been the responsibility of the ICT Strategy Steering Group, chaired by the Pro-Vice-Chancellor (Planning and Resources). The current draft version of the Plan is made available for consultation through the rest of 2006. A definitive version will be produced early in 2007 and submitted to Council for ratification.
47. The ICT Strategic Plan will define the changes needed for the University to move into a new era of ICT infrastructure, provision and support. A structure for agreeing policy, setting priorities, coordinating expenditure, and overseeing delivery (the ICT Structure for Coordinated Decision Making), is described in section 6, and will oversee the implementation of the ICT Strategic Plan.

<sup>14</sup>The 'Oxford ICT Structure' is used to refer to the devolved and distributed organisation of decision-making, resource allocation, service provision, and support staff within Oxford.

<sup>15</sup>Excluding central ICT service providers and Colleges.

48. An annual review should measure the success of the implementation of the ICT Strategic Plan, together with the definition of new sets of goals, and appraisal of the delivery and evolution of ICT services. The ICT Strategic Plan should be updated on a three-yearly cycle.

## Summary of contents

49. The ICT Strategic Plan document begins (*section 1*) by collecting and appraising individual ICT requirements. First and foremost the Plan is focused on improving ICT services for the user.

50. Subsidiarity<sup>16</sup> is an important theme in the Corporate Plan, and *section 2* considers the way this and other important principles are supported and facilitated through ICT, and how the University must, “Deliver exceptional facilities and services and manage them effectively and responsively for the benefit of staff and students” (Corporate Plan 20 (4)).

51. The principle of subsidiarity is embraced through the Oxford ICT Structure, where selected Central Services,<sup>17</sup> offered through the Central ICT Providers,<sup>18</sup> provide an environment which is tuned to enable services offered locally to be as effective as possible. The Strategic Plan aims to reduce, but not to remove all, replication of services. Clearly, there can be benefits to the user from locally implemented, replicated services, though disadvantages may also occur where reproduced services are incompatible and inconsistent. In *section 3*, the plan focuses on tuning and developing the Oxford ICT Structure, defining more clearly the responsibilities which lie with the Central ICT Providers, and those which should be local. It also recommends the building of a professional body for ICT staff within the University.

52. After gaining agreement over which services should be offered by the Central ICT Providers, the next step is to manage the integration of services so that the user perceives them to be seamless. This is the goal of *section 4*.

53. *Section 5* sets out a first attempt to map the major centrally funded ICT developments foreseen for the next five years. The focus is on the processes required to do this. It also makes recommendations for how this initial priority and budget plan will be developed into a definitive implementation plan for the University.

54. Very few of the recommendations made in the preceding sections can be successfully implemented without a new model for ICT coordinated decision making. *Section 6* proposes such a structure, intended to clarify the decision-making process and to enhance ICT services, support and projects within the University.

55. Sections 1-6 are concerned with developing the principles for establishing a new Strategic Plan for ICT. From within these developments, however, implementation proposals have emerged, and it is important to begin creating a plan for a second, implementation phase of the ICT Strategy. *Section 7* serves this purpose.

---

<sup>16</sup>‘Subsidiarity’ – as defined in the Corporate Plan, “the notion that decisions should be taken at the lowest level appropriate to the matter in hand. Thus, for example, deciding what to research is a matter for individuals and, where relevant, research groups. It becomes a matter for departments and faculties, divisions and the University as a whole only when support is required, most obviously through the allocation of resources. Subsidiarity applies equally to teaching and, of course, administration generally.” (Para. 14)

<sup>17</sup>‘Central Services’ are those services used across a large part of Oxford.

<sup>18</sup>‘Central ICT Providers’, providers which deliver ICT services which the University agrees are best operated from central ICT units (e.g. Computing Services, Library Services, and Business Services and Projects).

# 1. User-Oriented ICT Requirements

## Introduction

56. This section takes as its starting point the ICT requirements of the diverse members of the collegiate University, whilst Section 2 considers Oxford's strategic ICT requirements. The user needs identified in this section have been consolidated from a number of ICT Strategy engagement activities<sup>19</sup> including surveys completed by departments and divisions, discussion forums with college staff, electronic questionnaires of both students and staff, and input from individuals.

57. These needs and aspirations are the building blocks of the ICT Strategic Plan. There is no commitment that they will all be met fully, but they set the context for the rest of the ICT Strategy Programme discussion.

## Principles

p1. The ICT requirements of units and individuals, whatever their role within Oxford, must be addressed by the ICT Strategic Plan.

p2. These requirements, whilst primarily relating to enabling individuals to make their fullest contribution to Oxford's core aims, should be addressed within the context of academic freedom and subsidiarity.

p3. The overall ICT architecture for Oxford should comprise a combination of enterprise services, shared services and local services (including services specific to a teaching or research area).

p4. The provision of enterprise or shared ICT services must be based on the use of agreed standards in order to improve productivity through interoperation with local services and to reduce replication.

## Recommendations

r1. Develop mechanisms for ensuring ongoing effective input from staff and students into ICT strategic planning, and ensure that future ICT projects are developed according to the needs of the academic community.

## Consolidated User Requirements

58. The following list of aspirations has been grouped under themed headings. The prioritisation of Oxford's ICT requirements is presented in section five.

### To access information and resources from anywhere and at anytime:

59. Both staff and students, full-time and part-time, increasingly need remote access to information and resources, software systems, personal filestore and data storage, or computational systems. An appropriate authorisation system together with single sign-on is required.

60. ICT is impacted by dynamic legislative issues (e.g. SENDA, Data Protection, Freedom of Information). This affects developers of ICT systems such as web developers together with all the user community, who may be generally unaware of these factors affecting ICT usage. Therefore there needs to be a central mechanism for dissemination of such information.

61. University staff need to be able to access University resources, through appropriate fine-grained authorisation systems, including directory services with appropriate fine-grain authorisation. The same provision should be made available for other groups (such as NHS), where possible. Visitors to the University often require access to resources at their home institution as well as authorised access to local facilities.

<sup>19</sup>The collated input, on which the rest of the ICT Strategic Plan was built, is available at: <http://www.ict.ox.ac.uk/strategy/record/>

62. ICT should support the full range of administrative procedures associated with education and research. In particular, the monitoring of undergraduate and graduate academic progress would benefit from an online system which both facilitated and simplified the process. Such processes also increasingly require the secure electronic transmission of documents. This applies, for example, to the submission of assignments by distance-learning students or as part of a plagiarism detection system, the circulation of references or job applications, and the sharing of documents as part of a research collaboration.

63. Departmental administrators and other finance users of Oracle have identified needs in areas such as a more efficient purchasing interface, more flexible general ledger reporting and better grants reporting.

“...we would like to see support for any University-wide systems formally extended to include evenings and weekends; this is because part-time students need to access resources and systems whenever it is convenient for them - potentially 24 hours a day, seven days per week and quite possibly even during traditional ‘closure’ periods.” (Dept)

64. Users of central services require pertinent information regarding project and service status to be made available through an easily accessible web portal.

65. The growing emphasis on mobile and remote access to resources requires defined levels of support for key ICT services to ensure service availability for 24 hours per day, 365 days per year (where appropriate in the context of the University’s core activities). In this context, remote access includes not only access from home but also, for example, access by students on longer-term placements or staff on sabbatical leave. It is important that sufficient account is taken of the differing levels of ICT facilities which may exist outside the University when developing online services. It is expected, for example, access to online resources will increasingly be undertaken in consultation with other organisations, such as the NHS, where Oxford students or staff are frequently placed.

**To store resources securely:**

66. With the volume of data on students, administrative issues and record-keeping requirements, many units identify the need for federated, shared, managed, archived and backed-up filestore.

67. The large number of digital objects created as a matter of course within the day-to-day life of the University require an institution-wide digital repository infrastructure and a policy framework for research outputs, teaching and learning materials, digital collections; and administrative records, together with appropriate support for curation and preservation.

**To work in collaboration:**

68. Researchers are increasingly collaborating with groups external to the University and need software tools to enable collaboration together with secure space to store data and shared and authenticated access to data and tools from users including external collaborators.

69. Several units and individuals identified the need for an email and diary system with common functionality across the administration areas of the University, and a readily available meeting-rooms and event-booking system.

70. Researchers and administrators alike would benefit from desktop audio and video conferencing capabilities and collaborative technologies. This allows collaborative research, shared administration, and remote interviewing of candidates.

**To provide and receive support for ICT:**

71. Training needs to be made available to all members of the community, including IT support staff, on general IT issues as well as specific software systems. Results from the web questionnaire indicate that a large proportion of participants are either self-taught or learn from friends and family. Provision of formal training is likely to be more effective. For every ICT development there should also be corresponding training and support.

72. Many IT users, especially within an administration context, identify a secure, resilient and stable network, up-to-date reliable hardware, and commonly available, standard office software as a basic requirement, in order to carry out their roles effectively.

73. An area which has developed in a disjointed fashion is that of web development. Each unit and college has independent activities, some with plain or static web pages, others with sophisticated content management systems. The web developers (and therefore their units) would benefit from a centrally supported but federated content management system with distributed access; training on new and emerging standards and technologies. A web consultancy service would enable units across the collegiate University to upgrade web pages cost-effectively.

**To obtain computers and software:**

74. Software licensing is a burden to departments and colleges. There should be consideration given to a central software licensing service together with a remote software update service.

75. Given the size of the collegiate University, there are significant cost savings and efficiency gains to be had from coordinated, but sufficiently flexible, schemes for the purchase of hardware and software by units and individuals.

76. It is important in the federated University to enable units to make appropriate choices for both software and hardware to meet their own needs, but to also enable interoperability with, and between, central services through agreed standards and policies.

77. Most students provide their own laptop or PC (83% of the current first year undergraduates, 79% of all undergraduates). Most staff are provided with a PC or laptop by their department (72%), college (22%) or through their research project or by other means (6%). To ensure an equitable provision of personal computers there may be a number of users for whom a computer leasing or loan scheme would be desirable.

**Strategic Considerations**

78. The following needs and considerations have also been consolidated from the surveys and other input. They address strategic or University-wide issues rather than user-level aspirations.

79. Identifying and prioritising the needs of users, many of whom have multiple roles within Oxford, is complex. Developing effective mechanisms for appropriate staff and student input is an essential way of ensuring that the ICT Strategy meets its goals.

80. There needs to be a regular updating of legislative requirements with appropriate dissemination and implementation.

81. It is essential that the Oxford ICT Structure includes mechanisms for the visible consultation of users at all significant points in the planning, development, deployment, and support cycle for ICT.

82. Priorities for investment in ICT should be driven primarily by the needs of the University and its members. At the same time, however, the University needs to be kept informed about the opportunities offered by new technologies and to have a process by which needs are defined and new technologies tested against those needs prior to the development of full production services (addressed in *Section 6*).

83. There should be an environment in which generic solutions to common ICT problems that have been successfully deployed after their initial development within a single part of Oxford can be offered, in due course, as an option for other units within the University (see *Section 3*).

84. The current reporting and decision-making structures are inadequate for addressing the priorities and investment in ICT-based systems and services across the University. The lack of clear lines of responsibility for overall ICT provision within the University also makes

it difficult for both individuals and constituent parts of the organisation to know who has responsibility for the delivery of any given service; what the boundaries may be between, for example, hardware and software support; and what communication lines, if any, might exist between seemingly overlapping activities. A more coherent approach to ICT provision would help ensure that users of ICT, whilst having clear lines of support, need not know who supplies each component of an ICT system, as well as putting in place transparent mechanisms for establishing priorities and a centre of knowledge for ICT plans and policies throughout the University. During the implementation of the ICT Strategic Plan there will be emphasis on specifying service level definitions which specify boundaries.

85. A balance will need to be maintained between central and local provision: where there is an increase in central provision, this should release local IT support (knowledgeable of and accountable to the local users) to focus on local requirements. This is just as important in colleges as in faculties and departments.

86. The increasing availability of policy-based management for both systems and networks opens up opportunities for campus-wide solutions. Control of policies applied in any particular unit in order to accomplish unit-specific tasks should be devolved to local IT support, operating within agreed global frameworks.

87. Network infrastructure should be widely deployed which enables wired, wireless, or remote access for students, staff and visitors to appropriate networked resources within and beyond the campus.

88. Essential access to electronic versions of journals, access to university-wide and departmental-specific services should be provided in an identical manner in all libraries (e.g. TDNET, email etc.).

89. A significant proportion of undergraduates (79%) own their own personal computer. The ubiquitous nature of networked computing and mobile devices blurs the distinction between academic and social uses of digital technologies. On the one hand University policies will increasingly need to take this observation into account, whilst on the other hand personal mobile devices have potential to support learning and research processes.

90. The University ICT systems must allow information to be shared across the collegiate University by all those who have a legitimate interest in it, without requiring data to be re-keyed locally.

91. Continuation of services in the event of a disaster, including a pandemic, needs to be appraised, and steps taken to ensure business continuity. This is an issue from the continuation of a web presence, to the existence of financial and other fundamental systems and the central computer and network capabilities.

## 2. Strategic ICT Requirements

### Introduction

92. Section 2 discusses and makes recommendations for ensuring that ICT within Oxford can both fulfil the needs of Oxford's core activities (including compliance with statutory or regulatory obligations) whilst remaining faithful to the principle of subsidiarity. Section 2 makes it clear that a devolved, but coordinated and interoperating ICT structure, is appropriate for Oxford and offers the best services for the user (as discussed further in subsequent sections).

### Principles

P5. ICT is critical to the fulfilment of Oxford's strategic objectives.

P6. The requirements of Oxford's teaching, learning, research and administration activities should drive the prioritization and development of ICT services.

P7. The ICT Strategic Plan, like the University Corporate Plan, must be placed within the context of a federated institutional culture which values academic freedom, subsidiarity, disciplinary diversity, parity of esteem, collegiality, and the pursuit of excellence.

P8. Oxford must be able to respond effectively and efficiently to statutory requirements, many of which depend on ICT infrastructure and require on-demand and coherent access to disparate data sources.

P9. The provision of ICT should be agile and responsive in the light of Oxford's rapidly evolving requirements.

### Recommendations

R2. Implement a holistic<sup>20</sup> approach to ICT and its coordination across Oxford, which aims to offer the best possible ICT environment across the collegiate University and embraces the principle of subsidiarity.

R3. Recognise that Oxford's devolved ICT infrastructure should be a heterogeneous but coordinated set of ICT services, some run centrally, some locally, and many shared.

R4. Set up a coordinated and long term approach to the development of ICT infrastructure, information organisation, and decision making, for all parts of Oxford.

R5. Determine and ensure an appropriate and consistent investment in robust infrastructure for mission-critical ICT systems.

R6. Develop organisational and technical policies and standards for interoperability in order to fulfil shared needs within Oxford's devolved ICT environment.

R7. Establish a University-wide identity management system which provides authentication and authorisation, and enables interoperability with national and international infrastructure.

R8. Develop personalised, federated and secure access to – and management of – University information resources.

<sup>20</sup>'Holistic' in the sense of considering the requirements of the collegiate University.

## Strategic Considerations

### University of Oxford Objectives

- a. Lead the international research agenda across the University's disciplinary spectrum and through interdisciplinary initiatives.
- b. Provide an exceptional education for both undergraduates and graduates, characterised by the close contact of students with distinguished scholars in nurturing collegiate and departmental communities.
- c. Make significant contributions to society, regionally, nationally and internationally, through the fruits of its research and the skills of its graduates, its entrepreneurial activities and policy leadership, and its work in continuing education.
- d. Attract, develop and retain academic staff of the highest international calibre and make Oxford University and its colleges employers of choice for all staff in the international, national and local environments.
- e. Recruit the very best students nationally and internationally through an equitable process based on achievement and potential.
- f. Equip staff and students with exceptional facilities and services and ensure that they are managed effectively and responsively.

Corporate Plan 2005-6 to 2009-10

93. In accordance with Oxford's declared objectives (above), the ICT Strategic Plan will ensure that Oxford, "provides high-quality and cost-effective ICT services and training that meet the needs of the University and its members" and "fosters innovation, best practice, and value for money in the use of ICT in teaching, learning, and research across the University".

94. Integral to the University of Oxford's objectives is the principle of subsidiarity, which Oxford values extremely highly<sup>21</sup>, and this principle must therefore be a pillar within the ICT Strategic Plan.

95. Subsidiarity in the context of ICT equates to a devolved ICT structure, which offers users the very strong benefits of local flexibility and local support, while being part of an overall Oxford ICT environment which is coordinated and cost effective. Establishing the optimum balance and developing a holistic approach to ICT for Oxford is at the very core of the ICT Strategic Plan.

96. Optimising the devolved ICT structure, which is more complex than a structure where the majority of the services are provided from the centre, requires a new level of ICT cohesion across Oxford, with improved methods of ICT prioritisation, coordination and interoperation.

97. The ICT Strategic Plan must empower local IT staff further in order that they are able to offer ICT services which are (even) more responsive and adaptable, uniformly good across Oxford, and provide easily accessible support for their users. A new 'ICT Forum' group for IT staff across Oxford (see section 3) will provide a professional body for the ICT workforce.

98. Together with empowering local ICT staff, the Oxford ICT Structure must provide the framework within which ICT activities can be coordinated, and where unnecessary replication can be reduced. It is the channel by which new ICT services can be introduced in a way which is both acceptable and beneficial to Oxford.

99. Examples of areas where such coordination is clearly beneficial are: a coherent Oxford wireless infrastructure requiring only one set of user credentials, a Tutorial Reporting System which supports college tutors in managing student reports, and Identity Management for all

---

<sup>21</sup>As recognised in *Section 1*.

users of the Oxford ICT system. The Financials system is a further example where large parts of the University use the same facility for supporting critical core administrative activities. Weblearn, the Virtual Learning Environment (VLE) to support teaching and learning, is a further example.

100. A necessary condition for optimising the devolved ICT structure is the ability to determine which services are best operated locally, which are best shared and which should be coordinated and/or operated by the Central ICT providers. This is explored in section 3.

101. The central ICT services should offer a suitable environment for cost effective deployment of shared and local services, and where they prove to be insufficient in meeting user requirements, improvements should be implemented (within any existing financial constraints).

102. Oxford should contribute to, with the intention of benefiting from, national and international activities<sup>22</sup> and aim to reach a common understanding on the best ways to create, host, and maintain coherent academic ICT infrastructures.

103. The principles required to ensure that new<sup>23</sup> ICT projects meet the needs of Oxford's users and interoperate with other applications are:

- a. ensure all users of the future ICT service are consulted and a full analysis of needs is undertaken and documented;
- b. develop ICT project designs which are available for Oxford to scrutinise<sup>24</sup>;
- c. inform Oxford of developments throughout the life of the project;
- d. where appropriate, oversee the ICT project by a Project Board<sup>25</sup> (see section 6), through its initiation, development and deployment;
- e. give careful consideration to the way the ICT service under development will interact with other ICT applications, and how interoperability will be ensured.

104. An additional requirement is that the devolved ICT structure must enable Oxford to respond to corporate-level needs. Some of these are driven by external factors – of which some are statutory and some are internal. The external factors include the need to report both to the Government and other stakeholders, but also provision of information to prospective students and staff.

105. Oxford is subject to new legal and regulatory requirements (e.g. Freedom of Information), greater scrutiny, and increasing assessment of quality (e.g. the RAE and any successor); demands which the devolved ICT structure must be able to meet. Full Economic Costing requires the University to act coherently from the researcher through to the service providers. Ensuring Oxford is able to meet these requirements must be a responsibility of the new 'ICT Coordinated Decision Making' structure.

## What the Collegiate University Requires

### Training and Education

106. A strategic approach should be taken to the provision of ICT training and education. All members of the community should have access to ICT training and development which integrates well with their needs and aspirations, whether related to learning, research, teaching,

<sup>22</sup>Many institutions, together with the JISC, are working to develop a framework for systems integration.

<sup>23</sup>As far as possible this applies equally to updates of existing ICT services.

<sup>24</sup>Part of the scrutiny will be through an *Architecture Group*, see section 6 for details.

<sup>25</sup>It is crucially important that the Project Board is fully connected to the part of Oxford responsible for the *core activity* which is facilitated through the ICT project. Ultimate ownership of the project must remain with the staff responsible for the *core activity*.

or administration. For every ICT development or policy decision there should also be corresponding education, training and support, subject to appropriate resources being available.

## Research

107. A research ICT infrastructure is required to underpin world-class research using innovative ICT to improve its efficiency and functionality (see e-Research in *Section 3*). In particular, the research infrastructure will be designed to support outstanding new research initiatives within and across disciplinary boundaries and to improve the communications infrastructure, thus unlocking the considerable research strengths within Oxford's colleges so that their role in supporting research is effectively integrated with that of the divisions and their constituent units.

## Learning and Teaching

### EPSC Academic Priorities

EPSC identified the following overriding educational objectives, derived from the Corporate Plan, in response to the JRAM consultation:

- a. Provide an exceptional education for both undergraduates and graduates, characterised by the close contact of students with distinguished scholars in nurturing collegiate and departmental communities (Corporate Plan, para 2);
- b. Maintain the tutorial system at the heart of undergraduate education, within the context of the development of a more diverse pattern of teaching and assessment (CP paras 46-48);
- c. Ensure that graduate studies is embedded as a core activity of the collegiate university and that funding for graduate students is significantly expanded (CP para 53);
- d. Ensure that the best applicants are admitted, irrespective of origin, circumstances and college choice, and implement an international recruitment strategy (CP para 73-75, 79);
- e. Maintain the overall envelope of resident students at the level at which a high quality collegiate education can be offered (CP para 66);
- f. Maintain the University's curatorial role in relation to important 'at risk' subjects.

108. Increasingly, the University requires ICT to underpin its teaching, especially to complement existing highly valued traditional teaching methods. Continued investment is needed in systems to support the administrative processes of teaching (including examinations management and plagiarism detection); the students' learning experience (including blended learning approaches); access to teaching resources, and the means to support innovation in teaching through the use of new technologies (see e-Learning in section 4).

109. The existing systems for the management and classification of examinations are insufficient. A reliable examinations management system, which can both avoid the need for re-keying data and be readily adapted locally for different marking schemes is required.

110. The Education Policy Standards Committee (EPSC) and the Graduate Committee of the Conference of Colleges have given high priority to ensuring that Graduate Studies is embedded as a core activity of the colleges, departments and faculties of the collegiate University.<sup>26</sup> ICT is an important component in the provision of first-class facilities to graduate

---

<sup>26</sup>See "Embedding Graduate Studies: a practical agenda", accessible via <http://www.admin.ox.ac.uk/epsc/oxonly/current.shtml> (Oxford only).

students and should also support the monitoring of graduate academic progress. In particular, ICT offers a means to create joint reports, accessible to, and managed by, both supervisor and student. A process must be established which enables the appropriate application to be funded, developed, supported and maintained (see section 6 for the new ICT structure which will enable such an initiative to be introduced).

111. The ICT infrastructure which is required to support teaching and learning also includes a Virtual Learning Environment (VLE) which fully supports personalised access to learning resources and operates throughout and beyond Oxford. The VLE must continue to be developed to remain competitive with the best elsewhere.

### **Administration**

112. ICT already underpins many essential administrative processes in Oxford such as finance, admissions, outreach, and development.

113. Administration systems have been developed locally, in many units, to target the specific needs of colleges, departments, and faculties. Increasingly, these have to interoperate with central systems to exchange key data to ensure that material held is not duplicated, or even worse, not synchronised.

114. A coherent ICT environment which supports first-class enterprise administrative systems is required (see e-Administration in Section 3). Agreed standards for interoperability between systems (both enterprise and local) are essential, as is the development of appropriate interfaces for the automated interchange of data.

### **Alumni**

115. The development of online virtual communities helps maintain the contact between Oxford and its alumni. ICT should underpin a clear set of services designed to ensure that alumni continue to remain active members of the collegiate University, e.g. through news, events, and opportunities to participate in the life of Oxford from anywhere in the world. Internally, ICT can assist the coordinated approach to fund-raising and development, as well as maintaining up-to-date contact data.

### **Remote Access**

116. It is now generally the expectation that students and staff should have easy access to ICT resources from any networked point on the globe.

117. Indeed, for many users remote access is becoming their regular means of accessing Oxford's ICT resources.

"It is clear that the dissemination and delivery of teaching will rely heavily on new technologies for group working and remote learning. Collaborations between disparate universities and research centres are becoming an essential part of the research landscape." (Dept)

118. The expansion of remote access and mobile computing requires defined levels of support and service availability (e.g. to ensure students may submit assignments online at any point before a deadline).

119. Conversely, *bona fide* visitors to Oxford frequently require convenient access to network points (wireless or otherwise) to enable connections back to their home institutions, as well as to other ICT resources as appropriate (e.g. within the library for external readers).

### **Intellectual Assets Accessibility**

120. There is a growing emphasis on the public availability of intellectual assets which have been created or purchased through public funding. Oxford has a rich collection of intellectual and cultural assets. Through the development of open access institutional repositories, ICT should be used to facilitate a culture of openness and accessibility. Online outreach

programmes and structured presentations of research and teaching activity have the potential to help attract the best students and staff, as well as help benefit the public understanding of the collegiate University and its core activities.

### 3. Oxford ICT Structure

#### Introduction

121. This section considers Oxford's ICT structure and reiterates that a devolved ICT environment remains the most appropriate model for the operation of ICT throughout Oxford. The principles underpinning the provision of ICT within the divisions, colleges and central ICT providers is outlined.

122. Three types of ICT provision are defined: local, shared, and enterprise. The need to identify the most appropriate location for the development and management of ICT services is discussed and how to ensure an appropriate degree of coordination to ensure maximum benefits from any given service. The development of an ICT Forum for support staff will assist this process.

123. Central ICT services must provide an environment within which local and shared ICT services can operate cost effectively and deliver the services needed by users. There must be adequate change management processes in place to address instances where services fail to provide such an environment.

#### Principles

P10. The devolved Oxford ICT structure, which is intrinsically more complex than a centralised system, must be actively coordinated, refined, and enhanced.

P11. Locally implemented services across Oxford should be able to benefit from interoperation with centrally-offered services.

P12. Benefits from coordination between central and local services should be maximised, while ensuring an excellent response to local requirements.

P13. The University requires an effective means for setting priorities and coordinating ICT activities.

P14. Oxford (collectively) must contribute to ICT developments, decide which applications are best run centrally, ensure central applications meet the needs of users, and make it possible to develop new ICT activities located in the most appropriate part of the collegiate University.

P15. For ICT services which are anticipated to operate across a large part of the collegiate University, the first consideration should be to provide them centrally, either as enterprise or shared services, in order to avoid unnecessary replication of local solutions.

P16. It is intended that existing mission-critical enterprise services will continue to be maintained by the central ICT providers such as the Computing Services, the Business Services and Projects group, and the Enhanced Computing Environment ICT Support Team. It is expected that a significant number of shared services will also be provided by the central ICT providers.

#### Recommendations

R9. Refine the devolved Oxford ICT structure through the application of a three-layer model comprising local services, standards-based shared services, and enterprise-wide services.

R10. Develop, via a new Coordinated Decision Making structure,<sup>27</sup> the principles and criteria by which ICT services are developed and provided as local, shared or enterprise services.

R11. Develop the principles and criteria by which central and shared services are regularly evaluated against user requirements and are discontinued, enhanced, or expanded as appropriate.

<sup>27</sup> A new ICT governance structure for prioritisation, coordination, optimisation and delivery; described in detail in Section 6.

R12. Specify and implement the required standards for interoperability so that local units will be able to make judgements regarding the most cost-effective means of delivering services to their users within the three-layer model.

R13. Establish a process whereby local ICT services for which there is a demonstrable need beyond the originating unit may evolve into shared or enterprise services with appropriate support and resources.

R14. Create an ICT Forum in which all IT support staff within Oxford are represented, coordinated, and allocated a small but sufficient budget in order to develop a secondment scheme and fund other small-scale relevant activities.

R15. Develop the structures necessary to enable Oxford to benefit from coordinated purchasing of ICT hardware, software, and consumables.

### Reviewing the Oxford ICT Structure

124. "Oxford's audit team found substantial evidence [in the Self-Evaluation Documentation], and in meetings with staff, that the University is developing a coherent and planned set of strategic priorities for coordinating [basic information and communications technology (ICT) and library resources]...." (Institutional Audit, March 2004)

125. Feedback from all parts of Oxford, and experience from leading national and international universities, makes it clear that it is essential to retain and refine the devolved Oxford ICT structure.

126. The important principle for Oxford is that ICT should be locally supported, locally driven and managed, but there should be coordination across the collegiate University to ensure a coherent ICT environment. This approach has the advantage of local support staff offering a responsive and tailored service to users, whilst within a coordinating framework which enables applications to interoperate and be cost effective.

127. Within such a devolved Oxford ICT Structure, it is essential that there are procedures in place by which Oxford can determine which services are best run and supported locally and which are best shared or run centrally.

128. For such procedures to work good communication across Oxford's devolved ICT Structure is essential, and groupware products, Wikis and other online applications will be used increasingly to improve the exchange of information.

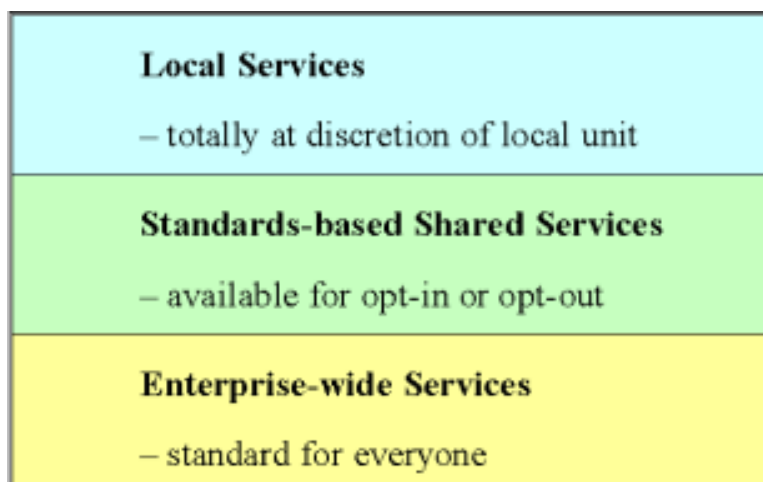


Figure 1. The Three 'layers' which together comprise the devolved ICT structure in Oxford.

129. The devolved Oxford ICT Structure can be represented as having three layers as shown in Figure 1 above. A 'local' ICT service refers to a service within a college or department,

generally (but not always) provided without central ICT funds. Shared services are those provided by a Central ICT Provider or another unit within Oxford which may prove to be more attractive for departments or colleges to use in conjunction with, or as an alternative to, a local service. Enterprise-wide services are 'standard' in the sense of being available for everyone rather than simply delivered on a single platform and are generally run by the 'centre'. Enterprise services, through the provision of interfaces for interoperability, are intended to form a foundation layer on which shared and local services may be built.

130. Principles determining the appropriate use of the layers are:

- a. when local innovation or optimization to meet specific local needs are the highest priority, the service should be provided locally;
- b. services that rely on close physical proximity of service provider and user should be provided at the local level;
- c. services are best provided locally when the service provider needs an intimate understanding of the user's needs and/or equipment and software, or where the ICT application is meshed with the activities and expertise of the unit;
- d. specialized services should be performed at the aggregated level appropriate to where most members share the specialized need;
- e. services needed by all or most members of Oxford should be delivered by Central ICT Providers;
- f. when there are strong economies of scale, the service is best provided by Central ICT Providers;
- g. when the function requires a broad or deep expertise, not generally available or affordable, or sustainable by individual units, it should be provided by the Central ICT Providers;
- h. when the service is strategic at the institutional level, it should be provided by the Central ICT Providers;
- i. when consistency across Oxford or economies of scale are the highest priority, the service should be provided by the Central ICT Providers;
- j. when a service is associated with significant institutional risks, it should be delivered, or overseen by, the Central ICT Providers.

131. Principles need to be established to determine under which circumstances a shared service should be offered, rather than a local or enterprise service. Such principles need to be agreed and deployed by a new Coordinated Decision Making structure, described in section 6. Where services provided by the Central ICT Providers do not meet the needs of users, a process must be put in place to ensure they are improved (assuming it is cost effective and appropriate to do so). Furthermore, the decisions on which services fall into each of the three layers need to be reviewed annually.

132. When it is agreed that a service should move between layers, there will need to be a mechanism for making readjustments to funding.

133. Furthermore, principles will need to be established to determine which services provided centrally should be funded from central funds and which are appropriate to be funded through cost recovery. It is likely that strategically important ICT services will be funded to a *standard*<sup>28</sup> level centrally, and any additional functionality will be offered on demand and funded through cost recovery mechanisms.

<sup>28</sup>'Standard' in the sense of offering a uniform service across the collegiate University which provides the core functionality required.

134. Examples of services at the *standard* level are:

- a. services required by most units;
- b. services where the cost of cost recovery is comparable to the cost of the service;
- c. services where central provision of services discourages replication;
- d. where the service provision is essential, but few would be prepared to pay locally (e.g. firewall security).

135. Generally, enterprise-wide services should be managed by the central ICT providers. These fall into two broad categories:

- a. services which are wholly run by a central ICT provider (e.g. Oracle Financials);
- b. services which are heterogeneous, but which have a single interface for their use (e.g. wireless computing, or a distributed filestore with a single catalogue).

136. The interoperation of enterprise activities provided by the Central ICT Providers, and between central and local services is discussed in section 4.

137. With suitable standards for interoperability specified and implemented, local units can then make judgements regarding the most cost-effective means of delivering services to their users within the three-layer model.

138. Some services may naturally fall across the layers in the three-layer model, and these will need careful consideration.

139. Some negotiation between departments and colleges may be required where there is a subject-specific need for software available in departments to also be made available in colleges (e.g. the use of specialised simulation software for teaching purposes, or the use of non-standard font packages).

140. Ideas and demands for new ICT services will often originate at the local level and a means to encourage this and fund its (initial) development is required.

141. Where interesting new applications are developed locally within units, these should be encouraged to be developed for a wider set of users, facilitated through appropriate funding. Local control of the applications should be retained, but it may be appropriate to transfer the applications for operation by a central ICT provider in due course.

## ICT within the Divisions

142. Each of Oxford's academic divisions, and their departments or faculties, has put in place structures for the investment in, and provision of, ICT. At the heart of divisional or departmental ICT strategic planning lie the requirements for research, teaching, and learning. This is apparent in both the facilities provided (e.g. teaching rooms, subject-specific software) and the frequent combination of generic and subject-based IT support provided.

"The substantial professional expertise that exists across the University should be recognized and involved at all stages of defining and developing University-wide ICT and related services. At present it is extremely difficult for divisions, units and experts to influence major decisions regarding such services. Indeed, it may be more appropriate for some University-wide projects to be developed and/or coordinated within units rather than centrally." (Division)

143. Divisions and their departments frequently wish to raise the profile of their research and teaching activities within the public domain, whether to attract student applications or research funding. In common with other parts of the University, ICT also underpins many of the administrative processes, employing a combination of local and enterprise services. ICT

may be deployed both to fulfil a business process and also in order to assist in lessening the administrative burden on academic members.

144. Individual units have overall responsibility for the development of policy and ICT provision (including the network infrastructure) beyond their own front door. The degree of coordination or central support provided for ICT at the divisional level varies. The IMSU, for example, provides a common network and desktop environment for the Medical Sciences Division, whilst the Humanities Division is working towards a software support service level definition template which is customised by faculties and other units.

145. It is within the divisions that the three-layer model should be most readily applied. The specialised needs of any given subject area demand a large degree of local services and support. Supporting ICT beyond subject requirements, for example in connection with more generic infrastructure or administrative processes, requires the provision of enterprise services. However, the development of a service within a particular department or faculty might, with relatively little extra resource, be expanded into a shared service offered to other departments or across divisions or within colleges. The Medical Sciences Division, for example, is developing a Research Discovery Service which has clear potential to be reusable across large parts of the University. Within the Humanities Division, however, faculties and departments often have clearly articulated ICT support services, whilst cross-divisional ICT services are only developing slowly. The challenge is to ensure that an appropriate CDM structure is in place which enables both divisions and their individual departments to bid for extra resources for the development of such shared services within an overall development framework, and to encourage local innovation or piloting of new services in the first place.

146. One of the consequences of deploying a devolved ICT model is that effective divisional ICT structures are required. These must set ICT priorities, manage resources, collect user opinion and interface to the new Coordinated Decision Making structure.

### **ICT within the Colleges**

147. The Oxford colleges, which are self-governing communities, have full responsibility for all aspects of their ICT infrastructure and services. The deployment of ICT aims to meet the needs<sup>29</sup> of the collegiate communities of students, fellows (and other academic staff), and administrative staff. The ICT infrastructure within each college offers support for the admissions process, keeping of student records, the tutorial system, accommodation systems, research activities of fellows and graduate students, IT facilities for graduate and undergraduate students, and a very wide range of administrative activities.

148. Individuals from colleges interact with University departments, faculties, committees, academic services and other facilities as well as across the collegiate system.

149. ICT support is offered locally within colleges by local college employed ICT support staff. These staff are supported centrally (e.g. by the IT Support Staff Services group in OUCS and the new ICT Forum), in the same way as ICT support staff are in other units of the University.

150. Colleges operate their own business processes to support their core operations. The challenge for the devolved Oxford ICT structure is to ensure there is right balance between fully encapsulating the principle of subsidiarity within the selection and provision of ICT, and ensuring a flexible but coherent environment which is sufficiently coordinated to maximise value for colleges and University alike.

151. It is essential that the University ICT infrastructure and college ICT infrastructure work together, especially with regard to centrally provided services and systems. Centrally provided services and enterprise systems must meet the academic and operational needs of college

<sup>29</sup>Interactions between the colleges and the University are complex. The Conference of Colleges represents the common interests of the colleges, especially in negotiation with the University on matters affecting the collegiate members.

members and staff, and where this does not happen there must be a forum at which a decision can be made to decide whether the enterprise systems should be changed to meet college needs, or it is best for the college to provide an alternative solution. The centrally provided services must meet the needs of the colleges wherever a cost-effective and appropriate solution can be found, and must provide an ICT environment for the effective deployment of local ICT services.

### **ICT within Central Administration**

152. The Central Administration provides the University with a broad and complex set of services which include, for example: the Academic Division; the Finance Division; the Estates Directorate; Development Office; Public Affairs Directorate; Research Services Office; and Personnel Services. ICT systems, many of which are provided by the Business Services and Projects section of Central Administration, underpin to one extent or another, all of the critical business processes of the University. BSP therefore is a major service provider to other parts of Central Administration, which act as consumers. The provision of ICT services through BSP is further discussed below.

153. The use of ICT by Central Administration staff reflects a similar set of requirements found within other parts of the University. Administrative staff use ICT for communication, to access information, and to access and use common and specialised software packages, internal business systems, and external web-based systems. The basic tools for this are the desktop computer and the University network and the internet. Central Administration is located on multiple sites across Oxford with staff allocated roles requiring mobility between sites. Consistent access to email and files as well as specific applications is required from multiple locations (including staff working remotely). The provision of a common desktop service, including an overall helpdesk service, is being provided through the Enhanced Computing Environment ICT Team.

154. Increasingly, University business is conducted via email and the circulation of electronic documents. The need for electronic records management, as well as long-term electronic document storage and preservation, is becoming more urgent. Central Administration also maintains the University's main website which is a vital tool for external relations. In addition, the University's intranet is increasingly used to support key committees and as a channel for communicating information to the broader University. Consideration should be given to the deployment of a content management system, including tools to enable online collaboration and interactive discussion.

### **ICT Support Staff**

155. The overall number of staff supporting ICT in Oxford is approximately:

- a. 552 registered IT staff across units<sup>30</sup>
- b. Approximately a further 50 IT support staff distributed within the Central ICT Providers and who are not currently on the ITSS register.

156. The potential of this cohort should be realised fully.

### **ICT Forum**

157. ICT staff together form a crucially important resource for Oxford, and it is proposed to establish an 'ICT Forum' (ICTF) which will coordinate and represent all ICT staff in the

---

<sup>30</sup>I.e. named on the ITSS register maintained by OUCS and whose role involves some proportion of formal IT support.

University. This Forum will build on and enhance the various existing ICT groups in Oxford – whether they be formal or informal.

158. ICT staff are currently represented on a range of existing ICT committees. The ICTF will provide an efficient means of drawing on the expertise of ICT staff in order that this invaluable resource can be fully used within the ICT decision-making structures.

159. By being a member of the ICTF, staff will be informed of ICT developments across the collegiate University, and will be part of a professional ICT body. As a result, they will be able to provide a better service to the users that they support within their own unit, calling upon best practice from across the collegiate University. This builds on the success of the existing IT support staff activities.

160. ICTF will provide the framework that will facilitate the full involvement of ICT Staff in both the strategic development and day-to-day running of ICT in Oxford. It will:

- a. be a representative group for all ICT staff;
- b. be a group to communicate and promote the views and interests of ICT staff in the ICT Coordinated Decision Making structure;
- c. provide a single known point of contact for the bodies in the University to consult ICT staff, thereby offering a means of collecting user requirements from across the collegiate University;
- d. be a professional forum for the exchange of experiences, ideas, and best practices;
- e. give its members privileges in contacting service providers;
- f. be able to request<sup>31</sup> ICT enhancements with high priority;
- g. be in a position to initiate its own projects and seek limited funding for those projects where necessary;
- h. be a broker in introducing local projects to the wider University;
- i. be a broker in introducing projects from the wider University to ICT staff;
- j. facilitate the exchange and trading of skills together with access to staff development and training schemes.

161. Within the ICTF there will be a number of loose sub-groupings representing the distinctly different job roles that ICT staff undertake – for instance ‘Central ICT Providers’, ‘College ICT Staff’, ‘Departmental ICT Staff’. However the ICTF will present a unified body in matters that concern all ICT staff and it will facilitate interaction and cooperation between the groups.

162. A body as large and as important as the ICTF will need coordination if it is to function efficiently. Although it would be possible to create a new body to perform this function, it would seem sensible to build on the current structure. To that end it is proposed that the Support Staff Group (ITSSG) be enhanced in order to take on the coordination and executive role of the ICTF.<sup>32</sup> Further, it is proposed that IT Support Staff Services (ITS3) be similarly enhanced in order to fully support the ICTF.<sup>33</sup>

163. The ICTF will include an interface with the Conference of Colleges. The provision of ICT experienced by most undergraduates is determined to a large extent by the facilities within a college and College ICT Staff play the pivotal role in delivering those facilities. Therefore it is

<sup>31</sup>Request via the new decision-making structure proposed in *Section 6*.

<sup>32</sup>ITSSG is a respected group that currently provides a degree of co-ordination of all ICT staff – it organises the current annual conference, organises training for staff and acts as an interface to the service providers.

<sup>33</sup>ITS3 is the full time unit based within OUCS that supports ICT Staff in the University and acts as the executive arm of ITSSG.

vital that the ICTF forge good, stable links with the Conference of Colleges so that the issues of importance to both sides can be shared and resolved.

164. It is desirable that funding be made available for a secondment scheme to enable ICTF members (with the agreement of their respective units) to contribute to enterprise or shared projects and activities.

165. Much of the innovative work in ICT in the University comes from within the cohort of ICT Staff and there should be a formal means of exploiting this across units. It is proposed that small-scale projects sponsored by the ICTF have priority access to an ICT Innovation Fund. There will also be a mechanism by which the ICTF can submit proposals for larger projects into the CDM structure (see section 6), with these projects receiving special consideration.

166. The ICT Forum will have its own modest budget in order that it can organise workshops and training sessions, and can attend training events and meetings outside Oxford.

### **Central ICT Providers**

167. Central ICT Providers are defined as centrally-funded units that offer IT services on an Oxford-wide basis. For the purpose of this document three main providers have been identified. These are Oxford University Computing Services (OUCS), Business Services and Projects (BSP), and parts of the Oxford University Library Services (OULS). The services offered by these three units may be, as indicated in the three-layer model above, intended to be standard for everyone (and free at the point of use); available for units to opt in (possibly on a cost-recovery basis); or provided as a locally tailored service (almost certainly on a cost-recovery basis).

168. The Central ICT Providers have developed their own distinct (though related) sets of principles which underlie the development and provision of their ICT Services. Each ICT Provider has established internal management structures.

169. Section 6 outlines a new structure to govern ICT provision for Oxford. It is not proposed, at this time, to make any changes to the management structures of the central ICT providers. However, the challenge for the future of centrally provided ICT is to ensure that the University has the structures and capacity in place to develop enterprise services (whether standard or available on an opt-in basis) which extend across the domains of two or more ICT providers, and where the lifetime cost of ownership is known at the outset of the service. Interoperability between services is addressed in section 4.

### **Oxford University Computing Services (OUCS)**

170. OUCS is recognised as the main provider of central ICT services across Oxford, in particular infrastructure services, and plays a leading role in the development of ICT in teaching and research. OUCS must continue to offer high-quality services that meet the requirements of users in the most cost-effective way, and must identify new services while developing existing services.

171. OUCS must have appropriate funding in order to offer and develop the existing range of services, but also to be flexible enough to bring in new services as required. There must be clear procedures for terminating services which are agreed to be of a lower priority. New services and developments to existing services should be driven by the needs of the academic community, and their development and implementation should follow a project methodology. OUCS must also be able to offer a core set of reliable services and, where desirable, enhanced services which are charged on a cost-recovery basis.

172. OUCS intends to roll out new ICT services using an approach informed by Service Oriented Architectures and will assist in the development of the agreed standards, including data interchange, for the emerging University information architecture (see section 4).

### **Business Services and Projects (BSP)**

173. BSP is recognised as the provider of enterprise business systems, and aims to deliver first-rate, cost-effective, integrated business systems which enable Oxford to manage its key resources and carry out its administrative functions efficiently and effectively. In order to achieve maximum benefits, BSP should take an integrated approach to the provision of business systems, while at the same time ensuring their applicability to Oxford's devolved ICT structure.

174. Business processes should be seen as a prerequisite to business system technology proposals. This ensures that the business requirements lead the technology solution – not the other way around.

175. Enterprise business systems must be robust, best-of-breed, and in line with the administrative processes of the University. In order to choose the most cost-effective underpinning ICT technology, as measured through the lifetime of the service, there should be the minimum amount of customisation of the application. It is recognised, however, that on some occasions customisation is essential, and this must be justified by a full cost-benefit analysis, again covering the lifetime of the service.

### **Oxford University Library Services (OULS)**

176. Library users, whether members of the University or external users, expect 24x7 access to library and information services. To guarantee this continuity of service requires resilient IT support systems and minimal downtime. Ubiquitous access to all OULS information resources for members of the University, including services restricted to certain categories of users, also requires good and secure communication networks. In addition, OULS has both a University and a national responsibility for the long term preservation of digital materials in its care and for serving the needs of a national and international readership.<sup>34</sup>

177. In keeping with the other central ICT providers, OULS must develop its services in line with the agreed interoperability standards (see section 4).

178. Electronic library provision will require increasingly close operation with other Central ICT Providers. One area of development will be integrating the new Library Management System with other services particularly: Identity Management and Directory Services, the University Accounting System, Student Records System, University portals, and the Virtual Learning or Virtual Research Environments. Such integration will also be necessary for other key library systems, viz. the Institutional Repository, the Oxford Digital Library, the OpenURL Resolver, and Electronic Resource Management systems.

### **Enhanced Computing Environment**

179. In 2005 it was agreed that ICT desktop provision and support for three central departments (Central Administration, Computing Services, and Libraries) should be consolidated.

180. A new ICT Support Team's main goal is to define and deploy an Enhanced Computing Environment (ECE), offering one or more standard desktop configurations with agreed standards of support. It is intended that the ECE should be offered for wider deployment across the University, once its usability across the three central departments has been ensured. It is of crucial importance that the ECE be of the very highest standard, and sufficiently attractive and flexible to be of interest to as many other parts of the collegiate University as possible, financed on a cost-recovery basis.

<sup>34</sup>OULS has approximately 25,000 external members at any one time.

### **Coordinated ICT Purchasing**

181. The new ICT structure proposed in section 6 should make it possible for Oxford to benefit from coordinated purchasing. There is an opportunity to implement a voluntary purchasing framework, as already available within other similar-sized institutions. The principle is that staff and students would be able to make ICT purchases from a set of companies within an overall framework, possibly one shared with other universities. The companies would offer guaranteed competitive prices, and purchasing would be web-based and streamlined. Apart from avoiding the situation where companies vary their discounts for different units across Oxford (as happens currently), this would reduce procurement overheads, shorten order times, and lead to greater uniformity of equipment.

### **Website Coordination**

182. Coordination is needed to ensure that websites within the 'ox.ac.uk' domain comply with relevant UK legislation.

183. Many units across Oxford would benefit from a web consultancy service to make it possible to create cost-effective websites which are well designed, meet legislative requirements, and are easy to maintain.

## 4. Integration of Enterprise Activities

### Introduction

184. The devolved Oxford ICT structure has many advantages. For it to be effective, however, the various, distributed systems must communicate with each other efficiently and effectively.

185. *Interoperability* is not, however, primarily a technical matter but rather requires a culture of interoperability within the organisational units which control data or underlying systems.

186. This section makes clear the need for interoperability which cuts across units and across layers in the three-layer model defined in section 3. For interoperability to be achieved (in order that better, more efficient and robust systems can be provided), there needs to be a clear and agreed source for any given item of data together with agreed standards and policies for data interchange, management and interfaces.

187. The establishment of an Architecture Group (see section 6) will ensure the development of an interoperability strategy; the definition of a Service-Oriented Architecture approach to the development of services; and an ongoing remit to monitor existing and planned major ICT projects.

### Principles

P17. The development of a culture of interoperability within Oxford is dependent on the development of an Information Strategy which, for example, clearly defines the information available for reuse; ensures processes are in place to guarantee the quality of information; and defines responsibilities with regard to the management and use of information.

P18. Enterprise-wide ICT applications (including shared services) should interoperate, and appropriate coordination structures should be put in place to offer a uniform interface to the user.

P19. The ability to interoperate with other services must be a key requirement for new services.

P20. Software procurement, deployment, and development must be based on analysis of functional requirements, value for money, agreed standards and data interchangeability – where appropriate. Development of new and updated applications should use appropriate project management methodologies.

P21. ICT architecture and standards must be defined, agreed, documented, and regularly updated.

P22. Commitment to a Service-Oriented Architecture (SOA) approach should be considered as the optimum way forward, whereby IT systems are constructed, where possible, from loosely-coupled, interoperable, and reusable 'services'.

### Recommendations

R16. Ensure the integration of enterprise and shared ICT services through the development of an over-arching interoperability policy, including both organisational and technical aspects.

R17. Base the interoperability of enterprise systems on standards agreed via an Architecture Group (part of a new Coordinated Decision Making structure).

R18. Procure or develop enterprise-wide systems based on the functional requirements defined by the user community and value-for-money in the entire deployment life-cycle, together with adherence to appropriate agreed standards, where possible, and availability of sustainable support.

R19. Define a Service-Oriented Architecture approach to the development and provision of ICT which is appropriate to the Oxford ICT Structure and which helps facilitate the funding and development of ICT services in response to local demand and innovation.

R20. Develop supporting structures for the planning and management of ICT projects, including the definition and use of appropriate methodologies.

### Interoperability

188. In an all-pervasive networked environment it is almost impossible, and increasingly undesirable, to define an ICT service by its organisational boundaries. An analysis of the requirements of individual users, units and the organisation as a whole, together with the need to meet statutory requirements, demonstrates that it is now essential to ensure interoperability between distributed systems.

“We see the provision of wireless technologies, a single sign-on protocol that facilitates access to Weblearn, digital library facilities, financial (e.g. Osiris) systems, administrative (e.g. Isidore) systems, etc., delivered using web technologies as being highly desirable. Delivery of such services using web technologies would be of great benefit, as this would make the whole process, hardware, and operating systems independent. This would be very beneficial for the department and possibly for the whole of the organisation.” (Dept)

189. Achievement of systems integration is partly a technical matter, requiring systems which can share data without the need to re-enter information. However, critical to achieving this are also changes in Oxford’s approach to data ownership, and a much more integrated approach to administrative processes. This integration needs to be both vertical (e.g. from individual departments and sub-departments up through divisional structures and to central administration), and also horizontal (across different departments, across colleges, and between colleges and the university departments). This requires a holistic and integrated approach to administrative processes, and underlines the importance of reviewing those processes at the same time as reviewing ICT systems. Only when users have confidence in both will they be willing and able to trust integrated systems to provide them with accurate data, and thus be willing to relinquish control of purely localised systems which, whatever their shortcomings or restrictions, are viewed as trustworthy and fit for purpose.

190. There is a risk that legacy systems, due to the expense or effort required to change, may become a barrier to strategic change within the institution.

191. Identifying and ensuring conformity with agreed standards,<sup>35</sup> wherever possible, is key to ensuring interoperability between systems and for data interchange both within and beyond Oxford.

192. To address the demand for interoperability, changes are required to the way the devolved ICT structure in Oxford is governed, and a new ICT Coordinated Decision Making structure is proposed to meet these requirements, as described in section 6.

193. Other institutions, together with the JISC, are developing a Service-Oriented Architecture<sup>36</sup> framework for systems integration. This approach, or one based on its principles, has the potential to offer flexibility and agility in the way ICT services are developed and deployed.

194. In order to ensure that cooperation between the services is maximised, it will be necessary to specify and agree an overall architecture and set of interoperation standards, driven by Oxford’s processes and requirements.

### Interoperability for Services provided by a Single Provider

195. The key results of integration of ICT services across Oxford will be:

- non-duplication of data;
- agreed processes by which data are updated and exchanged;

---

<sup>35</sup>It is hoped that many of these will be ‘open’, but more importantly they must be ‘agreed’.

<sup>36</sup>SOA is key to refining Oxford’s devolved computing model; a technical appraisal, however, is outside the scope of this document.

- agreed data interchange standards;
- agreed policies and safeguards to deal with data protection and copyright.

196. This will be the backdrop to an agreed information architecture which recognises the following principles:

- data are owned by Oxford as a whole;
- central and local services both need access to enterprise data;
- subsidiarity principles require local units to have the ability to develop local services using enterprise data;
- strong information rights management to avoid inappropriate use of data;
- data must be both carefully checked before entering the system and validated after entry;
- data must be correctly documented with an agreed understanding of the data semantics.

197. A fundamental requirement for uniformity of data, and for access management to persist across devolved services, is a recognised and accepted means of identity management<sup>37</sup> covering all users of the system. Identity management is possibly one of the most complex challenges for interoperability within a devolved ICT environment, but also one of the most crucial since interoperability between systems in other domains is dependent on it.

198. Wherever possible, existing services that underpin the Service Oriented Architecture approach should be used. For example, the emerging Single Sign-On system should be utilised to avoid maintaining disparate authentication and authorisation systems. It is acknowledged that for some services the most effective delivery mechanism will be via reusable Web applications which can be integrated with local online environments.

199. Appropriate user interfaces to data sources must be developed, and integrative technologies should be utilised. Moreover, the changing profile of means of access by University members (e.g. through mobile devices) must be taken into account.

200. The procurement of enterprise software should be based on functional requirements defined by the part of the collegiate University sponsoring the activity, value for money measured across the entire deployment lifecycle, and interoperability with existing and future services.

201. The information architecture and the agreed data standards form important components of an Information Strategy for Oxford. The ICT Strategic Plan provides an excellent platform form which to develop an Information Strategy, and this should be done as soon as possible.

## **Interoperability to Serve Key Processes**

### **e-Research**

202. Research is increasingly dependent on ICT at all stages of the research lifecycle. Tools and resources may be distributed within and across institutions and domains. A significant proportion of research involves distributed, global collaboration, which requires interoperability between institutional, national and international infrastructure to support it.<sup>38</sup>

<sup>37</sup>Developing an Identity Management system for the collegiate University will prove a significant challenge requiring technical assessments, cooperation of senior management, and coordinating across many units in the collegiate University.

<sup>38</sup>"e-Research is about global collaboration in key research areas, and the next generation of infrastructure that will enable it"(Director General of the Research Councils). The previous director of the UK core e-Science programme defined it as: "The invention and exploitation of advanced IT: to generate, curate and analyse research data; to develop and explore models and simulations; to enable dynamic distributed virtual organisations".

203. The development of a Virtual Research Environment (VRE) infrastructure is designed to serve the needs of individual researchers through to globally distributed research teams.<sup>39</sup> Research portal interfaces have the potential to offer interoperability between data resources, compute facilities, applications, and research repositories. Interoperability is also essential for the administration and dissemination of research, whether integrating project management and financial systems, or facilitating both the reporting of, and open access to, research outputs with minimal duplication of effort.

204. Interoperability is also key in facilitating the discovery of research in progress and enabling shared projects. The infrastructure to develop and support virtual organizations, the secure sharing of resources, and other forms of collaborative working are becoming essential to research across all disciplines.

205. The Oxford e-Research Centre<sup>40</sup> (OeRC), founded in 2006, builds on the success of the previous Oxford e-Science Centre, and operates in close collaboration with both academic divisions and services. It acts as a facilitator for new e-Research projects across Oxford and enables better, different, and faster research capabilities. The OeRC provides a CampusGrid<sup>41</sup> for Oxford's researchers and is a node on the National Grid Service<sup>42</sup>.

206. A specific goal of the OeRC is to offer a common interface for the user to a spectrum of computational facilities (local machine, CampusGrid, Oxford Supercomputer, National Supercomputer).

207. An Institutional Repository (IR) initiative, currently underway in Oxford, will be a key component within an interoperable VRE. The system on which the IR is being developed conforms with SOA principles, making it easier both to provide repository services for different research communities, and to extend the range of supported data types beyond e-prints and e-theses.

### **e-Learning**

208. e-Learning developments must be targeted at the academic needs of the University to complement the traditional teaching methods at Oxford whilst at the same time exposing academics and students to new opportunities afforded by the technologies. e-Learning methodologies and tools can also facilitate access to tuition and learning resources for students located away from Oxford, whether temporarily or, for example, undertaking a part-time course. (see also 'Learning and Teaching' in section 2).

209. e-Learning systems, and the VLE in particular, require adherence to interoperability standards, especially as the monolithic systems of the past are being redeveloped as a series of collaborations between best-of-breed tools. For example, if a better assessment tool emerges it should be simple to swap it with the existing tool. For this to happen requires an architecture based on interoperability standards<sup>43</sup>. Moreover, e-Learning tools (VLEs, e-portfolios, assessment management, tutorial reporting systems, plagiarism detection) will increasingly need to exchange information with other systems (notably enterprise business systems). The Oxford VLE, for example, is being developed with principles of interoperability paramount, and is adopting a 'best-of-breed' approach to particular services within the VLE framework.

210. The Oxford libraries have, perhaps, contributed less to the development of e-Learning in Oxford than is normal for university libraries, despite the fact that they have much to offer in terms of both content and expertise. e-Learning development would benefit from

---

<sup>39</sup><http://www.vre.ox.ac.uk/>

<sup>40</sup><http://www.oerc.ox.ac.uk/>

<sup>41</sup><http://www.oesc.ox.ac.uk/facilities/oxgrid.xml>

<sup>42</sup><http://www.oesc.ox.ac.uk/facilities/ngs/>

<sup>43</sup>As outlined in the JISC e-Framework, <http://www.e-framework.org/>.

greater integration and interoperability, whether based on a centralized model or federation of distributed e-Learning centres, which would encourage library engagement.

211. A major direction for future development will be electronic delivery of information to the desktop, both within and beyond Oxford. This will require closer integration of services provided by the Library Services and the ICT infrastructure.

### **e-Administration**

212. Increasingly, business systems will be delivered to end users online, as suppliers of commercial systems convert their existing user interfaces to exploit fully the Web technologies now available. In addition, the five-year plan for business systems development includes plans for projects to provide online self-service facilities in some specific areas of functionality:

- online application service for candidates who apply directly to the University, rather than via UCAS;
- self-service enrolment, to allow students to register online;
- e-expenses, to enable staff to claim travel and subsistence expenses online;
- i-procurement, to increase the efficiency of the purchasing process.

213. In all these areas, it is likely that a pilot project will be undertaken in the first instance, to give the University time to address process and procedural changes which will arise out of these new ways of working, before the functionality is rolled out to a wider audience.

### **Conclusions**

214. Integration of enterprise ICT services is essential. Interoperability is required, and where possible agreed standards should be used. Similarly, interoperability between central and local ICT services is essential.

215. An Architecture Group (see section 6) will be responsible for defining an ICT development architecture for Oxford and maintaining an ongoing role to ensure systems are as interoperable as possible. The success of such activity will require the development of an institutional Information Strategy.

216. An increasingly important theme will be the integration of information delivered by the Library Services with other services within the ICT infrastructure.

217. The structure for Coordinated Decision Making, described in section 6, must encompass e-Research, e-Learning and e-Administration.

## 5. The ICT Budget and Priority Plan

### Introduction

218. Section 5 defines an approach, together with a set of principles, for the development of an ICT Budget and Priority Plan. This is a five-year central ICT expenditure plan.

219. The Oxford central ICT expenditure plan has been produced for the first time. *It must be stressed that the amounts shown in the ICT expenditure plan are illustrative.*<sup>44</sup>

220. Centrally funded ICT projects have been assigned priorities, based on the requirements identified in sections 1 and 2 of the ICT Strategic Plan.

221. A full explanation of the central ICT expenditure plan is given in Appendix A.

222. The five year central ICT expenditure plan reveals the need for a consistent approach to establishing the costs of central ICT activities, and scopes the projected investment which will be needed to roll-out and maintain mission-critical central ICT services. Of necessity, this exercise is a very first attempt, the amounts are only illustrative, and much more detailed analysis will be required within the implementation phase of the ICT Strategic Plan.

223. An initial comparison between expenditure foreseen in the ICT expenditure plan and the amount allocated to ICT in the University's Capital Projects Register reveals a significant discrepancy. This emphasises the importance of being able to terminate ICT services provided by the centre which are no longer essential.

### Principles

p23. ICT pervades Oxford academic and administrative life. It is critical to fulfilling both individual and organisational aspirations. The establishment of a central ICT expenditure plan, therefore, which enables the collegiate University to anticipate and prioritise central ICT expenditure and development, is an essential outcome from the ICT Strategy Programme.

p24. The University requires a five-year rolling plan for central ICT expenditure (hereafter referred to as the 'ICT Budget and Priority Plan'). Central ICT expenditure is an investment which has consequences for the whole collegiate University, and the investment must be managed, kept within a specified allocation, and priorities for expenditure specified, collectively.

p25. The academic community must determine the essential components within a prioritised central ICT expenditure plan; this process itself is dependent on appropriate ICT coordination and decision-making processes being in place in divisions and across the colleges.

p26. The ICT Budget and Priority Plan must take local ICT requirements and investment as its initial focus. It must identify the shared and central ICT services which are essential for the local services to operate effectively.

p27. The ICT Budget and Priority Plan must cover central expenditure on ICT in teaching, research, and administration (including services provided by OUCS, OULS and BSP). It must also foster conditions for local innovation and sustainability. Where appropriate the Plan must allow for, and fund, the scaling-up of local developments into Oxford-wide shared services.

p28. The ICT Budget and Priority Plan must take into account the University's strategic objectives and the increasingly complex statutory requirements.

---

<sup>44</sup>*Illustrative* in the sense that substantial additional analysis would be required to give reliable investment predictions produced against consistent criteria. Activities are underway to specify criteria which define the funding components within ICT capital projects.

## Recommendations

- R21. Define an approach and a set of principles to develop a five-year University ICT Budget and Priority Plan covering the services funded centrally.<sup>45</sup>
- R22. Enable users across the collegiate University to specify priorities for central ICT investment; the Plan should be updated yearly, and should offer a single consolidated view of central ICT investment.
- R23. Provide a breakdown of ongoing operational expenditure and a descriptive and prioritised list of major new central ICT investments.
- R24. Place the new five-year University ICT Budget and Priority Plan, and the process used to maintain it, under the ownership of the Director of ICT, and oversee its development through the PRAC ICT Sub-committee.<sup>46</sup>
- R25. Establish processes to appraise expenditure on ICT in teaching, learning, research and administration, to measure total cost of ownership, to prioritise expenditure on new central ICT projects, and to establish and keep within a specified budget.
- R26. Address the apparent discrepancy between the resources allocated for centrally-funded ICT in the University's Capital Projects Register and the indicative amounts required for central ICT services in the five-year ICT expenditure plan.

## ICT Budget and Priority Plan

224. An ICT Budget and Priority Plan is derived from analysis of local requirements within Oxford, the projects foreseen by the central ICT providers, and consideration of ICT requirements which enable Oxford to meet both its strategic objectives and the increasingly complex regulatory requirements.
225. A prerequisite for establishing an agreed ICT Budget and Priority Plan is to ensure an appropriate ICT Coordination and Decision-Making (CDM) structure is in place (see Section 6). The amounts in the Budget and Priority Plan presented here are *illustrative*.
226. The ICT Budget and Priority Plan tabulates central ICT applications and services which are currently foreseen, and assigns priorities on the basis of feedback received in sections 1 and 2. Central investment must be driven by the services and the environment that they provide for local users.
227. The relevant principles are to:
- a. invest in central ICT services which provide local users with the ICT environment they require, and enable local ICT services to work effectively;
  - b. enable the collegiate University to set central ICT priorities for expenditure;
  - c. ensure that there are adequate resources to ensure high-priority ICT services are resilient, robust and reliable and effective;
  - d. terminate central ICT services which are no longer the highest priority<sup>47</sup>;
  - e. ensure that overall central expenditure is contained within a limit set by the collegiate University in competition with other calls on expenditure.
228. In some cases, investment is to provide *infrastructural glue* to make the local ICT services work effectively (e.g. underlying network).

<sup>45</sup>Including the services provided by OUCS, BSP and OULS.

<sup>46</sup>Described in section 6.

<sup>47</sup>While the amounts in this section are illustrative, there are indications that the foreseen capital budget for ICT is unlikely to fund all the services in the ICT Budget and Priority Plan.

229. In other cases, it is for applications to enable local services to interoperate with other local services or central services (e.g. Identity Management).

230. For some applications the best means to deliver an ICT service to Oxford is to operate it centrally (e.g. Finance system) – see section 3 for a discussion of the three-layer model.

231. An initial presentation of an ICT Budget and Priority Plan, or ICT plan for proposed central ICT expenditure, is presented in Appendix A - Table A1. It should be stressed that the quantities shown in the table are illustrative, in the sense that substantial further analysis will be required to ensure a consistent costing algorithm (see Appendix A for details).

232. The purpose here is to propose a process by which Oxford will be able to construct a Budget and Priority Plan for central expenditure on ICT in coming years. It will be a blueprint for future procedures, and will be refined by the new Coordinated Decision Making structure.

233. The result of the exercise is a five-year ICT Budget and Priority Plan for central expenditure, with priorities set by Oxford, aimed to maximise the return for local units and users, and to facilitate long-term strategic ICT planning.

234. The University has conducted an exercise in parallel with the ICT Strategic Programme, undertaken by the Services Funding Working Group, with a remit, 'To consider and make recommendations to PRAC about the basis on which the cost of IT services should be met in the future'. The five year Budget and Priority Plan will be refined by using the outputs from this working group which includes a detailed analysis of current ICT services and funding models.

235. Proposed central expenditure given in Table A1 is classified according to the following *Categories*:

- Category 5 – funding already agreed by central University;
- Category 4 – very strong user requirement and/or underpins other high priority pilots, projects, services;
- Category 3 – potentially very important, and worth funding as a pilot;
- Category 2 – very important for parts of Oxford but not an enterprise-wide service; should be funded through cost-recovery;
- Category 1 – potentially less important than higher categories but worth considering to be funded as special project through Development Office.

236. Figure 2 below provides a plot of the data from Table A1, shown as a function of Category (5-1 upwards).

237. Figure 3 below shows the result of adding the current baseline budgets (assuming the baselines are held constant) to the above plot (represented in the lowest strip).

238. Assuming the current central ICT provider baseline budgets are maintained,<sup>48</sup> the University is committed to approximately £11m/year plus Category 5 expenditure.

239. The central ICT expenditure plan has been created to be compatible with, and indeed supportive of, the Capital Projects Register, used by the University's Capital Steering Group. An initial comparison between the expenditure foreseen in the ICT Budget and Priority Plan in its current state (remembering the uncertainties listed in Appendix A concerning the calculation of the amounts) and the proposed ICT expenditure in the Capital Projects Register, indicates that funding anticipated in the latter will only cover the capital<sup>49</sup> costs of all Category 5 projects and a fraction of the Category 4 projects.

---

<sup>48</sup>The central ICT provider baseline budget should be evaluated and appraised.

<sup>49</sup>The amounts shown under the capital columns in Table A1.

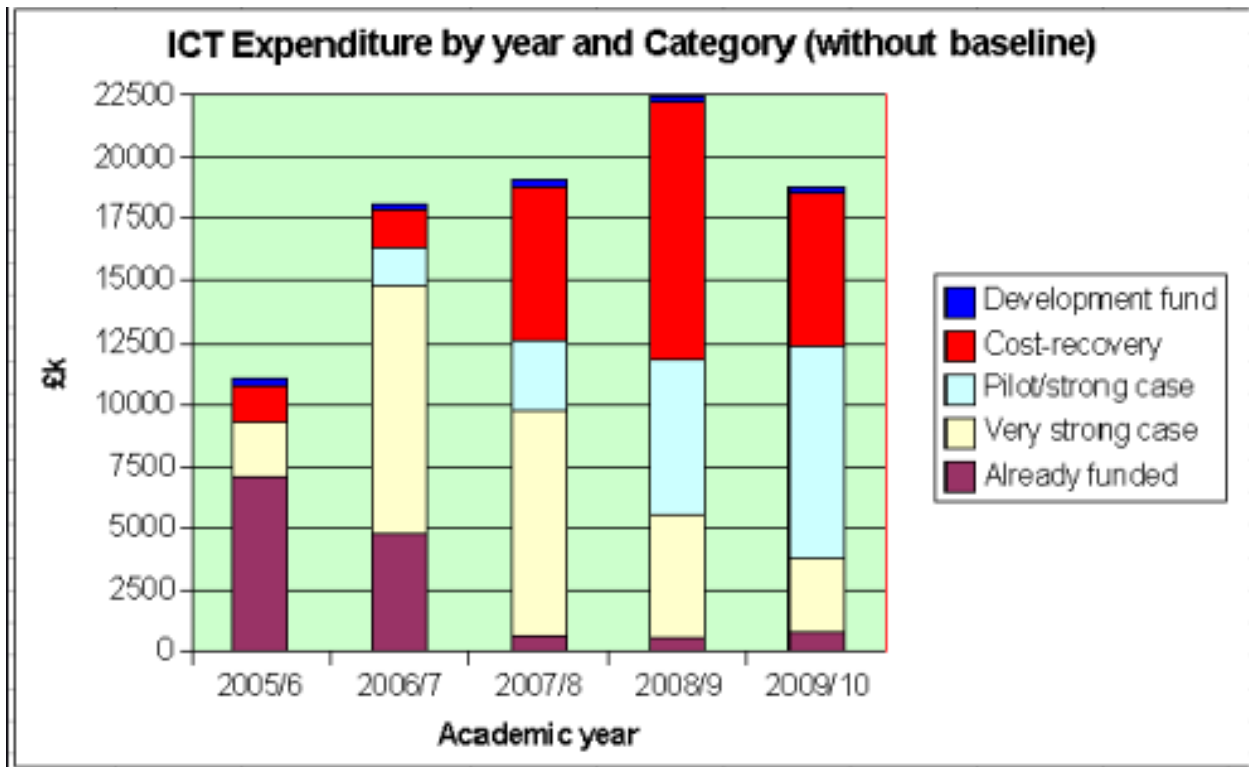


Figure 2. Plot of proposed central ICT expenditure for 2005-2010, by category.

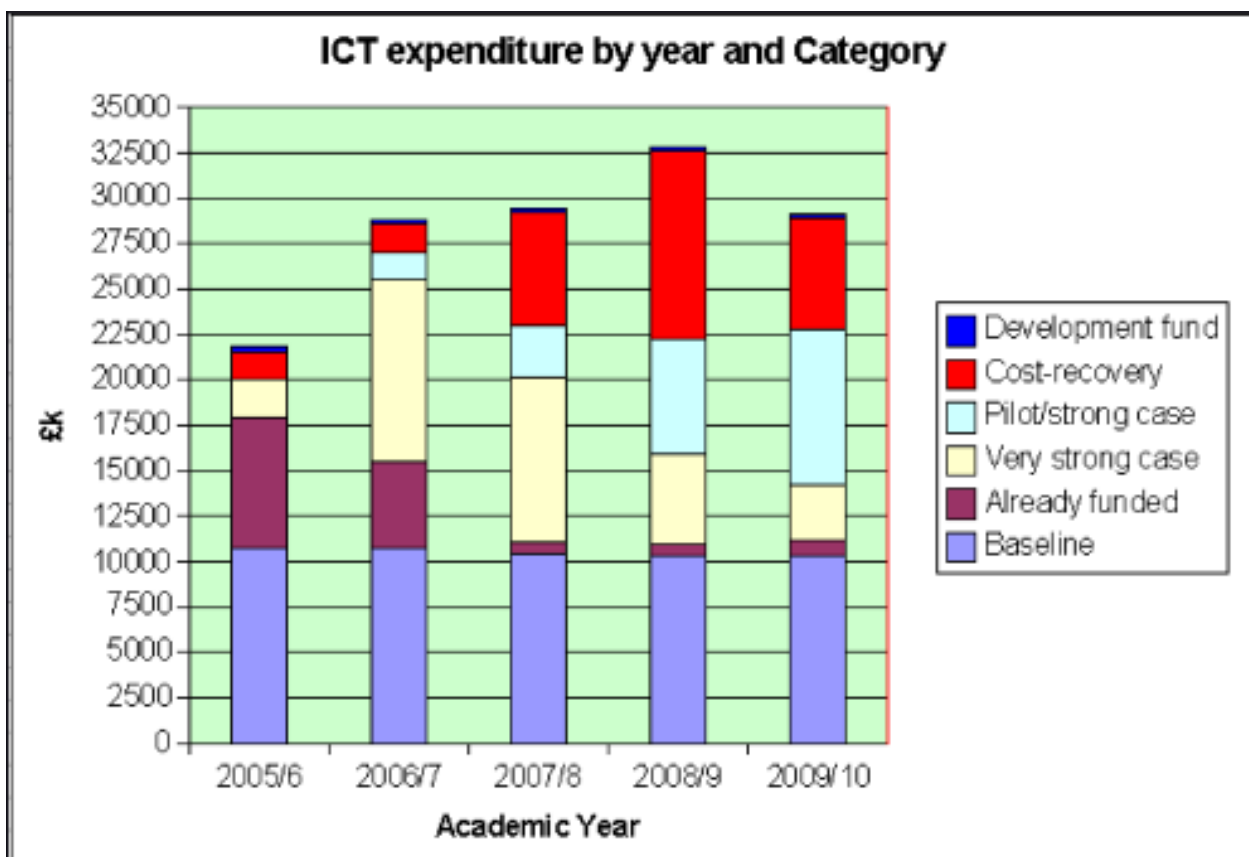


Figure 3. Plot of proposed central ICT expenditure for 2005-2010, including baseline budgets.

240. It will be essential for the collegiate University, through the new Coordinated Decision Making structure described in section 6, to specify central ICT priorities, and to ensure that mission-critical central services deliver effectively for the user and receive adequate funding in order to operate robustly, reliably, and effectively.

241. It is expected that all mission-critical central ICT services will be appraised as soon as possible, and risk assessments made to establish the likelihood of serious failure. This will make it possible for the Coordinated Decision Making structure to make informed decisions concerning where resources are most needed.

242. Not all items in Category 4 and no items in Category 3 are fundable within the ICT budget foreseen by the University's Capital Steering Group. The Coordinated Steering Group structure will need to establish the amount of funding the collegiate University is prepared to allocate to central ICT provision (in competition with other priorities), to ensure ICT expenditure priorities are agreed within this overall allocation, and to ensure that key mission-critical ICT services are appropriately funded in order to be resilient, robust and reliable.

243. Table A3 in Appendix A offers a holistic view of ICT expenditure across Oxford. Taking the total spend from Table A2, the projected spends from Categories 1 and 2 (these would be cost-recovered and would not be borne by the Centre), an approximate total divisional spend on ICT (based on one Division's approximate numbers), approximate college expenditure (based on the extrapolation from the spends of a few colleges), and finally some known ICT funding from external agencies (mainly Research Councils and JISC), gives an overall annual spend for ICT across Oxford in the region of £50m.

## Key Priorities

244. In general, ICT priorities should be determined by the degree to which the investment enables the University's strategic objectives to be met and according to the following criteria:

- meeting the academic and administrative needs of users;
- sustaining or benefiting the day-to-day processes of the University;
- meeting the University's statutory requirements;
- the feasibility of the project;
- value for money measured across the lifetime of the service.

245. There is a general belief that many of Oxford's mission-critical ICT services have not had sufficient investment. As a consequence, there is a risk that they are insufficiently robust and there is inadequate redundancy. A key priority is to address this by identifying the high-priority services and allocating sufficient resources (possibly at the expense of others).

246. The remainder of this section describes the ICT priorities for Oxford. The first grouping is based on the types of requirements identified in sections 1 and 2. The second set is the result of applying the categorisation metric described above.

## Mobile Computing and Communications

247. Improvements underway in departmental and college connections to the University backbone network will lay the foundations for a **campus-wide wireless network**.

248. Investigations are already underway to see whether a future University wireless service could be integrated with an Oxford city-wide service. Experience elsewhere has shown that this may be the most cost-effective approach.

249. The **telephone infrastructure** is based on ageing analogue technology (albeit reliable and maintainable). Increasing demand for new services will require a change of technology

to Voice-over-IP (VoIP). The technology will be piloted within, for example, the Radcliffe Infirmary development, but a wholesale transfer of the University telephone infrastructure to VoIP should be started within the next five years, contingent on suitable infrastructure.

### Resource Integration and Personalisation

250. Throughout this period the University will need to review, as a matter of some urgency, its **groupware solution** (e.g. an integrated email, calendaring, scheduling, and messaging system). This will be undertaken alongside developing the ECE but would be hosted by OUCS. The costs for this will vary considerably depending upon the solution adopted.

251. **Email services** are a critical requirement throughout Oxford. The bulk of email traffic flows through the centrally supported mail facilities. Further investment is required to ensure that the infrastructure can meet increasing demand whilst providing the level of resilience required for essential services.

252. The development of an **institutional portal framework** has the potential to deliver user interfaces and behind the scenes interoperability between, for example, a groupware solution, the development of a Virtual Research Environment framework, and the Virtual Learning Environment.

### Management of Information and Data

253. Rolling out the **student records system** fully to colleges and departments will offer major benefits to Oxford.

254. Upgrading and enhancing the **Financials system** is essential in order to keep in step with the software manufacturer's supported applications.

255. An **identity management and directory service** to provide data for authentication and authorisation services is required by applications across Oxford.

256. An identity management service will help facilitate the implementation of a **Campus-wide access management system** to enable single sign-on to diverse resources, including via any institutional portal.

257. A strategic review of **personnel and payroll systems** should be undertaken. The present approach is to outsource payroll processing and retain and support in-house the Opendoor software for HR. The University relies heavily on Opendoor, and delayed replacement will create an acknowledged risk. Many consider that an integrated HR/payroll solution should be a long-term high priority aim (for 2009/10); the college dimension will be a crucial consideration for any future system.

258. The importance of the University's web presence cannot be over-emphasised. Increasingly it is the main showcase for all the University's activities, for the general public, applicants, and the academic community. There is a pressing need for a **content management system**, aligned with the Oxford ICT Structure, to support Web development.

259. There should be a piloting of a **University 'Smart Card'** as part of an overall access management strategy and which may be used by departments and colleges to control access to buildings and the use of selected facilities (e.g. Library borrowing, photocopying, catering).

260. The **research grant costing service**, currently provided by Resolve, should be upgraded in order to provide better interoperability with, for example, the financial system and external grant proposal submission processes.

261. The integration of University buildings information within an **estate management system** is required.

### Secure Data Storage and Access

262. The amount of data held within Oxford is growing exponentially, and there is at present no

**data storage framework** for managing those data reliably and securely. In addition, there are areas of new and pending legislation which will impose obligations across Oxford, and where it is necessary to be able to demonstrate compliance. Increasingly, intellectual assets are held only in digital form. There is an urgent need to develop a data storage infrastructure which provides a range of facilities including access management, repository services, secure backup, and offline facilities.

263. **Backup and archival services** comprise a mixture of centrally supported and local facilities. Over the next three to four years there should be a more unified approach to supporting departmental backup. Other areas that may need considering in the future include a backup service usable by undergraduates, and for PDAs and other mobile devices. Greater security would be provided through the provision of a second off-site storage location.

264. **Institutional repository infrastructure** includes an agreed framework for the development and delivery of interoperable digital repositories for e-prints and other forms of research output, learning objects, research data, and library, museum and archive collections in digital form.

### **Flexible Desktop Computing**

265. Three central departments (Central Administration, Computing Services and Library Services) are building and deploying an **Enhanced Computing Environment (ECE)**. This requires an initial outlay, to bring the three units to a common standard, and to create the new environment. After three to four years, this will result in an overall saving of resources.

266. Once the ECE is established in the three units, the service will be offered to Oxford on a cost-recovery basis. Some modest investment may be needed to get this established.

### **Resilience of ICT Systems**

267. Some of the current **network infrastructure** was installed in 1984. It is essential that the network provides the appropriate level of resilience to ensure that teaching, research and administration demands are met.

268. A further upgrade to the **backbone network switching structure** will be required in the next four years to ensure that Oxford meets the continuing requirements for capacity and efficiency.

269. The current OUCS **Computer Room** is full to capacity and, as the location of many core infrastructure services, represents a potential risk to the business continuity of the University should the facility be subject to a prolonged outage. The provision of a modern, secure University-wide computer room facility is recommended in order to distribute and duplicate (as backup) key server and network infrastructure. It will be offered to units across Oxford to use on a cost-recovery basis.

### **Research**

270. The long-term vision for Oxford's **Supercomputing facilities** requires consistent capital and recurrent investment over the next five years, much of which will be recovered through fEC.

271. The newly formed **Oxford e-Research Centre**, and its **CampusGrid**, will have most of its activities funded through fEC and research income, but some investment from the University will be required.

272. The development of a **Virtual research environment framework** offers the potential for supporting collaborative, interdisciplinary research across the academic divisions; addressing the needs of particular research communities through offering reusable tools and shared resources within an interoperable framework.

273. A **Research management and reporting** system is essential in order to meet the requirements of the RAE for 2008 in particular and the need to report and disseminate information about research more generally. In the longer term the service should interoperate with, for example, institutional e-prints and data repositories and personalised virtual research environments.

274. The **Research Discovery Service**, piloted in the Medical Science Division, should be considered for wider use across Oxford, and if appropriate, funded centrally.

### **Teaching and Learning**

275. There should be a rolling program for upgrading the **IT and audio-visual facilities in teaching spaces** across the University (e.g. Examination Schools, lecture rooms, seminar rooms, etc).

276. Weblearn, the centrally supported **Virtual Learning Environment (VLE)**, requires continued and adequate investment to ensure its long-term sustainability and continuation of its flexible and modular approach to the development and deployment of tools.

277. A **Lecture, tutorial, and exam scheduling** tool suited to Oxford's teaching requirements, including an online searchable database of lectures and classes is desirable.

278. An integrated examinations management and classification system is required, including either the replacement or the further development of Mark-IT. It is important that any classification system can be easily adapted by departments to suit local marking schemes.

### **Cost-effective ICT Purchasing**

279. A voluntary purchasing framework, as operates in other similarly sized institutions, will be made available. Staff and students will be able to make purchases from a set of companies within an overall framework, possibly shared with other universities.

280. In addition to guaranteeing competitive prices, this results in reducing procurement overheads, shortened order times, and greater uniformity of equipment.

### **Developing ICT Support Staff**

281. A small budget allocation is foreseen for the ICT Forum to fund meetings, travel, buy-out of staff time for central and shared activities, and small ICT projects.

### **Enabling Coordinated Decision Making**

282. To **encourage innovation and enable flexibility** in responding to new developments, an annual fund should be made available to support innovative projects in ICT that match the University's strategic goals. The fund should also be available to allow projects to migrate to services, within the context of the ICT Budget and Priority Plan.

### **Categorisation of ICT Priorities**

283. Each of the projects has been classified according to the categorisation scheme described above. The central funding for Category 5 projects has already been allocated (mainly in 05/06). Category 4 projects have not necessarily been allocated resources but are considered to be the highest-priority activities. Category 3 projects are also desirable but may benefit from a pilot project to demonstrate their value before subsequent investment. Category 2 projects, mostly relevant to specific Oxford communities, are likely to be offered on some form of cost-recovery basis whilst Category 1 projects, though interesting, are currently considered a relatively low priority for internal funding, and rely on development funding to go ahead.

284. The following list orders projects first by their categorisation and then by size in terms of budget. In subsequent revisions of this exercise, the scope and status of each project will be specified. Illustrative budgets for each activity are indicated in Appendix A.

### **Category 5 – funding already agreed**

**Library Management System:** OULS project to roll-out a new Library Management System (LMS) tailored for the Oxford environment and which will integrate closely with the University's new administrative systems, the Virtual Learning Environment and a broad electronic information environment.

**Financials hardware upgrade:** Upgrading hardware is a pre-requisite to upgrading the software to version 11.5.10, and is also required in order to address performance issues.

**ISIDORE Phase 3:** Improved security features via IGS.M upgrade; piloting of online graduate applications and self-service registration.

**ISIDORE Phase 2A:** Roll out of new student administration processes and access to OSS to colleges and departments, and also development of enhanced reporting facilities.

**Finance process review/training:** Review of processes and provision of relevant training for Oracle Financials

**Transfer payroll to ASP (first stage):** Interim payroll project to move payroll processing from OpenDoor to an external bureau service.

**Central Admin desktop refresh:** Replacement of desktop machines within University Offices.

**Enhanced Computing Environment Project:** Enhanced Computing Environment (desktop) for University Offices, OULS and OUCS.

**Estates Directorate Planon Phase 1:** Planon replaces the existing estate management software; initially replacing the ProMaster helpdesk system and interface with the Insite space management system.

**University Web CMS Phase 1 (Pilot):** Implementing a Content Management System (CMS), and carrying out a pilot conversion of the University's 'Statutes and Regulations'.

**Lecture lists development:** Implementation of an online searchable database of lectures and classes, which is expected eventually to replace printed lecture lists (Facility CMS).

**RAE data collection tools:** Data collection and verification for RAE2008, based on staff data held in OpenDoor, augmented by information obtained from Oracle Financials, Oracle Student System, and Divisions.

### **Category 4 – highly desirable**

**Campus groupware:** Funding for the development/procurement of an integrated email/calendaring/file sharing application.

**Mobile computing/telecommunications: phase 1 (wireless):** Equipping up to sixty University buildings with wireless networking to enable roving access to the University network and beyond.

**Undergraduate admissions project:** This project will be required if the University decides to implement a standard admissions process across all subjects and colleges; includes integration of functionality provided by ADSS and Admit more closely with OSS.

**Institutional filestore – phase 1:** Development of data storage framework to manage the University's data reliably and securely; enable digital files and data held anywhere in the University to be accessed by anyone with appropriate authorisation; provide a high-performance repository with secure backup and offline facilities.

**ISIDORE Phase 4:** Online graduate applications rollout, self-service registration rollout, workflow pilot and online supervision reports.

**Institutional Repository:** Implementation of an institutional repository infrastructure to manage and provide access to the range of digital resources produced as a result of the University's education and research activities.

**Examinations management and classification system:** Development and implementation of a system to manage the process of setting exams and classifying candidates

**ICT office:** Budget allocated to ICT office to fund ICT Director post, support staff and non-staff costs.

**ISIDORE Phase 5:** Possible implementation of modules to support collection of student fees.

**MSD Content Management System:** Deployment of Content Management System within Medical Sciences to assist with maintenance of distributed websites.

**Institutional filestore – phase 2:** Continuation of Phase 1.

**ALMS system replacement:** Replacement of the ALMS database currently used by the Development Office to maintain external contact details, including alumni, and manage fund-raising campaigns.

**Backbone network switching upgrade:** Upgrading the backbone network switching structure to take advantage of higher speeds etc.

**Establish ICT forum:** Budget allocated to ICT Forum to fund meetings, travel, buy-out of staff time for central and shared activities, and small ICT projects.

**Network cabling replacement:** Review network ducting and cabling to increase capacity, update cables and provide extra resilience.

**HR/payroll process review:** A strategic review of personnel and payroll business processes.

**Central Backup (HFS): update servers/disk storage:** Expansion of Hierarchical File Service (HFS) to allow use by researchers remotely from Oxford, undergraduate access, and more seamless department backups (Stage 3b).

**Virtual Learning Environment:** Developing and maintaining Weblearn, the University's Virtual Learning Environment (VLE)

**Replace Latch software for Land Agent:** A new property management system is needed for the Land Agent, to replace the legacy 'Latch' system.

**Oxford Digital Library:** Implementation of a filestore to manage data produced as a result of the Oxford-Google project and the Oxford Digital Library.

**Oracle Fixed Assets module:** Implementing relevant Fixed Assets module within Financials to permit identification of asset costs to individual departments.

**Software upgrade to Oracle Financials 12:** Upgrading to version 12 of the Oracle Financial software as a pre-requisite for adopting the 'Fusion' product.

**e-Research infrastructure (initial):** Investment through the Oxford e-Research Centre to develop CampusGrid and other aspects of e-Infrastructure (before covered through cost-recovery).

**Software upgrade to Oracle Financials 11.5.10:** Upgrading Oracle Financials and underlying database from the current version 11.5.7 to version 11.5.10.

**Upgrade to email infrastructure:** Upgrade email service to provide additional mailstore capacity and extra backup facilities.

**Central backup (HFS) off-site tape/library drives:** Expansion of Hierarchical File Service (HFS) to allow use by researchers remotely from Oxford, undergraduate access, and more seamless department backups (Stage 2).

**Central backup (HFS) replace central tape library/update drives:** Expansion of Hierarchical File Service (HFS) to allow use by researchers remotely from Oxford, undergraduate access, and more seamless department backups (Stage 4).

**Central backup (HFS) unify departmental backups:** Expansion of Hierarchical File Service (HFS) to allow use by researchers remotely from Oxford, undergraduate access, and more seamless department backups (Stage 3a).

**Transfer payroll to ASP (second stage):** Continuation of project to transfer payroll functionality to an external bureau.

**MSD Research Discovery Service:** Deployment of Research Discovery System to expose the range of research and expertise within the Medical Sciences Division.

**Identity management:** To develop a 'metadirectory' of information which will greatly improve access to networked resources and systems by users entitled to do so; ensures that such data is derived only from authoritative sources; and enables the development of new services within the University, whether by departments or central services.

**Estates Directorate Planon: phase 3:** Rolling out Planon to departments to provide access to buildings information for administrators.

**Financials enhanced reporting:** Replace the Discoverer reporting tool with a more appropriate tool better meeting the University's requirements.

**Estates Directorate Planon: phase 2:** Planon system to replace functionality provided by InSite.

**University Web CMS Phase 2 (Rollout):** Depending on outcome of Phase 1, converting centrally maintained web pages to Content Management System, and retraining staff to use the new tools.

**OUCS Teaching rooms upgrade: phase 1:** Upgrade of final teaching room within OUCS to modern facilities to promote and share a collaborative learning space, available for departments to use.

### **Category 3 – desirable (e.g. pilot)**

**HR/payroll implementation:** This project will replace OpenDoor with a new integrated HR/payroll package, depending on the outcomes of the business process review.

**Mobile computing and telecommunications: phase 2 (VOIP):** Migration of telephone infrastructure to Voice-over-IP (VoIP) in response to demand for new services; migration strategy required with initial installation expected as part of Radcliffe Infirmary site redevelopment.

**ISIDORE Phases 6, 7 8:** May include developing OSS to support electronic dossiers for graduate admissions, implementation of a solution for OUDCE's 'open access' programmes, implementation of OSS functionality to support recruitment and enquiries.

**i-Procurement:** Implementing the i-Procurement module in Financials to improve methods of entering data at the front end of Oracle purchasing.

**Central Web consultancy team: phase 2 (service):** Operate support/development team to offer advice and help set up standards-compliant web sites.

**Implement Oracle Fusion product:** Oracle planning to release 'Fusion', which is intended to combine the best elements of the Oracle Student System (OSS) with the best elements of the PeopleSoft 'Campus Solutions' product

**Research Discovery Service:** Potential rollout of Medical Sciences Research Discovery System as a service to other Divisions.

**Institutional portal:** Implementation of an online, personalised gateway to University resources and services for staff and students.

**e-expenses via payroll bureau:** Implementation of e-expenses through the bureau service.

**Replace/ upgrade Resolve:** Review of Resolve, for costing grant-funded research, with a planned closer integration with Oracle Financials.

**Central Web consultancy team phase 1 (pilot):** Establish a support/development team for departments and research projects to advise on setting up standards-compliant web sites.

**OUCS Teaching rooms upgrade phase 2:** Expansion of IT training facilities due to increased demand for courses and teaching space, by furnishing a fifth lecture room at OUCS.

**Automatic timetabling pilot:** Use of Facility CMIS to provide automated timetabling facilities for lectures and classes.

**Card system 'smart' card pilot:** Upgrading University Card hardware to pilot 'smart' cards for interested departments or colleges (running costs to be borne by participating units).

### **Category 2 – funded through cost-recovery**

**New University machine room:** Second machine room to overcome serious risk issues concerning sole point of failure in OUCS machine room.

**Oxford Super Computer:** Capital and running costs for Oxford Supercomputing Centre (funding sources include SRIF3 and RAE Strategic Investment initiative).

**e-Research infrastructure:** Operating services for the research community (eg CampusGrid), funded through fEC.

**Campus Grid:** Maintenance of University computational grid for data-intensive research needs.

**Virtual Research Environment service:** Development of generic services which support collaborative virtual research environments serving the needs of researchers across disciplines.

**Campus scheduler:** Implementation of a service to enable scheduling of meetings, classes, room bookings and other events.

### **Category 1 – consider through development funding**

**ICT innovation fund:** An annual fund to support innovative projects in ICT that match the University's strategic goals and enable flexibility to respond to changing requirements.

## 6. ICT Structure for Coordinated Decision Making

### Introduction

285. Each section in the ICT Strategic Plan builds on the previous one, and collectively they develop a case for ICT refinement and change in Oxford.

286. Section 1 reports changes requested by users, some of which require coordination of the underpinning services (for example the generation of directory services for all users). In section 2 the argument is advanced that to benefit from local ICT provision within a devolved ICT structure there must be coordination and interoperability between applications. In section 3 proposals are made to refine and develop Oxford's devolved ICT structure. The need for a mechanism to determine appropriate allocation of services to each of the three layers of the ICT model is identified. An ICT Forum is proposed which will report into a new ICT Coordinated Decision Making structure. Section 4 stresses the need for Oxford's enterprise applications to interconnect seamlessly and effectively, and to interoperate with local applications. Interoperation requires a process for agreeing and implementing standards. Section 5 begins the process of creating a definitive 5-year ICT expenditure plan for Oxford's ICT investment. It provides Oxford with the ability to set ICT priorities for the first time, and to ensure its mission critical applications are appropriately resourced, and recognises a discrepancy between planned central ICT expenditure and the requirements identified.

287. Sections 1-5 build a convincing case for ICT change in Oxford. In order to effect ICT change, a new type of ICT governance, a structure for ICT coordination, optimisation and delivery, is required. The new structure is described in this section.

### Principles

P29. A structure for Coordinated Decision Making (CDM) is required for ICT, in order to contribute to meeting Oxford's values, to underpin world class research, to support learning, to facilitate first class administrative systems, to make intellectual assets accessible, to refine the Oxford ICT deployment model, to integrate enterprise activities, to define ICT priorities and focus resources on mission-critical services, to agree components within the Oxford ICT three-layer model, and to introduce new ICT applications effectively and reliably.

P30. ICT provision must offer full support for, indeed in some respects underpin, Oxford's principle of subsidiarity. The CDM structure is responsible for coordinating and refining the concomitant devolved ICT deployment model.<sup>50</sup>

P31. The CDM structure must coordinate ICT across the University to ensure that departments and colleges are given the services and interfaces that they require. It must provide a connection for users and IT staff with Oxford's policy makers.

P32. The CDM must set policy for, and prioritise activities across, the central ICT services, including those provided by OUCS, BSP and OULS; it must ensure that total central ICT expenditure remains within a total allocation set by the collegiate University.

P33. The CDM structure must enable Oxford collectively to establish priorities and policy, evolve and develop ICT, and ensure quality of service to the user.

P34. The CDM structure must have sufficient components (committees and groups) to meet requirements, but should be as streamlined and transparent as possible.

P35. A single individual in the University must be given responsibility to: ensure ICT can offer full support for Oxford's principle of subsidiarity, coordinate the devolved ICT deployment

---

<sup>50</sup>It should be stressed that the CDM committee structure will not have responsibility for, nor interfere with, ICT policy and decisions made within Divisions and Colleges.

model, be accountable for central ICT services, and lead the implementation of the ICT Strategic Plan.

## Recommendations

R27. Introduce an ICT Coordinated Decision Making structure to embrace ICT in Oxford, and establish as a fundamental component of the Coordinated Decision Making structure for ICT a PRAC ICT Sub-committee with both Strategy and Implementation arms.

R28. The proposed committee structure should provide strategic direction for ICT, determine ICT policy and agree the priorities for central ICT investment. The committee structure will also ensure mission-critical ICT services are resilient and reliable; identify and manage risks; ensure Oxford complies with relevant legislation; and put in place quality assurance standards for optimal ICT operational delivery. It will ensure central ICT expenditure remains within a total budget set by the collegiate University through PRAC, and will terminate services agreed to be of a lower priority or fund them by cost recovery.

R29. Establish a Director of ICT post as the executive arm of the PRAC ICT Sub-committee. The Sub-committee and Director of ICT should direct and coordinate the strategic development of central ICT services including those managed by OUCS, BSP and OULS.

R30. The Coordinated Decision Making structure should establish bi-directional communications channels with the appropriate University committees with responsibility for education, research and administration, in order that those aspects of teaching, learning, research and administration underpinned by ICT are properly considered and given appropriate priority by the collegiate University. For research and teaching this should be achieved through the respective PVCs being members of the top-level committee.

R31. Establish an Architecture Group to develop and maintain an interoperability framework for Oxford together with the monitoring of ICT projects' adherence to appropriate standards.

R32. Create a User Forum with a cross-section of Oxford ICT users.

R33. Create ICT Project Boards for new ICT projects or service upgrades.

R34. Form other groups within the ICT structure, as needed, to report to the Strategy and Implementation arms of the PRAC ICT Sub-committee; terminate groups on project completion or completion of activity.

R35. Address full Economic Costing for ICT services through the Coordinated Decision Making structure.

R36. Measure the new ICT Coordinated Decision Making structure against COBIT principles.

## Strategic Considerations

288. Coordinated Decision Making (CDM) is often referred to as *governance*. This term is avoided in the ICT Strategic Plan (except in this section<sup>51</sup>) as it often has connotations of being 'driven from and by the centre'. The CDM structure proposed here is completely different and takes a holistic, collegiate approach to ICT governance. It is a structure that will enable the Oxford devolved ICT structure to operate effectively, coherently, and to meet regulatory standards. It will enable the academic community to specify ICT priorities and will ensure that the centrally provided enterprise services meet the needs of the local users, and provide an ICT environment which is suitable for the cost effective deployment of local ICT services.

289. The term 'governance' has many different definitions. Richard Boreham of KPMG defines it as, "the creation of the environment in which others can manage effectively",

<sup>51</sup>'Governance' is employed here in line with the terminology used within the quotations and references which follow in section 6, and in the additional commentary provided in the ICT Strategy Programme Record.

where, “management is the making of operating decisions”. The IT Governance Institute<sup>52</sup> defines it as, “an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that the organization’s IT sustains and extends the organization’s strategies and objectives”. Phil Thompson of Dickson Dees defines it as, “a structure of relationships and processes to direct and control the enterprise in order to achieve the enterprise’s goals by adding value while balancing risk versus return over IT and its processes”. The Enterprise Governance Framework defines it as, “the set of responsibilities and practices exercised by the board and executive management with the goal of: providing strategic direction; ensuring objectives are achieved; ascertaining that risks are managed appropriately; verifying that the enterprise’s resources are used responsibly.”<sup>53</sup>

290. The JISC,<sup>54</sup> recognising that ICT is pervasive, makes the following statement, “... information systems and IT now underpin almost every activity within HE and therefore a large variety of systems has to be considered; systems cross organisational boundaries and consequently management structures can be complex; the use of information technology is often embedded in other processes making it difficult to review the effectiveness of single components such as IT.”

291. It is increasingly common at large universities to have a permanent post of Director of ICT or Chief Information Officer who forms the executive arm of the ICT governance structure.

292. The ICT Strategy programme received strong and consistent feedback that Oxford should have a Director of ICT to provide leadership and to coordinate ICT strategic planning and implementation.

293. Oxford’s devolved ICT Structure has many benefits and offers the best possible service to users, but the complications of a heterogeneous system with many autonomous units requires careful coordination. The Director of ICT will ensure that:

- a. central ICT expenditure is within the overall budget specified by the collegiate University;
- b. local ICT investment delivers maximum return;
- c. components within the overall ICT infrastructure interoperate;
- d. centrally provided services meet the needs of users, are cost effective, and interoperate with local services;
- e. central ICT expenditure is correctly prioritised by the collegiate University (not by the service providers);
- f. risk for delivery of ICT services is correctly managed;
- g. mission-critical ICT services deliver effectively for the user and are adequately resourced to be reliable;
- h. Suitable training is available for all users;
- i. the overall ICT structure meets statutory regulations.

294. The Director of ICT will also have responsibility for taking the ICT Strategic Plan through an implementation phase (as described in *Section 7*). The proposed responsibilities of the Director of ICT are outlined in Appendix C.

---

<sup>52</sup>IT Governance Institute (ITGI), <http://www.itgi.org/>.

<sup>53</sup>The Programme Record explores the principles of ICT governance in more detail, and in particular presents a set of indicators of good practice.

<sup>54</sup>A Framework for Information Systems Management and Governance, <http://www.insight.strath.ac.uk/projects/itgov/index.htm>

295. In addition to the responsibilities outlined above, ICT governance must cover: strategic<sup>55</sup> and long-term planning; annual programme and project portfolio, individual programme and project delivery, and operational service delivery. Governance is not a replacement, but is a facilitator, for good ICT management.<sup>56</sup>

296. ICT governance will offer:

- a. a means by which the academic community can determine ICT priorities;
- b. a development path for improved understanding between ICT and the core activities of the collegiate University;
- c. a means by which the administrative and information management requirements of the University can be addressed as effectively as possible within financial constraints;
- d. transparency and encouragement for Oxford to take more, active, control over central ICT matters and costs;
- e. a single point of connection for capital ICT planning in the University;
- f. appropriate risk management of ICT services;
- g. the ability for Oxford ICT to be agile and to change in response to new requirements;
- h. the ability to prepare plans to mitigate against major ICT failures and to ensure business continuity;
- i. the ability to plan for the changed ICT requirements in the case of a major incident (e.g. a pandemic);
- j. the ability to ensure Oxford ICT complies with legislation;
- k. the ability to manage and optimise the return ICT receives from full Economic Costing (fEC).

297. It is essential that mission-critical ICT services are appraised to ensure that they deliver effectively for the user<sup>57</sup>, and are reliable and agile. Legal risks must be understood, defined, and prioritised, and strategies must be adopted to ensure that Oxford complies with this specific type of legislation.<sup>58</sup>

298. ICT has a potentially important role to play in the event of a pandemic or serious disaster within the University, and contingency planning must be made for this eventuality. The new ICT governance structure must decide the appropriate level of investment which should be made by way of preparation.

299. COBIT<sup>59</sup>, published by the IT Governance Institute, is a framework focused on control, “to provide a clear policy and good practice for IT governance”. As a new ICT governance structure is established in Oxford, it should be measured against the COBIT principles.

300. In the consultations undertaken as part of the ICT Strategy Programme there has been wide and consistent consensus on the need for a single point of convergence for ICT governance, for all central ICT services, through a *PRAC ICT Sub-Committee (S/c)*.

301. Oxford requires an ICT governance structure with a remit which covers all the main central

<sup>55</sup>Strategy determines ‘how you get there and deliver’, policy specifies ‘where you wish to get to’. It can be argued that ‘ICT policy’ does not exist as policy is set to meet Core activity goals at the institutional level.

<sup>56</sup>ICT management will be considered in phase 2 during the planning of the implementation of the ICT Strategic Plan.

<sup>57</sup>Management of risk is explored in the Programme Record.

<sup>58</sup>The legislative environment is further considered in the Programme Record.

<sup>59</sup>Information Systems Audit and Control Association (ISACA): COBIT, <http://www.isaca.org/cobit/>. A summary of COBIT is also provided in the Programme Record.

ICT providers. All other Russell Group universities (and many leading universities world-wide) have recognised that effective ICT governance is only possible if it covers all centrally funded ICT, including that provided by computing services, business services, and libraries.

302. The governance structure should also have responsibility for overseeing central ICT investment in e-Research, e-Learning and e-Administration.

303. Draft terms of reference for a PRAC ICT S/c are given in Appendix B. These will be refined as the ICT Strategic Plan is implemented, and the entire structure will be reviewed by PRAC at the end of AY 2008/9.

304. The new Oxford ICT governance structure is shown pictorially in Figure 4 below, and is modeled closely on the PRAC Building and Estates Sub-Committee.

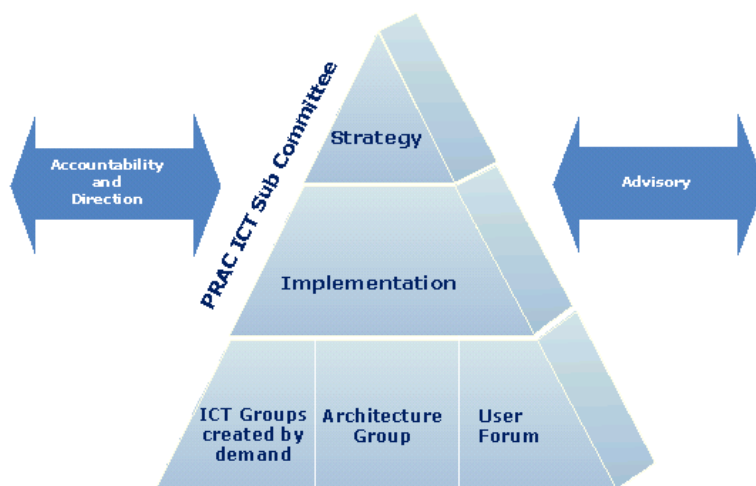


Figure 4. Representation of the proposed committee structure for ICT governance.

305. The PRAC ICT Sub-Committee has ‘Strategy’ and ‘Implementation’ arms. The top triangle represents the development of a strategy and policy governance framework together with the setting of ICT priorities by the academic community. The implementation layer below the Strategy Arm deals with: implementing the ICT Strategic Plan, service level definitions for services, overseeing project delivery, risk analysis, and ensuring business continuity.

306. It is expected that the Implementation arm will evolve once the ICT Strategic Plan has been implemented fully.

307. Three types of activity report to the PRAC ICT Sub-Committee; these are described in subsequent paragraphs.

308. The PRAC ICT Sub-Committee ICT governance structure is described in detail in Appendix B, where Terms of Reference and Membership are given.

309. The ICT governance **accountability** of the PRAC ICT Sub-Committee is achieved in two ways. It is accountable through its membership (Pro-Vice-Chancellors, Heads of Division, Conference of Colleges, Registrar), and also through its connection to structures in the University (via the horizontal arrows in Figure 4) which currently, or will in the future, address ICT strategy and policy issues. It is, therefore, the collective responsibility of the collegiate University to govern ICT and to set ICT priorities through the respective structures within divisions, faculties, departments, colleges and Central Administration, and these are all brought to a focus through the PRAC ICT Sub-Committee.

310. The academic community is represented through membership on the PRAC ICT Sub-Committee and through the horizontal connections to structures which specify ICT priorities

and policies across the collegiate University. This will make it possible, for the first time, for the academic community to specify priorities for investment across all the central ICT service providers. These priorities include not only those relating to education and research but also to the administration and information requirements which support these priorities. The horizontal connections will help ensure that ICT services meet the community's needs fully and cost effectively.

311. Similarly, Central Administration is represented through membership on the PRAC ICT Sub-Committee and through the horizontal connections to its structures which specify ICT requirements. Central Administration is, in general, a consumer of ICT services, and these underpin the services they offer to the collegiate University. The central ICT services must be accountable to Central Administration in order that first class services can be built on the ICT infrastructure provided, and the PRAC ICT Sub-Committee provides this accountability.

312. Where suitable structures (committees, groups and fora) do not exist across the collegiate University to connect with the PRAC ICT Sub-Committee, these will need to be created in order for ICT governance to operate correctly within the devolved ICT structure. Within a devolved ICT Framework, all components must share responsibility for ICT governance.

313. In addition, the PRAC ICT Sub-Committee has an horizontal **advisory** connection to structures across the collegiate University (for example: to the ICT Forum, Libraries ICT Committee, IT Committee representing Central Administration, Faculty and Departmental ICT Committees and the Web Strategy Group).

314. For the horizontal connections which are made to structures across the collegiate University to be effective, communication transparency and openness, will be essential. This will be achieved by:

- minutes, agendas, reports from the PRAC ICT Sub-Committee being openly available to the collegiate University on the Web, with the exchange of agendas and minutes between the S/c and ICT committees (etc) where considered appropriate.;
- Dedicated web areas for each connection;
- Personal support through Director of ICT.

315. The new ICT governance structure is designed to be as streamlined as possible. When a new ICT project is commissioned a Project Board will be created which is accountable for good governance, budget oversight and risk management. In general, Boards will be chaired by a senior academic representing a part of the collegiate University that sponsors the project (explained in detail in Appendix D).

316. In common with other universities, there will be an ICT Architecture Group (AG), comprised of staff from across Oxford. When a new ICT project is proposed, the AG will make sure that the project adheres to Oxford's ICT principles (interoperability, coherence – as discussed in Section 4). The AG will only meet when required by the PRAC ICT S/c. ICT decisions taken locally can have profound implications elsewhere, and the AG will be responsible for ensuring that the overall ICT infrastructure works coherently. The AG is discussed further in Appendix B.

317. All ICT governance structures must enable the views of the user community to be expressed. The new User Forum facilitates this; its Terms of Reference are given in Appendix B. The challenges for creating an effective User Forum are to attract the right cross-section of users and to ensure that attendees find it to be a worthwhile exercise. It is proposed that directors of the central ICT providers will attend, with one or more presentations at each meeting. The User Forum is an essential component within the governance structure, and it must strive to make ICT a shared responsibility across Oxford.

318. The Oxford ICT governance structure will be the medium for setting ICT priorities against capital funds such as SRIF, and a single point of interaction for ICT with the new capital planning structures within the University. It will also be responsible for implementing changes to service funding proposed by the Services Funding Working Group.

319. The analysis in Section 5 makes it clear that ICT resources currently foreseen by the Capital Planning Group will not meet the investment required by the capital ICT projects tabulated in Appendix A. The governance structure will be required to face difficult decisions in determining priorities.

320. It is proposed that the PRAC ICT S/c agrees an overall allocation for central ICT expenditure with PRAC - in competition with other University requirements. In order to fund the mission-critical services appropriately, it is likely that some ICT services will need to be terminated, or funded through cost-recovery.

321. A particular issue facing ICT is the implementation of full Economic Costing (fEC) for some of its services, especially when fEC becomes applicable to teaching as well as research. The Oxford ICT governance structure will be essential to establish appropriate costs and prices and an effective fEC model.

322. Some decisions taken by the new ICT governance structure may have consequences for ICT management (e.g. a new focus of activity may require a change of deployment of staff). On these occasions a group will be formed to address the specific issue.

323. It will be important that the ICT governance structure is agile and flexible. It must be able to adapt to the changing ICT environment. Undoubtedly the structure will continue to evolve after it is implemented. It may be necessary, for example, to have separate structures to coordinate e-Research and e-Learning.

324. It will be important for the governance structure to develop a set of key performance indicators for Oxford ICT. This will make it possible for the quality of service to be benchmarked<sup>60</sup> against other Universities, and to monitor improvement as the ICT Strategic Plan is implemented.

325. The governance structure must operate in conjunction with the range of other strategic planning processes within Oxford, including environmental impact analysis and energy conservation; contingency planning and disaster recovery.

326. The governance structure will be appraised and refined by using a set of case studies (e.g. creation of an institutional repository, development of a university-wide filestore, upgrade to central email servers, new content management service, creation of directory services, and disaster recovery) in advance of it being commissioned.

---

<sup>60</sup>Also, will offer a point of interface for the Internal Auditors.

## 7. ICT Strategy Implementation – Phase 2

### Introduction

327. Sections 1-6 have described the principles needed, and explored the processes required, in order for Oxford to move into a new era for ICT. Assuming acceptance of the Plan by the University, the implementation of the ICT Strategic Plan will occur in *Phase 2* of the ICT Strategy, as outlined in this section.

### Principles

R36. Careful planning and commitment from across Oxford is required to make the step change from agreeing the principles of the ICT Strategic Plan to taking forward the implementation in Phase 2.

R37. Implementation of the ICT Strategic Plan will require new procedures, new coordination, and new prioritisations to be agreed.

### Recommendations

R37. Subject to recommendation by Council to proceed, after the forthcoming period of consultation, make preparations for implementation of the ICT Strategic Plan.

### Strategic Considerations

328. The ICT Strategic Plan, as presented in the previous sections of this document, establishes the principles needed for Oxford to move into a new era of ICT infrastructure, provision, decision making, priorities and support.

329. Requirements have been collected from across Oxford, distilled into principles, and the principles prioritised.

330. Oxford's devolved ICT structure offers the best functionality and service for its users, but it is complex and needs coordination and organisation to deliver the most cost-effective and best-quality results.

331. An ICT Budget and Priority Plan detailing proposed expenditure and capital investment, has been developed, and a process defined by which this plan will be refined, offering Oxford the opportunity to debate and agree University ICT priorities (for the first time).

332. The ICT Budget and Priority Plan, with approximate University expenditure included for illustrative purposes, has shown the approximate central ICT investment which will need to be made over the next 5 years.

333. A first consolidated programme of future ICT projects has been put forward, together with indicative costs, and priorities based on user requirements.

334. Methods for ICT project management, which retain ownership with the sponsoring part of Oxford, have been described.

335. A 'Coordinated Decision Making' structure has been proposed which provides the framework within which the ICT Budget and Priority Plan can be refined, ICT priorities can be agreed, and ICT can be managed effectively. A new post of Director of ICT has been shown to be essential to provide leadership and coordination.

336. The devolved model of ICT has been appraised and tuned in order to give maximum support for the important principle of subsidiarity across Oxford.

### Moving to the implementation phase

337. In phase 2, Oxford must step across from the principles embodied in the ICT Strategic Plan to a plan for implementation.

338. A provisional plan for implementation is given in the table below. This will be adjusted depending on feedback received during the consultation period in MT 2006 and from Council.
339. Where possible, and without making any assumptions, preparations for Phase 2 will be made in parallel with the consultation exercise.
340. The three-layer distributed ICT model will be defined and the environment to support layers 2 and 3 will be specified.
341. Existing and proposed ICT projects will be appraised. Cost benefit analyses, and risk analyses<sup>61</sup>, will be undertaken. In some cases the *cost associated with doing nothing* will be evaluated.
342. Metrics, as part of an investment analysis, will be created to measure Return On Investment (ROI) for ICT projects in order to appraise:
- Effectiveness of common infrastructures;
  - Possibility of long term recurrent savings made possible by capital investment;
  - Case for termination of unsatisfactory services.
343. Work groups may be formed in order to consider how best to implement the ICT Strategy in those parts of Oxford where there are specialised requirements (e.g. the clinical departments).
344. Key performance indicators will be specified for ICT services, making it possible to measure service improvement and increased cost-effectiveness, and also enabling benchmarking.

Table 2: Suggested timetable for implementation

Phase 2 Activities	When
Create ICT Strategy Implementation Plan	Mid '07
Establish ICT CDM Structure	Mid '07
Create permanent Director of ICT Post	Mid '07
Appoint positions on the PRAC ICT Sub-Committee. (ICT S/c <sup>62</sup> )	In time for MT '07
Determine whether Oxford has the skills required for Phase 2 and act accordingly	Mid '07
Analyse currently-funded ICT projects – do cost benefit and risk analyses (where required)	Mid '07
Create Project Boards for new ICT pilots and projects (see below for specific examples)	Mid '07
Launch project to deliver wireless across Oxford	MT '07
Specify key performance indicators for ICT	MT '07
Measure ROI, terminate unsatisfactory ICT services	MT '07
Investigate VAL IT <sup>63</sup> as means of ensuring optimal ICT governance	MT '07
Start project to deliver Single Directory Service	MT '07
Start project to develop mobile computing plan and implementation	MT '07
Start to measure change of key performance indicators with time	Late '07

345. Important concomitant questions will need to be addressed:
- Is Oxford ready to accept and embrace the changes proposed for Phase 2?
  - Does Oxford have all the skills needed in order to effect the Phase 2 implementation?

<sup>61</sup>Focusing, in particular, on mission critical services.

<sup>62</sup>ICT S/c' represents both Strategy and Implementation arms of the sub-committee

<sup>63</sup>Val IT governance framework, <http://www.isaca.org/valit/>.

346. The ultimate measure of success for Phase 2 will be the extent to which user expectation is met across Oxford when the ICT Strategic Plan is implemented.

## 8. ICT Strategic Plan Conclusions

347. Most leading universities have prepared ICT strategic plans. In many cases these have been developed by the central ICT providers, often following standard templates. The Oxford ICT Strategic Plan is fundamentally different. It is the result of a nine-month ICT Strategy Programme, with a team of over 50 individuals from across the collegiate University, and is focused on the needs of the user. As far as possible it has been a *strategy developed by consensus*.

348. Although Oxford has been one of the last to develop an ICT Strategic Plan, the timing has been good. Users' requirements, statutory regulations, and Oxford's teaching, learning, research and administration processes, have all evolved significantly in recent years.

349. Oxford's devolved ICT deployment model reflects the importance of the principle of subsidiarity and remains the best model for ICT provision across Oxford. A primary challenge for the ICT Strategy Programme has been to determine the best way to optimise the devolved model, to encourage local ICT initiative and responsibility while offering an overall coordinated and agile ICT infrastructure.

350. The devolved ICT deployment model is more complex than a central model, and requires careful coordination for it to be effective and to compete with the best systems elsewhere. A Coordinated Decision Making structure (with the Strategy arm of the PRAC ICT Sub-Committee together with the Director of ICT) is required to ensure:

- a. centrally provided ICT services meet the needs of users;
- b. central ICT provision enables an environment where local ICT investment is cost effective;
- c. central ICT services interoperate with each other and with local ICT services;
- d. business continuity is assured, service levels defined, and risk assessments made;
- e. a five year ICT central expenditure plan is created;
- f. central ICT expenditure priorities are set by the collegiate University, and the ICT expenditure envelope<sup>64</sup> is used to optimal effect<sup>65</sup>;
- g. a total budget for central ICT is balanced against other priorities across the collegiate University, and expenditure is retained within the allocation;
- h. mission critical ICT services are adequately funded to be resilient, robust and reliable.

351. At many points in developing the ICT Strategic Plan, the need for an Oxford Information Strategy has been apparent. This is urgently required. The ICT Strategic Plan offers a framework and a clear opportunity to address issues relating to information control and management, and the principles should be developed into a full Information Strategy. An Information Strategy will offer an excellent vehicle for defining and coordinating the optimum management and flow of information between business, e-learning, e-research and library systems.

352. The University has a draft Information Strategy document,<sup>66</sup> which is in urgent need of updating. The JISC Information Toolkit<sup>67</sup> will offer useful guidance as it provides a means to map information resources against types of information activity. A clearly identified requirement which has been expressed, and which would form a component within an Information Strategy, is for an electronic records management system.

---

<sup>64</sup>The amount the University allocates from its central funds to ICT.

<sup>65</sup>It is known that the amount currently allocated is insufficient to meet the needs identified in this Strategic Plan.

<sup>66</sup> Available at <http://www.ict.ox.ac.uk/strategy/working-papers/SG1.pdf>.

<sup>67</sup> Available at <http://www.jiscinfonet.ac.uk/Resources/evalkit/toolkit-database/ev036>

353. The ICT Strategic Plan draws together the conclusions reached by the ICT Strategy Programme, and presents a strong set of recommendations and principles. Creating an ICT Strategic Plan, however, is only the first step in the process. The measure of the ICT Strategy Programme's success will be the improved ICT services, the benefits of ICT prioritisation, and the optimised and coordinated devolved ICT structure which Oxford will enjoy, all of which will follow a successful implementation and deployment of the recommendations and principles of the ICT Strategic Plan.

## Appendix A: ICT Investment – Five-Year Budget and Priority Plan

An ICT Budget and Priority Plan, or five-year central ICT expenditure plan, has been produced for the first time in the University. *It should be stressed that the amounts shown in the Budget and Priority Plan are illustrative.*<sup>68</sup> The purpose is to establish and agree the principles for creating an ICT Budget and Priority Plan, and to explore how this will be used to help set ICT priorities for central expenditure in the future. It will provide a vital tool for addressing the apparent discrepancy between the funding which is likely to be available, and the funding required.

Table A1 presents a single plan for ICT investment over the next five years. It is important to recognise the following caveats and explanations:

- a. The purpose is to collect Oxford's ICT planned expenditure through central University funding in one table, to prioritise<sup>69</sup> items driven by the needs of the collegiate University, and to make estimates of the central ICT resources which will be needed over the next five years.
- b. The plan covers central funding for ICT activities across the University (measured in 2005/6 £s throughout).
- c. The intention is to develop a process by which a single view of central ICT expenditure can be created. It will be a blueprint for future procedures; both the process and the content of the ICT Budget and Priority Plan will be refined and developed by the new 'ICT Structure for Coordinated Decision Making' (CDM) structure.
- d. The result will be an ICT Budget and Priority Plan for central expenditure, with priorities set by Oxford (as opposed to the ICT service providers), which will enable long-term strategic planning to be made in the provision of central ICT.
- e. The current priorities are specified on the basis of feedback received and documented in sections 1 and 2.
- f. The ICT project costs specified by units in the table have been developed according to local practice, and this leads to apparent inconsistencies. In due course it will be essential to specify and agree a common approach, but at present it is important to recognise and understand the differences.
- g. Similarly the level of detail for future planning varies from unit to unit,<sup>70</sup> and again a common approach will be required in future.

---

<sup>68</sup>*Illustrative* in the sense that substantial additional analysis would be required to give reliable investment predictions. Activities are underway to define criteria for specifying funding components within ICT capital projects.

<sup>69</sup>Prioritise, or define appropriate funding mechanism.

<sup>70</sup>**Sample Costing Processes** As indicated above, the figures in Table A1 have been generated through different costing models within the various units. Commentary is provided in order to illustrate current practice.

**OUCS:** Where the ICT investment is in upgrading or replacing current equipment, no increase is projected for recurrent costs (staff, maintenance, etc.), which are assumed to be part of the overall baseline funding for OUCS. Capital costs are based on current market prices without adjustment for inflation. It should be kept in mind that many of the planned upgrades include technologies not currently available. The next generation equipment costs are therefore based on the current generation of hardware, etc. For new services, capital costs are calculated as above. The projected recurrent costs are an estimate of the new costs arising from staff costs, maintenance, etc. to support the new service (with no adjustment for inflation). Funding for new services is assumed to flow from an increase in the overall baseline, a cost-recovery mechanism, or some other method.

**BSP** costing of projects indicates ballpark investment costs for each new project or phase of development, in/over the appropriate financial year(s). Except where funding has already been awarded, generic project-costing estimates have been used, based on the estimated size (small, medium or large) and expected duration of the project. A detailed, project-specific costing exercise will need to be carried out for each project, as part of the project start-up process. The estimated figures are intended to include staff costs for additional resources required for the duration of the project, but do not include any allowance for the time of University staff expected to contribute

- h. An additional area of uncertainty relates to the source of funding: some central ICT activities are not funded from the infrastructure charge (e.g. some are funded by Oxford University Press); this level of detail is missing in the current analysis.
- i. An area of particular uncertainty is the process of moving from pilot – to project – to service, and specifying what constitutes **baseline** budgets for the service providers through the lifecycle of the application. The Business Services and Projects unit proposes to create a permanent team of specialists to continue development and enhancement of finance and student systems, based on Oracle Financials and the Oracle Student System, and a permanent rolling programme of other (i.e. non-finance, non-student) business systems projects. This would obviate the need to submit annual bids for ongoing phases of work on Oracle Financials and ISIDORE and for individual smaller projects. In OUCS's case, it is assumed that upgrades and renewal of existing services require new capital investment, but that recurrent costs remain covered within the baseline allocation. New services delivered by OUCS, however, which require additional recurrent costs (staff, maintenance, etc) will either need to be added to the baseline in due course, or the cost met through charging.
- j. By analogy with the creation of *new* projects, it will be important to specify a process for seeking agreement to *terminate* existing ICT services, and agreeing the consequent reduction in baseline level.
- k. The University's overall approach to planning future capital spending is to cost each individual project in full, including that part which is considered by some units as part of existing recurrent expenditure. It is recommended that this becomes the standard approach (this is not done consistently in the table entries at present).
- l. The forthcoming CDM structure will need to address the issue of baseline allocations for all the central service providers in the University. No further analysis is undertaken here but the University will need to debate and agree a definition of what is included, possibly with fEC considerations taken into account. A process for determining the appropriate baseline levels by year will have to be agreed by the collegiate University (which will include additions for new services and subtractions for the removal of old services).
- m. The Medical Sciences Division ICT expenditure and plans have been appraised and two entries<sup>71</sup> are included in Table A1. These are exciting projects which are applicable beyond the confines of the Division, and are representative of other projects developed through units within Divisions and Colleges. It will be important for the central University to invest in ICT wherever the best use of resources can be made<sup>72</sup>, and it is proposed that funding is made available to ensure that these important ICT services are accessible to the wider University.
- n.

A *Categorisation* is made for each entry in Table A1. This is based on a number of factors, but in particular feedback received from Oxford as described in sections 1 and 2 of this ICT Strategic

---

to projects as part of their day-to-day responsibilities. The figures also include expected hardware, software and consultancy costs. Figures for future financial years have been adjusted to allow for inflation (at 4%).

OULS ICT expenditure is divided into staff, non-staff and capital costs. Staff costs are based on actual salary costs. Non-staff costs are based on the current equipment budget. Capital costs relate to an annual replacement cycle and the supporting hardware.

<sup>71</sup>Information about the MSD Content Management System and Research Discovery System is available at <http://www.medsci.ox.ac.uk/portal/ict> (Oxford only).

<sup>72</sup>OxCort, the tutorial reporting system, is an excellent example of a new application, driven by those members of the collegiate University, to meet a specific need, and part-funded centrally.

Plan. To an extent the category represents the potential funding source/method. The Category definitions are:

- Category 5 – funding already agreed by central University;
- Category 4 – very strong user requirement and/or underpins other high priority pilots, projects, services;
- Category 3 – potentially very important, and worth funding as a pilot;
- Category 2 – very important for parts of Oxford but not an enterprise-wide service; should be funded through cost-recovery;
- Category 1 – potentially less important than higher categories but worth considering to be funded as special project through development office.

Some items have components within more than one Category,<sup>73</sup> in this case the item is placed in the most relevant Category.

The formal allocation of projects to Categories will be re-appraised by the new CDM structure in due course.

- o. Full Economic Costing (fEC) is likely to play an increasingly important role in funding central ICT services, particularly when teaching as well as research is covered. This will have an important impact on Category 2 items, and will increase the focus on cost recovery for different levels of service within a given ICT application.

Data from Table A1 are displayed in Plot A1 and show the central ICT expenditure by Category. Plot A2 shows the same data with a total anticipated central ICT baseline expenditure added. If the baseline remains at current levels, the University is committed to c. £11m/year plus the Category 5 expenditure. This is shown in Plot A3.

Table A2 takes the projected expenditure from Categories 4-5, tabulates the anticipated baseline amounts, unit by unit, and forms a total central ICT expenditure which would be required year by year.

Table A3 offers a holistic view of ICT across Oxford. Taking the total spend from Table A2, the projected spends from Categories 1-3 (a proportion of these would be cost-recovered and would not be borne by the Centre), an approximate total divisional spend on ICT (based on one Division's approximate numbers), approximate college expenditure (based on the extrapolation from the spends of a sample of colleges), and finally some known ICT funding from external agencies, gives an overall spend for ICT in Oxford.

This rather crude approach indicates that the total Oxford ICT spend could be as high as £50m/year if external funding continues at its present level, if cost recovery ICT services are introduced, and if some development funding is procured for ICT.

The ICT Budget and Priority Plan for central expenditure has been created to be compatible with, indeed in support of, the Capital Projects Register, used by the Capital Steering Group.

**An initial comparison between the expenditure foreseen in the ICT Budget and Priority Plan in its current state (remembering the uncertainties listed above concerning the amounts) and the proposed ICT expenditure in the Capital Projects Register, indicates that funding anticipated in the latter will only cover the capital<sup>74</sup> costs of a fraction of the projects foreseen. The budgeting exercise will need to be repeated more carefully before definitive statements can be made.**

**It will be essential for the collegiate University, through the new CDM structure described**

---

<sup>73</sup>This approach minimises complexity, but may lead to additional uncertainty in interpretation.

<sup>74</sup>The amounts shown under the capital columns in Table A1.

**in Appendix B, to specify central ICT priorities, and to ensure that mission-critical central services receive adequate funding in order to operate robustly, reliably, and effectively. Existing services which are agreed to be of a lower priority may need to be terminated.**

It is expected that all mission-critical central ICT services will be appraised as soon as possible, and risk assessments made. This will make it possible for the CDM to make informed decisions, concerning where resources are most needed.

Eventually the CDM structure may be offered an ICT budget to manage part of the ICT expenditure. This will avoid every (small scale) ICT project needing to get endorsement from PRAC before it can proceed.

# Appendix A: ICT Investment – Five-Year Budget and Priority Plan

Description	2005 to 2006			2006 to 2007			2007 to 2008			2008 to 2009			2009 to 2010			Category*	
	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff		
<b>Projected major expenditure</b>																	
Admin Desktop Refresh (single purchase) - Rollout				541												5	
BOE Project				494												5	
Finance process reengineering	200			250			350			250				250		5	
Financials hardware upgrade	1204			250					250				250			5	
IS/DOME Phase 2A	1075			650												5	
IS/DOME Phase 2	1212			650												5	
Lecture Lists development	117															5	
Library Management System	1100	400	1000		500											5	
QLED Phase 1	349															5	
RAF data collection	25															5	
Transfer payroll to ASP (first stage)	600			120			120			120			120			5	
Web CMG Phase 1 (Pilot)	500															5	
ALMS system replacement	100			900												4	
Backbone network switching upgrade									1000							4	
Cabling and network cist updates				450			150			150			150			4	
Central backup (HPS) off-site tape library drives				500	50											4	
Central backup (HPS) replace central tape library/phase drives									300	30		200	20			4	
Central backup (HPS) unify departmental backups							250	25		250	25					4	
Central backup (HPS) update servers/storage through				200	25		300	30		200	20					4	
e-Research infrastructure - total	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
Email				400	40		40		40		40		40		40	4	
Examinations management and classification system				100		50	200		100		100		50		50	4	
Financials enhanced reporting				307												4	
GIS/ERP (LMS) (GIS)	25	900	65	400	65		571		400	65	324	400	65	400	65	4	
HR/payroll process review																4	
ICT forum				200		200		200		200			200		200	4	
ICT office				250		250		250		250		250		250		4	
Identity management				100	100				100	100						4	
Institutional Phase 1				600	125	100		600	125	100		125	100		125	4	
Institutional Phase 2							600	60		60			60		60	4	
Institutional Repository				600	60	100		60	100		60	100		60	100	4	
IS/DOME Phase 4				1866					616							4	
IS/DOME Phase 5									1236							4	
Medical CMS	7	75	25	276	16		264	15		176	10		181			4	
Medical HDS	20	60	85	84			53		53		53		56		56	4	
Mobile Computing and Telecommunications Phase 1: Wireless				1500	200			200		200			200		200	4	
ODL	100	50	140		50	140		50	50		50		50		50	4	
Oracle Flex Assets Invoicing									620							4	
QLED Phase 2				307												4	
QLED Phase 3									319							4	
Replace Latch for Land Agent									676							4	
Software Upgrade to Oracle 11.5.10	278			250												4	
Software upgrade to Oracle 12									626							4	
Teaching Rooms Phase 1: LR 4								100								4	
Transfer payroll to ASP (second stage)				120			120			120			120			4	
UoL admissions project							1125		634							4	
Virtual Learning Environment (VLE)	50	100		50	100		50	100		50	100		50	100		4	
Web CMG Phase 2 (Rollout)				115			15		15		15		15		15	4	
Automatic timetabling pilot				100												3	
Card system 'smart' card pilot				100												3	
Central Web Consultancy Team Phase 1 (Pilot)				30	33	210	30	33	238							3	
Central Web Consultancy Team Phase 2 (Service Establishment) expenses support bases								624		6	500		12	600		3	
HR/payroll implementation															4825	3	
Improvement							1125		634							3	
Implement Oracle Fusion product														1221		3	
institutional portal				200		100		50	100		50	100		50	100	3	
IS/DOME Phases 6, 7 & 8										1266			1338			3	
Mobile Computing and Telecommunications Phase 1: VAP										3000						3	
Replace upgrade Resolve				601			0	270	40	0	270	50	0	256		3	
Research Discovery Service (RDS)							144	50	0	270	40	0	270	50	0	256	3
Teaching Rooms Phase 2: LR 5									400							3	
Canvas OHL	25	30	50	10	30	50	10	30	50	10	30	50	10	30	50	2	
Canvas scheduler				100	100											2	
e-Research infrastructure - largely cost recovery							0	500	0	0	500	0	0	500	0	2	
Machine room							4250		8500				4250		4250	2	
YSC	1200	100	120	600	300	160	600	400	160	600	400	160	600	400	160	2	
YSC service							100	50		100		100		100		2	
ICT Innovation				250		250		250		250		250		250		1	

Table A1. Overall illustrative priority and expenditure plan for ICT, 2005/06 – 2009/10

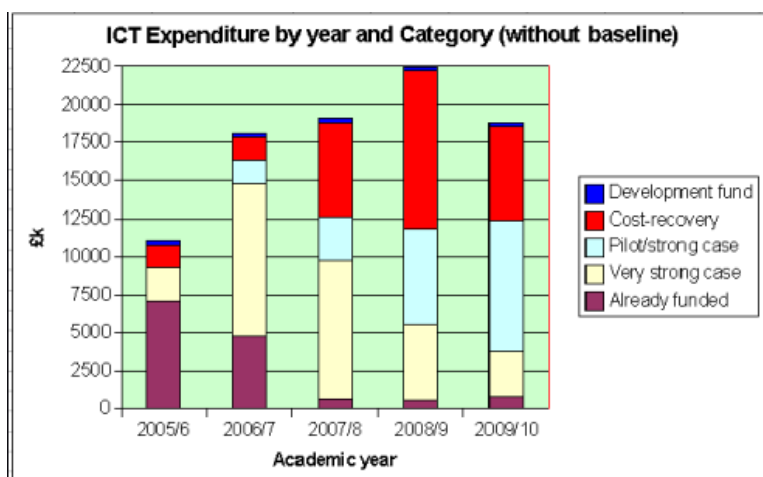
Appendix A: ICT Investment – Five-Year Budget and Priority Plan

	2005 to 2006			2006 to 2007			2007 to 2008			2008 to 2009			2009 to 2010		
	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff
<b>Projected major expenditure (categories 4-5)</b>	6759	430	303	9281	1630	820	8176	1780	647	4140	1580	641	9220	1680	547
OUUS baseline	150	300	313	167	300	313	161	300	313	150	300	313	150	300	313
ECE baseline		951	980		951	980		808	784		808	784		808	784
OUUS baseline		1000	3000		1000	3000		1000	3000		1000	3000		1000	3000
BSP baseline		4062			4000			4000			4000			4000	
<b>Anticipated total central ICT expenditure</b>	<b>6909</b>	<b>6743</b>	<b>4596</b>	<b>9448</b>	<b>7881</b>	<b>5113</b>	<b>8337</b>	<b>7888</b>	<b>4744</b>	<b>4290</b>	<b>7688</b>	<b>4738</b>	<b>9370</b>	<b>7788</b>	<b>4644</b>
<i>Total estimated expenditure by year</i>			18248			22442			20969			16716			21802

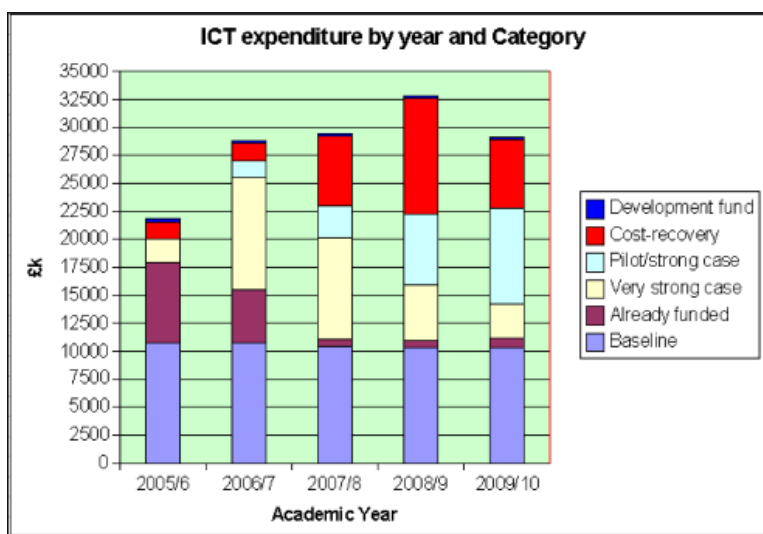
Table A2. Projected major expenditure (category levels 4-5) and anticipated baseline funding required by each Central ICT Provider.

	2005 to 2006			2006 to 2007			2007 to 2008			2008 to 2009			2009 to 2010		
	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff	capital	recurrent	staff
<b>Anticipated total central ICT expenditure</b>	6909	6743	4596	9448	7881	5113	8337	7888	4744	4290	7688	4738	9370	7788	4644
<b>Projected major expenditure (categories 1-3)</b>	1220	600	970	3900	915	1470	5700	1030	830	13650	950	730	4450	895	730
<b>Anticipated divisional spend on ICT</b>		5000	9000		5000	9000		5000	9000		5000	9000		5000	9000
<b>Anticipated college spend on ICT</b>		1400	2800		1400	2800		1400	2800		1000	2800		1000	2800
<b>ICT funded externally (mainly JISC)</b>		200	1100	265	300	1100	65	200	1100		200	1100		200	1100
<b>Total spend on ICT across Oxford</b>	<b>8129</b>	<b>13943</b>	<b>18466</b>	<b>13613</b>	<b>15496</b>	<b>19483</b>	<b>14102</b>	<b>15518</b>	<b>18474</b>	<b>17940</b>	<b>14838</b>	<b>18368</b>	<b>13820</b>	<b>14883</b>	<b>18274</b>
<i>Total estimated expenditure by year</i>			40538			48592			48094			51146			46977

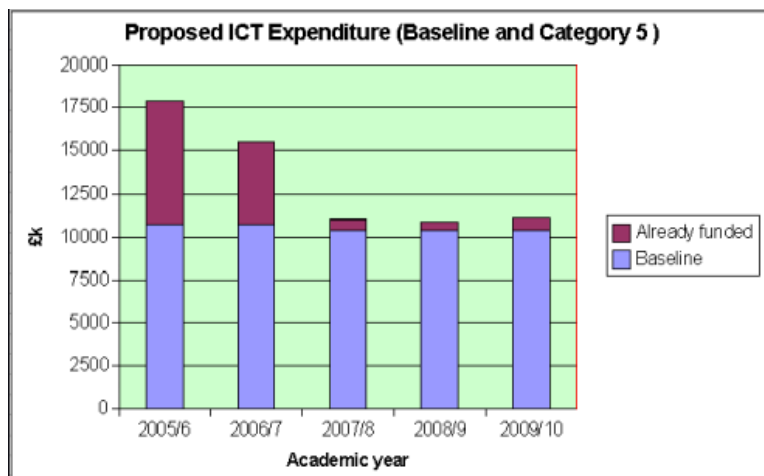
Table A3. Overall picture of ICT spend across Oxford combining Table A2 totals with category levels 1-3 expenditure, together with illustrative college and divisional spend.



Plot A1: Overall proposed ICT expenditure, for all category levels, excluding baseline.



Plot A2: ICT expenditure for all category levels, and including baseline.

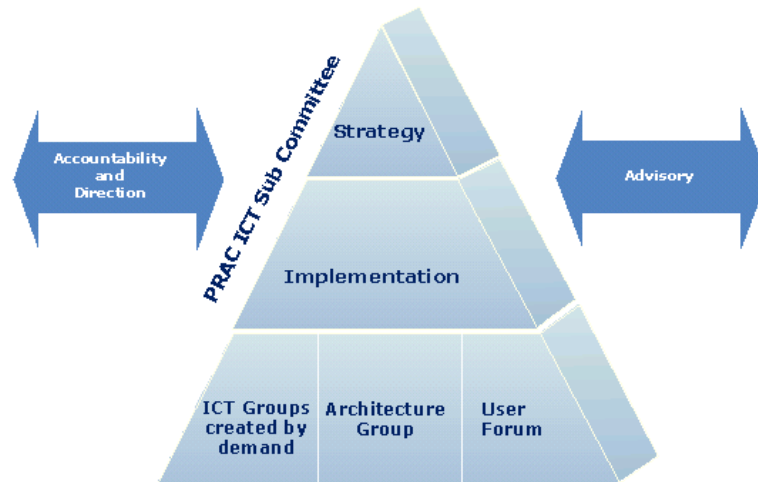


Plot A3: ICT expenditure for baseline and category level 5 (funding agreed) projects

## Appendix B: Terms of Reference of the Planning and Resource Allocation Committee Sub-Committee Structure

This appendix describes a new governance structure for ICT in the collegiate University. The principles have been introduced in Section 6.

The structure is shown in the following Figure:



Representation of the proposed committee structure for ICT governance.

The PRAC ICT Sub-Committee has 'Strategy' and 'Implementation' Arms; membership and terms of references are given below. It is expected that the Implementation Arm will evolve once the ICT Strategic Plan has been implemented fully.

The governance **accountability** of the PRAC ICT Sub-Committee is achieved in two ways. It is accountable through its membership (Pro-Vice-Chancellors, Heads of Division, Conference of Colleges, Registrar), and also through its connection to structures in the University (via the horizontal arrows in the Figure) which currently, or will in the future, address ICT strategy and policy issues. It is, therefore, the collective responsibility of the collegiate University to govern ICT and to set ICT priorities through the respective structures within divisions, faculties, departments, colleges and Central Administration - these are all brought to a focus through the PRAC ICT Sub-Committee.

Where suitable structures do not exist across the collegiate University to connect with the PRAC ICT Sub-Committee, then these will need to be created in order for ICT governance to operate correctly within the devolved ICT structure. Within a devolved ICT Framework, all components must share the responsibility for ICT governance.

In addition, the PRAC ICT Sub-Committee has an horizontal **advisory** connection to structures across the collegiate University (for example: to the ICT Forum, Libraries ICT Committee, IT Committee representing Central Administration, Faculty and Departmental ICT Committees and the Web Strategy Group).

The governance structure is designed to be as streamlined as possible. When a new ICT project is commissioned a Project Board will be created which is accountable for good governance, project delivery, budget planning and risk management. In general, Boards will be chaired by a senior academic representing a part of the collegiate University that sponsors the project (explained in detail in Appendix D).

In common with other universities, there will be an ICT Architecture Group (AG), comprised

of staff from across Oxford. When a new ICT project is proposed, the AG will make sure that the project adheres to Oxford's ICT principles (interoperability, coherence – as discussed in Section 4). The AG will only meet when required to by the PRAC ICT S/c, and is discussed further in a sub-section below.

All ICT governance structures must enable the views of the user community to be expressed. The new User Forum facilitates this; its Terms of Reference are given a sub-section below.

There will be a review point for the ICT governance structure at the end of the 2008/9 academic year. It will consider: the efficacy of the structure, the Strategy and Implementation arms, and also whether it remains appropriate for the ICT governance structure to report into PRAC. It is proposed that the Review is undertaken by PRAC, and membership of the Panel should include the Chairperson of EPSC, principal users of the system, and external experts.

### **Strategy Arm of PRAC ICT Sub-Committee**

The Strategy arm of the PRAC ICT Sub-Committee will meet termly, and is responsible to PRAC for:

- determining under PRAC, a strategy and policy framework for ICT<sup>75</sup> across the collegiate University;
- enabling overall ICT priorities and direction to be determined by the academic community; enabling Central Administration to ensure that the ICT services which underpin the services they supply to the collegiate University are fit for purpose and cost effective;
- preparing, implementing and updating a five-year rolling ICT Strategic Plan;
- establishing ICT priorities set against the wider context of, and with advice from, the collegiate University, establishing and overseeing the central ICT budget, monitoring central investment in ICT, and ensuring that total ICT allocation remains within allocation;
- ensuring that mission-critical ICT services deliver effectively for the user and are reliable and agile;
- formulating and reviewing the University's ICT programme for all capital projects underpinning teaching, research and administration; and setting up ICT project boards, when appropriate, and ensuring these have suitable connections into the sponsoring parts of the University which own the activity;
- establishing and overseeing ICT deployment policy across the collegiate University; setting service-level definitions policy and ensuring there are procedures in place to monitor quality of service;
- contingency planning for the use of ICT in the event of pandemics or collegiate University disaster;
- planning for major failure in ICT provision, and associated risk analysis; ensuring business continuity<sup>76</sup>;
- as appropriate, giving advice on all aspects of ICT to PRAC and Council and other University bodies;

---

<sup>75</sup>ICT' is defined as Information and Communication Systems, Processes and Technology which is within the scope of the *ICT Strategic Plan*. This encompasses ICT across the collegiate University, including ICT provided by the central providers (Computing Services, Library Services and Business Services and Projects), ICT for research, ICT for teaching, ICT for administration, the ICT fabric extending across divisions and colleges, and ICT training.

<sup>76</sup>'Business continuity' focus varies through the academic year. Student information provision, for example, is crucially important at admissions time. Accordingly, particular attention will be focused on specific areas through the year.

- monitoring the activities of the PRAC ICT Sub-Committee Implementation Arm, and through its Chairman receiving reports of progress with all major ICT projects.

The Strategy Arm of the PRAC ICT Sub-Committee will consist of:

- (1) a Chairperson, appointed by Council, who preferably will be the Pro-Vice-Chancellor (Research and Academic Services and University Collections);
- (2) the Registrar/or representative;
- (3) the Chairperson of the Conference of Colleges/or representative;
- (4) the Pro-Vice-Chancellor (Education)/or representative;
- (5-9) one person appointed by each of the divisional boards<sup>77</sup> (Head of Division/or representative);
- (10-11) an undergraduate and postgraduate representative (possibly OUSU President and OUSU Vice-President);
- (12) the Director of Finance;
- (13) the Academic Registrar;
- (14) the Director of University Library Services and Bodley's Librarian;
- (15) the Director of ICT – Chairperson of the 'Implementation Arm';
- (16-18) as required, in attendance:– the heads of the central ICT Service Providers, including Computing Services, Business Services and Projects and Library Services.

The Sub-Committee may co-opt up to two additional members from within or outside the University to advise on ICT matters.

The Pro-Vice-Chancellors represent their respective communities. If the Pro-Vice-Chancellor (Research and ASUC) is not Chairperson then he/she should be a member in his/her own right.

It will be essential for the Chairperson of the PRAC ICT Sub-Committee to receive strong support from the Director of ICT. Without a considerable amount of preparation and work being done on behalf of the Chairperson, the task would be far too onerous.

### **Implementation Arm of the PRAC ICT Sub-Committee**

The Implementation arm of the PRAC ICT Sub-Committee will meet monthly, report to the Strategy Arm of the PRAC Sub-Committee, and be responsible for:-

- implementing the ICT Strategic Plan;
- implementing the principals specified by the Services Funding Working Group into a revised 5 Year ICT Budget and Priority Plan;
- establishing an 'Architecture Group' to recommend University standards for technical development, deployment and interoperability;
- establishing a User Forum;
- commissioning and considering business plans for new ICT projects;
- creating ICT project boards and receiving reports;
- developing processes to transfer pilot services - to projects to build new full scale services - to rolling out production services;
- developing ICT service level definitions, and quality of services;

---

<sup>77</sup>Continuing Education are considered as a 'Division'.

- developing ICT key performance indicators;
- undertaking work in preparation for the business of the Strategy Arm of the PRAC ICT Sub-Committee;
- receiving reports from the Architecture Group, User Forum, ICT Project Boards and ICT Service Providers, as appropriate;
- monitoring ICT service level definitions, quality of services; and key performance indicators.

The Implementation arm of the PRAC ICT Sub-Committee will consist of:

- (1) the Director of ICT as Chairperson;
- (2) - (4) the heads of each of the central ICT providers;
- (5) - (9) one person appointed by each of the divisional boards (e.g. Chairman of Divisional ICT Committees);
- (10) one person appointed by the conference of colleges (e.g. Chairman Colleges ICT Group);
- (11) Chairperson of User Forum;
- (12) Chairman of ICT Forum.

The Implementation arm of the PRAC ICT Sub-Committee may co-opt up to two additional members from within or outside the University to advise on ICT matters.

For the first time, a single body will be responsible for the delivery of enterprise services from the central service provider through to the desktop. In the implementation phase of the ICT Strategic Plan, *ITIL*<sup>78</sup> will be explored as a framework for ensuring quality of service.

## User Forum

The User Forum will report to the Implementation arm of the PRAC ICT Sub-Committee, of which the Chairperson of the User Forum will be a member.

The User Forum will represent the views of the ICT user community across the departments, faculties and colleges, and will ensure that users are provided with a persistent mechanism by which to input to the ICT strategic planning process.

The ICT User Forum will play a crucially important role in ensuring that ICT projects are developed according to the needs of the user community and that the user community has ownership over the development, delivery and review of ICT services.

The membership criteria and terms of reference will be agreed by the PRAC ICT Sub-Committee but it is expected that members will be drawn from across the research, teaching, learning and administration constituencies of Oxford.

It may be appropriate, for example, that whilst the Chairperson serves for a specified period, the membership of the Forum is more dynamic, with members at any one meeting partly determined by the agenda of the meeting.

The User Forum will meet approximately once a term. The agenda for each meeting may, for example, include an agreed theme with one or more presentations, as well as an opportunity for members to raise issues of importance to their respective constituencies.

The Director of ICT and Directors of central ICT providers will be in attendance at each meeting.

---

<sup>78</sup>IT Infrastructure Library (ITIL), <http://www.itil.co.uk/>. ITIL is a framework for process focused activities, a further explanation is provided in the Programme Record.

## **Architecture Group**

The Architecture Group will be established by the PRAC ICT Sub-Committee.

The Architecture Group is responsible for ensuring coherence within the overall ICT infrastructure and adherence to the fundamental principle that the provision of common ICT services must be based on the use of agreed standards, in order to reduce replication and improve productivity through interoperation with local services; and to encourage the application of local choice and implementation where desirable. Interoperability in this context encompasses not only technical interoperability but also semantic interoperability (shared understanding of the meaning of information) and organisational interoperability (agreed business processes and ensuring collaboration between organisational units). The principles for interoperability will be determined by the collegiate University and will be agreed by consensus.

The Architecture Group will:

- Develop and maintain an institutional interoperability framework, including an Information Architecture for Oxford which agrees the standards and information flows to enable interaction between ICT applications, whether enterprise, shared or local.
- Recommend standards for technical development and deployment and, in particular, define an appropriate service-oriented approach to the development of ICT services;
- Contribute to the development of an overall Information Strategy for Oxford;
- Monitor and provide guidance to existing and future ICT projects to ensure conformance with agreed standards.

The membership of the Architecture Group will be determined by the PRAC ICT Sub-Committee. It will include members expert in organisational and technical interoperability drawn from across Oxford, senior technical experts from the ICT Forum, and external representation.

## Appendix C: Role and Responsibilities of the Director of ICT

### Role

The post of Director of ICT will provide leadership and coordination for ICT strategic planning and implementation.

The Director of ICT will be the lynch-pin within Oxford's new Coordinated Decision Making structure, and through close support for the Chairperson will enable the PRAC ICT Sub-Committee to operate effectively. All structures require a significant amount of executive activity to take place outside the meetings – the Buildings and Estates Sub-Committee is a good example of where this happens – and the Director of ICT will serve the structure in this way.

It is anticipated that the Director of ICT will more than cover his/her costs through the savings that can be realized. There are substantial opportunities through coordinated procurement,<sup>79</sup> exploiting technology to reduce replication, shared software licences, and the exchanging of best practice.

Oxford's devolved ICT structure has many benefits (as discussed in Section 3), but it is recognized that coordination and leadership is vital in order to ensure that:

- local ICT investment brings maximum return;
- applications and services within the overall ICT infrastructure interoperate
- services provided centrally are cost effective and meet the needs of users;
- mission critical services deliver effectively for the user and are adequately resourced;
- central expenditure is correctly prioritised, and remains within the total allocation made by the collegiate University;
- there is an effective channel for communication between users, ICT suppliers and University management;
- risk to ICT services is managed across the collegiate University;
- applications to external funding bodies (e.g. JISC) are coordinated;
- ICT projects are overseen;
- the overall ICT infrastructure is agile;
- appropriate ICT training is available;
- and the ICT infrastructure complies with legislation.

The Director of ICT post will hold an essential place within Oxford's devolved ICT structure. In terms of overall coordination of ICT across Oxford, the post will report directly to the PRAC ICT Sub-Committee. In terms of governing the central ICT activities the post will report to the Vice Chancellor through the Pro-Vice-Chancellor (RASUC). The P-V-C (RASUC) will consult and seek guidance from the Registrar as required.

The Director of ICT will be responsible for providing overall coordination of Oxford's devolved ICT model, ensuring the governance of central ICT services, managing ICT risk and overseeing business continuity, and directing the implementation of the rolling ICT Strategy through the delivery of a programme of ICT projects. The Director of ICT will be supported, as appropriate, by an ICT Office and will chair the Implementation arm of the PRAC ICT Sub-Committee.

---

<sup>79</sup>See Section 4, para 176.

## Responsibilities

- Reporting to the Vice Chancellor through the Pro-Vice-Chancellor (RASUC); the P-V-C (RASUC) will consult and seek guidance from the Registrar as required.<sup>80</sup>
- Creating a shared vision for a devolved ICT environment with a Coordinated Decision Making structure to ensure that staff and students are equipped with exceptional ICT facilities and services, and that the services are managed effectively and responsively.
- Overseeing the implementation of effective mechanisms for ensuring input from staff and students into the ICT strategic planning process and ensuring that ICT projects are developed according to the needs of the user community.
- Overseeing the portfolio of ICT projects, including the coordination of applications to external funding bodies .
- Chairing the Implementation arm of the PRAC ICT Strategy Sub-Committee and being a member of the Strategy arm of the ICT Strategy Sub-Committee.
- Developing and reviewing a five-year ICT Strategic Plan for the collegiate University in line with Oxford's devolved ICT model.
- Producing an annually updated five-year strategy implementation plan for ICT, comprising an agreed set of priorities; a corresponding budget for ICT expenditure; programme of projects; and a rolling evaluation of services.
- Ensuring that total central ICT expenditure remains within allocation.
- Creating a single point for communication between PRAC and the ICT community, and between users across the collegiate University and ICT service providers.
- Creating a set of Key Performance Indicators to benchmark Oxford's ICT services against those in other universities, and to monitor improvement as the strategic plan is implemented.
- Interfacing with the Capital Planning activities in the University on behalf of ICT.
- Ensuring that critical ICT services deliver effectively for the user and are adequately resourced in order to be resilient, robust, and reliable.
- Offer a single point of contact between the University auditors and ICT; managing risk and ensuring business continuity for enterprise-wide and shared ICT services; and assisting in the creation of a framework for managing risk and business continuity for local ICT services.
- Developing an agile and standards-based ICT culture receptive to change and innovation through communication and liaison with central ICT providers, heads of college and divisions, and all components of the coordinated ICT decision-making structure.
- Ensuring appropriate ICT training is available.
- Cultivating a shared understanding of enterprise service provision and direct collaborative service developments amongst central ICT providers.
- Coordinating the development and maintenance of a new University Information Strategy.
- Establishing and maintaining links with other universities and relevant external bodies

---

<sup>80</sup> Given the complexity of ICT delivery within Oxford, this reporting line will be kept under review, and will be reviewed after 12 months.

## Responsibilities

---

and otherwise representing the University externally in ways that may from time to time be approved.

## Appendix D: Organisation Structure for ICT Projects

This appendix defines the roles, responsibilities and Terms of Reference, where appropriate, for effective initiation and management of ICT projects.

The PRAC ICT Sub-Committee, and its Implementation arm, is responsible for taking strategic and programme related decisions. Through the Director of ICT it will, champion ICT projects which have been sponsored by units from across Oxford, seek funding,<sup>81</sup> and work closely with PRAS to plan and finance projects. For those projects which are supported financially, it will identify a Project Sponsor to produce, in collaboration with the Director of ICT, a high-level business case/project brief and will appoint, and monitor progress of, an ICT Project Board. The Project Boards will be accountable for the good governance and risk management of major<sup>82</sup> ICT projects, and will be overseen by the Director of ICT.

It is essential that the part of Oxford which *sponsors*<sup>83</sup> the ICT project continues to have responsibility for the project. This is achieved by ensuring suitable representation on the Project Board, and ensuring that the Project Board has a direct reporting line to the sponsoring unit.

The **Project Board** will be chaired by a senior academic and will have membership as follows:

- Chairman
- Project Sponsor<sup>84</sup>
- Director of ICT
- Project Assurance Office
- Senior Departmental user representative(s)
- College Representative(s) (where colleges are users of the project output)
- Senior Representative(s) of ICT Service Provider(s)

The Project Board will have the terms of reference as follows:

- exercise financial and management control of the Project on behalf of PRAC and the Strategy arm of the ICT Sub-Committee;
- report to the sponsoring unit, PRAC and the Strategy arm of the ICT Sub-Committee on project issues and risks as appropriate;
- authorise each phase of the Project Life Cycle until introduction to service;
- evaluate supplier proposals and authorise the signing of supplier contracts;
- maintain the project plan and progress reports;
- monitor project resources and budget;
- assist the Project manager with major risk and problem management as required;
- maintain the requirements specification;
- approve the membership of the Steering Committee (where required).

<sup>81</sup>In some cases for a pilot study first.

<sup>82</sup>Major' will probably be defined as those projects with a budget of more than £100k or likely to have a significant impact across Oxford.

<sup>83</sup>The major user of the system produced by the project or the part of Oxford which has championed the ICT development.

<sup>84</sup>This individual will be, typically, the head of the part of Oxford that will be the major user of the systems produced by the project.

Complex Projects may require a **Steering Committee** to take on some of the work required by the Project. Steering Committee members will be nominated by the Project Sponsor at the start of the Project and will be approved by the Strategy arm of the ICT Sub-Committee.

Its membership will be made up as follows:-

- Chairman (typically a senior user)
- Senior user representative for each functional area
- Development and implementation representative(s) (from central ICT providers)
- Operation and support representative (from central ICT providers)

The Steering Committee will have terms of reference as follows:-

- assess the project business case and risk register (where detailed analysis required);
- review the test and implementation strategy (where detailed analysis required);
- support and assist the Project Team as required;
- report on risk and other issues to the Project Board (in particular potential time and cost overruns).

The **Project Manager** is accountable to the Project Board for the delivery of the Project.

## Appendix E: Scenarios for Success

The following brief scenarios are intended as illustrative examples of the benefits which might result from the identification and prioritisation of shared ICT services for Oxford on the one hand, and their implementation within a coherent information environment on the other. The scenarios are not intended as a statement of fact about how ICT should be implemented within Oxford but rather, by providing a range of profiles, to demonstrate the potential for ICT to address the day-to-day requirements of Oxford staff and students.

The scenarios are deliberately utopian in nature and present only a snapshot of any given role's optimistic use of ICT. The emphasis is on the day-to-day activities relating to the role in which the person acts and the ICT assumptions are, as within the ICT Strategic Plan itself, intended as a means to fulfilling those requirements. The scenarios derive their priorities from Sections 1 and 2 of the ICT Strategic Plan and connect those requirements with the ICT priorities discussed in *Section 5*.

The following roles are represented by scenarios:<sup>85</sup>

- Undergraduate Student
- Graduate Student
- Part-time Taught Postgraduate Masters Student
- Researcher
- Lecturer
- Department Administrator
- Head of Division/Department
- IT Support Officer
- College Alumni Officer

Each scenario comprises the following elements:

- Working assumptions about the priorities or requirements of the role;
- A 'story' derived a series of activities in the life of the person depicted;
- A list of assumptions made by the story with respect to ICT services or processes in place.

### Undergraduate Student

#### Profile

- Will probably have actively chosen not only the University in general but also the college in particular, possibly based on facilities available as well as academic profile;
- In first year may have 1-2 essays (and tutorials) per week together with some combination of lectures, classes or laboratory time;
- Opportunity to select options from second year onwards;
- Significant amount of time devoted to non-academic activities including college, sport, social and employment;

---

<sup>85</sup>The set of scenarios which formed part of the consultation process and which resulted in a number of additional scenarios submitted by units and individuals within Oxford, are incorporated into the Formal Programme Record.

- Will make heavy use of library facilities but increasingly likely to have personal wireless-enabled laptop.

### **Story**

Alex is in Blackwells coffee shop intending to build a bibliography for her next assignment. Her laptop is open and she has just used her Oxford username to securely access Oxford's student portal over the public wireless network. She bought her laptop at a discount through a purchasing scheme in which her college had opted to participate. She could be sitting at home seeing the same set of online resources, or indeed anywhere where a network connection existed. Her experience of the student portal presents her with a variety of services and resources provided by her faculty, college, the library or other parts of the University. Her next assignment is intended to build on what she prepared for her previous tutorial. She retrieves and opens her completed assignment from her personal space within Oxford's filestore system as if it was stored on her own laptop. Having reminded herself of the concluding points, she uses the library's integrated search box to collect and save references, texts and digital images from a combination of local and national databases which she stores in her file space and connects together using a mindmap tool within the virtual learning environment. Whilst doing so, the portal alerts her to the latest potential sources of funding gathered from across the University and which match her saved profile. Her faculty's calendar, which she has integrated with her personal calendar, has been updated by the faculty office to let her year know that Dr Edward's lecture has been moved to Thursday morning. It's useful to see the details of the event but she also knows she has set the calendar to text her daily appointments (academic *and* social) to her new mobile phone. This thought reminds her to return to the portal and update her student record with her new phone number.

### **ICT Assumptions**

- Computer and software purchasing scheme for students and staff, as well as units;
- Single sign-on system;
- Secure access over wireless and wired networks via single sign-on;
- Student portal interface creating a seamless, tailored information environment;
- Integrated library portal and federated searching of distributed databases;
- Alerting services, via the portal, email or newsfeeds which aggregate information from a variety of sources including, for example, information commonly published in Gazette or by colleges/departments;
- University-wide calendar system which combines personal, academic and public events; together with interoperability with mobile devices;
- Access to aggregated 'student' record with authorisation to manage selected data fields.

### **Graduate Student**

#### **Profile**

- Science graduate working as part of a European-wide research initiative;
- Spends bulk of research time in the laboratory or at desk;
- Through collaborative projects within the Department also has access to facilities within other institutions;
- Despite the previous points he is also an active member of college MCR;

- Hoping to pursue an academic career in his subject and so seeking publication and teaching opportunities.

### Story

John Martin, a science graduate student, is part of a European-wide research initiative. His department has supplied him with a pre-configured PDA with network access. His PDA is effectively his lab notebook. He combines the PDA with a digital pen and paper. This is especially useful since the pen and paper gives him the same freedom to make sketches as the traditional bound notebooks of his undergraduate days, but with all the advantages of storage and manipulation on his PDA (synchronised with his desktop in the office). His PDA is also synchronised with the Oxford calendar, alerting him to not only forthcoming seminars of possible interest but also to key dates relating to research report deadlines and collaborator meetings. Back at his desk he submits his part of the lab's research report, noting that more details may be found in the digital lab notebook via the department's implementation of a virtual research environment. He also views online the termly academic progress report drafted by his supervisor, records some comments, and submits his own section of the joint report.

Before returning to the lab he books a place on a course introducing Oxford's campus grid, an event to which he was alerted from his saved search on the University's database of aggregated training and professional development opportunities. The workshop is mainly for his interest since the analysis of data he is currently working on is not yet at the stage of requiring large amounts of computational power (unlike his friend Charles in Astrophysics). However, he knows his department is currently considering a proposal to join both their managed and teaching room computers to the campus grid.

Later that afternoon he participates in a research seminar presented in New York but delivered to him using personal desktop video conferencing. He has configured the conferencing software to record the seminar so that he can replay it on his PDA whilst travelling, for example, at a later date. The seminar is of particular interest because he has been co-writing an article with a fellow graduate student in New York. The current version (and the previous five versions) of the article is in his personal repository space, to which he has granted his New York collaborator access. He sees that she is also participating in the seminar and sends her greetings via private messaging. Before leaving for home he quickly pays his Battels account (deadline today) via a link to the college payment system in his view of the Oxford portal.

### ICT Assumptions

- PDAs and other mobile devices integrated with research activities;
- University portal personalised to provide most relevant information, including access to graduate information, library resources and relevant national and international resources;
- One system for submitting, viewing, and commenting on joint graduate-supervisor progress reports and feedback forms;
- Alerts for relevant University events operating on University-wide listings coded by keywords, with the option to update electronic diary;
- Alerts for key new research news, funding and publications operating on keywords, with the option to update personal research bibliography;
- Online database and booking system for training and professional development with functionality to keep a record of continued professional development;

- Support for desktop video conferencing and tools for managing collaborative, distributed research activities;
- Oxford secure filestore for research data and documents, accessible from within and beyond Oxford;
- Access to distributed compute facility for large-scale mathematical and statistical modelling;
- Online payment of University and college bills.

## **Part-time taught postgraduate masters student**

### **Profile**

- May live and work remotely, perhaps on the other side of the globe
- May take 2-4 years to complete the course
- Physical presence in Oxford may be sporadic
- Desires to participate in the life of the University as far as possible and have access to resources as if physically present
- Profile may be applicable to any other staff or student member who is working at a distance from Oxford itself.

### **Story**

Catherine Delancy combines her working and family life with the pursuit of a part-time professional masters degree with the University. Although she has selected to stretch the modular course over a number of years and despite living some considerable distance from Oxford, she is keen to benefit as much as possible from being a member of the Oxford community. She maintains regular contact with other students on the course and the teaching staff via personal email, and online collaboration tools, including messenger technologies and voice-over-ip telephone. Many of her fellow students are in different countries and different time zones, so asynchronous communication tends to work best for the group as a whole. She is currently experimenting with tutorial sessions using desktop video-conferencing over her home broadband connection, having securely shared her essay with her tutor using a combination of the virtual learning environment and her personal file space. As a registered student Oxford's identity management system knows who she is and to what she is entitled to access. She has been allocated an Oxford username and can effectively make use of the student portal, the virtual learning environment, as well as research databases, personal filestore, discounted software licences, etc. She also appreciates the live online support she can receive should she have questions about using library or computer facilities. At periodic intervals she pays the next instalment of her fees and submits her part of the joint termly supervision report online. On the occasions she does visit Oxford, she connects her laptop to any convenient network point or makes use of wireless access. She sees the same familiar portal interface and range of resources as if she was back home on the other side of the world. In fact, her experience is not dissimilar to a resident student working at home during the vacation or a member of staff working away from the office.

### **ICT assumptions**

- Online tools for communications and collaborative working, including the provision of online 'live' support;

- Identity and access management services encompassing non-resident as well as resident, part-time as well as fulltime students and staff;
- Institutional portal presenting tailored sets of online services and resources to authorised users;
- Ability to make online payments to colleges and the University;
- One system for submitting, viewing, and commenting on joint graduate-supervisor progress reports and feedback forms.

## **Researcher**

### **Profile**

- Lecturer or post-doctoral research assistant;
- Already has established research record in a specialised area;
- Principal or co-investigator on at least one project;
- Concerned with ensuring research gets done and published; with developing collaborations whilst remaining competitive;
- Contributing to teaching and graduate supervision.

### **Story**

Dr Heaney's research is taking her into an increasingly unfamiliar area and she is seeking someone to assist in validating her results. She uses the Oxford's Research Discovery Service to locate a potential collaborator in another department. She also discovers the existence of an international research project led by Oxford which is making use of much the same primary data as her but for quite different purposes. Her own data would complement what the project already has and she would benefit from participating in a broader network of expertise. She emails the PI and includes a link to her research profile page on the RDS, from which her research publications and, in some cases the supporting data, can be retrieved from the institutional research repository. Like Mr Martin she is keen on making use of technologies which enable collaborative working. She is an active member of one or two email discussion lists in her area. An email informs her that a colleague in a partner institution has uploaded a preprint for comment to the project's working space in Oxford's research repository. She glances through the paper and makes use of the system's version control to add a reference and link to one of her own published papers before suggesting to colleagues an online conference to discuss outputs and the next phase of the project. Later that week she completes a proposal for supplementary funding and submits the final budget to her department administrator using a project costing tool integrated with both the University's financial system and the online system preferred by the research council.

### **ICT Assumptions**

- University-wide system to enable discovery of research expertise, projects and outputs;
- Digital repository with interfaces for different purposes, including access, storage and preservation of research outputs and data;
- Desktop collaboration and communication tools, including revision and version control tools for collaborative writing;
- Online research grant costing system interoperable with both University financial systems and funding body proposal submission systems.

## Lecturer

### Profile

- University Lecturer, gives at least 16 lectures and classes to undergraduates and to graduates in any one academic year;
- Tutorial fellow in college, devotes around 12 hours per week to undergraduate tutorials;
- Supervises student dissertations and graduate research students;
- Also embodies a significant research role and a growing administration workload.

### Story

It's Sunday afternoon and Dr Wilson is working from his study at home using his personal laptop. Over his broadband link he is able to securely access all his documents, library databases, and the University systems for which he is authorised as if he was sitting in his college office on a Monday morning. He completes the last of his draft examination papers and, securely, makes them available for comment by the external examiner. He is reminded of the submission of an essay by his undergraduate student, Alex, within his Faculty's view of the virtual learning environment (VLE). He has a quick read online and sees an unfamiliar journal article cited. He quickly locates a digital copy, adding the link to his own personal reading list. If the article is any use he will update his public reading list. He consults his personal view of the University-wide calendar and suggests a date with which to meet with Alex. At this meeting he will also discuss and finalise Alex's third-year options, after which Alex will register her options via the Oxford portal which, in turn, interoperates with the student records system and the VLE. Finally, he uploads to the VLE a set of gobbets for discussion next week by his tutorial group (the members of which are duly and automatically alerted by email).

Next day, Dr Wilson meets with Susan, a third year D.Phil student he jointly supervises with Professor Gosford. He discusses some final changes to her thesis after which Susan uploads a revised version of the thesis (with changes clearly and automatically highlighted) to a secure area on the institutional research repository, for a final review by Professor Gosford.

### ICT Assumptions

- Secure means of exchanging sensitive information within and beyond the University;
- Email or newsfeed alerting system from the VLE and other enterprise applications;
- Library portal integrating 'appropriate copy' lookups with user requests/records;
- University-wide calendar incorporating personal calendars;
- Course administration processes online with appropriate delegation to students, tutors and departments;
- Secure repository for controlled sharing of documents.

## Department Administrator

### Profile

- Provides or oversees the full range of departmental administrative support;
- Supports teaching and learning administration together with support for grant funding;
- May act as secretary on a range of departmental committees;

- Provides financial reporting and budgetary control for both the department and its research projects;
- Develops and implements personnel policy;
- Responsible for buildings management;
- Likely to be primary point of contact for various departments in central administration.

### **Story**

Today Mr Rhodes is working in one of the Department's annex buildings up the hill. His department supplies him with a managed desktop environment, one of the advantages of which, is that he can login with his Oxford username to any one of the department-owned machines with his personal filestore available and his profile settings intact. He views his schedule for the day on the Department's view of the Oxford calendar. He enters the deadline for final amendments to the lecture list, reminding them of the Web address of the online system. The appropriate subject groups duly receive an alert and an entry in their personal calendars. An email from Professor Reader requests, rather urgently, a budget outturn for one of her research projects. This he can produce reasonably quickly since the department's research management system includes reporting templates for various funding bodies into which the relevant figures are dynamically retrieved from the University's financial system. Just before lunch Mr Rhodes submits the draft minutes of last week's meeting of the Department Board to the appropriate section of the Department's intranet repository. The system alerts members of the Board to their availability and one or two members take the opportunity to make some minor corrections before re-submitting to the repository.

### **ICT Assumptions**

- Single sign-on extended to managed desktop computers;
- Email or newsfeed alerting system from various enterprise applications;
- Online research costing system;
- Interoperability between local and enterprise systems (e.g. research management and financials system);
- Federated institutional repository infrastructure which allows for managed access whether for units, groups or individuals.

### **Head of Division/Department**

#### **Profile**

- An eminent academic in their field;
- Providing leadership and vision (within a framework of consensus);
- Senior managerial and administrative role.

### **Story**

Professor Archer circulates the latest draft of her Division's research strategy. Part of the strategy focusses on identifying the priority areas for development, building on a combination of research strengths and a desire to respond to known funding opportunities. A section of the research strategy considers the infrastructure required to support new and evolving research areas. It is clear to Professor Archer, for example, that the Division with its many departments, research groups and active individual researchers, requires a means by which the Division's

recognised stakeholders, as well as prospective students and even academic staff within the Division, can quickly identify the range and depth of expertise which lies within the Division. Professor Archer fears that the Division is losing opportunities for industrial collaboration simply because research managers are unable to obtain a clear picture of where the Division's strengths lie. She does not, of course, have the solution immediately to hand but delegates consideration of the challenge to the Divisional IT Committee (since an online solution would seem to be appropriate).

A working party convened by the IT Committee, and comprising interested parties from a number of departments, are allocated a relatively small budget to undertake a scoping study. They quickly establish that not only have other universities attempted, with varying degrees of success, to implement a catalogue of research and expertise, but a department within another Division appears to have developed a promising solution which is extensible enough to be potentially reusable within Professor Archer's Division. Furthermore, the Research Services section has a system to track research submissions which should interoperate with divisional catalogues of research and expertise. The working group reports back its findings. At a joint meeting of the heads of divisions there is a shared concern that the University does not have a coherent approach to capturing and disseminating not only information about research expertise but, where desirable, the record of research and its outputs. Clearly, the forthcoming RAE will require significant effort to be devoted to research reporting.

At their bi-weekly meeting the Pro-Vice-Chancellor for Research raises the issue with the Director of ICT. It is agreed that, with some minor modifications, the report produced within Professor Archer's Division should be brought to the next monthly meeting of the Implementation arm of the PRAC ICT Sub-committee, chaired by the Director of ICT. The principal and overall requirement raised by the heads of divisions is supported. It is recognised that a coherent approach to the management and dissemination of research information will need to cover and integrate a range of existing systems in different parts of the University, and it may be necessary to develop some new services to plug existing gaps. The Implementation arm asks the Architecture Group to begin scoping the interoperability requirements; a task force comprising individuals from within the Divisions, Research Services, Library and computing services agree to develop the business case further. The User Forum invites guest experts from two or three other institutions so that a cross-section of Oxford users can hear how others have developed and implemented similar systems.

The activity is scoped as a programme of work with a series of discrete projects, many of which include enhancing components already existing within departments (and, in one case, a college), as well as some new developments to ensure interoperability between the relevant shared enterprise systems. The programme is particularly complex due to the variety of available data sources and systems. The PRAC ICT Sub-committee approves the programme and the proposed financial model which combines a proposal for pilot funding from the John Fell Fund, matching funding from divisional boards, and additional central funding to implement key interoperability requirements (with additional benefits for other services).

Whilst the programme was developed over a three-year period some quick wins are identified simply through expanding or reusing systems already developed and ensuring that control of the programme and its constituent projects remained with the originating users. Professor Archer later reports that a spin-off benefit of initiating and being involved in this part of the research infrastructure programme was a contribution to the sense of shared purpose amongst the departments of the Division and a willingness to participate in establishing a service in which they felt a sense of common ownership.

## ICT Assumptions

- An effective and coordinated decision-making and resource allocation process for ICT requirements arising from the within the academic divisions;
- A strategic approach to the development of new or enhanced ICT services;
- Coherent and collaborative information environment in which business and shared ICT systems interoperate.

## IT Support Officer

### Profile

- Provides software and hardware support to research and teaching activities;
- May be only person providing such a role within a unit but part of a divisional team;
- Frequently expected to be familiar with more than one operating system and both server and client software;
- Will support (directly or indirectly) some combination of staff and student computing; academic and generic;
- Expects to share and gain expertise as part of a wider IT support community.

### Story

Francis, a departmental IT support officer, begins the week with a brief meeting of the Division's IT support officers. With the approval of their respective departments the IT officers have recently implemented a common online helpdesk which enables them to assist with non-specialised queries and provide some level of holiday cover. The group work well together though each recognises that even within the same Division departments have specialised subject requirements. Informally, at least, most would prefer to share generic support whilst gaining more expertise in supporting, for example, the research projects within their departments or advising on software to assist teaching. Francis' department approves his attending a three-day IT project management course with two colleagues from other divisions. Attendance at the course has been part-funded by both the division and the ICT Forum, with an overall aim to increase expertise in IT project management methodologies within divisions and departments. He enters the dates into the team's view of the central calendar, confident that in his absence any emergencies will be covered by his IT colleagues in the division. Having dealt with a couple of queries about digital images and databases, and upgraded the deputy administrator's PC, he continues working on a proposal to the ICT Innovation fund to pilot a method for getting legacy calendars to synchronise effectively with the central service. If successful, he hopes to be released for half a day a week to collaboration with a colleague from Physics and the groupware support people within OUCS.

## ICT Assumptions

- Local IT support staff working together within, for example, the divisional structure;
- IT support staff encouraged to further develop ways of working in collaboration;
- Increasing emphasis within departments on specialised subject support whether to meet the IT needs of research projects or for teaching and learning;
- University-wide calendar and central support services for IT support staff;

- ICT Forum with a shared budget for professional development and innovation projects.

## **College Alumni Officer**

### **Profile**

- Responsible for maintaining and developing relationships with alumni from the College;
- Organises events;
- Maintains alumni web page on the College website and prepares newsletter;
- Assists the Fellow for Alumni in his correspondence with alumni;
- Maintains alumni database for the College;
- Administers responses to all fundraising activities and reports results to the Bursar and President.

### **Story**

Theresa Money Penny begins her day with an alert from the Oxford's news service of a research breakthrough by a team which includes two members of her college. She feels the item would be of interest for the alumni online newsletter but in the meantime ensures that a link to the press release is contained within her college news feed.

She resumes the final planning for a gaudy dinner on a Friday with the three-yearly garden party on the following day. Invitations for both were sent out three months ago, and replies have been received through her events management system. The Bursary has recently opted into a shared University service which enables the college to accept credit card payments for this event. Fortunately, the payment system seamlessly interoperates with the online component of the events management system. She generates lists for the catering department and the porters' lodge. The events system has previously alerted her that one guest will be in a wheelchair and another is diabetic. The college has opted to allow its database to interact with a centrally-supported alumni contact management system. Potential benefactors have been flagged by the Development Office, and an attendance list (including career details) with these people marked has already been sent to the President, Fellow for Alumni and the Bursar, who will all attend both events. The list of 'missing' alumni for the years of the gaudy is taken from the database to circulate to alumni coming to the dinner.

She checks with the IT support staff that the equipment for the talk to be given at the garden party is set up and the presentation she received yesterday uploaded. There is a breakfast reception in New York timed to coincide with the garden party and she checks that the video conferencing facility is working. This will allow alumni to greet each other from both events. When alumni arrive at the events, Theresa Money Penny and her assistant update the contacts database on a laptop via a wireless link. A last minute phone call is required to the caterers - their contact details have been downloaded to her phone from her contact management system. They also update the event's web page with images and video clips from the garden party (having been given permission at the time of recording).

### **Assumptions**

- News alerting, aggregation and syndication of news feeds;
- Secure wireless access;
- Federated online payments system interoperating with college events management and financial systems;

- College volunteers to permit its contact management database to interoperate with a central alumni contact management system;
- Interoperability achieved between college systems or business processes;
- Out-of-hours technical support;
- Video conferencing support service;
- Staff training provided in data protection and related issues.

## Appendix F: Glossary

The glossary defines a set of terms according to their usage in the ICT Strategic Plan. Words in quotation marks are defined elsewhere in the glossary.

*Academic freedom* – The most fundamental virtue, common to all universities, is academic freedom, which may be defined as the freedom to conduct research, teach, speak and publish, subject to the norms and standards of scholarly inquiry, without interference or penalty, wherever the search for truth and understanding may lead.

*Business system* – a system which facilitates a business process. Oxford University's Business System and Projects team (BSP) provides "enterprise" business systems which enable Oxford to manage its key resources and carry out its administrative functions efficiently and effectively.

*Central ICT Provider* – a centrally-funded unit which offers "ICT services" for "Oxford". Three main providers have been identified: Oxford University Computing Services (OUCS), Business Services and Projects (BSP), and parts of the Oxford University Library Services (OULS).

*Collegiate University* – a collective description of the University of Oxford, including divisions, colleges, central administration and academic services and University collections. "Oxford" is used synonymously within the ICT Strategic Plan.

*Conference of Colleges* – a body which represents the common concerns of the colleges of the University of Oxford; negotiates with central University bodies on collegiate matters; appoints members of joint University/College committees; has representation on Council, its committees, and the five Divisional Boards; and acts for intercollegiate discussion and decision-making.

*Coordinated decision-making* – a structure which provides "ICT governance" and strategic direction across "Oxford", determines ICT policy and agrees priorities for central ICT investment.

*Core activities* – activities which define "Oxford", including research, learning, teaching and administration.

*Devolved ICT structure* – a heterogeneous set of ICT services, some run centrally, some run locally, some shared, which provides the ICT environment for users.

*Directory Services* – a networked service from which information can be looked-up and retrieved about available or shared resources, including information about groups, individuals, networked computers, filestore, printers etc. A directory service is commonly used for managing users and desktops on a local network.

*e-Administration* – administrative services and applications which are delivered to end users over the network. In the public sector e-administration is frequently associated with better transparency and accountability.

*e-Learning* – services which are delivered, enabled or mediated by ICT for the purposes of delivering education, and the technology and services which help create, manage and deliver those activities.

*e-Research* – two definitions are often quoted: "... global collaboration in key research areas, and the next generation of infrastructure that will enable it" and "The invention and exploitation of advanced IT: to generate, curate and analyse research data; to develop and explore models and simulations; to enable dynamic distributed virtual organisations". In the context of the ICT Strategic Plan e-Research also includes the more general support of research activities with ICT.

*Enhanced Computing Environment (ECE)* – a managed desktop environment which brings together standard applications, infrastructural services, and access to "enterprise" services

provided by “Central ICT Providers” together with other specific applications as required by the “local” unit in which the ECE is deployed.

*Enterprise service* – a service available across “Oxford”.

*Full Economic Costing* – a development of the Transparent Approach to Costing (TRAC) to provide a forecast of the full economic cost of undertaking a research project. All Higher Education Institutes within the UK are required to identify all direct and indirect costs for each research project, including space/estates charges, depreciation, an adequate recurring investment for infrastructure, equipment, consumables, travel and the cost of all staff working on the project (including Principal Investigators, technical and administrative staff).

*Holistic view of ICT* – a view of ICT across “Oxford” which encompasses the forms, use, and lifecycles of ICT within “Oxford”, from business systems to e-learning; high performance computing to mobile devices; social, administrative, and academic use; support and training, governance processes, and requirements gathering.

*Information and Communications Technology (ICT)* – a term used to encompass all forms of computing systems, telecommunications and networks across “Oxford”.

*ICT Governance* – a structure of process and relationships to provide strategic direction, ensure objectives are achieved, risk managed appropriately, and resources used responsibly (the “Coordinated Decision-Making” structure serves this purpose in “Oxford”).

*ICT Project* – a project, run with a Project Board and using a project methodology, which is undertaken to develop a new or upgraded “ICT service”.

*ICT Service* – the integration of ICT applications and support provided by a supplier to users on an ongoing basis and designed to meet a defined requirement. An ICT Service is often defined by a “Service-Level Description”.

*ICT Strategy Programme (ICTS Programme)* – the programme of events which has delivered the “ICT Strategy”.

*ICT Strategic Programme Report* – a report which summarises the work carried out within the ICTS Programme (also referred to as the Formal Programme Record).

*ICT Strategy* – a strategy for future ICT development in “Oxford”. The principles and processes underlying the ICT Strategy are documented in the ICT Strategic Plan.

*Identity Management* – the creation of flexible definitions for individuals and groups which authenticates users and allows different levels of authorisation depending on the service used.

*Information architecture* – the design, analysis, and organisation or modelling of information, with a particular emphasis on the interrelationships between data. A common aim is the development of more effective presentation and use of information, or the corresponding user interfaces.

*Information strategy* – a set of attitudes in which: any information that should be available for sharing is well defined and appropriately accessible (allowing for necessary safeguards); the quality of information is fit for its purpose (eg accuracy, currency, consistency, completeness; all staff know, and exercise, their responsibilities towards information; there is a mechanism by which priorities are clearly identified and then acted upon

*Interoperability* – the ability for organisations, and especially the systems under their control, to communicate with each other and make use of the information transferred. Technical interoperability refers to the technologies and data standards required in order to exchange and process information between systems. Semantic interoperability refers to a shared understanding of the meaning of the information exchanged. Organisational interoperability occurs when disparate units agree a common set of business goals and processes in order to facilitate the exchange of information.

*Key performance indicators* – agreed quantifiable measurements which reflect the critical success factors of an organisation, and enable improvement to be measured.

*Local* – within a unit in “Oxford”: a department, college, faculty or division.

*Oxford* – a collective description of the “collegiate University”, including divisions, colleges, central administration and academic services and University collections.

*Service-Level Description (SLD)* – A document which, for example, defines an “ICT service”, its availability, and the responsibilities of the supplier and user. SLDs are often used as a means of managing expectations.

*Service Oriented Architecture(SOA)* – a collection of loosely-coupled, distributed services which communicate and interoperate via agreed standards. The combination of a service and standards-based approach can result in a directory of reusable service components which together can be employed to enhance existing networked applications or build new applications. A SOA approach is frequently found in the development of “enterprise” portals which aggregate services provided by different service providers using uniform methods of discovery, access, use and presentation.

*Shared service* – where an “ICT service” is not limited to a particular unit, a shared service will be available to all or some of the “local” units.

*Subsidiarity, the principle of* – as defined in the Corporate Plan, “the notion that decisions should be taken at the lowest level appropriate to the matter in hand. Thus, for example, deciding what to research is a matter for individuals and, where relevant, research groups. It becomes a matter for departments and faculties, divisions and the University as a whole only when support is required, most obviously through the allocation of resources. Subsidiarity applies equally to teaching and, of course, administration generally.” (Para. 14). In the context of ICT, subsidiarity equates to a devolved ICT structure, which offers users the very strong benefits of local flexibility and local support, while being part of an overall Oxford ICT environment which is coordinated and cost-effective. Establishing the optimum balance and developing a holistic approach to ICT for Oxford is at the very core of the ICT Strategic Plan.

## Appendix G: Consultations and References

During the course of the ICT Strategy Programme the following committees, groups and senior members have provided input to the activities of the Programme:

- ICT Strategy Steering Group and Work-tasks (for membership see <http://www.ict.ox.ac.uk/strategy/sg-members.xml>)
- Standing Committee of Conference of Colleges
- Humanities Division IT Committee
- Mathematical and Physical Sciences Divisional Board
- Mathematical and Physical Sciences ICT Panel
- Mathematical and Physical Sciences ASUC Committee
- Social Science Divisional Board
- Continuing Education Divisional Board
- Medical Sciences Division Information Strategy workshop
- Educational Policy and Standards Committee
- ASUC meeting with Heads of Divisions
- Information & Communications Technology Committee (ICTC) Strategy Subcommittee
- Business Systems Programme Board
- IT Research Committee
- IT Users' Group
- Colleges' IT Group
- IT Support Staff Group
- Value for money group
- Personnel Committee
- Staff Consultative Forum
- Pro-Vice Chancellor, Education
- Junior Proctor

Additional input to the draft Strategic Plan was provided at the following consultation events:

- Consultation with IT Support Staff, December 2005
- "Learning from Others", CIO Briefing Workshop, 25 January 2006
- ICT Lunchtime Seminar Series, Hilary Term 2006
- Colleges consultation seminar, March 2006
- Open consultation meeting, May 2006

Consultations have also taken place with the universities of Manchester, Warwick, Cambridge, Edinburgh, Cornell, and Chicago.

## References Cited

- Breslin, C., Coen, M. and Kelly, K., *A Framework for Information Systems Management and Governance*. University of Strathclyde, <http://www.insight.strath.ac.uk/projects/itgov/index.htm>.
- IT Governance Institute. *COBIT, Information Systems Audit and Control Association (ISACA)*, <http://www.isaca.org/cobit/>.
- Office of Government Commerce. *IT Infrastructure Library (ITIL)*, <http://www.itil.co.uk/>.
- ICT Strategy Programme Record, <http://www.ict.ox.ac.uk/strategy/record/>.
- ICT Strategy Steering Group Terms of Reference, <http://www.ict.ox.ac.uk/strategy/tor.xml>.
- Joint Information Systems Committee (JISC) and Department of Education, Science and Training (DEST). *JISC e-Framework*, <http://www.e-framework.org/>.
- University of Oxford Corporate Plan, <http://www.ox.ac.uk/corplan/>.
- IT Governance Institute, *Val IT governance framework*, <http://www.isaca.org/valit/>.