INFORMATION STRATEGY 2012 -17

CONNECTING KINGSTON

Introduction

This strategy arises out of the IS/IT Performance Improvement Fund (PIF) initiative which formed a part of the University's cost reduction programme. It is one of the supporting strategies identified in the University's' Led by Learning' strategy and has further linkage to both the Campus Development Plan II (CPD II) and the Timetabling and the Space Management (TTSM) PIF and has been informed by the University's Learning Technologies Review.

The aim of the strategy is to deliver excellent information services: these are essential if the University is to achieve its stated goals. The strategy will deliver physical and virtual working environments that are fit for purpose for students and staff through the provision of systems that support both individual and collaborative learning anywhere, at any time (Led by Learning 3.8). It will allow us to use space more flexibly and effectively through the provision of online services which enable access to information that is device and location independent. It will also contribute to the 2020 carbon reduction plan by reducing print volumes.

In short, the strategy will :

- improve information provision and IT services in the context of HE in the 21st century
- ensure coordinated and cost effective information services across the University
- reduce inefficiencies through process standardisation, simplification, consolidation of technology and integration thereby reducing the total cost of ownership of IT.
- reduce data duplication and redundancy
- improve the quality of (management) information

This is a service driven information strategy that will help the University become a University of choice for students with ambition to thrive in a complex interconnected world (Led by Learning 2.3). The need to provide information services of the highest quality has never been greater. Students are technically accomplished, demanding and critical of their educational provision and environment. The University needs to provide a level of service that meets and exceeds these demands.

We have identified 'information' as covering information resources, technologies, infrastructure, systems and services. It embraces the information we generate as a university and how we communicate information as well as the information we access or manipulate to do our work.

Background

The University's current IT provision has fallen behind the level that is necessary to provide reliable academic and administrative systems. This was evidenced by the recent Surrey County Council review into IT failures. The current capability of the IT infrastructure now represents a significant risk to the University in those areas identified in the internal audit report – Review of IT Risk and Control Framework 15 Sept. 2011 [1] and there is a likelihood of future business disruption. The University faces a number of challenges as a result of not having implemented and enforced a University wide Information Strategy. There have been years of reactive spending with budget holders often investing in low end technologies that have limited capabilities, compounded by under investment. This has led to the adoption of multiple systems with complex interfaces - Annex C. Many of the existing technical infrastructures are also nearing end of life and across the University there is lack of capacity, power, cooling and space utilisation which makes it inefficient and difficult to maintain. This at a time when the University should have high speed, high availability access to information that is device and location independent and responsive to need.

Further, in terms of information systems alone the higher educational context has changed dramatically on both local and global scales over the last 10 years:

- Knowledge resources widely and easily accessible available across all disciplines independently of the institution
- Significant governmental funding and growth of Open Educational Resources (see QEC Papers 2011/12 - 9 and 56)
- Nascent growth in open online courses, along with international developments in 'at cost' validation of open courses and those based on OERs
- Technologies with affordances that align with strategic institutional learning and teaching objectives (see RAF principles, University L&T Strategy, Led by Learning) are widely available to students and staff independently of the institution.
- Personal mobile technologies with the processing power of high-end PCs 10 years ago are in the hands of our students with predictions that within 3 years 80% of global access to the Internet will be via mobile devices (The mobile 'app' based operating system, Android, is now the world's most installed system exceeding MS Windows).
- Nationally recognised gaps in student and staff digital literacies
- Growing disparity in access to technologies amongst our existing and potential students

The underlying approach of this strategy is to reduce the total cost of ownership (TCO) of IT and increase the quality and range of delivery options. Delivery options such as shared services and cloud computing are a means of making efficiency savings and improving institutional flexibility. This service model will increase reliability through standardisation whilst at the same time, over a planned period reduce expenditure.

[1] At the time of our audit, we note that the University has not sustained its investment in the IT infrastructure. IS budgets since 2006-07 have been based on maintaining the "status quo" whilst capital expenditure and investment have been kept to a minimum. This was in spite of the increase in student numbers in recent years.

In order to ensure business continuity the immediate technical risks need to be resolved, followed by a programme of consolidation to drive out the inefficiencies which will then enable the University to make optimal use of IT, and to recognise the changes in both the national and international contexts. The strategic priorities are:

1. Personalised student environment:

Provision to students will embrace the student lifecycle from enquirer to alumnus. In the new funding landscape students will be paying higher fee levels and will expect the very best educational experience. They come to University familiar with IT functionality through social networking, virtual learning and mobile working. They expect IT to be available 24 x 7 on a device of their choice. They expect physical learning environments and information resources to be available 24/7.

- Offer 24 x 7 access to a supported and technology enabled learning environment, designed to help the student engage with their academic work. There will be easy access to self help, and web based support options and frequently asked questions. Students will be able to simply and quickly use self service tools to diagnose and resolve common issues (e.g. password resets, Council Tax letters). More complex issues will be resolved through a consolidated single Help Desk using multiple channels including (phone, email, instant messaging and remote support depending on the severity, priority and complexity of the issue. Advantage will be taken of shared services (eg. NORMAN) to deliver cost effective solutions and ensure resilience.

- Provide technologies that can be used to effectively enhance learning and teaching while recognising the complexities of pedagogic processes, literacies and environments. Factors include the balance of public and private spaces; institutional and third party and personal technologies; balance in staff led, scaffolded and student led activities and models; recognition of the interfaces between student social / informal and formal learning spaces; projecting the institution for remote learners; issues of copyright, data protection and intellectual property rights.

- Improve their experience by increasing student to PC availability, closing the gap between personal student software and institutional software provision, with students often several versions ahead and by introducing simpler and easier integration with the wide range of social networks.

- Build on institutional good practice and continue to provide and develop the mix of technologies that are a prerequisite to enhancing and developing active and effective learning and teaching.

- Support key and emerging standards that promote innovative practice, openness and sharing including HTML5 and IMS (e.g. Common Cartridge, QTI) as well as tools and open source applications that encourage the development of virtual communities of practice.

- Development of an integrated student portal that reduces complexity in the multiple interfaces that students currently need to navigate across the multiple systems and ensure accessibility via mobile and personal technologies.

- Provision of physical and virtual sandboxes for experimentation / innovation and collaboration using new technologies and sources of information.

- Move from the traditional workstation to a ‘context aware’ personal environment where a student can use either a University provided PC (Apple, Linux or Windows) or their own device to access integrated applications, services and information quickly and reliably from any location.

- Agree on and implement a University wide resource management system for loan equipment
- Enable 'mobile money' to make any payments simple.

2. Shared high capacity ICT Infrastructure:

"We will be known for our collegial, supportive culture, ignoring internal and external boundaries to provide the best possible education for our students" (Led by Learning 3.6)

"We will endeavour to minimise our impact on the environment;" (Led by Learning 3.2) and actively contribute to the university's carbon reduction plan e.g. the new zero carbon print solution that is being introduced. The new infrastructure will deliver high levels of performance in one half of the footprint of the existing infrastructure thereby releasing space, will draw less power approx 1/3rd of the current power usage and require less air conditioning.

Technologies will be used that are scalable and which reduce the complexity of information and systems' integration:

- High performance, high availability, resilient 10gb dark fibre network connections between campuses (see Annex A) with public services network (PSN) links
- A cohesive next generation network with a proactive management platform and interface for operational simplicity
- A network capable of LAN-SAN convergence in a Fibre Channel over Ethernet (FCoE) environment using Converged Enhanced Ethernet (CEE) resulting in a simpler topology
- Remote access to systems and networks will be provided and mobile technology will be leveraged to ensure that irrespective of the communication method (email, SMS, IM, video conferencing etc.) users will be able to communicate and collaborate not only within the University but with any external organisation / individual anywhere
- Digital IP based telephony enabling staff to work efficiently and effectively, independent of location
- High speed, secure pervasive wireless (802.11 n including spectrum analysis to scan the 2.4 ghz and 5 ghz radio bands to identify radio frequency interference) access available across campuses which will create a 'wireless where possible wired where necessary' network access model. This will recognise the growth of 'always connected' mobile and personal devices that will be increasingly used in formal learning and teaching activities.
- IPv6 with its plug and play capabilities to allow the next generation of SIP-based interpersonal communications applications – including voice over IP (VoIP) and innovative forms of messaging, presence and virtual room videoconferencing system (VRVS)
- Cost-effective, consolidated, scalable (JISC are predicting data growth in the HE sector of 44% per annum) and secure data storage accessed by virtual servers. Storage with capacity that can be rapidly provisioned and will be fully backed up and where required business continuity / disaster recovery.
- Simplified, secure single sign on access to applications, services and information on demand from any location (remote access / home working)

- Virtualised desktops independent of device or location enabling mobile / flexible working.
- Web 2.0 and 3.0 services to provide open, standardised protocols to provide a unified means of accessing information from a diverse set of systems and platforms. These web services can be reused to provide completely new services and applications providing business flexibility.
- Consistent high definition audio visual provision and IT equipment in all teaching rooms and lecture theatres, and ensure that we continue to develop flexibility in the classroom (e.g. interfaces for personal and mobile technologies and mobile podiums), and that recognises the changing dynamics of face-to-face learning and teaching sessions
- University wide software licensing negotiated on concurrent usage thereby ensuring economies of scale.
- End-point device provision (ranging from notebooks, tablets, 'all-in-one' PCs to high performance PCs) supplied as a managed service which removes the high 'break / fix' support costs. This will include usage monitoring to inform the replacement cycle.
- Fully exploit the opportunities that the Unified Communities over Regional Network (UNICORN) project – Annex D - offer to share services and systems.
- Options for the student halls of residence range from 10gb provision by the University shared between the rooms through to students arranging their own provision.

However, this consolidated provision of IT will retain a distributed local presence / delivery / support where relevant and necessary. There will be University wide IT governance and agreed University wide technical standards including procurement. The standards will be based on industry best practice, including Information Technology Infrastructure Library (ITIL) e.g. the ITIL Service Catalogue and Control Objectives for Information and Related Technology (CoBit). The service catalogue is a means by which services can be consistently defined, configured, deployed and governed. This will include investment in professional competency development (eg. The British Computer Society (BCS) Skills for the information Age) and technical development.

3. Integrated information processes and systems:

"We will review our processes regularly to ensure that they focus on the needs of our students and staff" (Led by Learning 3.1) to allow staff more time to focus on the best teaching, learning and research outcomes and to ensure administrative efficiency. Central to achieving this is the recognition that information is an asset in its own right. To be a truly effective organisation, information needs to flow within the University untrammelled by technological or organisational barriers. It is essential for everyone to have easy access to the information they need, in the form they need it and when they need it if the University is to be fully effective.

Improved quality and integrity of data through information lifecycle management (ILM) will ensure that there is a reduced volume of discrete data storage and a single shared view of the data which is held securely once and only for as long as necessary. Data will be held once, accessed on a need to know basis and then either archived or deleted based on a University data retention policy. The policy will determine what happens to all information and data (both paper and electronic) after it has ceased to be of relevance for administrative or immediate academic purposes and ensure that archived electronic records, in particular, continue to be readable as technologies change.

There will be defined common standards (effectively information governance) and simplified technology to reduce the cost and management effort associated with data storage, data manipulation, data repositories, reporting, dashboard and analysis tools. A middleware layer using a web based data aggregation service which integrates

internal data and externally hosted data in a flexible and extensible way. Providing management information with an emphasis on improved evidence based decision making and the processes that gather, present and use that evidence in business intelligence systems. Through the adoption of Web 2.0 and Web 3.0 technologies and techniques and HTML5 which will soon be adopted as a standard to enable the next generation of interactive web services.

Enterprise Architecture (EA) is a strategic technique about people and processes as much as technology and it is a holistic approach. An EA approach will be adopted to tackle the problem of achieving full integration across our various systems along with the need to develop sustainable data exchanges between legacy systems without an ongoing reliance on multiple point to point system integrations that are resource intensive and complex to maintain.

Enterprise Resource Planning (ERP) is the right approach for organisations which want a single end-to-end system from the same supplier, with consistency, visibility and reliability across their business processes. The larger ERP vendors provide applications and a proprietary technology platform and development environment. There is then a commitment to that technical environment and vendor which has an element of lock-in and therefore risk.

Splitting up large monolithic systems into smaller modules responsible for different areas of service is a more flexible and responsive approach to changing business needs. This is enabled technically by service oriented architecture (SOA) to improve interoperability. It defines standards to integrate different applications for a web based environment and across a range of implementation platforms. This links business processes and workflows within other systems. Using open standards means linking systems from different suppliers across a range of institutions and organisations is possible. Services can then change rapidly to meet changing needs which results in reduced operating costs across a range of administrative and operational areas.

Consistently using repeatable, efficient processes aligned to industry best practice and simplifying the integration, management and administration of all information systems will remove a number of administrative functions e.g. the introduction of ‘e-marketplace’ and the removal of multi-part paper order forms.

Sharepoint will be used as the University platform to improve content driven applications, collaborative working, information access through metadata standards and workflows to ensure consistency and quality of processes. Electronic workflows and approval mechanisms will be used to improve cross University business processes and reduce administrative overheads. Simplified access to information and consistent views using version control of documents will also reduce administration.

In mapping the process flows across the University it is clear that there are a number of information silos and the bottlenecks that these produce. It is possible to improve business processes but the core business administration systems (HR, Finance, Student Records and Timetabling and Space Management) must be reviewed to ensure that there is full interoperability. It is important to review the core business administration systems (e.g. HR before contract date November 2012) to ensure that we make the best possible use of the information, streamline information flows and administration and enable partnership / shared working and collaboration. Information is also held in a variety of systems in departments and faculties which can be as unstructured as a spreadsheet or word processed document and commonly held in databases which have been developed (and are often sufficient) to meet a specific requirement without regard to institutional requirements. This results in inconsistency and poor data quality.

Once these issues have been addressed it will be cost effective for IT systems and services to be increasingly delivered through the 'cloud'. These cloud services are developing e.g. 'software as a service' and what they have in common is that customers pay to access them and only pay for what they use. This transfers the total costs of ownership to the supplier and increases the University's ability to rapidly scale on demand. Microsoft 365 cloud provision will start with student email in 2012. A high priority will be to automate high / intensive administrative processes such as MEQ, OPR & high volume scanning.

4. Enabling academic effectiveness:

We will apply industry best practice to deliver unified, reliable, high performance and available IT that support high quality teaching and research (Led by Learning 1.1).

University systems will enable content delivery to support learning, teaching and research regardless of format or device. This flexibility is necessary to ensure that information provision remains current e.g. adapting to different publishing models, e-book procurement structures and journal licensing.

The ongoing development of the Universities learning technologies to meet the complexities of evolving learning and teaching practices and processes across the institution aligned with RAF, blurring the interface between virtual and physical spaces, increasingly mobile enabled and interfacing with personal and non-institutional technologies. To promote Open Access and repository work to both raise the profile of Kingston's research output, and the role of research in learning and teaching and support this through the design and agreement on metadata standards that allow effective information searches across all databases and repositories.

Academics work within communities that span organisational and national borders. The ability to communicate and share information internationally is increasingly important. University systems and technologies will need to be flexible and able to incorporate new partnerships, collaborators and realise the concept of the 'edgeless university'. This will require an infrastructure with the flexibility to incorporate new tools quickly and to support innovation.

The Timetabling and Space Management PIF sets out to ensure optimal usage of space and this strategy will assist by decoupling wherever possible usage from fixed areas which in turn will enhance the staff and student experience and better reflect developments in pedagogy and changes in the way students learn.

The Institution will provide secure, high speed, high availability research infrastructure and networks with 10gb fibre connections capable of supporting super computing and high performance computing (HPC) and Graphical Processing Unit (GPU) nodes to support researchers with the Research Excellence Framework (REF) 2014 and to access UK National HPC service HECTOR based at Edinburgh. This will support academics who need dedicated technical advice for research projects and help to develop the ways in which our cutting edge research feeds into commercial activities and public engagement . Using technologies such as Apache Hadoop an open source framework for running applications on large clusters of commodity hardware. Hadoop implements a parallel processing technique named Map/Reduce, where the application is divided into many small fragments of work, each of which may be executed on any node in the cluster. In addition, the Hadoop framework provides a distributed file system that stores data on the compute nodes, providing very high aggregate bandwidth across the cluster.

5. Collaborative working

We will be welcoming and outward looking, blurring the boundaries between staff and students, the University and the community, and will work closely with local and regional communities to develop an engaged university (Led by Learning 3.4)

Staff development and training will be essential to address issues of digital literacy and ensure all staff, teaching, research and administrative, have the capability to exploit technologies to best effect

Our systems will be designed to ensure the University can work effectively with its teaching and research partners, enabling sharing of data and information, where licences and IPR permit, both formally and informally. Enabling future collaborative ventures which will require greater bandwidth such as collaborations, alliances and mergers (CAM).

Technology must not be an obstacle to collaboration. IT have taken a 'denial of access' approach to service delivery instead we will provide new and innovative ways of working adopting a 'last line of defence' approach. The fundamental change is a transition to managing access rather than managing assets.

6. Outputs

The financial position is included in Annex B. The actual implementation plan will be developed to integrate with the other University strategies. There are a number of current contracts that will need to be taken into consideration when planning the upgrades.

When this plan is achieved the University will have:

- Consolidated and cost effective infrastructure and information services
- Intelligent technology with automation, integration and efficiency
- Improved student and staff user experience
- Reduced administrative overhead and TCO of IT

The recommended KPIs are :

- annual reduction (over 3 years) in the total cost of ownership (TCO) of IT
- annual increasing levels of satisfaction in the IT infrastructure and availability of information services reflected in surveys of staff and student opinion
- projects, which deliver the anticipated benefits and return on investment, being delivered on quality, time and budget as monitored by the Programme Board
- annual improvement on the response to NSS questions :

  Q17 – I have been able to access general IT resources when I needed to over the last three years – the response in 2011 was 76% with a sector difference of -7

  Q16 % increase was 82% in 2011 – sector average

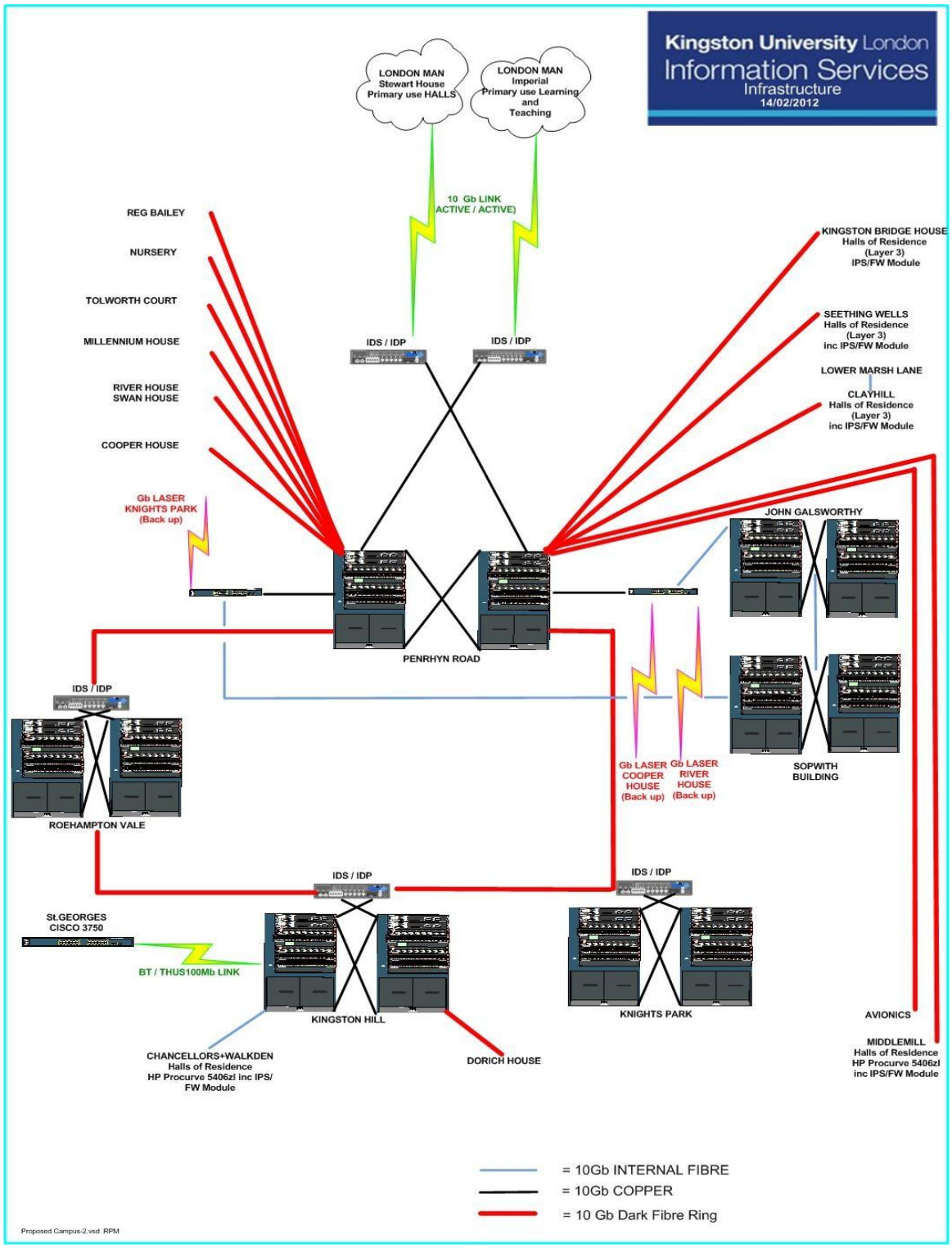
7. Assumptions

Successful delivery is based on the following assumptions :

- IS will be restructured to implement and support the information strategy. Currently people are organised around technically siloed skill sets, functions and platforms. The disadvantage is in the organisational construct behind it, where individual resources are disassociated from one another. Coordination and end-to-end accountability for service results are lacking. Service predictability and quality are poor with tremendous effort continually being expended to resolve unanticipated situations, making this a highly reactive and inefficient model.
- Integrated information processes and systems will result in changes to administrative, IT and support functions across the University
- A development programme to raise staff IT skills across the institution will be developed with a range of training formats to address varying levels of competence for example 'bite-sized', self-paced and on-line flexible training packages for those who prefer that approach.

Annex A Proposed network infrastructure

The infrastructure will be designed to be resilient (automatic fail over) and has redundant network connectivity to reduce the risk of interruption and to be as power efficient as possible. The diagram shows current locations, it is recognised that some buildings are on fixed term lease and that the campus development plans could in the future introduce new sites.



Annex B Financial Position

The National Audit Office (NAO) report on shared services across government [2] identifies the need to simplify, standardise and reduce customisation. The diagram Annex C illustrates the complexity of the current bespoke system interfaces. The diagram does not include the large number of bespoke systems that are currently being maintained. The core business systems range from large monolithic databases such as student records (SITS 1999), HR (PSE 2002) and finance (BluQube 2005) to a single user Paradox database. Many of the applications do not support single sign on technology. There is a high overhead and corresponding high risk in maintaining this unnecessary complexity. There are a number of options from maintaining the current position through to 'outsourcing everything'. Maintaining the status quo is an option but there will be an increased risk of interruption to services with the age and limited life span of a number of critical components of the infrastructure. 'Outsource everything' is also an option but would be very expensive because of the high level of customisation that Kingston has applied to processes and systems. It is important to recognise the associated costs of customisation. The University needs to move towards a simple, fully integrated systems and processes without bespoke customisation. This will deliver key benefits including integrated business processes, no duplication of data, a single view of 'the truth' and low maintenance costs.

The goal is for IT to be consolidated into a single University wide, scalable highly resilient and integrated infrastructure with access 24 x 7 x 365. The investment will enable the University to be more cost effective and to realise the business benefits in the future of a range of delivery methods including managed services, outsourced, shared services or 'cloud' provision'.

Currently it is difficult to establish the total cost of ownership of IT across the University because of the diverse nature of historical IT expenditure and the levels of system support. This is confirmed in the internal audit report – Review of IT Risk and Control Framework 15 Sept. 2011 [3]. We have had access to the findings of the Tribal financial benchmarking project 2008 / 09 and UCISA's annual Higher Education Information Technology Statistics (HEITS) 2010. The HEITS statistics are recognised as a valuable benchmarking tool because they include central IT expenditure as well as institutional IT expenditure. They are also recognised as the only collection of statistics on Higher Education IT by the Office of National Statistics (ONS). It is recommended that when the total cost of ownership of IT in the University has been identified that the HEITS statistics are used as the appropriate HE sector benchmark. Accurately measuring these costs will encourage a cultural change to focus on return on investment and business value.

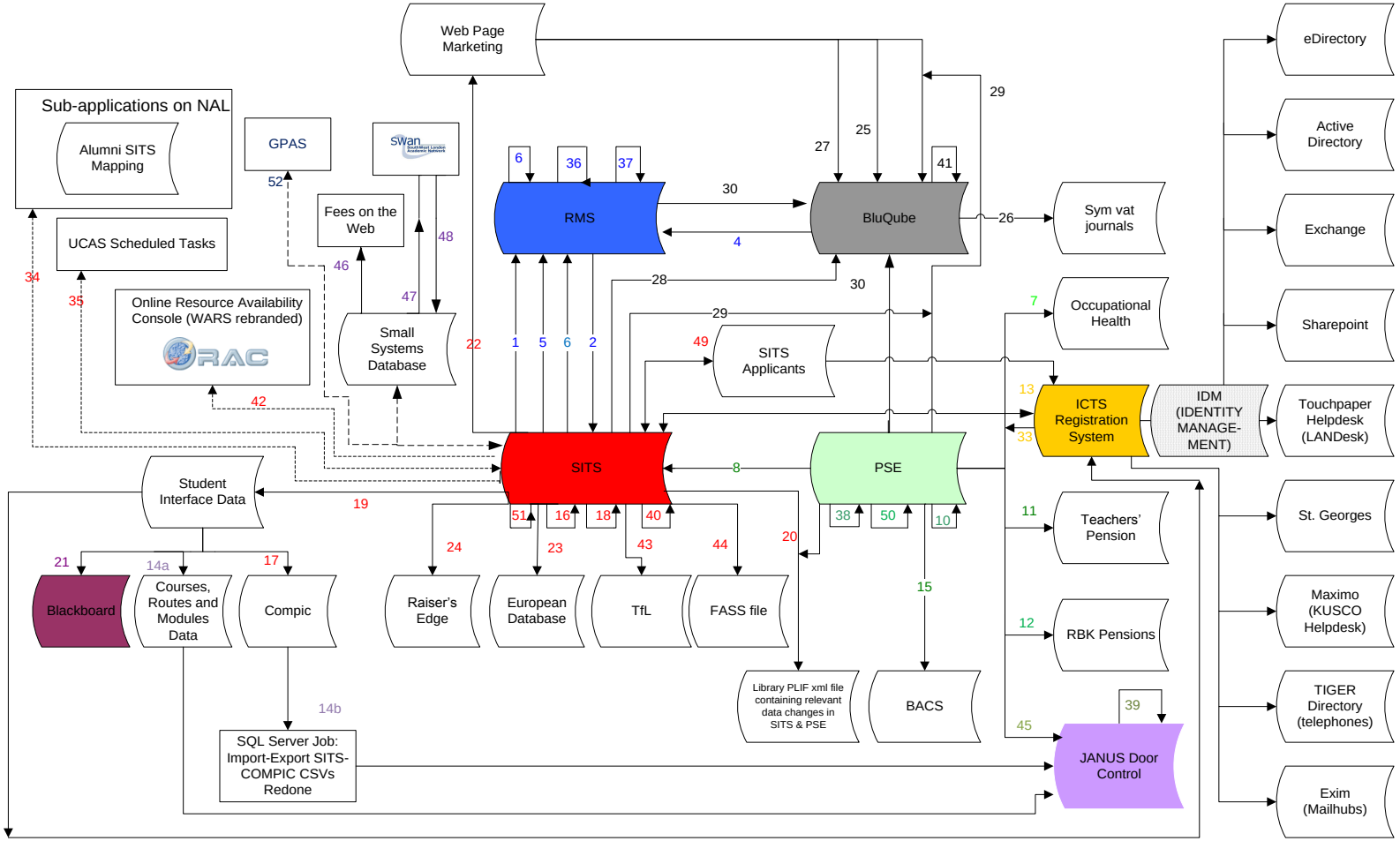
[2] Efficiency and reform in government corporate functions through shared service centres HC 1790 7 March 2012

[3] We note that the University is not aware of the amount being spent on IT and related services in a year. This is due to the devolved structure of the University whereby IT budgets are held by IS as well as the faculties and departments.

Annex C Customisation

CORPORATE INFORMATION SYSTEMS

APPLICATION INTERFACES – including Scheduled Jobs
November 2011



Annex D Regional Network