




MONASH University

An abstract background image consisting of numerous thin, parallel lines of varying shades of blue and white, radiating from a central point at the top, creating a sense of depth and motion, similar to a perspective view of a road or a digital data stream.

Information Technology Services

**Information and Communications
Technologies Strategic Plan
2008 - 2010**

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INTRODUCTION

This document is the University Information and Communications Technologies (ICT) Strategic Plan, 2008 revision. It provides a consolidated direction for ICT investment in response to the university's strategic plans. It supplements the 2006-2010 ICT Strategic Plan.

Planning methodology

The strategic plan has been developed with comprehensive input from key stakeholders in each portfolio. ITS has developed several consultative planning avenues that engage with different levels of stakeholders, including a senior "planning analyst" function and a more service-focused "service roadmap" function.

The primary conduit for new initiatives is through the "planning analyst" function, where senior ITS staff consult with key business areas to support the analysis and development of project concepts for new initiatives. Further exploration and validation of portfolio areas also occurs through portfolio workshops. The workshops contribute to the development of a three-year roadmap for each portfolio area, and provide an opportunity for key stakeholders to validate or refine current and planned activities within the portfolio.

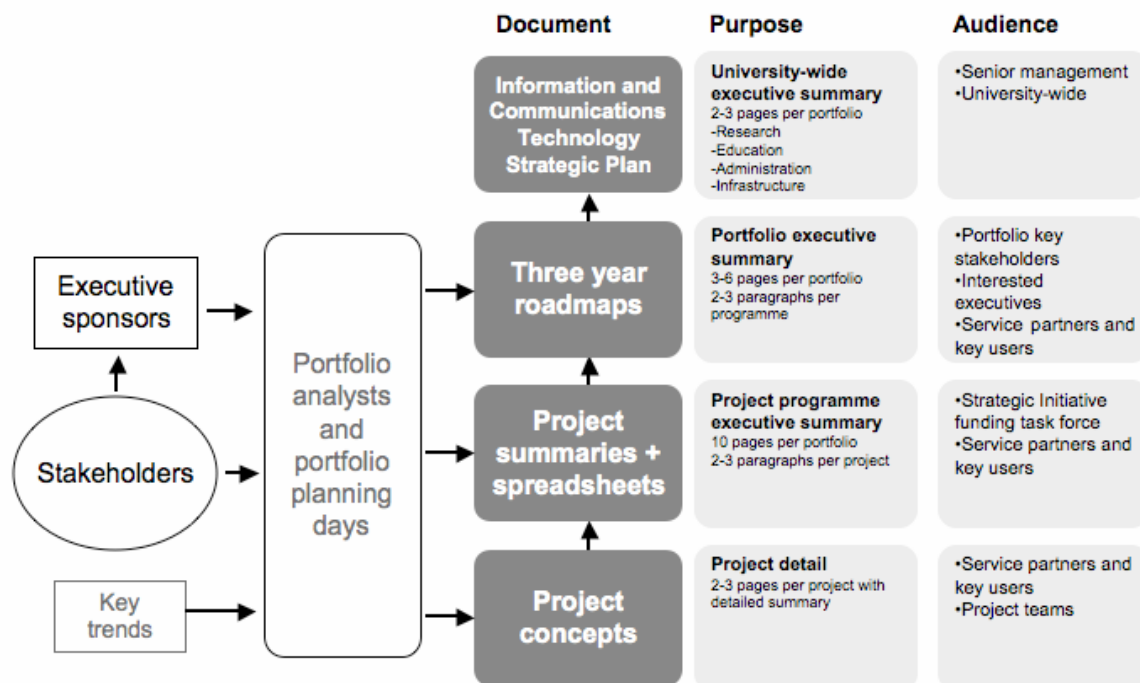


Figure 1: Planning methodology

The roadmaps describe an aggregated programme of work that addresses specific business areas within each portfolio. The programme of work is made up of a series of aligned project initiatives that are submitted for funding. Funded projects are governed by business areas, using a formal project methodology with support from ITS and conducted with input from across the university, as appropriate.

The role of ICT infrastructure in delivering an information-centric approach

The Monash University *Information Management Strategy* describes information as a crucial resource that must be managed like financial, human resource and other resources. Monash's information must be managed and presented in a way that supports staff and students in making decisions, doing their work and collaborating with their peers.

The strategy emphasises the importance of information-centric technology solutions, focused on the user and their information needs. Figure 2 represents this diagrammatically. At the top is the user and their information needs. These are supported by services, delivered by applications, running on infrastructure. ICT infrastructure provides the crucial foundation upon which information and services are delivered.

Plan overview

This strategic plan provides an executive summary of the combined programme of work across all portfolios. The six portfolios that ITS delivers services to are:

- Research
- Education
- International
- Information Management
- Administration (including Advancement and Finance)
- Infrastructure

In this plan, the international needs have been reflected as part of the design and implementation of initiatives in research and education. Similarly, information management activity forms part of the programme of work conducted in administration and infrastructure.

Primarily, this plan addresses the next three years of ICT investment. It aggregates the three year roadmaps developed in 2007 for research, education, administration and infrastructure. A longer term view is provided in the full 2006-2010 ICT Strategic Plan.

This document summarises the most critical strategic activities (which are by no means all that is underway) in the ICT space using a concise and business-focused format. This format:

- Provides an overview of the business driver for this strategic activity
- Summarises the status of activity so far
- Outlines the benefits expected from investment in this area

The ability to deliver against the *ICT Strategic Plan* is strongly influenced by staff capacity across the university, the impact of shared services, the need to maintain existing services and IT governance arrangements.

This document will be reviewed annually on a rolling five-year basis. Particular strategic initiatives will be added and subtracted as dictated by the changing strategic environment and priorities of the university.

It is hoped that this approach will be useful both to university senior decision makers and to those charged with managing ICT systems across the university.

The Information Technology Services Division commends this document for consideration by the University.

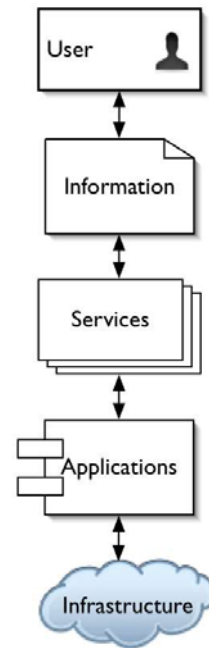


Figure 2: Info-centric technology

KEY TRENDS

This plan responds to key external influences and opportunities that affect the way ICT delivers services to support the University in its mission. The key trends can be summarised as:

- **Data volumes:** Current growth in data volumes associated with research instruments and sensors, the use of multimedia, and large integrated enterprise databases is placing increasing demands on data storage services, computer networks and computational tools.
- **Collaboration:** Team based work activities are becoming the normal way of working for students and staff involved in research, education and administration. Teams expect to be able to collaborate using video conferencing, audio conferencing and data sharing services.
- **Social computing:** Students who belong to the age of “digital natives” have adopted ICT as a community lifestyle, and they expect their university to reflect this.
- **Mobility:** Monash is a multi campus, international university. Students and staff expect to be able to work from anywhere, at anytime, with equivalent levels of functionality.
- **Green IT:** Monash has embraced its social obligations by setting challenging targets towards environmental sustainability. These will influence the procurement, operation and disposal of ICT equipment.
- **Client relationship management:** The Monash community is large and diverse and relationships with individuals potentially extend over a lifetime. There is an increasing benefit to be obtained from adopting holistic and comprehensive policies and processes for the way Monash interacts with its stakeholders.
- **Information quality:** Monash stakeholders are dependent on the availability of relevant, timely and accurate information, and their ability to manage that information.
- **Automated processes:** The implementation of information and applications systems provides an opportunity for process efficiencies that generate savings to the university and improvements in service to the Monash community.
- **Online services:** Students have an expectation that educational resources and administrative services will be available online. Online service delivery for students and staff saves time and reduces costs.
- **Security risks:** The dependence on ICT, the level of network “connectedness” to external parties, and the widespread use of personally owned devices by staff and students make the university increasingly vulnerable to breaches in security.

RESEARCH INFRASTRUCTURE AND MANAGEMENT INFORMATION SYSTEMS

Monash is a leading research-intensive university, and for the last few years has been developing the high quality ICT infrastructure required to support its continued success in this regard. The infrastructure plays two critical roles; firstly to satisfy a variety of specialist needs across disciplines within Monash, and secondly, to both align with, and guide national and state strategies for the establishment of enhanced infrastructure for research. The results have been very positive, with multiple research projects across Monash benefiting in areas as diverse as climate modelling, crystallography and indigenous studies. Monash, with a range of collaborator institutions, has also attracted over \$18 million in federal and state funding for a number of world-leading research infrastructure projects. These projects include ARROW, DART, ARCHER and VeRSI, and Monash staff have subsequently participated in a number of high profile national and international research forums, leading the agenda in their areas.

Continued investment is needed in order to develop our infrastructure further, to fully realise the benefits of investment made to date, and to maintain our national profile. A range of high volume instrumentation (medical, microimaging, Synchrotron, etc.) is coming online during the planning horizon, with resulting data and potential for collaboration. Large volumes of data also need to be analysed and shared in the humanities and social sciences, in particular cultural archives. There are many more benefits to derive from improving access to the infrastructure, and improving integration between these central elements and faculty-based initiatives. Our infrastructure positions Monash to focus research on the key capabilities identified in DEST's National Collaborative Research Infrastructure Strategy (NCRIS).

The key elements for continued development of Monash's ICT research infrastructure are data storage and management; high performance computing; researcher's desktop environment (integrating services, tools and software, including collaboration capabilities); and advisory and user support services. These elements align with the NCRIS Platforms for Collaboration Final Investment Plan, established by DEST. An additional focus is on information systems for research administration that will deliver improved insight into Monash's research performance while supporting the university's researchers, their teams and associated administrative staff.

Research data storage and management

National strategies and policies require appropriate storage, management and access to research data. At the same time, a further six specialized, high volume data generating instruments will become operational in the next 18 months, each generating a similar amount of data to the Synchrotron. In order to address this exponentially growing need, Monash has developed a Large Research Data Storage (LaRDS) service. Currently in pilot, the service will go into full production by the end of 2007. A sustainable funding model has been developed to meet exponentially growing storage capacity for an annual operational expenditure. The research data storage service will be funded from 2008 from central support service charges, with storage allocations to be determined by Faculties.

Data curation is also required to ensure ongoing access for analysis, collaboration, re-use and long-term archival. The Monash Research Data Management Policy calls for the establishment of a Data Curation function within the university in response to NHMRC/AVCC policy requirements that require institutions and researchers to properly store, manage and protect research data. A dedicated data curation service will bring significant improvements in this respect. The Library is establishing a Data Management function in 2008 that will be funded from central support services charges.

Summary of benefits

- Equip Monash for the predicted growth in research data volumes
- Ensure Monash research data is appropriately managed, including retrieval, security and access
- Support emerging Monash, NHMRC, AVCC and NCRIS policy requirements that require institutions and researchers to properly store, manage and protect research data.

High performance computing

Analysis must be carried out on the high volumes of research data generated by specialized instruments for successful research outcomes to be achieved. This is particularly relevant in disciplines such as medicine and science. Analysis is either *computationally intensive*, for tasks requiring significant analytical or mathematical operations over low volumes of data, or *data-intensive*, for tasks requiring simpler operations across large volumes of data. High performance computing addresses these analysis needs.

Subscriptions to National (APAC¹) and state (VPAC²) facilities for computationally intensive tasks meet much of Monash's major requirements in this area. Data-intensive computing however, must be close to the data stores, and to the sources of data creation: sensors, instruments and researchers. In response to this requirement, the MSG (Monash Sun Grid) was established in 2005, recently evolving into the Monash Campus Grid (MCG). Currently, the MCG does not have the capacity Monash will need over time. The major central components of the MCG are aging and will be due for replacement by 2009. Several initiatives aim to address these issues, with priorities for development over the 2008-2010 period as follows:

- Integration of faculty, central and desktop compute capacity
- Coordination with 2008 Monash protein crystallography high performance computing (HPC) project
- A major upgrade to take advantage of technology advancements (planned for 2009)

Additional funding for the upgrade will be sort from the Australian Research Council, NCRIS and VPAC.

Summary of benefits

- Handle increased demand for data intensive computing
- Ensure Monash facilities remain competitive in terms of value for money
- Handle increased demand for computationally intensive tasks, while taking advantage of regional and national capabilities
- High performance computing is the key enabler for data visualization capabilities
- Improved environmental efficiencies.

Researcher's desktop environment

Having established the critical foundation pieces of data storage and management and high performance computing, we must bring access to such tools and services within easy reach of researchers. The Monash e-Research Portal (MeRP) is one element of this approach. It will provide a range of services, tools and information in a seamless and easy-to-use manner for researchers, enabling them to carry out not only their core research activities from one place, but also all the supporting activity such as applying for grants in a more efficient and effective manner. Personalized and discipline-specific functions will be made available for each researcher, all through the my.monash portal.

Researchers must have appropriate tools to manage data, including functions such as cataloging data and controlling security and access rights for data. Tools to enable these functions will be delivered via MeRP. An 'Information Management for Researchers' programme will build on the university's 'Information Management for Workgroups' framework to support improved information management practice within research teams and communities.

Having commenced in 2007, the design and development of MeRP will conclude in 2008. Normal operational activities for the service will begin in 2009. Incremental enhancements will be carried out in response to researcher requests from that point forward, and toolsets and services from the DART, ARCHER and VeRSI pilots will also be incorporated.

¹ Australian Partnership for Advanced Computing

² Victorian Partnership For Advanced Computing

Summary of benefits

- Single point of access for researchers to the tools and information they need
- Support emerging Monash, NHMRC, AVCC and NCRIS policy requirements that require institutions and researchers to properly store, manage and protect research data by providing a consistent set of tools to researchers for managing their data
- Improved access to tools and information
- Improved researcher productivity through less time spent looking for tools and information, and less time spent using tools that are not the best for the job

Interinstitutional and international collaboration capabilities

With 50% of research papers featuring non-Monash authors, and an increasing number of cross-discipline research endeavours, facilitating collaboration between researchers across institutions is critical to research performance.

New workgroup collaboration, voice and video services are being implemented from 2007-2009. These services will provide new opportunities for rich collaboration experiences across the international campus network, with partner institutions and researchers. In addition to basic email and calendar functionality, support for real-time collaboration support, team-based document sharing and collaboration spaces, internet telephony (VoIP) and desktop and room-based videoconferencing will be provided. In addition, services developed under the NCRIS Platforms for Collaboration program will be deployed.

Monash will be deploying new procedures developed by the Australian Access Federation that will facilitate collaborative work between researchers from different institutions. These procedures will improve the ability for researchers to share data and computing resources.

In order to strengthen collaboration with specific partners, ICT audits will be conducted with key international partners. This activity will facilitate greater research collaboration by establishing the best methods for exchanging information and ideas, and provide mutual benefits in the development of ICT infrastructure.

Summary of benefits

- Improved collaboration between researchers within Monash and with external partners, at minimal additional cost to the University
- Improved value from international partnerships, including mutual learning around ICT capabilities

Advisory and user support services

ICT investments can be best leveraged where ICT experts are available to assist research teams to take advantage of existing services. It is proposed to provide advisory services that will support researchers develop an understanding of the services that are available and to adapt research environments to suit.

There are occasions where specialist applications or services might be required to support research projects, for example in the adoption of e-Research practices. Trials have established that the most effective model for providing such support is to embed IT professionals alongside researchers. Experienced analysts would help researchers adopt existing services or contribute to the development of new ones.

A core group of staff will be established to provide the service in 2008, with expansion in future years. Expertise in database and systems development, needs analysis, and user interface design and development will be available. A model of engagement with faculties and research teams will be developed.

Summary of benefits

- Ensure researchers have access to the IT support and information they need to develop discipline specific software tools

- Ensure that researchers can benefit from IT development already carried out
- Ensure researchers are assisted in appropriately managing their research data

Research administration systems

High quality administrative, management and information systems are key to Monash's strategy to be a leading research-intensive university. New systems provide improved insight into Monash's research performance and also directly support the university's researchers, their teams and associated administrative staff.

Planned initiatives include systems and data integration developments to support the RQF, replacement of inappropriate database and spreadsheet usage, business intelligence reporting on research data and the further development of profiling software. This profiling software can then be utilised to pre-populate administrative forms that in turn contain in-built workflows. This should speed up the application processes for a number of university research systems.

Summary of benefits

- Reliable, high quality information on research performance at an individual, department/school, faculty and university level
- Increase in research funding and collaborative research projects
- Reduction in academic time spent on bureaucratic requirements, and therefore more time for core academic and research related business
- Identifying resources and expertise within the university and relating it to proposed research activities.

EDUCATIONAL TECHNOLOGY

Monash provides a mature suite of traditional educational technologies, and analysis by CALT, ITS, the Library, Faculties and others has identified a range of opportunities where services can be expanded. These opportunities are being addressed through a framework (providing governance and context) and a roadmap (providing an implementation plan). The development of the framework is being lead by the Educational Technology Committee, a sub-committee of Education Committee.

The roadmap proposes six programmes of work: providing enhanced support for education in physical learning and teaching spaces; the my.monash portal and Monash University Studies Online (MUSO) online learning suite; support for collaboration; the Monash University Lectures Online (MULO) audio lectures service; support for educators and the encouragement and support of innovation.

Flexible teaching, learning and collaboration spaces

Monash's multi-campus, multi-national footprint provides both opportunities and challenges in collaborative learning. Effective collaboration between teaching staff and/or students on different campuses is fundamental to the success of Monash's approach. In parallel, the evolution of pedagogical models and increasing student expectations of the physical spaces in which they learn are raising demand for collaborative teaching and learning spaces.

Leading practice³ suggests that the next generation learning space is not so much a traditional lecture theatre as a multi-format teaching and collaboration space. Spaces would support switching between a classroom format and group work in a single campus or videolinked multi-campus mode. Appropriate positioning on campus will encourage informal collaboration and group work between campuses. A suite of student response systems and a simplified multi-campus booking, support and maintenance model will ensure highly engaging spaces that are easily accessible and well utilised.

Summary of benefits

- Support for new pedagogical approaches in teaching spaces
- Opportunity for teaching staff to develop collaborative approaches that draw on local campus strengths
- Better access to teaching expertise across campuses for students
- Greater opportunity for students to work together in a problem-solving mode of learning

Portal and MUSO suite

The my.monash student portal and MUSO⁴ suite already offer a rich range of educational support. Access to this suite will be improved through the introduction of a student workbench, providing integrated, student-centred access to a broad suite of learning, collaboration and support services.

Support will be broadened with new services such as e-Portfolios and Sakai. e-Portfolios will enable collating and reflecting upon learning experiences in line with graduate attributes; and provide an environment to share those experiences with fellow students, teaching staff and potential employers.

The student workbench will also provide seamless access to real-time collaboration and administrative functionality. In addition, the workbench will incorporate functionality to support improved transition and retention for new students.

Summary of benefits

- Single point of access for students to all the learning, administrative and collaboration tools and services they need, making them easier to find and reduce lost productivity
- Ensure my.monash portal continues to be at the forefront of student portals across the higher education sector
- Evolve online learning tools in line with latest and best available on the market

³ In Australia (<http://www.uq.edu.au/nextgenerationlearningspace/forum-2007>), UK

(http://www.jisc.ac.uk/uploaded_documents/JISClearningspaces.pdf) and US (<http://www.educause.edu/LearningSpaces/10569>)

⁴ Monash University Studies Online, incorporating WebCT, InterLearn and other online learning management services

- Support student fulfilment of graduate attribute objectives
- Improve educational outcomes with better transition and improved retention of at-risk students

Collaboration support

New workgroup collaboration, voice and video services are being implemented from 2007-2009. These services will provide new opportunities for rich collaboration experiences across the international campus network and with partner institutions. In addition to basic email and calendar functionality, support for real-time collaboration support, team-based document sharing and collaboration spaces, internet telephony (VoIP) and desktop and room-based videoconferencing will be provided.

Summary of benefits

- Promote teacher-to-teacher, teacher-to-student and student-to-student communication and collaboration across campus and with international partners
- Ensure that planned investment is exploited to its full potential within the education context

MULO (Lectures online) enhancements

The existing Monash University Lectures Online (MULO⁵) service has proved highly successful, and requires significant investment to meet growth and functionality expectations. An initial refurbishment will support access and download via a variety of new formats, including Podcasting, along with synchronised slides, and, where available, video. Subsequent enhancements will include audio searching, annotation, support for video-podcasting and eventually full learning experience capture and playback (ie. video, slides, individual notes, in-class response, etc.).

Summary of benefits

- Ensure Monash lectures online capabilities take advantage of latest trends in consumer technologies
- Ensure Monash students can access the best live and recorded teaching materials, in the way that suits them

Educator support

A significantly enhanced education support environment places challenges on teaching staff to learn new technologies and identify appropriate opportunities to apply them in their teaching. Similarly, the university's increasing approach to multi-campus teaching encourages a more collaborative approach to developing and delivering course and unit materials.

A change management programme will be required to support these changes. Primarily driven from a pedagogical viewpoint by CALT, it would also need support from the Library, the Faculties and ITS. Pioneers will need to be identified and resourced to pilot new models of working. Some will need to be temporarily seconded as advocates, coaches and mentors in the implementation and rollout of the broader change. And significant effort will need to be invested in the development of training, support and technology facilities (eg. "teacher's workbench") to support the change programme.

Summary of benefits

- Single point of access to tools and services needed to collaboratively develop and deliver coursework
- Support for improved work practices (including staff development at point-of-need)

⁵ *Monash University Lectures Online*, the automatic capturing and publication of audio lectures from lecture theatres

Innovation support

There are significant opportunities for coordinated support of innovation, research and development in educational technology across the university. Innovations tend to be conducted in isolation, with little shared learning and significant possibility of duplication in researching the same or very similar products.

A more structured approach to supporting the various levels of innovation is proposed. A cross-disciplinary support network will be developed to provide joint pedagogy and technology support for teaching staff endeavouring to experiment and adopt new technology. It will incorporate expertise from CALT, the Library, ITS, SCSD and other stakeholders as appropriate.

As tools become more established, they would be deployed with an initial, moderate cost adoption into an 'innovation hotbed'. The 'innovation hotbed' will be provided through a common technology suite (ie. application framework and tools), allowing a consistent approach to development, delivery and re-use at both a technology and user-experience level.

Following successful piloting, the innovation support model will facilitate a transition path towards an enterprise class product pilot, that, with positive evaluations and support, could lead to a full implementation of a university-wide service via the normal budget and project routes.

Summary of benefits

- Increased level of support for teaching staff engaged in innovative use of technology
- Reduced duplication of effort across teaching staff
- Improved technology support freeing teaching staff to focus on the core of modifying pedagogy to take advantage of the innovation
- More transparency around moves from pilot to enterprise-wide educational technology deployment

ADMINISTRATION ICT INFRASTRUCTURE

Monash is in a relatively strong position with established and stable systems infrastructure to support core administrative functions such as student and academic administration, financial and resource management, and human resource management. There have been significant advances over the last few years in provision of more customer-centric services, and renewed commitment and a major re-investment in SAP ERP and Callista software has opened up opportunities for implementing new technologies and business functionality not previously possible. Considerable work has already been done, with ICT infrastructure and basic online services established and many successes such as the Web Enrolment System (WES) and Employee Self Services (ESS).

Many administrative and support systems depend to a large extent on the accuracy and currency of information in the core SAP and Callista systems. These integrated administrative applications are thus central to the successful operation of core university functions. Application integration and cross-application reporting are key issues for 2007 and beyond, with the focus now turning to consolidated information for tactical and strategic purposes. The business intelligence strategy being implemented from 2007 provides a three to five year roadmap for harvesting and presenting critical information for decision support.

Activities over the next three years will focus on strategically applying ICT to improve and reform underlying business and communications processes.

Enterprise Resource Planning (ERP)

With the 2007 implementation of mySAP, Monash's finance, human resource and payroll administration system is making available an extended suite of standard business functions including travel management, project systems, treasury and risk management, real estate, plant maintenance, eProcurement and employee and manager self-service functions such as performance management and eRecruitment. Support for mySAP extends to at least 2012, meaning Monash will not have to revisit ERP market offerings for at least five years.

Services will, wherever possible, be delivered through the SAP portal and include a range of functions applicable for staff as requesters and as approvers (the SAP terms ESS and MSS will no longer be used as staff will be presented with a single menu which is appropriate for their job role.).

A planned program of HR services over the next three years will use the SAP portal infrastructure to deliver high volume transactions such as performance management, online induction, recruitment and appointment/reappointment tasks. All services will utilize inherent SAP workflows and web based approval services to manage approval and escalation.

Summary of benefits

- Support for range of finance, HR/payroll and self-service functions until at least 2012
- Ease of expansion / growth and increased flexibility offered by mySAP licence
- Strategically leverages Monash's investment in systems through integrated, self-service functionality replacing manual or paper-based processes
- Streamlines transaction processing through introduction of employee and manager self-service and workflow applications.

Student Recruitment, Admission and Administration

By 2010 all significant events in the prospective and current student's relationship with Monash will be administered online and where appropriate initiated by Monash rather than being initiated by the student (eg. graduation). Guidelines will be set and processes established to ensure online engagement is a constant and consistent experience for the student client.

In addition to student life-cycle functions such as recruitment, application and general academic and student administration, related services will continue to grow around the core student system (Callista), including:

- Improved self-service (including Callista Connect), self-support (expanding ask.monash) and student communications (enhanced system utilising email and collaboration services)
- Improved records management through electronic records management system
- Enhanced student community with personal electronic directories ('social networking')
- Develop systems for assisting students with disabilities
- Timetabling and class booking
- Learning support systems for off-campus delivery
- Course and unit approval processes and publications (including curriculum data management)
- Admission and enrolment load planning and monitoring
- Core business surveys and evaluations.

The 2007/2008 eAdmissions initiative and International Admissions pilot program will see the introduction of the end-to-end inquiry-application-admission service channel for various cohorts and offers potential for the initial implementation of Monash's Customer Relationship Strategy.

Summary of benefits

- Provide robust and effective student administration for the university
- Improve the client experience by minimising contact points and maximising connected services
- Minimise the risk to the university through development of emergency management systems
- Minimise cost through standardised delivery of re-usable functions such as address changes

Donor and Alumni Management

Deficiencies in the core Donor, Alumni and Community Relations system (Advance CS) have been identified, both at strategic and operational levels. A structured program of data cleansing and system improvements commenced in 2007 with a comprehensive review of the current information systems.

Planned activities include further development of organizational capacity to underpin a powerful relationship network and support a high-performing information management system; reviewing the potential of the Advance CS system for Monash's donor and alumni engagement and enhanced electronic services for administrators and clients

Summary of benefits

- Develop a mutually beneficial relationship with prospects, donors and alumni to strengthen the viability of advancement and revenue generation
- Improve levels of conversion of prospects to students/donors
- Establishment of, and support for, essential infrastructure to underpin a powerful relationship network
- Reduction in custom development of core services, resulting in reduced costs and risks

Business Intelligence

Timely, accurate and meaningful data that can be manipulated and presented in a customized manner is critical to reaching the university's proposed objectives. A key requirement is the ability to report across multiple applications, so that a single view at different levels of the organization can incorporate HR, Financial, Student, Research and other information sources, including external sources. This need is being address through a Business Intelligence (BI) strategy that outlines a programme of work for gathering, storing, analysing and reporting data to help make better decisions.

A Business Intelligence project has been established and together with strong governance will address data quality and integrity issues university-wide. The Project will populate a data repository and provide enterprise wide definitions of data in a data dictionary that can be used in University-wide and local reporting (i.e. faculty, division, department, etc). The data repository holds copies of transactional/non-transactional data that have been transformed in such a way that querying, reporting and other analyses become simple. The process of transforming operational and transactional data results in a consistent view of information by providing a single source of Monash and other data.

Initial information releases for Research, Education, International, Advancement, HR and Finance and Resources will occur over the three years 2007 – 2009. Over the same period, data quality in source systems will be improved to guarantee accuracy of strategic information.

Summary of benefits

- Brings data from disparate sources into a 'single version of the truth'
- Provides easier access to corporate data
- Provides 360° view of customer (student) information (enrolment, research, financial, etc)
- Capability to improve business process through measuring and monitoring performance across a range of business activities
- Supports simple queries and reports, Online Analytical Processing (OLAP) and Data Mining approaches.

Customer Relationship Management (CRM)

CRM is an holistic approach to an organization's philosophy of dealing with its customers and stakeholders. This includes policies and processes, front-of-house customer service, employee training, marketing, systems and information management.

At Monash a CRM implementation will consider not only the underlying technology, but the broader organizational requirements and the impacts of change on the organization. It will encompass elements of prospective and current student management; alumni; prospects and donor management; industry and partnership management. As such, it will transcend the core administrative systems.

A number of areas of the university have a requirement to record details of contacts and conversations with members of the university community. Some areas of the university already have systems in place or are in the process of implementing them. Existing activities should be completed to ensure that high priority outcomes are achieved on schedule; new requirements should be consolidated into a university wide programme.

- A feasibility study will be conducted to establish the need for an enterprise-wide CRM approach, to establish requirements and develop a strategy and implementation plan. If implemented, existing CRM and cohort-specific contact management systems should be reviewed for possible assimilation or integration into an over-arching relationship management system.

Summary of benefits

- Improved marketing through a consolidated approach to planning, campaign management and lead management
- Improved student support and retention with a consolidated profile of enquiries and requests

ICT CORE INFRASTRUCTURE

Infrastructure is the underlying foundation for the IT applications and services that support critical university processes. Upgrading and maintaining infrastructure usually involves a large investment and significant resources and time to implement. Multiple complex dependencies require careful planning when changes are introduced in order to minimise disruption. With the reliance Monash has on its ICT infrastructure, it is important to maintain, refresh and expand the infrastructure to ensure it continues to support the university's goals.

Infrastructure planning needs to be carefully designed and executed so as to retain and improve as appropriate the following attributes

- security – to ensure data and services are not compromised
- scalability – to allow for growth and expansion (provisioning in anticipation of demand)
- resilience – to ensure services can tolerate a degree of failure
- recoverability – to ensure services are made available as soon as possible after failure
- accessibility – to ensure effective use of services by those authorised to use them
- manageability – to ensure services can be managed cost effectively
- fitness for purpose – to ensure value by providing effective services for the minimum overall cost (not over or under engineered)
- standards compliance – to ensure services can be accessed in a well understood manner and inter-operate with other services.

Workgroup Collaboration Support

Collaboration has been identified as a critical need by all sectors of the university: education, research and administration users. Existing email and calendar functionality will be replaced with an integrated collaboration suite. Commencing in 2007 the project will provide calendar, email, to-do, contact list functionality and limited PDA synchronisation through Lotus Notes and associated products. The next phase (2008-2009) will provide real-time collaboration support ('Sametime') and team-based document sharing and collaboration spaces ('Quickplace'). Integration with Voice and Video Services (described below) will provide a comprehensive integrated collaboration environment.

The final phase of the programme (2009-2010) will be the rollout of improved information management practices through the 'Information Management for Workgroups' framework. Adopting a common set of practices within a team or project will provide significant gains in efficiency and effectiveness, making it easier to find information, collaborate in activities and introduce new collaborators. The Information Management for Workgroups framework provides a systematic way to define, capture and spread common information management practices in a sustainable and extendible manner.

Summary of benefits

- Staff and students will be able to collaborate more effectively, across multiple sites and time-zones
- The need for staff to travel will diminish, saving time and environmental impact
- Monash staff who travel or work from multiple locations will have the benefit of more advanced methods to collaborate anywhere, anytime, and on a range of devices
- Advanced collaboration services will make it easier for researchers to participate in a wider range of research activities and relationships, regardless of location, or university affiliation
- Improved teacher to teacher, teacher to student and student to student collaboration.

Desktop Workstation Environment

A range of enterprise workstation infrastructure is already provided for staff and students, supporting functions such as file and print sharing, application distribution, workstation inventory, backup and remote access. In addition, a standardised desktop (SOE) is being piloted and is likely to be rolled out for general staff. The SOE will provide a consistent approach to procurement, image deployment, installation and ongoing management and support, with interoperability benefits for end-users and IT support staff. An important consideration in the current planning horizon is the implementation of Microsoft's latest release of the Windows operating system, Windows Vista.

Thin client technology will continue to support remote access to central applications, especially to non-Australian staff. Over the next two years, ITS will also conduct a review to ascertain if the services currently provided by the Novell environment will continue to be appropriate in the coming years, particularly in light of new overlapping services becoming available through the Workgroup Collaboration Support project.

Summary of benefits

- 15-40% lower costs associated with desktop support through the use of a Standard Operating Environment allowing quicker support through telephone, remote or onsite access
- Ability to deploy University services and applications in a consistent and timely fashion
- All staff have the ability to access applications and data through a number of mechanisms from different locations around the University
- All students obtain high quality, consistent services regardless of campus or location.

Web Strategy Implementation

Through a broad consultative process combined with industry research, a university-wide web strategy was developed in 2005 and published in early 2006. The web strategy states that the university's web presence must "Attract, support and retain staff, students and partners most likely to help Monash in the attainment of its strategic goals, in the most cost-effective manner."

The strategy represents a major shift in the university's web presence, separating public (external-facing) and intranet (internal-facing) content and focuses on user needs and activities rather than on institutional information silos. Incremental enhancements can be conducted as part of aligned projects or operational web activity, but an implementation project is required to oversee the consolidation of the public web presence. The project would assist content publishers to categorise and place information for best effect for various target audiences. The new web presence is expected to provide significant improvements in engaging with external and internal communities, providing real staff savings through increased productivity and increased revenue.

This is a two-year project. During the first phase, the Monash public web presence will be redeveloped and internally focused content will be moved to a separate university intranet. During the second phase the intranet will be further refined to target specific roles, functions and workgroups. Existing IT infrastructure such as the Web Content Management System, user authentication systems and the my.monash portal will be used to develop and deliver the new Monash web presence. All intranet content will be accessed via the my.monash portal allowing Monash users to seamlessly navigate across all relevant content from a single login.

Summary of benefits

- Streamlined public web site will:
 - better position Monash to attract the leading undergraduate and postgraduate students, and leading research, teaching and general staff
 - better position Monash to engage with partners and benefactors
- Redeveloped public web site will showcase key areas such as research achievements and advancement / marketing campaigns
- Separation of public and intranet content will:
 - make relevant information easier to locate
 - improve security for intranet content
- Improved content maintenance and delivery processes will minimise unnecessary duplication of content and resources by allowing portions of content to be re-used in more than one place.

Data Centres

Centrally provided infrastructure is managed in two air-conditioned, fire-protected, redundantly powered data centres that ensure high availability. Both facilities are aging and have limited capacity for improved power and air conditioning requirements of increasingly consolidated computing, particularly supporting the university's research program. The proposed data centres would provide nearly double the capacity of existing facilities and provide adequate power and air conditioning capacity to support this growth.

On hot days Building 28's air conditioning is inadequate for the existing load. As the temperature rises, equipment becomes unreliable. Should the cooling equipment fail, servicing and recovery times are sufficiently long that servers would need to be turned off, with associated loss of service. Power in Building 28 has only 10% capacity left and any increase in cooling capacity will require an upgrade to the building's electrical infrastructure. Interim upgrades must be implemented to ensure service continuity until the first centre is available, hopefully in early 2009.

Resilient service delivery requires spreading services across two geographically separated data centres. Other organisations have similar requirements, and Monash is seeking a partnership with another organisation to share the costs (and benefits) of an improved dual site environment.

Summary of benefits

- Increased capacity for server growth to meet growing demand for online services
- Decrease risk of physical infrastructure failures resulting in significant and prolonged interruptions to service.

Data Network (Cabled and Wireless)

Over 20,000+ network data points (including 400 wireless points) provide robust, high speed (gigabit per second) access to desktops, laptops, printers and other devices. Behind the scenes the service is managed and delivered through 1,350 network devices in 150 buildings on 20 sites.

The network includes enhanced security performance to conform with Monash policy. Quality of Service (QoS) support is being implemented to prioritise traffic for delay-sensitive applications such as video and Voice-over-Internet Protocol (VoIP). The strategy for network enhancement supports e-Research initiatives with enabling technology for the development of computational storage, collaboration grids and advanced communication services. Progressive enhancements to inter-campus and Internet gigabit network capacity links through the Victorian Education and Research Network (VERN) will enable provision of an equal service to all Australian campuses. Initiatives are being implemented to ensure appropriate service to international campuses as well (although national issues in South Africa will continue to offer challenges to service levels).

A significant refurbishment to the next generation of network technology ('IPv6') is scheduled to commence in 2009. This upgrade will overcome some limitations of current networking technology, but legacy network devices (including some PCs and printers) may not support the new technology. Planning will need to commence in 2008 to ensure appropriate preparation across the university.

Finally, enhanced proxy capability will improve performance for web-based services and content.

Summary of benefits

- Improved performance across internal and external networks (regional (VERN) and national and international (AARNet))
- Increase opportunities for video, audio, voice and related rich media and mixed media content across the full spectrum of services, from courseware through to research and administrative functions of the University
- Wireless aids mobility with base stations located at convenient locations, (meeting rooms, cafés and libraries), and the 'eduroam' service (<http://www.eduroam.edu.au/>), providing access for Monash people at other universities and non-Monash staff at Monash.
- Ability to do fine-grained security and billing
- Reliable service delivery orientation to allow Business Continuity 24x7 with planned resilience and Disaster Recovery support. Network capacity planning ensures risk minimisation to services reliant on the network
- Security–Ingress Control – Protect the network from misbehaving applications through the implementation and maintenance of network access control policy.

Voice and Video Services

Monash supports a large and complex voice and video communications environment, delivering telephony and videoconferencing services across the international campus network. The present environment delivers isolated communications on aging and under-capacity infrastructure.

A large-scale refurbishment effort will provide improved, integrated communications across voice (VoIP), telephony data (faxes) and video communications. Presence information will indicate availability and allow calls to be accessed from or transferred between a range of devices (eg. desk handset, laptop 'softphone' or mobile phone). Improved video conferencing infrastructure will support expanded desktop and room-based videoconferencing, providing improved quality, security and access. Integration of voice and video services with workgroup collaboration support will provide a rich, integrated collaboration environment.

Summary of benefits

- Meet increased demand for a variety of voice technologies that aid mobility on-campus, inter-campus, inter-University, Australia-wide and worldwide
- Improvements in success of reaching the desired person through functionality that supports presence awareness
- Ability for the receiver to control how and when to receive communications
- Potential to improve workflow through the integration of voice and video capabilities to enterprise applications
- Containment of costs by moving to one technology network platform that converges voice and data infrastructure into a single unified service. This has operational cost savings and simplified operations in maintaining a single infrastructure

Host Server Platforms

ITS is consolidating and standardising the infrastructure environment around new technology standards to provide a more flexible, secure and uniform platform that simplifies configuration, deployment, and management of our server resources and reduces the Total Cost of Ownership (TCO). The migration of services from the existing hardware platforms to this virtualised space began in 2006, and will continue as hardware currently in use comes to end of life over 2007, 2008 and 2009.

Over 450 host server platforms provide the underpinning infrastructure for all University applications and services. Traditional infrastructure approaches result in higher overheads, with servers supporting fewer applications, higher support costs and larger quantities of data-centre space. New infrastructure technologies support on-demand capacity provision, allowing capacity to be adjusted as needed by the application in a cost effective way.

Summary of benefits

- Lower power and environmental resource usage through fewer physical servers
- Lower TCO per server as utilisation of hardware is typically increased from below 20% to above 80%, requiring fewer physical devices to deliver the same performance
- Improvement in scalability and enhanced ability to deploy new services efficiently and in the shortest possible timeframe
- Improved business continuity through hardware sharing and the ability to relocate virtual servers to other sites in real time, minimising outages
- Simplified Disaster Recovery by using common hardware across ICT services

Data Storage Management

The storage of corporate data has grown from 8 terabytes in 2004 to 65 terabytes in July 2007. The proposed work for corporate data parallels the developments undertaken in the LaRDS project that addresses the rapidly increasing demands for research data storage.

The challenge is to provision storage capacity on an as required basis, at the lowest cost possible, and in as efficient a manner as possible, while still meeting the resilience, performance and recovery

needs of the service. A Storage Area Network (SAN) was installed in 2004 in order to better manage university data, increase storage efficiency, improve resilience and reduce costs.

Activities anticipated within the planning horizon include the introduction of a third, low-cost tier, improved reporting, allocation and utilisation, and hierarchical storage management (near line storage on tape). A significant upgrade of the storage infrastructure to the next level of technology is required to improve storage performance and cost efficiencies.

Summary of benefits

- Reliable data protection via enterprise class backup and restore facilities
- Tiered data storage solutions to meet the differing university demands
- Reduced costs (administration cost per Gigabyte, Total Cost of Ownership per Gigabyte, improved efficiency for disk storage utilization, etc.)
- Remove vendor lock in, creating greater competition for future purchases.

Security

Maintaining the confidentiality, integrity, and availability of the university's teaching, research and administration information is extremely important to Monash's reputation and survival. As a large proportion of Monash's IT fleet is directly connected to the Internet, the university is potentially susceptible to threats that can directly impact the security of its information. These threats are constantly changing. Monash needs to be continually vigilant in defending itself against these security issues to protect its reputation and its intellectual property.

A combination of people, processes, and technology is needed to protect against IT security risks. People (staff, students, and IT staff) must be adequately educated to ensure they understand how they can help protect the University from attack. Our IT security policy and processes are based on best practice ISO 17799. From the technology perspective, key IT security components are integrating together to provide a platform where users can do what they require, but do so securely. This is especially important when looked at from a University perspective.

This strategy encompasses the following components:

- Education – maintain an active education programme with all users of IT at the University
- Processes – ensure that Monash's security policy and procedures meet best practice
- Technology – Review the University's security architecture in terms of:
 - Firewalls, which allow appropriate traffic and block inappropriate traffic
 - Intrusion Prevention systems, which detect attacks and stop them in real time
 - Network Admission Control, which ensures networked devices are 'safe' before they are allowed access to the University's network resources
 - International Virtual Private Network, providing improved security for international campuses without reducing performance while access Australian-based services
- Automation – replace manual monitoring, management and response processes with automated ones.

Summary of benefits

- Protects the University against user initiated security problems through an effective user education programme
- Enhances the Network Access Control Policy, provides support for more protocols, e.g. H.323 which will support collaboration via voice/video conferencing
- Allows finer grain access control and configuration to services, reducing the risk of compromise
- Stops attacks in real time, lowering required staff effort. Will also stop undesirable protocols in real time, eg. Kazaa, BitTorrent
- Protects PCs by ensuring they have the latest patches and up to date anti-virus installed on them – this is especially important with portable computers that may plug into different networks.

Application Integration

Monash has a large and diverse collection of information systems. Information must flow between systems and be jointly reported from all systems in order to effectively support the business processes and information requirements of the university. New integration technologies based around the Business Process Execution Language (BPEL) are significantly reducing development and maintenance costs for these integrations. BPEL not only shares data and provides joint reports, but can also build workflowed interaction between multiple applications. The project team is gradually replacing legacy integrations with this new technology. The project will eventually provide a shared library of business functions that can be aggregated by central and faculty/divisional developers into custom applications, reports and workflows.

Summary of benefits

- Ability to link local administrative systems to corporate applications
- Better, timelier access to information with real-time integration of events providing improved support for business needs
- Reduction in inquiries and complaints from students and staff arising from delays in triggered events
- Ability to convert manual workflows into web based applications that cross application boundaries
- Reduction in costs of interface development, maintenance and operations
- Reduction in risk of errors caused by relying on unauthorised sources of data

Identity Management and Authentication Systems

Identity Management governs access to systems and content through access controls, roles and credentials. This includes services such as computer account and password management, centralised directory services, account profiles, access rights, and underlying management systems. Timely access to appropriate resources is imperative for staff productivity, information management and intellectual property/security.

In order to support collaborative work with other institutions, the federal government is developing national federated Identity and Access Management infrastructure (Australian Access Federation, <http://www.aaf.edu.au/>). These federated approaches to authentication and access will allow greater collaboration between Monash researchers and researchers at other institutions. It also has the potential to provide Single Sign-on (SSO) web services within the university.

Summary of benefits

- Reduced cost through centralised management of user computer accounts and identity
- Increased security through centralised management and consistent application of registration/deregistration procedures
- Ability to collaborate easily with external parties.

Enabling services

A range of enabling services are centrally provided or co-ordinated to facilitate high quality service. These include leadership, training and consultancy in the adoption of project and service management frameworks and provision of first and second level ICT support and training. These approaches are increasingly working together to ensure successful service outcomes from a project's conception until its commencement as a service and throughout the service's life.

A range of recent activities have commenced in these areas in light of increasing demand for ICT services as funding continues to diminish. The current status of these services is:

- **Project Management Office:** Originally established in 2000 to support and oversee the capital programme, from 2007 the project office will have an increasing role overseeing all significant changes both for existing and new services.
- **Service Management Office:** Established in 2005 to oversee the governance of services through service level agreements, since 2006 the Service Management Office has been standardising the delivery of "by request" (including "fee for service") point solutions that build on existing services.

- **Service Desk:** Reconfigured in 2004 from the ITS HelpDesk, from 2007 the Service Desk will provide leadership in release management, incident management and problem management.
- **Training Office:** From 2007 the training office will oversee all centrally provided ICT training across enterprise systems (eg. SAP and Callista), frameworks (eg. ITIL Service Management and Thomsett Project Management) and technical support systems (eg. AddHost and CRUX).
- **Procurement and contract:** From 2007, centralised procurement, contract and licensing functions will ensure consolidated vendor negotiation across the university.

Summary of benefits

- Improve performance and quality of ICT across the university
- Improved governance and accountability for capital and operational investment
- A single point of contact for all student and staff enquiries and incident reports
- Optimise procurement and contract negotiation outcomes across the university
- Consistent priorities for operational enhancements across the Division