Information Systems Services

Annual Review

2006/2007

Highlights of the Year

Performance Improvements

- Availability of Internet connectivity via our Internet Service Provider (ISP) HEANET was 100 percent with no outages in web services.
- Email availability for staff and students was 100 percent with no recorded outages in service.
- Just under 40,000 requests for IT help resolved by IS Services staff
- Introduction of “best practice” ITIL approach to IT service delivery

Services for staff

- Podcasting – new podcasting service available for academic staff
- Technical support available for lecture theatres 0800-2145 daily
- Laptop and projector loan scheme made available through helpdesk
- Portable audio and video conferencing units available for loan through helpdesk
- New DELL hardware service provided by IS Services staff
- New telephone support system offering improved call handling and response times and call back features.

Services for students

- 2,600 students connected to the College network – a 100 percent increase via the first self service technology in any educational institution in Ireland.
- New Google Applications including Gmail introduced in June 2007 the first university in Europe to adopt,
- Email for life service introduced for TCD students.
- Growth of 60 percent in wireless network access points increasing number of access points from 290 to 469, significantly improving mobility in line with the strategic plan

Services for researchers

- Expanded network capacity and international connectivity and 100 percent availability of Internet service,
- The extension of the College’s wireless network to most areas of the College and the enablement of the roaming facility “EDURoam” continues the process of implementing a mobile information service of international standards
- Customised IT training courses

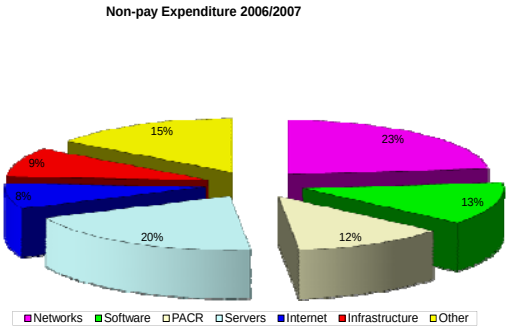
Services for conferences

- Guest access – guest access for connectivity to the Internet made available to the Accommodation Office and various academic schools
- BT Open Zone – First commercial Internet service in any educational institution in Ireland provided to all visitors to College
- 1st line technical support and service level agreements for conferences

Financial Review

Non-Pay Costs

An outline of the major non-pay expenditures for the year is shown below.



It is worth commenting on some of the major cost items shown above. The single largest item is the College network which continues to expand to new areas and to require constant upgrading and maintenance in order to provide the continuous and reliable levels of service expected.
Financially, a significant component of the College network is the horizontal cabling system with provides data outlets at the work space.
During this period IS Services subcontracted 70 minor extensions to the wired network on behalf of Departments. The total cost of works was €192,000 and consisted of the provision of an additional 574 dual data outlets.
Additionally IS Services co-ordinated an additional 10 extensions to the wired network undertaken and funded by Director of Buildings on behalf of other departments. These ten additions comprised an additional 105 dual data outlets.
The CRANN/Sports Hall/Science Gallery alone added an additional 1050 dual data outlets to the horizontal cabling infrastructure.

The total growth of wired network infrastructure during this period was 3,458 data outlets.

The annual spend on software to support College needs has also increased. The annual Microsoft License for College for example, is €128,000.
As part of the annual replacement of a percentage of outdated hardware, extra resilient servers were installed which increased the server spend to 20 per cent, compared to 14 per cent in the previous year.

Staffing Review

Following the staffing difficulties of the last few years, a more stable position was reached and a major investment was made in staff training to ensure the modern services expected by users could be provided in an optimal manner.

Senior Management Team

In the post reporting period the Director of Information Systems Services retired in Dec 2007. The Deputy Director has now taken the role of acting Director and the MIS Manager is now acting Deputy Director.

Short Term Contracts

A concerted effort was made to minimise the time consuming recruitment exercises involved with reappointing short term contracts on an annual basis.

Where possible short term contracts were converted to permanent positions or to contracts of indefinite duration. This should result in a decrease in recruitment activity in future years. In some cases, staff are funded by other College areas and attempts will be made to crystallise the funding for these positions so that contracts of indefinite duration can be provided for these staff.

The move towards longer term contracts and permanent positions should mean the investment in staff training is retained in College and the overall costs of recruitment are reduced significantly in future.

There was a notable tightening in the market for IT specialists in Ireland during the year. This could have an effect on future recruitment and IT development due to shortages of trained staff.

Formal IT Service Standards

Following on many years of IT development in IS Services, some more formal standards and practices were introduced during the year. These will result in changes in ways of working in coming years as components are adopted from the formal standards.

The service standards include “ITIL” and are regarded as world class for service delivery.
Work commenced on the reorganisation of the User Support group in early 2007. This was primarily aimed at improving customer service but also the first move in realignment with the proposed new College academic structures. Work also started on the provision of Service Level Agreements (SLA’s) and a pilot scheme involving four, areas two academic and two administrative/support was initiated.

The formal standards will be most apparent in the User Support and Helpdesk areas where changes will be introduced to provide more information for users on the status of work and the expected delivery time of requests.

External Environment

Security

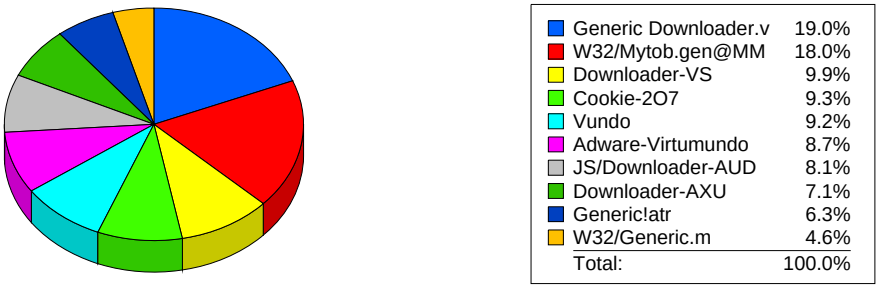
The 2006-07 academic year marked a notable rise in IT Security threats globally and consequently to the College data network. Spam volumes rose rapidly as did the number of malware detections recorded by the College’s centrally managed anti-virus detection systems. Additionally, an increased number of Security incidents were recorded in 2006-07 these included virus outbreaks, compromised systems, and compromised account credentials.

The scale of College operations, the rapid adoption of new technologies and the large number of new systems/applications implemented in College every year contribute to a challenging environment in which to implement security controls however Information Systems Services have made significant progress in the following key areas:

(i)Virus/Malware

The comprehensive antivirus software in place on all desktop and server systems has continued to successfully minimise disruption caused by viruses and worms. The most significant disruption this year was caused by the W32mytob.gen virus which resulted in 35 machines being temporarily disconnected from the network in January 2007.
College Virus statistics continue to reflect increased detection and mitigation of spyware and associated malware, and reduced incidents involving traditional viruses and worms.
As an additional service Information Systems Services use the data produced by the College anti-virus system to contact users experiencing repeated virus detections in order to provide assistance in identifying underlying issues or vulnerabilities associated with their computers.

Top Ten viruses detected 06-07



(II) Software Updates

Monthly roll-outs of Microsoft Security patches continue to approximately 4000 workstations and servers in College. These rollouts are managed by the User Support Group and are successfully ensuring that College machines are compliant with the most up-to-date security levels. This provides further protection against virus infection and system compromise.

(III) Account and password management

A number of initiatives have been progressed to help ensure the integrity of College user accounts and passwords. Information Systems Services have implemented a 180 day mandatory password change policy to ensure that users update their passwords in a timely manner. Additionally, Information Systems Services continually review the security of existing passwords and notify users suspected to have weak passwords.

Also in 2007 a new system was implemented to enable users to manage passwords more effectively. The Password Manager service is a web-based application which enables College users to change, reset and unlock passwords either from Campus or off-Campus via a web browser.

(IV) Phishing

Phishing, the process whereby criminals attempt to obtain user credentials or financial information by fraudulent emails or websites emerged as an increasing threat to College users this year. Information Systems Services have repeatedly communicated the dangers to users, reiterating the message that users should never respond to unsolicited requests for personal account or financial information.

(V) Disaster Recovery
In December 2006 the Information Policy Committee approved the first draft of the Information Systems Services Disaster Recovery Policy. This includes backup and recovery details for all key College systems managed by Information Systems Services. This document conforms to the international ISO27001 standard as requested by external security auditors. The next phase of this process involves testing the recovery procedures for all key systems which Information systems Services plan to progress in the next academic year.

(vi) Login banner
A new login banner was added to the College domain. This is a dialogue which appears as users log in to the domain which reminds users of College IT policy and of their Security obligations. This was implemented in line with best practice.

(vii) Network Design
Significant security improvements have been introduced in the network architecture. A DMZ has been introduced to house high risk Servers/Applications providing Internet facing applications. This will serve to protect the internal local area network from Internet attacks.

(viii) Intrusion Detection
The College Intrusion detection system which proactively detects threats to the College network was expanded to cover the College data network more comprehensively. This system has proven particularly successful in alerting Information Systems Services to security incidents in a timely manner.

(ix) User Awareness
Information Systems Services has continued to provide high quality information and advice to users on measures to secure their IT equipment via user notes and an information website.

Availability
Security of information services in College involves not only ensuring the integrity of information, but equally making sure that services are available to users whenever and where they are needed. Many areas in College are unable to function when there are breaks in the network service.

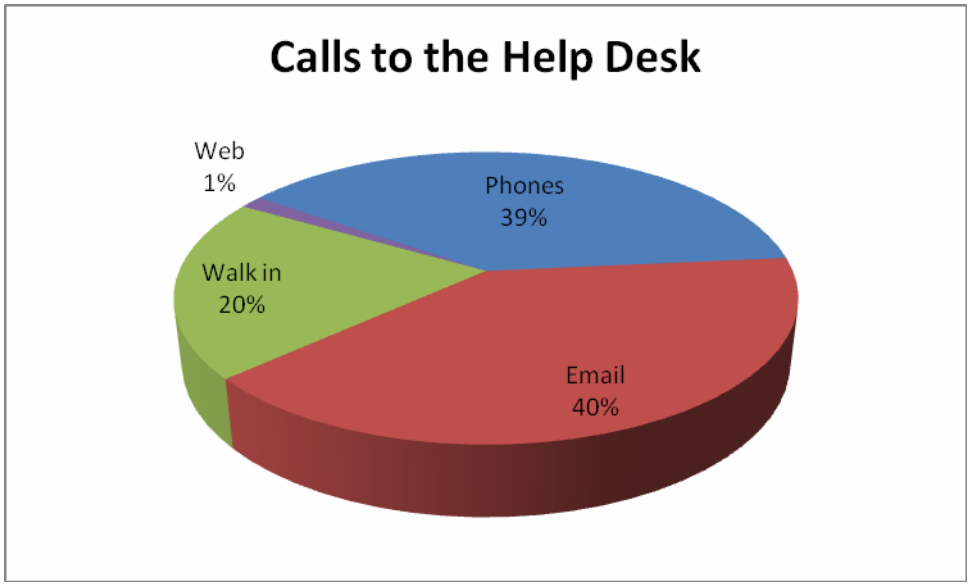
When new applications or services are installed on the College network, it is now practice that duplicate systems are also installed to maintain services should one component fail. The requirements for a 24 hour, 365 day a year, service required extra investment to provide this resilience and this investment will be required for all new systems in College.

In particular, the College's web presence is a vital service to users inside and outside College. In order to protect the web presence, a separate copy of the website is maintained in a data hosting service outside of College which provides a safe environment should the main web service fail for any reason.

Support Activities in IS Services

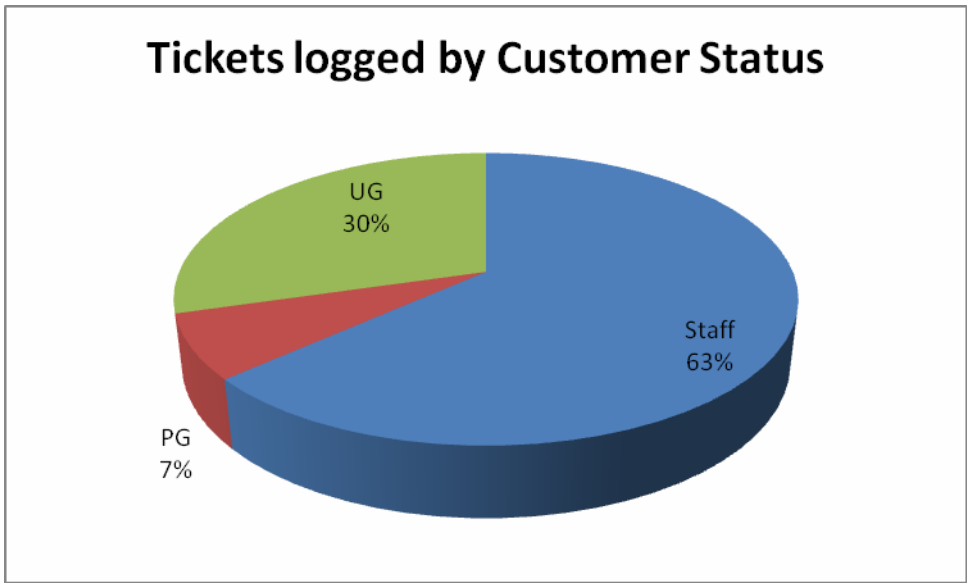
User Support

The central point of contact for all IS Services technical queries is the Helpdesk, which is managed by the User Support group. The continuing rise in the numbers of staff using computing services and the exponential rise in undergraduates now with their own computing devices has resulted in a significant rise in the number of users contacting IS Services for assistance. The total number of calls answered by IS Services Helpdesk staff over 2006/07 was 39,415. The preferred mechanism for contact is now email for the first time surpassing phones. The preferred mechanism for staff is still telephone and in 2007 a new telephone system was introduced which greatly enhances the customer experience. The new system has customer call back service which allows customer to hang up but retain their position in the queue, it also has queue information – whereby all customers are advised of position in queue.



Over the year an exercise in customer profiling was conducted. There has been a significant rise in the number of undergraduates contacting the Helpdesk. This is in line with the increase in the number of students using their own personal computers**.** For the first time the number of staff wishing to connect or get help with laptops has exceeded that for similar requests for desktop computers. This is very much in line with the worldwide move towards mobility.

Break-down of customer profiles



Improved Support for Dell Hardware

During the year two staff were trained as Dell Certified Hardware Diagnostic Engineers.
IS Services personnel will diagnose and resolve all matters, and any required interactions with DELL for the issuing and/or installation of replacement hardware will take place between DELL and IS Services personnel. Users are entitled to next day on-site visit from IS Services which is the same as they would have got from DELL.

Automatic Updates for Windows PC's

Monthly security updates are now automatically pushed out across the network to all windows PCs removing the need for PC users to manage their own updates.

Training Programme

During 2006-7 IS Services continued to expand the range of training courses offered to College staff and postgraduate students. In the period Oct 2006 – September 2007 the Training and Publications group conducted 188 training sessions which were attended by 1,479 College staff and postgraduate students.

Of those attending courses, 47 percent were postgraduate students and 53 percent were College staff. Apart from the published schedule of courses, a number of customised courses were arranged, on request, for researchers

and postgraduate students in areas including the Trinity Centre, St. James's Hospital and the Department of Health Policy and Management.
IS Services act as an accredited testing centre for the European Computer Driving Licence and conducted 77 tests during 2006-7.

Staff from the Training and Publications group participated in the inaugural TCD Postgraduate Skills Summer School which was held on June 18-20, 2007. Training sessions were conducted in Effective Presentations using Powerpoint, Planning Thesis Production Using MS Word, and the use of Google and TCD library resources (jointly with library staff).

Courses have also been targeted at staff that have little computer experience, or would not traditionally be computer users, so that they can perform activities that require internet access.

The training unit continue to play an active role with the work of the Trinity Access Programme.

Audio Visual and Media Service

The audio visual installations continue to be an integral part of the teaching facilities in College. During the year a maintenance contract was arranged on the equipment installed in the main lecture theatres.

The systems in the Senior Lecturer's pool rooms will be serviced a number of times a year and any breakdowns in the interim will be repaired by one of the College's audio visual suppliers on a call-out basis. IS Services staff will continue to check the correct operation of the equipment and will also provide a first level support to users of the theatres and seminar rooms.

Integration of data and display services, so the Lecturer in a classroom or theatre need only interface with one unit when encountering a problem, was achieved during the year. Theatre audio visual facilities are now serviced by the same team servicing the computers which has eliminated a number of frustrations for the lecturing staff.

In line with existing practice, a number of lecture theatres had their AV facilities upgraded with new projectors and the standard control unit. Following on from the pilot schemes, additional facilities for videoconferencing and podcasting of lectures were installed in some theatres. There has been a noticeable growth in the use of these technologies and some very positive feedback has been received from the user community.

One of the notable system installations was the design and installation of a display facility in the Board Room which has greatly enhanced presentations at meetings held there.

A number of high profile events and meetings were recorded and edited by AVMS staff. Some of these were webcast or video streamed as requested.

Student Facilities

Student Induction

Traditionally, Junior Freshmen students attend a one hour induction programme to familiarise themselves with the way IT services are provided in College. This year the bulk of the courses (1,800 out of 2,100) were provided in an online interactive manner rather than in a class.

The induction was initiated when a student logged onto a machine in College, with the username and password that they were provided at registration. They were then taken through the induction tutorial before they could perform any standard functions on the PC. The induction course takes the students through the use of the College computer rooms, email and specific pointers on the College website.

Student Computer Rooms

In keeping with standard practice – to ensure students have access to the most modern computing equipment possible - about a third of machines in the student computer rooms were upgraded during the summer. Machines that are replaced in this process are installed as stand-up email stations in public areas in College.

The PCs College Centres in St James's and Tallaght Hospitals were upgraded and all email stand-up stations were upgraded.

As the student computer rooms are high use areas, a number of them underwent major refurbishments, including painting, lighting and carpeting.

Extra stand-up email stations were installed in various places around College where space permitted, including a cluster in a new location in the Arts Building near the Davis Theatre. A number of these stations are equipped with furniture that allows access from a wheelchair.

Student Owned Computers

The system to allow the secure attachment of student computers to the College network which had been deployed the previous year was heavily used. The system is called Network Accession Control (NAC). This system, which depends on a dedicated network appliance, detects a computer connecting to a specified network point and starts a process to check the machine for compliance to standard College policies. The system is implemented by an identical pair of boxes to ensure a resilient service for students.

If the computer complies with current policies on operating system version, presence of appropriate security software and absence of identified viruses or spyware, the machine is connected to the appropriate section of the College network for that particular user or area.

In the event that the computer does not comply with the defined standards, the machine is placed in a quarantine network and the problems are described to the user with solutions suggested. Once the appropriate repairs are made, the user can then connect to the College network.

Where new threats are identified during the coming years, it will be possible to force machines to apply patches or other software downloads to ensure that machines do not jeopardise other activities or users of the network.

A measure of the success of the system is that 80 per cent of computers were connected to the College network out of normal working hours, in the students' own time. In the past, a student was required to bring their computer to a special network clinic, most of which were held during normal office hours.

In the first four weeks of operation of the system more that 1,100 new student computers connected successfully to the network, most of which did not require the student to contact IS Services for assistance.

Originally only available for students in residences, or for fixed networking connectivity in Libraries, September 2007 saw the system being made available for students requiring connection to the wireless network which means the service is now available to all students who have the relevant computing devices.

College Networks and Services

Identity Management

The Identity Management system that has been implemented over the last few years continues to pay dividends as new services are integrated with the system. All new services must support the Identity Management system so that users only have to remember a minimum number of usernames and passwords. The final phase of this will be completed in 2008 but significant enhancements were added in 2007.

New appliances supporting connections to the internet and the Network Accession Control system all connect to the Identity Management system.

It is planned that the new staff email system and the extended facilities for sharing calendars will similarly connect to the system and will allow the users easy access through their standard username and password.

Password management is one of the major problems referred to the Helpdesk. The use of multiple passwords causes problems; also users tend to

forget their passwords following periods of vacation. A new service has been implemented which allows users to create new passwords online when they answer some personalised questions and this should eliminate many calls to the Helpdesk and will allow users to resolve problems outside normal working hours. This system will also facilitate improved password security now that policies are in place for regular password changes and better password selection.

Email Service

Extensive planning to introduce new email systems for both staff and students was undertaken. A review of best practice in universities was carried out and it was determined that the demands of the two groups are disparate enough to provide different technologies for each.

Modern email systems provide more than simple email and usually integrate a range of personal productivity tools that can be linked to personal digital assistants or the functions built into mobile phones. For the last few years, a limited shared calendar system has been provided to some staff and on the basis of increased demand for this service, therefore the extensive use of shared calendars was made a requirement for the new system.

Staff Email

The new system, for staff and postgraduate students, will continue to provide the existing email services, so there should be no major change for users. A new Webmail system will be implemented at the same time. As well as email, the new service will provide online calendars for all staff and postgraduate students, available on the computer desktops as well as on the web. Thus, a calendar user will be able to manipulate their diary over the web, even when they are out of the office.

The new system will integrate with the Identity Management system, eliminating the requirement for users to remember multiple passwords.
The new system will be available in mid 2008.

It has been noted that the existing Webmail system in College, while it is used very extensively by both staff and students, lacks some of the modern features expected in a mail system and presents problems in universal access to the package. Whilst access problems can be alleviated in most cases, plans were undertaken to set up an alternative service for undergraduate students which would provide them with extended features and larger online storage space.

Student email
In early 2007 it was decided that the new student email system would be provided by Google. It offered considerable advantages over the existing email system for students, IS Services and College.

Senior management at the university were already considering Google Apps for Education which provides free of charge email and a range of collaborative applications including Google Calendar to: (a) coordinate meetings and School events with sharable calendars, Google Docs: (b) create, share and collaborate on documents in real-time, and Google Sites; (c) easily build team websites.

The move to Google Apps has eliminated the need for additional hardware and ongoing maintenance, and has delivered significant cost savings.

The ability to retain the College's email alias – and the fact that there was no charge for the service greatly influenced the decision-making.

The system went live in May 2007 and all current 4th year students were invited to opt in to the new service. All continuing students and new entrants were automatically setup with new accounts in Sept 2007.

As part of the implementation of the new student email system all students now retain the email and account facilities after they have left College and this would provide the "email for life" concept for University Alumni.

SPAM Email

In 2006/07, there was a major shift in the activities of the network-hacker community. From seeking personal aggrandisement and notoriety by breaking into computer systems, there was a move to activity motivated by personal gain. This great upsurge in nefarious activities is a result of criminal action by those seeking to defraud individuals or corporations for financial gain.

SPAM email is one of the tools of a modern criminal fraternity. It is exceedingly cheap to send spam email and whilst the return on any individual email is low, substantial fraud can be inflicted by enormous numbers of emails.

The identification and trapping of spam email is very much a cat and mouse affair. Once effective measures are put in place, the spammers evolve their techniques to bypass the defences that are put in place.

In December 2006 IS Services introduced a new SPAM filtering service for the College email systems. All mail coming into College is now filtered and quarantined by a Microsoft product called Exchange Hosted Services (EHS). The reduction in SPAM email has been dramatic and it has provided very successful spam and virus filtering service for TCD throughout 2007.

On average for the period from January to September 2007 88% of all e-mail sent to TCD was spam. To give some idea of the scale of the problem in Sept 2007 there were 19,805,073 emails sent to TCD only 4,069,795 were valid emails. The new system gives a guarantee of 100% virus free emails and 99% SPAM free emails.

College Network

The College network was enhanced and expanded in several stages throughout the year. Extra fibre-optic links were installed between the major networking hubs which, coupled with replacement hardware, allows for extra resilience and throughput to the major areas in the main campus.

Through using the Dublin MAN (Metropolitan Area Network) provided by HEAnet, it was possible to link the Trinity Enterprise Centre in Pearse Street into the College network.

The HEAnet Dublin MAN also allowed for specialist research links to be set up on a fibre-optic network to researchers in Dublin City University. This sort of collaboration would be extremely expensive, or even impossible, to set up and operate on an ad-hoc basis. It is likely that future research collaborations will be facilitated by the modern networking facilities that are currently being put in place.

Wireless Networking

The demand for extra wired network points continues as extra space is acquired by the College and users install multiple machines in the existing spaces. The expansion of the wireless service has proceeded according to plan with 60 per cent growth in wireless coverage during the year.

Whilst much of the main campus is wireless-enabled, areas remain which will be addressed in coming years. Areas with high numbers of mobile users will be targeted first. New wireless access points were added in the Arts building making it totally wireless enabled, the Enterprise Centre was also added as was Trinity Hall in Dartry and East Theatre.

Pilot Projects

As the ICT world moves towards convergence and more services are expected from the ICT infrastructure two high profile projects were conducted. The first was in the area of IPTV which involves delivering TV over the College data network. A trial was conducted that was successful and it is hoped to progress this technology in 2008 subject to funding. Some applications of this technology would be to provide language students with language channels directly to their computing device or to any computer in College, eliminating the need for special labs, and enhancing the learning experience.
A social application of this technology would be to deliver TV channels to student residences again using the College data network.

The second pilot was conducted with the Director of Buildings and examined the use of telephony over the College data network. Commonly known and often interchanged IP Telephony (IPT) or Voice over IP (VOIP) is the way forward in the Telecommunications arena. This pilot was is in line with what is happening in the commercial world and could offer cheap telephony in some

instances for College users and also offer significant savings in the cabling infrastructure. This will be progressed with the Director of Buildings in 2008.

Servers

Previous reports have highlighted the problem of “server creep”, where more and more servers are required for each application, and this issue became further apparent during the year. The main computer room managed by IS Services now has nearly 200 Servers running multiple services.

The requirements for security and access to data have demanded that fault tolerant systems be implemented with duplicate machines at either end of College, doubling the number of servers.

Even though servers are tending to become smaller physically they require more power and generate more heat which has to be dissipated.

During 2006/07 a strategic decision was taken to move to a technology called “virtualisation”, where possible. This is where a single server can be logically split into several virtual machines. This in turn may help reduce costs and improve reliability in the future. Testing of this technology in College is at an early stage and many software suppliers may not support their system when run in a virtual environment. These matters will have to be addressed.

As well as the two server rooms on the main campus, a rack of servers are situated in a secure hosting site in West Dublin where a number of College systems are installed to provide services in the case of a major outage on campus. An example of this is the College’s web presence which would be provided from this site in the event of a major disruption locally.

Online Disc Storage

A limited amount of online disc storage has been available to all users for many years; however it has only been available to those directly connected to the main College network.

Increasingly, users are working away from the College, either at home or whilst travelling, and require access to files in their central storage. During the year, a system was implemented allowing all users to access their central storage in an authenticated manner through the web. This means that files can easily be up and down loaded to and from the online file storage.

An extended file storage system called a “Storage Area Network”, or SAN, has been in use for a few years and allows large scale storage to be shared amongst a range of servers. A new and larger SAN was installed during the year which allows some research projects to hold very large data files securely on the College network. It is expected there will be an increased demand for this sort of secure file storage in the coming years and suitable archiving mechanisms for infrequently used files will need to be developed.

Virtual Dedicated Network Team

It had become apparent that the generic commodity IT service that has been provided to all users in College over the last few years does not cope well with the requirements of top tier researchers. Limited funding has meant that some specialised services could not be delivered in a timely manner to research groups.

The advent of Science Foundation Ireland and overheads funding has allowed a team of staff to be employed to facilitate researchers in their work and to deliver leading edge services. There is now a team of four staff who are directly funded to provide support and facilities to the whole research community in College.

Whilst it was considered that these staff would form part of a physical team, funding did not allow for a sufficient team of staff with the right skill sets to be established. Therefore a virtual team was created whereby individual members have easy access to the specialist skills of their other colleagues providing a high level of service to the researchers.

Most of the research active areas in College are now covered by a blanket wireless network as requested by the research groups. Other requests facilitated include the provision of specialist networking facilities to allow easy communication with a commercial partner, and the provision of dedicated fibre-optic connections to researchers in another Irish University. These services could never be provided in a commodity style service without specifically targeted funding.

Internet Developments

College's Connection to the Internet

The College's network connection speed and the number of physical connections to the network increased during the year, minimising some potential points of failure. The automatic fail over of the diverse network connections was tested during the year and services continued uninterrupted on other links when each circuit was physically unplugged.

As part of the ongoing development of the academic internet service provided by HEAnet, a new charging model was introduced which allows for rapid changes in the connectivity bandwidth to the College. This means that some network intensive teaching or research functions could be facilitated by enhanced connectivity if required.

HEAnet has also provided specialist research support for College and has provided dedicated fibre-optic circuits across Dublin for some of the SFI funded research programmes. It is expected that these non-standard networking requests will increase in the future. HEAnet will be able to provide these services in Ireland and will be able to use its contacts worldwide so that advanced research projects can span the globe.

As mentioned in the highlights section there was a 100% availability of this service during 2006/07.

Guest Service for Conferences and Visitors

The guest service implemented in the previous year continued to provide visitor services for a range of College conferences and events. The system, which is run off a network appliance, makes it easy for authorised College visitors to access the internet in a controlled manner. Currently the visitor system is restricted to the wireless network, which is where the demand usually originates.

It is now expected that a visitors from another institution will have ready access to the internet when they visit an institution such as College.

In Europe, and to a lesser extent, the world, there is a wireless roaming system called "EDURoam" implemented in many third level institutions. This system allows authorised visitors to connect to the network based on the credentials that they have to authenticate themselves in their home university. For example, a visitor from Trinity could log in on another university's network using their Trinity username and password via the EDURoam system.

Following the integration of the College's Identity Management system with the EDURoam system, it is now possible for College staff to log into a wireless network on an EDURoam enabled campus. The reverse is also true; any visitor to College who is enabled for EDURoam at their home institution can

now use the Trinity network to gain access to the internet. TCD were the first university in Ireland to implement this system.

TCD became the first Irish University to integrate with, and host a commercial Internet service offering provided by British Telecom (BT). In doing so, TCD became the largest BT Open Zone hotspot on the Island. All visitors to College can now be provided with Internet access while on site which greatly improves the conferences and residential services to visitors. Vouchers for this service can be purchased via the Students Union shops and there has been a large number of users to date. Other organisations are likely to follow this lead.

Web Developments

Access to the web in College has traditionally been provided though servers running specialist software which download web pages and deliver them to the user's machine. Whilst these proxy servers have delivered trojan work down the years they have now been replaced by specialist machines, or appliances, designed to provide the same functionality in a highly reliable and secure manner.

A number of these appliances have been installed and have taken over the "proxy service" in College. These systems integrate into the Identity Management system so users only need one username and password. The appliances require less management effort compared to the computers they replaced. The appliances are deployed in a fault tolerant and load balancing manner so they optimise delivery of web pages. The volume of traffic through these devices is shown in the appendices.

Also deployed during the year was a search-engine appliance which indexes all available web pages in College on a continuous basis and provides the search functionality available on most College web pages. The search appliance replaces a general purpose computer and implements a vastly improved deep searching functionality to users.

Administrative Developments 2006/2007

Short-term contracts

While the staff situation in MIS stabilised somewhat during the year under review, MIS continue to have some 20 percent of staff on short-term contracts. There were also a number of vacancies for programmer positions, which had been approved for specific projects. The policy and procedural delays in recruiting for these positions has reduced our capacity to meet demand and placed considerable strain on existing resources. MIS, in common with other areas of IS Services, is on a continuing recruitment treadmill, which exhausts significant management time and effort.

Systems Development

Projects in progress

During the year, there were over 35 development projects in progress, which represents an unprecedented level of development in the Group. MIS continued to accelerate the shift from bespoke development to procurement and the vast majority of current projects are now being successfully undertaken through the public procurement of packaged applications. The main projects in progress during the year were:

1. Accommodation, banqueting and catering system (ABC)
2. Active directory and identity management
3. Catering electronic point-of-sale (CEPOS)
4. CMIS interface
5. CODA finance upgrade
6. Core HR upgrade
7. e-Remittances migration to OAS
8. ExamR upgrade
9. Library management
10. Library time and attendance
11. Nursing allocations
12. Nursing attendance
13. Oracle application server (OAS) replacement
14. Postgraduate applications centre (PAC)
15. Programme management system
16. Question Mark
17. Research showcase
18. Research themes
19. RSS media experts
20. Seanad elections 2007
21. Sports hall system
22. WebCT
23. Women in science and engineering (WiSER)

Demand for new systems

Demand for new systems or for enhancement and improvement of existing systems continues apace. There are approximately 30 significant projects in the current pipeline and many more on the long wish list. Ideally, MIS would like to be in a position to meet all demands as they arise, but this is impossible given the limited availability of funding and of existing staff resources in IS Services and in user areas. Occasionally, this means that projects that would be strong candidates for development cannot be undertaken as quickly as desired. Where this happens, there is little option, in the meantime, but for the user area to continue to make appropriate policy, procedural and administrative arrangements to perform their functions.

Project prioritisation

The high level of demand for new systems gives rise to the need to prioritise projects so that those that offer most benefit to College can be undertaken, with the support of the wider College community. IS Services is developing a set of project prioritisation criteria to assist in selecting projects for execution. Criteria under consideration include:

- Availability of funding
- Availability of staff
- Cash flow improvement
- Cost saving
- Improved efficiency or effectiveness
- Positional improvement
- Revenue increase
- Service improvement (research, teaching and learning, alumni, administration, etc)
- Statutory requirements
- Strategic, operational or tactical alignment
- Time improvement
- Value for money.

Project funding

Funding for new projects is always a challenge for College. Within its normal current budget allocation, MIS does not receive provision for new projects and must rely on the sponsoring areas to find funding to cover development costs, staff costs, acquisition costs and ongoing maintenance and support. During the year under review, the practice of costing projects on a full cost basis, over a five-year period, was adopted. While this makes it somewhat more difficult to get projects started, it has the great benefit of offering greater certainty that a project will proceed successfully to completion and be sustainable thereafter. Where this approach is being used, projects are proceeding very satisfactorily and with considerable expectations of success.

Bespoke development

MIS continues to carry out bespoke, or in-house, development on a significant number of our older systems, particularly those supporting student administration, examinations and fees management. This is unsustainable, due to the obsolescence of many of the systems and hardware and the old technologies on which they are built. The time, cost and staff effort required to support these systems, though essential under the circumstances, are disproportionate to the return received and would be better devoted to developing and implementing newer packaged systems. The area is hamstrung by the support and maintenance burden, which further reduces our capacity to meet new demands.

Skill challenges

It is difficult to find new staff with the skills or willingness to work with older technologies. IS Services is fortunate at present to have staff with the requisite skills to support older systems but, as they are on short-term contracts, there is a real danger that they would leave the College, creating a serious maintenance challenge and increasing operational risk significantly. Therefore, these older systems, which are absolutely critical to the operations and funding of College, are always in danger of failure and must be replaced as a matter of priority.

Systems integration and database development

MIS also provides systems integration and database development services for new project developments. These are fundamental to the provision of a coherent, reliable, secure and available information service to end users. Although less visible to users than the applications themselves, these services are fundamental to successful project development and are the vehicles for managing access to systems, ensuring their continuing availability, and for providing distributed access to online information.

Review of Student Administration Project

Following the review of the Student Administration System (SAS) project in 2007, College took the decision to suspend the project and is now considering the options for a new system. An application has been made under the Strategic Innovation Fund (SIF II) to assist in funding a new project and, at the time of reporting, a decision has not been taken on this system. In the meantime, this area of College is operating on the older systems referred to above and is therefore at considerable operational risk.

Systems Maintenance

Support and maintenance

In addition to new development, MIS supports and maintains all existing systems, databases, utilities, interfaces, reports, lists, etc. As our inventory of new systems increases, so also does the maintenance and support burden. In particular, the move to a packaged approach has shifted the support burden from development teams to the database support team, which must maintain individual environments for each application; manage and support vendor software releases and upgrades; manage vendor performance at a technical level; provide secure remote access to vendors, and ensure that vendors adhere to our technical standards.

Databases

MIS manages and supports well over 150 databases and their applications. As vendors upgrade and enhance their systems and technologies, it is

necessary for MIS to do the same to ensure that systems remain current and under support from vendors. Where investment is not made in these areas, a classic “legacy” situation is created leading to the use of obsolete systems that are no longer supported or supportable.

Internal systems

Programme and operations management

During the year, MIS developed systems for internal use to assist in managing resources, the programme of development work and operations.
The programme management system tracks the status of all projects currently in development. The resource management system identifies the projects and tasks on which staff are currently working and on which they are scheduled to work in the coming period of approximately one to three months. The operations reporting system tracks the current status of all operational systems and whether they are undergoing any changes. The training management system tracks staff training requests and approvals and provides a mechanism for staff feedback following attendance at training courses.

Quality Management

Quality assurance

A Quality Assurance (QA) function was established in MIS in 2007. It provides an internal project and software quality assurance service in MIS and an external post-implementation review service for completed projects. At present, one full-time equivalent staff resource is assigned to the function, which does not enable us to provide a complete range and depth of services. However, it is intended, over the coming years, to increase the staff in the function and to widen its remit to all of IS Services and, eventually, to more external projects.

Policies, procedures and standards

The QA function developed policies, procedures, methods, standards and tools for improved quality management, which are helping to improve performance in development and delivery. Areas addressed so far include requirements specification, project controls, software testing, change management, release management, peer review and post-implementation review.

Reviews undertaken

A number of internal peer reviews were carried out by QA during the year, one external post-implementation review was completed, and another started. These activities have helped to highlight issues, lessons to be learned, and further benefits to be gained from development work and project execution.

e-Strategy

Although e-Strategy has been approved by the College, and governance arrangements were put in place during 2007, resourcing and funding has not been finally agreed.

Governance

Representation on committees and groups

During the year, MIS worked with user areas to bring several systems proposals to IPC. The quality of proposals has improved considerably and now includes provision for a full five-year total cost of ownership. This has helped IPC to make more informed decisions and appreciate the longer-term costs and impacts of projects. It has also helped to identify the resources required for initial project development and ongoing maintenance and support. MIS was also represented on the Restructuring Implementation Oversight Group during the year.

Vendor Management

Vendor performance management

As more and more systems are purchased from external vendors, there is a need to manage the performance of our key vendors effectively. MIS generally meets key vendors, often with end user colleagues, at least quarterly to address any performance issues, contractual matters, service quality, etc. MIS also work with them very actively during significant project developments and upgrades. Where possible, MIS are moving to relationship management based on service level agreements.

Vendor selection

Our systems and vendor selection procedures have also been improved significantly over the past year or two, which have improved our management of vendors. Representatives from MIS attend sectoral meetings with vendors and with colleagues from other colleges, which gives greater influence over the services being provided by vendors and the future directions of their products.

IUA/SIF/Collaboration

External collaboration

MIS is represented on a number of collaborative projects with other colleges, which are run with the support of the IUA. It was also heavily involved in the preparation of the SIF II funding application, which was made in collaboration with a number of other colleges. Finally, representatives from MIS meet their

counterparts from other colleges regularly, and at two scheduled meetings per year, to discuss matters and projects of mutual interest.

IS Services - Challenges for the Coming Year

As ever, the pace of change in both the technological arena and in the structures of the College will need to be tackled vigorously in the coming years.
Solutions must be found to the management of information systems in College and the appropriate delivery of relevant information to all users. This information is required so processes in College can be managed and planned in the best manner possible.

Technologically there are many challenges ahead. We are in a state of permanent change, driven by the demands of staff and students now more than ever before.

Mobility, access to information 24 hours a day and the social needs of users are likely to drive technological change into the future. New devices and services are being developed on a daily basis and techniques will have to be implemented to provide these to the students who have an expectation of College being at the forefront of technological change.

Funding

Changing the perception of IT from that of a cost centre to one of a critical service in a time of change and when there are many competing causes is a significant challenge that will need to be faced by IS management in the coming years.

Being realistic about IT funding when costs are increasing (and budgets are not) means pursuing ways to reduce costs and reallocate savings. Eliminating, reducing or consolidating services may also help. Creating collaborations among colleges and universities for shared services such as disaster recovery is a potentially helpful strategy. The following practices may help facilitate successful IT funding efforts

- Align funding with institutional priorities
- Create fiscal flexibility to support innovation/research/teaching
- Construct and facilitate a structured and transparent IT budget process

Governance, Organisation and Leadership

The environment in which we work is very demanding. Creating an effective governance and framework for decision making on ICT systems is something that is currently missing. It will require somewhat different frameworks and tools to ensure delivery of efficient and effective IT support versus those used in many corporate environments. IT support at the university is mostly centralised but there are significant pockets of IT support strewn across the College. Many large scale projects go ahead without the involvement of the IS Services department and there is duplication in services offered to the College

community. There are also significant staffs costs involved in IT across the university and the there are a number of computer facilities that need to be consolidated to ensure value for money and cost savings. The role of a Chief Information Officer (CIO) in bringing this together cannot be understated. The governance problem is proportional to the degree of decentralisation of IT at the College, and it severely limits effective and efficient delivery of IT services.

Sourcing

The department will need to make active sourcing decisions, neither wholly outsourcing nor wholly in-sourcing, but choosing the right mix according to business requirements and market characteristics. Services will need to be delivered in a coherent pattern that has an excellent lifetime business value; they are not simply inexpensive at the time of initial purchase or narrowly efficient from the IT perspective alone.

Infrastructure – (Networks and Systems)

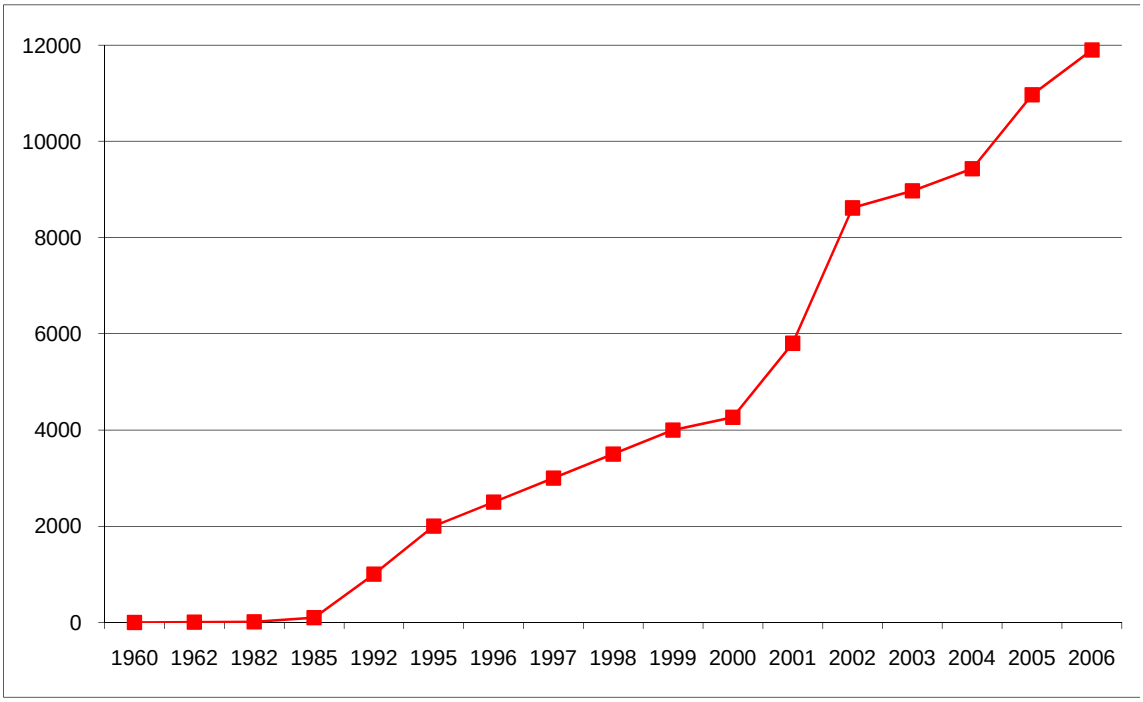
Managing IT infrastructure in today's environment requires a careful balancing of cost, manageability, flexibility, stability, security and performance. With over €10,000,000 invested over the past ten years it is one of the largest and most complex infrastructures in the country. During the restructuring process the attention has focused on Management Information Systems with infrastructure barely getting a mention. If the infrastructure does not receive a high level of investment over the coming years then the College will fall behind in the key areas of teaching and research and the investment in Management Information Systems may be wasted.

Disaster recovery/Business Continuity

The cornerstones to any complete IT disaster recovery and business continuity plan are technology, people, and communications. A comprehensive plan must define the time-critical activities necessary during an emergency response. The lack of such a plan has been highlighted many times by IS Services, Internal and External Audit and external risk assessors. College's approach to the problem has been piecemeal even though the reliance on IT infrastructure and systems increases annually.

Appendix Statistical Information 1995 to 2007

1. Estimated Number of Computers in College



2. Changes in funding and staff numbers in IS Services & AVMS

	Non-Pay Allocation €	Pay Allocation €	Total €	Staff Count
1995/96	1,511,793	1,414,120	2,925,913	48
1996/97	2,076,542	1,633,463	3,710,006	52.5
1997/98	1,866,738	1,730,324	3,597,063	59
1998/99	1,766,748	1,999,171	3,765,919	63.5
1999/00	2,049,200	2,371,637	4,420,837	62.5
2000/01	2,172,768	2,723,611	4,896,379	61.5
2001/02	1,691,278	3,729,419	5,420,697	70.5
2002/03	2,816,756	4,021,089	6,837,845	72.5
2003/04	2,283,696	4,500,842	6,784,538	76.5
2004/05	2,230,060	4,351,791	6,581,851	85.1
2005/06	2,620,398	5,376,335	7,996,733	87.1
2006/07	2,759,412	5,190,577	7,949,989	87.1

3. Number of Public Access Computers and Laser Printers

	Number of Computers	**Number of Printers**
30th September 1995	223	18
30th September 1996	247	19
30th September 1997	367	56 (trials using small printers)
30th September 1998	379	29
30th September 1999	408	38
30th September 2000	494	38
30th September 2001	526	38
30th September 2002	534	38
30th September 2003	540	38
30th September 2004	625	35 (service externally managed)
30th September 2005	650	30 (service externally managed)
30th September 2006	760	36 (service externally managed)
30th September 2007	802	37 (service externally managed)

4. Internet Connection speed

Date	**TCD Internet Speed**
30th September 1992	64 Kb
30th September 1993	128 Kb
30th September 1996	512 Kb
30th September 1997	2 Mb
30th September 1999	5 Mb
30th September 2000	8 Mb
30th September 2001	30 Mb
30th September 2002	40 Mb
30th September 2003	1 GB (effective speed 125 Mb)
30th September 2004	1 GB (effective speed 180 Mb)
30th September 2005	1 GB (effective speed 180 Mb)
30th September 2006	2 x 1 GB (effective speed 318 Mb)
30th September 2007	2 x 1GB (effective speed 1GB)

5. Documents Retrieved By Proxy Servers

Year	Number of Pages
1998/99	197,857,969
1999/00	333,983,923
2000/01	525,977,517
2001/02	791,051,179
2002/03	883,301,476
2003/04	923,679,308
2004/05	1,516,445,814
2005/06	2,300,024,991
2006/07	3,751,734,706

6. Pages Printed in Student Computer Rooms

Year	Number of Pages
1999/00	2,066,667
2000/01	2,393,939
2001/02	3,216,362
2002/03	3,317,923
2003/04	3,780,123
2004/05	2,920,000
2005/06	3,278,043
2006/07	3,598,981

IS Services Structure: 30th September 2006