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- Designed to support the needs of students, lecturers and researchers  
- Easy to use, easy to access and easy to learn  
- Resilient  
- Energy efficient  
- Agile and easy to maintain  
- Cost effective  
- Secure
Introduction

A recent article¹ on the Forbes Technology Council blog started with the following statement:

“Every company is a technology company, no matter what product or service it provides. The companies that embrace this fact are the ones that shape our world.”

Whilst the University is not a company in the traditional sense, its reliance on technology and its need to embrace technology, in all its forms, are clear. Whether we recognise it or not, technology underpins every aspect of University activity, and provides us with both opportunities and challenges.

This document provides a strategic framework and plan for central IT services for the next three years, 2017-2020. It builds on the previous IT strategy and has been informed by deep engagement with our customers, academic staff, students and support staff, as well as an extensive and sustained examination of the external technology landscape more generally.

The IT strategy is a key enabler for the wider University strategy, and is aligned to University’s six objectives.

The document has the following structure:

- Section 1: Briefly reviews our progress over the previous strategy period
- Section 2: Examines internal opportunities, challenges and risks for the next strategy period
- Section 3: Looks outward at the external technology landscape and the impact this may have
- Section 4: Articulates our strategic choices
- Section 5: Details our five programmes of activity and the projects we plan to deliver

Appendix A contains details of our underlying principles.

Section 1:  
Looking back 

2014/5 – 2016/7

Over the last three years there have been significant changes and improvements to the IT services offered by central IT Services (ITS). ITS is now seen as a trusted partner by academic and support departments, with a modern approach to the management of technology and staff who have the right skills and attitudes to support the University in all of its endeavours.

In the last strategy we identified a number of internal challenges. On the whole, we have responded and addressed these: most significantly, those related to moving networking, compute and storage services on to a sustainable footing. We have also addressed how we manage and monitor our services, leading to faster response times and improved customer service and support. Almost all of the projects outlined in the previous IT strategy have been completed or are near completion. Tribal benchmarking and other comparisons show that IT services at York continue to be very cost effective and this is due, in large part, to the principles and choices detailed in the previous strategy.

As noted above, we have invested heavily in our infrastructure and this has resulted in major improvements to IT facilities which are visible to both students and staff. Equipment is now replaced on a more sustainable footing, and many key systems have been upgraded: for example, our storage infrastructure, HPC (High Performance Computing) and research facilities as well as the wired and wireless network across campus.

A key area for the last strategy was support for research. ITS now has a clear and highly valued research support offering for all academics and research postgraduates. All services are free at the point of use, removing the need for departments to duplicate offerings. In the area of computation we have been able to secure a small amount of funding, through partnerships with departments, to expand provision. In future we would like to develop this approach more fully.

By working closely with academics to help them access HPC facilities on-site, in the N8 and nationally, we have increased the amount of HPC time used by York academics for their research. We see no sign that we have met all the demand for research HPC. In addition to traditional users of HPC, we have also increased support for non-traditional HPC users in the Social Sciences and Arts and Humanities.

Over the period, there has been a gradual transition of departmental IT staff into ITS. This transition is largely responsible for the increase in staff to 95 FTE, up from 70 in 2014. 17 members of staff have moved from academic departments and 8 from professional services;
the former are responsible for teaching and research support, the latter for enterprise systems, infrastructure and software development.

These changes have, on the whole, been well received with service levels being maintained and in many cases improved. At the same time, savings of approximately £120k p.a. have been achieved through the reconfiguration of staff grades and responsibilities. In addition, savings have been achieved in capital expenditure by reducing duplication of basic infrastructure and economies of scale. In the departments with ITS line management, we are increasing the use of commodity services, freeing up staff time to support teaching and research, while keeping and enhancing local provision where appropriate.

On the downside, licensing costs from large software suppliers have increased. This upward trend is set to continue and is the result of suppliers being subjected to the gradual erosion of their revenues because of competition from new cloud services. In one case, with the library system, the increase has been caused by the University being forced by the supplier to move to their own cloud offering. In this case it has been a largely positive experience and we will see more suppliers making this transition in the future.

In summary, the last IT strategy has delivered improvements in all areas of the IT operation across the University. These improvements have been a contributing factor in maintaining high\textsuperscript{2} NSS satisfaction scores for IT as well as a sector leading performance in professional services benchmarking\textsuperscript{3}. This strong foundation will underpin the future development and investment necessary to support the University strategy and meet the changing needs and expectations of students and staff in an increasingly competitive environment.

\textsuperscript{2} In the 2017 NSS we have a satisfaction score of 89% placing us 8th in the sector

\textsuperscript{3} In the 2017 Professional Services benchmarking we have an overall satisfaction of 91.4%; the sector average is 76.2%.
Section 2: Looking forward

2017/8 – 2019/20

The link between the University strategy and the IT Strategy is represented in the diagram below.

Our projects and activities are all aimed at supporting the University’s key and enabling objectives. Some of these links are more obvious than others, for example, our work on high performance computing, HPC, has a clear benefit to research; other areas, like cyber security, are more about managing risk to the business, but are no less essential to the success of the University.

*Diagram 1: Link between University Strategy and IT Strategy*
For the next strategy period we have identified a number of areas that are strategically challenging and need focus. Some of these are new, some are part of a longer term programme of activity; all are outlined below.

Better coordination between departmental and central IT services

As detailed above, during the last strategy period, we have gradually moved to the position where approximately 25 IT staff across both academic and support departments have moved under ITS line management. In these departments, we have worked to professionalise staff management and reduce duplication of effort. Much work, however, remains to be done to review business processes and update or retire the custom software systems that many big science departments have to run their administration. These systems have multiple risks: they create duplicate sources of data, can be dependent on one member of staff for maintenance and are often not as user friendly as modern software.

Although considerable progress has been made, there are still significant opportunities for improved effectiveness by using technology and process review to deliver both financial and time savings.

Where academic and professional service departments continue to invest in local IT teams there is a risk that efficiencies and improvements to services will not be delivered. We will continue to work with these departments to understand how support can be provided in the most effective way.

Research Support

The infrastructure, support and training we offer for research is provided by 1.5 FTE; the demand for this kind of support is, however, far greater. When we benchmark ourselves in this area we come in the lowest quartile. The challenges we face are:

- providing dedicated software engineering support for projects
- increasing support for researchers to access HPC and Big Data facilities
- creating a sustainable funding model to provide a local tier 3 compute facility.

It is essential that over this strategy period we continue to invest in, and expand, our local HPC provision (YARCC). Again, when we benchmark ourselves against comparator institutions our facilities are in the lowest quartile. Not only do we lack significant raw computing power but we are not able to support the communications and storage infrastructure which is required by such a facility.

Our research computing training courses have been incredibly popular with postgraduate students. We believe that an integrated training programme with some form of recognition,

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or accreditation, would be a unique selling point for our Graduate School. We see this as a huge opportunity for York, but additional resourcing is required to put such a programme in place.

Finally, we have identified an increasing need to prove to data providers and research funders that all research data will be stored in a secure manner and processed in accordance with the highest standards.

Support for teaching

While many of the services that support teaching are not directly delivered by ITS we believe that over the coming years there is a need to respond to changing student and staff expectations. Online programmes, assessment, e-marking, learning analytics and changes in the student management system market present both opportunities and challenges. Many institutions are actively working on these types of service, although often in one area rather than a comprehensive programme.

Support for a diverse set of technologies in classrooms (Windows, Linux and Mac) that enables teaching relevant to future employability will continue to be important. IT Services has improved the service efficiency in this area, but continued focus and development is required to ensure we can keep meet the demands of academic departments.

Digital Services\(^5\) to support efficiency and effectiveness

Digital Services are those delivered by the Enterprise Systems team in ITS and a number of other professional service departments. They are provided using the full range of our core information systems. In the last strategy we identified the need to:

“develop an overall strategy for enterprise systems to enable better support for teaching and learning ... there is a fragmented approach to the provision of administrative systems. Funding for system development and system support staff are managed locally by different areas. Integration has evolved over time and is now complex and time consuming to support, and does not provide a joined-up service to users. In addition, the University has a large number of legacy applications; although these systems often provide vital services, they are difficult to support and integrate...”

While some good progress has been made and a mature model for making change is now in place, we are still very much at the start of the huge undertaking that is required. We lack the capacity to radically transform the University into a fully technology enabled organisation. Increasing capacity would enable us to deliver on ambitious plans for transforming inefficient

\(^5\) Digital Services is a term coined by the Government Digital Services to describe their approach to the use of technology to transform government processes. We are using the term in a similar way to describe not just the technology itself but how it is used and developed. See [government-digital-service](https://www.gov.uk/government-digital-service) for more information.
processes, giving all staff the tools they need to scale their operations, remove administrative burden and improve many aspects of student life. Many universities and other organisations have large scale ‘Digital Transformation’ programmes underway recognising that there are guaranteed downsides that will result from not investing even if there is no certainty in the outcomes of these initiatives.

Information Security

Information Security is continuing to increase in importance and is now a strategic risk for most organisations. Universities are very difficult environments to secure: the mix of open networks, a wide range of users and a culture of freedom of choice in terms of IT mean that many of the solutions used in industry will not work without significant modification. We do, however, have the same need to keep data secure as any other organisation of similar size and complexity. Segregation of data and data handling processes based on risk will be key to meeting our requirements without compromising the student experience or placing overly onerous burdens on staff.

With all university activities depending on IT in some form, disruption to IT caused by a denial of service attack or ransomware encrypting files can stop organisations working (as has happened to major hospital trusts and a number of councils in 2016). We are also seeing a steady increase in, and professionalism of other attacks such as phishing. Institutions in the sector have lost money to fraud linked to phishing.

Added to the risk of malicious attack is the risk of data loss caused by human error, misconfiguration or other errors. With the introduction of the GDPR in May 2018 the Information Commissioner has new powers to fine organisations up to €20m or 4% of turnover for major data loss and with the increasing sensitivity of research data providers (especially in the Health and Government areas) to data management risks, there is a drive to formalise and evidence how we manage and secure data. For example, we see a move to requiring external certification (e.g. Cyber Security Essentials and/or ISO27001) to access sensitive data, with most members of the Russell Group working to provide facilities for research on very sensitive data sets. Building this capability will increase our ability to conduct research on such datasets against competitor institutions who do not have such a facility.

Digital Literacy

We still have a large part of the University workforce (Academic and Support) who lack the skills to make the best use of the IT facilities available to them. This results in ‘fossilised’ ways of doing things as individuals are unwilling or unable to use any tools other than the ones they are familiar with. Research shows⁷ that this is a challenge all organisations share. Modern IT tools are mobile friendly and collaborative but require the engagement of the

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⁶ The ability to locate, organize, understand, evaluate, and analyze information using digital technology. It involves a working knowledge of current high-technology, and an understanding of how it can be used. Digitally literate people can communicate and work more efficiently, especially with those who possess the same knowledge and skills.

⁷ https://www.nngroup.com/articles/computer-skill-levels/
whole community to use them to best effect. This means that those who disengage have a disproportionate effect on the efficiency of those working in new ways. A very simple example is the inconsistent use of Google Calendar across the University.

The standard and outdated job description criteria of ‘proficient in the use of Word and Excel’ are insufficient criteria on which to evaluate IT competency, and in most cases are not tested at interview. Increasing the digital literacy of our staff is a major challenge but in order for us to reap the benefits of the investments we are making in IT we must focus on enabling staff to develop conceptual understanding that will let them approach modern working methods with confidence, helping them to understand and use the excellent collaborative suite of tools available to us (Google, Wikis, etc). Without increasing skill levels we will be unable to address many of the inefficient practices we see across the institution.

Infrastructure updates

Over the next period, we will continue to invest to meet ever increasing demands for infrastructure services\(^8\). In the longer term, there will be some reduction in server spend due to increased use of cloud services, but for this strategy period increases in capacity are needed for departmental, research and administrative system servers. This creates challenges in timing the transition to new cloud based models of service delivery to minimise the cost changes, whilst not locking ourselves out from new, and potentially more agile, methods of service delivery.

In terms of cost, the largest item is the continuing upgrade to the wired and wireless networks. Our network traffic from campus to the internet continues to double every 18 months. With the increasing volume of video traffic and high resolution services such as streaming 4K TV services (mainly driven by student demand) and increased large data transfers from large science projects, we see no sign of this trend stopping in the strategy period. This leads to expenditure in three areas: on-campus wireless, our internet connection and the on-campus backbone network that connects the two and a complex procurement and delivery programme to ensure that our IT estate is both fit for purpose and managed with a sustainable replacement cycle.

\(^8\) Infrastructure services are our wired and wireless network, our server infrastructure, which includes both storage and compute.
Section 3: Drivers and trends

Technology drivers and external trends

Having outlined our internal challenges above, this section looks at the trends in the external technology landscape. It is vital that we are aware of what these are and how they are likely to impact the University.

Cloud-based storage and compute

In our last strategy we noted that:

“Cloud services and business models are maturing rapidly and now offer another option for some types of storage and processing needs. They are not, however, a ‘silver bullet’ and are never likely to be a universal solution, nor are they as cost effective as many vendors claim. Careful consideration is needed before using cloud services to ensure they meet resilience, security and ‘portability’ needs.”

We believe this statement still stands and that the major vendors of public cloud have now settled, with Amazon AWS being the largest vendor followed by Microsoft Azure and Google Platform as the other large scale providers. We have a watching brief on cloud-based storage and compute offerings and will continue to use them where there is a cost advantage to doing so.

Impact

Our current use of cloud services has led to a reduction in the amount of capital spend required, e.g. using Google, which is free, has removed costs of c£25k p.a. for storage but the increasing use of cloud services will not lead to a decrease, in absolute terms, in capital spend over the period of this strategy. This is due to increases in demand for compute and storage and the need to ensure our network capacity and resilience keeps pace with demand.
Software as a Service (SaaS)

New vendors of enterprise systems are generally offering only a cloud-based, SaaS model for service delivery and incumbent suppliers are following suit. The data security considerations are now well understood, but in a maturing market it is still necessary to be an intelligent customer in order to select the right solutions that integrate with our existing systems and are open for us to extend and adapt.

Higher Education has been slow to adopt this new model due the prevalence of legacy technologies, but this is starting to show signs of change with an increasing use of hosted systems across the sector for core applications such as student record systems or VLEs.

Impact

We anticipate that all new enterprise systems purchased will use a SaaS model and that current vendors, who provide us with on premise products, will start to ‘force’ us to move to their SaaS model. This has implications for:
- our budget, as SaaS products are typically more expensive than on premise products and there is a shift in funding models from one based on a large initial purchase price plus support costs to one based on a per-user per-year
- procurement decisions, which should be cleared through ESSG\(^\text{10}\) to ensure necessary consultation and specialist advice before purchase
- our data governance model, which needs to ensure we have the right checks and balances in place.

Device trends

Research universities have never been technology monocultures in the way other public sector organisations are, but with the rise of different operating systems, form factors and devices, there is a change in expectations and a requirement for systems to work on all devices. The stereotype of tablets being for consumption and laptops/desktops being for “real” work is now being challenged. Overall the ARM/mobile ecosystem is, by units sold, now 10x the volume of the traditional Intel (desktop/laptop) one, and increasingly that scale will drive adoption through cost savings to manufacturers. In a work context however, the traditional desktop/laptop running Windows, MacOS (increasingly) or Linux (in certain science departments) will continue to be a key need for professional tasks for the foreseeable future.

Matching trends seen globally, we see increased time spent on “mobile” operating systems (e.g. iPads) for work purposes as well as leisure. Students expect to be able to do tasks from

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\(^{9}\) Software-as-a-Service (SaaS) is a software licensing model in which access to the software is provided on a subscription basis, with the software being located on external servers rather than on servers located in-house. Software-as-a-Service is typically accessed through a web browser, with users logging into the system using a username and password.

\(^{10}\) Enterprise Systems Strategy Group
tablets and phones as well as traditional desktops/laptops and staff increasingly use iPads and other tablets for reviewing papers and notes in meetings etc, as well as teaching.

This is an area of rapid change with major global companies all trying new form factors and systems and it is not yet clear which ecosystem will dominate. The major vendors are:

<table>
<thead>
<tr>
<th>Company</th>
<th>Form Factor</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google</td>
<td>Phones/Tablets</td>
<td>Android</td>
</tr>
<tr>
<td></td>
<td>Laptops</td>
<td>ChromeOS/Android</td>
</tr>
<tr>
<td></td>
<td>Augmented/Virtual Reality</td>
<td>Daydream (Android)</td>
</tr>
<tr>
<td>Apple</td>
<td>Phones/Tablets</td>
<td>iOS</td>
</tr>
<tr>
<td></td>
<td>Laptops/Desktops</td>
<td>macOS</td>
</tr>
<tr>
<td></td>
<td>Augmented/Virtual Reality</td>
<td>Rumoured to be in development</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Laptops/Desktops</td>
<td>Windows</td>
</tr>
<tr>
<td></td>
<td>Augmented/Virtual Reality</td>
<td>Hololens</td>
</tr>
</tbody>
</table>

Other vendors of mobile devices (Microsoft, Blackberry etc.) now have market shares well under 1% and falling.

**Impact**

Microsoft has missed the mobile market but will remain a major player in the traditional desktop/laptop market, while Apple and Google are both trying to leverage their success in mobile into gaining dominance of end user compute devices. We will keep a watching brief on this area to ensure we are able to respond to changes brought about by a major shift in end user device choice and subsequent shakeouts in market position and revenue amongst our major suppliers.

**Automation, agents and mobile first services**

We have now reached the point where consumption of digital services via mobile devices has overtaken the desktop. Students now graduating from York are the first generation to have grown up in an era of pervasive internet and increasingly new businesses are launching with mobile services first to meet changing expectations and usage patterns. At the same time most universities are stuck with a huge number of paper-based processes
and legacy business systems, and digital communication often limited to text messages and email.

The next big trend is that automation is moving to a new stage of development with ‘intelligent’ assistants and devices now becoming mainstream consumer products (e.g. Amazon Echo). These ‘bots’ are starting to find their way into online customer service agents and are even on the development roadmap of our Finance system. They offer the potential for improved customer service and efficiency where simple enquiries can be dealt with quickly and without interrupting staff. Combined with the use of mobile devices (where digital assistants first made a mainstream appearance) they offer the opportunity to provide simple mobile services without the need for dedicated applications.

Impact

We need to accelerate our ability to offer digital services via a mobile device and push our suppliers to do the same. All new systems should have mobile delivery and integration (e.g. alerts via mobile notifications) as a core facility and offer integration points for automation and bots. This needs to be a key criteria in any tender process for business systems with the procurement cleared through ESSG.

This also has implications for our internal development effort and data architecture, with a possible increase in resource required for development on iOS and Android.

Analytics everywhere and the ‘Internet of Things’

The phrase Internet of Things is much misused. For universities, it is likely to mean that increasingly everything is connected to the internet, but in many ways this is not a new trend. The University’s washing machines have been internet-connected for over five years, our turnstiles and door locks for a similar time.

The implication is that we continue to collect and manage data from a huge number of sources including traditional IT systems as well as internet-connected devices, but that the volume of data will increase. This presents an opportunity to use data for new and novel services, but any use of such data must be tempered with privacy and data protection considerations. In some cases students may demand we use this data to provide better educational experiences and services. For example, using data to enable Learning Analytics by measuring engagement and attainment is gaining a great deal of attention in our sector.

Impact

To make data available and useful, we need to develop the technical capability and capacity and the right information governance framework to support the use of data gathered from across the University’s systems and ensure that it generates insight and actions. Over this strategy period we will develop our Master Data Management framework.
Section 4: Strategic choices

The following section outlines the strategic choices we have made for the next strategy period grouped under five headings:

- Information Security and Data Governance
- Technology choices
- Digital Services
- Service Delivery
- Digital Literacy and Skills.

Many of the decisions made in the last strategy are still relevant and are aligned to the new University strategy. We have reviewed and updated the seven principles upon which we based our last strategy and plan to continue to use them as detailed in Appendix A.

Using the developing governance mechanism of the Enterprise Systems Strategy Group we will prioritise our investment in accordance with their guidance.

Information Security and Data Governance

- Information Security will be a priority and will require change in staff and student behaviour, increased training and how we manage systems and data.
- We will retire as many legacy systems as possible, replacing them with more modern and secure alternatives.
- We will develop our ability to do research with sensitive data and expand secure data offerings across all facilities.
- To meet the requirements of the Information Commissioner, the GDPR and research funders as well as student expectations for secure data management, we will update our policies and procedures and ensure all staff and students are aware of the demands upon them.

Technology Choices

- We will aim to reduce ‘vendor lock in’ by opting for suppliers who use standards based approaches and encourage our incumbent suppliers to move to more open architectures.
- Our main collaboration platform will continue to be Google’s GSuite (Google Apps). We have worked to embed collaboration and use of Google across the institution and see the benefits of this now becoming apparent.
- We will continue to expand the use of chat based messaging for collaboration within and outside Information Services.
- We will only support iOS and Android for mobile platform development.
Over the next period, we will continue to invest to meet ever increasing demands for infrastructure services. In particular we will increase the capacity of our storage infrastructure.

Digital Services

- Enterprise Systems will continue to help departments work together to transform University services through our business analysis and project management capability.
- ESSG will continue to be the main governance group for all strategic and investment decisions involving digital services.
- We will choose SaaS based solutions before on-site hosting, where data protection and security allow.
- We will develop the case for a wide ranging transformation programme and the necessary investment so that the University can become a fully technology-enabled organisation.
- We will work with suppliers and departments to adopt a model of ‘continuous upgrades’ to our IT systems allowing us to take advantage of new system features more quickly than our competitors. Such a model needs to be complemented by improvements in digital literacy.

Service Delivery Model

- We will continue to support and develop desktop and laptop services on MacOS, Windows and Linux, whilst at the same accelerating our ability to provide digital services via mobile devices running Android and iOS.
- We will continue to offer our services (desktop support, storage, virtual machines, HPC, network, etc.) free at the point of use to continue the de-duplication of service offerings, realise economies of scale in infrastructure purchasing and management and free staff time to support more directly research and teaching.
- We will aim to provide as many standardised services/systems to support administration as possible, thereby removing the need for departments to run and develop their own. We do, however, recognise that some needs are unique and will ensure that departments who need bespoke systems select the most cost effective and low maintenance way to do this.

Digital Literacy and Skills

- We will work with HR to set expectations for digital competence in our recruitment process and support mechanisms for assessing this through interview.
- Working with our colleagues in the Library and HR, we will help to develop courses that raise the standards of digital literacy for existing staff.
Section 5: Details of programmes and projects

This section of the strategy is subject to change, as the projects we undertake may be driven by external or internal factors.

Programme 1: Cyber Security and Information Governance

In the last IT Strategy, Cybersecurity was embedded within each of the programmes. In this period, we want to further increase our focus on information security and make it a major programme, which will both cut across other programmes and have its own projects combining technical improvements (e.g. scanning our network for vulnerabilities), policy and governance work and user education.

<table>
<thead>
<tr>
<th>Project</th>
<th>Aim</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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</thead>
<tbody>
<tr>
<td>Obtain Cyber Security Essentials Plus</td>
<td>Satisfy data providers that their data is managed suitably by obtaining externally validated certification</td>
<td>Complete for managed desktop environment</td>
<td>Expansion of certification scope to include managed laptop service</td>
<td>BAU service with annual re-certification</td>
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<tr>
<td>Baseline security of systems</td>
<td>Develop a detailed understanding of risks and vulnerabilities within the University’s IT estate. Implement a remediation</td>
<td>Audit all systems across the University with a baseline scan. Initial remediation</td>
<td>Repeat scan and fix issues found Fully roll out patching policy and ensure compliance</td>
<td>Repeat scan/fix/rescan cycle and make part of business as usual across the institution</td>
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<tr>
<td>Area</td>
<td>Action</td>
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<tr>
<td><strong>Manage legacy systems</strong></td>
<td>- Increase data security by retiring systems that can no longer be kept up to date.</td>
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<tr>
<td></td>
<td>- Audit of systems across the University.</td>
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<tr>
<td></td>
<td>- Develop plan (within and outside ITS) to manage the risk.</td>
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<td>- Ensure all legacy systems are segregated and have mitigating controls in place</td>
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<td></td>
<td>- Ensure regular checks on legacy systems are done as part of audit project.</td>
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<td></td>
<td>- Review requirements for all systems and schedule retirement if possible</td>
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<tr>
<td><strong>User education</strong></td>
<td>- Reduce the likelihood of attackers gaining access to data or systems via stolen credentials</td>
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<td></td>
<td>- Phishing training</td>
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<td>- Upgrade of Information Security training</td>
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<td></td>
<td>- Roll out of new version of training and annual update training</td>
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<td><strong>Policy and Governance</strong></td>
<td>- Further improve our Information Governance policies, meeting funder requirements for data handling and information management</td>
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<tr>
<td></td>
<td>- Further development of University policy to align with ISO27001</td>
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<tr>
<td></td>
<td>- BAU: regular reviews done by ISB and taken to ISG as necessary</td>
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<tr>
<td></td>
<td>- BAU: regular reviews done by ISB and taken to ISG as necessary</td>
<td></td>
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<tr>
<td></td>
<td>- Prepare for the GDPR</td>
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</tbody>
</table>
Programme 2: Ensuring our Infrastructure keeps pace with University needs

To ensure that our IT infrastructure remains fit for purpose, and can expand to meet increasing University demands, we have a planned refresh cycle. This programme will deliver new compute, storage and network services. Managing continuing upgrades to infrastructure on campus West and the first wave of replacements within the oldest buildings on campus East, the programme will deliver improvements to server and storage capacity as well network speeds.

<table>
<thead>
<tr>
<th>Project</th>
<th>Aim</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Network capacity expansion and upgrades</td>
<td>The core network links all end user devices, wired and wireless to our internet connection. Regular improvements to capacity and a managed refresh cycle for equipment are necessary to meet demands for bandwidth</td>
<td>Upgrades to Heslington West networks, phase 1 Capacity increases in core network, phase 1</td>
<td>Start of network replacements in Heslington East Upgrades to Heslington West networks, phase 2 Capacity increases in core network, phase 2</td>
<td>Phase 2 of Heslington East upgrades Upgrades to Heslington West networks, phase 3 Capacity increases in core network, phase 3</td>
</tr>
<tr>
<td>Re-tender for network equipment</td>
<td>Our main tenders for all non-wireless network equipment need renewing. Working closely with Procurement, we will put in place multi-year frameworks for the next period</td>
<td>Development of needs and supplier engagement</td>
<td>Tenders for all wired network equipment to be issued</td>
<td>No tenders planned</td>
</tr>
<tr>
<td>Wireless network expansion and upgrades</td>
<td>Wireless is now the network access method</td>
<td>Further coverage expansion</td>
<td>Further capacity expansion</td>
<td>Further capacity expansion</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Project 1</td>
<td>Project 2</td>
<td>Project 3</td>
</tr>
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<tr>
<td><strong>Storage</strong></td>
<td>for most students and an increasing number of staff. This project will provide capacity upgrades, increases in coverage and start the refresh cycle for the oldest wireless hardware.</td>
<td>Start of replacement cycle for Cluster 1 wireless. (CS, Hub)</td>
<td>Phase 2 of Heslington East replacement project</td>
<td>Phase 3 of Heslington East replacement project</td>
</tr>
<tr>
<td></td>
<td>To meet increasing demands for storage from both academic departments, support departments and students, we will continue to expand the Tier-1 and Tier-2 facilities procured during the last strategy period.</td>
<td>Expansion of our Tier 1 storage and small expansion of Tier 2 (research/departmental) storage</td>
<td>Major expansion of Tier 2 storage</td>
<td>Replacement/upgrade for Tier-1 storage</td>
</tr>
<tr>
<td><strong>Firewall expansion</strong></td>
<td>Market evaluation</td>
<td>Upgrade of our main campus firewall to cope with the growth in internet traffic</td>
<td>No further upgrades</td>
<td>No further upgrades</td>
</tr>
<tr>
<td><strong>Infrastructure software upgrade</strong></td>
<td>Our key platform for running all business systems, student services and infrastructure on remains VMWare. Based on current usage</td>
<td>Expansion of virtualisation platform</td>
<td>Move of full new features to business as usual</td>
<td>Virtualisation platform upgrade, phase 2</td>
</tr>
<tr>
<td><strong>Servers</strong></td>
<td><strong>Data Centre plant upgrades</strong></td>
<td><strong>IT Classroom rolling refresh programme</strong></td>
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<tr>
<td>trends, we expect to expand the capacity of this system to meet demand.</td>
<td>Virtualisation has reduced the number of physical servers required to provide services, but the remaining servers need a managed replacement and upgrade cycle to remain fit for purpose.</td>
<td>IT Classrooms on campus remain a requirement for teaching as well as being heavily used by students. A rolling programme of replacements and upgrades will ensure they remain fit for purpose.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement of load balancers and upgrade/replacement phase 1. Upgrade cycle is smaller in this year reflecting previous investment</td>
<td>Replacement of load balancers and upgrade/replacement phase 1.</td>
<td>Phase 1</td>
<td></td>
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</tr>
<tr>
<td>Rolling upgrade/ replacement phase 2 Final replacement of the oldest servers. The server estate will be in a managed replacement cycle at this point</td>
<td>Replacement of old plant (aircon, UPS) in data centres New equipment running as Business as usual (BAU)</td>
<td>Phase 2</td>
<td></td>
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<tr>
<td>Rolling upgrade/ replacement phase 3</td>
<td>New equipment running as Business as usual (BAU)</td>
<td>BAU</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phase 1</strong></td>
<td><strong>Phase 2</strong></td>
<td><strong>Phase 3</strong></td>
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</tr>
</tbody>
</table>
Programme 3: Supporting Research

Building on developments over the last strategy period, we will further increase our support for research, providing more facilities for HPC and the analysis of large data sets as well as the staff support and training to assist researchers in making full use of the facilities provided.

<table>
<thead>
<tr>
<th>Project</th>
<th>Aim</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure data safe haven for research data</td>
<td>We will work together with interested departments and research units to develop an ISO27001 certified secure “Data Safe Haven” for processing highly secure data such as that involving medical, health or child protection records</td>
<td>Scoping, requirements gathering, policy development and initial work, building on the work done by ReCSS</td>
<td>Pilot implementation and initial certification work</td>
<td>Service moved to full production and certified to ISO27001</td>
</tr>
<tr>
<td>Expansion of HPC facilities</td>
<td>Further expansion of our local HPC facility YARCC(^{11})</td>
<td>Specification of system and installation of enabling works. Tender issues and equipment delivered</td>
<td>Main system and high speed storage into full production ~4,000 extra cores and 1Pb storage</td>
<td>BAU: no major upgrade planned for this year</td>
</tr>
<tr>
<td>Improvements in support for researchers</td>
<td>Improve the specialist technical support available to researchers across all Faculties for specialist compute or HPC issues.</td>
<td>Further development of the Research Support Service and setup of Faculty HPC team</td>
<td>Work with staff in faculties to ensure support is available where needed</td>
<td>Support network in place and embedded across academic departments</td>
</tr>
</tbody>
</table>

\(^{11}\) York Advanced Research Computing Cluster
Programme 4: Departmental and Faculty IT

ITS is now providing IT services to a range of academic departments. The exact requirements vary by department but common themes are reducing duplication, improving business processes thereby freeing up staff time to more directly support research and teaching.

<table>
<thead>
<tr>
<th>Project</th>
<th>Aims</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>Develop and implement a sustainable management structure and consultation model</td>
<td>Put a management structure in place for all faculty/department support within ITS</td>
<td>Bed in the new structure, agreeing targets with all departments.</td>
<td>New management structure in full operation</td>
</tr>
<tr>
<td>HYMS</td>
<td>Standardise the HYMS IT offering as much as possible. HYMS is unique in the University as a cross-institution joint department, and will continue to have significant requirements for non-standard IT systems</td>
<td>Delivery of the new HYMS desktop and stage one of the move to Office365</td>
<td>Stage 2 of the Office 365 move, focusing on collaboration and workflow</td>
<td>Refresh of HYMS desktop</td>
</tr>
<tr>
<td>ReCSS</td>
<td>This partnership and associated change of line management starts in August 2017. The project will be further scoped as the relationship deepens</td>
<td>Working with ReCSS IT staff to fully understand the needs and the area and to increase cover</td>
<td>Increase support for researchers in ReCSS</td>
<td>New model fully in place and academics fully aware of the facilities available</td>
</tr>
<tr>
<td>Electronics</td>
<td>Continuing the progress made over the last 18</td>
<td>Retirement of major legacy systems and</td>
<td>Working with ESG, expand use of common</td>
<td>Phase 2 of business platform sharing</td>
</tr>
<tr>
<td>Department</td>
<td>Description</td>
<td>Actions</td>
<td>Contents</td>
<td></td>
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</tr>
<tr>
<td>Physics</td>
<td>Physics has a large amount of duplication of central services, combined with a legacy network that hampers research and teaching. Working with the department, we will standardise where appropriate, and upgrade infrastructure to ensure that it is fit for purpose.</td>
<td>Improvements to support processes and audit of existing legacy systems. Refresh of the lab and classroom IT systems</td>
<td>Phase 1 of legacy system retirement, move of local HPC clusters in YARCC Working with ESG, expand use of common platforms across Physics and Electronics (e.g. mailing list management, module feedback)</td>
<td></td>
</tr>
<tr>
<td>The York Management School</td>
<td>To provide core IT services including cover, which was not possible with a single post</td>
<td>Bedding in of new arrangements and review of service provision after year 1</td>
<td>Move to business as usual for support Investigate possible shared services for administration</td>
<td></td>
</tr>
<tr>
<td>Departmental business systems</td>
<td>Most large science departments have bespoke business systems. These are all disparate and custom to that department.</td>
<td>Review of business systems and processes in departments</td>
<td>Development, standardisation and retirement of systems as appropriate, phase 1 Development, standardisation and retirement of systems as appropriate, phase 2</td>
<td></td>
</tr>
</tbody>
</table>
This project will review the systems and recommend and implement future directions for each of them.

<table>
<thead>
<tr>
<th>Biology</th>
<th>Reconfigure the staffing in Biology IT to better support HPC and Bioinformatics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provide more integrated facilities and support in partnership with the Biology Technology Facility</td>
</tr>
<tr>
<td></td>
<td>Develop and cost replacement cycle staff PCs</td>
</tr>
<tr>
<td></td>
<td>Development, standardisation and retirement of systems as appropriate, phase 1</td>
</tr>
<tr>
<td></td>
<td>Standardisation of HPC facilities where appropriate</td>
</tr>
<tr>
<td></td>
<td>Development, standardisation and retirement of systems as appropriate, phase 2</td>
</tr>
</tbody>
</table>
Programme 5: Digital Services

The digital services programme consists of projects which aim to address the need to create new services, replace ageing systems and enhance existing services to make efficiency savings. This list takes into account major projects and supporting activity we are aware of at this stage, but it is the programme subject to the most change as new priorities emerge or shift due to external factors.

<table>
<thead>
<tr>
<th>Project</th>
<th>Aims</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>The Enterprise Systems Strategy Group has been established and aims to improve the decision making and investment decisions made for digital services</td>
<td>Fully establish the Enterprise Systems Steering Group and secure additional capacity for new services and improvements</td>
<td>Build the case for a large scale but incremental ‘digital transformation’ programme, which encompasses the whole University</td>
<td>Govern a wide ranging programme of work to deliver leading digital services to staff and students</td>
</tr>
<tr>
<td>Online Learning</td>
<td>Provide support for the operational requirements of a new online learning platform</td>
<td>Establish the systems and services through data integration required to deliver and administer the first courses</td>
<td>Adapt services so that they operate with minimal administrative intervention and support the full scale of the service</td>
<td>If required, ensure that reporting services, forecasting and modelling include online provision seamlessly</td>
</tr>
<tr>
<td>Programme and Module Catalogue</td>
<td>In support of the new University pedagogy build on the success of the module catalogue to create the programme catalogue components</td>
<td>Develop the Programme Catalogue to support the York pedagogy</td>
<td>Feed resulting data into other systems and processes such as timetabling. Fully embed information as part of digital marketing</td>
<td>Further integration to support departmental needs (e.g. supporting module choice)</td>
</tr>
<tr>
<td>Timetabling and space management</td>
<td>The systems used to support services that underpin teaching and learning are no longer fit for purpose. This project</td>
<td>Deliver a new timetabling gateway and room booking application - retire the existing solutions</td>
<td>Review and possible tender of our existing core timetabling system</td>
<td>Ensure full integration of new and existing systems to support the space management processes end-to-end</td>
</tr>
<tr>
<td></td>
<td>aims to provide a stable and accessible services for administrators, teaching staff and students</td>
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</tr>
<tr>
<td><strong>Research Grants and Contracts</strong></td>
<td>Develop a service to manage the end-to-end administrative lifecycle for research grants to support our Research strategy</td>
<td>Worktribe (SYGMA) live and supporting the grant management lifecycle</td>
<td>Embed Worktribe including further integration work and support for efficiency and process improvements</td>
<td>BAU</td>
</tr>
<tr>
<td><strong>Master data management, Data warehouse and reporting</strong></td>
<td>We do not have a data warehouse meaning that departments are increasingly try to create their own reporting and data analysis capability. A central warehouse will drive efficiency</td>
<td>Establish the model and infrastructure for a data warehouse providing an initial service to BIU and a pilot department. This is dependent on improvements to our data integration architecture</td>
<td>Further development to establish a platform that can easily accommodate new data sources in short timescales</td>
<td>Develop and embed a culture of self-service reporting on a high-quality data sets that everyone can trust</td>
</tr>
<tr>
<td><strong>Marketing and student recruitment systems</strong></td>
<td>Ensure that the CRM, CMS and other marketing tools and communication platforms can support the work of External Relations</td>
<td>As the marketing restructure concludes work with External Relations to understand their system requirements</td>
<td>Present cases for investment or a roadmap for system development. Start implementation if appropriate</td>
<td>Work with External Relations to continually review and improve the tools that support digital marketing</td>
</tr>
<tr>
<td><strong>Finance Systems</strong></td>
<td>Review the finance systems in place and develop a roadmap for improvements to support good financial management and reporting</td>
<td>Complete a review of services and create a service catalogue that maps out systems and supporting processes</td>
<td>Work with senior managers in Finance to agree a roadmap of service improvements and deliver those with the highest priority</td>
<td>Continually review and monitor service improvements delivered and extend roadmap as appropriate</td>
</tr>
<tr>
<td>Attendance monitoring</td>
<td>Support for departments where attendance monitoring at a variety of teaching activities is required</td>
<td>With policy development complete undertake initial analysis to understand how the market can support an efficient attendance monitoring processes</td>
<td>Implement an attendance monitoring system with low administrative burden and data as a core principle</td>
<td>Review attendance monitoring reporting and how this might support administration in departments</td>
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</tr>
<tr>
<td>Enquiry and case management services</td>
<td>Provide a high quality commodity service to meet the demand for enquiry handling and case management needs. Improve service throughput, department collaboration and efficiency</td>
<td>Further development of the case for investment in this area</td>
<td>Create a project team and governance to implement a University wide system. Begin implementation if successful.</td>
<td>Extend use across the University with student facing services a priority.</td>
</tr>
<tr>
<td>Retirement of legacy systems</td>
<td>Outside of the specific services detailed here there is a large number of systems that need to be retired in favour of central services</td>
<td>Prioritise the list of legacy systems to be retired and match this work to other projects in this programme</td>
<td>Continue this process in years 2 and 3 of the strategy</td>
<td></td>
</tr>
<tr>
<td>Role based service provisioning</td>
<td>Replace legacy identify and provisioning systems. Ensure that new systems can be integrated quickly</td>
<td>Retire legacy provisioning system (REGI) and ensure new systems are provisioned from new IDM system</td>
<td>Retire 2nd legacy provisioning system and provide a standard model for new system deployment and integration</td>
<td>Ensure that information security is improved through automated and workflow supported role based access</td>
</tr>
</tbody>
</table>
Appendix A:  
Principles that underpin IT choices

The principles that follow have been reviewed and updated for 2017-20. We will review and update them, if appropriate, on an annual basis so that new services and projects are evaluated against a relevant set of principles that reflect current technology trends and drivers. We recognise that some of these principles can conflict - for example, ease of use and security - so we will use a pragmatic approach to balance risk and the user experience.

1. Designed to support the needs of students, lecturers and researchers

Although this should be a statement of the obvious, we wish to make it explicit that our purpose is to provide systems and services that are aligned to the needs of our customers, be they students, lecturers, researchers or those staff who support teaching and research. The implications of this for us are that:

● We must ensure, by using as many mechanisms as possible, that we understand what our customers want from us and that we have a wide variety of ways for gathering feedback on whether our services are meeting their needs

● We must be open to new ideas and willing to support innovation in all aspects of our services

● We must be flexible in our approach to service delivery and accommodate diversity where necessary

2. Easy to use, easy to access and easy to learn

This is one of the most consistent pieces of feedback we receive from our users. Any systems we provide, either via third parties or developed in-house, should provide a great user experience. The implication of this principle is that when selecting and designing systems we must:

● test thoroughly for ease of use and ensure a consistent experience regardless of device or operating system

● Involve system users throughout projects, with a focus on interface design from an early stage

● Design self-service into our portfolio so that customers can access commodity services like storage, or compute power without our intervention
3. Resilient

As our dependency on IT increases it is essential that all our services have a suitable level of resilience. The implications of this are that we:

- ensure all teams work closely together so that we understand the dependencies between different systems and services
- build on the investment that has been made in our monitoring capability to spot and fix issues before they affect services
- design appropriate levels of resilience into all our services from the outset recognising that this will be more expensive in our budget requests
- use cloud services where appropriate to achieve the maximum possible resilience

4. Energy efficient

The University has aggressive carbon reduction targets to comply with and IT equipment contributes approximately 20% of carbon production across the University. The implications of this are that we must:

- work closely with the environment team in Estates to ensure we are complying with carbon reduction activities and can take advantage of schemes aimed at reducing our carbon footprint such as Salix
- recycle all of our old equipment and provide services for easy recycling to other areas of University
- Reduce the energy footprint of the IT estate by consolidating workloads where appropriate, offering virtualised servers to departments to replace old hardware and by considering energy use in all procurements we run

5. Agile and easy to maintain

Technology changes rapidly and the pace of change is accelerating. Customer need can also change rapidly either because of changes in the external environment, for example new legislation, or because of internal changes to business processes. We must, therefore, have systems that can be quickly and easily adapted and have a short development cycle. We also need to ensure that system maintenance effort is kept to a minimum, so that as much staff time as possible is available for work that adds value to the customer. The implications of this are as follows:

- iterative development techniques combined with comprehensive business analysis is our standard approach to system developments to avoid drawn out projects that deliver little value
- we continually review the technology and techniques used to deliver services. We recognise that rapid change is inevitable and therefore we must keep pace and not rely on existing technologies to always be relevant
- we must architect and engineer our systems so that they can be easily expanded or changed. This means designing for maximum flexibility in both the technology
and the processes it supports using methodologies that allow for rapid reaction to changing circumstances.

- wherever possible we must use a ‘standards based’ approach which will help to make our systems easier to integrate and more interoperable
- we must ensure we are aware of trends and changes in technology, regularly reviewing systems and processes to ensure they remain fit for purpose

6. Cost effective

Budgets are always under pressure and we recognise the need to ensure that the investments we make in technology are as cost effective as possible. The implications of this are that we must:

- work closely with our colleagues in the Procurement office to ensure that we are using best practice when making purchases and that we are aware of the relevant frameworks and national deals the University can take advantage of
- ensure we take advantage of cross-institution economies of scale in procurement
- ensure we fully consider the total cost of ownership, which includes maintenance, power, staff costs, licensing, external consultancy and consumables for any new service or technology we purchase or provide
- monitor our expenditure closely and ensure we have a deep understanding of our costs and where opportunities for cost reduction exist
- negotiate more robustly with our suppliers when contracts are renewed to ensure we are always getting the best price

7. Secure

Ensuring that the information we hold is kept secure is key to keeping the University running, avoiding reputational risk and ensuring that we can continue to host research in areas that handle sensitive data (e.g. medical/health data). This means that we must:

- ensure that all systems, services and devices are secured to an appropriate level and that data is assessed for risk and managed accordingly
- segregate our systems and network to reduce the impact of an intrusion and follow best practice in system design to secure all systems
- provide suitable training to all University staff handling sensitive personal/commercial data or developing systems that handle such data
- maintain legal compliance in all areas of Information Security, including PCI/DSS and Data Protection and develop policies and procedures in conformance with ISO 27001/2.
IT Strategy
2017/18 – 2019/20

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