

University of Gloucestershire – Information Strategy

Phase Two: 2018-2022

revelation

noun rɛvəˈleɪʃ(ə)n/

- something revealed or disclosed, especially a striking disclosure, as of something not before realised¹

Purpose

1. The University has an ambitious **Strategic Plan** expressed through our Mission, Vision, Values and four Goals:
 - (1) To provide a breadth and richness of experience that enables all our students to reach their full potential;
 - (2) To provide teaching and support for learning of the highest quality;
 - (3) To undertake research and professional practice which enrich students' learning and create impact and benefit for others;
 - (4) To build partnerships that create opportunity, innovation and mutual benefit for the communities we serve.
2. This strategic plan is supported by a number of key strategies, including Sustainability, Estates, Internationalisation, People and Culture, but particularly:
 - a. A new **Academic Strategy** which sets out our plan to develop attractive and competitive subjects; deliver excellence in learning and teaching; ensure impact through research and practice; and build an engaging approach to enhancement.
 - b. A revised **Marketing and Communications Strategy** that sets out our ambitions to: deliver growth in student numbers by at least one third; build the University Brand Identity, Personality and Visuals; support the development of the Academic Portfolio; and support the University in developing technological advances.
3. The achievement of the University's Strategic Plan and these related strategies critically requires the use of data, information and the associated technology.
4. The **purpose of this Information Strategy** is to ensure that the University's data, information and technology can effectively and efficiently support the delivery of the Strategic Plan. In particular:
 - a. To enable evidence-based decisions about progress;
 - b. To positively impact the student experience;
 - c. To ensure the most effective use of information skills and technology; and
 - d. To promote new ideas and identify strategic opportunities
5. This Information Strategy is broader than the activities of one department. It lays out a University-wide set of principles and actions. Many of these activities flow naturally

¹ Dictionary.com

from the Strategic Plan or individual department and school plans and many would be undertaken individually without a strategy. The importance of the Information Strategy is that it provides a coherent set of goals and actions that ensure that this range of complex and varied work is taken forward coherently and with focus.

6. The University's Strategic Plan calls for accessible, accurate and timely data to provide insight and lead to action, including development of learning analytics to support engaged student learning. This Information Strategy develops the detailed goals and activities around this.
7. The University's Strategic Plan also sets technical aims of sustained investment in infrastructure, delivering appropriate resilience, ensuring systems are technically coherent, and streamlined administrative systems. The Information Strategy provides a governing framework for these goals, and the detailed principles and actions are developed as an Annex, essentially forming the University's IT Strategy.

Background and Context

8. The University Executive approved the first phase of the Information Strategy in June 2015. Two phases were initially planned: Phase One was to lay the foundations through an understanding of the information needed to support the student journey; with Phase Two to target the effective use of data and information by staff and students linked to the update of the University's Strategic Plan and associated key strategies.
9. In Phase One, the University made significant strides in the availability of information to students through MyGlos and a greatly condensed student intranet (MyGlos Help). A new simplified external website was launched with a successful focus on recruitment. In addition, a course portal was developed in support of the Rethinking Enhancement project. This included an agreement to a key part of our data architecture (particularly the course hierarchy) as well as providing a decision-making tool to those providing course governance.
10. In amongst other technical developments, exploratory work was undertaken with Jisc around Learning Analytics. The technical delivery went at the pace of Jisc. While this was slower than they originally planned, we have benefited from the work in terms of profile, access to developments and insights around use of student data and approaches to interventions. We have now started to see the benefits of making use of student-related system data (for example the use of Moodle statistics as part of the Operating Plan). The promise of predictive analytics is still some way in the future but should remain a theme in Phase Two.
11. An audit of the Phase One work was completed in June 2017. The audit found that the key controls within the Information Strategy process were well developed and, with minor exceptions, properly implemented. The audit gave positive feedback to our development of an Information Strategy, and strongly supported our plans to continue to maintain the strategy into Phase Two.

12. The audit encouraged us to ensure the links were strong with the new Strategic Plan, that we improved the usefulness of KPIs, that we articulated more clearly specific work on technology and that we reframed the governance through an Information Steering Group. These actions have been adopted in the development of this strategy.
13. The above articulates the ongoing desire for an Information Strategy. The HE environment adds further weight to its purpose:
 - a. We need to be able to predict and influence externally published metrics, which encompasses the data that leads to those metrics, as well as being able to articulate a specific narrative about supporting student development through good use of learning resources and feedback.
 - b. We are moving into a regime that has a near real-time expectation on us to be able to generate good quality student data. This covers the traditional HESA returns, but also through oversight and Ofsted like inspections on some of our key growing courses (Nursing, Apprenticeships).
 - c. In an ever increasingly competitive environment, being able to join the dots on information and data remains key to maintaining an advantage (from keeping contact with prospective students, to quality measures of feedback and engagement to seeking to action that will positively influence NSS scores ahead of time).
14. This strategy responds to this context and lays out: the principles that we govern how we will progress any information and information technology related work; the scope of the information we are interested in; the four ambitions that express our delivery strategy, including key actions and KPIs; and a link to the benefits and the Strategic Plan.

Principles

15. This strategy provides the following guiding principles for how the University coherently uses its data and information assets:
 - a. We use information to understand our current situation and manage the University today
 - b. We use this understanding to predict outcomes and proactively make changes to inform tomorrow
 - c. We work to a central data and system architecture
 - d. We maximise self-service for the users of any data or system
 - e. We automate and deliver workflows online wherever possible

Scope and Strategic Approach

16. The principles of this strategy can apply very broadly to the University's information and technology; from teaching and learning resources, core data about our delivery and communications relevant to our various stakeholders. The principles should be used to guide decisions and activities that relate to the University's information.

17. However, the use of data and information is a broad agenda that unchecked, could attempt to encompass all of the Universities activities and goals. The approach here is to define four focused ambitions that build on each other to achieve significant outcomes and benefits for the University, whilst avoiding the danger of drowning in too broad an endeavour.
 - a. **Ambition 1: Content** – focus on the learning resources that form an essential component to the learning experience; and the data that drives the course quality, University’s decision making and external oversight.
 - b. **Ambition 2: Processing** – ensure that the essential content from Ambition 1 is processed in an accurate and reliable way so we trust our workflows to ensure that processing of data leads to legitimate insights.
 - c. **Ambitions 3: Accessing** – ensure the processed content is readily available through communications channels and dashboards.
 - d. **Ambitions 4: Using** – and to make sure that staff and students can use the resources and data effectively and safely.
18. These ambitions are described in more detail below. The bold statements summarise our intent.
19. The Annex describes our approach to the cross-cutting technology delivery as well as some of the delivery plans to put in place the technical solutions needed to meet the ambitions below.

Ambition 1 Content – Learning Resources and Data

20. The foundation of the overall strategy is the information the University owns and/or uses. This includes a wide range of information from videos, unique archive material, communication and decision papers and data-sets. The strategy is to focus on the information that is core to the student experience and the management of the learning programmes.
21. The student learning experience is built on outstanding teaching, which in turn relies on excellent resources. The strategy is to ensure every module is supported by a rich set of actively curated resources designed to increase student engagement and demonstrate guided independent learning. The resources will be part of a consistent virtual learning experience and online module structure that is available to all students. A key aspect is the development of ways of *measuring* the quality that is appropriate to the pedagogy of the relevant subject community, and is based on student engagement.
22. Discovery tools will be provided that support the students and the academics in exploring the resources they have access to, as well as to find resources that could enrich and stretch the learning experience and our research programmes. We intend to support the academic endeavour as fully as possible, whilst ensuring that the creativity and novelty of our academics isn’t stifled by spoon-feeding or rote delivery.

23. This approach puts in place the necessary systems to support fully on-line course design and delivery. While the move to fully on-line courses will be led by our academic approach, it is important that the activities under this Ambition support such courses.
24. Alongside the learning resources is the core data that governs the effectiveness and viability of our courses, and directly leads to external scrutiny of our overall teaching and learning aims culminating in the HESA data returns.
25. The strategy is to focus our data improvement efforts on the dataset(s) that constitute those returns, and to ensure the creation, manipulation and overall quality of that data meets the requirements of the returns.
26. **Overall Ambition 1 has two parts: to have demonstrably rich resources supporting all our modules, with those resources actively in use by students, forming a compelling narrative within our future, successful, TEF submission; and to meet the needs of HESA Data Futures enabling ‘automated’ data returns, as efficiently as possible, and for this to form the platform for predicting and hence influencing our key metrics.**
27. This Ambition directly supports Goals 2 and 3 of the University’s strategy. Teaching and Learning of the highest quality requires a focus on the learning resources, as does the undertaking of excellent research and innovative professional practice.

Priority Actions	Owner	Timeline
1.1 All modules using the Online Module Guide for Academic Year 2018/2019	Director of Quality Enhancement	Sept 2018
1.2 Resource list management software is in use by groups from each school	Associate Director of LTI Service	Dec 2018
1.3 Discovery system for learning resources integrated with resource lists and Moodle developments	Associate Director of LTI Service	Sept 2020
1.4 Online module structure including quality measures in place	Content Support and Information Manager	June 2019
1.5 All modules have a module structure within Moodle with integrated learning resources measured to agreed standards	Head of Learning and Teaching Innovation	April 2020
1.6 All courses have a mapped online guide and resources structure including quality measures	Director of Quality Enhancement	Sept 2020
1.7 Identify data used in returns, including the business processes that create and impact on the	Reporting Manager	Sept 2018

data; the governance around the data; and the minimum quality thresholds		
1.8 Demonstrate accurate data return in-year ahead of HESA data futures requirements going live	Reporting Manager	July 2019
1.9 Agree the academic model to drive our curriculum management	Dean of Academic Development	Sept 2018
1.10 Analyse measures of student engagement with learning resources to provide feedback on successful practices in the use of the virtual learning environment	Director of Quality Enhancement	2019

KPIs relating to Ambition 1:

- (1) Percentage of modules using the Online Module Guide
- (2) Measurable characteristics of the diversity of learning resources linked to each module and course
- (3) Student engagement with learning resources
- (4) NSS results relating to learning resources (questions 18-20)

Ambition 2 Processing – Integration, Automation and Prediction

28. The second layer of the strategy is to ensure data is moved accurately between systems, that derived values can be calculated with confidence, and that we make robust or quantified predictions from our data.
29. There is a need for an understandable system architecture which is covered in the Annex. In addition, we need to transparently document how the data flows and is changed between systems. We will do this linked to a set of priority workflows that are essential to the delivery of Ambition 1.
30. We also need to move our current data-warehousing system from just holding a current snapshot, to being able to build historical trends and allow for projections.
31. Longer-term we intend to be in a position to exploit the major developments in business computing around artificial intelligence and machine learning. We will continue our work to provide a learning analytic system through our partnership with Jisc. Initially, its value will remain in promoting the descriptive data around a student's engagement and learning, but we will maintain a close interest in the power of the predictive algorithms. We will set aside time and effort to understand the reliability of predictions and will look closely at other developing areas that include:
 - a. Helpdesk systems that perform initial, automatic, conversational triage of a student's query;

- b. Algorithms that look for patterns in submitted work that may indicate cheating or wellbeing issues;
- c. Systems that guide students and academics in identifying resources based on their needs.

32. **In summary, Ambition 2 is to integrate and automate the data-flows that support our highest data priorities. We also intend to be at the leading edge of understanding how machine learning and AI could support our business to enable rapid deployment of AI based systems where there is trust and a business case to do so.**

33. In a general way it is noted that this Ambition also supports Goal 3 of the University's Strategic Plan, by ensuring a clear understanding of our status in the run-up to the next REF.

Priority Actions	Owner	Timeline
2.1 Identify business processes that support Ambition 1, including identifying candidates for automation	Process Improvement Manager	July 2018
2.2 Develop a technical framework for workflows and map the technical solution to the system architecture, including automation where relevant	Head of Technical Delivery	July 2018
2.3 Automate the identified workflows	Head of Technical Delivery	End 2019
2.4 Document the data-flows and data-warehouse aspects relating to the workflows and data to ensure processing is clear and agreed	Senior Systems Architect (Data Systems)	End 2019
2.5 Scope and deliver the required trend-based historical data within the overall architecture (including changes to the data-warehouse model)	Senior Systems Architect (Data Systems)	2018-2020
2.6 Rollout of Jisc learning analytic system to Senior Tutors emphasising the use of descriptive data	Associate Director of LTI Service	Sept 2018
2.7 Full rollout of Jisc learning analytics via the tutor portal	Associate Director of LTI Service	Dec 2018
2.8 Review the impact and value of predictive data as part of student engagement to drive interventions	Dean of Academic Development	July 2019

2.9 Monitor trends in AI based on deep-algorithms relevant to HE to factor into update plans	Head of Technical Delivery	2018-2019
--	----------------------------	-----------

KPIs relating to Ambition 2:

- (1) Reduction in paper-based workflows
- (2) Staff satisfaction survey measures (that look at how well systems support staff)
- (3) Data Maturity using the HESA data maturity model
- (4) Data Anomalies requiring correction within data returns
- (5) Accuracy of predictive learning analytic data

Ambition 3 Accessing – Portals and Channels

34. The third component of the strategy is to ensure that students, staff and stakeholders (including prospective students) can gain ready access to data and information. This requires careful design around the communication channels that we intend different groups of people to use, building on the successes of the first phase of the Information Strategy (including MyGlos and the refreshed external website).
35. The key areas of development link closely to the University’s Marketing and Communication strategy, and are specifically:
 - a. Extending the SITS environment to support prospective students and alumni
 - b. Duplicating the ease and success of MyGlos to benefit staff
 - c. Keeping ahead of the sector with changes to the external website and coherently embracing the wider stakeholder needs of the external website through a merger of the separate wordpress sites
 - d. Adopting a full customer relationship management approach (and system) to bring coherent access to our student information to all the professional departments that have a need to engage with students across the whole lifecycle.
36. Moodle is increasingly the starting point for many of our student’s processes and we are in the process of moving module information and assessment processes to Moodle. It is therefore a natural progression to confirm Moodle as the basis for curriculum-based communications linking it to external social media channels where that makes sense.
37. It should be noted that while the focus of the strategy is on the core data and information described in Ambition 1, it is true that effective channels can readily be expanded to target different groups with a variety of content that is relevant to them. They will be built with this broad user experience in mind. This allows for a greater promotion of our active research areas to support the growth of our student numbers in this area.

38. A significant success of the first phase of the Information Strategy was the development of the course portal, providing both access to accurate and timely data in a readily accessible format, as well as a platform for recording and monitoring more qualitative assessment information in discursive and survey form.
39. We intend to expand on this use of portals to embrace at a minimum the needs of tutors from a student development perspective; and school level information to support decision at heads of school level. There is in addition a broader business dashboard need that will be explored and planned during this phase of the strategy.
40. **Ambition 3 is to expand the existing channels that work well (MyGlos for students and the external recruiting website) to provide a quality solution for the full range of stakeholders. Further, over the next few years we will develop a range of coherent dashboards that support decision-making at key levels within the University.**
41. Ambition 3 has a supporting role to Goals 3 and 4, by supporting the next REF exercise, as well ensuring that our partnerships are more effectively enabled through broader online communication.

Priority Actions	Owner	Timeline
3.1 Extension of SITS access to provide an Applicant's Portal	Associate Director of CMSR	Apr 2018
3.2 Duplication of the MyGlos technology to provide a more intuitive and cleaner MyGlos for staff	PR and Communications Manager	2019
3.3 Migration of the key department and school information to the new staff intranet	PR and Communications Manager	Sep 2019
3.4 Development of an Augmented and Virtual Reality App for prospective students to enhance their on-campus experience during open days and applicant days and to enable virtual open days	Senior Brand Communications Manager	2018
3.5 Redesign of new external website and associated brand changes	Senior Brand Communications Manager	2018-2019
3.6 Redevelopment of external website and migration of separate wordpress sites into one website structure	Senior Brand Communications Manager	2018-2020

3.7 Work with a small number of pilot, volunteer, subject communities, to enhance Moodle as a communications platform to support course and subject curriculum-based communications and group discussion	Content Support and Information Manager	2019
3.8 Redesign the Personal Tutor Portal to become a Tutor Portal, supporting the integration of all useful information that supports individual tutees and the tutoring process more generally	Head of Technical Delivery	2018-2019
3.9 Development of a School Dashboard to support School based decision makings	Head of Technical Delivery	2019
3.10 Review the need for further portal and dashboard views and consider a roadmap of the technical tools to support user self-service	Head of Technical Delivery	August 2018

KPIs relating to Ambition 3:

- (1) Web-site usage statistics
- (2) MyGlos download and tile use statistics
- (3) Usage statistics relating to the portals and dashboards
- (4) Take-up of Moodle as a communications platform, measured by course

Ambition 4 Using – Skills, Governance and Security

42. The final element of the strategy brings a focus to the effective use of the University's information. This embraces the development of skills in staff and students, as well as the governance and security arrangements to keep our information reliable and safe from exploitation that would be damaging to our reputation.
43. For students, we intend to deepen the partnership with Jisc, developing with them a set of online teaching modules based around Jisc's Capability Framework. We will explore the collaborative development of the learning resources with Jisc and other HE/FE partners where it is appropriate and where there is interest.
44. The Jisc framework has support within the HE sector and is a good basis for encouraging students to have the core skills to succeed in their ambitions. The skills development will be embedded within the taught modules and complement the subject based learning. In addition we intend such skills to have a broader impact on the students' skills portfolio relevant to their chosen career.
45. It is important that academic staff can exploit the technology developments that underpin many of this strategy's ambitions, and forms a core part of the IT Strategy. To

that end, we will link the necessary information and technology skills to the Academic Career Pathways. This will support the various academic roles in getting the most from the range of information technology solutions available to them.

46. All staff will also be able to access a portfolio of available information skills resources that support their training needs. There will be a particular focus on the secure use of data in decision making, covering good information assurance practice and providing support to the range of data analyst skills we need.
47. The final element to the effective use of our information is the governance and security framework within which we operate. We intend to build on standard industry practices and processes which are appropriate to the way the University operates. This will put LTI, in particular, in a good position to complement the School of Business and Technology's teaching ambitions.
48. **Overall Ambition 4 is to: support our students in achieving high levels of confidence in using information, which forms a reference point for the overall value of our offer to students; enable staff to develop those information skill elements that help them most in their particular job; and to achieve Cyber Essentials Plus as a good standard to evidence our information security competence.**
49. Ambition 4 directly relates to Goal 1, as enabling students to reach their full potential requires students to be confident with their information skills.

Priority Actions	Owner	Timeline
4.1 Create a framework on Moodle in partnership with Jisc, progressively populated with a set of e-learning resources covering the digital capabilities model	Associate Director of LTI Service	2018-2020
4.2 Develop assessment and accreditation mechanisms to evidence impact	LTI Senior Trainer	2020
4.3 Promote student take-up of digital capabilities skills training in coordination with Your Future Plan activities	Associate Director of LTI Service	2018-2019
4.4 Incorporate the Technology to Enhance Learning programme outcomes into generic academic job descriptions and teaching pathways	Strategic HR Business Partner	End 2019
4.5 Develop staff competence in using the technical capabilities provided, particularly through the Technology to Enhance Learning programme	Director of Quality Enhancement	2020

4.6 Develop skills resources for professional services staff focused around the essentials of information security	Associate Director of LTI Service	July 2018
4.7 Plan a broad set of information skills capacity for all staff that builds on the TEL foundation	Director of HR	2019
4.8 Progressively expand the learning resources available to staff to support their effective use of the core systems in use at the University	LTI Senior Trainer	2018-2019
4.9 Promote the use of remote and mobile working technologies	Head of Technical Delivery	2019
4.10 Complete data related measures, to be in place for new General Data Protection Regulations	Director of Governance and Registry Services	May 2018
4.11 Complete compliance with payment card standard (PCI-DSS)	Content Support and Information Manager	May 2018
4.12 Ensure all staff complete security awareness training	Strategic HR Business Partner	2018
4.13 Achieve Cyber Essentials Plus benchmark	Content Support and Information Manager	Dec 2018
4.14 Launch the refreshed Information Security Management System	Content Support and Information Manager	2019

KPIs relating to Ambition 4:

- (1) Self-reported confidence scores by students
- (2) Correlation between use of information skills learning resources by students and their overall academic achievement
- (3) Self-assessed knowledge and confidence via audit for staff
- (4) Percentage completion of essential training

Benefits and link to the Strategic Plan

50. The key benefits are:

- a. To enable evidence-based decisions about progress – this will be clear as we proceed to delivering near real-time HESA returns that pass their quality measures, and see our dashboards and portals in use by schools.
- b. To positively impact the student experience – this will be clear from survey-based feedback on the quality of the learning resources and the measures introduced through our analytics
- c. To ensure the most effective use of information skills and technology – this will be evidenced through the efficiency measures of our workflows and the cost efficiency of our technical architecture
- d. To promote new ideas and identify strategic opportunities – this will come from following developments in using data and information to make predictions as well as the work embedded in the technology strategy to make innovative use of our learning and teaching systems (in particular)

Resources

51. Many of the activities in this strategy are driven by the other strategies of the University. As mentioned in the background, the value of this strategy is it brings together these activities and provides a focus and coherence to what is otherwise a broad agenda against which it can be difficult to make concerted progress. As a result, much of the activity is already resourced within the teams and resources already agreed or deployed.
52. The approach to information skills development and rollout for students and staff remains a significant ambition and resource challenge which will be closely monitored by the group commissioned with overseeing the activities of this strategy, the Information Steering Group (see next section). That group will review the actions and priorities and bring to UEC any issues for consideration.
53. The technical delivery described (and expanded in greater detail in the Annex) is resourced predominantly from the capital resources available to enhance and support the IT Infrastructure (though limits on that capital funding may have an impact on the overall spend and timescales of progress). Therefore, at the top level, no new funding sources are required for this strategy to proceed.
54. It is perhaps worth identifying however, that the communications and marketing work requires delivery of internal, external and customer relationship management system changes. It is not possible to deliver against all of these requirements without either some additional priority funding (that has been bid for) or for the timescales to be adapted for the individual strands of project. Balancing the resource available and the priorities will be a role for the steering group.

Governance

55. One of the audit recommendations from Phase One was to consider establishing a more coherent steering group to oversee the work of this strategy. This has been agreed. An Information Steering Group will subsume the work of the Data Governance Group as

well as provide a reporting body for the Data Improvement Project that has the delivery responsibility for much of Ambition 2.

56. Major change activities shall be governed using the University's project management framework, providing a structured approach to projects with an emphasis on upfront planning and definition, based on Prince2.
57. The Information Steering Group will also be aware of emerging requirements and issues with the technical systems and provide a place to agree priorities and champion the need for significant system changes. This will involve reviewing the capital prioritisation of the IT Infrastructure element of the capital allocation.
58. Technology Roadmaps are the fundamental artefact that represents the development, technology and capital decisions for each product. These are jointly owned and agreed between the Business Champions and System Owners. Through frequent engagement, customers will be involved in defining and scheduling changes to IT systems.

Annex: University of Gloucestershire's IT Strategy

1 Principles

A1. Our effort and ingenuity is focused towards student-facing teaching and learning systems, academic support to students, and ensuring that business systems are efficient and run on a solid technology platform.

A2. As with the overarching Information Strategy, achieving this ambition is an essential part of enhancing the student experience, creating a connected and informed staff environment, and meeting the external stakeholder needs through ready provision of robust information.

A3. The technology element of the Information Strategy is founded on a base of 6 principles.



A4. It is vital that we protect our key information assets, students, staff and research, by remaining **secure and compliant**. To achieve this, we shall:

- Operate all systems to a common security model, patching and securing systems
- Take a risk-led approach, only operating systems outside of the security baseline with appropriate risk-analysis and specific agreement
- Gathering intelligence and modelling threats to build sustainable processes for InfoSec risk mitigation, vulnerability analysis, penetration testing and reporting

- Utilise best-practice, and practice what we preach, partnering with the School of Business and Computing, as well as external bodies

A5. To support students and the continuity of business, the University's IT needs to be **resilient** to disruption. To achieve this, we shall:

- Regularly review and test our response to IT and Business Continuity incidents
- Utilise skilled staff effectively, minimise single points of knowledge, and prioritise critical systems and infrastructure
- Continuously seek to identify and reduce vulnerabilities within existing architectures
- Use a tiered approach (see Appendix B) to prioritise our obsolescence and network resilience enhancements maintaining Tier 0 resilience and seeking to minimise Tier 1 resilience risks

A6. To remain responsive to student and academic demand, the changing IT industry and HE sector, we must be **agile**. To achieve this, we shall:

- Use Agile methodologies in the development of our core systems, and work with the professional departments to maximise the benefit of iterative and incremental deliveries
- Apply appropriate process, whilst seeking to minimise bureaucracy
- Maintain a balance between support, development & innovation in order to maintain a stable, yet progressive set of services and systems
- Leverage our relationship with Jisc to get pioneering capability into the University
- Anticipate peak demand, and be ready to respond to major incidents at any time

A7. Maintaining an efficient and effective set of **integrated** systems is key to this strategy. To achieve this, we shall:

- Prioritise and centrally manage a core set of solutions that integrate with other University systems, rather than developing standalone systems that accommodate local needs.
- Continue to take a best-of-breed approach to system selection decisions, that balances cost, support and risk.
- Operate a centralised IT model, ensuring all systems and technical decisions are taken in consultation with the LTI Service
- Work in partnership with the schools and departments, ensuring we clarify the roles and responsibilities between the user community and the senior system developers for the product backlogs
- Contribute to the Data Improvement Project, implementing technical solutions that support a "right first time" approach to gathering, managing, and using data

A8. With a fixed budget, it is important that the services we offer and projects we undertake are **maintainable**. To achieve this, we shall:

- Automate whenever possible
- Promote our self-service solutions
- Drive for standardisation, to reduce support costs and improve operational effectiveness
- Target reductions in the revenue support baseline

A9. Along with the Estates Department and the other professional departments, we are key enablers and must remain **service-oriented** and not self-serving. To achieve this, we shall:

- Continuously assess and improve our services, looking from the customer's perspective
- Anticipate, recognise and seek to meet others' IT needs
- Use industry best-practice (ITIL)
- Use metrics and KPIs to predict and course-correct
- Enable self-service

2 Cloud Enabled

A10. Wide spread adoption of cloud has led many vendors to shift focus from on-premise solutions to cloud delivery models, giving rise to a question: which is best for the University?

A11. Essentially, the fundamental difference between cloud vs on-premise systems is where they reside. On-premise systems are installed locally, requiring local support and hardware infrastructure, where cloud software is hosted on the vendor's server and usually accessed via a web browser.

A12. As with all architectural decisions, there are advantages and disadvantages to both, as demonstrated in Table 1. There is no right or wrong answer to the cloud vs on-premise system debate. Every system is different, and has different requirements that will influence the choice of the deployment strategy.

	Potential Advantages	Potential Disadvantages
Cloud-based	<ul style="list-style-type: none"> • Anywhere and anytime access • Affordable & predictable costs • Scalability • Lower energy costs 	<ul style="list-style-type: none"> • Connectivity • Long-term costs / TCO • Less customisable
On-Premise	<ul style="list-style-type: none"> • Total cost of ownership 	<ul style="list-style-type: none"> • Large capital expenditure

	<ul style="list-style-type: none"> • Complete control • Uptime 	<ul style="list-style-type: none"> • Responsibility for maintenance • Longer implementation times
--	--	---

Table 1 - Cloud vs On-Premise Systems

A13. As a University, we intend to leverage the benefits from cloud based solutions as our default position. When we review product roadmaps and integrate new products, we'll use cloud-based deployments where it makes good business sense to do so, testing:

- Capital vs revenue expenditure
- Business Continuity, where we don't want to increase risk
- The system's upgrade cycle, aligning functionality, compatibility and integration

A14. Whilst infrastructure-as-a-service is a valid paradigm for many organisations, due to our scale, the number of users, and our connectivity this is not a valid model for the University; therefore, we are following a software-as-a-service model on a case-by-case basis.

3 Systems

A15. The majority of the University's core systems and services are managed and provided by the LTI Service, and in addition franchising is enabled where appropriate. Individual schools and professional departments may operate IT if it's done in agreement with the LTI Service and in line with the principles and approaches set out in this strategy.

A16. The LTI Service manages the core set of IT Infrastructure and Systems for the University. This includes a variety of tasks:

- First-line, through to deep support
- Managing IT incidents and problems
- Planning and implementing maintenance and outages
- Implementing new functionality through system development and upgrades
- Leading and supporting projects
- Working with suppliers to manage contracts, and enhance value for money

A17. The University's core systems underpin University life and are used by virtually every student and staff member each day. Those centrally managed by the LTI Service can be grouped as per Figure 1.

A18. To continue to deliver maximum benefit, without significantly increasing the required resources, requires balancing effort and a clear direction of travel and emphasis for each group of systems. This is set out in Table 1.

A19. A more detailed look at some of the key systems, the approaches to architecture, procurement and investment, as well as highlighting milestones for significant deliveries or

decisions, and links to strategic projects within each system group is presented in Appendix A to this Annex.

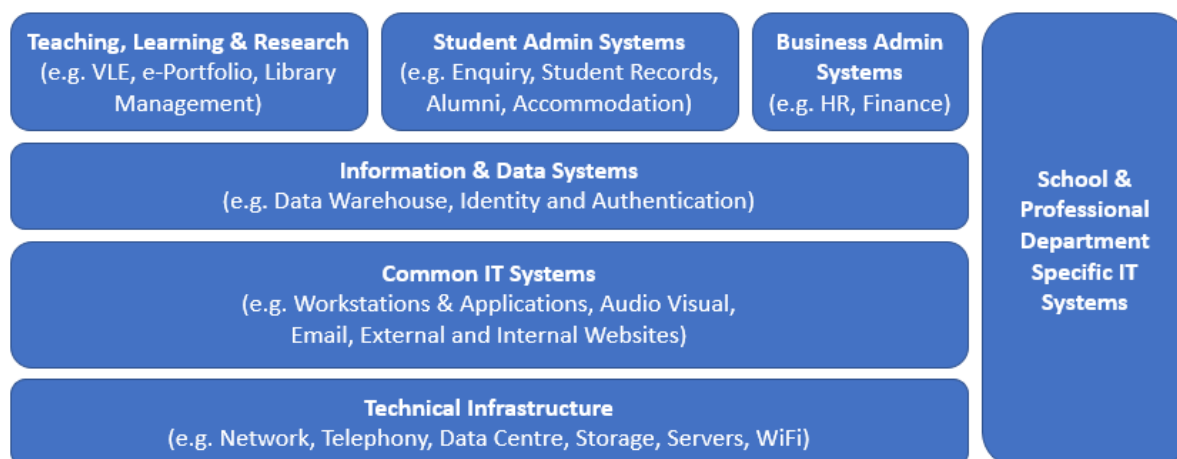


Figure 1 – University IT Systems

System Group	Direction
Teaching, Learning & Research	Grow our capacity to develop capability that underpin teaching and learning and put our VLE at the centre of the student learning experience.
Business Admin Systems	Reduce the effort required to develop and maintain systems, by using off the shelf capability and managed services.
Student Admin Systems	Continue with off the shelf systems that act as a single source of truth for the student journey, from enquiry, through study and beyond to alumni.
Information & Data Systems	Enhance our in-house developed data warehouse, as the platform for Business Intelligence and to support integration of systems.
School & Professional Department Specific IT Systems	Franchise where appropriate to do so. Increase provision of common infrastructure platforms.
Common IT Systems	Increase provision of off-campus IT for students. Increase functionality and automation through better use of system management. Continue a rolling programme of workstation refreshment.

Technical Infrastructure	Increase resilience and lower obsolescence by increasing emphasis on information security practices and continuing to use industry standard technologies. Grow capacity in line with University demand, and use managed services where cost effective.
--------------------------	--

Table 2 - Direction of System

4 Strategy Delivery Measures

A20. While many of the principles and activities within this IT Strategy will be carried out as part of the LTI Service normal business (such as routine system security activities), or under Programme and Project auspices, the activities highlighted in Table 3 significantly contributes to them. These actions are owned by the Head of Technical Delivery.

Principle	Priority Action	Timeline
Secure and compliant	Review the appropriateness of extended security controls such as two-factor authentication and pattern-recognition tools for threat analysis	By end of 2018
	Agree with the School of Business and Technology appropriate tests and enhancements to the University's system security	Through 2019
Resilient	Implement agreed risk reduction of Tier 1 Network Resilience issues	By end of AY20/21
	Maintain a rolling programme of technology obsolescence and replacement, ensuring that higher-tier vulnerabilities are identified and completed first	Technology Obsolescence Plan, ongoing
	Develop a programme of Business Continuity testing	By end of AY17/18
	Complete full test of automated failover of University systems from Park to Hardwick	By end of AY18/19
	Review impact of the potential move of the internet access point provided by Jisc, currently located at Park	By end of 2018

	Conduct a full review of Gold System Resilience (e.g. Moodle load balancing)	By the end of 2019
	Implement the Technical Roadmaps to address obsolescence issues	Ongoing
Agile	Increase our maturity in 'agile methodologies', that supports rapid and business focused development of system changes, ensuring teams in Registry, Finance and Planning, HR etc are influencing and championing the changes they need	Additional Agile training (by end of 17/18) Agile Working Group (setup by end of 17/18)
	Develop a set of technical roadmaps covering the core systems	Initial roadmaps by Aug 2018
	Setup an Innovation Working Group to progress identified innovations	Set up by, and inaugural meeting by, Aug 2018
Integration	As part of the Data Improvement Project, define and document the system architecture	By end of 2019
Maintainable	Introduce an archiving solution to enable cost effective data storage of important but infrequently accessed data (sampled student work for example)	Delivered by the end of AY18/19
	Reduce diversity of system platforms (particularly centralising on the Windows platform for servers)	Establish plan by end of AY18/19
	With Sustainability, progress and continue to identify IT changes to reduce electricity load, travel and carbon	LTI contribution to the Carbon Management Plan
	Reduce revenue like-for-like costs by 3% each year	LTI Business Plan KPIs
	Move away from lots of individual contracts for particularly network links between campuses, to one contract per supplier, to compete for supply of a set of network capabilities, balancing resilience and cost	By end of AY18/19
	Reduce duplicity in systems by identifying and progressing options for rationalisation (e.g. CAFM, SCUBA)	By end of 2020

Service-Oriented	Delivery of quality customer-focused services. Increase service maturity by focussing on ITIL principles and processes	Delivery of the Service Improvement Plan & increase in engagement scores
	Introduction of the Three Service Operations processes across the department	By end of July 2018
	Develop a process to add Requirement Management into Sunrise	By End of August 2018
	Introduce and develop Known Error Database	By end of June 2018
	Implement management of Change Control within Sunrise	By end of December 2018
	Implement a Service Catalogue	Developed by end of October 2018, rolled-out and communicated by June 2019

Table 3 - Strategy Delivery Measures

KPIs relating to IT Strategy:

- (1) Reduction in Tier 1 resilience risks
- (2) Maintain Cyber Essential Plus benchmark
- (3) Key system service availability measures (internet access, external web-site, Moodle, SITS, and MyGlos)
- (4) Core performance measures (workstation boot and logon times; network utilisation)
- (5) %age of workstations, servers and network equipment outside of replacement timeline

A21. Delivery of this strategy is constrained by the available capital as part of the joint LTI Service and Estates Department 5 Year Capital Plan, and the LTI Service's yearly revenue budget allocation. The timescale of the plan may change according to funding availability.

Appendix A to IT Strategy Annex: Systems

The complete list of systems is maintained within the Definitive Systems List, however, the following sections provide an overview of key systems and equipment, as well as strategies concerning their ongoing development.

Business Systems

The key systems are:

- ResourceLink for HR and Payroll
- Agresso for purchasing, sales and general ledger, and the fixed-asset register
- SITS for student records
- Sunrise for HelpDesks
- Azorus
- CareerHub

Each of the systems is managed by the Applications Development and Support (ADS) team within the LTI Service. The team are using Agile methodologies to continuously develop and support these systems in line with the agreed roadmaps.

We shall continue to:

- Review functionality of existing systems, before investing in new, in order to reduce unsustainable skills-need growth and to reduce support costs
- Use a best-of-breed approach to implementing new systems, taking advice from industry and other institutions across the sector
- Build a good relationship with a small number of key suppliers, to capitalise on their growing knowledge of our business

Our ResourceLink system is due to come to the end of life in 2019, and the LTI Service shall lead a project, with HR and Finance and Planning, to look at our options for an HR and payroll system to meet the University's future needs.

Within the next 5 years we expect our Student Records System to be cloud-based, in line with our own cloud-enabled strategy, and the technical roadmap of Tribal's Edge platform.

For the core systems, our upgrade policies will continue to balance resources (system development, testing and business input) vs the need to implement new functionality and remain in-step with our supplier's roadmaps (see Appendix C).

Legislative changes coming into effect in May 2018 (the General Data Protection Regulation) will have an impact on those systems that hold or process "personal data", potentially requiring changes to the business systems and beyond.

Teaching, Learning & Research Systems

The key systems are:

- Moodle
- Mahara
- Planet eStream
- MyGlos
- OCLC WorldShare
- ePrints

Moodle is the University's chosen Virtual Learning Environment (VLE). We are investing development effort to ensure that Moodle becomes the digital space that students use to learn. To ensure that, we will find more ways to draw students to Moodle as the only place to find certain resources (e.g. Module Guides, Assessment Briefs, Resource Lists). We will ensure that Moodle draws on existing data held in our systems to populate course, module, and assessment information from a single source of truth.

We are integrating Moodle and SITS as the next evolution of Electronic Marking of Assessment. This will provide marker functionality on-a-par with the best systems on the market, enhance student submission experience, whilst retaining the primary records in our Student Records System. Such developments demonstrate value from system interoperability and are an important contributor to meeting the University's Information Strategy aspirations.

Through the TEL Programme, seamless integrations with core systems, higher quality user experience and a structure to mirror academic pathways are all planned enhancements.

Our old online media system (Helix) is being replaced by Planet eStream. This, alongside a Resources List Management System due in 18/19, shall deliver a fit for purpose, integrated set of components that plug into Moodle and the Library Resource System, allowing the capture, editing (including screen capture), storage, distribution and curation of the learning resources relevant to a module or course.

Following the significant exploration of internal student communications as part of the Student First Digital initiative, we have invested in MyGlos as the platform for effective student communication. Through integration with other systems, we are able to support CMSR in targeting communications to specific segments of the student population (e.g. by school, or level of study). This offers significant opportunities for personalised communications.

OCLC WorldShare went live as the Library Management and Resource Discovery System in July 2017. This was procured via a government framework and is subject to a two year contract. The system manages the key procurement, licence management and circulation processes for the library. Crucially it also provides the customer facing search for all our learning resources and full-text access to online journals/eBooks.

The University's Research Repository stores all research outputs in full-text and open access. It performs two vital functions for the institution; 1) as a public window into the high-quality work produced by our academics and 2) as the key enabling tool for the REF 2021 submission. The repository is built using open source software, hosted and managed under the ePrints name. REF reporting tools are being developed in collaboration with Jisc.

Information and Data Systems

The key systems are:

- Data Warehouse
- Single SignOn
- Active Directory

To support the analysis, reporting and use of our data, and the integration of systems, we shall continue to develop and support a Data Warehouse. As our maturity in business intelligence increases the Data Warehouse shall be developed to provide historical data.

The Learning Analytics work with Jisc is in the early pilot stages with three schools (Business, Education, and Social-Work & Nursing). The project shall continue to provide a rich source of data (library resources and attendance data) to academics, and shall explore the extent to which predictive analytics provides value.

To mitigate the ever-increasing cyber security threats, and to bring our practices in line with government advice, we'll be improving our logical access technologies. We shall migrate away from the Unified Access Gateway and coalesce with Single Sign-On. In line with government and sector guidance, we'll support staff and students in cyber awareness, and have a set of policies that reflect a proportionate response to the threats present.

There shall be enhancements to the current 'Personal Tutor Portal' so that all tutors have excellent information and data about the students on their modules, all in one place. The portal will become the "dashboard" for the learning analytics data harvested as part of the Jisc collaborative project.

Common IT Systems

Key systems are:

- Over 2,500 workstations and mobile devices for students and staff
- Microsoft Office 365 for office suite and e-mail
- Audio Visual equipment
- External and Internal Websites

The LTI Service has worked hard to consolidate the University onto a smaller set of supportable platforms (Windows & Mac), and to centrally package and deploy applications using leading industry technologies (Jamf Suite for Mac, and SCCM for Windows). As these technologies continue to develop, the LTI Service will maintain knowledge and our access to best-practice by ensuring regular independent health-checks.

Where the opportunities make sense from a cost, sustainability (support), security and usability perspective, cloud and managed service solutions will form the core of our application offerings, such as Office 365 and Adobe's Creative Cloud. In line with this, in 2018 the LTI Service shall migrate to using Exchange Online Protection as our hosted e-mail security service, providing enterprise-class reliability and protection against spam and malware.

The TEL Programme will drive enhancements to the student and staff desktop experience, providing enhancements that will include:

- Remote working supported by a new VDI for students
- University-wide Windows 10 roll-out. This co-ordinated uplift shall allow us to make use of the Windows-as-a-Service concepts, such as twice-yearly feature updates, increased application compatibility and a new way to build and deploy desktops.
- Rolling replacement of end user devices, in line with a 6-year replacement programme

Developments to the internal and external websites will be led with significant involvement from CMSR. Rebranding work will be pervasive across all business and content systems.

Technical Infrastructure

The key systems include:

- Pure Storage Array
- Core network
- Telephony system
- EduRoam Wi-Fi

We shall continue to use best-of-breed industry-recognised systems and suppliers (e.g. Cisco, Fortinet, Avaya) to underpin our technology platforms. A rolling replacement programme will ensure that issues related to obsolescence are minimised.

As stability is paramount, so governance of the core technical infrastructure is provided through a Change Control Board, and a regime of testing, where possible within representative environments. We shall carry out preventative maintenance to reduce risk, whilst being cognisant of, and seek to minimise, disruption.

We shall continue to operate an IP Telephony System that supports the day-to-day business of the University, which can be deployed quickly to support events such as Clearing. Within the next 5 years, we shall look to replace our existing IP Telephony System, making better use of the Unified Communications features enabled by better connectivity and converged platforms.

We shall deliver enhancements to Wi-Fi bandwidth in large classrooms and open learning spaces to ensure students and staff can simultaneously use multiple devices. Provision of connectivity and capacity into halls of residence, and circuit bandwidths of our direct connections to the Internet at each campus shall follow utilisation and will increase as capacity management demands.

To reduce our business continuity burden, we shall move away from providing connectivity to local schools and colleges.

Appendix B to IT Strategy Annex: Tiered Resilience

Tier	Resilience Description
Tier 0	Network vulnerability that can impact the operation of the whole University with a target is to maintain operation without Tier 0 risks
Tier 1	Vulnerability that can impact a whole teaching campus (which includes Pittville) or the continued operation of a Category Gold business system – target is to reduce risks to the minimum.
Tier 2	Vulnerability that can impact a group of buildings (which includes Delta) or the continued operation of a Category Silver business system – target is to take sensible risk mitigation but to accept Tier 2 resilience risks will remain.
Tier 3	Vulnerability that can impact an individual teaching space or small group of staff or the continued operation of a Category Bronze business system – target is to have reasonable contingency measures in place for this level of risk.

System Category	Primary Datacentre Location	Fall-back Datacentre Location (if required to be moved during a BC event)	System Duplication
Gold	Park Campus (additional resilience from Park's UPS)	Not required	Hardwick
Silver	Hardwick	Hardwick (if capacity)	None
Bronze	Hardwick	None, system taken offline	None

The Gold, Silver and Bronze categories will be reviewed once the additional storage has been commissioned at Park and Hardwick.

Appendix C to IT Strategy Annex: Core Business Systems Upgrade Policies

System	Upgrade Policy
SITS	Upgrade once per year, increasing two versions. SITS Software updates bi-monthly. Server patching monthly.
Agresso	Milestone releases annually. Software updates quarterly. F&P and ADS agree whether to update the system. Currently no regular schedule in place. Report Engine (Excelerator) Upgrade schedule differs. Server patching monthly.
ResourceLink	Three or four major upgrades a year. One or two of these can be compulsory for legislative or functionality reasons. Patch upgrades approximately one every 2 months. Server patching monthly.
Moodle	Security updates as required, with point updates at major university breaks and annual upgrade to latest stable version annually. Server patching monthly.
Mahara	Annually major upgrade, usually to the summer stable release in line with Moodle upgrade. Timescales determined by referral work, exam boards and ongoing portfolio creation by users. Server patching monthly.