

Jisc: a hidden advantage for higher education

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About the author

Martyn Harrow has been Chief Executive of Jisc since 2012. He was previously an executive board member and Director of Information Services at Cardiff University. Before entering the education sector, he led information and communications technology for global companies within Unilever and ICI, where at various times he was responsible for IT across the USA, Europe, Africa, the Middle East and Asia. The author would like to thank members of the Jisc board for their comments on earlier versions of this paper.

Foreword

Nick Hillman, HEPI Director

During my three-and-a-half years working at a senior level on higher education in the Department for Business, Innovation and Skills, I read thousands of written submissions from civil servants. Many of them focused on forward-looking topics that feature in the following pages, such as open access publishing, the future of the internet and online learning. But I don't recall a single submission on the body which used to be called the Joint Information Systems Committee and is today known as Jisc.

As the following pages argue, it is 'the hidden advantage' behind the higher education sector and it helps to bind the sector together. Yet knowledge of Jisc's importance comes to ministers and officials by osmosis.

This is a reflection of Jisc's world-beating success. Big information technology projects typically secure attention only when they go wrong, whereas Jisc has an enviable track record. From cross-sector procurement initiatives to connectivity for the newest big data projects, Jisc transforms the potential of students, researchers and academics – while saving hundreds of millions of pounds a year.

But, as this pamphlet makes clear, there are some threats on the horizon. The current successful infrastructure has been

created incrementally and we must not lose it by accident. There are three particular dangers.

1. Disintegration: Many cross-cutting bodies that serve higher education institutions are shifting from collective provision to a subscription model. The risk is some institutions do not subscribe, perhaps because of short-term decision-making, and a disorientating vortex takes place – which, in Jisc’s case would affect universities’ ability to deliver, with new suppliers having to be found for core services. This is avoidable: HEPI has itself shifted from being funded solely by HEFCE to being funded by around a dozen Partners and nearly 100 University Partners. Direct subscription models can bring individual institutions and cross-sector bodies closer together, but they are challenging to maintain successfully.

2. Unbundling: I occasionally wish I could buy only those sections of the Sunday newspapers I will bother to read rather than the whole huge pile, but such a pick-and-mix approach would lose economies of scale and ultimately be another threat to the newspaper industry. As Martyn Harrow argues here, there is a similar risk if universities seek to unbundle Jisc’s services as a result of poring over each item of institutional expenditure as the (relatively) fat years give way to leaner times. On the other hand, there may be extra opportunities as new providers pop up and grow and as the higher education sector becomes more diverse.

3. Amnesia: Most people date the era of competition in higher education to the 1980s, so it is perhaps surprising that

Jisc's origins are to be found in that dog-eat-dog decade. As competition continues to grow, there is a risk that Jisc's collaborative approach looks outdated. But we should not forget how difficult it was to manage in the past, nor assume that rapid technological change has removed the need for collective action. It is reminiscent of the debate on the BBC licence fee: new services pose valid questions for TV licensing, but they do not on their own prove it is the wrong model for public sector broadcasting.

The thinned-down civil service machine is no more likely to provide ministers with papers on Jisc than it was in the past, and the corridors of power may continue to overlook how successful the UK has been in finding the sweet spot between institutional autonomy and useful collaboration. That is why this publication is so important. As the holder of a PhD in Economics as well as a former employee of the BBC, the newish Universities and Science Minister, Greg Clark, is particularly well placed to understand that sector-wide bodies can deliver efficiency through collective action.

After all, there has never been a time when it has been so important for higher education to grasp the benefits offered by new digital technologies.

What is Jisc?

This pamphlet focuses on the work of Jisc, the UK's expert body for digital technology and digital resources in higher education, further education and research.

Since its foundation in the early 1990s, Jisc has played a pivotal role in the adoption of information technology by UK universities and colleges, supporting them to improve learning, teaching, the student experience and institutional efficiency, as well as enabling more powerful research.

Jisc provides more than 600 universities and colleges across the higher and further education sectors with:

- Network and IT services – including access to one of the UK's fastest internet connections, computer security protection and ubiquitous Wi-Fi access for academics, researchers, students and staff through the eduroam network service.
- Digital resources – including a licensing consortium through which institutions procure the vast majority of the electronic journals and other information resources used for research and teaching. It also provides shared services to support libraries and institutional repositories, resource discovery tools, and access to digital archives, geospatial data, multimedia and open educational resources.
- Advisory services – supporting universities to get the most out of using technology for teaching, research and administration, along with advising the sector on how to respond to new challenges and opportunities.
- Selective innovation and experimentation on how fast-changing digital capabilities can be harnessed by higher education institutions and the sector for new advantage.

Jisc's targeted research and development activity keeps the UK abreast of ways to apply global developments in leading-edge technology. The purpose is to find promising ideas and translate new digital solutions from other sectors and contexts into products and services that benefit education and research communities and add real value.

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Executive Summary

Each year, universities contribute more than £73 billion to the UK economy and generate £10.7 billion in export earnings, putting higher education well ahead of many other sectors in terms of economic impact. The sector is recognised as being world-class – home to a diverse array of institutions which teach students from around the world and produce high-quality, high-impact research.

There are many reasons for this outstanding success but, without doubt, one of them is the competitive advantage that all UK universities enjoy through having access to a world-class shared digital infrastructure. Much of this infrastructure is the result of many years of enlightened investment by the funding councils and others, in and through Jisc, the expert body for digital technology and resources in higher and further education.

But higher education institutions are now in an age of considerable turbulence, having to deal simultaneously with policy uncertainty, globalisation, technological innovation, financial pressures, scarce resources and steps towards a market in higher education (which is in itself leading to greater uncertainty, more competition and a stronger student voice).

Digital technology is arguably the most powerful tool yet invented to enhance human and organisational performance, but its influence on the education sector, while significant, has not been as extensive as in other areas, such as publishing and music. However, increasingly, the education sector is seen to be on the cusp of a new period of technologically-driven change. The developments and associated innovation that emerge from this could have a crucial role in enabling UK universities to respond to competitive pressures and remain world-leading.

The investment that the UK has made in shared infrastructure through Jisc means that UK institutions are now very well positioned to make the most of the new opportunities that it presents. This infrastructure, which includes the Janet network, is entirely committed to the benefit of UK education and research, and is envied around the world. In fact, by any standard, the UK has, through Jisc, one of the most successful 'shared services' ever – contributing annual cost savings alone in excess of £200 million, with every university seeing a direct financial benefit. For a typical research-intensive university this direct benefit is around £2.5 million, but institutions also gain advantage through the top-class digital facilities and resources that all UK researchers, lecturers and students access and derive value from each day.

Jisc provides expert assistance and advice to help universities exploit the opportunities and avoid the pitfalls of the rapidly changing digital landscape. It negotiates with multinational

corporations, such as Microsoft, Amazon and global publishers on the sector's behalf, and has a world-leading horizon-scanning and trend-monitoring function to identify and explore new opportunities and new technologies. It then works to support universities and colleges in applying those technologies. Jisc also represents and acts for the UK internationally, which is increasingly important given that our infrastructure is not restricted to the UK.

But now, just at the time when there is most need for it, when a moment of huge opportunity and huge challenge is upon us, the future of this advantageous investment in digital infrastructure and innovation could be at risk. In line with other sector bodies, as a natural corollary of the recent shift in higher education funding away from central grants and towards student fee income, the funding model that underpins Jisc is changing. For the next three years, institutions will pay a compulsory subscription charge that will constitute 20 per cent of the Jisc budget. From 2017, compulsion may be removed – with institutions free to decide whether or not to continue with their subscription.

Having traditionally been part of the crucial, but often not visible, enabling infrastructure of the higher education sector, with its services to some extent being seen as part of the furniture or even taken for granted, university leaders and policymakers have no agreed frame of reference for what Jisc does. Without this, it is difficult for them to get a complete view of what they would lose from ceasing membership of

Jisc. When this absence of recognition and understanding is considered in tandem with local financial pressures, there is a risk of institutions opting out.

Were this to happen, the business model for the UK's shared digital infrastructure would start to crack. This could bring about the loss of two decades of investment; increased costs (thereby reducing the amount available for local spending on improving the student experience or research outcomes); and a serious reduction in the benefits universities, staff and students enjoy today. It would result in the dispersal of a hard-won body of digital expertise that understands the real needs of the sector because it is of the sector, by the sector and for the sector. It would also expose HE and FE to commercial suppliers being able to capitalise on a disaggregated and uncoordinated market at the expense of individual institutions. This is an outcome that nobody in the sector has actively set out to achieve but, without vigilance, it could be a very damaging unintended consequence.

Jisc has responded to the change in its funding model by re-evaluating, restructuring and redesigning every aspect of what it does and how it does it, to be sure it is ahead of any analogous service in terms of capability, cost-effectiveness and efficiency. For example, the restructuring of Jisc's 'front of house' operation, which is taking place currently, is expected to deliver recurrent savings of £3 million a year while also providing significantly improved arrangements for customer support and interaction. By 2016, this process of optimisation

will have achieved cost reductions equivalent to 34 per cent of Jisc's operating budget while fulfilling, without disruption, increased demand for the core digital services, resources and support that all universities rely on every day. The total investment currently targeted through Jisc to provide these benefits and to assist the sector in keeping at the forefront of international best practice accounts for just a third of the savings it generates.

This paper suggests that we need to recognise the potential danger that lies ahead for our shared digital infrastructure and work actively on finding a way – at the lowest reasonable investment cost – to secure the future of this national asset.

This is not about Jisc's self-preservation, but rather maintaining effective support for the UK's leading position in global research and education. Other organisations around the world are looking with envy at the new cohesive Jisc model, which embraces the whole research and education digital proposition. Settling this uncertainty will enable a renewed focus on maximising the benefit that universities can obtain from digital technology as a strategic enabler for their own research, teaching and learning, student experience, institutional management and competitive positioning. Success in this area is in our own hands and only ours to lose.

Turbulent times – the challenges facing UK universities

1. Higher education is crucial to Britain's continued economic success. Each year, universities contribute more than £73 billion to the UK economy – the equivalent of around 5 per cent of UK GDP.¹ Through knowledge transfer and up-skilling of the workforce, it underpins much of the rest of our high-tech, highly skilled economy. It has also been identified by government as a key export industry, with an ambitious strategy put in place to boost the amount of income brought into the UK by universities each year. It is essential that we maintain and safeguard our success in this sector. Any loss of market share would have serious effects, especially outside of London where universities act as anchor institutions for local economies.

2. However, the continued success of the higher education sector is not something we can take for granted. The challenges faced by British universities are now intensifying.² Competition for the recruitment of international students is tougher than in the past and likely to become more so as countries such as Brazil, China and the Gulf states pour billions into developing new capacity in their higher education systems.³ In research, we face similar challenges³ with many of our competitor nations outspending us year on year.⁴ Within the English higher education sector, the removal of student number controls from 2015 and the lowering of barriers to entry heralded in the 2011 White Paper will create even greater competition between higher education providers.⁵

The demands and expectations being placed on universities by students are also growing. Students are looking for greater returns, greater satisfaction and greater value-for-money in line with the large investments they are required to make under the new student finance settlement.

3. Technology is also a driver of change and a source of challenge for university business models. In the coming decades, it is likely that technology will have transformative effects in ways we cannot even begin to imagine. Twenty-five years ago, a 34-year-old software engineer wrote a paper proposing the creation of a new system of interlinked documents which would help facilitate collaboration among the network of scientists associated with the European research laboratory, CERN. That software engineer was Tim (later Sir Tim) Berners-Lee, and that system, which came to be known as the worldwide web, has changed life as we know it – building new industries, destroying old ones, and creating new possibilities in work and leisure alike. In some sectors, the changes which flowed from Berners-Lee’s breakthrough have been absolutely fundamental.

4. Yet, despite the intimate involvement of academics and universities in the creation and development of new digital technology, the higher education community has avoided some of the more disruptive and destructive consequences of its application. While it is clear that technology is being well used in some areas, particularly in research enablement, storage of resources and university administration, the

underlying operating models employed by many universities are rather similar to what they have always been. Compare this with sectors such as journalism or the music industry, which now operate using business models (and methods of revenue generation) that are virtually unrecognisable from two decades ago.

5. We are now on the cusp of seeing the potential for similar large-scale change being driven through education: the moment of transformation is fast approaching. In summer 2013, *The Economist* argued that ‘technology has supposedly been on the verge of transforming education for over a century. This time it looks as though it will.’⁶ Professor Vasant Dhar, director of the Center for Business Analytics at the Stern School of Business at New York University, reaches a similar conclusion. He argues the internet means that, ‘it would be unwise for any university to assume it will be able to function with its current business model in the increasingly unbundled world that lies ahead.’⁷

Embracing technology

6. It is vital that we see digital technology as an opportunity to transform universities, and as a useful enabler of better research and better learning, rather than as just yet another challenge to be overcome. At Jisc our view is that digital technology is one of the most powerful capabilities yet invented to enhance human and organisational performance. We now carry around in our pockets the means to access close to the sum total of human knowledge. Applied innova-

tively and in the right way, technology will have a crucial role in enabling universities to handle their response to these new competitive pressures and remain world-leading.

7. There is an array of new applications of technology in the pipeline which have the potential to transform UK higher education. Just as websites use data to optimise and personalise the experience of visitors, the New Media Consortium argues that 'learner analytics' will be used in the education sphere to improve learning outcomes through personalising and individualising the experiences of students. Based on data captured from student interactions and responses, virtual learning platforms will be able to signpost students to content that will help them develop their understanding of the areas where they are weakest.⁸ More controversial uses of the technology have already seen universities monitoring library access and usage of virtual learning environments to identify students who might be disengaged.

8. Greater access to digital resources that students can access and use themselves, at their own pace, will enable institutions to move closer towards a 'flipped classroom' pedagogical model.⁹ Jisc has already worked with a number of institutions to use this approach to develop more effective ways to teach large groups of students, including the production of 'video lectures' which students watch in their own time to free up valuable contact time for more interactive teaching.¹⁰

9. For those involved in research and teaching, the most profound change is the move that is currently under way to an operating model known as 'open by default'. In teaching, many resources are now being made available openly under Creative Commons licensing for other teaching staff to use and build upon. Jisc has created Jorum – a catalogue of open educational resources – to help staff and students discover suitable resources.

10. In research, the consequences of 'open by default' are just as exciting, with the hope that open access publications, open data and workflows to aid reproducibility, alongside open science and equipment sharing, will lead to greater opportunities for innovation and technological progress. Open is an approach that is even spreading to the commercial world – exemplified by the decision of Tesla Motors to open up its entire patent portfolio to encourage further and faster development of electric vehicles.¹¹ Open will unlock the door to higher citation rates for research papers, high impact scores and greater scope for UK research to have the maximum possible visibility, uptake and re-use.

11. So the UK has little choice. We cannot hold back this rapidly intensifying technological revolution – nor should we wish to. We can embrace it now and channel it into becoming a force that enhances the world-class position of the sector, or we can allow digital technology to be forced upon us later, with the added challenge of trying to catch up with competitor nations whom we have allowed to steal a march.

Meeting the challenge: a world-leading digital infrastructure

12. Harnessing the power and potential of technology is not easy – it requires substantial investment in infrastructure and services. But shrewd investment by the higher education sector, primarily through the funding councils, in shared technological infrastructure over the last two decades means that UK universities are now exceptionally well placed to make the most of these new technologies to drive improvements in research, management and learning and teaching.

13. In the earliest days of the development of the worldwide web, the UK higher education sector foresaw the transformative potential of that nascent technology and created Jisc. It was charged with providing national vision and leadership on networks and specialist information services for the benefit of the entire sector. Twenty-one years on, as a result of that investment, the UK has a nationwide digital infrastructure and resource base that supports the operation of every single university and further education college funded by the UK higher education and further education funding bodies – more than 600 institutions in total.

14. This is an important source of competitive advantage for UK institutions. While most competitor nations now have national research and education networks, akin to Jisc's Janet network for the UK, and some even offer supplementary services, none has a comparable single body providing an integrated across-the-board range of services, advice, support and innovation.¹² Sir Alan Wilson's independent review of Jisc found that 'inter-

A hidden advantage for higher education: the ubiquitous nature of Jisc services

Jisc not only provides solutions to the challenges faced by higher education's library and IT communities, but its services are also firmly embedded into most students' and academics' daily lives.

Students

Students benefit from:

- access to high-speed internet (including when away from campus and even overseas via eduroam);
- digital resources that have been purchased through Jisc-negotiated journal agreements; and
- easy connectivity to resources wherever they are in the world through Jisc's access management solutions.

Research and teaching staff

Researchers and lecturers benefit from:

- support for collaboration between institutions, including the ability to share large amounts of data;
- communication technologies such as streaming and videoconferencing;
- access to open educational resources, which they are able to use to support their own teaching;
- the facility to search for books, serials and other resources across multiple national and university libraries; and
- a growing number of online digitised texts, with powerful discovery tools - acquisition and digitisation at a national level has enabled researchers and students to have affordable desktop access to the digital and fully searchable text of historic books, publications, periodicals and parliamentary papers, meaning they can examine content rapidly, efficiently and far more productively.

University leaders and strategic managers

Advice and support with harnessing the potential of technology to improve the student experience, institutional management and research, as well as to cut costs.

nationally its reputation is outstanding as a strategic leader and partner' and that it 'is one of a small group of organisations acknowledged to be 'world class' in providing leadership in ICT'.¹³ It is almost unparalleled globally yet, as Nick Hillman highlights in his Foreword, it is poorly understood by policy-makers as they have had no reason to get to grips with it.

15. At the time of Jisc's founding there was recognition that, while the higher education sector flourishes under the principle of institutional autonomy and freedom, there are significant benefits that can be realised by the sector working together. This remains the case today.

There are four principal benefits for institutions.

i. Cost savings

16. Through collaboration, universities have benefited from significant cost savings. Jisc estimates (using a rigorous methodology approved by its audit committee) that, through the cost reduction and cost avoidance associated with its products and services, higher education institutions collectively make direct savings of over £200 million per year. Plans are in place to increase this to almost £300 million over the next few years.

17. The table opposite demonstrates the typical estimated savings for different types of the 150+ higher education institutions served by Jisc, contrasted with their subscription contribution.

	Typical large research-intensive institution	Typical post-1992 teaching-focused institution	Typical small specialist institution
Estimated value of Jisc membership (annual savings from use of products and services) ¹⁴	£2,509,000	£1,238,000	£117,000
Subscription to Jisc 2014/15	£150,000	£74,000	£7,000

18. There are also large productivity savings associated with the use of many Jisc services – reducing the time needed (and therefore salary costs) for research, teaching and management activities. These savings are more difficult to quantify, though an evaluation of the pilot stage of just one Jisc service estimated that the associated productivity savings would be more than £4.5 million. In some disciplines, automation and time-saving technological innovation have made researchers many times more productive than a decade ago. Through Jisc, researchers now have many other powerful tools of analysis and discovery that were unimaginable just a few years ago. Using the Historical Texts Platform, for example, researchers have access to thousands of rare and hard-to-find texts on their own computer screen, with the possibility of locating authors and works within minutes that would once have taken months to gather.

19. Through leveraging the collective purchasing power of the sector, combined with specialist insight into what the sector’s technology needs are, Jisc is able to deliver significant economies of scale. It also provides the space for universities to focus on their core business of research, teaching and learning

through outsourcing the administrative burden of commissioning their own bespoke provision. This is also to the benefit of suppliers, who would otherwise have to deal with many more potential customers, significantly increasing the cost of sales, which would inevitably be passed on to customers.

20. As the Diamond Review on efficiencies in higher education has demonstrated, it would not make sense for institutions to procure this national digital infrastructure locally. Collective procurement of this sort has been the centrepiece of efforts to cut costs across much of the public sector.¹⁵ Jisc has been a trailblazer in this area and there could be considerable scope for its approach to be replicated and rolled out across a number of other areas of sector need. Indeed, there are now efforts underway to introduce similar shared and collaborative approaches for other kinds of physical research infrastructure. A number of regional consortia, notably the N8 Research Partnership, the Midlands 5 (M5) and Science and Engineering South (SES-5), have emerged to do this for physical infrastructure such as scientific equipment. Indeed, the Kit Catalogue software that underpins this equipment sharing at the N8 and M5 was developed with Jisc funding by Loughborough University.

21. Jisc itself is continuously exploring the potential for rolling out this approach to other elements of the digital infrastructure for UK higher education. For example, it has recently created a new shared data centre for UK medical and academic research in partnership with several leading universities and research institutes. This centre will allow its users to

consolidate their sensitive data in one safe environment and enable greater collaboration, as well as saving them money both in terms of operational costs and by not having to procure facilities repeatedly.

22. Jisc's new initiative on brokering access to High Performance Computing (HPC) capability is another example of the savings that can be delivered. This will provide frameworks for small and medium-sized employers and universities to purchase access to HPC infrastructure on industry-standard terms and conditions, meaning they can avoid the expense and time delay associated with conducting their own due diligence. This will allow institutions and industry easier access to computing capability while also providing an opportunity for institutions to monetise, at commercial rates, some of the spare capacity they have. It will help ensure the sector as a whole is getting the most (and best value for money) out of its HPC research infrastructure.

23. A final example is Jisc's work supporting universities' efforts to establish overseas campuses. This transnational education work, which is currently in pilot phase, has seen Jisc utilise its specialist procurement expertise to broker network access provision on behalf of a number of British universities setting up campuses in China (through a partnership with CERNET, the Chinese education and research network) and in Malaysia (through negotiations with commercial providers). This has driven down institutional costs, increased the quality of the connectivity and enabled them to get arrangements in place more quickly than would otherwise be possible.¹⁶

24. IT projects, particularly in the public sector, are notorious for becoming sources of uncertainty and failure with many projects coming in late, significantly over budget or failing to meet requirements. Consider the recent launch of Marks & Spencer's new website – teething problems with the new site cost the company millions and contributed to an 8 per cent slump in online sales. With its expert staff, experienced in major project delivery, Jisc projects have avoided this fate. For example, the £25 million upgrade of the UK's backbone research and education network, Janet6, which gives universities an average network speed of 10 gigabytes per second, was delivered both on time and on budget.¹⁷ Aside from the increase in internet speed, the vast majority of users will not have even noticed the switch-over.

ii. Finding routes through uncertainty

25. Institutions benefit from support in navigating uncertainties and responding to some of the emerging challenges in the higher education sector.

26. At the turn of the millennium, as universities looked to move to a digital first approach to resources, Jisc helped the sector to make the transition. It created the first national model licensing arrangement in the world, a development which then led on to the creation of the Jisc Collections purchasing consortium. To this day, Jisc staff apply their expertise and leadership to securing preferential terms for institutions in complex rounds of negotiations with journal publishers. Similarly, Jisc has led the way in developing responses to the open scholarship agenda. Working with the University of

Southampton, it helped develop the world's first digital repositories – allowing universities to completely transform how they store, use, measure and promote their research output.

27. Jisc's work on open access, big data and research data management clearly demonstrates how it supports institutions through change and the opening up of new opportunities (see page 24).

iii. Innovation

28. Thirdly, Jisc provides a cost-effective mechanism for sharing the costs of innovation. Continued innovation is essential to ensure the sector can meet new technological requirements and is sustainable in the longer term. But the costs of IT research and development can be huge and justifying spending on it can sometimes be a difficult proposition for senior managers in institutions.

29. In comparison to other potential uses of resources, it is often very difficult to quantify the likely benefits of investment in potentially risky technological innovation. It is nearly impossible to predict accurately what level of investment you need to put into innovation to get the best return: a degree of speculation is often still required. An organisation might spend 30 per cent of discretionary income on an innovation project for 10 years and get almost nothing of value. The 11th year of continued investment might enable a major breakthrough which repays the investment thousands of times over.

Big data and research data management

Already recognised as one of the government's 'Eight Great Technologies', big data refers to the ability to access and analyse huge new datasets that will facilitate major breakthroughs in research across a range of disciplines, from healthcare and the physical sciences to applied social sciences and public policy. However, innovations in data-driven research will cause significant practical problems for universities.

Through its Research Data Management Programme, Jisc is working with universities to develop practical solutions on how the huge datasets being generated by research groups can be stored and made available for wider analysis, use and validation. If all institutions were to create their own solutions not only would we be likely to lose value from shared standards and protocols, but we will also waste money on siloed infrastructure investments. In the longer term, success in this area will mean public funding is not wasted on recreating data that has already been produced, and that data created through research is used to its full potential.

Connectivity to the Janet network is also crucial to many big data projects. Take the work of the European Bioinformatics Institute, part of the Wellcome Trust Genome Campus in Cambridgeshire. The network is used to share the petabytes of data generated through its genome sequencing analysis with researchers and collaborators around the world. Jisc's role in connecting these partners is key to enabling the discovery of new drugs and new diagnostics. The network is playing a similarly vital role in enabling the UK's position of leadership in space exploration, allowing high-resolution imagery to be sent between the UK's space hub at Jodrell Bank and observatories around the world.

Open Access

Since publication of the Finch Report in 2012, the vast majority of significant research funders in the UK have mandated researchers to make their research outputs available openly.¹⁸ These mandates vary in their implications for institutions, meaning that good working models are only slowly emerging. Jisc has been providing institutions with information on policies and their implications, as well as working with funders and publishers to simplify the policy environment.

Crucially, Jisc has also been developing new negotiating frameworks on behalf of the sector to ensure UK universities keep the costs of complying with the mandates under control, and developing shared services that will count article usage, help institutions keep track of their research outputs and make open access research easier to find and use.

30. A better approach to research and development is for the costs to be shared among the whole sector. By investing strategically in research and development within the sector, Jisc is able to invest in innovation on the sector's behalf, with the risks associated with these investments shared among all the institutions. This makes these risks a less scary proposition – especially in the current economic climate, when individual institutions are likely to be taking a more cautious approach. The case for such shared innovation is even more profound if one considers 'unsuccessful' innovations – it makes no sense for multiple institutions to invest individually in exploration of the same potential opportunity only to find it unfeasible or inappropriate.

31. Innovating on a national basis also increases capacity through aggregating convening power – Jisc is able to marshal expertise from across the sector for innovation projects because everyone has a stake in shared success. It is able to host the conversation – bringing together the best of UK and international expertise to have an informed and structured debate to identify the most sensible cost-effective ways forward, in a manner that would be more difficult for individual institutions to achieve.

32. Operating at sector-level scale also means that the organisation has experience and expertise in moving projects down the innovation pipeline from being a research and development concept to being a fully operational product or service. Having done this on dozens of occasions, Jisc brings the acumen and insight needed to help the sector

tackle and mitigate implementation and sustainability issues. Indeed, much of Jisc's early investment in research and development has allowed the sector to enjoy services, such as virtual learning environments and repositories for research, that are now core parts (or foundational elements) of their day-to-day business.

33. Identifying the areas for possible innovation and investment through horizon-scanning and trend-monitoring (across a multitude of sectors, markets and locations) is also a time-consuming and relatively resource-intensive activity, which it makes much more sense to do on a national shared basis. To do it locally would lead to huge amounts of duplication, overlap and over-selectivity, and make it more likely that big opportunities would be missed. It would also be disproportionately expensive.

34. To outsource innovation to an organisation outside of the sector would also be sub-optimal. Firstly, institutions would not benefit from the application of an in-depth multi-layered understanding of the sector's particular needs and requirements. Secondly, as a sector-owned, sector-led organisation Jisc brings something distinct as an honest broker and trusted supplier. Unlike many other providers who might wish to design and deliver services to the sector, the measure of its success is the contribution it makes to the application of digital technology to research and learning in the UK education sector rather than competing commercial considerations.

35. This work has helped to position British universities to make the most of the new opportunities presented by digital

technology, to the extent that educational technology is listed in the Government's international education strategy as an area of major UK strength.¹⁹ The pioneering work of Jisc in building an e-learning infrastructure means that the UK has a global reputation for cutting-edge technology-supported learning.

iv. Enabling new possibilities

36. Finally, the higher education sector's collective investment through Jisc has resulted in the enablement of teaching and research possibilities that simply would not have been an option without the benefit of scale. The two services cited below are cases in point – neither would have been possible without the scale and the sector-wide perspective provided by Jisc. For a single institution to invest in the development of such services simply would not make sense.

37. Digimap allows students and researchers to access and use Ordnance Survey data and maps that would otherwise have to be individually licensed at high cost – it is estimated that maps with a commercial value of over £40 million were downloaded during the 2013/14 academic year.²⁰ Digimap is being used in research across a number of disciplines – from mapping the impacts of sea-level rise scenarios to researching the geography of health inequalities. It is also used extensively for teaching and by undergraduates and post-graduates carrying out dissertation research.²¹

38. Another example is Jisc's new partnership with the Higher Education Statistics Agency (HESA), which will see the

development of tools to provide university leaders and managers with better and more sophisticated data on which to make decisions. The new services, known as Heidi-Plus and Heidi-Lab, will allow institutions to link HESA data with their own datasets, support cost benchmarking and also provide a platform for institutions to collaborate on the development of new methods of analysis. Getting the data needed for informed institutional planning to date has often been much more time consuming and expensive.

Continual upgrade

39. The early pioneers in this area did not set out with a grand design, yet we have organically and incrementally created a very cohesive UK-wide digital infrastructure, which: (a) saves universities money; and (b) drives forward the UK's application of technology. To have achieved this in such a strongly and advantageously decentralised and autonomous system is a major achievement, which has served the UK well and gives us a competitive advantage, economically and academically. Without this mechanism there is no doubt that there would be serious underinvestment in the innovation, development and application of digital technology, which would be damaging to UK universities in the long term.

40. Now, given the new pressures in universities' competitive environment, it is more important than ever before that we preserve this vital infrastructure. But preservation alone is not enough. Given the rapidly shifting opportunities for research

in particular, we need to ensure that we are innovating and that we remain at the head of the pack, as early adopters of new technology and its applications.

41. The Government recognised this in its most recent consultation on long-term capital funding for science and research, arguing that ‘the world class research environment of the 2020s will not look like the world class research environment of today: continual upgrade is required to meet the challenges of tomorrow.’ It went on to say, ‘Early acquisition of, and researcher access to, such new technologies is needed to ensure competitive advantage for the UK.’²²

Risks to the UK’s digital infrastructure

42. But, at this, the very moment when our historic investment in digital is perhaps at its most valuable, when we should be looking to the future and seeking to build on our current advantage, an unfortunate combination of circumstances means that instead we could face sleepwalking into disaster by losing the world-leading infrastructure we already have.

A new funding model

43. The recent changes to the English undergraduate funding system have reverberated across UK higher education. The reforms represented a rebalancing of the system with the majority of institutional funding for teaching now coming from student tuition fee income rather than from funding council teaching grants.

44. With the corresponding reduction in the budgets of the funding councils, and with institutions benefiting from additional tuition fee income beyond that which simply replaced former teaching grant income, the government has shifted an element of the responsibility for funding services from central bodies to individual institutions. As GuildHE chief executive and former BIS special adviser Andy Westwood told *Times Higher Education* earlier this year: ‘rightly or wrongly, there’s an expectation in government that a high fee – at least higher than expected or predicted by [ministers] – brings the assumption that institutions would meet all kinds of costs out of an increased level of resource.’²³

45. So, from 2014 onwards, an element of the investment in Jisc services, around 20 per cent, will be met directly by subscribing higher education institutions. However, this contribution is still relatively small compared to the contribution made by Jisc’s core investors, the UK funding councils. From 2014 to 2017, the subscription element will be mandatory, but from 2017 onwards it is probable that institutions will be able to decide whether or not to continue to pay towards the package of products and services.

46. Having had Jisc products and services provided at no local cost (save for a small ‘network charge’ towards some of the cost of the Janet network) for two decades, universities and colleges have no meaningful frame of reference through which to value this digital infrastructure. Previously, they have simply been able to take these services as a given. Nor did Jisc

itself need to put significant effort into developing such a frame of reference. Even today, developing such a framework is difficult, complicated by the fact that, in most institutions, no single person has a full picture of what that institution gets from Jisc, making it difficult for decision-makers to assess its value.

47. The move towards a subscription model is a major change for university leaders who, for the first time, are being asked to make active decisions on how they secure and finance the national digital infrastructure that their institutions need. The increasing local financial pressures on universities means that institutions are rightly inclined to scrutinise and challenge every expenditure item, question its value and even look for alternative providers. The absence of a long-standing frame of reference about the scope and value of Jisc services obviously makes this more difficult.

48. A further tension comes from some institutions charging the entire subscription to their IT departments rather than spreading it across the institution, leading to the prospect of very obvious and perhaps painful reductions in local activity to absorb the costs – perhaps the cessation of a local IT project or staff reductions. While it is an internal matter for institutions how the new charge is being managed, Jisc believes that the subscription should be seen as a strategic university subscription rather than an IT subscription, as every vice-chancellor, academic, and student accesses and benefits from its services.

Unintended consequences

49. This combination of circumstances could lead to decisions that are nationally damaging, even if locally understandable. If it were to happen across a number of institutions the consequences could potentially threaten the UK's digital infrastructure just at the time when it is most needed. It is vital that a medium to long-term view prevails and that we do not allow local pressures to undermine the UK's competitive advantage.

50. These risks have been recognised previously. Indeed, even in the independent review that catalysed the changes to the Jisc funding model, Sir Alan Wilson warned that 'there is a risk that if the burden of investment falls more on institutions, some of them will reduce it to manage short-term financial pressures.'²⁴ There is also a risk that continued pressure on public finances leads to demands from government for universities to absorb ever-greater proportions of the cost of providing digital infrastructure, at a faster rate than universities can absorb, or indeed beyond a point that universities have the appetite to absorb.

51. Such a situation could lead to a number of institutions opting not to continue with the Jisc subscription. This would undoubtedly have an impact on remaining members, for two reasons. Firstly, having already cut the Jisc operating budget by 34 per cent since 2010 (and having closed services that were less of a priority) there is limited capacity to cut operating costs further without damaging core services and stifling the sector's pipeline of new services and digital

innovation. Secondly, a reduction in Jisc's membership would necessarily diminish the economies of scale that it can deliver and also lead to higher unit costs for the remaining members. This damage to the value proposition for remaining members could lead to further opt-outs and, in the longer-term, a scenario where Jisc's very existence, and thus ability to deliver benefits to the community, is put at risk.

52. The absence of a digital infrastructure organisation would cause significant disruption within the higher education sector from which it would be very difficult to recover. Institutions would face high transition costs. Universities would be forced to divert internal capacity to manage and procure services. Increased costs of sale for suppliers would inevitably be passed on to customers, increasing the price of procurement. In the longer term, universities would be dependent on alternative sources of innovation – perhaps having to rely more on generic commercial products produced by commercial providers, at more commercial prices but without the same level of bespoke tailoring to the needs of the UK sector.

53. Moreover, it would also have consequences for teaching, learning and research, potentially creating huge barriers to collaboration between institutions (both nationally and globally), as well as inconveniencing users. Some of the services provided by Jisc may not be the most glamorous to the casual observer but they are crucial to everyday academic activity. Take access management: through Jisc's UK Access

Management Federation, academics and students can access vast amounts of content through single sign-on portals. Without this collaboration, users might have to generate log-in details for each individual publisher or content platform. Given the size of today's universities, that would result in millions of individual usernames and passwords being created unnecessarily.

54. Crucially, there would also be longer-term damage to the competitiveness of the wider sector. Without the investment in new products and services, and the development of existing ones, the use and application of technology in the sector might stagnate. Undoubtedly, the sector would have to develop a shared service vehicle quickly through which universities could continue to procure collectively and provide some products and services. Such a service would also have to inter-operate with the diverse range of services in research and education around the world, a complex operation currently managed on behalf of the sector by Jisc. A budget-model 'no-frills' shared service would lack the sophisticated insight into customer needs that Jisc has developed over years of engaging with university staff at all levels. A more sophisticated vehicle risks simply recreating large parts of the current Jisc organisation following a painful period of uncertainty, turbulence and expense. An alternative scenario would see the sector being increasingly reliant on development work conducted by generalist commercial providers, without the tailored support and understanding of the needs of a highly specialised sector.

55. We are in danger of sleepwalking into just this situation. This is not about Jisc self-preservation but maintaining effective support for the UK's leading position in global research and education. A new dialogue is needed at the highest level of each and every university to determine how the digital needs of their institution will be met, both in the immediate future and in the longer-term. Similarly, policy-makers should only act in full knowledge of the potential consequences, both intended and unintended, of funding and policy decisions.

56. As Professor David Eastwood, then chief executive of HEFCE, and now vice-chancellor of Birmingham University, has put it: 'Imagine a world without Jisc – we wouldn't be able to compete, we wouldn't have the structure, the platform, we wouldn't have made the headway, in digitisation, in freeing up access ... and we wouldn't have the edge which having Jisc means we have.'²⁵

Looking to the future: Jisc's vision

57. But, just as the sector needs to keep innovating and evolving its use of digital technology, Jisc itself must continue to evolve and become ever more closely aligned to the changing needs of the institutions that it serves.

58. Jisc is acutely aware of the financial pressures faced by member institutions, and is doing everything possible to reduce unnecessary cost and deliver its portfolio of products and services more efficiently. In the last three years it has

overhauled its operations and made significant efficiency savings – including removing funding from operations and services which were no longer priorities. This approach will continue and intensify. Jisc’s portfolio of products and services will be under continuous informal review, in partnership with stakeholders and customers, to ensure it is even more aligned with what the higher education, further education and research sectors need and want. In addition, it will formally review a third of all products and services through a robust process every year.

59. Furthermore, it is clear from responses to the recent HEFCE consultation on the Jisc subscription that there is a keen appetite among many in the sector to be engaged in setting the future direction of Jisc.²⁶ Jisc’s vision is for there to be renewed, sector-leading, active and deep engagement between itself and universities. In this vein, it is putting in place mechanisms which will allow the sectors it serves to have far greater input and influence over its priorities. In late 2014, it will establish two new consultative forums to inform the work of, respectively, its digital resources and technologies platforms. A radical reshaping of the customer service element of its operations is already underway, and will equip it to respond more effectively to institutional demands, queries and requests for advice and support. It has also moved its innovation function to a co-design model, actively involving representatives from universities and colleges across the country in generating ideas, prioritising potential projects and developing new products and services. Finally,

because we see the need and in line also with the move towards more open public services, it is developing the robust systems and processes necessary to provide customers and stakeholders with more transparent data about its investments and its services.

60. But ultimately the real test of success for Jisc will be the degree to which it can enable and support universities to harness digital technology as they carry out their core work of incubating the next generation of researchers, and driving forward the frontiers of knowledge and teaching to a high level. Jisc has had substantial successes over the last two decades, including leading negotiations with publishers, fostering international collaborations, delivering and securing Janet6 and pioneering work in developing virtual learning environments, to name just a few.

61. But a vital part of what Jisc has to offer is the value that will be created by the successes to come. The sector's continued engagement with Jisc opens the door to extending successful shared service models to completely new areas of opportunity. There are a multitude of companies that provide 'business in a box' back-office services for new start-ups – why has the sector not moved closer to a similar 'university in a box' model? Imagine having finance and registry functions, tailored to the specialist needs of higher education institutions, available at low cost, without the need to develop expensive and risky bespoke systems. This 'university in a box' concept, which could involve developing and delivering all

the basic operational systems for a university as a shared service, using cloud technology, would lower administration and overhead costs for every institution and free up resources to focus on improved learning and research.

Conclusions

62. The UK's higher education and research sector currently enjoys significant benefits from Jisc, including financial savings and forward investment in keeping up with the opportunities associated with the fast-changing digital world.

63. If we are not to lose these advantages we need to work actively on finding a way – at the lowest reasonable cost – to secure the future of this shared national asset and to focus our attention on maximising the benefit that universities can obtain from digital technology for their own research, teaching and learning, student experience, institutional management and competitive positioning internationally.

64. In this context, it is worth noting that other organisations around the world are looking with envy at the new cohesive Jisc model which embraces the whole research and education digital proposition. The success of this is in our own hands and only ours to lose. The alternative will be for the product of two decades of investment to be put at risk just at the time when it is needed most.

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