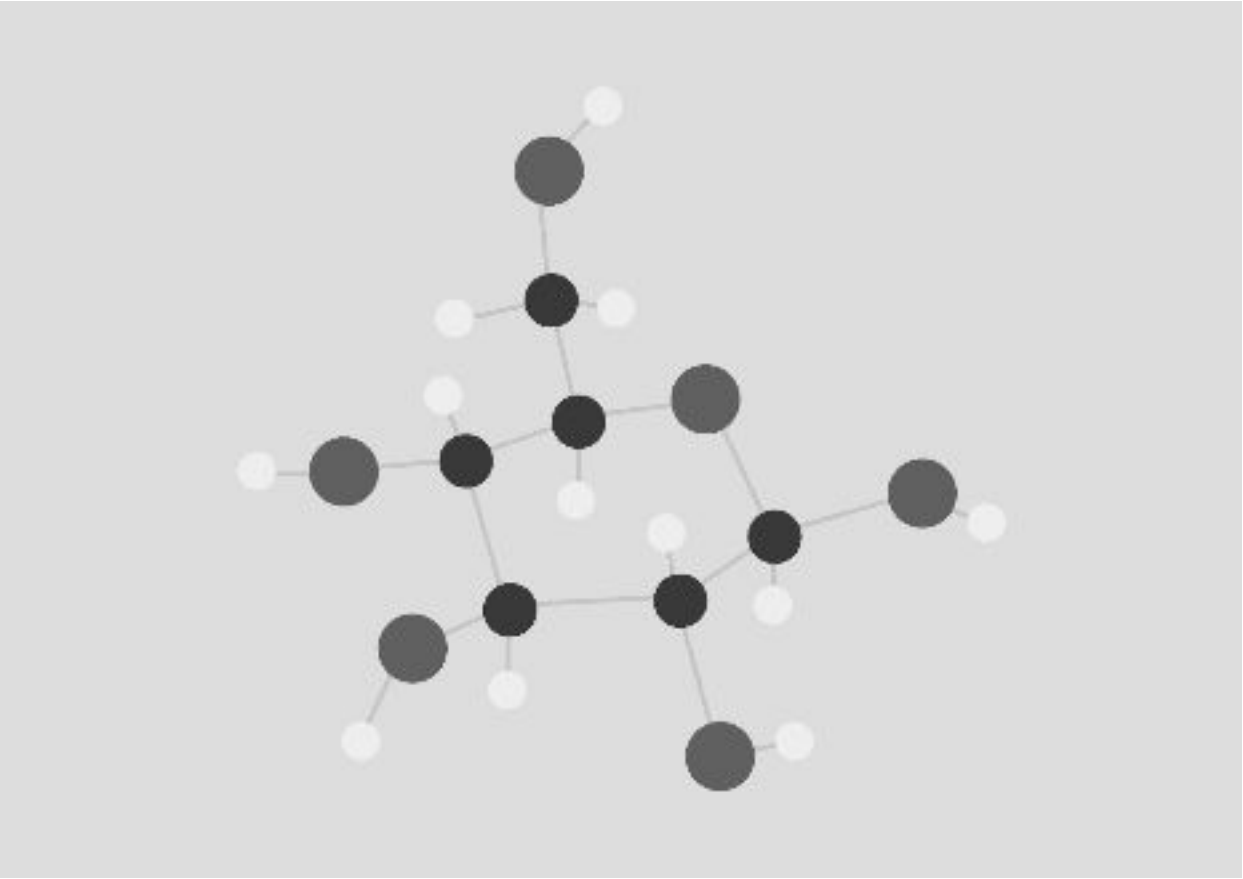
Digital Strategy Environmental Scan

for the Concordia University Digital Strategy Committee



Prepared by Christine Madsen and Megan Hurst

Athenaeum21

www.athenaeum21.com

June 2018 | Public Version

CONTENTS

Introduction: What is a Digital Strategy? What is Not?

A strategy is defined as a "plan of action designed to achieve a long-term or overall aim" (Oxford Dictionaries, n.d.) and therefore requires an organization to have a vision for its long-term goals. Organizations do not operate in a vacuum, though, and a critical (and often overlooked) part of strategic planning is identifying broad trends that may affect an organization in the near or distant future. This is particularly critical when creating a *digital strategy*. We define “digital strategy” as “a plan of action for the adoption of institutional processes and practices to transform the organization and culture to effectively and competitively function in an increasingly digital world.” For universities, it is also important that a digital strategy has a strong student and user focus, increases the organization’s ability to take risks, and transcends departmental and discipline silos.

Digital strategies are fairly unusual in universities, but that does not mean that universities do not have strategies for digital success and/or transformation. A recent Jisc white paper *Delivering Digital Change*, in fact, cautions against having a separate digital strategy at all. “We would argue that a research strategy or student experience strategy should already be looking at how digital is integrated, and what might be at stake, rather than cross referencing or deferring to a separate digital research or digital student experience strategy. Institutions will have multiple strategies across all areas of their business, each owned by different directors and senior managers. Digital is most effective when deployed within these strategies rather than alongside or as an addendum” (Phipps & Clay, 2018, p. 4).

In contrast, digital strategist Michael Edson argues that strategies—digital or otherwise—should be employed to bring attention and resources to the areas of an institution that require it. “My own feeling is that with strategy, at the most basic level, there are no rules. Strategy should tell a story about a direction that the institution needs to head in. If you need a digital strategy because that is where you need the focus, then by all means do it. Or if you need a mobile strategy because you need to focus there, then do it. You just need to solve the problem that you have. This approach gives you permission to work on a digital strategy if the institutional strategy is already set. Or to work on the institutional strategy if there’s a willingness to do that. But to do it quickly, and concretely. And do it in language that means something to the people doing the work (not the board, not the governors, not the funders). Whatever kind of strategy you need, it's all ok” (Athenaeum21 interview with Michael Edson, 2018).

Daniel Greenstein, former Director of Postsecondary Success at the Bill and Melinda Gates Foundations believes that much of the importance of strategic planning, whether digital or not, lies in the process, not just the outcomes. “This is why these strategic planning processes are important. They do more than just evaluate strengths and weaknesses, they put in place the data and the numbers that can begin to generate a conversation that is more, rather than less, inclusive. Which isn’t driven top-down by ‘here’s what we are going to do.’ It is driven top-down by ‘Here are the challenges we are facing. What are the strengths that we have and how can we address these challenges?’” (Athenaeum21 interview with Daniel Greenstein, 2018).

Some digital strategies are simply IT strategies or IT plans in disguise, with a focus on technology, rather than on users. Other digital strategies may fade away if they are not consistently referenced and utilized by organizations. One reason for this may be the lack of a clear plan of action that relates to the actual work that must get done now, and in the future. Other reasons are described further in this report.

What is very clear from the research and interviews, is that **digital strategies are most successful when they become part of the DNA of the people and the culture of the organization**. This is easier said than done, but by no means impossible. This report includes a number of lessons from diverse sources in both successes and failures of digital strategies and digital change initiatives. The majority of the time, success or failure hinge on people and culture, not on technology.

The “Moon Shot”: Getting the Basics Right

What does it mean to aim for a “moon shot”? Thinking, and aiming “big” can be an important part of a successful strategy, but can also hold traps that prevent successful implementation.

The “moon shot” references the United States’ NASA Apollo program, which ran for twelve years (1961-1972) and was triggered, in part, by President Kennedy’s proclamation in an address to Congress in 1961 that the US would land “a man on the Moon and return him safely to the Earth" by the end of the 1960s. As one former Apollo Mission Control employee characterized this, “You are listening to the radio and the President announces that the country is going to put a man on the Moon by the end of the decade. Keep in mind that no one has ever even escaped low-Earth orbit, let alone escaped Earth’s gravity, executed Holman transfers AND navigated to another body. Now you have to implement

the largest engineering project in history, while inventing not only technologies, but also whole fields of study" (Haughwout, 2014).

One of the most important lessons from the success of the Apollo "moon shot," according to the lead engineer, was a fatal catastrophe resulting from failed communication across specialized technology teams operating in silos. The loss of the lives of two test astronauts made explicit the risks of a lack of shared responsibility, accountability, and the need for deeper collaboration and communication between siloed teams. The sobering realization that lives were at stake elevated the teams' drives for deeper collaboration in identifying and solving problems, and in creating shared processes and systems to facilitate excellence through iterative testing as they entered entirely new problem spaces. The "moon shot" turned out to be successful because of a dramatic shift in focus from a technology problem to be solved by siloed teams of specialists and experts, to a shared human responsibility for the safety of human lives and a *shared mission for collective excellence*. The post-fatal endeavor re-focused the teams on *getting the basics right* by breaking every problem down into its most discrete components; continually iterating, testing, and improving; and constantly communicating. At the root of doing the basics right is establishing a shared understanding of why a mission is being undertaken and why it matters at all.

Characteristics of "Successful" Digital Strategies

As with the Apollo program, successful digital strategies are first and foremost human-centred. They continually focus on solving human problems at both broad and narrow scales. They imbue staff and stakeholders with the mindsets, skills, and authority needed to solve those human problems. Successful digital strategies address organizational and incentive structures, organizational culture, communication, processes, and systems. Only upon these a-, non- or pre-digital foundations, can digital strategies successfully leverage digital data and technologies to enable and transform people, knowledge, organizations, and society.

Concordia University provided six themes at the outset of this environmental scan research. These themes helped to shape the nature of the research and were important in ensuring its comprehensiveness. These themes were:

1. **User Experience**
    a. Personalized, integrated, intuitive, and seamless
2. **Digital Literacy**

    a. Skills and capabilities
    b. Critical engagement with technology
3. **Collaboration**
    a. Communication and information sharing (inside & outside one's organization)
4. **Information for Decision Making**
    a. Data acquisition, transparency, access, find-ability, and usability
5. **Innovation and Discovery**
    a. Enabling and embedding exploration, experimentation, and adoption
6. **Services, Tools, and Support**
    a. Identifying and locating based on needs

Our research cut across all of these themes, and a clear set of characteristics of successful and unsuccessful digital strategies emerged from the examination of digital transformation, digital maturity, organizational change management, and strategic planning and visioning. We therefore propose the following themes as being particularly well-suited to framing the creation of a successful digital strategy.

- **People**
    - Continuously Develop Digital Literacy and Skills
    - Set Bold Goals
    - Be Agile and Adaptive
    - Be Service- and User-Oriented
- **Culture**
    - Support Well-Being During Change
    - Enable Cross-Functional Collaboration
    - Decentralize Decision-Making
    - Expect a Marathon, Not a Sprint (but Celebrate the Sprints!)
    - Support Risk-Taking, "Failure," and Continuous Learning
- **Leadership: Knowledge, Vision, and Communication**
    - Know the Organization Before Trying to Change It
    - Bring Together the Right People
    - Define a "Moon Shot"— A Bold Purpose, Quest
    - Establish a Common Language
    - Continuously Communicate to All Levels of the Organization
- **Organizational Alignment**
    - Align Digital Strategy with Organizational Strategy
    - Align Talent Management with Digital Strategy
    - Align Organizational Reporting and Accountability with Digital Strategy
    - Align Digital Strategy with Funding and Resource-Allocation

- **Data**
    - Support Prioritization and Decision-Making
    - Promote Data Literacy Among Specialists and Non-Specialists
    - Define Guidelines, Policies, Best Practices for Ethical Data Governance, End-use, Privacy, and Security
    - Design Systems and Data to Support Interoperability/Portability
- **Technology**
    - Develop Tech for (and with) End-Users
    - Get the Basics Right: Support Process Improvements and Efficiencies
    - Balance Basics (Infrastructure) vs. Innovation ("Moon Shots")

These themes are porous and interrelated. A key concept running throughout these findings is that of "digital maturity." In 2017, Gerald Kane and his co-authors defined digital maturity as "how organizations systematically prepare to adapt consistently to ongoing digital change" (Kane et al., 2017). This concept is useful for its understanding of digital transformation as a spectrum and *an ongoing process*, rather than a destination. Organizations in Kane's research are clustered into three maturity groups, "early," "developing," and "maturing." The authors defined the latter as those organizations "in which digital technology has transformed processes, talent engagement, and business models" (Kane et al., 2017). We propose carrying that definition even further to "*organizations which have successfully leveraged* digital technologies to transform processes, talent engagement, and business models," thus emphasizing the primary activism required by an organization for digital technologies to actually and meaningfully transform processes, models, etc.

Kane et al.'s 2016 survey of digitally maturing companies found the following common characteristics:

- Creating an effective digital culture is an intentional effort: Digitally maturing companies are constantly cultivating their cultures
- Senior-level talent appears more committed to digitally maturing enterprises
- Digitally maturing organizations invest in their own talent
- Soft skills trump technology knowledge in driving digital transformation
- Digital congruence is the crux: To navigate the complexity of digital business, companies should consider embracing what we call digital congruence—culture, people, structure, and tasks aligned with each other, company strategy, and the challenges of a constantly changing digital landscape
  (Kane, Palmer, Phillips, Kiron & Buckley, 2016)

This concept of “digital maturity” is similar to what Phipps and Clay describe in the 2018 Jisc white paper as the “post-digital." That is, the post-digital environment is one in which “the digital environment is taken for granted, and ‘digital’ is no longer the most interesting aspect of a particular practice” (Phipps & Clay, 2018, p. 4).

Whether called “maturing” or “post-digital," and regardless of the type of organization, there is a clear need for understanding the opportunities and overall success that digital transformation can bring. The French consulting firm Roland Berger “assessed the digital maturity of French companies, looking into three distinct dimensions: equipment, practices and uses, and organization and skills. We found that the more digitally mature companies grew revenue at six times the rate of their less mature counterparts. Beyond this financial impact, employees in the digitally advanced companies also reported a 50% higher index of well-being at work" (Bouée, 2015).

Above all, it is clear from the literature and interviews, that achieving any sort of transformation—digital or otherwise—is the product of regular, diligent thought about what an organization wants to be and wants to achieve. Digital strategist Michael Edson perhaps put it best when he said, “Success in digital transformation is about being very clear about the type of value that you want to create. The organization needs to think about civic value, social value, in a disciplined way every day—and it seems to yield a lot of fruit. What is the value proposition for a local, Canadian institution that wants to have a global impact? That is a super important question. Thinking hard about value creation has to lead you to a discussion of social value, in the broadest sense” (Athenaeum21 interview with Michael Edson, 2018).

People

It is worth emphasizing that our themes *start* with “People," and *end* with “Technology." As Kane explains, “how an organization implements technology is only a small part of digital transformation. In cases where digital transformation does involve implementing new technologies, the technology is only part of the story” (Kane, Palmer, Phillips, Kiron & Buckley, 2017).

Continuously Develop Digital Literacy and Skills

Fostering digital mindsets and skills across the entire organization is an indicator of digital maturity in a wide range of organizations. In university environments, this involves a combination of investing in faculty and staff skills and attracting new talent—which are not mutually exclusive. Kane et al.’s research into digitally maturing

companies indicates that **investing in developing digital skills in existing staff** is more likely to be successful than replacing those staff. “More than 75% of digitally maturing organizations surveyed provide their employees with resources and opportunities to develop their digital acumen, compared to only 14% of early-stage companies” (Kane et al., 2017).

Teaching and Learning Innovations (TLI) at California State University, Channel Islands (CSUCI), is an excellent example of this, and is described in more detail below in one of the Case Studies. Although central to the digital transformation of CSUCI, the university does not have an explicit digital strategy and TLI was established with teaching, not technology at its centre, specifically to “prepare faculty to teach in a digital era” (Athenaeum21 interview with Jill Leafstedt, 2018). It accomplishes this by providing training and opportunities through what it calls an “untethered” approach, which allows it to address the needs of faculty and staff whose capabilities fall along the full range of digital literacy—both early adopters and those who lag behind in their use of technology. Significantly, the programs at the TLI put faculty in the “learner’s seat,” exploring new technologies and teaching approaches not only as teachers, but as students. For example, they teach blended learning techniques via blended learning courses. This may have a de facto effect of making faculty more oriented to the learning experiences of their students.

Preparing and “upskilling” faculty, staff, and students for working in a digital environment is best accomplished with an **ongoing plan to support digital literacy and skills development. This is not—nor can it be—a “one-off” series of trainings,** but needs to be a constant and consistent activity. This type of continuous learning is also not simply about acquiring digital skills and capacities, but about a more comprehensive approach to digital literacy. The Jisc *Building Digital Capabilities Framework* (Killen, Beetham, & Knight, 2017) defines six elements of digital capability:

1. ICT Proficiency (Functional skills)
2. Information, data and media literacies (Critical use)
3. Digital creation, problem solving and innovation (Creative production)
4. Digital communication, collaboration and participation (Participation)
5. Digital learning and development (Development)
6. Digital identity and wellbeing (Self-actualising)

In Jisc’s 2017 case studies in digital capabilities, participants from the University of Brighton acknowledged that if successful, integration of digital literacy and digital capabilities training, may result in a loss of identity for the program. “Projects around digital literacy may lose visibility over time but this does not need to be a problem. The

more that digital practices are embedded, and digital policies integrated into an organization, the less of a separate identity the issue needs to have" (Beetham, 2017, p.4). This mirrors what Kane calls "digital congruence" (Kane et al., 2016) or Knight refers to as the "post-digital" (2017).

Jisc's 2017 case studies in digital capabilities also offer several different models for implementing staff development and training. One of the most effective seems to be offering regular, small activities, updates, and reminders to staff in a common time-frame, but which they can complete in their own time. A representative from Anglia Ruskin University said, "An effective way to raise the capabilities of a whole cohort of staff is to offer bite-sized activities that they undertake voluntarily, in their own time (e.g. 'five minutes a day, for five days'), but in the same time-frame (e.g. during the same week). This offers a good compromise between personal flexibility and the cohort effect" (Beetham, 2017, p.5). This is also one of the models supported by digital literacy expert and interviewee, Monica Bulger, and is evidenced in her "Crash Course in Media Literacy" series on YouTube (Crash Course, 2018), which provides a series of "bite-sized" lessons in media literacy.

Regardless of the delivery method, "**digital literacy projects depend on professional development being strategically valued**, and properly resourced. That means 'people viewing their own professional development as important… just as important as their research'" (University of Brighton in Beetham, 2017, p.6).

Set Bold Goals

Supporting and promoting **"boldness" of thinking and action**, was another topic that arose frequently throughout this research. In 2017, two researchers surveyed more than 2000 companies across all major industries and countries and found that digitally maturing organizations **are bold** in their digital ambitions. "The bolder the digital strategy, the more likely the company is to have a successful digital transformation. In our dataset, bold corporate strategies were associated with significantly superior performance on all counts" (Bughin and Zeebroeck). This sort of boldness (also discussed below in Leadership and Culture) provides a clear, shared vision to everyone in an organization and inspires a sense of co-ownership and participation—particularly when they can connect the vision to their day-to-day roles.

The ability of **bold, audacious goals to inspire achievement in people** is well known across many disciplines. In a 2018 BBC interview with plant geneticist Professor Dame Caroline Dean, she mentioned the importance of setting a short timeframe for mapping

the genome of a particular plant (Arabidopsis) important to the plant research community. It was one of the first organisms to have its genome mapped and the first *complex* organism to be mapped. Complicating the effort was the fact that multiple labs were involved. “It was a big international collaboration and we would meet annually to come up with goals to map out how most efficiently to do this collaboration. At one point, we all met in Denver Airport [in 1990] and we were trying to come up with medium- and long-term goals and the director of the John Innes Centre at the time said ‘We really have to have a big goal, let’s say that we will finish the sequence by the year 2000.’ This was before we had started any of the mapping…and everybody said ‘Oh, I don’t think we can do that.’ But…the fact that we had that goal galvanized everybody—funding bodies, scientists, everybody. And we reached it. So that was a real lesson to me, that if you set big enough long-term goals, you can achieve them” (Hill, 2018). The project was hailed as a triumph of international collaboration.

Another way of characterizing bold digital strategies is as “offensive” versus “defensive.” Bughin and Zeebroeck (2017) define “offensive strategy” as creating new demand, new supply, and a new business model versus “defensive,” which is about improving what you already do—or what some may call “incremental improvements.” This does not mean that organizations should not “get the basics right,” but that they should think about and align the role of “the basics” within their overall strategy. “Increasingly, operational excellence is the minimum requirement for doing business digitally” (Ross, Sebastian, Beath & Winter, 2017).

Be Agile and Adaptive

Successful digital strategies enable the people implementing them to **adapt to the changing environment**. This applies both inside and outside of an organization, that is, both enabling people inside an organization to change and grow into a digital mindset, but also allowing the organization itself to become adaptive and agile to local, national, or global trends. For this reason, the University of Bergen’s (UiB) digital strategy is structured around interconnectedness and ecosystems, recognising that students and faculty engage in a range of ecosystems that may overlap with the university. “Much of this interconnection takes place beyond UiB’s control and with tools not owned or governed by UiB. New cultures are being established, along with organisational, technological and professional platforms and ecosystems in which students, employees and the university participate. This creates opportunities as well as challenges” (University of Bergen, 2016, p. 5). For Bergen, the relevant ecosystems that may impact their digital strategy are as ubiquitous as Facebook and Google, or as obscure as the networks of government

departments, research institutes, and publicly-traded companies that all need to share data privately and securely (Athenaeum21 interview with Tore Burheim, 2018).

The California Digital Library even more directly addressed the need for **adaptiveness to external ecosystems** by creating a "Future Trends" document that accompanies their strategic vision (California Digital Library, 2018). Their future trends provide an external framework for their strategy, allowing the organization to check in from time to time and see if they need to adjust their strategy based on changes in these trends. This is similar to a scenario-planning exercise that provides a modular structure of variables that makes it easy to re-assess trends and how well the organization is adapting to the trends.

From the business literature, researchers at McKinsey have identified that people across agile organizations "individually and proactively watch for changes in customer preferences and the external environment and act upon them. They seek stakeholder feedback and input in a range of ways.…[They] identify new opportunities to serve customers better, and gather customer insights through both formal and informal mechanisms…that help shape, pilot, launch, and iterate on new initiatives and business models" (Aghina et al., 2018). As described here, **user-centred cultures seem to by nature be *agile* cultures**. This was true for all successful examples of digital transformation that we encountered in our research and interviews. All agile cultures, however, are not necessarily user-centred by nature.

Be Service- and User-Oriented

Whether talking about government-funded aerospace, business, or academic institutions, in our complex, digital era, the clear trend is that organizations that are **user-oriented and service-oriented, are more successful in digitally transforming themselves**. "What we've learned, both through our surveys and in our own experience with clients, is that the human experience is vital to raising an organization's Digital IQ. Businesses must think critically about how their digital initiatives will affect the experience of customers and employees, as even the most well-intentioned initiatives can have unforeseen impacts on people.…Top performers in our survey…have a better understanding of the human experience that surrounds digital technology. These companies prioritize user experience specialists and [create] better customer experience through their digital initiatives" (Puthiyamadam, 2017). For universities, "**ultimately it should be student needs which shape their decisions on investment in technology** and how to drive forward digital learning" (Knight, 2017).

Lancaster University credits their success in digital transformation to **listening to**

students and staff. Their pioneering iLancaster app allows students to do everything from check for openings in the laundry room, catch a bus, or lookup their exam seat. Everything in the app was chosen by students, according to Amanda Chetwynd, Provost for Student Experience. This same user-centric approach was taken for the implementation of their online learning platform that enables both staff and students to earn a digital skills certificate as well as in their staff and student co-design projects, which are focused on bringing digital technologies into learning, teaching, and assessment (Jisc, 2018).

Just like learning a new software or technology, **people need to be taught the skills to support organizational digital transformation and digital maturation in a user-centric way**. As mentioned above, organizations are well-served by investing in growing their staff, students, and faculties' digital literacy, and a key part of this is teaching the skills needed to provide user-focused services. "Achieving the potential of digital transformation requires public bodies to have new skills. These are not simply existing people with new awareness, but genuinely new skills including **user research and analysis…[and] user experience skills**" (Deloitte UK, 2015).

Alongside those skills, Lancaster University also recognized the need to change the culture in support of a user focus. They successfully shifted the culture of IT support from being focused on a problem to solve or a computer to fix, toward supporting and teaching a person to help themselves and develop new digital skills. "There has been a change in the culture of IT support so that service desk staff see themselves as coaches first, and as technicians second. When someone has a problem, instead of just fixing it, we are encouraging the service desk to help people to work out how to help themselves, such as where to look for online help, recognising good websites, etc. Then the next time that person has a problem they will be able to search for a solution, recognise what is a good or bad solution, and analyse the problem before they start" (Jisc, n.d., p.3).

Summary

To summarize, digitally maturing organizations support a people-first approach, both with their employees and their end-users. They foster digital mindsets that enable:

- **Continuously Developing Digital Literacy and Skills**
- **Setting Bold Goals**
- **Being Agile and Adaptive**
- **Being Service- and User-Oriented**

Culture

Culture is often the difference between new digital solutions being successfully adopted or rejected. Culture, in the context of this report, clearly overlaps with People (above), but while the latter can be seen to be about addressing individuals, this section focuses on changing the culture of the organization as a whole. Changing culture is notoriously difficult and many organizations focus on the more tangible aspect of technology deployment rather than influencing the culture affecting *adoption* of new technologies by their intended users. As emphasized in the 2018 Jisc white paper on leading digital change, "organisations must choose strategic responses that are flexible and focused on the impact of digital change rather than on technology" (Phipps & Clay, 2018, p. 7). Earlier Jisc case studies in digital capabilities also recognized the role of culture change in digital transformation. "The digital university is not just the same organisation with more skilled people in it. **Digital capability is an organisational change agenda**" (University of Lincoln in Beetham, 2017, p. 4).

The University of Leicester recognized the need for culture change as a core part of their digital strategy. As such, *communication and adoption* of their digital strategy was a priority. In a 2017 discussion with Concordia University's Digital Strategy Committee, staff members from Leicester described two different projects that highlight the importance of both. One project (the implementation of lecture capture software), was described by Leicester as being "very technology-led." That is, the project focused more on the implementation of software than it did on the adoption of the new processes that the software enabled or required. Another project described by Leicester was the implementation of attendance management software. In contrast, this project was set up and managed as a "business project" rather than a technology project. As such, **changes to policies procedures, and organizational culture were discussed and planned for up front,** as part of the business planning process. This led to a more successful embrace of the software because the communication of the project acknowledged the need for a change in process and culture, not just in software.

This division between "IT Projects" (which tend to be technology led and focused on implementation) and "Business Projects" (which acknowledge the changes in process, procedures, and culture that are needed for a successful project) is one way of understanding the different culture silos that can exist in academic institutions and was a theme that arose throughout this research. **Projects that focus on the implementation of new processes or changing business processes, rather than the implementation of**

new technologies, have a higher chance of succeeding. As an expert in digital literacy said about the reasons for failure of the Gates Foundation and government-funded educational technology initiative, inBloom (which is explored further in the Case Studies section below), "IT needs to have a seat at the table, but they should not be leading the discussions or making the decisions" (Athenaeum21 interview with Monica Bulger, 2018).

Daniel Greenstein suggests promoting and supporting culture change by fostering inclusion. "Culture of inclusion is very important. Shared governance is there to be part of the fabric of the institution. It's a huge gift if you think about it in the right way. It's a constant reminder that decision-making processes need to be highly consultative. If one of the things that you are trying to accomplish is a degree of culture change, you can't do it without a consultative approach.…You need engagement at the deepest possible level in order to move those cultural perspectives in radical directions. So inclusivity in the goal-setting and planning process is taking on a greater importance—recognizing how deeply the culture stands in the way of the transformation" (Athenaeum21 interview with Daniel Greenstein, 2018).

Support Well-Being During Change

Although the digital maturity of an organization depends upon changes in culture, little of the general *strategy* literature provides guidance for supporting staff through times of change (although we recognize there are other areas of research which do). The Jisc *Digital Capabilities Framework* is an exception, however, and provides a section on the support of "well-being" of staff and students during periods of significant culture change. The University of Lincoln both recognizes the difficulties that arise from change—"digital change generates anxiety and stress, as well as interest and excitement–and both need to be acknowledged before personal development can happen"—and suggests engaging directly with these issues. "Digital identity and wellbeing are effective routes to engage staff and students. They address people and their real-world practices, rather than roles and ideal behaviours" (Beetham, 2017, p. 9).

Enable Cross-Functional Collaboration

When looking at examples of successful culture change in support of digital maturity, two topics emerged repeatedly. The first was that of **cross-functional teams**. Rather than re-organizing the structure of an institution, implementing cross-functional teams that can address specific problems, and design and implement solutions, help both to move digital transformation forward and to change culture. This is clear in the structure of the implementation of digital strategies at University of Leicester and University of Bergen,

and was repeated throughout our interviews with Michael Edson, Jill Leafstedt, and Gerald Kane.

From the business and strategy literature, this is also an ongoing topic, "organizations usually do not change their internal structure as a part of digital transformation and so the teams working on these transformations get slotted into the existing structure. Where the team actually '"sits,' both physically and in the org chart, can affect their ability to influence the cross-functional groups integral to real digital transformation" (Libert et al., 2016). Creating "virtual" **cross-functional teams** came up repeatedly in this research, but there was also evidence that **physically co-locating staff can be useful**. The University of British Columbia (UBC) created a virtual organization of the Learning Technology Hub, but they physically co-located the IT app team members and tech-focused pedagogy team in the same room. "This made it practically impossible for them *not* to collaborate. It's a physical drop-in space for faculty and students, and now they are tightly integrated. We have projects staffed by mainly IT people, but headed by a pedagogical person and vice versa" (Concordia Digital Strategy Committee interview with UBC, 2017).

Decentralize Decision-Making

A second common practice that we saw in digitally maturing organizations was the ability to **decentralize decision-making.** The delegation of authority and resources is essential for the success of cross-functional teams, but also for supporting innovation and digital transformation across the organization. "Many leaders are hesitant to relinquish control and rely on a network that lies outside of their chain of command. Working with these external groups requires new, co-creative leadership styles, but also can allow organizations to tap into enormous pools of capabilities and under-utilized resources" (Libert et al., 2016).

Digitally maturing organizations empower individuals and groups to make decisions at the local level, so they can iterate and innovate more quickly. This was part of the success of UBC's Learning Technology Hub, wherein they made sure that "the accountability sits with the decision-maker…. Now we have evaluation guidelines that look at supports— we don't want to have to go four layers up the organization to get a decision on a $10k software license. We have thresholds for different levels of decision-making" (Concordia Digital Strategy Committee interview with UBC, 2017).

Expect a Marathon, Not a Sprint (but Celebrate the Sprints!)

Digitally maturing organizations recognize that transformation is a long, arduous process.

They **expect a marathon, not a sprint.** The research indicates that preparing for a long journey is essential, as is **recognizing the successes and failures along the way.** "Transformation is not easy; it is a long, challenge-filled process" (Bill and Melinda Gates Foundation, 2014).

John Kotter has written extensively—and for decades—on the need for perseverance in any organizational change. "Real transformation takes time, and a renewal effort risks losing momentum if there are no short-term goals to meet and celebrate. Most people won't go on the long march unless they see compelling evidence within 12 to 24 months that the journey is producing expected results. Without short-term wins, too many people give up or actively join the ranks of those people who have been resisting change" (Kotter, 1995).

Support Risk-Taking, "Failure," and Continuous Learning

According to Jill Leafstedt, Executive Director of Teaching and Learning Innovations at CSUCI, one of their biggest successes has been "creating a space for faculty to feel safe to fail. Since day one, we've had presidential support for that. Risk-taking space supported across the board….When you're iterating, you have to embrace failure and move on. I've had to learn that myself, and teach my team that it's OK and to move on" (Athenaeum21 interview with Jill Leafstedt, 2018).

Summary

An overall recognition of the need for culture change in an institution's digital strategy is essential. In short, we found that successful digital strategies enable, or are complemented by, changes in culture that:

- **Support Well-Being During Change**
- **Enable Cross-Functional Collaboration**
- **Decentralize Decision-Making**
- **Expect a Marathon, Not a Sprint (but Celebrate the Sprints!)**
- **Support Risk-Taking, "Failure," and Continuous Learning**

Leadership: Knowledge, Vision, and Communication

Recognizing that digital transformation is about supporting people and changing culture is essential, and the research indicates that both of these require strong and clear

leadership. This is the case in the business sector, where leadership is discussed in terms of setting overall agendas and roadmaps—"in our experience, without the right road map and the management mindset needed to follow it, there's a real danger of traveling in the wrong direction, traveling too slowly in the right one, or not moving forward at all" (Catlin et al., 2015).

As with staff across the organization who need to be "upskilled" to prepare for digital change, leaders, too, need to be digitally-savvy; however, the **"soft-skills" are as-or-more important than deep technological skills**. As Gerald Kane said to us, leaders and managers "can't be devoid of tech knowledge, but the requisite digital literacy is accessible to everyone. I find it easier to teach the executive the tech skills that they need, than it is to teach the millennials the leadership and strategic skills that they need. They don't need to learn Ruby on Rails, blockchain, etc., they just need a conceptual understanding so they don't think they are magic. This can be a done in a couple of sessions, or in a class. It does not need to be an entire degree" (Athenaeum21 interview with Gerald Kane, 2018). To this end, the University of Leicester has implemented "digital leadership development" for managers, which includes short, one-day courses in "Leading Digital Change" and "Leadership in a Digital Age" (University of Leicester, n.d.).

Know The Organization Before Attempting to Change It

The 2017 Jisc case studies in digital capability emphasize **the need for leadership to understand a culture before trying to change it.** According to staff at Nottingham Trent University, "digital capability is a whole-organisation agenda, but how it gets taken up depends on local factors such as departmental cultures, management styles, and how innovators are supported. It is important to find common ground between diverse stakeholders. 'It's about finding the right balance for the organisation between centralised and distributed. There is never one way of doing it'" (Beetham, 2017, p. 2). The Jisc case studies also emphasize that there is not a single approach that will work for everyone, "there are many ways in which individuals can be digitally 'capable' in their roles; similarly, there are many ways in which an organisation can develop digital capability depending on the established culture, rules, roles and divisions of labour" (Nottingham Trent University in Beetham, 2017, p.2).

In evidence of this, our research uncovered at least two different forms of successful leadership around the implementation of digital strategy, emphasizing the need to understand an institution's existing culture before trying to change it. More common of the two approaches is one where the leadership "supports" and advocates for change, but

does not force it. At the University of Southampton, the goal was to support change through building trust. “Digital innovators have to gain trust and credibility with academic staff. This can be done by ensuring that approaches are flexible and adaptable rather than rigidly imposed, and that academic staff can initiate ideas and projects, and requests for support” (Beetham, 2017, p. 8). This is in contrast to the story from Teaching and Learning Innovations at CSUCI, where trust was important in the implementation of a new Learning Management System (LMS), but change was not optional. A clearly stated, and “over-communicated” vision paved the way for the embrace of the new system, even by the most technically-challenged faculty. This was further facilitated by an eighteen-month lead time, allowing repetition of messaging, and by regular project status updates to the faculty senate. People felt well-supported by the Teaching and Learning Innovations team’s visible availability to address concerns about the changes. Because of the leadership, and the respect, transparency, and collaboration that the TLI team had cultivated, the “imposed” LMS became an opportunity for culture change, bringing along faculty that were more traditionally reluctant to embrace change. The project was completed quickly and efficiently.

The University of Calgary has taken the concept of knowing the organization one step further by implementing a formal research project. By establishing “Lab Next,” Calgary is studying the changing nature of research practices in order to understand how to improve their library services (University of Calgary, n.d.). This research-first approach is in contrast to many libraries, which have taken a very functional approach—thinking first about what the library already does and how it could be improved.

Bring Together the Right People

Getting to know the culture of an organization before embarking on change, also means **identifying the people in the organization who can help facilitate change.** As a respondent from University College London (UCL) said in their Jisc digital capabilities case study, “Invest in comfortable shoes. Achieving change in a large organisation requires you to explore it and understand the different staff and student experiences within it. So walk around, see what’s going on, talk to people and provide opportunities for them to connect with each other” (Beetham, 2017, p.3).

Michael Edson similarly emphasized the need to **find, and bring together, the right people**: “A big problem is that in institutions, in the boardroom, the people who are wise on these matters are too often absent from the boardroom day to day. Boards seems to be full of older people, less tech-savvy, and they are just not comfortable or confident in their

decisions in these matters. Therefore, they devolve to the 'let's just keep the servers running' mentality. These are not the people who are going to lead these changes. That being said, I have also seen the approach where one person, a kind of golden boy or girl, a tech wizard, is given the job of developing something new on their own, without the rest of the board or leadership team really getting on board or understanding what is happening. And that fails too. So the emphasis is on getting the right people involved in these decisions. As Jim Collins said probably 50 years ago, 'get the right people on the bus'" (Athenaeum21 interview with Michael Edson, 2018).

Sarah Knight, Head of Change-Student Experience at Jisc, similarly acknowledges the need for not just the right people but for the right leadership. "Transforming a university into a smooth-running digital machine is a big task…This requires a senior member of staff with the strategic steer and focus to take the university's digital vision forward" (Knight, 2017). According to the CEO and Principal at Epping Forest College, "It is important to have a strategic vision for the college and it helps for that to be driven at a very senior level" (Beetham, 2017, p.3).

Define a "Moon Shot" - a Bold Purpose

There were many sources that indicated that **setting a bold agenda** was a key factor in successful leadership of digital transformation in education. The Bill and Melinda Gates Foundation partnered with McKinsey in 2015 to try to understand key themes for successful change in higher education. They interviewed more than 100 people in higher education and "institutional leaders pointed to three distinct themes they think should be considered to manage the increasing and inevitable changes in higher education." All three themes are mentioned in the case study below, but important here is that the first amongst Gates' themes was the need to do something different or bold. "Institutions must define a differentiated value proposition…While almost all colleges and universities are experimenting and tweaking their models, few institutions have radically restructured their postsecondary experience" (Bill and Melinda Gates Foundation, 2015).

The look and feel of a "bold goal" or "moon shot" will vary depending on the time and place of the "moon shot" and the overall culture of the institution. Often, though, an academic institution's boldness of purpose comes from recognizing their overall **responsibility and relationship to broader society.** Bergen's digital strategy is boldly titled "Digitalisation that Shapes Society" in recognition of their broader agenda and commitment to the world outside their university. For the California Digital Library, strategic vision is about "respond[ing] to society's need for unfettered information access

to confront the critical problems of today and tomorrow" (California Digital Library, 2018).

Setting a clear, bold, differentiated goal is an important role of leadership, but the research indicates that **having focus and purpose** is equally important. One core argument from a 2017 Harvard Business Review article which describes setting strategic goals (digital or otherwise) as "quests," points out that digital transformation must be focused: "the organization must identify the specific quest that will lead to greater value generation…the ongoing digital revolution does not itself constitute a transformation—it is a means to an end, and you must decide what that end should be" (Anand & Barsoux, 2017, p.5).

Daniel Greenstein describes this lack of focus as one of the primary causes of "initiative fatigue." He argues strongly for institutions to have bold, but focused, goals that play to an organization's strengths but also take advantage of an opportunity. "There are so many opportunities in higher education, and there are so many opportunities in digital aspects of higher education. How you stack, rank, compare or evaluate them, absent a 'big goal,' that is really hard [to do]…. I would take it one step further. It is not just enough to have an audacious goal, I think it's really important to have it be *quantified*. If you have it quantified you can have the conversations about what it takes to get there and what you will have to sacrifice" (Athenaeum21 interview with Daniel Greenstein, 2018).

Establish a Common Language

Our research indicates that digitally maturing organizations **draw a picture of what success looks like, and communicate it widely**. The University of Leicester did this directly by creating a section of their digital strategy called "Our Measure of Success: We Know We Are Successful When." Their video about the creation of a "Digital Campus" communicated the goals and methods of their digital strategy and enabled stakeholders to have a clear, shared mental model of a digitally-enabled campus (University of Leicester, n.d.).

Frameworks for digital capabilities and digital literacy can be helpful in communicating a shared understanding and vocabulary to a wide range of stakeholders. "A digital capabilities framework is not an end in itself but it can provide **a common language for development, a benchmark for individuals to aspire to**, and a checklist for staff and student support" (Beetham, 2017, p.1). Such frameworks can also be useful for helping communicate an organization's place in a wider ecosystem: "A coherent, high-level framework should be institutionally owned but can be closely mapped to developments

beyond the institution (e.g. Jisc, EU frameworks, or versions of them)" (Beetham, 2017, p.2). Several institutions warn, however, against making such frameworks too rigid or prescriptive. North Lindsey College has found that, "It is challenging to devise digital capability statements and levels that work across a wide variety of settings. The North Lindsey approach has been to offer generic 'missions' that individuals can make relevant to their role and subject specialism" (Beetham, 2017, p.2).

Continuously Communicate to All Levels of the Organization

The leadership's vision of what a successful digital transformation looks like needs to be **communicated *to,* and to be *inclusive* of, all levels of an organization**. "Most strategies for public institutions are written for boards, funders, governors, etc. With that audience, they fall into making shallow, but grandiose, claims. If I had a dollar for every time they mention innovation, collaboration, etc., I would be a rich man. But those kinds of strategies don't mean a thing to the people who do the work. They know it's a con, or it's not for them. They know it's a shallow, credit-taking exercise. Unless the mindset of the planning process is about recognising and catalysing and harnessing the collective genius of a community, it is not going to work. Or, put positively, **if the process is about supporting and harnessing local talent and talent in the broader community, everyone will want to work on it**" (Athenaeum21 interview with Michael Edson, 2018).

The Open University has also cautioned not to underestimate **the importance of communicating experiences alongside vision**. "Examples from practice, shared through communities of practice, can be more persuasive than detailed requirements: 'it's the stories about practice that are most powerful'" (Beetham, 2017, p.2).

Ultimately, communication needs to be recognized as the responsibility of a number of people at different levels of an organization, but it can also become core to someone's responsibilities. "Institutions constantly underinvest in the 'connector' role. The translator. That needs to be there. Lots of projects have failed for the lack of that person who can explain to the non-tech people what is going on" (Athenaeum21 interview with Michael Edson, 2018).

Summary

To summarize, our research has indicated that leaders of successful digital transformation enable adoption by all levels of an organization when they:

- **Know the Organization Before Trying to Change It**
- **Bring Together the Right People**

- **Define a "Moon Shot"— A Bold Purpose, Quest**
- **Establish a Common Language**
- **Continuously Communicate to All Levels of the Organization**

Organizational Alignment

Organizational alignment in a digitally maturing organization is ultimately about **ensuring that the vision set out by leadership is fully adopted and incorporated into working practices** and authority and responsibility structures. It is about who makes decisions, how decisions get made, and how new initiatives get resourced. As there is no "perfect" model for achieving organizational, process, and strategic alignment, what emerged from the research is a series of best practices that can be seen to support this alignment at any given institution.

Align Digital Strategy with Organizational Strategy

Digitally maturing organizations put into place the **structures that will enable their success**, establishing the guidelines that help them align with their overall strategy, and that bridge between long-established organizational processes and structures with new objectives. "The first step managers need to take is to assess their organization's purpose and vision. *What are the organization's goals? Why does it need digital transformation to achieve them?*" (Bouée, 2015).

Jisc's tools for surveying digital expectations and capabilities (see Tools and Resources) can be helpful in this assessment. As one participant has noted, "running a survey of digital capabilities is a good way of bringing key stakeholders together and building a shared understanding of the issues, quite apart from the value of the evidence collected. It also communicates to participants how the organisation describes and values digital practices" (Glasgow Caledonian University in Beetham, 2017, p.2).

Sometimes the alignment between digital and organizational strategy is literal. The University of Bergen's Digital Strategy was designed alongside the University's Strategy. "The two strategies were created in parallel, with the digitalisation strategy as an extension of the larger university strategy" (Athenaeum21 interview with Tore Burheim, 2018).

Align Talent Management with Digital Strategy

One common successful practice of alignment is **supporting innovators and change-makers** who already exist inside an organization. Aligning an organization

around a strategy does not mean putting into place strict rules or structures to which everyone must adhere, but **finding the people who are already doing great work** in the organization and figuring out how to **support and scale their efforts**. “Many parts of the organisation will already be working on digital capability [even if they don’t call it that]. The key with any new initiative is to draw on that rich expertise and help it to become better articulated” (The Open University in Beetham, 2017, p.4).

Particularly when recognizing the need for organizational change, **supporting those who can move culture change forward** should be a priority. “Many companies are adopting new talent models in response to digital trends. Employees engage in two- to three-year ‘tours of duty,’ engaging in one project or role for a certain period of time, at which point they transition to a new role inside the company or outside in order to continually develop different skill sets. These efforts are clearly and intentionally designed to allow the company to cultivate diverse talent in a rapidly changing digital world, but they don’t involve implementing or using new technology at all” (Kane et al., 2017).

Promoting experimentation within an organization can provide an institution with the innovation required for digital transformation without needing to look to outside talent. The business literature recognizes the need for experimentation, “digitally maturing businesses are 2.5 times more likely than early-stage companies to be conducting both small experiments and large enterprise-wide initiatives” (Kane et al., 2017).

Jisc also supports the notion that **allowing for experimentation and successful implementation by a few people can support the overall digital maturity of an organization**. “Key to providing the right digital environment are well-trained, fully-engaged members of staff who can design and deliver courses with technology embedded in them. The case study universities which featured in our Jisc digital capabilities guide found that this approach fosters a climate of digital fluency that diffuses throughout the university, from students to chancellors and everyone in between” (Knight, 2017).

Michael Edson talks about innovation and experimentation in terms of “making small bets, often” and encourages organizations to “think big, start small, and move fast.” By “start small,” he means **experimenting** and making decisions early. He says, “I like to get people to think about compound interest. Make early, clear, strong bets. It needs to be early. A good example is the hand wringing that many in libraries are doing / have done around e-books, instead of just placing an early bet and re-adjusting as necessary as they move forward. There is also the Buckminster Fuller change model, which states that some

systems are so broken you have no option but to build something new on the side and then move people into it when they are ready. I caution people to avoid the 'skunk works' model though - of allowing a few people to develop something in their own silo. You have to bring everyone along….Don't put the changemakers in a silo" (Athenaeum21 interview with Michael Edson, 2018).

According to the University of Southampton, this also includes ensuring that change-makers receive **support from outside an organization**. "Innovators need external networks, especially the opportunity to share with people in similar roles but different institutional settings" (Beetham, 2017, p.5). This was echoed by North Lindsey College and Salford City College who said respectively, "The **external perspective is really important for sharing experience and gaining confidence**" (Beetham, 2017, p.5) and "Student change agents benefit from networking beyond their own institution" (Beetham, 2017, p.7).

The establishment of **cross-functional teams** as a means to support overall culture change, as mentioned above, is also relevant to achieving alignment between strategy and process and to **supporting innovation and experimentation**. While the establishment of teams that bring together many *functions* or *roles* from across the organization can help expose people to many parts of an institution, bringing together the "right" personalities is an important part of supporting experimentation.

Align Organizational Reporting and Accountability with Digital Strategy

Implementing a matrix-style organization as described earlier with the example from UBC's Learning Technology Hub means **aligning staff, structure, and resources to user needs, rather than requiring new programs and initiatives to fit into existing structures.** The creation of "virtual" structures also accommodates agility and flexibility—service or project-focused teams can be created and dissolved much more quickly than trying to formally re-organize a department or whole organization. The success of cross-functional teams depends upon aligning authority with responsibility. That is, **ensuring that teams given the responsibility for a project or program actually have the authority to make the required decisions**. This was part of the success of UBC's Learning Technology Hub, wherein they made sure that "the accountability sits with the decision-maker" (Concordia Digital Strategy Committee interview with UBC, 2017).

Align Digital Strategy with Funding and Resource-Allocation

The California Digital Library (CDL) have explicitly outlined the process for aligning

resources with their strategic priorities. Called the "Connect Process," they have established "a mechanism for creating alignment of CDL-wide activities around selected thematic clusters for the purpose of ensuring that the resources are expended efficiently and effectively to support CDL's strategic vision. Connect activities are designed to analyze, synchronize, improve and prioritize efforts within a given topic or service area. The process can be undertaken by ad hoc or standing groups" (California Digital Library, 2018).

Summary

When done successfully, organizational and process alignment should both support and perpetuate digital strategy: "**direct integration with the strategy puts digital at the centre of the business**, fostering natural forms of internal collaboration as well as corporate governance that places digital topics alongside other business requirements. Strategic priorities and investment decisions are now part of the same process" (Catlin et al., 2015).

Alignment is key to the success of digital strategy and digitally maturing organizations:

- **Align Digital Strategy with Organizational Strategy**
- **Align Talent Management with Digital Strategy**
- **Align Organizational Reporting and Accountability with Digital Strategy**
- **Align Digital Strategy with Funding and Resource-Allocation**

Data

Support Prioritization and Decision-Making

Related to the need for leadership to stay **focused on end-users** and for a wide variety of people in an organization to develop **user-experience skills** (both discussed above) is the need for an organization to **have data about users to inform its digital strategy**. As mentioned above, rather than simply trying to improve the existing library services, the University of Calgary established a research laboratory to understand the changing nature of the university's researchers' practices and outputs. **With that research data in hand, decisions could then be made** about how best to support these evolving research practices.

At the departmental or organizational level, data is also important for gauging the current state of digital capabilities of the staff, or digital maturity of the organization. The two Jisc tools mentioned throughout this report—the Digital Discovery Tool and the Student

Tracker—are about **gathering data to support digital transformation**. The Jisc Digital Student Experience Tracker provides institutions with data about the digital expectations and readiness of the student population, but also provides Jisc an aggregate view across institutions. For example, the 2017 survey of students at 74 institutions found that "students were most motivated to improve their digital skills when tutors inspired them with their own digital know-how" (Knight, 2017). This tool is currently also being piloted with teaching staff.

The Digital Discovery Tool uses data at both the individual and organizational level to support increased digital capabilities. Using a series of quiz-like questions, individuals are "made aware of digital practices they already have and new ones they might try. Once their answers have been submitted they receive a visual profile of their digital capabilities. This is followed up with advice on the 'next steps' they might take to further develop their practice." At the organizational level, this (completely anonymous) aggregated data can be used to understand the current level of digital capabilities of staff. "These can be used to help understand the organisation's strengths, weaknesses, and priorities for development" (Jisc Building Digital Capability Blog, n.d.).

External surveys and tools are not the only way to gather data on student and staff populations, though. With the changing nature of the digital systems that support academic institutions today, and the data made available via open web social media platforms, large quantities of data can be made available about students and faculty that can help shape decision-making about digital services and about learning progression. Daniel Greenstein is a strong advocate of data-enabled predictive analytics, "I think there are huge opportunities going forward for universities and colleges to achieve vastly better efficiencies *and* improve student outcomes, when using predictive analytics in doing capacity planning. If I'm asking my students…what their degree plans are, I can actually forecast demand for course sections and size, and staff, and building space, three and four years out. If I do that semester by semester, I will actually learn how good my predictions are. So you can imagine that, combined with the academic preparedness of the students and demographic data, I'm going to be able to view the pipeline and mitigate the risks of high rate DFW courses [courses with a high student failure or withdraw rate] a few years out." Greenstein goes on to discuss the benefits of the analytics enabled by iPASS system implementations. The cost of increased student retention through interventions enabled by analytics "is going to be way less than whatever it is going to cost to implement the iPASS system and even to hire new advisors. The data we have on the return on investment of iPASS suggest that it may take 3-5 years to recoup investment, but eventually it's revenue positive" and it can take less time for some institutions with higher

per student revenues (Athenaeum21 interview with Daniel Greenstein, 2018).

This data can change practices at an institutional level, but it can also change practices on a small scale. Professor Gerald Kane studies digital transformation across business and industry, but he also teaches business school students at Boston College. He has been using social media in his classes for more than a decade. His students are asked to tweet and blog, and to review each other's work. Several years ago, he stopped giving tests "I have so much data about what students actually do, I don't need to wait for the old instruments—tests—to know what they are knowing. Because of that monitoring, they do more work and better work rather than cramming for a test. I have 250 data points on every student." Kane checked the efficacy of this sort of assessment system for several years. He found a 90% correlation between his own assessment of students' work and the assessments of students by their peers. "If there was a deviation it was because I undervalued a student's work." He is still the final arbiter "to make sure the system doesn't get gamed," but overall he has found this use of data very efficient and effective (Athenaeum21 interview with Gerald Kane, 2018).

This is an example of best practice in the use of data by an individual, and could be scaled and rolled out more substantially across the college. Data, however, should not be seen as always being about the organization monitoring the individual. It can also be used to empower the individual to understand more about themselves. "Staff and students are seeing the benefits of having learning-related data at their fingertips. Learners can monitor their progress, timetables and issues such as attendance; staff can monitor key metrics relating to their learners and courses" (SERC in Beetham, 2017, p.10).

Once an emerging field, **learning analytics have become mainstream**, but how much an institution should try to "know" about its students—and how much they should use that data to try and predict behavior—is still a very open question.

Promote Data Literacy Among Specialists and Non-Specialists

Use of data should be accompanied with appropriate data literacy training for data specialists and non-specialists alike, across student, faculty, and staff populations. As outlined in the inBloom case study, failure to do so can lead to disaster. "A major failure was not understanding that data is a mystery to most people. This gap in knowledge allowed fear to take hold and undermine the project" (Athenaeum21 interview with Monica Bulger, 2018).

Not everyone needs to know how to work with data, but organizational **leaders need to**

understand how to interpret data, and a wide range of people need to comprehend the role and implications of data in people's personal, professional, and social lives, as well as in our organizations and societies. There is also a need for education around the data collection practices of companies. Google, in particular, is not transparent about what data they are collecting from users of any of their products, including their "Apps for Education." What is clear, though, is that anyone engaging with Google or its products makes everyone else on a shared device vulnerable to their data collection. "Everyone is tracked, even after they are logged out. There remains confusion about when someone gets tracked. When they're on the regular Internet, including Google's sites, everyone is tracked" (Athenaeum21 interview with Monica Bulger, 2018).

The University of Bergen's digital strategy takes a strong stance on this issue, asserting that "UiB must ensure that all digitalisation and use of information technology takes place in an ethical and lawful manner which protects privacy," even taking a stand against the political use of illicit data collection: "Technological and political developments have led to increased monitoring of activities in digital forums. UiB must prevent electronic monitoring or the fear of such from impeding academic activities or restricting academic freedom" (University of Bergen, 2016, p.5).

Promoting literacy around the ethical (and legal) management and use of personal and research data is urgently needed in an increasingly complex digital landscape. Tore Burheim, the Director of IT at the University of Bergen, describes the need for data literacy amongst researchers: "When we talk to research groups, they are not always aware of law and regulations. We try to educate and inform them about legal requirements, and provide a user friendly solution for lawful data handling" (Athenaeum21 interview with Tore Burheim, 2018).

The University of Bergen's digital strategy includes a goal of "introducing standards and procedures conducive to the secure handling of all research data at UiB" (University of Bergen, 2016, p.9). Two major initiatives at the university address this goal. The first is a research data infrastructure called SAFE, based on the Norwegian Code of conduct for information security in the health and care sector, it provides a service to employees, students, and external partners that "ensures confidentiality, integrity, and availability are preserved when processing sensitive personal [research] data" (University of Bergen IT Department, n.d.). The second initiative involves a laboratory equipment inventory and new laboratory equipment maintenance service. Burheim states, "It's a comprehensive task, but necessary to ensure security. Some of the equipment was not designed to be standing on the open web….But it's also to [help] provide a good service for people to

collect and protect sensitive data from the lab equipment. People are working with DNA and that is quite sensitive data" (Athenaeum21 interview with Tore Burheim, 2018).

Beyond training in the ethical (and legal) management and use of sensitive data, many institutions are offering courses in data science, data curation, maintenance, analysis, and visualization. Instruction in these areas is becoming increasingly popular across all disciplines, including the humanities. Strong open source data science curricula exist via The Open Source Data Science Masters, and DataCamp (see Tools and Resources).

Define Guidelines, Policies, Best Practices for Ethical Data Governance, End-Use, Privacy, and Security

Without clear and well-communicated policies and procedures, the use of data by academic institutions can inhibit digital transformation and even cause a backlash, as was the case for inBloom when parents protested the collection of students' data by the initiative. Recent extended industrial labor union action in higher education institutions across the UK set up a dynamic described by one interviewee as "management vs. faculty." "In times of industrial action, IT may suffer from being seen as a tool of 'the managers.' Colleagues are less keen on us collecting data when it might be seen as control or monitoring rather than helping with decision-making" (Athenaeum21 interview with Melissa Highton, 2018).

Use of data by institutions should be accompanied by appropriate use and privacy policies, as well as accompanying measures to keep data safe. But as digital literacy expert Monica Bulger points out, this shouldn't scare people off from using data. "There is a need for clear privacy policies and transparency about how the data is used, [but also] more discussion of the history of, and benefits of, data use. We need rhetoric around benefits [of data] in higher ed. Medicine and tech are benefiting from analytics. Higher ed can architect how tech is being used" (Athenaeum21 interview with Monica Bulger, 2018).

Design Systems and Data to Support Interoperability and Portability

The University of Bergen's digital strategy covers data use comprehensively, promoting the use of open standards for research data: "The handling, processing and publication of such data should be based on the principle of open access, within strict ethical frameworks. Open access to research results should be the norm" (University of Bergen, 2016). At UiB, the library has taken the lead on open access to research.

Bergen's digital strategy also addresses the **need for interoperability in order to support a seamless user experience for students, staff, and faculty**. Their goal is to build "connected value chains from data collection, through storage, processing and

access, to publishing and evaluation" (University of Bergen, 2016, p. 9), which will support their goal of a "self-service university administration" that promotes the re-use of data "so as to avoid asking users the same thing multiple times and to ensure consistent information in all systems" (p. 11).

Many universities are also exploring the need for the interoperability of data and systems in order to create a better student experience. Lancaster University used digital technologies to provide a seamless registration process for incoming students. While requiring interoperability between their online registration platform, the iLancaster app, and a newly-purchased "Queue Buster" software, the work put into improving both online and face-to-face elements of registration meant vastly improved student satisfaction with the process (Lancaster University, 2017).

Summary

When used to support decision-making and improve services, data can be a powerful tool to understand the workings of an entire organization as well as to advocate for change. Digitally maturing organizations:

- **Support Prioritization and Decision-Making**
- **Promote Data Literacy Among Specialists and Non-Specialists**
- **Define Guidelines, Policies, Best Practices for Ethical Data Governance, End-use, Privacy, and Security**
- **Design Systems and Data to Support Interoperability and Portability**

Technology

Technology comes last on this list of characteristics of a successful digital strategy not because it lacks importance, but because it should first and foremost be led by strategy and function. That is, technology should be implemented for a human *purpose* and not for its own sake. Equally, **technology should not drive the culture of an institution, but support and promote it**. The IT systems that institutions invest in should fit the mission, vision, and purpose of the organization. In the words of someone at University College London, "If the available virtual learning environments do not fit the ethos of your institution, develop something that does!" (Beetham, 2017, p.10).

Develop Technology for (and with) End-Users

Mission, vision, and purpose ultimately come from **placing end-users at the centre** of everything. As mentioned in the Teaching and Learning Innovations case study, "we didn't

want to train people on *tools*. We wanted to prepare people *to teach*....Because our campus hadn't had a big focus on technology, the tools were exciting, but the teaching, learning and student engagement was why people stuck around" (Athenaeum21 interview with Jill Leafstedt, 2018).

Working not just for, but *with* end-users is an important part of developing successful digital services. Jisc themselves now use a "co-design" approach in developing their tools and services whereby they "work closely with potential users and potential bill payers of services, right from the earliest stage so they are involved in designing and building them up" (Hitchcock, 2018). This approach promotes adoption of technologies—in part through providing a sense of investment in the end-product—and has been adopted by several universities in the UK. Lancaster University and the University of Leicester both have programs that pair students with staff and/or faculty to design a new digital tool or service *together*.

Putting technology at the service of users, particularly in educational settings, also means recognizing the relationship between the digital and the physical. User-centred design of technology acknowledges that **universities no longer have control over all of the technology in the classroom.** Students, faculty, and staff come equipped with a slew of personal digital devices and this, too, should be recognized in the design of the intersection of technology and spaces. "The learning environment isn't fixed and technology is far from static, so instead of developing new bespoke digital learning spaces, universities may be better off embedding digital technologies across the spaces they already have. At our annual digital festival, Liz Ellis from the Open University argued that the digital learning environment of the future will be a 'series of spaces and application programming interfaces so it won't be a thing in itself'" (Knight, 2017). For this reason, **digital and physical experiences of the university should be thought of, and planned for, simultaneously.** "The physical and virtual environment are critical for giving staff and learners confidence in their digital practices. It helps if the people responsible for digital capabilities are closely involved with space design and with IT planning" (UCL in Beetham, 2017, p. 10).

Get the Basics Right: Support Process Improvements and Efficiencies

Because of the anxiety surrounding change (as discussed above), it is important for organizations to "get the basics right." **Core IT systems should facilitate, not impede, the day-to-day work of an organization**. "It's important to address infrastructure as well as people's skills. You can't get people to try stuff if the technology won't actually let them

do it'" (University of Lincoln in Beetham, 2017, p.10).

Few digital strategies speak directly to getting the basics right, but several address this idea using different language. The University of Bergen's digital strategy, for example, calls for a "self-service university administration." "New administrative services shall be user-friendly and designed to be accessible to all where they need them. **Processes shall be automated wherever possible and existing information shall be reused**. Self-service in administrative processes and services shall be pursued wherever this is possible and tenable. The potential for the realisation of quantitative and qualitative benefits shall form the basis of prioritisation" (University of Bergen, 2016, p.11). This is similar to the University of Leicester's proclamation that "simple things should be automated and delivered as quickly as possible" (University of Leicester, 2017, p.5) and not dissimilar to Lancaster University, "which is leading the way with their 'dot.everything' approach, whereby all processes—from student admissions and assessment to requesting travel and managing payroll—are carried out online" (Knight, 2017).

The University of Edinburgh has a significant program of works that runs parallel to, but intertwined with, their Digital Transformation. Called their "Service Excellence Program" it constitutes a series of initiatives to replace or implement core IT systems across the organization for human resources, student administration and support, finance, and student recruitment and admissions. As mentioned by the South East Regional College (SERC) in the 2017 digital capabilities case studies, "the development of reliable, robust, standardised IT systems has many benefits in terms of administrative efficiency, and staff confidence in the systems they need" (Beetham, 2017, p.10). Getting the basics right is an important step towards getting an organization to buy into digital transformation.

As mentioned above with regard to data, **interoperability plays a key role in designing seamless user experiences**. Such experiences require interoperability, flexibility, and modularity from often dissimilar systems. "IT architecture and, in certain cases, the IT organization itself essentially function at two different speeds. The customer-facing technology is modular and flexible enough to move quickly—for instance, to develop and deploy new microservices in days or to give customers dynamic, personalized web pages in seconds. The core IT infrastructure, on the other hand, is designed for the stability and resiliency required to manage transaction and support systems" (June et al., 2015). Keeping the end-user in mind when designing system interactions is important to ensuring the overall integrity of the user experience, but also to fostering the patience needed to work through complicated interaction design.

Balance Basics (Infrastructure) vs. Innovation ("Moon Shots")

At the University of Edinburgh, Digital Transformation is seen as just one of the strands to improve the way the University and its people work. Their Digital Transformation initiative balances work on replacing and upgrading core systems (mentioned above with regard to the Service Excellence program) with a "sprinkling" of innovative projects. Melissa Highton, the Director of Learning, Teaching and Web Services at Edinburgh is clear that one would not happen without the other. "There was considerable technical debt….So many old, home grown systems." She describes the need to balance and intertwine the infrastructure replacement projects ("the basics") with more innovative initiatives. Infrastructure projects "are not sexy, because they are replacement projects. It is challenging to communicate those core infrastructure projects under the name of 'Digital Transformation.'" While the core systems provide basic functionality to improve and facilitate people's day-to-day work, "you have to have a sprinkling of innovation" in order to provide the organization with a sense of progress. "Colleagues need to see something positive to begin to buy-in to change. When MOOCs were new we put a lot of effort into developing a lot of them, which means many people got involved, and enjoyed the new digital ways of learning. And they are very visible. Sometimes it is about seeing new things happening. Inspiring people" (Athenaeum21 interview with Melissa Highton, 2018).

Daniel Greenstein argues that part of the importance of creating a digital strategy is to ensure you prioritize the infrastructure needed to support your goals. "Digital is in service to the goal. An important part of digital transformation is the infrastructure. Without good infrastructure you can't do predictive analytics, you can't do data-driven decision-making. If you are going to move significantly into digital learning, then you need to have the right infrastructure, a coordinated one, in place….Whatever your goals are, they are going to have an impact on your IT infrastructure" (Athenaeum21 interview with Daniel Greenstein, 2018).

A worldwide survey of academic institutions by the International Council for Open and Distance Education also acknowledges the need to balance innovation and "the basics." Their survey indicates that in order to be adopted, "new tools must easily align to the core functions of a higher education provider" and further that "tools that can be more readily added-on to core functions, but do not require wholesale organisational change, are more likely to be used frequently" (Orr, Weller & Farrow, 2018, p.23). While seemingly arguing against innovation, these findings indicate that innovation will be more successful in

designing within the context or the core mission and function of the organization.

Finding that **balance between "the basics" and innovation is an important part of success in digital transformation**. If implemented using appropriate and well-communicated business change procedures, new software or IT systems can facilitate efficiencies and create seamless and positive user experiences for staff, students, and faculty.

Summary

Ultimately, those organizations who have been successful in digital transformation can be characterized as understanding how to:

- **Develop Tech for (and with) End-Users**
- **Get the Basics Right: Support Process Improvements and Efficiencies**
- **Balance Basics (Infrastructure) vs. Innovation ("Moon Shots")**

Characteristics of "Failed" Digital Strategies

Only those who dare to fail greatly, can ever achieve greatly.
Robert F. Kennedy, June 6, 1966

Perhaps due to the sensitivities around "failure" (or, more accurately, the *perceptions and judgments* that something or someone has "failed"), it is as-or-more difficult to find fully transparent examples of "capital 'F'" "Failures" than it is to find examples of "capital 'S'" "Successes." Our research and interviews brought us to some good discussions and examples of both successes and failures of digital *projects or initiatives*, but with the exception of the inBloom case study (see below) few examples of "Failed" *digital strategies*. Arguably, inBloom was not a digital strategy at all, but instead a "moon shot" technology initiative *without* a thoughtful digital strategy, therefore lacking attention to the existing digital literacies, behaviours, workflows, and ecosystems of its intended users and stakeholders, and to the cultures it intended to disrupt. We would argue that a good *digital strategy*, incorporating the considerations described in this report, might have actually *saved* inBloom from its very expensive and public failure.

Perhaps **more common than the "Failed" digital strategy is the dusty, neglected, or altogether abandoned digital strategy** that lacked the leadership, vision and/or commitment to the long journey of digital transformation. Vision and commitment from leadership can result in a well-written digital strategy, but without the cultural or

operational alignment and integration, even a beautifully-crafted strategy will likely fail. Making a digital strategy relevant to the day-to-day lives of the people doing the work of the organization is essential; and breaking the gravitational pull of behavioural and cultural inertia requires far more than offering a "new" technical solution to an existing problem.

Neglect of the Primary Importance of People and Culture

A repeated cause of failure of digital initiatives, and ultimately of some of the digital transformations identified in the literature, is the neglect of the **primary importance of people and culture in the adoption and use of technology**. "Perhaps the most common understanding—that digital transformation is about the implementation and use of cutting-edge technologies—is likely the most misguided. It's not hard to find a company that has implemented a new digital tool or platform just to have it remain unused by employees or unable to deliver the intended transformative impact on the business" (Kane, 2017).

At both the macro scale of *digital transformation*, and at the micro scale of the development of *digital services*, people, culture, leadership and organizational alignment are key factors for success. *Not* addressing the complex factors of people and culture can be the difference between a highly successful digital strategy or digital initiative and a failed one. A digital strategy might have many of the right elements described earlier in this report, but the neglect of even just one element can present immense obstacles to the intended adoption or transformation. In the words of one researcher, it is risky to put "**too much focus on technology rather than willingness to address deep change and rethink how people work**" (McConnell, 2015).

Multiple interviewees identified instances of "failed" rollouts of new technologies at their institutions, and more often than not, it was due to basic human resistance to change. Even the most flawlessly executed technology deployment can become a waste of resources if it is not adopted by the people for whom it is intended.

Lack of Vision

Lack of vision is not entirely uncommon in the higher education technology landscape. We encountered as many, or more, IT plans labelled as "digital strategies" in our research as we encountered substantive, comprehensive digital strategies. Perhaps it is perceived as easier and safer, for institutions lacking resources or confidence in their ability to predict the future, to focus on the more *tangible* aspects of IT projects than to plan for the

emergent social, economic, and technological trends that could influence their business and service models, and possibly even their missions. McConnell (2015) cites one of the major obstacles to digital transformation being the "inability to prove business value of digital through traditional ROI calculations, resulting in lack of senior management sponsorship." Kane urges against this narrow focus on the familiar and the easily quantifiable in favour of a forward-looking vision: "To use a sports analogy, you throw the ball where the receiver is going, not where they are now" (Athenaeum21 interview with Gerald Kane, 2018).

Kane further argues that **leadership needs to commit to the difficult work of thinking and planning for the future because it can actually reduce waste and unnecessary cost**, rather than increasing costs, as leaders may fear. "A great example is autonomous vehicles. Some form will be mainstream within 10 years, so it is silly for Boston to be talking about spending $3 billion on subway extensions, when an autonomous vehicle network is imminent. I would encourage them not to invest in a subway as that will be obsolete by the time it is done" (Athenaeum21 interview with Gerald Kane, 2018). Kane advocates for envisioning 10 years ahead to best enable meaningful digital transformation.

Imbalance Between Infrastructure and Innovation

If avoiding the future is a contributor to failure, another is being overly **seduced by new, alluring, "innovative" technologies without full consideration of the larger contexts of integration, adoption, and use**. A *Harvard Business Review* report on reasons for failed change management initiatives cites being "seduced by the wrong quest." In other words, "the chosen quest misfires because it was not the product of deep deliberation or shared conviction or it fails to address the central issue" (Anand & Barsoux, p. 6). Further, sometimes high-profile investments in new or innovative technologies are made at the expense of maintaining or upgrading infrastructure. That being said, innovation should neither be feared nor avoided. It should, however, be placed firmly within the context of an institution's vision and mission. Without that direction, fear can take over and those in charge of technology can fall back on a "let's just keep the servers running" mentality, devoid of any innovation.

Finding the right balance of focus and investment between infrastructure and innovation follows more easily from a deeply-considered vision that reflects the context of the organization and its internal and external ecosystems. As acknowledged by numerous of the interviewees for this report, prioritization of resources against infrastructure vis-à-vis

innovation will never be easy, but it can be easier. A well-articulated vision can be translated into meaningfully-ranked priorities when resources are being allocated, as is the case with the University of Bergen's technology planning, where potential new initiatives are scored on different aspects, but mainly on their relevance to university strategy and quality in research and education. This provides a way to talk about and evaluate projects in the context of the university mission in addition to the normal economy, risk, and operational needs (Athenaeum21 interview with Tore Burheim, 2018). Conversely, the absence of such vision, more frequently results in the "insufficient funding and competing priorities" that Deloitte UK describes as two of the "most significant barriers impeding [e-government] digital transformation" (2015).

Though commonly characterized by a number of our interviewees as being thought of as "boring" or "un-sexy" to their university's leadership, **IT infrastructure can be viewed as an opportunity and a foundation for more visibly innovative and interesting investments**. When thought of as "getting the basics right," future-looking and thoughtful infrastructure investments can provide a strong foundation for more visible and helpful future innovations. Communicating the value and relevance of "getting the basics right" to accomplishing the "moon shot" appears to be key to organizational commitment.

Lack of Commitment to the Marathon

Another common theme of failed digital initiatives and digital transformations is **unrealistic expectations of the effort, cost, and duration required for success**, which are often followed by a lack of will and commitment, once those expectations are tested. "Where it comes off the rails is where the senior leadership team doesn't believe their own strategy. And they don't have the collective skills, will, and wisdom to pull that off. Staff can sense that lack of commitment, consistency, and clarity, and when they sense it, it leads to complete and utter fail. Conversely, Kotter and Collins and others write about what can happen when leaders consistently and persuasively sell, live, and reinforce the big vision every day" (Athenaeum21 interview with Michael Edson, 2018).

Ultimately, **"failure" comes from unmanaged risk, but can transform itself into learning, with the right people, culture, and structures in place to support it.** Failures *within* a digital strategy, if the organization actively supports risk-taking, continuous learning, agility and adaptiveness, deep collaboration and communication, and data-driven and decentralized decision-making, can actually lead to even greater successes, as was the case with NASA's Apollo program. As noted by psychologist Carol Dweck, "organizations that embody a growth mindset encourage appropriate risk-taking,

knowing that some risks won't work out. They **reward employees for important and useful lessons learned, even if a project does not meet its original goals**" (Dweck, 2016). This realism of both the costs and the value of embracing the future, is essential to the endurance required for the long-term success of digital transformation efforts.

Stalled Decisions and Momentum

As described earlier, having **decentralized decision-making protocols** that enable teams directly involved in digital transformation to maintain momentum is an important factor to success. McConnell (2015) describes the first barrier to digital transformation as being "slow or stalled decision-making caused by internal politics, competing priorities, or attempting to reach consensus." Edson echoes this observation more directly: "One example that I have seen is an organization that wrote a 'big strategy', but there was no one actually available to make decisions. It took months to get a meeting or make a decision" (Athenaeum21 interview with Michael Edson, 2018).

Indeed, bridging agile technology development methods to slower moving, more entrenched decision processes and structures can prove challenging for even the savviest diplomats. The key is to anticipate such conflicts, and pre-empt them with new protocols, as UBC did with software procurement decisions below a certain price point (see above).

McConnell cites "**lack of understanding operational issues at the decision-making level and difficulties when going from theory to practice**" as another major obstacle to digital transformation (2015). This can be true at the basic systems level in complex organizations, but also in modelling complex business and process dependencies. Resources need to be invested in understanding the connections between the systems in order to understand the implications of the changes. There are conceptual models and tools that can assist with bridging such operational and communication gaps or mis-alignments. One such tool is the Benefit Dependency Network, which "seeks to get managers to identify and map all the changes that they will be required to make if expected benefits and outcomes are going to be delivered. It also illustrates very clearly how this change will be enabled and shaped by digital technologies. The resultant network shows how each of the expected benefits will be delivered through a combination of technology and business changes and how these are related to each other" (Peppard, 2016, p. 3).

Summary

To summarize, in our literature review, research, interviews, as well as in our own

experiences and first-hand observations of dozens of organizations, “Failed” digital initiatives and digital transformations suffered from one or more of the following issues:

- **Neglect of the Primary Importance of People and Culture**
- **Lack of Vision**
- **Imbalance Between Infrastructure and Innovation**
- **Lack of Commitment to the Marathon**
- **Stalled Decisions and Momentum**

Conclusion

As noted throughout this report, bold aspirations are key to digital transformation and digital maturity. Boldness comes with inherent risks, of course, but digitally maturing organizations are finding success in mitigating those risks and changing the way they work through:

- Investing in people and culture
- Putting users at the center of their efforts
- Involving users in the collaborative, cross-functional development of new services
- Being agile and adaptive
- Taking risks iteratively and learning along the way
- Scaling up thoughtfully
- Understanding that transformation is a very long journey
- Being data-driven in their decisions
- Establishing clear policies and practices
- Leveraging open standards and supporting interoperability

By getting the basics right, strong digital strategies provide highly relevant guidance to navigate the foreseeable traps of so-called failure. Well-conceived digital strategies can help organizations turn such obstacles into successful and enduring digital transformations.

Case Studies

California State University Channel Islands, Teaching and Learning Innovations

Further Information

https://www.csuci.edu/tli/

About Teaching and Learning Innovations

From their website[1]: "Teaching and Learning Innovations at CSU Channel Islands is a program designed to guide, support and inspire faculty at CI to step outside of traditional boundaries of teaching to improve student learning. We are led by the CI mission to put students at the centre of the educational experience. The following guiding principles are the basis for all of our efforts.

- Cultivate student engagement in learning
- Foster student-student and faculty-student interactions
- Promote human presence in learning experiences"

Why They are of Interest

According to the Executive Director, TLI began with a vague mandate from the university to "do something digital" and followed a long period of change in university leadership. Although central to the digital transformation of CSUCI, the university does not have an explicit digital strategy, but the TLI was established specifically to "prepare faculty to teach in a digital era." The keys to their success appear to be:

- **User-centric approach:** Addressing the digital capabilities of a wide range of faculty via their "untethered approach"[2]
- **Experimentation and iteration**: Providing a safe space for faculty and students to experiment, succeed, and fail via their Faculty Innovations in Teaching Studio[3]
- **User-centric approach:** Mirroring what they are teaching to others (e.g., "practicing what they preach"). For example, teaching "blended learning" skills to faculty via blended learning courses[4]
- **Decentralized authority:** For example, the TLI has authority and responsibility for the Learning Management System (LMS). They were able to lobby for the resources to change their LMS to something they felt would be more useful and familiar to

[1] http://tlinnovations.cikeys.com/about-2/
[2] https://www.edsurge.com/news/2016-10-06-a-step-by-step-guide-to-untethered-faculty-Development
[3] http://tlinnovations.cikeys.com/fit-studio/
[4] http://tlinnovations.cikeys.com/online-learning/

students (from Blackboard to Canvas).

- **User-centric approach:** The LMS transition went seamlessly because they used their "untethered" approach. According to Jill Leafstedt: "We got our tech laggards in the door. We grew the trust with the population of faculty that we weren't reaching before and we were able to double our population served. We untethered our approach. Our faculty program made documentation available online and created videos about Canvas. Self-starters could follow one path. We had hand-holding for others…This was not about teaching faculty Canvas, it was about changing our campus culture."

University of Leicester, Digital Strategy and Digital Innovation Partnerships

Further Information:
Digital Strategy: https://www2.le.ac.uk/institution/digital-campus
Digital Innovation Partnerships: https://www2.le.ac.uk/institution/digital-campus/strategic-priorities/dsc/digital-innovations-partnerships

About Their Digital Strategy
From their website:[5] "Achieving a Digital Campus is one of the key strands of our **Strategic plan**, and we are aiming to put **digital at the heart of what we do** at the University."

About the Digital Innovation Partnerships
From their website:[6] "The Digital Innovation Partnerships (DIP), a Digital Strategy project led by the Leicester [Learning] Institute, is an opportunity for staff and students to digitally enhance learning and teaching. Staff and students jointly identify areas where the use of technology will make a positive contribution and work together to design, implement and evaluate a new or enhanced digital practice within a course."

Why They are of Interest
Two things stand out about the University of Leicester's digital strategy. First, their approach to communicating their digital strategy is comprehensive and culture-focused. As they said in their conversation with Concordia in December 2017, "the change in the culture is hard, because the resources are all invested in deploying the technology. You need to resource adoption, not just deployment." Their Digital Innovation Partnerships

[5] https://www2.le.ac.uk/institution/digital-campus
[6] https://www2.le.ac.uk/institution/digital-campus/strategic-priorities/dsc/Digital-innovations-partnerships

are a good example of this. Staff are provided with resources and a student mentor to help bring technology into their teaching. While Leicester admits (in their conversation with Concordia) that their digital strategy has not yet been entirely successful, they do seem to have made progress through:

- Recognizing that culture change is the biggest roadblock to digital transformation
- Distinguishing between "enabling" technologies that make life and work easier for people (e.g., single sign on) and innovation
- Therefore, resourcing the adoption of technology rather than simply the deployment
- Providing both a "safe space" and a student mentor for faculty to experiment and adopt new technologies for teaching and learning

---

University of Bergen, Learning Management System Rollout

Further Information
ekstern.filer.uib.no/ledelse/digitaliseringsstrategi_2016-22_ENG.pdf

About Their Digital Strategy
The University of Bergen's (UiB) Digital Strategy, Digitalisation that Shapes Society: Strategy 2016-2022,[7] was created as an extension to the University's Strategy, Ocean, Life, Society.[8] According to the Head of IT, Tore Burheim, the digital strategy was created to draw attention and resources to needed digital infrastructure (Athenaeum21 interview with Tore Burheim, 2018). The strategy acknowledges that digital technologies permeate all parts of the university including education, research, communication, innovation and administration. Therefore, their "digitalisation" strategy has five basic components:

1. An Underlying Digitalised Infrastructure
2. User-Oriented Digital Services
3. The Digitally Accommodating University
4. A Self-Service University Administration
5. A Culture of Change and Implementation

Why They are of Interest
UiB's "Self-Service University Administration" is similar in some ways to Concordia's notion of "getting the basics right." The strategy also directly discusses the need for culture

[7] http://ekstern.filer.uib.no/ledelse/digitaliseringsstrategi_2016-22_ENG.pdf
[8] https://www.uib.no/en/strategy

change. Of particular interest, is the attention that UiB has paid to understanding the optimal way of rolling out large, basic infrastructure projects, which they characterize as "adapting the sizes of projects in order to reduce the time it takes to develop new services while also minimizing risks." In our interview with Burheim, he provided the example of rolling out a new Learning Management System (LMS) as an example of adhering to this practice. Firstly, the UiB had a large, bold mandate to "digitalise education." In recognition that thousands of other universities had also implemented LMSes, and that the core of all of those systems are largely the same, they said, "we want to go for open source and we will go for the [most common]. So we took the base system and implement that first." That implementation started with a short pilot and then rolled out across the whole university in just a few months. By starting with a "core" implementation (or "minimum viable product"), they reduced complexity significantly. That implementation was then followed by the release of a mobile app. According to Burheim, the mobile app was not successful when the first version was developed and rolled out. "And if we had made the app part of the main project, then the main project would have been both delayed and damaged, not only on the delivery and technical solution, but also on project management focus. With the app we got a long discussion on integration, functionality and quality and how to do this and that. If we had tried to do that as part of the main project that would have damaged the whole main project." Taking an iterative, modular approach, and separating out pieces of work into discrete components, enabled them to demonstrate progress, celebrate successes, quickly learn from failures, and improve.

This example embodies what Michael Edson speaks about in his presentation and in the Athenaeum21 interview as "think big, start small, and move fast." With a bold goal (digitizing education), UiB was able to achieve significant progress in a relatively short time.

---

inBloom

Based on "The Legacy of inBloom" (2017) by Monica Bulger, Patrick McCormick, and Mikaela Pitcan and the Athenaeum21 interview with Monica Bulger

Further Information
https://datasociety.net/blog/2017/02/02/assessing-legacy-inbloom/

About inBloom
inBloom was envisioned as a private-public partnership to build an educational

technology platform to serve the (extremely fragmented) US primary and secondary school market with an open source platform integrating "a data warehouse, a universal lesson bank, a universal item bank, and a learning trajectory map…It intended to address the challenge of siloed data storage that prevented the interoperability of existing school datasets by introducing shared standards" (Bulger, McCormick & Pitcan, 2017, p.3). The vision was to provide a large-scale education platform that would serve the needs of diverse K-12 systems, freeing up financial resources for other educational needs, and ultimately "organize existing data into meaningful reporting for teachers and school administrators to inform personalized instruction and improve learning outcomes" (Bulger et al., 2017, p.4).

The belief of the leaders of inBloom was that it had to scale fast, due to time restrictions on windows of US federal education funding. It promised early participants "high security and profound changes in data management" in a compressed time frame. Said the former CEO of inBloom, "The belief is that it can't be designed small so we have to go big…Above all, inBloom needed to be an enterprise scale system in order to process the volume of data anticipated across the country from state and district partners with an expectation of continued growth. And…it needed to offer high security at scale on day one, adding to the development complexity. InBloom had also become interdependent with state and district projects and timelines, many driven by federal…funding with strings attached" (Bulger et al., 2017, p.11).

Why They are of Interest

inBloom was a "moon shot," and ticked many of the right boxes of being bold, leveraging open source code, advocating for open data standards, and data-driven learning. It had political support, extensive funding, and technical talent. inBloom ultimately failed, however, at a total cost of $100 million in just 3 short years. Despite having so many of the right elements key to a successful digital strategy, its failure was a result of neglecting the primary importance of people, culture, communication, and iteration. The inBloom project failed to involve key stakeholders and users (namely parents, teachers and school administrators) in the process (much less to view them as collaborators); overlooked the importance of influencing the existing behaviours, workflows, ecosystems, and cultures that they aimed to improve with technology; did not clearly communicate the vision and future benefits to key stakeholders; and scaled too big, too quickly.

Supplemental Case Studies (From Other Sources)

Gates Foundation Postsecondary Success Program

https://postsecondary.gatesfoundation.org/what-were-learning/institutional-snap-shots/
http://postsecondary.gatesfoundation.org/wp-content/uploads/2014/11/McKinsey-Article-Condensed-11.25.14.pdf

These case studies come from more than 100 interviews with higher education experts and leaders in 2013/4 to identify key themes for successful changes in higher education. The result was a series of themes and 10 models of transformational change. The themes:

1. ***institutions must define a differentiated value proposition and be deliberate in the execution against it***
2. ***lack of dramatic reshaping of their institutions***. While almost all colleges and universities are experimenting and tweaking their models, few institutions have radically restructured their postsecondary experience.
3. ***transformation is not easy***; it is a long, challenge-filled process

The interviewed leaders also suggested a set of recommendations to help institutions overcome hurdles they might face during strategic changes, such as:

- engaging stakeholders early and often
- using data to communicate and provide validity
- prioritizing what matters most for the institution and students, among others

The Foundation also produced a series of case studies or "snap shots" that illustrate what they found at particular institutions.

Of particular interest are the study of Georgia State University,[9] , which illustrates excellent use of data for decision-making and Franklin & Marshall College,[10] who implemented a bold theory of change.

Gates also implemented a “framework of issue areas for institutional leaders to consider explicitly and in relationship with each other to ensure they make decisions that best align with their institution’s goals, and help each institution organize and operationalize a value

[9] http://postsecondary.gatesfoundation.org/wp-content/uploads/2015/12/Case-Study-Georgia-State-University.pdf
[10] http://postsecondary.gatesfoundation.org/wp-content/uploads/2014/12/Franklin-Marshall-Snap-Shot-12-15-14.pdf

proposition."

Jisc Digital Capabilities Framework Case Studies

As part of their guide to Developing Organisational Approaches to Digital Capability, Jisc developed a set of case studies. The first six of these cases describe specific examples of use of Jisc's Digital Capability Discovery Tool. The latter 15 cases are describing further education (FE) and higher education (HE) providers' experiences of how they are working to improve their organisational digital capability, support staff and students to develop individual digital capabilities.

We have drawn from these cases in the body of this report, but the full set can be found here: https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability

Arizona State University Making Digital Learning Work Case Studies

From their website:

"Guided by the Action Lab research group at Arizona State University, the Boston Consulting Group conducted deep onsite research of six leading institutions delivering higher education online to determine cost and benefits along three dimensions: access, outcomes, and economics for both students and institutions.

Participating institutions include: Arizona State University, University of Central Florida, Georgia State University, Houston Community College, Kentucky Community and Technical College System, Rio Salado Community College."

Making Digital Learning Work
https://edplus.asu.edu/what-we-do/making-digital-learning-work

Case Studies
https://edplus.asu.edu/sites/default/files/Making%20Digital%20Learning%20Work%C2%A0Appendix%20only.pdf

Digital Strategies and Related Documentation

University of Bergen (UiB)

Digitalisation That Shapes Society: Strategy 2016-2022
http://ekstern.filer.uib.no/ledelse/digitaliseringsstrategi_2016-22_ENG.pdf

From their website: "The DigUiB programme is the University of Bergen's focus on new digital solutions. We develop, test and introduce digital support solutions and useful tools for education and communication"
https://www.uib.no/en/diguib/90193/diguib

SAFE: secure processing of sensitive personal data in research
https://it.uib.no/ithjelp/images/b/b2/SAFE_E_-_For_decision_makers.pdf

California Digital Library (CDL)

Mission, Vision, and Values
https://www.cdlib.org/about/mission.html

Strategic Vision
https://www.cdlib.org/about/docs/cdl_strategic_vision.pdf

Supporting Documents:

- Service Evaluation Checklist [PDF]
- Connect Process [PDF]
- Explore Process and Proposal Form [PDF]
- Evaluation Against External Offerings [PDF]
- Future Trends [PDF]

Lancaster University

Digital Lancaster
http://www.lancaster.ac.uk/iss/digital/

Digital Lancaster Case Studies
http://wp.lancs.ac.uk/digital-case-studies/

Portland State University

University Strategy Plan
https://www.pdx.edu/strategic-plan

Specific Initiatives Around Innovation
https://www.pdx.edu/strategic-plan-innovate-for-long-term-stability

"Moving Past Fear to Innovation" Presentation by Sukhwant Jhaj, Vice Provost for Academic Innovation and Student Success at Portland State University.
https://www.youtube.com/watch?v=MQiux4QhH60

University of Edinburgh

Digital Transformation
https://www.ed.ac.uk/digital-transformation

Service Excellence
https://www.ed.ac.uk/university-secretary-group/service-excellence-programme/projects

University of Edinburgh Learning analytics
https://www.ed.ac.uk/academic-services/projects/learning-analytics-policy

University of Edinburgh Digital skills
https://www.ed.ac.uk/information-services/help-consultancy/is-skills

University of Edinburgh Professional Development for Learning Technologists
https://www.ed.ac.uk/information-services/learning-technology/professional-development/professional-development-for-learning-technologist

University of Edinburgh Video Tools
https://www.ed.ac.uk/information-services/learning-technology/media-hopper-create
https://www.ed.ac.uk/information-services/learning-technology/media-hopper-replay

Tools and Resources

Arizona State University, EdPlus, Making Digital Learning Work
https://edplus.asu.edu/what-we-do/making-digital-learning-work

Checklist for iPASS Predictive Analytics Technology
https://library.educause.edu/resources/2017/4/checklist-for-ipass-predictive-analytics-technology

Crash Course in Media Literacy
https://www.youtube.com/watch?v=AD7N-1Mj-DU

DataCamp
https://www.datacamp.com/

Jim Collins website on strategic planning and change management
https://www.jimcollins.com/

Jisc Digital Discovery Tool
https://digitalcapability.jiscinvolve.org/wp/digital-capability-discovery-tool/

Jisc Student Tracker
https://digitalstudent.jiscinvolve.org/wp/data-service/

John Kotter's 8-Step Process for Leading Change
https://www.kotterinc.com/8-steps-process-for-leading-change/

Open Source Data Science Masters
http://datasciencemasters.org/

A Tool to Map Your Next Digital Initiative [Benefit Dependency Network]
https://hbr.org/2016/06/a-tool-to-map-your-next-digital-initiative

Acronyms

AI	Artificial Intelligence
AR	Augmented Reality
AR/VR	Augmented Reality/Virtual Reality
A/V	Audiovisual
DL	Digital Literacy
ERP	Enterprise Resource Planning
FE	Further Education
GDPR	General Data Protection Regulation
HE	Higher Education
ICT	Information and Communication Technology
IoT	Internet of Things
IT	Information Technology
KPIs	Key Performance Indicators
LMS	Learning Management Systems
MOOC	Massive Open Online Course
VLE	Virtual Learning Environment
VR	Virtual Reality

Bibliography (Reverse Chronological by Publication Date)

*content authored by interviewees for this project

2018

[forthcoming] 2018.08.14 - Gupta, S. Driving Digital Strategy: A Guide to Reimagining Your Business. Retrieved April 9, 2018, from https://hbr.org/product/driving-digital-strategy-a-guide-to-reimagining-your-business/10105-HBK-ENG

*2018.06 - Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D., and Buckley, N. Coming of Age Digitally. MIT Sloan Management Review and Deloitte Insights. Retrieved June 5, 2018 from https://sloanreview.mit.edu/projects/coming-of-age-digitally/?utm_medium=email&utm_source=newsletter&utm_campaign=dlrpt2018

2018.05.28 - Greenstein, D. Personal Interview by Athenaeum21

2018.05.22 - Burheim, T. Personal Interview by Athenaeum21

2018.05.18 - Highton, M. Personal Interview by Athenaeum21

2018.05.15 - Knight, S. Personal Interview by Athenaeum21

2018.05.15 - Hill, F. (Producer). (2018, May 15). The Life Scientific [Audio Podcast]. Retrieved from https://www.bbc.co.uk/programmes/b0b2jdxj

2018.05.14 - Beetham, H. Building capability for new digital leadership, pedagogy and efficiency. Retrieved May 16, 2018, from https://digitalcapability.jiscinvolve.org/wp/

*2018.05.12 - CrashCourse: Media Literacy. Retrieved May 16, 2018, from https://www.youtube.com/watch?v=sPwJ0obJya0&list=PL8dPuuaLjXtM6jSpzb5gMNsx9kdmqBfmY

2018.05.11 - Kane, G.C. Personal Interview by Athenaeum21

2018.05.07 - Leafstedt, J. Personal Interview by Athenaeum21

2018.05.02 - Edson, M. P. Personal Interview by Athenaeum21

2018.05.01 - Bulger, M. Personal Interview by Athenaeum21

2018.05.01 - Canadian AI Ecosystem 2018 (English). Retrieved May 9, 2018, from http://www.jfgagne.ai/canadian-ai-ecosystem-2018-en/

2018.05 - Fleming, O., Fountaine, T., Henke, N., & Saleh, T. Ten red flags signaling your analytics program will fail | McKinsey & Company. Retrieved May 16, 2018, from https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/ten-red-flags-signaling-your-analytics-program-will-fail

2018.04.23 - Heracleous, L., Terrier, D., & Gonzalez, S. The Reinvention of NASA. Retrieved April 26, 2018, from https://hbr.org/2018/04/the-reinvention-of-nasa

2018.04.16 - Uppaluru, M. The U.S. Needs a New Paradigm for Data Governance. Retrieved April 19, 2018, from https://hbr.org/2018/04/the-u-s-needs-a-new-paradigm-for-data-governance

2018.04.08 - Biemiller, L. How to Decide Turf Battles Over Campus Space: Use Data, Not Emotion. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/How-to-Decide-Turf-Battles/243024

2018.04.08 - Blumenstyk, G. Can Artificial Intelligence Make Teaching More Personal? The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Can-Artificial-Intelligence/243023

2018.04.08 - Evans, A. Pros and Cons of Virtual Reality in the Classroom. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/ProsCons-of-Virtual/243016

2018.04.08 - Fredericksen, E. E. Why Your College Needs a VP for Online Learning. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Why-Your-College-Needs-a-VP/243021

2018.04.08 - Gardner, L. How A.I. Is Infiltrating Every Corner of the Campus. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/How-AI-Is-Infiltrating-Every/243022

2018.04.08 - Gilliard, C. How Ed Tech Is Exploiting Students. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/How-Ed-Tech-Is-Exploiting/243020

2018.04.08 - Gose, B. Did You Know You Can Major in Drones? The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Did-You-Know-You-Can-Major-in/243019

2018.04.08 - Kim, E. C. 7 Steps to Better Online Teaching. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/7-Steps-to-Better-Online/243015

2018.04.08 - Loyet, D. What I Learned When My Students Used Google Translate. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/What-I-Learned-When-My/243017

2018.04.08 - Schneider, N. Why Researchers Shouldn't Share All Their Data. The Chronicle of Higher Education. Retrieved

April 16, 2018 from http://0.www.chronicle.com/article/Why-Researchers-Shouldn-t/243018

2018.04.11 - Waibel, Gunter. Message from the Executive Director: California Digital Library. Retrieved April 19, 2018, from https://www.cdlib.org/about/message.html

2018.04.05 - Somers, J. The Scientific Paper Is Obsolete. Here's What's Next. The Atlantic. Retrieved April 19, 2018, from https://www.theatlantic.com/science/archive/2018/04/the-scientific-paper-is-obsolete/556676/

2018.04.04 - Hitchcock, G. Students don't necessarily want more digital – they just want it used better. Retrieved May 16, 2018, from https://publictechnology.net/articles/features/%E2%80%98students-don%E2%80%99t-necessarily-want-more-digital-%E2%80%93-they-just-want-it-used-better%E2%80%99

2018.04 - Allas, T. Transforming a 150-year-old government agency: A CEO story | McKinsey & Company. Retrieved April 9, 2018, from https://www.mckinsey.com/industries/public-sector/our-insights/transforming-a-150-year-old-government-agency-a-ceo-story

2018.04 - D'Emidio, T., & Malfara, D. Build a case, build a following: Laying the groundwork to transform customer experience in government | McKinsey & Company. Retrieved April 9, 2018, from https://www.mckinsey.com/industries/public-sector/our-insights/build-a-case-build-a-following-laying-the-groundwork-to-transform-customer-experience-in-government

2018.04 - Handscomb, C., Jaenicke, A., Kaur, K., Vasquez-McCall, B., & Zaidi, A. How to mess up your agile transformation in seven easy (mis)steps | McKinsey & Company. Retrieved April 19, 2018, from https://www.mckinsey.com/business-functions/organization/our-insights/how-to-mess-up-your-agile-transformation-in-seven-easy-missteps

2018.04 - Orr, D., Weller, M. & Farrow, R. Models for online, open, flexible and technology enhanced higher education across the globe – a comparative analysis. Oslo: International Council for Open and Distance Education

2018.03.05 - Queen's University Digital Planning Project Group. Themes Emerging from Environmental Scan of Digital Strategies in Higher Education. Retrieved April 8, 2018: from http://www.queensu.ca/sites/default/files/assets/pages/strategicframework/QU-DPPG-Environmental-Scan-March-5-2018.pdf

*2018.03.06 - Knight, S. Delivering digital change. Retrieved May 16, 2018, from https://www.jisc.ac.uk/news/delivering-digital-change-06-mar-2018

2018.03 - Bailey, A., Vaduganathan, N., Henry, T., Laverdiere, R, & Pugliese, L. Making Digital Learning Work: Success Strategies from Six Leading Universities and Community Colleges. Retrieved May 26th from https://edplus.asu.edu/sites/default/files/BCG-Making-Digital-Learning-Work-Apr-2018%20.pdf

*2018.02.21 - Bulger, M., & Davison, P. The Promises, Challenges, and Futures of Media Literacy. Retrieved May 16, 2018, from https://datasociety.net/output/the-promises-challenges-and-futures-of-media-literacy/

2018.02.14 - Jisc. Lancaster University: digital fluency for everyone [video]. Retrieved May 16, 2017 from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability/case-studies#

2018.02 - Phipps, L., & Clay, J. Delivering Digital Change: Strategy, Practice and Process. (Senior Leaders' Briefing Paper). Jisc. Retrieved May 24, 2018 from http://repository.jisc.ac.uk/6800/1/Jisc_Digcap_Senior_leaders.PDF

2018 - Aghina, W., Smet, A. D., Lackey, G., Lurie, M., & Murarka, M. The five trademarks of agile organizations | McKinsey & Company. Retrieved from https://www.mckinsey.com/business-functions/organization/our-insights/the-five-trademarks-of-agile-organizations

2018 - Burton, M., Lyon, L., Erdmann, C., & Tijerina, B. Shifting to Data Savvy: The Future of Data Science In Libraries (Monograph). Retrieved from http://d-scholarship.pitt.edu/33891/

2018 - California Digital Library (2018). California Digital Library Strategic Vision. Retrieved April 24, 2018 from https://www.cdlib.org/about/docs/cdl_strategic_vision.pdf

2018 - Canada's AI Corridor is Maturing: The Canadian AI Ecosystem in 2018. Retrieved May 9, 2018, from http://www.jfgagne.ai/blog/the-canadian-ai-ecosystem-in-2018

2018 - Neal, S. Agile Disruption: Global Leadership Forecast 2018. Retrieved April 19, 2018, from https://www.ddiworld.com/glf2018/Agile-Disruption

2017

2017.12.14 - Puthiyamadam, T. What Digital Transformation Really Means. Retrieved April 10, 2018, from https://hbr.org/webinar/2017/12/what-digital-transformation-really-means

2017.12 - Anand, N. & Barsoux, J-L. What Everyone Gets Wrong About Change Management. Retrieved April 11, 2018 from https://hbr.org/2017/11/what-everyone-gets-wrong-about-change-management

2017.12 - Borghi, J., & Lowenberg, D. Prioritizing Researcher Perspectives in Driving Adoption for Research Data Management. Retrieved from

https://www.cni.org/pbs/prioritizing-researcher-perspectives-in-driving-adoption-for-research-data-management

2017.12 - Tijerina, B., & Erdmann, C. Data Science in Libraries: Findings and a Roadmap Forward. Retrieved from https://www.cni.org/topics/digital-curation/data-science-in-libraries-findings-and-a-roadmap-forward

2017.12 - Wilson, L., Davis, C., & Bourne-Tyson, D. Collaboration and Platform Integration in Support of a Federated Research Data Management Service in Canada. Retrieved from https://www.cni.org/pbs/collaboration-and-platform-integration-in-support-of-a-federated-research-data-management-service-in-canada

2017.11.21 - Ismail, N. Top 5 biggest challenges for digital transformation in the NHS. Retrieved April 8, 2018, from http://www.information-age.com/top-5-biggest-challenges-digital-transformation-nhs-123469677/

2017.11 - Chodacki, J., & Dennis, T. Taking the Carpentry Model to Librarians: How to Build a Library Community for Data Intelligence and Better Collaboration Across Institutions. Retrieved from https://www.cni.org/topics/economic-models/taking-the-carpentry-model-to-librarians-how-to-build-a-library-community-for-data-intelligence-and-better-collaboration-across-institutions

*2017.10.01 - Kane, G. C., Palmer, D., Phillips, A. N., & Kiron, D. Achieving Digital Maturity. Retrieved from https://hbr.org/product/achieving-digital-maturity/SMR624-PDF-ENG

2017.12.27 - Henretta, D., & Chopra-McGowan, A. 5 Ways to Help Employees Keep Up with Digital Transformation. Retrieved April 19, 2018, from https://hbr.org/2017/09/5-ways-to-help-employees-keep-up-with-digital-transformation

2017.09.27 - Madden, M. Privacy, Security, and Digital Inequality. Retrieved May 16, 2018, from https://datasociety.net/output/privacy-security-and-digital-inequality/

2017.07.31 - Bughin, J., & Zeebroeck, N. V. 6 Digital Strategies, and Why Some Work Better than Others. Retrieved April 8, 2018, from https://hbr.org/2017/07/6-digital-strategies-and-why-some-work-better-than-others

2017.07.04 - Cañigueral, A. & Sterling, B. Francesca Bria in Barcelona: Building the Networked City From the Ground Up With Citizens, WIRED.com. Retrieved April 26, 2018, from https://www.wired.com/beyond-the-beyond/2017/07/francesca-bria-barcelona/

2017.07 - University of Leicester. Discovery-Enabling Digital: 2016-2020. Retrieved May 25, 2018 from https://www2.le.ac.uk/institution/digital-campus/documents/university-of-leicester-digital-strategy.pdf

*2017.06.29 - Knight, S. How do you create a digital university? The Guardian. Retrieved from http://www.theguardian.com/higher-education-network/2017/jun/29/how-do-you-create-a-digital-university

2017.06.03 - Rogers, C. HE students not equipped for growing digital workplace. Retrieved May 16, 2018, from https://universitybusiness.co.uk/Article/he-students-not-equipped-for-growing-digital-workplace

2017.05.29 - Puthiyamadam, T. How the Meaning of Digital Transformation Has Evolved. Retrieved April 8, 2018, from https://hbr.org/2017/05/how-the-meaning-of-digital-transformation-has-evolved

2017.05.04 - Jisc. Case studies: journeys towards digital capability. Retrieved May 16, 2018, from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability/case-studies

*2017.05.04 - Killen, C., Beetham, H., & Knight, S. Developing organisational approaches to digital capability. Retrieved May 16, 2018, from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability

2017.05.02 - Gavin McLachlan's introduction to Digital Transformation. Retrieved April 19, 2018, from https://www.ed.ac.uk/digital-transformation/about/gavin-mclachlan-introduction

2017.05.01 - Mazzei, M. J., & Noble, D. Big Data Dreams: A Framework for Corporate Strategy. Retrieved April 8, 2018, from https://hbr.org/product/big-data-dreams-a-framework-for-corporate-strategy/BH817-PDF-ENG

2017.05.01 - Lancaster University. Improving Digital Registration Processes for a Better Start to Student Life [video]. Retrieved online from http://wp.lancs.ac.uk/digital-case-studies/registration/

2017.04.18 -Goals of digital transformation. Retrieved April 19, 2018, from https://www.ed.ac.uk/digital-transformation/goals

*2017.04.04 -Kane, G. C. Digital Maturity, Not Digital Transformation. Retrieved April 19, 2018, from https://sloanreview.mit.edu/article/digital-maturity-not-digital-transformation/

2017.04.01 - Ransbotham, S., & Kiron, D. Analytics as a Source of Business Innovation. Retrieved April 8, 2018, from https://hbr.org/product/analytics-as-a-source-of-business-innovation/SMR605-PDF-ENG

2017.03.04 - Haviland, K. (producer) & Fairhead, D. (director). Mission Control: The Unsung Heroes of Apollo [motion picture]. Retrieved May 24 2018 from http://www.netflix.com

2017.03.13 - Tiersky, H. 5 top challenges to digital transformation in the enterprise. Retrieved April 8, 2018, from https://www.cio.com/article/3179607/e-commerce/5-top-challenges-to-digital-transformation-in-the-enterprise.html

2017.03. - Beetham, H. Case studies: journeys towards digital capabilities Lessons learnt, Helen Beetham. Retrieved May 24, 2018, from http://repository.jisc.ac.uk/6643/1/Digicapcasestudies_lessonsfinal.pdf

*2017.02.02 - Bulger, M., McCormick, P., & Pitcan, M. The Legacy of InBloom. Retrieved April 22, 2018 from https://datasociety.net/pubs/ecl/InBloom_feb_2017.pdf

*2017.02.02 - Bulger, M., & McCormick, P. Assessing the Legacy of inBloom. Retrieved May 16, 2018, from

https://datasociety.net/blog/2017/02/02/assessing-legacy-inbloom/

2017.02 - Bughin, J., LaBerge, L., & Mellbye, A. The case for digital reinvention | McKinsey & Company. Retrieved April 19, 2018, from https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-case-for-digital-reinvention

2017.01.27 - Berrone, P., Ricart, J. E., & Carrasco, C. The Open Kimono: Toward a General Framework for Open Data Initiatives in Cities. Retrieved April 8, 2018, from https://hbr.org/product/the-open-kimono-toward-a-general-framework-for-open-data-initiatives-in-cities/CMR635-PDF-ENG

2017.01.25 - Bonchek, M. A Good Digital Strategy Creates a Gravitational Pull. Retrieved April 8, 2018, from https://hbr.org/2017/01/a-good-digital-strategy-creates-a-gravitational-pull

*2017.01.17 - Greenstein, D. Three things to consider about increasing access to higher education (essay) | Inside Higher Ed. Retrieved May 27, 2018, from https://www.insidehighered.com/views/2017/01/17/three-things-consider-about-increasing-access-higher-education-essay

*2017 - Bulger, M. Student Privacy, Equity, and Digital Literacy Newsletter (formerly This Week in Student Privacy). Retrieved May 16, 2018, from http://tinyletter.com/spi/archive

2017 - Digital Learning Framework for Schools. Retrieved April 26, 2018, from https://www.education.ie/en/Schools-Colleges/Information/Information-Communications-Technology-ICT-in-Schools/DLF.html

2017 - Digital Strategy for Schools 2015-2020. Retrieved April 26, 2018, from https://www.education.ie/en/Schools-Colleges/Information/Information-Communications-Technology-ICT-in-Schools/Digital-Strategy-for-Schools/Digital Strategy Information.html

2017 - Fairhead, D. Mission Control: The Unsung Heroes of Apollo (2017). Retrieved from http://www.imdb.com/title/tt5959952/releaseinfo

2017 - NMC Horizon Report > 2017 Higher Education Edition. Retrieved April 8, 2018, from https://www.nmc.org/publication/nmc-horizon-report-2017-higher-education-edition/

2016

*2016.12.15 - Leafstedt, J. & Pacansky-Brock, M Faculty Development in the Age of Digital, Connected Learning - EdSurge News. Retrieved May 9, 2018, from https://www.edsurge.com/news/2016-12-15-faculty-development-in-the-age-of-digital-connected-learning

*2016.12.06 - Kane, G. C. Your Digital Talent Needs May Not Be What You Think They Are. Retrieved May 10, 2018, from https://sloanreview.mit.edu/article/your-digital-talent-needs-may-not-be-what-you-think-they-are/

2016.12.02 - Kapoor, R., & Klueter, T. Organizing for New Technologies. Retrieved May 9, 2018, from https://sloanreview.mit.edu/article/organizing-for-new-technologies/

2016.11.25 - Dunleavy, P. Public Sector Productivity - Measurement Challenges, Performance Information and Prospects for Improvement.

2016.11.11 Edgington, K. Data is helping government expect the unexpected. Retrieved May 16, 2018, from https://www.openaccessgovernment.org/data-government-andy-beale-web-summit/29885/

2016.10.28 - Kaganer, E., Gregory, R. W., & Codrean, C. Driving Digital Transformation at the DBS Bank. Retrieved April 8, 2018, from https://hbr.org/product/driving-digital-transformation-at-the-dbs-bank/IES639-PDF-ENG

*2016.10.06 - Leafstedt, J. & Pacansky-Brock, M. A Step-by-Step Guide to "Untethered" Faculty Development - EdSurge News. Retrieved May 9, 2018, from https://www.edsurge.com/news/2016-10-06-a-step-by-step-guide-to-untethered-faculty-development

2016.08.29 - Felin, T., & Powell, T. C. Designing Organizations for Dynamic Capabilities. Retrieved April 8, 2018, from https://hbr.org/product/designing-organizations-for-dynamic-capabilities/CMR629-PDF-ENG

2016.08 - Jisc. #FELTAG Soundbites. Retrieved May 16, 2018, from https://www.youtube.com/watch?v=VJoAt2BVmfs&list=PL1riPvLbxfYHQzBKFen2S66TE24jcvuVe

*2016.07.26 - Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. Aligning the Organization for Its Digital Future. Retrieved May 11, 2018, from https://sloanreview.mit.edu/projects/aligning-for-digital-future/

2016.07.14 - Libert, B., Beck, M., & Wind, Y. 7 Questions to Ask Before Your Next Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/2016/07/7-questions-to-ask-before-your-next-digital-transformation

2016.06.13 - Caddick, A. MPs warn the UK is heading towards a digital skills crisis. Retrieved May 16, 2018, from https://www.openaccessgovernment.org/mps-warn-uk-heading-towards-digital-skills-crisis/26757/

*2016.06.09 - Smith, R., McKean, P., & Knight, S. The evolution of FELTAG: a glimpse at effective practice in UK further education and skills | Jisc. Retrieved May 16, 2018, from https://www.jisc.ac.uk/reports/the-evolution-of-feltag

2016.06.03 - Peppard, J. A Tool to Map Your Next Digital Initiative. Retrieved April 9, 2018, from https://hbr.org/2016/06/a-tool-to-map-your-next-digital-initiative

2016.05.11 - Pucciarelli, F., & Kaplan, A. M. Competition and Strategy in Higher Education: Managing Complexity and Uncertainty. Retrieved April 8, 2018, from https://hbr.org/product/competition-and-strategy-in-higher-education-managing-complexity-and-uncertainty/BH740-PDF-ENG

2016.04.12 - Evans, M., Dunleavy, P., & McGregor, C. "Connecting Government" in Australia: towards digital-era governance?

2016.03.04 - Bill and Melinda Gates Foundation. Institutional Snapshots. Retrieved May 16, 2018, from https://postsecondary.gatesfoundation.org/what-were-learning/institutional-snap-shots/

*2016.02.29 - Edson, M.P. Innovation Salon 03: Think Big, Start Small, Move Fast. Retrieved from https://vimeo.com/157210947

2016.02.05 - Samuel, A. The Soft Skills of Great Digital Organizations. Retrieved April 9, 2018, from https://hbr.org/2016/02/the-soft-skills-of-great-digital-organizations

2016.01.13 - Dweck, C. What Having a "Growth Mindset" Actually Means. Retrieved May 24, 2018, from https://hbr.org/2016/01/what-having-a-growth-mindset-actually-means

2016 - University of Bergen. Digitalisation that Shapes Society: Strategy 2016-2022. Retrieved April 21, 2018 from http://ekstern.filer.uib.no/ledelse/digitaliseringsstrategi_2016-22_ENG.pdf

n.d.-2015

2015.09.30 - Bouée, C.-E. Digital Transformation Doesn't Have to Leave Employees Behind. Retrieved April 9, 2018, from https://hbr.org/2015/09/digital-transformation-doesnt-have-to-leave-employees-behind

2015.08.28 - McConnell, J. The Company Cultures That Help (or Hinder) Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/2015/08/the-company-cultures-that-help-or-hinder-digital-transformation

2015.06 - Catlin, T., Scanlan, J., & Willmott, P. Raising your Digital Quotient | McKinsey & Company. Retrieved April 19, 2018, from https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/raising-your-digital-quotient

2015.12.15 - Nylen, D., & Holmstrom, J. Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. Retrieved April 8, 2018, from https://hbr.org/product/recommended/an/BH648-PDF-ENG?referral=02527&cm_vc=rr_item_page.articles

2015 - Deloitte UK The Ascent of Digital: Understanding the public sector's digital evolution. Retrieved April 9, 2018, from https://www2.deloitte.com/uk/en/pages/public-sector/articles/the-ascent-of-digital.html

2014.07.20 - Haughwout, J. (2014 July 20). On the 45th anniversary of the moon landing: 5 lessons the Apollo's program manager taught me at MIT [blog post]. Retrieved May 25, 2018 from http://lagrangianpoints.com/2014/07/45th-anniversary-moon-landing-5-lessons-apollos-program-manager-taught-mit/

2014.07.14 - Herold, B. Khan Academy To Be Subject of Ed. Department Evaluation. Retrieved May 16, 2018, from http://blogs.edweek.org/edweek/DigitalEducation/2014/07/khan_academy_to_be_subject_of_.html?cmp=SOC-SHR-FB

2014.09 - Teisseyre, N., Bioulac, A., & Gautier, D. The digital journey, an opportunity for France: Leapfrogging to Transformation. Retrieved May 10, 2018, from https://www.rolandberger.com/de/Publications/pub_the_digital_journey_an_opportunity_for_france.html

2014 - Bill and Melinda Gates Foundation. Higher Education Transformation: Perspectives from the Field. Retrieved from http://postsecondary.gatesfoundation.org/wp-content/uploads/2014/11/McKinsey-Article-Condensed-11.25.14.pdf

2014 - van Deursen, A. J. A. M., Helsper, E., & Eynon, R. Measuring digital skills: from digital skills to tangible outcomes [Monograph]. Retrieved May 16, 2018, from http://www.oii.ox.ac.uk/

*2013.12.16 - Greenstein, D. Essay arguing that major changes are coming to higher education | Inside Higher Ed. Retrieved May 27, 2018, from https://www.insidehighered.com/views/2013/12/16/essay-arguing-major-changes-are-coming-higher-education

2013.11.13 - Evans, L. Digital Services Framework opens its doors. Retrieved May 16, 2018, from https://www.openaccessgovernment.org/digital-services-framework-opens-its-doors/1225/

2013.02.25 - Dunleavy, P., Carrera, L. The rise of a robot state? New frontiers for growing the productivity of government services. Retrieved April 8, 2018, from http://blogs.lse.ac.uk/politicsandpolicy/the-rise-of-a-robot-state-new-frontiers-for-growing-the-productivity-of-government-services/

*2013 - Livingstone, S., & Bulger, M. A Global Agenda for Children's Rights in the Digital Age: Recommendations for developing UNICEF's research strategy. Retrieved May 16, 2018, from https://www.unicef-irc.org/publications/702-a-global-agenda-for-childrens-rights-in-the-digital-age-recommendations-for-developing.html

2012.11.19 - McDonald, M. P. Digital Strategy Does Not Equal IT Strategy. Retrieved April 8, 2018, from https://hbr.org/2012/11/digital-strategy-does-not-equa

2011 - Khan, S. Let's use video to reinvent education. Retrieved from https://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education

1995 - Kotter, J.P. Leading Change: Why Transformational Efforts Fail. Retrieved May 26, 2018 from: https://hbr.org/1995/05/leading-change-why-transformation-efforts-fail-2

1966 - Kennedy, J. F. Day of Affirmation Address, University of Cape Town, South Africa. Retrieved from https://www.jfklibrary.org/Research/Research-Aids/Ready-Reference/RFK-Speeches/Day-of-Affirmation-Address-as-delivered.aspx

n.d. - Data for Democracy. Code of Ethics for Data Scientists. Retrieved May 16, 2018, from http://datafordemocracy.org/projects/ethics.html

n.d. - Digital discovery tool | Jisc Building Digital Capability Blog. Retrieved May 15, 2018, from https://digitalcapability.jiscinvolve.org/wp/digital-capability-discovery-tool/

n.d. - Jisc. Lancaster University: Digital Fluency for Everyone. Retrieved May 26, 2018 from http://repository.jisc.ac.uk/6639/1/DigicapLancasterUniversity.pdf

n.d. - Strategy. In Oxford English Living Dictionaries Online. Retrieved May 25, 2018 from https://en.oxforddictionaries.com/definition/strategy

n.d. - University of Bergen IT-department. SAFE for decision makers. Retrieved from https://it.uib.no/ithjelp/images/b/b2/SAFE_E_-_For_decision_makers.pdf

n.d. - University of Leicester. Digital Leadership Development. Retrieved May 28, 2018 from https://www2.le.ac.uk/institution/digital-campus/strategic-priorities/dsc/leadership-development

n.d.- University of Leicester. University Digital Strategy: Building the Digital Campus. Retrieved May 28, 2018 from https://www2.le.ac.uk/institution/digital-campus

n.d. - University of Oxford. Digital strategy | University of Oxford. Retrieved April 10, 2018, from https://www.ox.ac.uk/about/organisation/digital-strategy?wssl=1

Bibliography (Alphabetical by Author Name)

*content authored by interviewees for this project

Aghina, W., Smet, A. D., Lackey, G., Lurie, M., & Murarka, M. (2018). The five trademarks of agile organizations | McKinsey & Company. Retrieved from https://www.mckinsey.com/business-functions/organization/our-insights/the-five-trademarks-of-agile-organizations

Allas, T. (2018, April). Transforming a 150-year-old government agency: A CEO story | McKinsey & Company. Retrieved April 9, 2018, from https://www.mckinsey.com/industries/public-sector/our-insights/transforming-a-150-year-old-government-agency-a-ceo-story

Andriole, S. J. (2017, April 1). Five Myths About Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/product/five-myths-about-digital-transformation/SMR601-PDF-ENG

Avery, J. (2014, April 7). The Tate's Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/product/the-tate-s-digital-transformation/314122-PDF-ENG

Bailey, A., Vaduganathan, N., Henry, T., Laverdiere, R, & Pugliese, L. (2018, March) Making Digital Learning Work: Success Strategies from Six Leading Universities and Community Colleges. Retrieved May 26th from https://edplus.asu.edu/sites/default/files/BCG-Making-Digital-Learning-Work-Apr-2018%20.pdf

Beetham, H. (2017, March). Case studies: journeys towards digital capabilities Lessons learnt, Helen Beetham. Retrieved May 24, 2018, from http://repository.jisc.ac.uk/6643/1/Digicapcasestudies_lessonsfinal.pdf

Beetham, H. (2018, May 14). Building capability for new digital leadership, pedagogy and efficiency. Retrieved May 16, 2018, from https://digitalcapability.jiscinvolve.org/wp/

Berrone, P., Ricart, J. E., & Carrasco, C. (2017, January 27). The Open Kimono: Toward a General Framework for Open Data Initiatives in Cities. Retrieved April 8, 2018, from https://hbr.org/product/the-open-kimono-toward-a-general-framework-for-open-data-initiatives-in-cities/CMR635-PDF-ENG

Biemiller, L. (2018, April 8). How to Decide Turf Battles Over Campus Space: Use Data, Not Emotion. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/How-to-Decide-Turf-Battles/243024

Bill and Melinda Gates Foundation. (2014). Higher Education Transformation: Perspectives from the Field. Retrieved from http://postsecondary.gatesfoundation.org/wp-content/uploads/2014/11/McKinsey-Article-Condensed-11.25.14.pdf

Bill and Melinda Gates Foundation. (2016, March 4). Institutional Snapshots. Retrieved May 16, 2018, from https://postsecondary.gatesfoundation.org/what-were-learning/institutional-snap-shots/

Blumenstyk, G. (2018, April 8). Can Artificial Intelligence Make Teaching More Personal? The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Can-Artificial-Intelligence/243023

Bonchek, M. (2017, January 25). A Good Digital Strategy Creates a Gravitational Pull. Retrieved April 8, 2018, from https://hbr.org/2017/01/a-good-digital-strategy-creates-a-gravitational-pull

Borghi, J., & Lowenberg, D. (2017, December). Prioritizing Researcher Perspectives in Driving Adoption for Research Data Management. Retrieved from https://www.cni.org/pbs/prioritizing-researcher-perspectives-in-driving-adoption-for-research-data-management

Bouée, C.-E. (2015, September 30). Digital Transformation Doesn't Have to Leave Employees Behind. Retrieved April 9, 2018, from https://hbr.org/2015/09/digital-transformation-doesnt-have-to-leave-employees-behind

Bughin, J., LaBerge, L., & Mellbye, A. (2017, February). The case for digital reinvention | McKinsey & Company. Retrieved April 19, 2018, from https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-case-for-digital-reinvention

Bughin, J., & Zeebroeck, N. V. (2017, July 31). 6 Digital Strategies, and Why Some Work Better than Others. Retrieved April 8, 2018, from https://hbr.org/2017/07/6-digital-strategies-and-why-some-work-better-than-others

*Bulger, M. (2017). Student Privacy, Equity, and Digital Literacy Newsletter (formerly This Week in Student Privacy). Retrieved May 16, 2018, from http://tinyletter.com/spi/archive

*Bulger, M., & Davison, P. (2018, February 21). The Promises, Challenges, and Futures of Media Literacy. Retrieved May 16, 2018, from https://datasociety.net/output/the-promises-challenges-and-futures-of-media-literacy/

*Bulger, M., & McCormick, P. (2017, February 2). Assessing the Legacy of inBloom. Retrieved May 16, 2018, from https://datasociety.net/blog/2017/02/02/assessing-legacy-inbloom/

Bulger, M. (2018, May 1). Personal Interview by Athenaeum21

Burheim, T. (2018, May 23). Personal Interview by Athenaeum21

Burton, M., Lyon, L., Erdmann, C., & Tijerina, B. (2018). Shifting to Data Savvy: The Future of Data Science In Libraries (Monograph). Retrieved from http://d-scholarship.pitt.edu/33891/

Caddick, A. (2016, June 13). MPs warn the UK is heading towards a digital skills crisis. Retrieved May 16, 2018, from https://www.openaccessgovernment.org/mps-warn-uk-heading-towards-digital-skills-crisis/26757/

California Digital Library (2018). California Digital Library Strategic Vision. Retrieved April 24, 2018 from https://www.cdlib.org/about/docs/cdl_strategic_vision.pdf

Canada's AI Corridor is Maturing: The Canadian AI Ecosystem in 2018. (2018). Retrieved May 9, 2018, from http://www.jfgagne.ai/blog/the-canadian-ai-ecosystem-in-2018

Canadian AI Ecosystem 2018 (English). (2018, May 1). Retrieved May 9, 2018, from http://www.jfgagne.ai/canadian-ai-ecosystem-2018-en/

Catlin, T., Scanlan, J., & Willmott, P. (2015, June). Raising your Digital Quotient | McKinsey & Company. Retrieved April 19, 2018, from https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/raising-your-digital-quotient

Chodacki, J., & Dennis, T. (2017, November). Taking the Carpentry Model to Librarians: How to Build a Library Community for Data Intelligence and Better Collaboration Across Institutions. Retrieved from https://www.cni.org/topics/economic-models/taking-the-carpentry-model-to-librarians-how-to-build-a-library-community-for-data-intelligence-and-better-collaboration-across-institutions

*CrashCourse: Media Literacy. (2018, May 12). Retrieved May 16, 2018, from https://www.youtube.com/watch?v=sPwJ0obJya0&list=PL8dPuuaLjXtM6jSpzb5gMNsx9kdmqBfmY

Data for Democracy. (n.d.). Code of Ethics for Data Scientists. Retrieved May 16, 2018, from http://datafordemocracy.org/projects/ethics.html

D'Emidio, T., & Malfara, D. (2018, April). Build a case, build a following: Laying the groundwork to transform customer experience in government | McKinsey & Company. Retrieved April 9, 2018, from https://www.mckinsey.com/industries/public-sector/our-insights/build-a-case-build-a-following-laying-the-groundwork-to-transform-customer-experience-in-government

Digital discovery tool | Jisc Building Digital Capability Blog. (n.d.). Retrieved May 15, 2018, from https://digitalcapability.jiscinvolve.org/wp/digital-capability-discovery-tool/

Digital Learning Framework for Schools. (2017). Retrieved April 26, 2018, from

https://www.education.ie/en/Schools-Colleges/Information/Information-Communications-Technology-ICT-in-Schools/DLF.html

Digital Strategy for Schools 2015-2020. (2017). Retrieved April 26, 2018, from https://www.education.ie/en/Schools-Colleges/Information/Information-Communications-Technology-ICT-in-Schools/Digital-Strategy-for-Schools/Digital Strategy Information.html

Dunleavy, P. (2016). Public Sector Productivity - Measurement Challenges, Performance Information and Prospects for Improvement.

Dunleavy, P., & Carrera, Leandro. (2013, February 25). The rise of a robot state? New frontiers for growing the productivity of government services. Retrieved April 8, 2018, from http://blogs.lse.ac.uk/politicsandpolicy/the-rise-of-a-robot-state-new-frontiers-for-growing-the-productivity-of-government-services/

Dweck, C. (2016, January 13). What Having a "Growth Mindset" Actually Means. Retrieved May 27, 2018, from https://hbr.org/2016/01/what-having-a-growth-mindset-actually-means

Eaves, D., & Goldberg, D. (2017, August 22). UK Government Digital Service: Moving Beyond a Website. Retrieved April 8, 2018, from https://hbr.org/product/uk-government-digital-service-moving-beyond-a-website/KS1241-PDF-ENG

Edgington, K. (2016, November 11). Data is helping government expect the unexpected. Retrieved May 16, 2018, from https://www.openaccessgovernment.org/data-government-andy-beale-web-summit/29885/

Edson, M. P. (2018, May 2). Personal Interview by Athenaeum21

Eisenmann, T. R., & Herman, K. (2016, December 14). HBS in 2016. Retrieved April 8, 2018, from https://hbr.org/product/hbs-in-2016/817062-PDF-ENG

Evans, A. (2018, April 8). Pros and Cons of Virtual Reality in the Classroom. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/ProsCons-of-Virtual/243016

Evans, L. (2013, November 13). Digital Services Framework opens its doors. Retrieved May 16, 2018, from https://www.openaccessgovernment.org/digital-services-framework-opens-its-doors/1225/

Evans, M., Dunleavy, P., & McGregor, C. (2016). "Connecting Government" in Australia: towards digital-era governance?

Faculty Development in the Age of Digital, Connected Learning - EdSurge News. (2016, December 15). Retrieved May 9, 2018, from https://www.edsurge.com/news/2016-12-15-faculty-development-in-the-age-of-digital-connected-learning

Fairhead, D. (2017). Mission Control: The Unsung Heroes of Apollo (2017). Retrieved from http://www.imdb.com/title/tt5959952/releaseinfo

Felin, T., & Powell, T. C. (2016, August 29). Designing Organizations for Dynamic Capabilities. Retrieved April 8, 2018, from https://hbr.org/product/designing-organizations-for-dynamic-capabilities/CMR629-PDF-ENG

Fleming, O., Fountaine, T., Henke, N., & Saleh, T. (2018, May). Ten red flags signaling your analytics program will fail | McKinsey & Company. Retrieved May 16, 2018, from https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/ten-red-flags-signaling-your-analytics-program-will-fail

Francesca Bria in Barcelona | WIRED. (2017, July 4). Retrieved April 26, 2018, from https://www.wired.com/beyond-the-beyond/2017/07/francesca-bria-barcelona/

Fredericksen, E. E. (2018, April 8). Why Your College Needs a VP for Online Learning. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Why-Your-College-Needs-a-VP/243021

Gardner, L. (2018, April 8). How A.I. Is Infiltrating Every Corner of the Campus. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/How-AI-Is-Infiltrating-Every/243022

Gavin McLachlan's introduction to Digital Transformation. (2017, May 2). Retrieved April 19, 2018, from https://www.ed.ac.uk/digital-transformation/about/gavin-mclachlan-introduction

Gilliard, C. (2018, April 8). How Ed Tech Is Exploiting Students. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/How-Ed-Tech-Is-Exploiting/243020

Goals of digital transformation. (2017, April 18). Retrieved April 19, 2018, from https://www.ed.ac.uk/digital-transformation/goals

Gose, B. (2018, April 8). Did You Know You Can Major in Drones? The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Did-You-Know-You-Can-Major-in/243019

*Greenstein, D. (2013, December 16). Essay arguing that major changes are coming to higher education | Inside Higher Ed. Retrieved May 27, 2018, from https://www.insidehighered.com/views/2013/12/16/essay-arguing-major-changes-are-coming-higher-education

*Greenstein, D. (2017, January 17). Three things to consider about increasing access to higher education (essay) | Inside Higher Ed. Retrieved May 27, 2018, from https://www.insidehighered.com/views/2017/01/17/three-things-consider-about-increasing-access-higher-education-essay

Greenstein, D. (2018, May 28). Personal Interview by Athenaeum21

Gupta, S. (2018, August 14). Driving Digital Strategy: A Guide to Reimagining Your Business. Retrieved April 9, 2018, from https://hbr.org/product/driving-digital-strategy-a-guide-to-reimagining-your-business/10105-HBK-ENG

Handscomb, C., Jaenicke, A., Kaur, K., Vasquez-McCall, B., & Zaidi, A. (2018, April). How to mess up your agile transformation in seven easy (mis)steps | McKinsey & Company. Retrieved April 19, 2018, from https://www.mckinsey.com/business-functions/organization/our-insights/how-to-mess-up-your-agile-transformation-in-seven-easy-missteps

Haughwout, J. (2014 July 20). On the 45th anniversary of the moon landing: 5 lessons the Apollo's program manager taught me at MIT [blog post]. Retrieved May 25, 2018 from http://lagrangianpoints.com/2014/07/45th-anniversary-moon-landing-5-lessons-apollos-program-manager-taught-mit/

Haviland, K. (producer) & Fairhead, D. (director). Mission Control: The Unsung Heroes of Apollo [motion picture]. Retrieved May 24 2018 from http://www.netflix.com

Henretta, D., & Chopra-McGowan, A. (2017, September 27). 5 Ways to Help Employees Keep Up with Digital Transformation. Retrieved April 19, 2018, from https://hbr.org/2017/09/5-ways-to-help-employees-keep-up-with-digital-transformation

Heracleous, L., Terrier, D., & Gonzalez, S. (2018, April 23). The Reinvention of NASA. Retrieved April 26, 2018, from https://hbr.org/2018/04/the-reinvention-of-nasa

Herold, B. (2014, July 14). Khan Academy To Be Subject of Ed. Department Evaluation. Retrieved May 16, 2018, from http://blogs.edweek.org/edweek/DigitalEducation/2014/07/khan_academy_to_be_subject_of_.html?cmp=SOC-SHR-F

Hill, F. (Producer). (2018, May 15). The Life Scientific [Audio Podcast]. Retrieved from https://www.bbc.co.uk/programmes/b0b2jdxj

Hitchcock, G. (2018, April 4). Students don't necessarily want more digital – they just want it used better. Retrieved May 16, 2018, from https://publictechnology.net/articles/features/%E2%80%98students-don%E2%80%99t-necessarily-want-more-digital-%E2%80%93-they-just-want-it-used-better%E2%80%99

Highton, M. (2018, May 18). Personal Interview by Athenaeum21

Institutional Snapshots. (2016, March 4). Retrieved May 16, 2018, from https://postsecondary.gatesfoundation.org/what-were-learning/institutional-snap-shots/

Jisc. (2016, August). #FELTAG Soundbites. Retrieved May 16, 2018, from https://www.youtube.com/watch?v=VJoAt2BVmfs&list=PL1riPvLbxfYHQzBKFen2S66TE24jcvuVe

Jisc. (2017, May 4). Case studies: journeys towards digital capability. Retrieved May 16, 2018, from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability/case-studies

Jisc. (n.d.) Lancaster University: Digital Fluency for Everyone. Retrieved May 26, 2018 from http://repository.jisc.ac.uk/6639/1/DigicapLancasterUniversity.pdf

Jisc. Lancaster University: digital fluency for everyone [video]. Retrieved May 16, 2017 from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability/case-studies#

Kaganer, E., Gregory, R. W., & Codrean, C. (2016, October 28). Driving Digital Transformation at the DBS Bank. Retrieved April 8, 2018, from https://hbr.org/product/driving-digital-transformation-at-the-dbs-bank/IES639-PDF-ENG

*Kane, G. C. (2016, December 6). Your Digital Talent Needs May Not Be What You Think They Are. Retrieved May 10, 2018, from https://sloanreview.mit.edu/article/your-digital-talent-needs-may-not-be-what-you-think-they-are/

*Kane, G. C. (2017, April 4). Digital Maturity, Not Digital Transformation. Retrieved April 19, 2018, from https://sloanreview.mit.edu/article/digital-maturity-not-digital-transformation/

*Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2016, July 26). Aligning the Organization for Its Digital Future. Retrieved May 11, 2018, from https://sloanreview.mit.edu/projects/aligning-for-digital-future/

*Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2017). Achieving Digital Maturity. Retrieved from https://hbr.org/product/achieving-digital-maturity/SMR624-PDF-ENG

*Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D., & Buckley, N. (2018, June). Coming of Age Digitally. MIT Sloan Management Review and Deloitte Insights. Retrieved June 5, 2018 from https://sloanreview.mit.edu/projects/coming-of-age-digitally/?utm_medium=email&utm_source=newsletter&utm_campaign=dlrpt2018

*Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (n.d.). Strategy, not Technology, Drives Digital Transformation. Retrieved from https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/

Kane, G.C. (2018, May 11). Personal Interview by Athenaeum21

Kapoor, R., & Klueter, T. (2016, December 2). Organizing for New Technologies. Retrieved May 9, 2018, from https://sloanreview.mit.edu/article/organizing-for-new-technologies/

Kennedy, J. F. (1966). Day of Affirmation Address, University of Cape Town, South Africa. Retrieved from https://www.jfklibrary.org/Research/Research-Aids/Ready-Reference/RFK-Speeches/Day-of-Affirmation-Address-as-delivered.aspx

Khan, S. (2011). Let's use video to reinvent education. Retrieved from

https://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education

Killen, C., Beetham, H., & Knight, S. (2017, May 4). Developing organisational approaches to digital capability. Retrieved May 16, 2018, from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability

Kim, E. C. (2018, April 8). 7 Steps to Better Online Teaching. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/7-Steps-to-Better-Online/243015

Kiron, D. (2017, October 1). Why Your Company Needs More Collaboration. Retrieved April 9, 2018, from https://hbr.org/product/why-your-company-needs-more-collaboration/SMR622-PDF-ENG

*Knight, S. (2017, June 29). How do you create a digital university? The Guardian. Retrieved from http://www.theguardian.com/higher-education-network/2017/jun/29/how-do-you-create-a-digital-university

*Knight, S. (2018, March 6). Delivering digital change. Retrieved May 16, 2018, from https://www.jisc.ac.uk/news/delivering-digital-change-06-mar-2018

Knight, S. (2018, May 15). Personal Interview by Athenaeum21

Kotter, J.P. (1996, May-June). Leading Change: Why Transformational Efforts Fail. Retrieved May 26, 2018 from: https://hbr.org/1995/05/leading-change-why-transformation-efforts-fail-2

Lancaster University. (2017, May 1) Improving Digital Registration Processes for a Better Start to Student Life [video]. Retrieved online from http://wp.lancs.ac.uk/digital-case-studies/registration/

*Leafstedt, J. & Pacansky-Brock, M. (2016, October 6). A Step-by-Step Guide to "Untethered" Faculty Development - EdSurge News. (2016, October 6). Retrieved May 9, 2018, from https://www.edsurge.com/news/2016-10-06-a-step-by-step-guide-to-untethered-faculty-development

Leafstedt, J. (2018, May 7). Personal Interview by Athenaeum21

Libert, B., Beck, M., & Wind, Y. (Jerry). (2016, July 14). 7 Questions to Ask Before Your Next Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/2016/07/7-questions-to-ask-before-your-next-digital-transformation

Livingstone, S., & Bulger, M. (2013). A Global Agenda for Children's Rights in the Digital Age: Recommendations for developing UNICEF's research strategy. Retrieved May 16, 2018, from https://www.unicef-irc.org/publications/702-a-global-agenda-for-childrens-rights-in-the-digital-age-recommendations-for-developing.html

Loyet, D. (2018, April 8). What I Learned When My Students Used Google Translate. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/What-I-Learned-When-My/243017

Madden, M. (2017, September 27). Privacy, Security, and Digital Inequality. Retrieved May 16, 2018, from https://datasociety.net/output/privacy-security-and-digital-inequality/

Mazzei, M. J., & Noble, D. (2017, May 1). Big Data Dreams: A Framework for Corporate Strategy. Retrieved April 8, 2018, from https://hbr.org/product/big-data-dreams-a-framework-for-corporate-strategy/BH817-PDF-ENG

McConnell, J. (2015, August 28). The Company Cultures That Help (or Hinder) Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/2015/08/the-company-cultures-that-help-or-hinder-digital-transformation

McDonald, M. P. (2012, November 19). Digital Strategy Does Not Equal IT Strategy. Retrieved April 8, 2018, from https://hbr.org/2012/11/digital-strategy-does-not-equa

Neal, S. (2018). Agile Disruption: Global Leadership Forecast 2018. Retrieved April 19, 2018, from https://www.ddiworld.com/glf2018/Agile-Disruption

NMC Horizon Report > 2017 Higher Education Edition. (2017). Retrieved April 8, 2018, from https://www.nmc.org/publication/nmc-horizon-report-2017-higher-education-edition/

Nylen, D., & Holmstrom, J. (2015, January 15). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. Retrieved April 8, 2018, from https://hbr.org/product/recommended/an/BH648-PDF-ENG?referral=02527&cm_vc=rr_item_page.articles

Orr, D., Weller, M. & Farrow, R. (2018, April). Models for online, open, flexible and technology enhanced higher education across the globe – a comparative analysis. Oslo: International Council for Open and Distance Education.

Peppard, J. (2016, June 3). A Tool to Map Your Next Digital Initiative. Retrieved April 9, 2018, from https://hbr.org/2016/06/a-tool-to-map-your-next-digital-initiative

Phipps, L., & Clay, J. (2018, February). Delivering Digital Change: Strategy, Practice and Process. (Senior Leaders' Briefing Paper). Jisc. Retrieved May 24, 2018 from http://repository.jisc.ac.uk/6800/1/Jisc_Digcap_Senior_leaders.PDF

Post-Secondary Success: Institutional Snapshots. (2016, March 4). Retrieved May 13, 2018, from https://postsecondary.gatesfoundation.org/what-were-learning/institutional-snap-shots/

Pucciarelli, F., & Kaplan, A. M. (2016, May 11). Competition and Strategy in Higher Education: Managing Complexity and Uncertainty. Retrieved April 8, 2018, from https://hbr.org/product/competition-and-strategy-in-higher-education-managing-complexity-and-uncertainty/BH740-PDF-ENG

Puthiyamadam, T. (2017a, May 29). How the Meaning of Digital Transformation Has Evolved. Retrieved April 8, 2018, from https://hbr.org/2017/05/how-the-meaning-of-digital-transformation-has-evolved

Puthiyamadam, T. (2017b, May 29). How the Meaning of Digital Transformation Has Evolved. Retrieved April 9, 2018, from https://hbr.org/2017/05/how-the-meaning-of-digital-transformation-has-evolved

Puthiyamadam, T. (2017c, December 14). What Digital Transformation Really Means. Retrieved April 10, 2018, from https://hbr.org/webinar/2017/12/what-digital-transformation-really-means

Queen's University Digital Planning Project Group. (March 5, 2018). Themes Emerging from Environmental Scan of Digital Strategies in Higher Education. Retrieved April 8, 2018: from http://www.queensu.ca/sites/default/files/assets/pages/strategicframework/QU-DPPG-Environmental-Scan-March-5-2018.pdf

Ransbotham, S., & Kiron, D. (2017, April 1). Analytics as a Source of Business Innovation. Retrieved April 8, 2018, from https://hbr.org/product/analytics-as-a-source-of-business-innovation/SMR605-PDF-ENG

Rogers, C. (2017, June 30). HE students not equipped for growing digital workplace. Retrieved May 16, 2018, from https://universitybusiness.co.uk/Article/he-students-not-equipped-for-growing-digital-workplace

Ross, J. W., Sebastian, I., & Beath, C. M. (2017, January 1). How to Develop a Great Digital Strategy. Retrieved April 8, 2018, from https://hbr.org/product/how-to-develop-a-great-digital-strategy/SMR582-PDF-ENG

Samuel, A. (2016, February 5). The Soft Skills of Great Digital Organizations. Retrieved April 9, 2018, from https://hbr.org/2016/02/the-soft-skills-of-great-digital-organizations

Search Funded Research Grants and Contracts - Details. (2014). Retrieved May 16, 2018, from https://ies.ed.gov/funding/grantsearch/details.asp?ID=1521

Simmons, R. (2018, May 3). Perspective | Why are young adults the loneliest generation in America? Washington Post. Retrieved from https://www.washingtonpost.com/news/parenting/wp/2018/05/03/why-are-young-adults-the-loneliest-generation-in-america/

Smith, R., McKean, P., & Knight, S. (2016, June 9). The evolution of FELTAG: a glimpse at effective practice in UK further education and skills | Jisc. Retrieved May 16, 2018, from https://www.jisc.ac.uk/reports/the-evolution-of-feltag

Strategy. (n.d.) In Oxford English Living Dictionaries Online. Retrieved May 25, 2018 from https://en.oxforddictionaries.com/definition/strategy

Studio, I. (2016). Innovation Salon 03: Think Big, Start Small, Move Fast with Michael Peter Edson. Retrieved from https://vimeo.com/157210947

Teisseyre, N., Bioulac, A., & Gautier, D. (2014, September). The digital journey, an opportunity for France: Leapfrogging to Transformation. Retrieved May 10, 2018, from https://www.rolandberger.com/de/Publications/pub_the_digital_journey_an_opportunity_for_france.html

Tijerina, B., & Erdmann, C. (2017, December). Data Science in Libraries: Findings and a Roadmap Forward. Retrieved from https://www.cni.org/topics/digital-curation/data-science-in-libraries-findings-and-a-roadmap-forward

The ascent of digital | Deloitte UK. (2015). Retrieved April 9, 2018, from https://www2.deloitte.com/uk/en/pages/public-sector/articles/the-ascent-of-digital.html

The Scientific Paper Is Obsolete. Here's What's Next. - The Atlantic. (2018, April 5). Retrieved April 19, 2018, from https://www.theatlantic.com/science/archive/2018/04/the-scientific-paper-is-obsolete/556676/

Schneider, N. (2018, April 8). Why Researchers Shouldn't Share All Their Data. The Chronicle of Higher Education. Retrieved April 16, 2018 from http://0.www.chronicle.com/article/Why-Researchers-Shouldn-t/243018

Tiersky, H. (2017, March 13). 5 top challenges to digital transformation in the enterprise. Retrieved April 8, 2018, from https://www.cio.com/article/3179607/e-commerce/5-top-challenges-to-digital-transformation-in-the-enterprise.html

Top 5 biggest challenges for digital transformation in the NHS. (2017, November 21). Retrieved April 8, 2018, from http://www.information-age.com/top-5-biggest-challenges-digital-transformation-nhs-123469677/

University of Bergen. (2016). Digitalisation that Shapes Society: Strategy 2016-2022. Retrieved April 21, 2018 from http://ekstern.filer.uib.no/ledelse/digitaliseringsstrategi_2016-22_ENG.pdf

University of Bergen IT-department. (n.d.). SAFE for decision makers. Retrieved from https://it.uib.no/ithjelp/images/b/b2/SAFE_E_-_For_decision_makers.pdf

University of Leicester. (n.d.). Digital Leadership Development. Retrieved May 28, 2018 from https://www2.le.ac.uk/institution/digital-campus/strategic-priorities/dsc/leadership-development

University of Leicester. Discovery-Enabling Digital: 2016-2020. Retrieved May 25, 2018 from https://www2.le.ac.uk/institution/digital-campus/documents/university-of-leicester-digital-strategy.pdf

University of Leicester. (n.d.). University Digital Strategy: Building the Digital Campus. Retrieved May 28, 2018 from https://www2.le.ac.uk/institution/digital-campus

University of Oxford. (n.d.). Digital strategy | University of Oxford. Retrieved April 10, 2018, from https://www.ox.ac.uk/about/organisation/digital-strategy?wssl=1

Uppaluru, M. (2018, April 16). The U.S. Needs a New Paradigm for Data Governance. Retrieved April 19, 2018, from https://hbr.org/2018/04/the-u-s-needs-a-new-paradigm-for-data-governance

van Deursen, A. J. A. M., Helsper, E., & Eynon, R. (2014). Measuring digital skills: from digital skills to tangible outcomes

[Monograph]. Retrieved May 16, 2018, from http://www.oii.ox.ac.uk/

Waibel, Gunter. (2018, April 11). Message from the Executive Director: California Digital Library. Retrieved April 19, 2018, from https://www.cdlib.org/about/message.html

Wessel, M. (2017, December 1). The New Leadership Imperative: Embracing Digital Transformation. Retrieved April 9, 2018, from https://hbr.org/product/the-new-leadership-imperative-embracing-digital-transformation/ROT353-PDF-ENG

Wilson, L., Davis, C., & Bourne-Tyson, D. (2017, December). Collaboration and Platform Integration in Support of a Federated Research Data Management Service in Canada. Retrieved from https://www.cni.org/pbs/collaboration-and-platform-integration-in-support-of-a-federated-research-data-management-service-in-canada