IRISH UNIVERSITIES ASSOCIATION

Submission to DFHERIS & HEA

July 2023

Digital Investment in Universities

to support

Enhanced Teaching & Learning and Research Performance

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Digital Transformation Fund

The scale of investment required for Digital Transformation is significant. In the recent EY/Times Higher Education Report *'How are you balancing the books for a digital future?',* the scale of investment required was compared by an Australian university to "being the equivalent of spend on one new major building every 5 years".

We are, therefore, proposing an **initial 5-year investment programme of no less than €40m p.a**. for IUA universities. Recognising that investment priorities will vary by university; we propose that this funding would be allocated as a **Digital Transformation devolved grant**. It should be emphasised that this proposed digital investment programme is aligned to the Funding the Future process and assumes the necessary funding will be available to expand staff capacity.

The IUA Universities are cognisant of the benefits of organisations, such as HEANET, which are enabling elements of the essential digital services at a national level as a central agency. Critical digital investment is also required locally on the frontline for delivering many teaching and research services. The IUA believes this strategic digital funding can be used to drive both the local needs and shared investment opportunities.

The spending profile across each of the four target areas will vary depending on the current status in each university and the specific priorities relevant to that university.

Change and Transformation

The changes taking place in higher education are like never before. Universities, as primary producers of the talent and innovation for the knowledge economy, must respond to the rapidly evolving needs of the workforce driven by technological change. Universities are large, complex organisations with tens of thousands of staff and students and a range of other stakeholders – enterprise partners, government, regulators, funders, local communities, suppliers among others – to serve on an hourly and daily basis. Our enabling digital systems and infrastructure are, necessarily, equally complex. The context in which we must not only securely maintain them, ensure interoperability, and seek to meet stakeholders' digital expectations is a rapidly evolving one.

The digital systems and infrastructure in our universities requires urgent and critical investment in order to ensure that students are educated in an environment that reflects the needs of the workplace. Such investment will be underpinned by individual institutional digital and data strategies which, in turn, will be aligned with national strategies including the Digital Ireland Framework.

The IUA universities have outlined their commitment to a suite of measures to government on the basis of a 'right-sized', sustainable core funding programme. Those commitments include enhancing student outputs and outcomes, enhancing research performance, supporting lifelong learning and

workforce development as well as responding to the major societal challenges including climate action and digital capability.

The IUA outlined these commitments in some detail in our June 2023 submission. In that submission, it was clearly signalled that a parallel investment by government in the digital capacity of universities is essential in order to both unlock the benefits of technology to better enable IUA members realise their commitments and meet the expectations of stakeholders.

Digital-enabled Change

The key drivers of digital change in our universities include:

- ✓ The National Digital Strategy targets the development of high-level digital skills and digital skills for the labour market and employers are demanding more work-ready graduates which, in turn, requires universities to invest in their digital capacity and other infrastructure.
- ✓ Out-dated legacy digital systems in our universities cannot support the needs of students and researchers. Investment in systems and people is now critical.
- ✓ The Covid experience has accelerated demands for change and improvements in digital and blended learning. This requires sustained investment in platforms and capacity.
- ✓ Tracking and monitoring the individual needs and performance of students through better digital systems is key to improving student progression and completion, especially for priority target groups. Investing in data analytics is essential to foster and engage students' progress.
- ✓ AI is opening new possibilities, and considerable challenges, for student learning and assessment. Investment is needed to support staff as well as students to become AI literate.
- ✓ Research systems capacity, including interfacing with world-class research partners, must be developed if we are to grow our research output and to achieve government's Impact 2030 targets.
- ✓ Cyber security and data protection are, and will remain, a top priority with the requisite investment in secure, information security systems. Existing, on-campus legacy systems and outdated infrastructure are more vulnerable to cyber-attack.

Digital Investment Programme

A sustained digital investment programme is required if these challenges are to be met. This cannot be a once-off investment. It requires consistent and sustained investment over a 10-year period at least in order to address major current deficiencies, build future capacity and leverage digital advances at scale. We propose here an initial 5-year investment programme based on four key pillars including:

- ✓ Supporting **Teaching & Learning transformation** in our universities.
- ✓ Securing **data management and cybersecurity** across the university network underpinned by appropriate data governance.
- ✓ **Underpinning the research and innovation output** of universities.
- ✓ Enabling the achievement of **connected and sustainable university campuses** in line with the Climate Action Plan.

The specific investment requirements are tabulated below with, in each case, the impact that will be delivered as a result of this sustained investment programme.

Summary Investment Priorities and Impacts

	Digital Investment Target Area	Specific investment Priorities	Key Impacts
1	Supporting Teaching & Learning Transformation	• Enhancing student information and curriculum management systems • Broadening recent digital advances at scale across curricula • Improved assessment systems including response to AI • Digital upgrades of learning spaces	• Greater flexibility for learners • Improved progression rates and student outcomes • Increased work-readiness of students • Improved access to and support for lifelong learning • Improved learning experience
2	Enabling Research and Innovation Capacity	• Improved research data management solutions and adaptation of systems for Open Science • 'Big data' processing • Centralised digital infrastructure for research at campus level	• Improved research output • Enhanced capacity and agility to leverage 3rd party research funds • Better enabled, data-driven research • Improved monitoring and reporting of research outcomes
3	Enhancing Data Management and Cybersecurity	• Expansion of secure cloud-based solutions • Improved early warning and response capacity • Improved identity and access management	• Enhanced security, data protection, data management and analytics. • Enhanced compliance capacity • Reduced cyber-attack risk • Long-term value for money
4	Campus Connectivity and Sustainability	• Enhanced campus connectivity • Improved space and energy management solutions • Optimised document and repository sharing	• Delivery of Climate Action campus targets • Reduced carbon footprint • Reduced printing and paper use • Lower energy use on campus • Cost savings

1. Supporting Teaching & Learning Transformation

The nature of higher education has evolved significantly and rapidly over the past decade. The modern university must extend beyond the traditional 'school leaver' model of higher education. Universities must, not only provide a more innovative, blended learning experience, but also inclusively accommodate a much more diverse range of learners, including part-time and flexible learners, accessing higher education through a broader range of entry routes. Universities must be able to support the different learning needs of that diverse population of learners and increasingly there is a need to provide a more personalised education experience.

The nature of how teaching and learning is delivered has also been radically changed by technology. The move to hybrid and blended modes of delivery, accelerated by the pandemic, means that universities need to adapt pedagogy and assessment to meet the needs of modern learners and employers.

Legacy student and course management systems are constraining the capability of universities to fully support and drive the expansion of this new diverse learner base. Leveraging the benefits of emerging technology, ensuring interoperability with core student information and course management systems requires significant investment if stakeholders' digital expectations are to be met. There are also huge constraints on universities to fully exploit the power of data to support individual learners through their education pathways. Lack of capacity to invest in new transformative technologies to support teaching and learning is also constraining the capacity of universities to fully deliver a truly digital experience across all programmes.

Specific Investment Priorities

Universities will invest to support teaching & learning transformation to deliver the following.

- Enhanced student and course management solutions to:
    - Fully accommodate the diverse student population and to support the required expansion of upskilling, reskilling and lifelong learning;
    - Better identify, track and support the increasing access routes to higher education;
    - Better support student retention and progression;
    - Support the expansion of lifelong learning, including micro credentials, and the recognition of prior learning on a systemic basis.
    - Provide greater agility and capacity to respond to a changing learning environment.
- Stronger use of student and learner analytics to provide a more personalised learning experience as well as improving student retention, progression and success and supporting enhanced student well-being.

As an example, at Bolton College, UK, teachers create content through a virtual learning environment. However, in contrast to the typical homogeneous content to all students, they use analytics to provide a personalized pathway through the content. Students are differentiated according to the dataset about them and presented with targeted content and assessment materials. Adaptive algorithms mean that every student sees something different. A wide set of variables can be accounted for, such as how they performed in previous tutorials. Those who did well receive stretch challenges. Those who struggled receive less complex questions.

The environment also tailors content based on student needs, their current performance, learning style preferences, and career goals. A key interface to students and staff is the online digital assistant, Ada20, which provides updates, notifications and responses to queries, drawing from the same data set(s).

- Further embedding digital across curricula through enhanced Virtual Learning Environment solutions with a particular focus on
    - Use of collaborative applications;
    - Continuous and varied forms of assessment;
    - Improved and more flexible access to course content;
    - Developing appropriate and ethical use of AI, augmented, virtual and extended reality.

- Establishing appropriate and ethical use of AI, augmented, virtual and extended reality and machine learning for research and learning including improved assessment systems to respond to challenges of AI.

As an example, the Russell Group of research-intensive universities has just drawn up a set of principles to guide the response of those universities to generative Artificial Intelligence (AI). The principles state that:
-Universities will support both students and staff to become AI literate;
-Staff should be equipped to help students to use generative AI tools appropriately;
-The sector will adapt teaching and assessment to incorporate the "ethical" use of AI and ensure equal access to it;
-Universities will ensure academic integrity is upheld; and
-Universities will share best practice as the technology evolves.

- Enhancement of communication technologies across classrooms and other learning environments to support new and synchronous teaching & learning modalities.

Impact

The impact of digital investment in teaching and learning would include the following:

- Improved flexibility for learners in the modes of delivery and approaches to teaching & learning
- Improved access to and supports for lifelong learning
- Improved access and supports for non-traditional learners
- Improved progression rates and student outcomes
- Improved digital experience for all learners
- Improved digital skills and increased work-readiness of students

2. Enabling Research & Innovation Capacity

Impact 2030 has positioned research and innovation at the heart of addressing Ireland's societal, economic and environmental challenges. World-class research in our universities is, not only essential to our future economic competitiveness, but also critical to delivering major national targets such as the Climate Action Plan and ensuring a sustainable future for all our citizens.

The growth of 'big data', enabled by digitalisation and recent technological advancements, the early deployment of GPT technology and the exponential growth of Artificial Intelligence, together with the advancement of Open Science, present huge opportunities for research and innovation in universities. Data and data integrity has always been fundamentally important to research excellence but research data management capacity in Irish universities is low by international standards.

Significant investment in research-specific digital infrastructure is required if these opportunities are to be fully exploited by our universities. Investment is required in research information systems, including high performance computing capacity, and processing the 'big data' needs of the university research community.

Specific Investment Priorities

Investment in the following areas would considerably strengthen the research data security and research capacity of our universities.

- Data storage & management systems to support Open Science:
    - Expanding and enhancing the capacity for research data storage, management and archive capability.
    - Protecting the integrity, security and quality of life cycle management of research input and output.
    - Delivering safe, secure and uninterrupted access to data via appropriate back-up, data resilience and business continuity measures.
- Development of high-performance computing capabilities that facilitate the processing of 'big data' needs of the research community.
- Development of special-purpose facilities such as data visualisation labs to support cutting-edge research
- Integration of the latest digital technology into existing laboratories.
- Development of Research Information & Grant Management Systems to:
    - Support research administration and allow researchers to spend more time on research activity;
    - Improve integration and interoperability with other key systems including finance and HR and support accountability and compliance;
    - Support the dissemination and showcasing of research outputs and the profile of researchers to global audiences;
    - Support and facilitate greater collaboration and engagement with research partners.

Impact

- Improved security of research data, thereby underpinning the reputation and credibility of Ireland's universities.
- Maximising the impact and reach of research output.
- Improved monitoring and reporting of research outcomes and awareness of Irish research globally.
- Improved researcher productivity.
- Improved collaboration and engagement with enterprise.
- Enhanced capacity to leverage third party research funds.
- Improved protection of Intellectual Property.

3. Enhancing Data Management & Cyber Security

All universities are critically dependent on digital infrastructure and systems to support their operations. The IT infrastructure and systems in a university support a very complex spectrum of activities with a diverse set of users. Cyber risks are an ever-present and growing threat to the safe operation of our institutions. Universities hold a wide range of often sensitive data, are particularly susceptible to cyber-attacks and are actively targeted. Data published recently by Check Point shows that weekly average cyberattacks in education/research organisations are three times higher than those in industry generally and increased by almost 4,000% between 2013 and 2020. Irish universities have already recently experienced two major high profile, damaging and disruptive Cyber events.

Notwithstanding the prioritised implementation of cyber-security related measures by IUA member universities, a prolonged period of underfunding for systems, for the maintenance and upgrading of IT infrastructure and cyber protections has resulted in an increased vulnerability of aging, on-campus infrastructure to cyber-attack and left universities unable to meet public sector cyber security baseline standards. IT systems are as critical to universities as light, heat and water.

The siloed nature of aging legacy systems increases their vulnerability and also inhibits the capacity to employ new technology. There is a widespread need to embrace cloud computing in order to enable flexible access to university systems and data. Student data systems, in many universities, cannot handle the growing complexity and variation of the student population and learning pathways.

Specific Investment Priorities

Protecting university data and mitigating the risk of cyber-attack requires significant multi-year investment commitments. Data management systems need substantial overhauls or replacement in most universities. The following measures are among the top investment priorities.

- Migration of administrative systems to a SaaS cloud model.
- Full integration of all systems underpinned by secure workflows, delivering access to complete, current and accurate data.
- Improved early warning and response capacity through enhanced cyber security defence tools including:
    - 24/7 monitoring services;
    - Detection & response cyber services;
    - Cloud security tools;
    - SOC/SIEM implementation;
    - Improved firewalls;
    - Network perimeter security;
    - Endpoint device management.
- Proactive security validation and improved identity and access management.
- Enhanced disaster recovery capability, back up services and business continuity planning.
- Enhanced data loss prevention tools.
- Cyber security vulnerability management services.

Impact

- Reduced risk of major disruption arising from a cyber-security incident and related reputational damage to Ireland's university system.

- Long-term value for money by avoiding disruption and costs associated with a major cyber-security incident.
- Improved data accessibility and management and enhanced compliance capacity.

4. Campus Connectivity and Sustainability

Digitalisation can help universities in meeting the required reductions in greenhouse gas emissions as set out in the Climate Action and Low Carbon Development (Amendment) Act 2021 and driving the decarbonisation and sustainability of our society. Universities have a key leadership role to play in this regard, not only through research and innovation, but also as societal exemplars with graduates carrying that experience with them into the workplaces of the future.

University administration systems, which have had limited investment since the onset of the financial crisis, need to be migrated to the cloud. There is a need to move away from paper-based to more integrated digital systems. Investment in this area will, in the long-term, increase operational efficiency, reduce costs and contribute to the delivery of climate change targets.

Specific Investment Priorities

Digital investment is proposed in the following areas to support campus connectivity and sustainability.

- Enhance campus connectivity:
    - Development of secure modern, suitably enabling IT infrastructure.
    - Further extending wi-fi capability and moving away from fixed network solutions.
    - Development of mobile applications and portals to drive digital engagement with admin systems improving user experiences and efficiencies.
- Updating space management solutions to achieve more efficient and responsible use of physical campus resources and minimising or eliminating unnecessary use of energy resources.
- Optimal lifecycle management of unstructured data including document and repository storage, accelerating the rationalisation of staff and student print services.
- Reducing the campus carbon footprint through migrating power-intensive systems to cloud services.

Impact

- Delivery of Climate Action Plan targets.
- Reduced energy use on campus and carbon footprint.
- Reduced printing and paper usage.
- Demonstrate leadership in making sustainability a key basis for decisions and investments.
- Improved operational efficiency and cost savings.

IUA

July 2023