Investing in Our Future

Investing in research, innovation and the future talent of the nation is a fundamental ingredient of the national recovery.

Our universities are core partners in the national recovery effort. We produce the talent and create the knowledge base that drives economic growth and supports FDI. Our universities are central to the most successful economic growth hubs throughout the country including ICT, biopharma, med-tech and agri-food. These hubs underpin national and regional growth.

We propose a ***€3.5 billion capital investment over the next decade*** under the National Development Plan in four priority areas. These proposals are consistent with the objectives of *Our Shared Future*, the Programme for Government 2020.

1. **Research and Innovation:** A multi-annual fund, similar to PRTLI, is required to produce breakthrough research to drive economic growth and to prepare Irish society for the challenges ahead. This will provide cutting-edge facilities, equipment and talent support. €800m is required up to 2030 to make the Irish research system competitive again.

2. **Green Campus / Sustainability Fund:** To support the government's Climate Action Plan, a dedicated fund is required to transform the ageing campus infrastructure, retro-fit buildings and facilities and invest in smart, energy efficient technologies. €600m is required over the decade.

3. **Digital infrastructure:** Sustained investment is required to accelerate the transition to digital and blended learning, develop student systems and invest in cyber security and data analytics. A €500m investment up to 2030 is required under a multi-annual fund.

4. **Growth Fund:** It is now clear that the school-leaving population over the next decade is on the higher end of projections due to the demographic bulge. This means that the university / college population is set to grow by a quarter over the next decade. This requires urgent investment in facilities to cater for the growing student population. A €1.7 billion growth fund is required over the period.

IRISH UNIVERSITIES ASSOCIATION

SECURING THE TALENT & INNOVATION NEEDS for NATIONAL DEVELOPMENT

2021

Submission to the National Development Plan

Beyond National Recovery

Ireland, like every other country on the planet, faces a formidable challenge to recover from COVID-19. The immediate aftermath demands a sharp focus on jobs recovery, especially in the sectors most severely impacted by the pandemic. The fiscal backdrop for this short-term recovery will be challenging with significant legacy debt and a requirement to underpin the most vulnerable sectors of society.

The short-term recovery priorities must, however, be framed within the longer-term national economic development needs of the country. That is why this mid-term review of the National Development Plan is welcome. It provides an opportunity to re-assess national development priorities in the post-COVID, post-Brexit context. It enables government and key stakeholders to re-set priorities and to ensure that the underlying requirements are in place for driving economic growth and development over the next decade.

The Competition for Skills and Innovation

It is certain that the global battle for investment, talent and innovation will be even more intense in the decade ahead. Ireland must take on this competitive challenge in the face of a global climate crisis based on sustainable principles for our economy and our society generally. We must be ready to embrace that competition. Our talent, our skills and our capacity to innovate are the fundamental assets that we have as a small open economy on the edge of Europe. We can only compete successfully for investment if we have a talent and innovation base that measures up with the best in the world. This includes, not just the big players such as the US and China, but also other small open economies, especially those in Europe such as Denmark, Finland and, indeed, a post-Brexit UK.

It is notable that Ireland's highly competitive innovation and talent base played a pivotal role in the rapid recovery of the Irish economy from the financial crisis. It is equally notable that the parts of the economy that continued to thrive through the COVID crisis and support the country's tax base – ICT, med-tech, bio-pharma and others – are all centred on our high-skills capacity and clustered around higher education institutions.

Our universities and other HEIs provide the essential pipeline of talent, research and innovation that drives the knowledge economy. It has a key role to play in the social and economic recovery of the country both in the short-term and through the next decade. Ireland can only make a successful recovery if we continue to compete successfully in high-skills sectors. This is fundamental to maintaining our creative and competitive advantage as an FDI destination of choice in Europe and in supporting regional development and the network of SME companies across the economy.

Universities too have a pivotal role as agents of change as we tackle the environmental and societal challenges ahead. They have the capacity to carry out transformative research, not just in the physical sciences and the green agenda, but also to develop models of social and economic policy to support sustainable development

Universities play a key role in reimagining society and in social cohesion and equality. It is essential that investment is made in the capacity and infrastructure of the university / higher education sector if it is to be able to cater for expanding numbers and maintain its output of globally competitive graduates and research. We believe this investment should be around four key pillars as follows:

- Capacity for sustainable growth
- Sustainability measures through a Green Campus Fund
- Digital infrastructure
- Research infrastructure – The HE-RISE Fund

1. Capacity for Sustainable Growth

The next decade will see a significant growth in student numbers in higher education. The most recent DES baseline scenario shows that the number of full-time students will grow to 222,500 by 2030[1], at constant post-primary transfer rates (See Appendix 1). This amounts to an increase in intake of about 2,500 per year. In addition, it is an agreed priority to significantly increase the number of part-time students over the same period, and to improve post-primary progression rates. These combined factors require an increased investment in on-campus facilities as we have set out below.

Some commentators have suggested that there will be a sharp reduction in physical / on-campus teaching in the post-COVID context due to a shift to online or blended learning. However, while blended learning will certainly increase, the requirement for significant investment in physical facilities remains for the following reasons:

- ✓ There is already significant over-crowding on the majority of campuses due to the growth in the student population by a third over the last decade or so without the commensurate investment in facilities.
- ✓ There is a strong demand from students for in-person teaching as evidenced repeatedly by student surveys. Aside from the pedagogical merits of at least partial face-to-face teaching, COVID-19 has shown clearly that the on-campus experience is fundamental to the well-being of students and to their overall college experience. The traditional classroom environment must be re-imagined to support challenge-based and collaborative learning.
- ✓ Many disciplines will continue to require on-site facilities such as laboratories, workshops, practical's, etc. These include all science-based courses, all healthcare and engineering courses, agriculture and veterinary.
- ✓ Many humanities and social science courses also have significant laboratory / workshop requirements (e.g. psychology, languages, communications, teacher education) that require physical infrastructure.
- ✓ The growing population of international students in Irish universities further adds to the physical infrastructure needs. International students are worth c. €0.5 billion in export earnings to Ireland each year. Investment is required to support international student growth across our entire university network.
- ✓ Aside from the buildings' infrastructure, there is a significant investment requirement in equipment, an area that has been seriously neglected over the last decade. This is dealt with in detail below in the Research section.

[1] DES (2018): Projections of demand for full-time third level education, 2018 to 2040, https://www.education.ie/en/Publications/Statistics/projections/projections-of-demand-for-full-time-third-level-education-2018-2040.pdf

- ✓ The growing student population, both full-time and part-time, requires further investment in non-academic infrastructure such as student welfare (healthcare, counselling), sports and leisure facilities. Such investment should espouse a "universal design" approach to facilitate accessibility and participation by all.
- ✓ The need for ongoing investment in student accommodation is well documented and requires prioritisation as part of the government's overall housing policy initiatives.

Project Ireland 2040 provides for exchequer-funded capital expenditure on third-level of €2.2 billion over the period from 2018 to 2027. We believe that this understates the requirement by at least 50%. The Cassells Report concluded that €5.5 billion in capital expenditure is needed by the sector up to 2030 (from 2016).

Given the understandable paucity of state contributions for capital investment over the recession decade, universities were forced to borrow to fund essential capital needs. Borrowings among the seven universities are now over €800 million with current annual capital repayments of c. €20m in addition to interest payments of €14m. By 2022, overall borrowing will have reached €1 billion with annual capital repayments rising to €43m and interest costs to €24m. The capacity for universities to continue to borrow to fund capital requirements is, therefore, very constrained.

The National Development Plan should provide for investment to support campus capacity growth in higher education over the next decade under the following three headings:

Academic facilities: Investment in core teaching and learning facilities to cater for flexible learning and the known volume increase in part-time and full-time student numbers over the next decade and to reconfigure space to reflect the requirements of modern world class HEI's and the needs of 21st century students. This includes reconfiguration of facilities and development of capacity for hybrid models of learning.

Support infrastructure: Investment in student welfare, sports, recreation and other facilities that are not only fundamental to the campus experience but also to wider community engagement, support student well-being and provide for an internationally competitive college infrastructure.

Student accommodation: Sustained investment in a student accommodation programme to alleviate the substantial and growing demand for student living spaces within the wider housing crisis.

Based on a pro-rata application of the Cassells analysis, an overall capital investment in higher education of ***€3.5 billion is needed from 2021 to 2030***. Our member universities have provided submissions which outline their individual priorities for capital infrastructure over the next decade. Note that the specific investment priorities outlined below (Green Campus, Digital and Research) are within the overall proposed €3.5 billion capital envelope.

2. Green Campus Investment Fund

Much of the buildings infrastructure on our university campuses is old and outdated. The older buildings on four of our campuses (TCD, UCC, NUIG and MU) date from the 19th or earlier centuries. These include beautiful historical buildings of significant value to the national cultural heritage. However, their use as functional buildings in a modern university is compromised, especially from an energy use and sustainability viewpoint. Even newer buildings, including those on the other three university campuses, are in many cases almost half a century old and do not measure up to contemporary energy efficiency and sustainability or accessibility standards.

A multi-annual capital investment programme for the IUA universities is required over the next decade to urgently update and retro-fit outdated buildings based on sustainable principles. This Green Campus Investment Fund should be targeted at a sector-wide green energy, insulation and conservation programme with the aim of creating carbon-neutral campuses by 2030. Universities need to prepare students for the workforce in the coming decade with physical facilities and infrastructure that allow for a 21st century learning, teaching and research environment.

Critical upgrades of existing infrastructure must be a priority with a particular focus on insulation, heating and ventilation systems, energy and water conservation, smart building technology, and accessibility. Universities should be prioritised as exemplars of sustainable public buildings sending their graduates into the workplace as advocates for what can be achieved. The Green Campus Investment Fund will be used to address a range of key needs in the universities including:

- Retro-fitting buildings with insultation and other measures to bring them up to the required standard of sustainability;
- Implementing smart building technology to maximise energy and water efficiency and to support space utilisation management;
- Replacing inefficient heating and ventilation systems with the aim of dramatically improving air quality and energy efficiency so as to achieve carbon-neutral status;
- Urgently addressing 'red-letter' health and safety-related issues in outdated university buildings and facilities and ensuring space is fit-for-purpose with maximum utilisation;
- Supporting green travel and transport infrastructure with expanded cycling, walking and public transport infrastructure;
- Supporting biodiversity on campus by integrating within the overall campus development plan.

The ***Green Campus Investment Fund*** for the seven universities will cost an estimated €**600m** over the next decade. We propose a multi-annual fund with an annual investment of **€60m**. This is an absolutely essential enabling measure for universities to provide facilities capable of facilitating a fit-for-purpose student experience in the 21st century and to contribute to the climate change objectives of government.

The seven universities in the IUA have a combined population of staff and students in excess of 150,000. An investment at this level would yield on-site carbon neutrality for this very large population group.

3. Digital Infrastructure Investment

The COVID-19 pandemic has provided real impetus to digital transformation with a rapid transition to remote teaching and assessment. This transition, however, was undertaken in 'emergency' mode and is an initial step on a long journey. We now need to build on the progress made over the last 9 months and embed and further develop what has been achieved in a sustainable and more strategic way. While the emergency transition to online / blended learning has been successful in the main, it has also exposed the very substantial gaps in digital infrastructure capacity.

Ireland's universities are central to the national ambition for technological change and digital transformation with responsibility for developing talent and preparing tomorrow's entrepreneurs and innovators with the skills necessary to thrive in the smart economy. This can only be achieved if the necessary enabling digital infrastructure is in place to exploit the possibilities that technology presents. It is untenable to expect universities to adequately prepare students for the workforce in the 2020's without the requisite digital facilities.

There are a number of key components of a sustained digital infrastructure investment programme that will enable the building of a sectoral capacity to meet the demands of students in the digital age and enable universities to compete with their international peers. These are summarised as follows with more detail provided in Appendix 2.

Student systems: Urgent need for investment in digital student record systems to support students from application to graduation and to provide the flexibility required to respond to the changing nature of HE.

Cyber security: The rapid shift to remote and online teaching has exposed the security weaknesses of university digital systems. Investment is urgently needed to secure systems and data.

Data and analytics: There are currently substantial limitations to data access and management both within HEIs and across the system. This limits the capacity for system insights, evidence-based decision making, and reporting, as well as future opportunities such as the use of AI and robotics into a range of functions and facilities.

Digital learning platforms: Upgrades to learning platforms is required to sustain blended learning programmes and online assessment capability.

Digital classroom and collaboration spaces: Enhancement of capacity to produce graduates ready for the smart-working environment with improved digital collaboration capacity including greater accessibility.

Staff development and student support: Investment in supports and training for staff to build capacity for digital teaching and to improve student engagement and retention. Considerable investment is needed for CPD to upskill staff in the use of digital systems and for data analytics.

A multi-annual digital investment programme of **€50m per annum** is required to enable the university sector to build digital capacity and to enhance the student online experience. This requires a **€500m** investment over the next decade under the NDP.

4. Research & Innovation Investment – the HE-RISE Fund

Ireland faces significant socio-economic challenges as we emerge from the current crisis. Research and innovation will play a key role in the national recovery and rebuilding Ireland's future. Research has a transformative influence on societies and economies, impacting on every aspect of an individual's life from health and well-being to the environment, education, skills development, enterprise, climate change and standard of living.

The Programme for Government clearly outlines an ambition for Ireland to be a leader rather than a follower in the technological revolution. It also prioritises the funding of research to address societal and environmental challenges and to support foundational and discovery research. We have set out elsewhere the requirements for current expenditure to support research in higher education. There is also an urgent need for a capital expenditure programme in the form of a renewed PRTLI, ***the Higher Education Research Innovation Strategic Expenditure Fund (HE-RISE Fund)***.

Overall spending on research in Ireland lags behind that of our key competitors. Government Budget Allocation for Research & Development (GBARD) has been consistently below 1% of total expenditure since 2012, reaching a low of 0.93% in 2018. This is well below the EU average for GBARD of 1.34% and almost half that of key competitor nations such as Denmark. An additional €350m per annum would need to be allocated to bring Ireland into line with the EU average.

The last of 5 PRTLI calls was made over a decade ago in 2010 with a cumulative €1.2 billion invested in our research infrastructure in the previous 12 years. This strategic investment in research excellence and world class facilities enabled Ireland to improve its research output, delivery and impact. Up to €80m per year was invested in research infrastructure. A similar level of capital investment is now required. Such investment would enhance research and innovation capacity, increase the uptake of advanced technologies, develop skills for the knowledge economy and smart specialization, enhance the growth and competitiveness of SMEs, support digitization and drive social cohesion.

There is a fundamental and urgent need for investment in research infrastructure across Ireland's higher education institutions, in which the majority of publicly funded R&D is carried out. Providing adequate levels of up-to-date and well-resourced research infrastructure, supported by full time suitably qualified technical staff, is essential to enable researchers accomplish high quality, high impact and innovative research that delivers against national strategic objectives. The continuous support and maintenance of this infrastructure requires sustainable funding models through both core and competitive funding to ensure equipment remains current and effective over its planned and finite lifetime.

With the growth in digitisation and the global move towards Open Science, Irish national research infrastructure needs to be future-proofed and fit-for-purpose for the coming decades. A high-quality national research infrastructure enables Irish researchers to compete for, and deliver on, project funding under European Framework programmes (H2020, Horizon Europe) and promotes effective research partnership with industry enhancing both research talent and innovation capacities. Without such infrastructure, the capacity of the Irish research system is seriously diminished.

A renewed and sustained programme of investment in research infrastructure, the HE-RISE Fund, should focus on three priority areas as follows:

Physical infrastructure - €500m: Maintenance and upgrade of existing facilities and equipment to provide the capacity to attract, train and retain top talent and provide skilled people to meet industry's current and future needs.

Investment in shared national infrastructure to grow Ireland's current and future strengths in areas of strategic importance (smart specialization) and to keep up to date with new markets and developing sectors.

Human capital development - €250m: Investment in technical support staff to ensure optimum utilisation and maintenance of research infrastructure and equipment. The development of an apprenticeship model to support this should be explored.

Capital investment to support the costs of post-doctoral researchers, PhD students, research assistants and technicians contributes to the development of the Irish human capital research base and the generation of a skills pipeline for employers. Delivering such a pipeline of highly-skilled postgraduates is a critical component in the development of the knowledge economy and society.

Digital / "soft" infrastructure €5m: The development of a central equipment/infrastructure database accessible to public and private organisations is a key requirement for the system.

This includes transitioning to Open Science, allowing greater dissemination of, and access to, research findings. It would enable 'lifetime' investment planning for infrastructure so that equipment can be installed, will be managed by trained personnel, and funding ring-fenced for service/maintenance costs past original service contracts/warranties to maximise the return on investment. Legacy planning should include end-of-life planning (e.g. moving research equipment to teaching labs within and between HEIs).

In total, a **€755m** investment programme under the HE-RISE Fund is required.

Summary

There is a significant and growing infrastructure gap in our universities in terms of the physical infrastructure, the sustainability of our campuses, the digital capacity and the essential technological / research infrastructure required in modern universities. Targeted funding is required on a sustained basis for the lifetime of the NDP to address this gap. The NDP provides the opportunity to ensure that this investment can be directed strategically and deliver real system-wide impact in the most cost effective and efficient manner.

The priorities we have outlined are essential to enable universities to respond to the skills needs of the country, to support the innovation capacity of the economy and to deliver on the climate action goals as set out in the Programme for Government. The priorities we have outlined will support employment and regional development, provide the foundation for sustainable economic growth and help Ireland compete internationally as a leading-edge knowledge economy.

Appendix 1

DES (2018): Projections of demand for full-time third level education, 2018 to 2040, p7

Results

Table 4 presents results of total enrolments under the 4 scenarios outlined above for selected years out to 2040.

Under scenario S1 (baseline) total enrolments will rise each year up to 2030 and peak at 222,514, an increase of over 38,870 on 2017 levels, driven primarily by demographic trends. After 2030 numbers will fall steadily to reach 203,000 by 2040. Scenario S2, which holds the transfer rate steady but increases international enrolments by an additional 25 per cent over S1, will add an additional 3,658 students by 2030, and over 7,300 by 2040. Under S3 where both the transfer rate and international students rise strongly, enrolments in 2030 are projected to be 58,556 higher than 2017.

Table 4: Projections of full time demand for places in Third Level Institutions, 2018-2040 (Download detailed file)

	S1 (baseline)	S2	S3	S0
2017		183,642		
2018	186,890	186,890	187,689	186,091
2019	191,324	191,324	193,141	189,506
2020	196,609	196,609	199,626	193,591
2023	204,339	205,437	212,691	197,085
2026	213,624	215,819	228,202	201,241
2029	222,264	225,556	241,167	206,653
2030	222,514	226,172	242,198	206,488

Appendix 2

From Pivot to Strategy: Investing to Sustain & Accelerate the Digital Journey

In March 2020, our universities moved 130,000 students and 16,000 staff from a predominantly on-campus mode of education delivery to an emergency remote learning model. The pivot was largely successful but it exposed the wide variation and the deficiencies in the digital infrastructure across the sector. It is clear that there is a requirement for a sustained investment in digital capacity if we are to build on the progress of the last nine months.

The National Development Plan provides a real opportunity to build on the momentum achieved in 2020, to embed the achievements in a sustainable way, build real progress and to position the sector for further strategic digital development.

Table 1 below identifies key digital investment priority areas for the university sector over the term of the National Development Plan.

This investment would allow the digital transformation of universities to continue. It provides for prioritisation of those pillars that will offer the more immediate benefits and best support to students and that have the greatest positive impact on the delivery of inclusive, accessible learning.

Table 1: Digital Investment Priorities, IUA Universities

Pillars	**Investment Area**	**Amount (€m)**
Achieving Student Success	Student Systems Modernisation Infrastructure Investment Data Reporting / Learning Analytics	200
Transforming the Digital Learning Environment	Digital Learning Platforms Digital Classroom & Collaboration Spaces Staff development & student engagement	125
Supporting Data Informed Decision Making	Enterprise Data Strategy Business Systems Integration, Analytics & Cloud Migration	50
Nurturing Innovation	Research Infrastructure & Data Management Virtual Reality & Augmented Reality	75
Developing 21st Century Business Strategies	Cyber Security Systems Digital Transformation, Literacy	50
Total Investment		**€500m**

Achieving Student Success - €200 million

- **Student Systems modernisation**
  Our student systems are the heart and lungs of our Universities Digital Systems. Critical, but complex, these systems support the administrative processing of a student's time on campus from application to graduation. They are inflexible legacy applications, designed primarily to help efficiently administer typical students completing a traditional academic journey through a full-time, on-campus education. These systems must be adapted for the future of education, one built on accessibility, agility and flexibility.

  The investment in modernising these systems will enable universities to be more flexible in their offerings, supporting the modern 21st century student and opening up our education to other learners. It will allow universities to place more services online, to recognise and credit student engagement such as their extracurricular activity or learning elsewhere. It will support new pathways and flexible learning models that reflect the needs of students and cooperation between HEIs at home and across Europe.

- **Data Reporting/ / Learning Analytics**
  As digitalisation increases across our learning activities and our services, the volume of data captured has increased significantly. We need to develop the capability to unlock its full value and to harness this data to drive better outcomes for our students.

  The reduction in time spent on campus makes it essential to put systems in place to appropriately monitor and report on student engagement, allowing for timely supports and interventions for all students to ensure their wellness and engagement across all elements of their time in Higher Education. This can particularly help identify and target supports for the most vulnerable students, and increase their opportunity for progression.

- **Infrastructure Investments**
  Irish universities have a critical dependency on their ICT infrastructure. Always on and remotely accessible digital services are now essential. If the Digital systems fail, even for a period, the university essentially ceases to function. The current infrastructures was not designed to sustain this mode of operation and needs to be upgraded to assure availability, accessibility and connectivity.

Transforming the Digital Learning Environment - €125 million

- **Digital Learning Platforms**
  The learning platforms in Irish universities have kept Irish students learning throughout the pandemic, but in emergency mode only. We need to extend these platforms further if we are to hold the ground made on digitalisation of education and develop this mode of delivery. We must offer fully supported digital environments that develop digital competencies in learning, organisation, communication, research and collaboration.

  The investment priority is on the inclusion / access for all our students and the enhancement of the platforms for online assessment and sustainable modes of hybrid learning. Preparing these platforms for micro-credentials will allow universities to open up education to lifelong learners who choose their own pathways, pace and mobility.

- **Digital Classroom and Collaboration spaces**
  The classroom is no longer simply a physical place, it is wherever you go to learn. The digital classroom ensures an equivalent learning experience whether participating physically or virtually. Where COVID-19 triggered a move to emergency remote teaching, the Digital Classroom relies on and extends digital learning platforms with the supports required for delivery of hybrid learning, with active and full participation and collaboration. It will also invest in the physical infrastructure to allow for real-time interaction and capture for on-demand review of lecture content and referenced material that meets the highest accessibility standards.

  Universities need to invest in facilities to support challenge-based approaches to learning, to support interdisciplinarity, problem-solving and critical thinking.

  The 21st century classroom needs to more closely resemble the 21st century workplace. Reflecting the need for our learners to graduate with required workplace skills and in support of modern pedagogies with increased output-based learning, the digital classroom and physical spaces on university campuses must also be equipped to enable collaborative group and project working.

  The development of these Digital Learning Platforms and Classrooms will allow the university sector show leadership in meeting the government targets for the adoption of smart working, delivering on the positive environmental impacts, enabling a greener economy and offering opportunities for increased participation in work.

- **Staff Development and Student Engagement**
  Investment in digital systems and infrastructure is of limited benefit if there is not a commensurate investment in the people engaging with it, both staff and students. The National Forum for Enhancement of Teaching and Learning has made some early gains in this regard and the IUA's Enhancing Digital Teaching and Learning project, funded by the HEA, has helped to build digital capacity.

  However, the COVID-19 digital 'pivot', while successful in the short-term, has highlighted the need for investment to upskill all staff and to build on the capacity of universities to provide improved student engagement in the digital / hybrid environment.

Supporting Data Informed Decision Making - €50m

- **Enterprise Data Strategy**
  Historically, universities have never fully leveraged the value of the data in our systems. University management recognise the critical strategic value of data and wish to unlock the value of that data in terms of sectoral planning and to inform long-term policy decisions.

  There is an opportunity to harness the value of Big Data/AI to inform management decisions, solve problems, reduce duplication and costs, glean new insights and enhance strategic planning. This presents opportunities for both university managers and for other key stakeholders including the HEA and DFHERIS. Building this capability across the university sector would facilitate the management of data as a true university / sectoral asset. This will entail developing a data-enabled institutional culture, one where interoperability, scalability, and extensibility, as well as data integrity, standards, and governance, across multiple applications and platforms is the new norm.

- **Business Systems Integration, Analytics & Cloud Migration**
  There are technical challenges on sharing and integrating data across the multiple systems developed and configured at different times by different vendors and stakeholders. In order to leverage the real power of data, investment is required to facilitate the integration of increasingly complex suites of IT systems, some in the Cloud, some on premise, enhancing operational efficiencies and effectiveness and delivering a return on investments for institutions and for the State. Systems that are not integrated result in significant increases in cost and resource consumption and undermine the power of data as a strategic asset to universities and to wider stakeholders.

Nurturing Innovation - €75m

- **Research Infrastructure & Data Management**
  Ireland requires fit-for-purpose research infrastructures to achieve its stated national ambitions as a world-class research nation. Access to analytic software, providing reliable real-time support for their technology needs, adequate bandwidth, data storage and computational resources to conduct their research are all fundamental requirements of researchers. Excellent infrastructure would also support enhanced communities of innovation that would make Ireland a magnet for innovation and investment, and transdisciplinary research practice which has become a core element of global sustainability science.

  Research data management systems facilitate the tracking of research investment and research impact and would allow universities to improve their ranking submissions on research impact and support a quality measurement for research activity across the sector and a national response to enhancing Irelands Research Reputation.

  Digital technology can also significantly support the Open Science agenda through the dissemination of results.

- **Virtual Reality & Augmented Reality**
  Virtual and augmented reality provide real opportunities to enhance the quality of teaching & learning and research in our universities. The opportunities presented by this technology can bring new opportunities to experience hands on and practical learning to much broader numbers of students and researchers than would otherwise be the case.

Developing 21st Century Business Strategies - €50m

- **Cyber Security Systems**
  The threat of disruption and significant loss from the cyber-criminal community has never been more pervasive. The shift to online and remote working has seen the number and impact of these attacks increase significantly. Universities are prime targets due to the high value of our research, intellectual property and education assets. Investment in active cyber defences

with significant preventative and protective measures is necessary to avert highly disruptive, expensive and reputationally damaging cyber hacks or ransomware attacks.

- **Digital Transformation & Literacy**
  Universities need to provide the digital experience that students now take for granted. Embracing digital transformation is about building on the core values of the university sector and developing new and significantly more effective ways to enrich and expand the teaching and learning mission. Digital transformation has the potential to facilitate new pedagogic strategies and reach a larger, more diverse section of learners, including many seeking new kinds of skills and credentials.

  The building of communities of practice and enhanced competencies across the university sector would facilitate the unbundling and re-bundling of learning content and offer opportunities for reasonable and affordable access and education for all.

  Moving services to the cloud provides an opportunity for a collaborative effort to re-examine and update existing business processes across the university sector to gain efficiencies or increase functionality, and/or opportunities for high-level improvement in processes and workflow.