



Smarter World, Smarter Work

An Ibec campaign

Smarter technology for a better future

Irish business priorities for
a national AI strategy





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Smarter Work**
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Key Ibec messages

Ibec's vision of a future Ireland is for a more competitive, smarter low carbon economy, with a sustainable enterprise base that provides quality jobs and enables a high quality of life. An inclusive Ireland at the heart of an outward looking, dynamic and successful EU, that provides the conditions for organisations and individuals to adapt to technological change and reach their full potential. Under the right conditions, Artificial Intelligence (AI) are a suite of transformative technologies that can enable that future. Ireland has a positive baseline in certain aspects of digital development, but our economy and society must be prepared to work and compete in a world that is subject to further technological change.

In this context, Ibec envisage a national AI strategy, aligned with EU initiatives and globally relevant standards for interoperable and trustworthy AI, that enables government, organisations and individuals to: embrace innovation and technological change; address policy issues of strategic importance; deliver quality jobs and enhance well-being. This paper outlines Ibec's priorities for a national AI strategy for the period 2020-2024. It complements Ibec's ongoing campaign Smarter World, Smarter Work. The new Strategy should enable an ongoing dialogue to further develop Ireland's AI ecosystem and enable Government, enterprise, innovators and individuals to identify and realise opportunities in AI adoption. For example, enable an expert cross-sectoral and cross-functional advisory forum to engage and assist in promoting better cross-sectoral understanding, adoption and innovation in trustworthy AI. The paper is non-exhaustive and aims to contribute to an ongoing policy debate on AI and digital automation.

Key Ibec priorities for a national AI strategy include:

1 Enable government and enhance public services for a smarter world.

Government can play a key leadership role in preparing organisations and individuals for technological change, so that society and business in Ireland can reap the benefits. It should shape a flexible, outcome-driven governance of AI, both at home and with its international partners. The approach to the governance should be evidence-based, proportionate and risk-based. Government should act as a catalyst by enhancing conditions for AI awareness and adoption and lead by embracing technological change in government and enhanced public service delivery.

2 Deliver the infrastructure for a smarter world.

Physical and data infrastructure are key enablers in helping Government, business and individuals access the opportunities offered by AI and digital automation.

3 Nurture further innovation for a smarter world.

Ireland is an ideal testbed for further digital transformation because of our collaborative nature, innate technology base and the natural proximity afforded by the size and infrastructure of the country. We are big enough to be relevant and small enough to be nimble in this space. To enable a competitive economy for a smarter world, we must further develop our AI ecosystem. This means enabling investment and collaboration in AI research and an enhanced environment that supports our research and innovation in AI applications.

4 Enable smarter entrepreneurship.

Irish business already competes in an increasingly digitalised world. It is important to realise that it is in the implementation of AI-based solutions across all sectors where the real economic benefits will be found. We should focus on enhancing our comparative strengths and the conditions that enable every organisation to embrace innovation, better understand opportunities and adopt technologies, including AI. Enterprise must be encouraged in developing, adopting and deploying AI applications. Different sectors, organisations and individuals may be at different stages in their understanding and adoption of AI. Some may lack awareness of the opportunities from AI, while others may require support in the development and deployment of AI applications. We must resource the response accordingly. Without enterprise-driven AI, Ireland will not be able to add value to ongoing research in AI and lose out to competitors.

5 Enable individuals to succeed in a smarter world.

Enable everyone to reach their potential and succeed in an era of further innovation and technological change. Build an indigenous pipeline of AI talent and practitioners. Encourage digital inclusion and diversity and intensify investment in education and developing relevant skills. Build external partnerships and attract mobile AI talent to augment this pipeline.

Introduction: Emerging context, emerging opportunity

About AI

Artificial intelligence (AI) can be described as a suite of technologies or systems aimed at reproducing certain human cognitive processes – technologies that can be combined to sense, comprehend, act and learn¹. Current AI, although it can equal or surpass human capabilities in certain domains, is still narrow. The development of an ‘Artificial General Intelligence’ – one that could match or surpass all human capacities, appears distant at present², and is not the subject of this paper. Examples of current domain-specific AI applications include natural-language processing, image understanding, text understanding and generation, voice recognition, robotic process automation (RPA) and autonomous cars.

New technological context, new opportunity

AI is not new³. AI development is iterative and has sometimes gone unnoticed⁴. However, while sometimes misunderstood or misrepresented, there has been significant recent progress in AI development through a combination of technical progress and increased volumes of computing power and data⁵. The World Intellectual Property Organisation (WIPO) report that there have been 1.6 million scientific papers and 40,000 AI-related patent applications since the 1950s, with the majority (more than half) of all AI-related patent filings published since 2013⁶.

AI is a transformative technology that can bring social and economic benefits for example through better healthcare, more efficient public administration, safer transport, a more competitive industry and sustainable farming⁷. AI has seen unprecedented levels of investment – funding of AI start-ups jumped to \$1.73 billion in Q1, 2017 up 84% on the previous year⁸. AI is estimated to have the potential to double the annual economic growth rates of developed economies and increase labour productivity by 40% by 2035⁹.

Ireland is ranked in a cluster of EU states who are high performers in digital progress¹⁰. Ireland’s AI ecosystem is characterised by a strong mix of both multinational and indigenous firms, 25 years of AI research, a variety of research centres focussing on different aspects of AI; and strong industry-academic collaboration¹¹. Ireland has:

- Developed an industry-driven nationwide Postgraduate MSc in Artificial Intelligence in 2018¹². There are currently four MSc degrees in AI in Ireland.
- Established a national Centre for Research Training in Artificial Intelligence (CRT-AI)¹³ in March 2019 with funding of over €14 million from Science Foundation Ireland (SFI) and an additional €3.3 million from industry and the academic partners. This joint initiative will train more than 120 PhDs.
- Been ranked 5th in terms of the number of AI companies per capita in Europe¹⁴, accounting for an estimated \$46.29M in AI start-up funding in 2017¹⁵.
- Been ranked as a European leader in access to open data¹⁶.
- The Irish Department of Education offered funding to secondary schools to acquire software to teach 3D CAD technology which is powered by Artificial Intelligence. 3D CAD technology is used as a teaching and learning tool in the design and communication graphics curriculum¹⁷.

By 2030, it is estimated that AI adoption in Ireland could under certain conditions:

- Provide positive net employment growth of up to 3% and productivity growth of 2.1%¹⁸.
- Increase GDP by 11.6% or €48 billion and have cross-sectoral impacts¹⁹.

Meet the challenges, realise the opportunity

Despite progress, the EU and Ireland face intense and growing global competition in the pace and level of our digital transformation²⁰. The ability to capture the opportunities from AI may vary between EU Member States, sectors and firms²¹. Embracing further technological change, such as AI, presents both opportunities and challenges across several economic and social domains²². Concerns have been raised in relation to the disruption of certain sectors, jobs displacement and the protection of rights. In this context, public policy has an important role in ensuring the potential benefits of AI and digital automation can be realised and potential risks mitigated through ambitious planning and implementation.

Several states and regions²³, including the European Union²⁴, are developing strategies around AI. The EU's approach involves: the co-ordination of member states' AI strategies; support for AI adoption by the public and private sector; support for relevant education and skills that prepare Europe for potential socio-economic change associated with AI and further digitally enabled automation; and governance and ethical guidance around AI. The Irish government committed to the delivery of a national AI strategy in 2019²⁵ to 'align with EU initiatives and provide a direction for the research and development of AI by enterprises as well as the innovative use of AI by enterprises to improve productivity'. Ibec supports the delivery of an ambitious national AI strategy that is consistent with relevant international initiatives²⁶ and other national strategies on innovation, education and the digital transformation of enterprise.

This paper outlines Ibec's priorities for a national AI strategy for the period 2020-2024. It complements Ibec's ongoing campaign Smarter World, Smarter Work²⁷. The paper is non-exhaustive and aims to contribute to an ongoing policy debate on AI and digital automation.

Ibec vision for a national strategy on AI

As the voice of Irish business, Ibec campaign for a better and sustainable future for Ireland. We want Ireland to be:

- A smarter low carbon economy, with a sustainable enterprise base that provides quality jobs and enables a high quality of life.
- A globally competitive Ireland, that is at the heart of an outward looking, dynamic and successful EU.
- An inclusive Ireland that provides the conditions for organisations and individuals to adapt to technological change and reach their full potential²⁸.

In this context, Ibec envisage a national AI strategy, aligned with EU initiatives and globally relevant standards for interoperable and trustworthy AI, that enables government, organisations and individuals to: embrace innovation and technological change; address policy issues of strategic importance; deliver quality jobs and enhance well-being.





Ibec priorities for a national AI strategy

1. Enable government and enhance public services for a smarter world

Government can play a key leadership role in preparing organisations and individuals for technological change. It can shape the emerging governance of AI, both at home and with its international partners. It can act as a catalyst by enhancing conditions for AI awareness and adoption and lead by embracing technological change in government and enhanced public service delivery.

A national AI strategy should:

- **Promote the development, adoption and use of AI-based solutions so that society and business in Ireland can reap the benefits.**

Recommendations:

- Strengthen public trust in AI by demonstrating benefits in service delivery e.g. health, transport and energy. Enlist national science agencies and NGOs in public engagement. Highlight the application of AI to everyday life.
- Promote and develop closer engagement between academia, industry, policy makers and influencers to develop public understanding of AI technologies and their potential application across enterprise and society.
- Deliver regular public progress updates to build and maintain momentum and support for delivery of the strategy.

- **Enable an ongoing dialogue to further develop Ireland's AI ecosystem and enable Government, organisations and individuals to identify and realise opportunities in AI adoption.**

Recommendations:

- Enable a platform for ongoing collaboration between Government, enterprise and academia on AI development and deployment. For example, enable an expert cross-sectoral and cross-functional advisory forum to engage and assist in promoting better cross-sectoral understanding, adoption and innovation in AI.
- Provide a clear vision, structure, responsibilities and internationally comparable metrics to measure success and enable corrective measures.
- Use dialogue and evidence to develop a flexible, outcome-driven governance framework that sets clear thresholds for market intervention, avoids undue regulatory burden or obsolescence and unlocks the positive potential of AI for Government, public services, business and individuals. The heterogeneous nature of AI technologies and their applications mean a one-size-fits-all legislative approach would be problematic or risk stifling the desired opportunities. There should

be an evidence-based, proportionate and risk-based approach to governance. Applications of AI determined to pose high risk or are of significant consequence should be governed differently than low-risk, inconsequential applications of AI.

- **Position Ireland with a leadership role in AI.**

Recommendations:

- Intensify work with our international partners to shape the emerging governance of AI and share best practice in embracing technological change.
 - Embed a human-centric approach²⁹ to the development, delivery, adoption and monitoring of AI techniques.
 - Complement and shape the EU's and the OECD's co-operative and ethical approach to AI development and deployment. Governance should be consistent with fundamental human rights. Encourage further international co-operation for 'trustworthy AI'³⁰.
 - Align the Irish national strategy on AI with other national and international (e.g. EU and OECD) policy initiatives of identified strategic importance for example trustworthy AI, further digital transformation and climate action³¹. Policy makers and stakeholders should work together to define any further appropriate safeguards needed for sensitive use cases whilst continuing to encourage innovation.
- Explore the opportunities to develop Ireland as a pre-eminent data economy - important to training AI systems. Ireland already has a Ministerial role dedicated to data governance, an established data forum and a strong regulatory role in data governance across the EU. We have a framework to build on.

- **Lead on incorporating AI solutions as part of the ongoing move to online Government services and the digitalisation of public service delivery. Provide a catalyst for opportunity and AI adoption.**

Recommendations:

- Strengthen government and public sector understanding and capabilities in AI and digital automation. Build external partnerships to augment this expertise.
- Identify opportunities and develop pragmatic guidance on AI application across government and public services.
- Develop mechanisms to share AI skills and resources such as piloting data trusts³². Encourage the responsible creation and sharing of datasets for training AI systems relevant to government and public services, while respecting privacy and cyber security requirements, particularly in identified areas of national strategic importance.
- Pilot programs that use AI to improve government and public services to citizens, particularly in identified areas of national strategic importance.
 - Help government and public services to contextualise and operationalise EU/OECD AI principles in the development and deployment of AI powered GovTech solutions across several domains. Share best practice.
 - Raise public awareness on how citizens' data is being used to meet these strategic aims as well as the benefits that accrue.

2. Enable enterprise and innovators to succeed in a smarter world

Irish business already competes in an increasingly digitalised world. It is important to realise that it is in the implementation of AI-based solutions across all sectors where the real economic benefits will be found. Further digital transformation of the economy could benefit practically every sector, building on those where Ireland already has comparative strengths, including information, communication technology (ICT); biopharmaceuticals and medical technology; financial and business services; agriculture and advanced food production³³. For that reason, we need to enable every business, and not just in the technology sector, to understand and embrace AI, where appropriate, as a key driver in the next round of technological change. We should focus on enhancing our comparative strengths and the conditions that enable every business to embrace innovation, better understand opportunities and adopt technologies, in particular AI.

A national AI strategy and complementary national strategies should:

a. Deliver the physical and data infrastructure for a smarter world

Physical and data infrastructure are key enablers in helping Government, business and individuals access the opportunities offered by AI and digital automation.

Recommendations:

- Enhance our connectivity. Enable further investment in secure, high quality digital infrastructure to enable access to further opportunity through AI. Ireland needs to keep up the pace of deployment of high-speed, high-capacity digital infrastructure and deploy 5G connectivity across the country. Secure, high-speed, high-volume, low-latency connectivity will be a key enabler for successful AI deployment in Ireland. There will also be a need for significant compute and storage infrastructure in Ireland if real-world machine learning is to be undertaken.
- Intensify the development of our data economy to enable AI development and adoption.
 - Encourage collaboration between government, regulators, enterprise and research community in identifying dataset requirements.
 - Support the creation of large, publicly accessible datasets for training and benchmarking AI technologies. Further encourage an open data community through the sharing and distribution of data and data sets. Open datasets and machine-readable data are helpful to further innovation and solving public sector challenges.
 - Encourage voluntary, responsible sharing of datasets for training AI systems relevant to key sectors while respecting IP, privacy and cyber security requirements, particularly in identified areas of national strategic importance.
 - Engage stakeholders, identify and breakdown technical barriers to sharing data (for example around portability and interoperability), establish standards and mechanisms to enable legal and responsible data sharing.

- Incentivise the legal and responsible sharing of research datasets.
 - Encourage voluntary sharing of data.
 - Promote data usage agreements.
 - Use regulatory sandboxes³⁴ to test data sharing standards and mechanisms.
- Intensify the development of our cyber security ecosystem to enable AI development and adoption. Setting the right approach to security for digital infrastructure will be key to help keep data secure and maximise trust in AI and how data is being used.
 - Update the National Cyber Security Strategy (NCSS) and encourage Ireland's cybersecurity ecosystem.
 - Ensure that our national cyber security and data protection capabilities are adequately resourced, and that Ireland is seen to be playing a strong international role in these areas.

b. Nurture innovation for a smarter world

We are an ideal testbed for further digital transformation because of our collaborative nature, innate technology base and the natural proximity afforded by the size and infrastructure of the country. We are big enough to be relevant and small enough to be nimble in this space. To enable a competitive economy for a smarter world, we must further develop our AI ecosystem. This means enabling investment and collaboration in AI research and an enhanced environment that supports our research and innovation in AI applications.

Recommendations:

- Leverage the EU Digital Innovation Hub network for AI³⁵. Develop a branded national AI cluster that is enterprise led.
- Intensify collaboration between government, business and research community, to:
 - Foster further public-private sector collaboration and investment in AI research. Ensure AI remains a resourced research priority with the enterprise agencies.
 - Promote interdisciplinary research to encourage innovation not just in technical issues associated with AI development/deployment or blending AI deployment with other emerging technologies but in the socio-economic, legal and ethical impacts too.
 - Invest in applied research of AI, particularly in identified areas of national strategic importance or comparative advantage.
 - Use regulatory sandboxes to test and scale up AI research as appropriate.
 - Help businesses to contextualise and operationalise EU/OECD AI principles in the development and deployment of AI powered solutions across a number of domains.
- Reduce the complexity of our R&D tax credit administration to enhance its attractiveness particularly to smaller firms for research and development in AI and other digital applications. Ensure we have the right supports to enable our smaller AI firms to start and scale.
- Introduce accelerated capital allowances for several areas of advanced manufacturing e.g. robotics. Ireland has the second lowest density of industrial robots in the EU15³⁶, despite them being strongly linked with increased productivity.
- Take a collaborative approach to standards development in AI and digital automation, emphasising their global relevance.
- Help our AI ecosystem by enhancing processes that support our firms to identify and secure further relevant EU funding.

c. Enable entrepreneurship for a smarter world

Different sectors, organisations and individuals may be at different stages in their understanding and adoption of AI. Some may lack awareness of the opportunities from AI, while others may require support in the development and deployment of AI applications. Enterprise must be encouraged in developing, adopting and deploying AI applications. Without enterprise-driven AI, Ireland will not be able to add value to ongoing research in AI and lose out to competitors.

Recommendations:

- Focus efforts in enhancing sectors where Ireland has identified comparative advantages or opportunities, including ICT, biopharmaceuticals and medical technology, agri-foods, financial and business services and potential GovTech offerings.
- The national AI strategy must complement the expected national Industry 4.0 strategy³⁷ and expected National Digital Strategy.
- Ensure strong collaboration between Government, the public sector, business and the research community to develop our AI ecosystem. Specifically:
 - Assess enterprise's awareness of AI and digital automation, the interest in adoption and barriers to adoption.
 - Identify the sectoral needs of end-users in the development, deployment and adoption of AI; and what existing supports could be improved to further enable an AI ecosystem.
 - Ensure coherence in the shared vision across several actors. For example, in the strategy's governance and in raising awareness among firms it will be important to develop a one stop shop portal/forum with relevant information for all interested in AI or other digital applications across the economy.
 - Support enterprise through awareness and demonstration of the application value of AI and in identifying sectoral and firm-level AI applications.
 - Provide advice and skills for the deployment of AI applications among managers, engineers, operatives etc.
 - This collaboration should be enterprise-led, globally relevant and underpinned by adequate funding mechanisms; a coherent governance structure; and a supportive institutional infrastructure.
- Improve tax relief on share options to assist young smaller firms in the development/adoption of AI and other digital applications.

3. Enable individuals to succeed in a smarter world

Enable everyone to reach their potential and succeed in an era of further innovation and technological change. Build an indigenous pipeline of AI talent and practice. Encourage inclusion, diversity and intensify investment in relevant education and skills. Build external partnerships and attract mobile AI talent, augment this pipeline.

A national AI Strategy should provide a platform that helps Government, business, academia and individuals to:

- Identify and address national skill gaps that help government, business and individuals in a digital age.
- Invest in the knowledge and employability skills for a digital age. The economy needs co-ordinated initiatives across the education system from primary to post-graduate, apprenticeships and alternative pathways to gain the relevant STEAM³⁸ and transversal skills³⁹ to embrace AI and other technological change. Specifically:
 - Empower educators and parents. Curriculum reform and career guidance is required so that education reflects the changing world around us and fosters future awareness and talent in AI and digital automation.
 - Accelerate the availability of the new Leaving Cert Computer Science course beyond the initial pilot schools.
 - Address under-funding of tertiary education and develop a sustainable model based on contributions from the state, individuals and business.
 - Ensure AI and digital automation are not just included in computer science curricula but in joint degrees or course modules too. Encourage cross-faculty collaboration between computer science and other enterprise-focussed academic fields to develop an indigenous pipeline of enabled AI talent.
 - Develop the indigenous pipeline of AI practitioners. Explore apprenticeship opportunities across the economy where graduates with AI knowledge are encouraged to employ that knowledge to real world challenges in the public and private sector in Ireland.
 - Embed an inclusive and lifelong approach to the development of skills in AI and digital automation.
 - Deploy appropriate supports to people whose current jobs may be transformed by AI, with a focus on training, career guidance and social safeguards.
- Work with employers to manage digital transformation in the workplace. Employers will need to facilitate new ways of working. Public policy on childcare, lifelong learning, retirement, pensions and taxation must keep people engaged in the labour market in a way that doesn't discriminate or disincentivise work.
- Promote Ireland as a location for mobile AI talent.
 - Continue ongoing national reform of visa and work permit processes.
 - Tackle planning barriers to vital development that enhance our quality of life. Enhancing quality of life attracts and retains mobile talent.





Use studies

Examples of AI potential across different domains

1: Make life less taxing. Application in a public service.

Ireland's Office of Revenue Commissioners (Revenue) receives more than 3 million calls a year. Research found that more than a quarter of customers use the phone as their primary means of contact with their tax authority and 78% of customers would welcome flexibility in how and when they interact with their tax authority.

In a world first for any tax authority, a collaboration between Revenue and Accenture demonstrated that an AI-powered 'voicebot' technology could offer a 24/7 automated call management service with an efficient, effective experience for customers. This award-winning⁴⁰ collaboration not only demonstrated customer benefits but also a novel transferable public service offering⁴¹.

2: Taking care of people. Applications in healthcare.

IBM has been exploring AI technologies and techniques for decades. IBM Research-Ireland is currently collaborating with UCD/Mater Misericordiae Hospital, the Royal College of Surgeons Ireland (RCSI), and digital pathology software company Deciphex to use AI techniques in helping surgeons to better identify cancers and improve medical interventions for patients.

The research team is using bio-physical models, applied mathematics, video analytics and AI alongside novel dye technologies to assist surgeons with cancer tissue identification and comprehension for improved precision in surgery⁴².

Dell EMC Ireland work with healthcare organisations to deliver technological solutions that can create positive patient outcomes. Researchers at the Irish Centre for Foetal and Neonatal Translational Research (INFANT) and University College Cork are harnessing AI techniques, enabled by Dell technology, to help healthcare professionals detect seizures in new-born babies as they occur so that prompt treatment can be provided, and long-term outcomes improved⁴³.

3: Taking care of business. Application in financial services.

Citi, the international bank, has a diversified product base covering 20 global and regional products. Ireland is home to both Citi's European HQ and its first Innovation Lab dedicated to research and development in the financial services industry.

Citi's innovation lab has used data and machine learning (an AI technique) to develop in-house solutions for fraud detection in payments for clients. The innovation reduces detection times and enhances client security.

4: Allow business to grow through customer onboarding. Application in identity verification.

ID-Pal is an Irish company that provides businesses with a digital identity verification solution for customer onboarding. The platform uses industry-leading biometric, document and database checks (leveraging both Artificial Intelligence and Machine Learning) to protect businesses from fraud by verifying that documents have not been tampered with.

Businesses benefit from a robust compliance solution and comprehensive customer due diligence reports for a complete audit trail to satisfy the regulators. The ID-Pal solution can enable businesses to remain competitive not only in Ireland, but globally, by replacing the typically costly and time-consuming onboarding process with a seamless, end-to-end solution that enables the business to focus on providing value to customers whilst meeting AML/KYC⁴⁴ requirements.

5: Unlocking the full potential of Ireland's natural resources. Application in energy production.

To combat climate change and achieve the Government's proposed 70% target for renewable electricity by 2030, Ireland will need to double its wind energy production over the next decade. AI can both enhance the performance of new wind turbines and increase the energy yield from the existing Irish wind farm fleet.

ESB is testing AI solutions from its FREE ELECTRONS™ global accelerator program⁴⁵ to increase the clean energy production from its wind turbines in 3 areas:

- 1 Reduction of maintenance outage times via better forecasting of component failures
- 2 Improved wind turbine blade inspections in conjunction with autonomous drones
- 3 Improved yaw control to extract more energy from variable wind conditions

A national AI Strategy should identify the opportunity of harnessing the power of this technology to address one of the most urgent and important issues facing the nation – our ability to reduce GHG emissions and decarbonise the economy:

- Identify most impactful areas where AI can cost effectively reduce GHG emissions
- Connect AI, environmental & engineering faculties in third level educational institutes & research bodies in a focused mission to pilot AI solutions with industry partners to reduce emissions
- Promote Ireland as an attractive location for AI testing in:
 - wind energy production
 - reducing energy consumption in buildings and industrial processes
 - optimising flexible demand to maximise clean energy use
 - use of energy storage to displace brown electricity production

6: Creating new worlds. Application in 3D content production.

Artomatix is an Irish AI software company who automate aspects of 3D content creation, thereby reducing production time and costs for their clients. Their key product is called ArtEngine. Applications of this technology include the film and video-game industries, industrial prototyping or interior design. Ireland's growing animation and digital entertainment sector is supporting regional jobs and is part of a significant global industry⁴⁶. Artomatix led a consortium involving WarDucks, Black Shamrock and Keywords that has secured funding under the Disruptive Technologies Innovation Funding call for 2018 to further develop ArtEngine and strengthen its market leadership position⁴⁷.

7: Exploring new worlds. Application in the Space industry and environmental monitoring.

Earth observation satellites are used for environmental monitoring, for example early detection of stresses in agricultural crops. The European Space Agency (ESA) are interested in harnessing Artificial Intelligence to enhance the processing of satellite images acquired in-orbit. Irish expertise is contributing to this effort.

ESA are interested in exploring the deployment of Commercial Off The Shelf (COTS) silicon chips in space applications. DCU based company Jaliko in partnership with Ubotica Technologies (Dublin) secured a European Space Agency (ESA) contract to characterise the Intel Movidius Myriad 2 Artificial Intelligence chip (also developed with Irish expertise) for space applications. Myriad 2 harnesses Artificial Intelligence for high-performance, low-power vision processing and can be pre-trained with data to recognise particular features and patterns or perform image segmentation as required. Ubotica are characterising the resilience of the Myriad-2 chip to the type of radiation that it would experience in space applications. Satellites observing the earth's surface typically collect and send home huge quantities of imagery/data. These data downlinks may be expensive, slow and include some data that may not be of interest to scientists e.g. cloud covered imagery. Ubotica are also involved with ESA in the development and deployment of an in-orbit AI algorithm to detect and pre-filter redundant data caused by cloud cover so that only cloud-free data is downlinked. If Ubotica and colleagues are successful with this demonstration mission, AI could be harnessed to better process satellite images collected in-orbit, improving the utilisation of the valuable downlink bandwidth. This could result in energy savings and the freeing-up of bandwidth, ultimately facilitating faster reaction times to identified environmental events, for example forest fire detection⁴⁸.

8: Organising business. Application in product lifecycle management.

Dassault Systèmes, the 3DEXPERIENCE Company, provides business and people with virtual universes to imagine sustainable innovations. Embedded in Ireland since the 1990s including through its R&D centre in Cork, the company provides solutions powered by Artificial Intelligence including:

- EXALEAD: provides AI-driven solutions to support decision making and continuous improvement in product performance, sourcing and sustainability, cost, quality and customer experience. It enables organizations to gather, align and enrich Big Data—whether internal or external, structured or unstructured, simple or complex—and to deliver that information the way users want to receive it. The AI-based solutions transform large volumes of heterogeneous, multi-source data into meaningful, real-time information intelligence to help users improve business processes and gain competitive advantage.
- To improve part reuse, US company Bird chose EXALEAD's OnePart search application for its mechanical engineering activities. OnePart utilizes indexing technology, which makes the search process faster. Engineers also use OnePart not only for 3D CAD documents, but for all other design documents such as data sheets, test data, manufacturing instructions, test procedures and drawings. With OnePart, engineers are able to rapidly find similar parts for reuse instead of spending time redesigning new ones. As a result, the company has reduced the number of duplicate parts on its server by 75% and accelerated product development.

9: Thought for food. Food for thought. Application in sports nutrition.

BASF collaborated with Nuritas in the development of its commercial sports nutrition product, PeptAlde™. BASF is a global company who supply the agricultural sector and leading manufacturing industries in Ireland.

Nuritas, an Irish company, use AI algorithms and genomic technology to identify and unlock certain molecules (bioactive peptides) in plants and foods that may positively transform human, animal and plant health.

AI techniques were used by Nuritas in identifying certain plant-based peptides from rice that can regulate inflammation and aid physical recovery. This knowledge was then used by BASF in the development of a food process to commercial scale⁴⁹.

10: Enabling people for a smarter world. Education and skills development in AI.

Technology Ireland ICT Skillnet is a network of companies who collaborate to address skills needs within the technology sector. It is co-funded by Skillnet Ireland and member companies. Skillnet Ireland is funded from the National Training Fund through the Department of Education and Skills. Technology Ireland ICT Skillnet have partnered with University of Limerick, Dublin City University and NUI Galway to deliver masters programmes in the area of AI⁵⁰.

11: Moving us. Application in transport.

Dublin Airport welcomed 31.5 million passengers during 2018. The Dublin Airport Authority (DAA) in collaboration with Microsoft are using data and AI to forecast passenger numbers and draw insights that can help DAA in decisions that improve its security queue process or optimise the passenger journey within the airport. Data and AI are being used to drive efficiencies in the airport and enhance passengers' experience⁵¹.

12: Connecting us. Application in communications.

Vodafone are using AI to help to improve its products and services and to run its business as effectively as possible. For example:

- AI-powered chat bots increase the speed with which customer enquiries can be resolved;
- AI techniques are used in Vodafone networks to identify where capacity is needed so that customers can enjoy optimised data services, such as high-quality video streaming;
- AI tools and software are used by employees to help them work more efficiently; and
- AI is increasingly used to help support good decision-making, utilising 'big data' analysis based on large, anonymised data sets.

References and notes

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Acknowledgements

Ibec would like to acknowledge all the contributions received from members, sectors, organisations and individuals used in the preparation and delivery of this report.

About Ibec

Ibec is Ireland's largest lobby group, representing Irish business both domestically and internationally. Our members span all sectors of the economy, collectively employing over 70% of the private sector workforce. Our policy work seeks to improve business conditions and thereby promote sustainable economic growth.

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