QUEEN'S UNIVERSITY BELFAST

Report on
'Capitalising on an AI World'
Economic Forum at
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Contents

1. Executive Summary

Northern Ireland stands at a pivotal moment, uniquely positioned to lead in the AI era. The Economic Forum brought together leading voices across academia, industry, and government to examine how the region can harness artificial intelligence as a transformative force for economic development and societal advancement. What emerged was a compelling vision of Northern Ireland as a distinctive player in the global AI landscape, one that builds systems people can actually trust.

The Forum's Central Narrative

While the world has transformed rapidly in the last two decades, with technologies like AI, data, and mobile communication revolutionising society, Northern Ireland has an opportunity to shift from reacting to proactively shaping the future. The forum's discussions revealed a consistent theme: where Silicon Valley's approach has been to "move fast and break things," Northern Ireland is positioned to build systems that are secure, explainable, and regulation-ready from the outset - precisely where the global market is heading as regulatory frameworks tighten worldwide.

The forum examined this opportunity across four critical sectors: Cyber Security and Finance, Health and Biotechnology, The Green Transition, and Business and Technology. Each sector revealed unique strengths and convergent opportunities, demonstrating that the old boundaries between industries no longer apply in an AI-driven economy.

Key Forum Insights

- **Technological Convergence at Exponential Scale**: Forum participants described the current moment as "the industrial revolution but on steroids," with AI, quantum computing, space technology, and biotechnology converging to solve problems at exponential rates. This convergence demands a shift from siloed thinking to understanding the "techplexity" of interconnected systems—an approach that aligns perfectly with Northern Ireland's collaborative, cross-sectoral culture.
- **From Scarcity to Abundance**: Discussions highlighted how emerging technologies are creating potential for vast abundance in energy, materials, and even economic models themselves. This transformation challenges traditional approaches to work and value creation, shifting focus towards human-centric pursuits that emphasise creativity, imagination, and the storytelling capabilities for which Northern Ireland is renowned.
- **Human-Centric AI Leadership**: The forum consistently emphasised that successful AI adoption requires more than technical expertise—it demands storytelling ability to make complex technology "relevant and trusted." Northern Ireland's cultural heritage of narrative and conflict resolution provides a unique foundation for bridging the gap between technological complexity and human understanding.
- **Collaborative Ecosystem as Competitive Advantage**: Participants highlighted Northern Ireland's "tightly integrated ecosystem" as its key differentiator, enabling faster innovation and commercialisation through collaboration between academia, industry, government, and civil society. Our collaborative culture represents institutional robustness and anti-fragility, refined through decades of post-conflict experience. This should be considered a competitive advantage, creating precisely the cross-disciplinary conditions that AI demands.

Current State and Untapped Potential

Northern Ireland's unique positioning for AI leadership stems from its Industrial Revolution heritage of polymathic innovators and post-conflict collaborative experience, now reinforced by the £1 billion Belfast Region City Deal - one of the UK's most substantial regional innovation investments. With £300 million creating world-class centres of excellence including the Digital Twin Centre and Global Innovation Institute, plus £120 million in digital innovation programmes, Northern Ireland possesses the foundational infrastructure to translate its collaborative culture into sustained AI-driven economic growth through coordinated cross-sectoral action.

The forum pointed to significant existing strengths but revealed enormous untapped potential. A baseline study of AI adoption, opportunity and impact in Northern Ireland (published by the AICC), found that the region has solid foundations with 198 active AI companies generating £188 million in revenue, supported by approximately 1,340 AI professionals across pure-play, diversified, and AI-enabled companies. The region shows particular strength in services and consulting (35%) and software development (33%), with emerging capabilities in health and life sciences.

However, a critical finding emerged. Despite these foundations, Northern Ireland captures less than 1% of UK AI investment activity, with indigenous firms having raised only £34.5 million across 48 deals since incorporation. This disparity highlights both the challenge and the extraordinary opportunity for strategic intervention and coordinated development.

Sectoral Opportunities and Cross-Cutting Themes

- **Cyber Security and Finance**: The forum positioned Northern Ireland as uniquely capable of developing AI tools for regulated environments, leveraging the region's ability to navigate both UK and EU regulatory frameworks. The emphasis on "secure by design" startups and the integration of cybersecurity expertise from day one creates distinctive market positioning.
- **Health and Biotechnology**: With an ageing population (over 40% over 65 by 2040-45) and integrated health data systems, Northern Ireland possesses strategic advantages for AI-driven healthcare innovation. The region's "converged platforms" and integrated GP records provide foundations for precision health applications that address both local needs and global health equity challenges.
- **Green Transition**: Climate urgency creates both imperative and opportunity, with Northern Ireland's renewable energy potential enhanced by AI optimisation of grid systems, weather forecasting, and energy management. The forum highlighted how AI enables small teams to scale rapidly, exemplified by companies handling multi-million pound contracts globally with minimal staffing.
- **Business and Technology**: The democratisation of AI skills—shifting from specialist teams to default competencies across all roles—requires systematic workforce development and new approaches to entrepreneurship that leverage AI as a "virtual executive team" for early-stage companies.

Critical Challenges Identified

The forum identified several systemic challenges that require coordinated response:

- **Risk Aversion in Regulated Sectors**: Cultural and regulatory caution, whilst necessary for

safety, can paralyse innovation. Overcoming this requires practical experimentation approaches that maintain safety standards whilst enabling innovation.

- **Commercialisation Bottlenecks**: Despite strong intellectual property generation in universities, traditional academic funding pathways remain slow and bureaucratic. The forum identified gaps in pilot-stage funding, founder mentorship, and access to secure datasets.
- **Skills Misalignment**: Current educational programmes remain largely siloed, failing to produce the cross-functional talent required for AI-driven enterprises that span technical, legal, and commercial boundaries.
- **Infrastructure Scalability**: Building AI systems at scale demands solutions for power consumption, cooling, and software-defined architectures that current infrastructure may not support.

Strategic Recommendations and Path Forward

The forum concluded with clear strategic imperatives:

- **Policy Alignment:** Establish a Northern Ireland AI Policy Action Group, led by the Executive Office with representation from all departments, to drive systematic AI adoption across government and position Northern Ireland as a leader in public sector AI deployment. This should include:
    - mandate authority over Department of Finance business case approvals for technology and data investments to ensure AI-first approaches
    - specific departmental targets for AI implementation with material savings targets that create reinvestment funds for further technological exploration
    - partners with commercial operators to develop capabilities that enhance both public sector sustainability and private economy productivity.
- **Skills Transformation**: Upskilling our existing workforce should be a priority. Launch a Northern Ireland AI Skills Transformation Programme, coordinated by the Department for the Economy and the Department of Education. This should include:
    - a suite of micro-credentials for public sector, industry, and academic professionals
    - cross-disciplinary modules embedded in FE and HE curricula by the 2026–27 academic year
    - and applied learning initiatives co-designed with industry to ensure relevance and uptake.
- **Commercialisation Innovation**: Unlock intellectual property through agile funding mechanisms, including hyperscaler grants up to £500,000, whilst providing integrated startup support that embeds security and compliance from day one. For example, the Department for the Economy, in partnership with Invest NI and UKRI, should establish an AI Commercialisation Accelerator Fund to support pilot-stage ventures and translational research. This should include:
    - hyperscaler-backed grants for MVP development
    - founder mentorship programmes embedded in university innovation hubs
    - integrated support for cybersecurity, compliance, and market readiness.
- **Infrastructure Investment**: The Department for Infrastructure and the Department for the Economy should jointly develop a Northern Ireland AI Infrastructure Strategy by Q2 2026. This should include:

    - investment in sovereign software-defined data centres as a local partner to the GSIT AI Opportunities Action Plan
    - shared data platforms with secure access protocols
    - planning reforms to support AI-enabled environmental assessments and grid optimisation.
- **All-Island Coherence**: Leverage opportunities for aligned AI governance frameworks between Northern Ireland and the Republic of Ireland to create coherent environments for building export-ready AI products.

Northern Ireland's Distinctive Advantage

The forum's overarching conclusion was that Northern Ireland's greatest opportunity lies not in competing on speed or scale, but in building systems that people can actually trust. The region's historical experience with conflict resolution, its polymathic innovation tradition, and its collaborative culture create ideal conditions for human-centric AI development that prioritises explainability, security, and ethical implementation.

Success hinges on leveraging these distinctive strengths whilst addressing systematic challenges through coordinated, cross-sectoral action. The forum demonstrated that Northern Ireland possesses the foundational elements—talent, infrastructure, collaborative culture, and strategic positioning—to not merely participate in the AI era, but to help shape it according to principles of trust, security, and human benefit.

The path forward requires sustained investment in translational capacity, interdisciplinary talent development, and governance structures that maintain Northern Ireland's advantage whilst scaling to capture significant economic and social opportunities. The forum's insights provide a roadmap for this transformation, grounded in the region's unique strengths and positioned for global impact.

2. Overarching Themes

Across all discussions, several core themes emerged as critical for Northern Ireland's success in an AI-driven world:

Technological Convergence and Exponential Acceleration

The pace of technological change is unprecedented, described as "the industrial revolution but on steroids". AI, supercomputing, quantum tech, space exploration, and bio-printing are converging, solving problems at exponential rates. This necessitates a shift from siloed thinking to "techplexity" – understanding the interrelationship between diverse technologies. The old boundaries between sectors no longer apply, with Finance, AI, and cybersecurity becoming increasingly interdependent.

Shift from Scarcity to Abundance

Emerging technologies are creating the potential for vast abundance in resources like energy (space-based solar, nuclear fusion with Helium-3 from the moon) and materials (asteroid mining, new digitally discovered compounds). This challenges traditional economic models and could lead to "unlimited universal income" where essential needs are met, shifting focus to human-centric pursuits like "love and beauty and joy".

Rethinking Human Work and Society

AI is not seen as destroying jobs but "will change the nature of our work as it always has done". The shift is from sequential "jobs" to simultaneous "work" and portfolio-based careers, where individuals can blend vocations and avocations for self-actualisation. Work transformation rates will vary significantly, with AI agents most effective in tasks that are "legible, specifiable, and verifiable." This requires prioritising imagination, creativity, and polymathic thinking whilst addressing the fundamental challenge that "the biggest problem we have is we don't know how to not work."

Collaboration as a Cornerstone

A recurring emphasis is on the necessity of "cross-sector collaboration" between academia, industry, government, and civil society. This "tightly integrated ecosystem" is seen as NI's key advantage, enabling faster innovation and commercialisation. The collaborative "triple helix" model exemplifies this approach, bridging gaps between research and market delivery.

Risk Management and Agility

Overcoming "risk aversion" in traditionally regulated sectors (health, finance, public sector) is crucial for AI adoption. The advice is to "put generative AI tooling in the hands of your people" for practical experimentation, fostering agility in R&D and product pipelines. However, this must be balanced with the "natural conservatism in critical infrastructure organisations" that ensures system stability.

Human-Centric AI Adoption

AI adoption must be "cross-disciplinary", involving not just computer scientists but also business, humanities, and even vocational skills. Success hinges on "storytelling" to make AI relevant and trusted, focusing on "why it matters to them" rather than just technical specifications. AI is now "part of everyone's job—from compliance to comms," requiring non-technical teams to become comfortable with AI applications.

IP Commercialisation and the Academic-Industry Gap

Northern Ireland is "sitting on a gold mine… of intellectual property" within its universities, but there's a need for more agile routes to market, including alternative funding mechanisms (hyperscaler grants up to £500,000) and direct partnerships with global players. University research timelines often conflict with market requirements for immediate implementation and iteration, whilst universities lack systematic experience in IP evaluation and commercial positioning.

3. Key Sectoral Insights and Opportunities

3.1 Cyber Security and Finance Panel

Secure AI Leadership and Market Positioning

Northern Ireland is uniquely positioned to lead in "the development of AI tools designed for regulated environments." This positioning represents a fundamental shift in innovation philosophy: whilst Silicon Valley built fast and broke things, Northern Ireland is building systems that are secure, explainable, and regulation-ready. This approach aligns with market direction as regulatory frameworks tighten globally.

The region's capability extends to AI-driven risk modelling, automated compliance, fraud detection, and real-time audit trails. These applications require the cross-disciplinary talent that spans technical, legal, and commercial boundaries - skills that are largely being developed on the job as academic programmes remain siloed.

Dual-Market Advantage and All-Island Coherence

Entrepreneurs and emerging companies frequently struggle to navigate the complex web of regulatory requirements within their industries, a challenge that is particularly acute for smaller firms lacking dedicated compliance resources. However, Northern Ireland's unique ability to navigate both UK and EU regulatory frameworks provides a significant strategic opportunity for regulatory innovation, enabling local companies to build globally deployable solutions whilst helping them overcome the compliance barriers that typically hamper rapid growth and market expansion.

The partnership between NI Cyber and Cyber Ireland too presents an opportunity for "a unified approach to responsible AI and cybersecurity across the island, aligned to both UK and EU markets." This extends to potential alignment in AI and data governance policy, cross-border research funding, and shared infrastructure and testbeds.

"Secure by Design" Ecosystem Development

Proximity to cybersecurity expertise and available testbeds fosters a culture where NI AI and fintech startups are "secure by design from Day One," making them attractive for regulated markets. This represents a core value proposition for the region's startup ecosystem, though it requires integrated mentorship on cyber, compliance, and AI design as part of the same product development process.

Strong Translational Research Infrastructure

The collaborative "triple helix" model (academia, industry, government) and Queen's unique "engineering team" within CSIT bridge the gap between research and market, delivering both short-term and long-term impact. This was exemplified by Rolls-Royce inviting Queen's to a global cyber research network alongside Purdue and Carnegie Mellon, demonstrating international recognition of the region's capabilities.

3.2 Health and Biotechnology Panel

Demographic Imperative and System Transformation

An ageing population (over 40% of NI population over 65 by 2040-45) and rising chronic conditions often clustered together as multiple long-term conditions within ageing individuals necessitates

transformative healthcare solutions. This demographic shift creates both urgent need and significant market opportunity for AI-enabled health technologies.

Integrated Data Advantage

Northern Ireland possesses "converged platforms" and "well-integrated GP record[s]", providing a "huge advantage" for harnessing data to drive precision health and address health inequalities. This integrated approach to health data represents a strategic differentiator that can enable more sophisticated AI applications than fragmented systems elsewhere.

Prediction, Prevention, and Global Health Impact

AI capabilities extend across multiple healthcare applications: predicting disease complications (e.g., diabetic eye disease via retinal photography, and potential cognitive decline), screening molecules for drug development, and significantly shortening development pipelines. Automated diagnostic systems can extend healthcare access to low-income countries, addressing global shortages such as ophthalmologist availability.

The potential for "scalable brain health" represents a particularly significant opportunity, leveraging new blood tests for neurodegeneration and digital technologies to understand brain health symptomology, effectively moving diagnostics outside traditional hospital settings.

Workforce Innovation and Funding Models

The Department of Health should commission a Health Innovation Workforce Strategy, with a focus on releasing clinical capacity for innovation. This should include the creation of protected time for frontline staff to participate in AI pilot programmes, supported by a ring-fenced innovation fund and coordinated through the Department and its ALBs. This could potentially be achieved by adopting models like the US Small Business Innovation Research (SBIR) scheme to fund collaboration between healthcare institutions and small businesses, creating new pathways for innovation whilst maintaining clinical excellence.

Cultural transformation remains essential, with "micro-credentials and training programmes" needed to equip healthcare professionals with AI literacy, addressing cultural resistance and fostering innovation mindsets across the healthcare workforce.

3.3 The Green Transition Panel

Climate Urgency and AI-Enabled Solutions

Climate change and energy independence represent "the most urgent and complex challenge facing society today", requiring bold action and new technology. Northern Ireland has "huge potential" for renewable penetration, with AI serving as a critical enabler for optimising energy systems, forecasting weather patterns, predicting renewable supply, and managing demand to minimise "dispatch down" of excess renewable energy.

Data as the Bedrock for Climate Action

Structured data forms the foundation for AI-enabled climate applications, from designing offshore wind farms to managing commercial energy use. Simply Blue's approach exemplifies this, using large geospatial datasets and early AI modelling techniques for optimal offshore wind sites and environmental co-location strategies such as seaweed farming.

AI processes vast datasets including GIS layers, market data, and consumption patterns to "pick an optimum site" for renewable projects, model financial arrangements, and enhance grid operations. This data-driven approach is essential for making "no-regret" decisions in infrastructure planning.

New Business Models and Entrepreneurial Opportunities

AI enables small teams to scale rapidly, as demonstrated by WIA, a company of "just a few people" handling multi-million pound contracts globally by leveraging AI for energy monitoring and potentially evolving into a utility provider. This exemplifies how AI can serve as a "virtual executive team" for early-stage founders, powering finance, product development, marketing, and customer support with minimal staffing.

Emerging opportunities include peer-to-peer energy trading, microgrid integration, and shared infrastructure ownership, creating pathways for citizen-led and community energy models that could reshape energy markets fundamentally.

Infrastructure Investment and Regulatory Alignment

Northern Ireland requires significant investment (estimated £2 billion for assets and grid infrastructure) to meet renewable targets. AI can support optimal investment decisions, but regulatory frameworks must evolve to recognise AI-based assessments as valid for environmental impact assessments and project planning.

The region's existing leadership in grid decarbonisation positions it as a potential "sandbox" for AI-driven Net Zero solutions, though this requires updated legislation and planning processes that can accommodate AI-driven methodologies.

Case Study: Harlander Autonomous Vehicle Project

The Harlander autonomous vehicle project in Belfast's Titanic Quarter represents a critical lesson in how Northern Ireland can accelerate AI and emerging technology adoption. Private innovation spaces can serve as proving grounds for public benefit. This £11 million project succeeded because it operated within Belfast Harbour's private estate, circumventing the regulatory inertia that stifles innovation on public infrastructure. The question now is whether Northern Ireland will learn from this success and create the regulatory environment needed to scale such innovations across the region.

Private Sector Experimentation for Public Good

Launched in July 2025, Harlander demonstrates the power of allowing private operators to experiment with cutting-edge technology for broader societal benefit. The project brings together industry leaders - Belfast Harbour, eVersum, Oxa, Angoka, BT, and HORIBA MIRA - in a £11 million initiative co-funded by Innovate UK, delivering Northern Ireland's first autonomous passenger shuttle service.

The nine-seater, electric-powered shuttle provides crucial last-mile connectivity from Titanic Halt Railway Station to destinations like Catalyst and Titanic Belfast, addressing real transport gaps across the 2,000-acre Harbour Estate. By integrating Level 4 autonomy software with advanced cybersecurity measures, the project sets new standards for safety and reliability whilst reducing

congestion and emissions.

Regulatory Freedom Enables Innovation

Harlander's success story contains a crucial caveat: it operates exclusively within Belfast Harbour's private property. This private estate status provided the regulatory freedom necessary for rapid deployment and practical testing of autonomous technology. Without the bureaucratic constraints that typically burden public infrastructure projects, the consortium could move from concept to operation with remarkable speed and efficiency.

Northern Ireland possesses the technical expertise, industry partnerships, and collaborative culture necessary for autonomous vehicle leadership, yet artificial barriers prevent scaling proven innovations to where they could deliver maximum societal impact.

Creating The Right Regulated Environment

Northern Ireland's collaborative culture and cross-sector integration capabilities position the region uniquely for autonomous vehicle leadership. Unlike purely technical innovation, autonomous vehicles require deep integration across transport planning, cybersecurity, regulatory compliance, and user experience, precisely the multidisciplinary approach that defines Northern Ireland's competitive advantage.

The Harlander project proves this capability exists. The challenge is creating regulatory environments that allow this proven capability to scale beyond private estates into public benefit.

The Innovation Imperative

Harlander autonomous vehicle project provides one example as to how Northern Ireland can accelerate AI adoption. First enable private sector experimentation that delivers public benefits, then scale successful innovations through supportive regulatory frameworks. The project's success within Belfast Harbour's private estate demonstrates both the region's technical capabilities and the artificial constraints imposed by regulatory inertia.

Strategic Sectoral Integration

Northern Ireland's strengths in Digital & AI skills, Renewable energy, Economic/Fintech/RegTech, Agricultural economy, Manufacturing technologies, and Screen technologies (forming the "DREAMS" acronym) create a strong foundation for integrated green transition initiatives that leverage AI across multiple sectors simultaneously.

3.4 Business and Technology Panel

AI Ecosystem Baseline and Strategic Positioning

Northern Ireland's AI ecosystem comprises 198 active companies (46 pure-play, 63 diversified, 89 AI-enabled) employing approximately 1,340 AI professionals and generating £188 million in revenue with £82 million in Gross Value Added (GVA). The sector shows clear pathway potential to £200 million GVA by 2028, with employment concentrated in Belfast (73% of firms, 89% of employment).

Sectoral strengths lie in services and consulting (35%), software development (33%), and emerging health/life sciences applications. Critically, only three companies engage in frontier AI development, positioning Northern Ireland's advantage in application rather than foundational research—a

strategic focus that aligns with regional capabilities and market opportunities.

However, Northern Ireland captures less than 1% of UK AI investment activity, with indigenous firms having raised £34.5 million across 48 deals since incorporation, highlighting significant untapped potential for strategic intervention.

Skills Development and Cross-Functional Talent

Education must evolve to "blend core technical skills (e.g., hardware/software integration) with AI literacy, soft skills, and ethical understanding." For example, an AI Skills Transformation Programme could be established, including a new suite of micro-credentials and cross-disciplinary modules to be embedded in FE and HE institutions by the 2026–27 academic year. This could be supported by industry co-design and aligned with the DREAMS sectoral strengths.

Queen's research-led approach and strong industrial advisory board ensure graduates develop skills for AI-driven enterprises, though crucial hybrid skills spanning AI, law, cyber, and finance are largely being developed on the job.

AI competencies are "shifting left" from specialised data science teams to default competencies across all roles, with organisations like Kainos targeting a future where "my team ceases to exist" as skills democratise. This democratisation requires systematic approaches to AI fluency development across all sectors and professional levels.

Industry Co-Design and Research Alignment

"Industry should be involved right at the very start and not at the end of the research pipeline" to define questions and co-create solutions, accelerating both commercialisation timelines and market relevance. This approach addresses the fundamental misalignment between academic research timelines and market requirements for rapid implementation and iteration.

Successful examples like QUB Datathons and the North West DEPTH programme demonstrate the value of shared access to test data and deeper industry-academic partnerships, though these need scaling and systematic integration across the research ecosystem.

AI-Enabled Entrepreneurship and Corporate Innovation

AI fundamentally lowers barriers to entrepreneurship, enabling startups to build and generate revenue rapidly with minimal upfront capital. This shift is particularly evident in coding applications, where tools like Cursor have achieved significant valuations in compressed timeframes.

Large corporates like Salesforce prefer to "acquire startups" rather than directly invest in university research, highlighting the importance of fostering spin-outs and translational mechanisms. However, this creates specific commercialisation bottlenecks for SMEs, including limited funding at pilot/MVP stage, gaps in founder mentorship, and lack of access to secure, useful datasets.

Corporate AI adoption demonstrates varied impacts, with Salesforce experiencing reduced engineering recruitment whilst achieving 30-50% productivity improvements, illustrating AI's paradoxical effect on workforce effectiveness. Legal sector pioneers like Baker McKenzie demonstrate how early AI adoption creates competitive advantages that compound over time.

Storytelling as Strategic Differentiator

Belfast's cultural heritage of storytelling represents a significant competitive advantage in AI

adoption, making complex technology "relevant and trusted in client and public contexts". The emphasis must shift from explaining "what the technology does" to communicating "why it matters to them," leveraging Northern Ireland's narrative capabilities to bridge the gap between technical complexity and human relevance.

4. Challenges

Policy and Regulatory Lag

"Twenty years ago we foresaw many of the challenges we face today but failed to formulate the policy interventions necessary to fully capitalise on opportunities and address significant risks." This pattern risks repeating with AI adoption, where regulatory frameworks lag behind technological capabilities, particularly in environmental and planning regulations that may not recognise AI-based assessments as valid.

Current regulatory misalignment creates friction and delays, whilst inconsistent jurisdictional approaches add complexity for businesses attempting to scale across markets.

Commercialisation Bottlenecks and Funding Gaps

Despite strong IP generation across universities, traditional academic funding pathways remain slow and bureaucratic. Specific bottlenecks include:

- Limited funding availability at pilot/MVP stage
- Lack of awareness regarding agile funding options (e.g., hyperscaler grants up to £500,000)
- Gaps in founder mentorship and commercial guidance
- Insufficient access to secure, useful datasets for development and testing
- Universities lacking systematic experience in IP evaluation and commercial positioning

The solution requires not just additional funding but "better bridges between research and commercial teams" that can accelerate translation from laboratory to market.

Risk Aversion in Regulated Sectors

Cultural and regulatory caution can paralyse innovation, particularly in health, legal, and public sectors. "The level of risk aversion is going to be the single biggest thing that's going to prevent them from moving forward". This ‘fear of losing control’ must be balanced with the legitimate need for stability and safety in critical systems.

The challenge extends to "natural conservatism in critical infrastructure organisations" where system reliability takes precedence, requiring careful change management approaches that maintain safety whilst enabling innovation. Close collaboration with the wider public (eg. through citizen's juries) can often provide assurance that the public are supportive of driving forward data-driven innovation for public benefit.

Infrastructure and Technical Scalability

Building AI systems at scale demands solutions for power consumption, cooling requirements, and software-defined architectures. Current grid infrastructure and slow planning processes hinder both renewable energy deployment and the technical infrastructure required for AI development.

The need for resilient hardware-software hybrid architectures becomes critical as GPU factories and data centres scale, requiring proactive infrastructure planning that anticipates future AI-driven demands.

Skills Gaps and Educational Misalignment

AI literacy gaps persist across the workforce, with crucial hybrid roles requiring skills that span technical, legal, and commercial boundaries. Educational programmes remain largely siloed, failing to produce the cross-functional talent required for AI-driven enterprises.

Traditional education systems, rooted in industrial revolution models, often "knock out" creativity and imagination at early stages, hampering the development of the polymathic thinking required for AI-era success.

Information Overload and Communication Challenges

The "knowledge doubling curve" indicates information doubles every 12 hours, leading to overwhelm and necessitating shifts towards "symbolic AI" and symbolic communication approaches. This information abundance challenges traditional communication and decision-making frameworks across all sectors.

Maintaining Collaborative Culture at Scale

As Northern Ireland's AI ecosystem grows, preserving the region's "trust-based, collaborative culture" becomes increasingly challenging. The intimate, integrated ecosystem that currently drives innovation may become harder to maintain as scale increases, requiring conscious investment in convening, cluster coordination, and open communication mechanisms.

Human Adaptability and Change Resistance

Fundamental human resistance to change poses significant challenges, particularly in overcoming traditional work patterns and adopting "simultaneous lives" or portfolio career approaches. The challenge extends beyond skills development to fundamental mindset shifts about work, value creation, and professional identity.

5. Recommendations and Practical Next Steps

5.1 Policy and System Alignment (Cross-Cutting)

Establish Multi-Stakeholder Policy Advisory Working Groups

Establish a cross-departmental AI Policy Action Group led by the Executive Office, with a mandate to set departmental AI adoption targets and influence technology investment approvals. Departments achieving material cost savings through AI deployment would receive reinvestment funds for further productivity initiatives. Through commercial partnerships in delivery, position Northern Ireland as a leader in government AI adoption whilst creating a more sustainable public sector and productive private economy.

Centrally Fund and Endorse AI Initiatives

Senior leadership backing and central funding (e.g., DfE/Invest NI funding is supporting AICC to deliver 248 projects with SMEs) are crucial for driving systematic AI adoption. This requires coordinated investment strategies that span sectoral boundaries and align with broader economic development objectives.

Strengthen Cross-Sector Collaboration Mechanisms

Foster deeper integration and systematic collaboration across government, academia, industry, and healthcare sectors to accelerate AI adoption and drive meaningful innovation. Initiatives like CASE (Centre for Advanced Sustainable Energy) provide vital examples of successful cross-sector collaboration that demonstrate the effectiveness of coordinated approaches, offering proven models that should be scaled and systematically replicated across other domains and sectors.

Legislative and Regulatory Reform

Update legislation to accept AI-driven methodologies for environmental impact assessments and project planning, facilitating renewable energy deployment and broader AI adoption. This includes supporting the Offshore Renewable Energy Action Plan with AI-enabled planning and assessment capabilities. A concerted effort is needed to identify key bottlenecks that can be overcome to accelerate progress.

Enhanced Investment Zone Integration

Leverage Northern Ireland's proposed Enhanced Investment Zone (EIZ) to create a dedicated AI-for-Climate Innovation Cluster, focusing specifically on accelerating Net Zero technologies and creating integrated demonstration capabilities.

5.2 Skills and Workforce Development

Healthcare Workforce AI Transformation

Introduce comprehensive "micro-credentials and training programmes" to equip healthcare professionals with AI literacy. This systematic approach must address cultural resistance whilst fostering innovation mindsets across the healthcare workforce, potentially following models similar to the US Small Business Innovation Research (SBIR) scheme. By upskilling key members of the health and care team on our new EHR assets, productivity within the health system can be increased rapidly. A range of courses and qualifications can provide an escalation of skills depending on the

individual and system needs.

Cross-Functional AI Talent Development

Design curricula that expose students to both hardware and software integration whilst encouraging cross-disciplinary learning spanning business schools, computer science, and practical applications. This includes developing programmes that bridge technical, legal, and commercial boundaries for regulated AI environments.

Scale Applied Learning Initiatives

Build systematically on successes like QUB Datathons and the North West DEPTH programme, offering shared access to test data and incentivising deeper industry-academic partnerships. These initiatives should become standard pathways rather than exceptional programmes.

Develop Systematic AI Fluency Across Sectors

Launch practical, targeted training for professionals in policy, finance, and compliance to help them "ask better questions and co-design better systems." This democratisation of AI understanding is essential for effective cross-sector collaboration.

Integrated Green and Digital Skills Action Plan

Integrate green skills development with digital and AI skills training to build a workforce capable of leveraging AI for green technologies, aligning with the region's DREAMS sectoral strengths.

5.3 Commercialisation and Funding Innovation

Unlock IP through Portfolio Strategy and Agile Funding

Reframe academic IP as market-ready assets through systematic evaluation and commercial positioning. Actively pursue "hyperscaler-backed grants" and other agile funding routes that bypass traditional delays whilst maintaining quality and compliance standards.

Integrated "Secure-by-Design" Startup Support

Provide comprehensive mentorship on cyber, compliance, and AI design from the outset of product development, making security integration a standard part of startup development rather than an afterthought.

Invest in Translational Infrastructure

Establish "founder-in-residence and innovation fellowship programmes" that interface research, market requirements, and regulatory frameworks. Leverage existing capabilities at AICC and Momentum One Zero for demonstrator projects that showcase "responsible AI" approaches.

Encourage Systematic Entrepreneurship

Lower barriers to entry for startups whilst fostering a culture supporting rapid hypothesis testing and revenue generation. This includes creating better bridges between research and commercial teams rather than simply increasing funding availability.

Address Commercialisation Bottlenecks

Systematically address specific SME challenges including limited pilot/MVP stage funding, gaps in founder mentorship, and lack of access to secure, useful datasets. This requires coordinated

intervention rather than piecemeal solutions.

5.4 Infrastructure and Data Management

Software-Defined Infrastructure Development

Focus on building resilient hardware-software hybrid architectures that address power consumption and cooling challenges for GPU factories and data centres. This requires proactive planning that anticipates AI infrastructure demands.

AI Strategy for System Operators

Establish digital and innovation functions (e.g., at SONI) to integrate AI into grid operations, focusing on data structures, sandbox environments for testing, and risk-based probabilistic approaches to dispatch. Target "100% renewable penetration in Northern Ireland by 2035" through AI-enabled grid management.

Build Shared Data Platforms and Standards

Create integrated data platforms and standards to unlock cross-sector innovation and reduce duplication in AI tool development. This includes establishing secure access mechanisms that balance innovation needs with data protection requirements.

Create AI-for-Climate Action Framework

Develop an integrated framework aligning digital, skills, and green investment strategies with specific missions like offshore wind development, zero-carbon transport, and energy resilience. This framework should leverage Northern Ireland's existing grid decarbonisation leadership.

5.5 Strategic Positioning and Innovation Governance

Maintain Collaborative Culture Investment

Consciously invest in convening, cluster coordination, and open communication mechanisms to preserve Northern Ireland's trust-based, collaborative culture as the ecosystem scales.

All-Island AI and Data Governance Coherence

Develop aligned AI governance frameworks between Northern Ireland and the Republic of Ireland to create a coherent environment for building and testing export-ready AI products, including cross-border research funding and shared infrastructure development.

Position as Trusted AI Development Hub

Leverage Northern Ireland's distinctive approach to building secure, explainable, and regulation-ready systems as a core market positioning, emphasising the region's capability to "build systems people can actually trust."

Systematic Applied Learning Goals

Establish systematic applied learning initiatives specifically designed to accelerate the development of commercially-ready, multi-disciplinary talent that can operate effectively in AI-driven enterprises.

6. Northern Ireland's Unique Advantage

Northern Ireland's unique position, rooted in its Industrial Revolution history, polymathic innovators like Lord Kelvin, John Boyd Dunlop, and Harry Ferguson, and post-conflict diplomacy experience, aligns perfectly with the vision for an AI-driven abundance era.

The region’s distinctive position in the AI era builds upon the £1 billion Belfast Region City Deal (BRCD), representing one of the UK's most substantial regional innovation investments and a genuine national asset for AI development. The BRCD's £300 million investment in five industry-led centres of excellence, including the Digital Twin Centre, Global Innovation Institute, and Centre for Digital Healthcare Technology, creates world-class physical and digital infrastructure specifically designed for AI adoption. Combined with £40 million in enabling digital infrastructure targeting advanced wireless connectivity and data platforms, these investments establish the foundational capabilities that position Northern Ireland as an AI innovation hub.

The imperative to act is immediate. Northern Ireland must leverage this unprecedented infrastructure investment through unified cross-sectoral collaboration between industry, civic leaders, academia, and government. The BRCD's £230 million in university research centres and £120 million digital innovation programme create conditions for translating established potential into sustained economic growth, requiring coordinated AI strategy that builds upon the region's polymathic innovation tradition and post-conflict collaborative experience.

The AI ecosystem here has solid foundations with 198 active companies and approximately 1,340 professionals, yet captures less than 1% of UK AI investment activity, highlighting enormous untapped potential. Northern Ireland's distinctive innovation philosophy - building secure, explainable, and regulation-ready systems (rather than moving fast and breaking things) - aligns with global market direction as regulatory frameworks tighten.

Combined with ‘the triple helix’ links between government agencies, academic institutions, and industry partners, Northern Ireland's proposition for foreign direct investment as the region that can rapidly customise talent development programmes to meet specific investor requirements is extremely attractive. This responsiveness to FDI talent needs - historic and ongoing - represents a competitive differentiator that requires continued strategic investment to maintain. The "DREAMS" sectoral strengths (Digital & AI skills, Renewable energy, Economic/Fintech/RegTech, Agricultural economy, Manufacturing technologies, and Screen technologies) provide comprehensive foundations for AI-driven economic development.

The region's talent pipeline strength, integrated health data systems, and cultural storytelling capabilities position it as a strategic hub for transatlantic and international partnerships. Northern Ireland has the opportunity not merely to participate in the AI era, but to help shape it through distinctive approaches that prioritise trust, collaboration, and human-centric solutions. Success requires coordinated action across all sectors, leveraging the region's collaborative culture whilst scaling systematically to capture the significant economic and social opportunities ahead.

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