Department for the Economy
An Roinn Geilleagair
www.economy-ni.gov.uk

Software & Cyber
Sectoral Action Plan

JUNE 2024

Minister’s Priorities

1. In February 2024, Economy Minister, Conor Murphy, set out a clear strategic vision for the economy with a focus on four key inter-related objectives – **increasing the number of good jobs, promoting regional balance, raising productivity and reducing carbon emissions.**

2. In line with the Minister’s priorities the Software & Cyber Sectoral Action Plan has been developed. The Action Plan sets out a number of key activities to be taken forward by the department and its key delivery partners that will help grow the sector and deliver the Minister’s vision for the economy.

3. Our Action Plan will also support other department strategies and action plans that are helping to deliver against the Minister’s priorities.

4. This document provides a high-level summary of the key opportunities and challenges facing the software sector in Northern Ireland. It sets out a focused range of actions that will be undertaken by the Department for the Economy, our delivery partners and stakeholders to help these sectors grow at scale. It addresses the software sector but also has a specific focus on cyber security, a key area of strength for NI.

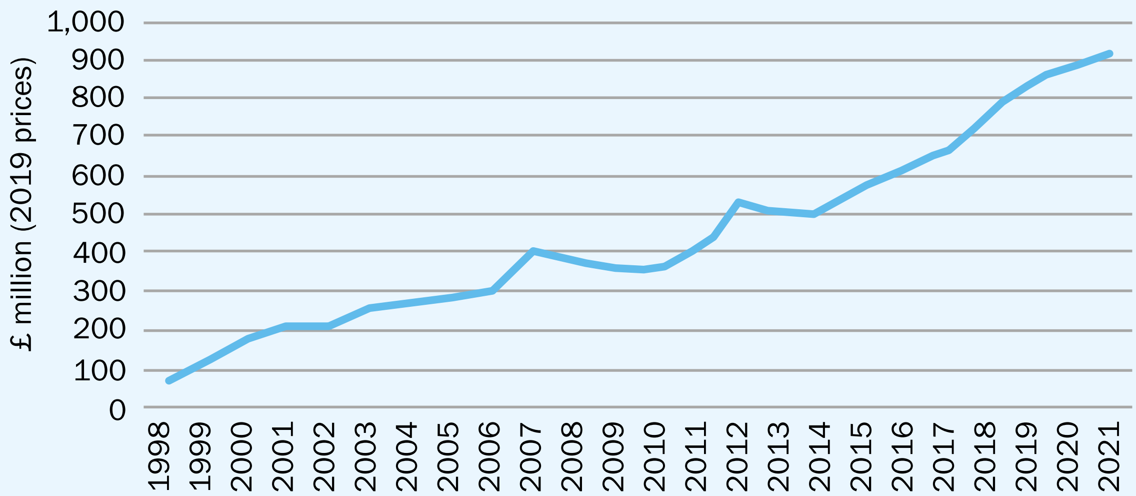
5. The software sector is one of seven sectors where the North of Ireland has established strengths in research and/or industrial capability and the potential to be globally competitive; if not already. Other priority sectors are Advanced Manufacturing; Life and Health Sciences; Fintech & Financial Services; Agri-Tech; Screen Industries; and Low Carbon including Green Hydrogen. Action Plans have also been developed for these sectors.

NI software - overview

6. Last year, the Department for the Economy commissioned external researchers to consider Northern Ireland's software economy: the organisations and people that develop, implement and support software-based functionality, products and services (see Understanding Northern Ireland's software capability and future 'windows of opportunity' | Department for the Economy (economy-ni.gov.uk)). These researchers, working with a group of stakeholders from industry and academia, noted the following features of NI's software economy (this includes people working in businesses where the primary product is software, and those who work on software in other industries).

7. NI's software industries generated around £915 million in Gross Value Added (GVA) in 2021, with around 46,000 working in NI's software economy. Software is also an area of growth with GVA having grown in real terms at an average of 12% p.a. since 1998. The overall NI economy grew by 1.4% p.a. over the same period.

GVA for NI's SIC 62 Computer programming, consultancy and related activities) £ million, 2019 prices)



Source: Understanding Northern Ireland's software capability and future 'windows of opportunity' | Department for the Economy (economy-ni.gov.uk).

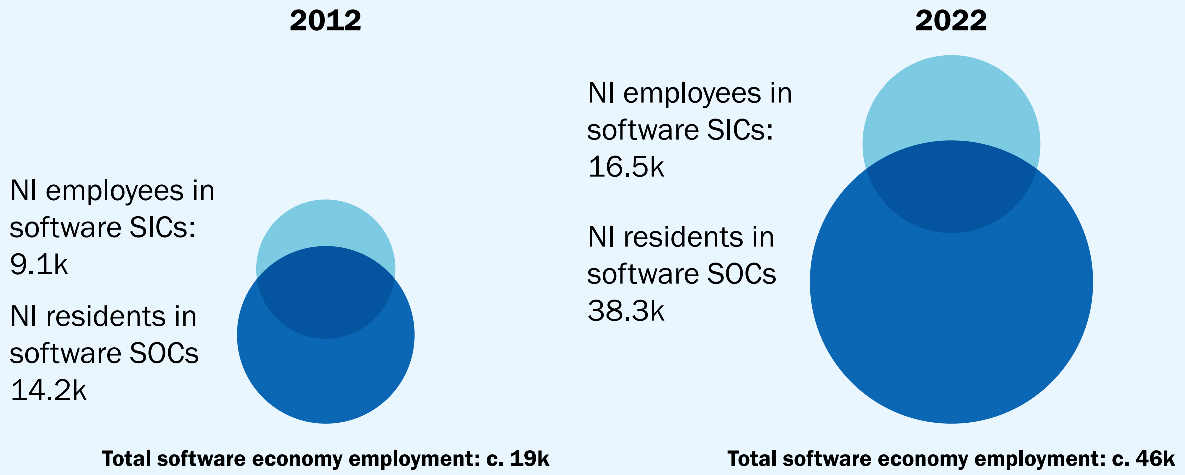
8. Global revenue in software is expected to grow annually by 5.27% from 2024-2028, with the majority of revenue expected to be generated in the US[1].

1 Statistics by Statista

Software jobs

9. The past decade has also seen a considerable increase in software employment. In the ten years from 2012, the number of people employed in the software economy grew from approximately 19,000 to around 46,000. This consists of about 16,500 employees in software-related industries and about 38,300 people resident in NI who work in a software-related occupation (some of which are in software businesses, but many of which are in other industries such as financial services, healthcare, wholesale & retail, public administration and manufacturing). The overlap between these two – that is, software occupations within software businesses – was about 8,600 people in 2022.

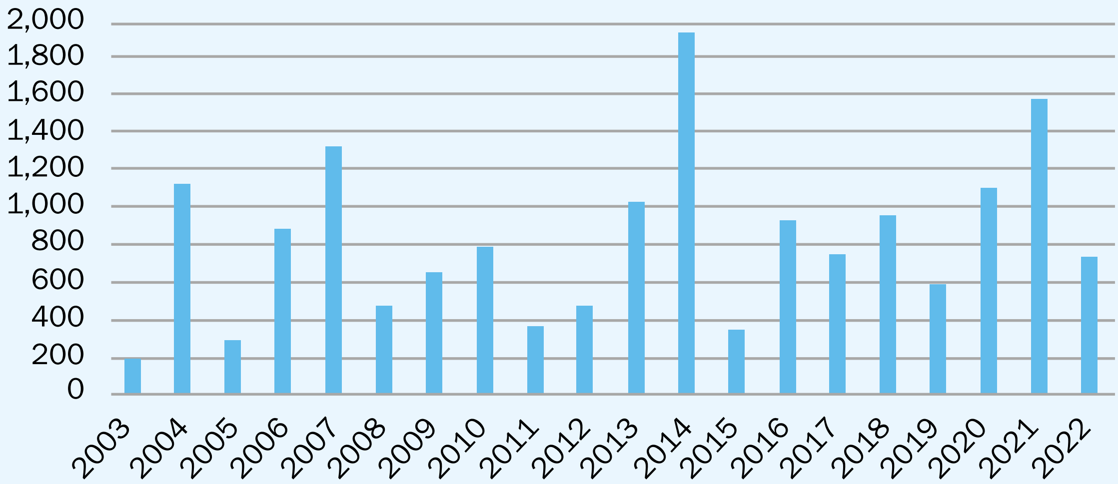
Total software economy employment in Northern Ireland, 2012 and 2022



Source: Understanding Northern Ireland's software capability and future 'windows of opportunity' | Department for the Economy (economy-ni.gov.uk).

10. Some of the growth of the NI software economy can be attributed to foreign direct investment (FDI). The graph below shows the estimated jobs associated with NI FDI in the Software and IT Services sector over the past 20 years.

Time series of estimated FDI jobs created in NI's Software and IT Services sector (2003 to 2022)



Source: Understanding Northern Ireland's software capability and future 'windows of opportunity' | Department for the Economy (economy-ni.gov.uk).

11. Those working in software also benefit from higher salaries, research found that the median annual pay per employee in SIC 62 (Computer programming, consultancy and related activities) was £36,710 in 2021, 52% more than the overall NI earnings median of £24,099.

Cyber security - overview

12. While the software sector is broad in scope, the department recognises that cyber security is a key area of particular economic and structural importance. The North of Ireland has a globally recognised cyber security ecosystem, which has gained increasing attention from companies, investors, academia, and governments. The growth of NI's cyber security sector is not a sudden phenomenon, nor overnight success. It is, rather, the result of consistent effort and sustained investment, arguably over the last twenty-five years. This is well evidenced - NI is the leading location for US FDI in cyber security projects (FT, 2021).

13. Belfast is one of the world's most concentrated cyber security clusters, with more than 100 cyber security businesses and teams. As expected, based on employer location, almost 95% of roles are posted within the Greater Belfast area with c.2% of roles in Derry/Londonderry and < 1% in areas such as Newry, Mourne and Down and wider Antrim.

14. In April 2023, Belfast hosted the National Cyber Security Centre's flagship event – CyberUK 2023, bringing over 2,000 global cyber security leaders to the region. At a national level, in 2022 UKG published the National Cyber Strategy which sets out a vision to strengthen the UK's ecosystem, build resilience, lead technologically, advance global influence, and detect and disrupt adversaries to 2030. In addition, it also published the Government Cyber Security Strategy (2022-30) which covers the role of the public sector in detecting and managing risk, protecting against attacks, and developing talent.

15. An NI Cyber Snapshot is produced annually by the Centre for Secure Information Technologies (CSIT) and Perspective Economics. It provides a basic overview of the NI cyber security sector. As of 2023 there were 124 companies with commercial or R&D driven cyber security teams in Northern Ireland employing an estimated 2,750 FTEs in cyber security. The average cyber security salary advertised in NI in 2022 was £53,8001. The sector has a target employment figure of 5,000 jobs by 2030, which is viewed as being on track. Estimated direct Gross Value Added (GVA) generated by the sector is approximately £266m; this is a 47 % increase in GVA since 2021 when it was £161m. It is estimated that if the cyber sector achieves this target, it will have an estimated GVA of £505m per annum by 2030.

Opportunities & challenges

16. The software sector has seen sustained growth in recent years and continues to make a significant contribution to the NI economy. The department's external researchers pointed to a number of economic strengths and the potential for continued growth of the software economy - particularly in certain specialisms – but noted key sets of challenges facing the continued development of the sector and a number of new and emerging trends. The department is therefore considering actions focused on the following key areas:

    a. **Collaboration** – seeking to develop collaboration by working on linkages within, and to networks and clusters beyond, Northern Ireland.
    b. **People and skills** – the key challenge emerging from research consultations with software stakeholders was that of the availability of individuals with the skills required. Another issue noted was that of remote working, and the need to optimise its economic benefits. Researchers also found an underrepresentation of women and people with a disability in the industry.
    c. **Innovation** – research considered broader trends, and highlighted a number of key areas where there is a need to grow capacity and capabilities to allow NI to remain globally competitive: Artificial Intelligence (AI), data science and data engineering, and cloud. The department also notes the importance of cyber security as a key area.
    d. **Trade and investment** – seek to support growth in the software sector via focused trade and investment.

17. The department is also reviewing subregional economic priorities in the context of software.

Collaboration

18. The department will also seek to develop, and build on existing, links with other regions and countries. For example, the island of Ireland is recognised as a global cyber security hub. Through engagement with the NI Cyber Cluster and Cyber Ireland we will look to build on this and strengthen North- South relationships. The department is considering cluster policy generally and the outturn of this action plan will be informed by and complement that central cluster work.

19. There is a role for the software industry itself in boosting the breadth and depth of the local talent pool. Sectoral organisations, such as the recently established 'Software NI,' can continue to build on existing work engaging with those who have a potential interest in software. This includes the Department for the Economy which has a specific role in providing information and guidance on careers.

People and Skills

20. A key challenge facing the software sector is the limited availability of people with the required skills – both in respect of giving local people the skills and training they need and in attracting skilled, experienced individuals from elsewhere.

21. One important part of this is NI's education system, with research consultees advising of a need for improvements to how coding and computational skills are approached in schools. Researchers also found that participation in computing education at school is comparatively low in NI - Computing's share of A-level subjects sat is nearly twice as high in England for example. The Department for the Economy, working with the Department for Education, has therefore considered actions to enhance software-relevant skills in children and younger people through broad improvements to education. These actions are wide-ranging and structural in nature and therefore represent longer-term projects, covering potentially a number of years.

22. Beyond school, there are various pathways into a software career. There are around 5,000 students enrolled on computing courses in NI's Higher Education (HE) Institutes (Queen's University of Belfast, Ulster University or the Open University). There were a further 1,099 enrolments for Information and Communication Technology courses at HE level in NI's Further Education sector in 2021/22. There are also conversion courses and Higher-Level Apprenticeships. However, researchers found that the number of people with software skills and qualifications had not been keeping up with demand from industry (undergraduate acceptances into Computing courses at QUB and UU have been broadly flat in recent years for example). The department will therefore seek to ensure people can gain relevant skills and qualifications through a range of alternative pathways.

23. While Belfast accounts for 18% of the NI population, researchers found that it accounts for 40% of NI's software businesses and is dominant in terms of the sites which have 10 or more employees. The rise in remote and hybrid working, however, means that many of those working for Belfast-based software businesses will, in practice, be working some of the time at home in other areas. Evidence suggests that this form of work is generally popular with employees for reasons such as flexibility. However, researchers pointed to potential disadvantages in terms of reduced co-worker interaction and personal/business development. Given the increased importance of managing remote/hybrid working effectively, sharing of good practice and management guidance across the software sector could be of benefit.

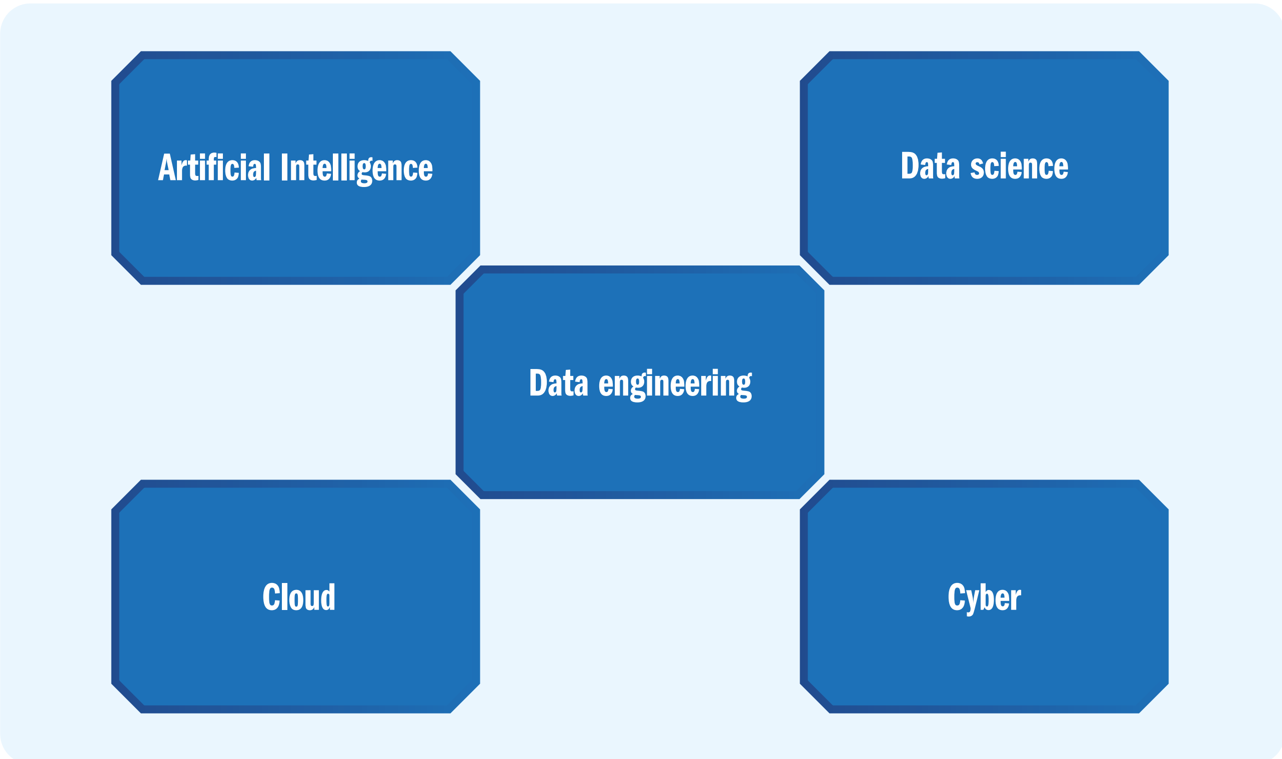
24. External researchers also found that women and people with a disability are underrepresented in the workforce. Women accounted for 27% of employees in software industries, and only 17% of NI residents in software occupations, while around 7.4 % of NI residents working in SIC 62 (Computer programming, consultancy and related activities) had a long-term health problem or disability that limited their day-to-day activities, versus the Northern Ireland average of 11.0%. There are potential benefits to individuals and society if all people have greater opportunity to work in a skilled area such as software. Similarly, there are potential benefits to business and the economy if we can make better use of an under-utilised talent resource

25. Beyond the local talent pool, a key source of skilled and experienced people lies outside Northern Ireland. Working with industry, Invest NI can help to address areas of specific need in the software sector by seeking to attract returning diaspora and new international talent.

Innovation

26. Researchers considered those technologies which were seen as crucial to productivity growth and addressing new market opportunities. Rather than focusing on particular sub-sectors, the study proposed a focus on strengthening NI's position in particular widely applicable technologies. Having considered broader trends, the technologies which were highlighted as the most pressing were: AI; data science and data engineering; and cloud.

27. While the outlook for NI's software sector remains positive, researchers referred to a 'window of opportunity' for NI to strengthen its capabilities in these key areas. This should help NI to remain globally competitive and avoid falling behind competitors. The department is therefore considering actions to improve capacity and capability in AI, data science/engineering and cloud, both in industry and academia, as well as cybersecurity given the sector's importance. In a public consultation held in late 2023, the department recognised these key areas for software. The department will work closely with Invest NI to ensure that software-relevant business support is focused – where appropriate – on strengthening capacity and capability in AI, data science, data engineering, cloud and cyber.



28. The local universities reported difficulties in recruiting PhDs and post-docs in areas such as AI and data science/data engineering, which researchers noted could constrain research in these sectorally important areas, industry/academic collaboration and the flow of postgraduates for industry. To maintain capabilities in a globally competitive environment, the department will consider if funding for these key software-intensive disciplines can be prioritised.

29. The progress seen by the local software sector is as a result of growth in the local NI software and foreign direct investment. Although the software sector has seen success with foreign investment, there are indications that NI is underweight with respect to micro-businesses in software-related areas. Researchers pointed to a focus on supporting local software businesses, as well as noting the role universities can play by highlighting and facilitating entrepreneurship as well as core software subjects. The plan therefore contains actions on encouraging entrepreneurship and a focus on local start-ups/scale ups.

30. NI has become a global cyber security hub, boasting an impressive eco-system of specialist research centres, home-grown innovators and international cyber security leaders. In order to strengthen its position as a location of excellence it is vital that opportunities are explored and maximised where appropriate. The department will seek to do this through engagement with our delivery partners and external stakeholder such as cyber security companies and academic institutions.

Trade & investment

31. As noted above, the growth in NI's software sector has come from both local software firms and foreign direct investment (FDI). The focus on local start-ups and scale-ups noted above can be complemented by considered FDI, which can have a role to play in strengthening NI's software sector through, for example, sharing knowledge, facilitating access to broader expertise and developing critical mass. Another way of driving growth and strengthening the sector is through external sales, given the software market in NI is comparatively small. A local software sector that is outward-looking – seeking to reach new customers and new markets – is one that can build market share and revenue while diversifying its business base.

32. A key priority for the minister is decarbonisation of the economy and the drive towards net zero. There may also be opportunities for the NI software sector in encouraging use of low carbon resources or undertaking measures aimed at improved energy efficiency. Similarly there may be broader market opportunities for NI firms in the new green economy, as governments and industry move towards activities that mitigate or reduce carbon footprints.

33. The NI City and Growth Deals initiative is a £1.3 billion package of capital investment by the NI Executive and the UK Government over the next 10-15 years. Momentum One Zero aims to drive inclusive growth through transforming Northern Ireland's digital economy by substantially increasing digital innovation in the region. Significantly expanding facilities at the Institute of Electronics, Communications and Information Technology (ECIT) in the Titanic Quarter, the £70m project builds on Northern Ireland's proven research in data-driven innovation to tackle the world's toughest challenges. Through engagement with relevant delivery partners the department will seek to ensure this project contributes towards the development of cyber security research and commercialisation.

34. The Minister has pointed towards regional balance as a key priority and the department is looking at how it can support the Minister to deliver against this objective. While remote and hybrid working means that the economic benefits of the Belfast-based software sector will extend to a degree into other parts of NI, the work on regional balance will continue. In Autumn 2024 the department intends to publish a subregional Action plan that will point to our subregional priorities and objectives. At that point in time, and in collaboration with stakeholders, sectoral leads for Software and Cyber will consider how and where we can support the departments priorities in relation to regional balance.

What’s Next?

35. The department and its delivery partners will seek to take forward these actions over the next three years. This will include reviewing and updating the Action Plan on the basis of broader trends and developments in departmental policy. Updated versions of this Action Plan may be published as required over the next three years.

36. We would like to thank our colleagues in DfE, Invest NI, DE, universities and colleges, industry, NI Cyber, CSIT, NI Cyber Security Centre, DSIT, Innovate UK and elsewhere, who contributed to our research and helped to shape this work. Particular thanks also to those individuals who kindly participated in our software research Steering Group. To all, we are grateful for your time and valued contributions.

Theme 1: Collaboration

Objective: To promote growth within the Software and Cyber sectors through collaboration and engagement.

Action No.	Delivery against Minister priorities	Detail	Delivery partners	Timescale
1	• Regional balance • High Productivity	**Collaboration & clusters** - Seek opportunities for improved collaboration by linking in with Ireland/UK-wide/GB/EU/international bodies, networks and clusters.	DfE (initial scoping)	Commencing 2024
2	• High productivity • Good jobs	**Industry communication** - Bodies such as Software NI should consider how best to communicate the opportunities offered by the software sector to key target audiences, including DfE in its specific role with respect to careers advice.	Software NI	Underway
3	• High Productivity • Good jobs	**Strengthen our position as a Cyber Security location of excellence** - explore opportunities to strengthen the north's position in relation to Cyber via collaboration and engagement with our delivery partners and external stakeholders.	DfE, DfE delivery partners as appropriate, Industry & NI Cyber	Commencing 2024

Theme 2 : People and Skills

Objective: Seeking to ensure that the software sector has the people with the skills it needs, from a broader talent pool.

Action No.	Delivery against Minister priorities	Detail	Delivery partners	Timescale
4	• High Productivity • Good Jobs	**Computing education** - DfE & DE should jointly research global best practice in computing education from primary through to tertiary levels, assess the applicability of initiatives/policies to the NI context, and implement pilots of the most promising approaches.	DfE, DE	Commencing 2024
5	• High Productivity • Good Jobs	**Skills & education** - DE should take a strategic approach to improving and enhancing the delivery of Digital Skills – including computational thinking and coding skills – across all key stages to equip children and young people with the necessary skills and develop a progression framework to support this including detailing the gateway skills and qualifications which are required to progress to FE, HE, training and employment careers in the digital skills and software industry. This should be done in liaison with CCEA, ETI, schools, DfE, the universities and industry.	DE	Underway
6	• High productivity • Good jobs • Regional balance	**Skills & qualifications** - With the universities, the FE sector and industry partners, DfE should continue to grow the numbers of people obtaining Computing-related skills and qualifications, through a variety of pathways, at a pace which takes into consideration the longer-term needs of NI's software economy.	DfE, HE, FE, industry	Underway
7	• High productivity • Good jobs	**Remote working** - DfE and Invest NI should facilitate the spread of best practice in remote working approaches across the software sector.	DfE, Invest NI	Commencing 2024
8	• High productivity • Good jobs	**Widening participation** - Within the scope of existing DfE structures, explore opportunities to tackle barriers to entry to the sector.	DfE	Commencing 2024

Theme 2: People and Skills (continued)

Action No.	Delivery against Minister priorities	Detail	Delivery partners	Timescale
9	• High productivity • Good jobs	**International talent** - DfE and Invest NI should take advantage of recent economic and working practice developments to facilitate an increase in the flow of experienced technical and commercial software talent re-locating to NI from GB, RoI and further afield.	DfE, Invest NI	Underway

Theme 3 : Innovation

Objective: Strengthening our position in key technologies (Artificial Intelligence (AI), data science, data engineering, cloud and cyber) and supporting the growth of local start-ups/scale-ups.

Action No.	Delivery against Minister priorities	Detail	Delivery partners	Timescale
10	• High productivity	**Technology focus** - Alignment of DfE and INI priorities in relation to software in respect of general purpose technology competences in AI, data science, data engineering, cyber security and cloud.	DfE, Invest NI	Commencing 2024
11	• High productivity	**PhDs/post-docs** - DfE to consider the potential to prioritise funding available for PhDs and post-docs in software-intensive disciplines (in particular AI, data science, data engineering and Cyber).	DfE, HE	Commencing 2024
12	• Net zero	**Entrepreneurship** - QUB and UU should: • offer opportunities for entrepreneurship and management education alongside relevant subject areas for the software sector; and • facilitate 'collision' opportunities between potential future co-founders.	QUB/UU	Underway
13	• High productivity	**Entrepreneurship/start-ups/scale-ups** - DfE and Invest NI should put emphasis on entrepreneurship and indigenous start-ups and scale-ups in software-intensive activities (including cyber).	DfE, Invest NI	Commencing 2024

Theme 4 : Trade and investment

Objective: Seek to support growth in the software sector via focused trade and investment.

Action No.	Delivery against Minister priorities	Detail	Delivery partners	Timescale
14	• High productivity	**Foreign Direct Investment (FDI)** - Build a strong FDI proposition for the software sector focusing on AI, Data science/engineering and Cyber.	DfE, Invest NI	Initial scoping underway
15	• High productivity	**Trade** - Invest NI should focus on Software and Cyber for export support and explore the potential for new markets /market access for businesses in the software sector, taking into consideration the particular challenges experienced by the sector.	Invest NI	Commencing 2024
16	• Net zero	**Net zero** - Support local software businesses to: (a) identify new market opportunities in the green economy locally and internationally; and (b) green their operations, reducing energy and resource costs.	Invest NI	Underway
17	• High productivity	**Investment** - Ensure that DfE investments such as City Deal investments e.g. Momentum One Zero support the development of cyber security research and commercialisation.	DfE, Invest NI and DfE delivery partners as appropriate	Commencing 2024