

## Our Vision – Q1

### Areas to consider:

- What are the innovation-rich sectors and sub-sectors where Scotland has existing or emerging competitive strength?
- How can we support these sectors to compete, collaborate and seek out global opportunities? What are our most exciting and promising areas of research and innovation where we have an opportunity to grow a significant industrial base in Scotland?
- What are the disruptive global megatrends that we want to harness and capture in Scotland? What steps will we need to take to support our businesses, universities and citizens to be able to engage with those opportunities?
- Should we prioritise our support for early-stage research to create the discoveries and innovations of the future, or shift the balance of our support towards research translation and commercialisation of today's new ideas?
- To what extent should we align our support for early-stage research with our economic and societal ambitions?
- International comparators

### How do we make Scotland one of the most innovative small economies in the world?

The Innovation Centres seem to be having a positive impact but there are many small initiatives in Scotland which all contribute to the innovation ecosystem.

In the [SSAC Report - Building on the Science Legacy of Covid-19 in Scotland.pdf](https://www.scottishscience.org.uk) ([scottishscience.org.uk](https://www.scottishscience.org.uk)) we recommend a focus on enhancing connectivity across the science community and its connections with both the private and policy sectors. This recent example echoes sentiment of Recommendation 1 in the Muscatelli Report [https://www.gla.ac.uk/media/Media\\_700300\\_smx.pdf](https://www.gla.ac.uk/media/Media_700300_smx.pdf). Successful innovation and enterprise requires a diverse ecosystem connecting researchers, industry and business comprising companies new and small with those that are multinational, large and established, together with policy makers and government.

This does not need financial investment, the need is more for bodies with a common goal to come together to identify their individual niches and then work together to avoid duplication and capture synergy. A transparent and collaborative network with the aim of integrating and synthesising knowledge and experience could provide a more cohesive body of evidence to inform policy decisions. Undertaking a social network analysis of the current ecosystem could be useful in identifying effective nodes of knowledge transfer.

An example from the Health sector of a collaboration involving 15 partners from across industry, the NHS, and academia is The Industrial Centre for Artificial Intelligence Research in Digital Diagnostics.

The SSAC is also recommending the appointment of an independent Chief Technology Adviser to work as part of the cadre of “Chief Advisers” within the Scottish Government.

## Our Vision – Q2

- Net Zero

- Wellbeing economy
- Improved productivity
- Inclusive growth
- International comparators

### **How can we better use innovation to help achieve Scotland's broader economic and societal ambitions?**

In 2020 SSAC published a report: [SSAC Report - The Environmental Impacts of the Scottish Manufacturing Industry 0.pdf \(scottishscience.org.uk\)](https://www.scottishscience.org.uk/wp-content/uploads/2020/09/SSAC-Report-The-Environmental-Impacts-of-the-Scottish-Manufacturing-Industry-0.pdf) which made the following recommendations with respect to helping the manufacturing sector manage its environmental impact. Many of these are also relevant to other sectors.

- Establish strategic pan-Scottish coordination of sustainable and circular manufacturing to drive the transition to Net-Zero.
- Develop a suite of manufacturing sector roadmaps to Net-Zero, including resilience and supply chain, at both the general manufacturing and key sectoral levels.
- Develop an integrated environmental impacts training programme for SMEs and industry targeted at supply chain opportunities and linked to Scottish Government Just Transition.
- Identify opportunities in supply chains where Scotland is in a potentially strong position to lead in manufacturing in the context of domestic and global Net-Zero.
- Integrate circularity into the design of products, with second life, reuse and reassembly addressed at the product design stage.
- Review incentives and tax-based approaches holistically, and provide support for investment in new technology using targeted fiscal measures and incentives with loans or grants.
- Develop an enhanced national knowledge exchange coordination framework, based on the existing network of support organisations, to act as a 'one-stop shop' for decision-makers in manufacturing to seek advice and to act as a central portal for signposting of funding.
- Benchmark global best practice for certification and standards on environmental impacts and circularity for products and processes underpinning the future development or adoption of a recommended toolkit and Life Cycle Assessment (LCA) standard for Scotland.
- Launch a dual initiative to tackle resilience and environmental aspects for responsible local production and supply.
- Collate and develop a suite of case studies across selected manufacturing sectors as part of a nationwide initiative.
- Develop an integrated digital lean production system integrating technologies to reduce waste and to address sustainability and supply chain resilience

In the process leading to our soon-to-be-published report on "Quantum Technologies: Opportunities for Scotland" we also considered the application of innovations to Net Zero goals. One "learning" from that process (which we have adopted more widely), which involves a virtual "Roundtable" bringing together a wide range of stakeholders with policy officials for plenary and breakout sessions, is the enthusiasm shown by stakeholders for a

better understanding of the policy process and by officials for the informal insights contributed in this format.

Another relevant SSAC report is on: [Future Landscapes Report on Geospatial Knowledge.pdf \(scottishscience.org.uk\)](https://www.scottishscience.org.uk/~/media/SSAC/Reports/Future_Landscapes_Report_on_Geospatial_Knowledge.pdf). Innovation and investment in the digital infrastructures of data held by public, academic and private sectors could unlock economic development in all sectors that rely on geospatial information. Viewing digital infrastructure in the same light as physical infrastructure (transport, energy), i.e. as an essential service of the digital age. SSAC recommended that a Scotland-wide geospatial framework should be established to combine expertise and datasets across policy areas, starting with the Environment, involving a consortium of cross-sectoral partners, allowing for expert input to policy decisions of a geospatial nature. [ERAMMP](#), co-funded by the Welsh Government, is a prime illustrative example which could provide the basis for a similar group in Scotland.

Increasing interest of life science companies to engage with the Scottish NHS and clinical academics in what is best described as a triple helix partnerships was referred to in [SSAC Report - Building on the Science Legacy of Covid-19 in Scotland.pdf \(scottishscience.org.uk\)](https://www.scottishscience.org.uk/~/media/SSAC/Reports/SSAC_Report_Building_on_the_Science_Legacy_of_Covid-19_in_Scotland.pdf). One of main themes already acknowledged as Scottish priority area is Precision Medicine described in the Science and Innovation Audit report sponsored by the UK Department for Business Energy and Industrial Strategy [University of Glasgow - Research - Glasgow Research Beacons - Precision Medicine & Chronic Diseases - Research features - Science and Innovation Audit](#)

### **Our vision - Q3**

- Jobs created in high-value, innovation-rich sectors
- Companies created / supported / scaling
- Levels of private and foreign direct investment
- International comparators

### **How can we measure progress and what metrics and indicators should we use?**

The challenge of this is highlighted in [Levelling Up the United Kingdom: missions and metrics Technical Annex \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/611111/Levelling_Up_the_United_Kingdom_missions_and_metrics_Technical_Annex.pdf) that saw low ratings for methods/metrics/measurement against physical, intangible, human, financial, social and institutional capitals.

However, in a regional and Scottish context a key consideration in setting and selecting metrics and indicators is to consider the “fitness” of the metrics to the desired outcome, referring back to Q1 and the need for the whole system to work co-operatively and effectively. Identification of metrics should involve engagement with social scientists (including behaviour experts) to consider actions that are social and network based which could drive performance but are lost in (traditional) raw measurement of performance/outcomes of human capital such as educational attainment.

### Theme 1 – World Leading Excellence and Expertise – Question 1

- What are the innovation-rich sectors and sub-sectors where Scotland has existing or emerging competitive strength?
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### What sectors and sub-sectors should Scotland aim to be a world leader in?

We would agree that investing in a few key priority sectors may bring benefits but that carries risks if the overall package of support (e.g. to ensure skills available at all levels required, an attractive research environment and investment is accessible) cannot be sustained. (Consider, for example, current flatlining of SFC funding, possible loss of access to Horizon Europe funding etc). Scotland also makes important contributions to supply chains (e.g. in quantum technologies), to early stage innovation (which can contribute to multiple sectors) and to enabling technologies (e.g. digital). Focusing on a few priority sectors should not be at the expense of retaining this wider expertise.

### Theme 1 – World Leading Excellence and Expertise – Q2

- How can we improve the connections between academia and industry?
- How can we further encourage and support the successful commercialisation of university research, including through spinouts and licensing?
- How can we work with universities and colleges as educators and trainers, as performers of research and knowledge exchange, and as supporters of new business formation to make a transformational change in innovation performance?
- International comparators

### How do we ensure that our universities, and other research and innovation performing institutions, act as anchors for the economy, playing their fullest role in helping grow businesses at the cutting edge of innovation?

In the SSAC review of Opportunities in Quantum Technology the following priorities were identified:

- Importance of leveraging research funding;
- Continuing to stimulate SME formation and their support;
- Engaging larger companies (*many of which will be multi-nationals*);
- Developing international relationships;

- Involving infrastructure companies;
- Engaging potential users;
- Developing and retaining talent.

We would also point to successful initiatives elsewhere:

At UK level, UKRI funds the Impact Accelerator accounts which have been awarded to universities and research organisations specifically designed to encourage translation and commercialisation [UKRI impact acceleration accounts – UKRI](#)

There is a need for better shared understanding of the roles of different parts of the ecosystem: an example of good practice is the system of job-share between the private sector and academia which is part of the world-leading innovation landscape in the US.

This is frequently referred to as a porosity between academia ( universities and research institutes) and industry. Ways to encourage early- and mid-career researchers to spend significant periods of time in industry as part of a career development plan which sees them return to academia should be explored. A reciprocal approach where researchers employed in industry spend time in academia could also help to accelerate innovation. These bilateral engagements will create a cadre of collaborators and innovators for Scotland.

### **Theme 1 – World Leading Excellence and Expertise – Q3**

- How can we ensure regions across Scotland contribute to and benefit from a more innovative and productive economy?
- How do we build innovation systems that deliver regional economic priorities and attract talent and investment to the region?
- How best do we connect companies with Scotland’s existing innovation assets and major place-based projects to drive competitive advantage?
- International comparators

**How do we support and grow clusters of excellence to deliver on our vision for innovation?**

### **Theme 2 – Investing in Innovative Businesses - Question 1**

- What does a business innovation user journey look like? How could this be improved?
- How can we encourage and support more businesses to innovate?
- What can we do to improve skills and training?
- How can we encourage a culture of entrepreneurship in Scotland?
- How can we ensure that the most innovative businesses can start and scale in Scotland?
- Have we got the right mix of incentives and regulations?
- International comparators

**What can we do to help businesses innovate today?**

## Theme 2 – Investing in Innovative Businesses - Question 2

- How do we engage and bring in additional private funding?
- What steps can Scotland take to attract additional international investment, and what role does public funding for innovation play in this?
- How can we engage more effectively with UK, European and international agencies in order to maximise the proportion of funding that gets spent in Scotland?
- Is the financing landscape in Scotland one that helps people start and grow businesses and supports business investment in research and development?
- International comparators

### How can we maximise the funding and investment available to businesses that innovate?

## Theme 3 – Adoption and Diffusion of Technology - Question 1

- Digital adoption
- Diffusion of technology
- Training and skills
- Management and leadership
- International comparators

### How can we become one of the best places in Europe for the adoption and diffusion of technology?

Research has shown that early engagement with end users and an understanding of the pathway from research outputs through to impacts are amongst factors promoting successful adoption and diffusion. The SSAC process of creating a space in which policy officials can interact with a range of stakeholders, both those directly in the pathway to adoption of innovations and those with a strong interest (e.g. consumers), can help to manage some of the risks.

### Q2

- Process innovation
- Technological adoption and diffusion
- Product-based innovation e.g. business models, product design and speed of iteration
- Peer learning and cooperation
- International comparators

### How can we better support businesses to improve their ways of working and be adaptive and responsive to changing markets?

## Theme 4 – Role of the Public Sector and Procurement – Question 1

- How can we ensure that public sector spend is a driver of innovation?
- How can we influence sectors like construction and health to embrace innovation?

- What can we do on pre-commercial procurement?
- International comparators

**What levers do we have in terms of public sector procurement which would encourage greater innovation within key sectors?**

### **Theme 5 – Innovation Infrastructure and Architecture - Question 1**

- Do we have the right mix of institutions, assets, programmes and agencies?
- Do they operate with sufficient scale and ambition?
- Do they collaborate sufficiently?
- Is there anything missing from the landscape? Are there overlaps or duplication that we need to address?
- International comparators

**Do we have the infrastructure and architecture in place to become a world leading innovation ecosystem?**

In our answer to Q1 we noted the potential benefits of social network analysis to better understand the attributes of the current landscape and how actors use the innovation infrastructures and architectures in place. SSAC would also emphasise the importance of engaging larger companies (including international ones), infrastructure providers and the potential users of innovative technologies (not just the technology developers) in aspiring to world-leading innovation.

### **Theme 5 – Innovation Infrastructure and Architecture - Question 2**

- Leadership and co-ordination and coherence
- Structures, processes and mechanisms
- The ability to move quickly when opportunities arise
- Connections and relationships between academia, industry and the public sector
- International comparators

**What opportunities are there for greater co-ordination and collaboration across the ecosystem?**

Covered in our response to Q1