

# Scotland's AI strategy

Volume 3: Key findings from the Working Group discussions

Report to the Data Lab and Scottish Government

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# 1 Introduction

This report documents the key outputs from Scotland's AI strategy working group discussions that took place between May and early August 2020.

## 1.1 Context

Prior to the formation of the working groups, two workshops with the Steering Committee informed the development of a [scoping document](#) which highlighted a number of key issues for the working groups to address. The scoping document was also used to inform the public consultation and public engagement exercises which were undertaken in parallel to the working group discussions. The outputs of these exercises can be found [here](#).

The scoping document proposed a direction for the strategy and contained an ecosystem model (see appendix A).

The scoping document proposed that strategic success will be determined by adoption of AI technologies across Scotland. This means that the strategy is [a strategy for Scotland](#) not an AI sector strategy or a public sector only strategy. The scoping document also directs Scotland's approach to the development and adoption of AI toward a focus on societal good and delivery of the National Outcomes.

The initial statement of vision in the scoping document was:

[The overarching vision of Scotland's AI Strategy will be to use AI to benefit Scotland's people and organisations, and help to achieve the transformational change envisioned in the National Outcomes.](#)

The ecosystem model in the scoping document summarises steering committee discussions by displaying the key areas of activity that will support an AI strategy for Scotland and highlighting the interdependency between these areas. The key areas of activity and the need for them to link together informed the structure of the working groups.

## 1.2 The working groups

The working groups were formed through a dual process of application and invitation. Membership of the working groups can be found [here](#).

There were five working groups:

- Development of AI and AI Enabled Products and Services;
- Ethical and Regulatory Frameworks;
- Skills and Knowledge;
- Data Infrastructure; and
- Join the Dots.

Over the course of the discussions, the [Skills and Knowledge](#) working group refined their area of interest by separating it into two related themes:

- Skills of the Workforce; and
- Knowledge and Understanding of AI Technologies.

Similarly, the [Join the Dots](#) working group evolved to become [Join the Dots and Leadership](#).

## 1.3 Purpose of the working groups

The broad aims of the working groups were:

- to bring in diverse expertise to develop the strategy and its roadmap;
- to focus on key strands of Scotland's AI ecosystem and the areas that need to be strengthened over the next five years;
- to develop an ambition for the strand which contributes towards the common vision of the AI strategy;
- to identify the key steps and milestones in the strand and strategy roadmap / to deliver the ambition and vision;

- to ensure strand priorities contribute to the development of a productive and effective ecosystem. This will include exploring links to other initiatives in Scotland, UK and internationally; and
- to identify how to develop shared ownership and responsibility for delivering the strategy and roadmap.

In advance of the first meeting, working group members received the detailed terms of reference and the scoping document.

## 1.4 The working group process

Each working group met three times: an orientation session, workshop two and workshop three. Each meeting lasted for two hours and was held online in Microsoft Teams.

The purpose of the [orientation session](#) was:

- to review the Terms of Reference for the working group, including the key questions posed to the working group in the scoping document; and
- to explore the vision and ecosystem framework proposed in the scoping document.

The purpose of [workshop two](#) was to explore the dynamics of success for Scotland's AI strategy and, in particular, to identify the priority issues in respect of each theme and to identify how they could contribute to achieving Scotland's ambition.

Further detail of the discussions in workshops one and two can be found in the individual workshop reports ([www.scotlandaistrategy.com](http://www.scotlandaistrategy.com)).

Once the working groups had completed workshop two, Anderson Solutions developed a visual model that built on the key outputs from the discussions and set out initial proposals from each working group for aim, outcomes and actions under each strategic theme for Scotland's AI strategy. The visual model also included a high-level strategic aim, alongside societal goals and strategic outcomes based on discussions at all the different workshops. The purpose was to provide a picture of the output so far from all working groups

and create an overarching strategic framework for each thematic area to work within.

The purpose of [workshop three](#) was to test and refine this model.

## 1.5 Report structure

This report documents the key outputs of the working groups on thematic objectives, outcomes and actions from the working groups.

[Section 2](#) presents the high-level strategic aim and outcomes as amended following presentation and discussion at the workshops. The high-level strategic aim and outcomes creates an umbrella under which all of the strategic themes sit.

[Sections 3 – 9](#) record the final outputs from the working groups. Each section sets out the:

- thematic objective;
- thematic outcomes;
- thematic actions required; and
- additional issues and points raised during the workshop conversations that Scottish Government will wish to consider as it draws up the strategy.

Section 9 collates discussion around investment – an important node in the ecosystem. Although none of the working groups were focused on investment, outcomes and actions related to investment were common topics of conversation across several working groups.

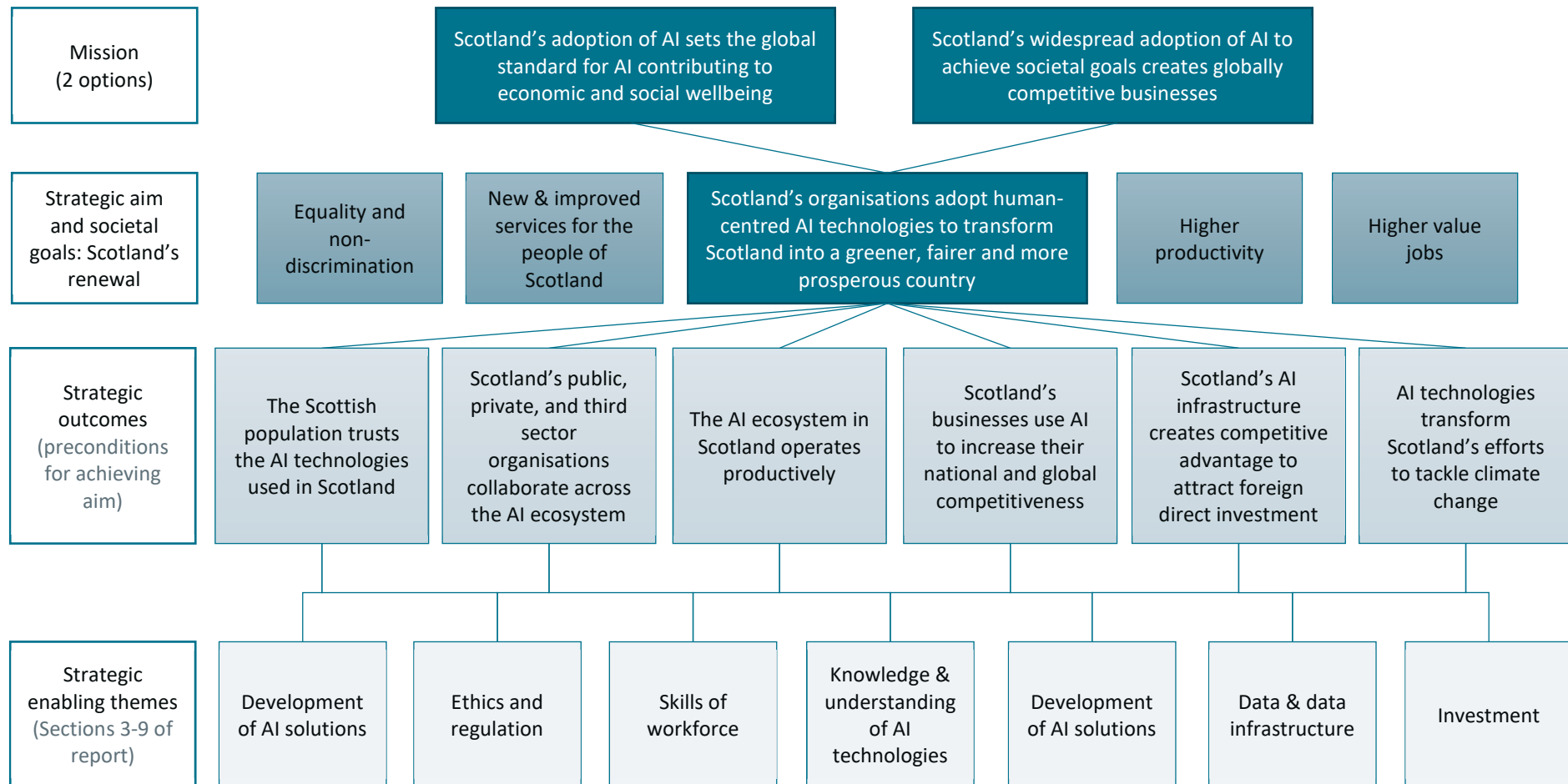
The mapping of thematic actions against thematic outcomes, that is set out in this document, took place in part during workshops and in part during the reporting phase. The latter allocated actions to the most relevant thematic objective and outcome. For example, several working groups discussed actions around skills development and investment, and these are mapped to the skills and investment themes as appropriate. A consequence of the time

available to each working group and, to some degree, the focus of the discussions means that some gaps remain, for example a small number of thematic outcomes do not have associated actions. These gaps will require further consideration.

[Section 10](#) summarises the key characteristics of a productive and resilient AI ecosystem, and a revised ecosystem model. The summary and revised model were prepared following the working groups discussions. Section 10 also contains a proposal from Anderson Solutions for key questions to be considered in the next stage of the strategy development process.

## 2 High-level strategic purpose

A high-level strategic purpose was created from discussions in the first two rounds of working group workshops. The purpose was to provide a picture of the whole to each working group and create an overarching strategic purpose for each thematic area to discuss and work towards. The high-level strategic purpose was presented to each working group in their third workshop, alongside the proposals for thematic outcomes and actions that emerged from the earlier workshops. The content of the high-level strategic purpose was developed further following discussion in the final workshops, and the latest version is presented below. The proposals from the working groups for objectives, outcomes and actions under each of the strategic themes form Sections 3-9 of the report.



### 3 Development of AI solutions

#### 3.1 Thematic objective, outcomes and actions<sup>1</sup>

Thematic objective	
Scotland punches above its weight in the development of AI technologies that will benefit Scotland and societies across the World.	
Thematic outcomes	Thematic Actions
1. Scotland is an exciting place to be and operates as an ethical living lab for AI technologies	1.i Develop a centre of excellence to bridge the gap between AI expertise and the sectors and organisations who can use AI – consider how the role of a centre of excellence could be delivered in a more virtual form using existing capacity e.g. link centres of expertise and doctoral training centres already operating in Scotland 1.ii Develop a better understanding of Scotland’s current AI capabilities (baseline) and increase awareness of existing activity 1.iii Increase the incentives (and remove disincentives) for academics to work part-time in industry to accelerate knowledge transfer. Marrying research and enterprise skills together is essential 1.iv Create space and investment for organic development of AI technologies (i.e. not linked to priorities)
2. Shared national priorities are the focus of collaborative problem solving and pursuit of opportunity	2.i Quickly create a short-term plan to prioritise a small number of nationally important areas/sectors where AI can accelerate improvement 2.ii Launch an industry challenge (competition) to focus on a specific challenge or opportunity

<sup>1</sup> Thematic actions were not necessarily identified for each thematic outcome during the workshops. This does not indicate a less important thematic outcome, it is either that no specific actions were identified in the time available during the workshops, or that actions that may respond to the outcome are allocated to another theme.



	<ul style="list-style-type: none"> <li>2.iii Develop an agile and collaborative method of working that links academia, industry, public and third sectors to address challenges and pursue opportunities.</li> <li>2.iv Map and connect existing expertise to national challenges and opportunities</li> </ul>
3. An agile and open approach enables learning and adjustment in the adoption of AI in Scotland	<ul style="list-style-type: none"> <li>3.i Monitor what Scotland learns in developing and implementing AI for societal good to support improvement and to export expertise to educate others</li> <li>3.ii Support commercial development of new and existing AI technologies</li> <li>3.iii Create use cases so that the potential of AI is better understood</li> </ul>
4. All stakeholders, including citizens, are involved in the development of AI technologies	<ul style="list-style-type: none"> <li>4.i Develop a model for citizen engagement in the development of AI technologies “they know what they need”</li> <li>4.ii Ensure diverse perspectives are engaged in the development of AI technologies e.g. more diverse teams working together in universities</li> <li>4.iii Create opportunities for businesses to collaborate</li> <li>4.iv Encourage professional bodies to set up AI working groups</li> </ul>
5. Scotland’s approach to the development of AI and AI enabled products and services attracts international investment	<ul style="list-style-type: none"> <li>5.i Develop and promote the ‘Scotland method’ for the development and adoption of AI technologies for societal good</li> <li>5.i Identify and promote what makes Scotland an attractive AI wealth creator at a global level. Scotland’s USP</li> </ul>
6. Accelerated change and value are achieved through reuse and adoption of existing AI - apply existing science to create value	

## 3.2 Additional issues to consider when drawing up the strategy

The following bullets summarise issues raised in the workshops that may require further consideration.

### From workshop three

- The diversity of teams *currently* developing AI is low. Addressing this requires a significant piece of work.
- Scotland needs an honest assessment of the current baseline with respect to its competitive position and attractiveness as a location for mobile talent.
- Scotland needs to act quickly to pull together the strategy – or else the private sector may move forwards on its own and leave government behind. Opportunities for a coordinated ecosystem approach will then be lost.
- The general population has concerns about the job losses that AI will bring. Addressing these concerns will require an open appraisal and clear communication.
- There is a marketing opportunity for Scotland to host a global AI event at which it launches the strategy.
- Opening data for research – and consequently data labelling and democratisation – are crucial elements of the strategy.
- Marrying research and enterprise skills together are essential.
- The strategy needs to deliver vertical integration in the development and adoption of AI.
- Skills development to support all aspects of the vertical chain is vital.
- Making Scotland an exciting place for AI feels like an important goal.

- Linking and coordinating existing resources may be a better approach than setting up a new ‘centre of excellence’.
- The strategy needs to take a clear view on what its value proposition and its focus should be. Developing AI in new areas? Specific sectors? Application rather than development? Product improvement? Scotland’s competitiveness?

### From workshop two

- Providing support to organisations to encourage adoption and innovation will be key.
- Leadership – and a coordinated strategic approach – will be key for successful intervention.
- Identify a simple means of communicating the presence of AI/ML and modelling in everyday use and products and services (e.g. AI mark).
- Engage with education stakeholders to identify themes and priorities for inclusion in the curriculum: this should impact not just the computer science and math curriculum but also business studies and philosophy.
- Invest in priority areas and goals for R&D. Consider an Innovation Fund to support this, linked to specific Scottish Challenges.
- Match making to introduce Businesses to AI suppliers.
- Develop a clear communication strategy.
- Ensure the role of AI is understood horizontally across all domains of public policy strategy.
- Develop a public information programme - *What is AI?* - similar to recent Covid-19 public health announcements.

### From the orientation workshop

- How do we ensure that AI can harness economic growth across all of Scotland?

- Make governance an underpinning principle rather than an aspect of the strategy.
- Look at practices adopted in the countries leading in this field and learn from their experiences - such as Finland. Much of the work has already been done and we should extend rather than invent.
- Where is privacy covered?
- How to develop "trust to use" across the SME (Small and Medium-sized Enterprises) base that makes up about 90% of companies in Scotland. There is a reticence in the SME private sector to engage with technological solutions. For example, not easy to get SMEs to use CRM (Customer Relationship Management), there is low take up of a loan scheme available to SMEs to help them invest, there is a lack of business

ambition in Scotland, Scottish companies can be risk averse – cultural, not just linked to AI.

- Get academia and industry to work as a collaborative. They should not be seen as separate blocks but on a spectrum of development from theory to practice.
- In discussing AI, we should talk about what someone will experience rather than how that experience will be enabled. Establish use cases – focus attention on using AI to support outcomes rather than on AI as a technology/approach.
- Regulation has an important role in supporting innovation. For example, GDPR forced people to innovate in a way they would not otherwise have done, which was a positive thing. Regulation can be a very positive thing.

## 4 Ethical and regulatory frameworks

### 4.1 Thematic objective, outcomes and actions<sup>2</sup>

Thematic objective	Ethical and Regulatory Frameworks drive impact from AI through engendering trust in AI amongst Scotland's citizens	
Thematic outcomes	Thematic Actions	
<p>1. Scotland has an ethically responsible professional AI culture and ethical principles around AI are widely adopted</p>	<p>1.i Incentives and levers are applied to promote adoption of ethical principles alongside adoption of AI: e.g. funding requirements, procurement, skills</p> <p>1.ii Create RRI (Responsible Research and Innovation) resources to guide new innovations</p>	
<p>2. Equality and non-discrimination are central to the Frameworks and wider AI strategy so that existing inequalities are not exacerbated by AI</p>	<p><i>Links directly to Section 2, point 4.ii 'Ensure diverse perspectives are engaged in the development of AI technologies e.g. more diverse teams working together in universities'</i></p>	
<p>3. The frameworks within which all should operate when developing and adopting AI are clear and accessible</p>	<p>3.i Create a clear and accessible ethical principles framework for AI in Scotland by engaging with all stakeholders</p> <p>3.ii Establish DPIAs and EIAs (data protection and ethical impact assessments) aligned to principles in framework</p> <p>3.iii Create an audit of practice for the development and adoption of AI. Align this to impact assessments</p> <p>3.iv Establish a business model for ethical assessment to ensure adherence to ethical practice</p>	

<sup>2</sup> Thematic actions were not necessarily identified for each thematic outcome during the workshops. This does not indicate a less important thematic outcome, it is either that no specific actions were identified in the time available during the workshops, or that actions that may respond to the outcome are allocated to another theme.

	3.v Build competencies (analytical expertise to provide quality assurance) into existing structures
4. AI systems are verifiable and accountable	4.i Identify simple means of communicating presence of AI - AI Kitemark
5. The frameworks resolve the tension between innovation and regulation, and the challenge of enforcement. Red lines define unacceptable AI, supported by existing and new regulation	5.i Establish AI red lines for unacceptable AI in Scotland and develop supporting regulation where appropriate and necessary
6. The citizen is engaged in the process and has access to a system of recourse	6.i New standards are co-created with all stakeholders including citizens 6.ii The population knows when AI is being used and can distinguish if it is a must use system 6.iii Establish an advocacy organisation that can work on behalf of citizen and help and advise citizen around AI and recourse
7. Scotland has learned from others and adopted best practice	7.i Scotland could act early to adopt standards already under development e.g. IEEE P7001
8. Scotland has an aspirational and global voice on ethically responsible and trustworthy AI	8.i Establish where Scotland has devolved power to establish standards and regulation and where it needs to influence others

## 4.2 Additional issues to consider when drawing up the strategy

### From workshop three

- How much of AI/data ethics is devolved?
- How will Scotland's strategy link to – and align with - the UK strategy?
- How will the strategic process ensure Scotland is resilient in light of the risks associated with Brexit?
- What are the implications of GDPR for the Strategy?
- Scotland does not have a strong mechanism of enforcement. A lot of existing regulation is not adhered to.
- Most businesses do not take voluntary steps to address equality.
- The ethical framework needs to be flexible in a fast-moving environment.
- The private sector needs an incentive to come to Scotland if they are to go through an ethical assessment.
- Scotland needs clarity in the language it uses around design, implementation and use of AI.
- How will the development of Scotland's ethical and regulatory framework be funded?

### From workshop two

- Ensure full engagement with the third sector and local authorities to support a profiled, regional approach.
- Elucidate a set of proto-standards and share widely to co-create standards with business and wider stakeholders in Scotland.
- Ensure the public are and feel included and consulted.
- Consider a multi-agency integrated plan of action to support AI R&D.

### From the orientation workshop

- Women's existing inequality is a weakness for Scotland. It also means there's an opportunity to use the AI strategy to improve the lives of women. This inequality is also a threat as there's a risk that increased adoption of AI exacerbates the problem.
- Inequality in the system can start with the make-up of teams in universities, with predominantly male cohorts, and this will impact design and everything that follows. Need to consider equality throughout process e.g. in the design of products, make-up of workforce, who is going to be using the products.
- How will EU regulation fit into this and what about the current Scottish regulatory landscape? How aligned to Europe do we want to be in Scotland?
- What about a consent-based model? Or do we have public interest options as under GDPR?
- Need to be clear about how we create the right ecosystem incentives for ethical AI development and deployment, to reduce burden on enforcement.
- Education of the population in digital literacy including AI is so important and this is a current weakness (*see Skills of the Workforce thematic outcomes and actions*).
- If Scotland wants to be sector leading in this space, you need to look at range of skills and competencies required and how you retain talent in a globally competitive field (*see Skills of the Workforce thematic outcomes and actions*).

## 5 Skills of the workforce

### 5.1 Thematic objective, outcomes and actions<sup>3</sup>

Thematic objective	
The workforce in Scotland is appropriately skilled and equipped to develop, adopt, use and challenge AI technologies	
Thematic outcomes	Thematic Actions
1. Scotland anticipates and responds to ever changing demand for new skills	1.i Identify and agree what the core skills are for AI in the 'creation of' and 'use of' AI (e.g. data citizen, data worker, data professional, ethical assessor) 1.ii Create an appropriate and robust funding model for AI skills development 1.iii Invest in adult education, particularly for those vulnerable to further exclusion.
2. Scotland's education system is aligned to Scotland's AI needs	2.i Include core skills for AI in the curriculum at all stages in nursery, primary, secondary and tertiary education. 2.ii Include data science as a core competency in all education pathways 2.iii Build subject and pedagogical expertise in teaching
3. Scotland learns from, responds to and develops best practice in workforce development	3.i Create flexible learning programmes for the workforce that reflect different learning styles, accessibility, and skills requirements 3.ii Build a culture of continuous learning to support existing workforce. Begin with upskilling and reskilling initiatives

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<p>4. Scotland's businesses invest in learning and development</p>	<p>4.i Focus on a wide range of businesses, not just technology businesses e.g. hairdressers, garages</p> <p>4.ii Create an AI Academy for Scotland - a membership organisation where industry and academia meet to learn about AI advancements and to advance best practice</p> <p>4.iii Deploy academics as coaches/mentors to in-house analytics teams</p>
<p>5. Opportunity to develop core skills in AI is available to all</p>	<p><i>See actions proposed under the outcomes for new skills, education, and workforce above</i></p>
<p>6. Scotland has a strong local AI talent pipeline</p>	<p>6.i Create AI Training Centres</p> <p>6.ii Establish doctoral training centres for cutting edge research and development</p>
<p>7. Scotland is a magnet for international AI talent / AI talent sticks to Scotland, including senior academic and commercial talent</p>	
<p>8. Ethical and moral literacy is embedded in all AI skills development</p>	



## 5.2 Additional issues to consider when drawing up the strategy

### From workshop three

- Involve the third sector in skills development and all other aspects of the strategy.
- How should the AI strategy connect to – and draw in – Scotland’s city deals and other initiatives to add value?
- Ensure that an AI Academy (if established) complements rather than crowds out existing activity.
- Scotland must ensure that the strategy addresses the disconnect between industry and academia.
- Review and draw on Lesson from elsewhere (e.g. CodeClan).

### From workshop two

- The strategy needs to support the development of skills and knowledge in SMEs.
- The strategy needs to make Scotland a world-renowned innovation hub for the commercial development of AI solutions that deliver economic and social prosperity.
- Scotland needs to address its lack of skills in the commercialisation process.

### From the orientation workshop

- There are big gaps between developers working on highly technical problems and industry.
- ...and between AI development in academia and general business. These gaps create translation problems.

- It is important that there's close partnership between AI development and AI adoption.
- Does the Scottish Government have the right investment strategy?
- Skills investment is critical to drive success. How will Scotland invest in nursery education, in school and in tertiary education to make this a reality?
- Very few of the people on advanced MSc and PhD courses will stay in the UK post-graduation. Scotland has limited opportunities for – and access to - expertise from UK-based students.
- Looking at this from a workforce perspective, how can Scotland embrace the skills of newer recruits (e.g. graduates) with existing staff (who will be less familiar with AI approaches)?
- The language spoken by industry and academia around data science and artificial intelligence is an elite and exclusive language. Need to use simple language to include everyone. If we do not change our language, we exclude people from the beginning.
- Some large organisations are risk averse and can be trapped by existing systems and IT infrastructure which have developed over many years and are hard to adapt.

## 6 Knowledge and understanding of AI technologies

### 6.1 Thematic objective, outcomes and actions<sup>4</sup>

<b>Thematic objective</b>	Scotland has a culture that accepts and enables AI Bridges are created between AI technologies and key audiences - people of Scotland, Scottish government, wider public sector, third sector and business – that increase their knowledge and understanding of AI	
<b>Thematic outcomes</b>	<b>Thematic Actions</b>	
1. People of Scotland have a good knowledge and understanding of AI and are aware of AI in their daily lives	1.i Create a Scottish campaign on AI technologies to inform and inspire the people of Scotland to engage with and adopt AI 1.ii Clearly state why Scotland is adopting AI technologies and use inclusive language and terminology 1.iii Confirm the message that Scotland is already a global leader in AI technologies and is continuing its excellence in invention	
2. The Scottish Government and wider public sector have a good knowledge and understanding of AI and senior decision-makers are comfortable with AI	2.i Create a Scottish campaign on AI technologies to inform and inspire the Scottish Government and wider public sector to engage with and adopt AI 2.ii Build the business case for adopting AI 2.iii Utilise Scottish Government’s internal AI network to act as champions and signposters to inform and inspire Government more widely	

<sup>4</sup> Thematic actions were not necessarily identified for each thematic outcome during the workshops. This does not indicate a less important thematic outcome, it is either that no specific actions were identified in the time available during the workshops, or that actions that may respond to the outcome are allocated to another theme.

<p>3. Scottish businesses and third sector organisations have a good knowledge and understanding of AI and senior decision-makers are comfortable with AI</p>	<p>3.i Create a Scottish campaign on AI technologies to inform and inspire Scottish businesses and third sector organisations to engage with and adopt AI</p> <p>3.ii Build the business case for adopting AI</p> <p>3.iii Utilise existing enterprise networks and groups to act as champions and signposters to inform and inspire Scotland's businesses and third sector organisations</p> <p>3.iv Map business processes to AI potential. Demonstrate business case using real live business situations</p>
<p>4. Scotland is a centre of excellence for open source AI. Transparency from digital service providers enables understanding</p>	<p>4.i AI centres exist across Scotland with a focus on local economic development, including SME development</p> <p>4.ii Develop a Centre of Excellence that operates a hub and spoke model (linked to existing centres and SRPe<sup>5</sup>) and connects AI expertise to Scotland's organisations</p>
<p>5. The younger generation is inspired to engage with AI</p>	<p><i>See Section 4, thematic outcome 2 'Scotland's education system is aligned to Scotland's AI needs'</i></p>
<p>6. A significant percentage of the population understand how AI can be used</p>	<p>6.i Establish an organisation that is a bridge between people and AI to increase AI literacy in the population</p> <p>6.ii Share examples of the beneficial use of AI as an enabling technology</p> <p>6.iii Show negative examples of AI and examples of where challenges exist ethically</p>

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<sup>5</sup> Scottish Research Partnership in Engineering

## 6.2 Additional issues to consider when drawing up the strategy

### From workshop three

- Organisations will need to recognize when younger staff members have a better understanding of known unknowns around AI.
- Look for organisations that can build a bridge between AI and citizens.
- Trusted community organisations and peers have a role to play.

### From workshop two

- The strategy needs to develop knowledge and understanding in SMEs.
- The strategy needs to identify priority sectors and technologies for investment based on Scotland's USP.

### From the orientation workshop

- How do we educate the general public so they are not 'scared' of AI and reticent to embrace AI and understand the risks with respect to jobs. How has people's understanding of risk changed since COVID-19? How modify for the various demographics of society.
- Scotland needs to recognize that different approaches will be required for different groups in society and different types of organisation.

## 7 Data and data infrastructure

### 7.1 Thematic objective, outcomes and actions<sup>6</sup>

Thematic objective	
Fit for purpose, reliable and flexible data infrastructure is accessible to all in Scotland	
Thematic outcomes	Thematic Actions
1. Fit for purpose, flexible data standards are commonly used to enable the reuse of data	1.i Establish a pre-standards Board (with wide representation) 1.iv Establish a data standards assessment process that seeks to adopt first, create second 1.iii Create a standards review process that enables change
2. Scotland has a culture of data sharing and maximum interoperability	2.i Establish a national data map / data library / data store 2.ii Target skills development to enable documentation, interoperability and basic data management (link to skills of workforce) 2.iii Manage safe federation of data in the data infrastructure and through data sharing agreements 2.iv Establish an early focus on data that is going to be most valuable to Scotland's renewal 2.v Robust data cataloguing under FAIR principles <sup>7</sup>
3. Scotland has fit for purpose and secure data infrastructure and storage, and all data infrastructure initiatives have a plan and commitment for national roll-out	3.i Create 'Scottish' data infrastructure available to all 3.ii Open source technology and infrastructure is an assumed starting point

<sup>6</sup> Thematic actions were not necessarily identified for each thematic outcome during the workshops. This does not indicate a less important thematic outcome, it is either that no specific actions were identified in the time available during the workshops, or that actions that may respond to the outcome are allocated to another theme.

<sup>7</sup> <https://www.go-fair.org/>

	<ul style="list-style-type: none"><li>3.ii Create a safe operating environment to ensure data security (use best available globally)</li><li>3.iii Fibre and 5G infrastructure available to all and ensure private operators are incentivised to deliver to all</li></ul>
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## 7.2 Additional issues to consider when drawing up the strategy

### From workshop three

- Infrastructure needs to be a level playing field across Scotland. Any new initiative must have a plan for national roll out built in upfront.
- Data Security must be fit for purpose. There must be a security infrastructure for all users that all users know HOW to use and that they DO use.
- Connectivity is important: Should Scotland upgrade the poorest data infrastructure first before addressing other upgrades? Or not?
- Establish mechanisms to build trust in data and data infrastructure across the population.

### From workshop two

- Create agile governance structures that reflect the speed of change in AI and enable standards to be implemented and developed over time.
- Make sure data standards are future proofed and as flexible as the technology needs to be.
- Establish a standard setting national body to lead the strategy.
- Take a proactive approach to driving innovation. Identify how government and other actors can move forward quickly.

### From the orientation workshop

- We need to be very clear about the principles around data infrastructure – purpose, applications, structures - and communicate them to Scotland’s people clearly. Then we need to define the pathway to achieving those principles based on where we are now.
- Communicating these principles will be essential for bringing citizens with us. We must help them understand the value of their data, the ownership issues around them and what happens to their data. Getting this right is essential to building trust in the system.
- We must look at how we will embed citizens – and their data – at every level of infrastructure.
- We are beginning to see consent enforcement embedded into technologies. The more we can codify and enforce policies the more we can achieve.
- How – from an infrastructure perspective - can we codify and enforce the policies we need? How can we embed policies into the infrastructure?
- There are more opportunities to create the data infrastructure Scotland needs than there are issues holding Scotland back - but that does not mean everything is straightforward. There is a huge amount of work to do. Scotland needs:
  - Clear direction;
  - Resources and funding to be targeted directly at the key points in the system that will make a difference; and
  - Resources to be clearly targeted in this way, not to be scattered between initiatives. Letting a thousand flowers bloom will not work here.
- Scotland has opportunity to leverage large global suppliers, but we must remember that those suppliers have the same level of access to other countries. It is (in other words) highly competitive.

## 8 Join the dots and leadership

### 8.1 Thematic objective, outcomes and actions<sup>8</sup>

Thematic objective	An effective and diverse collaborative effort is the driving force that implements the strategy and joins the dots	
Thematic outcomes	Thematic Actions	
<p>1. Scotland's public, private and third sectors are aligned, work together and are ready to adopt AI to respond to Scotland's challenges and opportunities</p>	<p>1.i Establish an AI Sector Group; with responsibility and a clear role to implement strategy. Membership should be diverse and include politicians and senior representatives of public, private, third sectors and academia</p> <p>1.ii Develop a coherent and agile strategy that prioritises and coordinates action across disciplines and organisations</p> <p>1.iii Ensure diverse voices can influence and challenge direction and action</p>	
<p>2. Scotland has credible and highly visible leaders in AI</p>	<p>2.i Lead development of a coherent and well-resourced governance environment</p>	
<p>3. It is clear who is responsible and for what, and where to get help</p>	<p>3.i Develop a detailed implementation plan for the strategy (incl. immediate action plan), ensuring all action aligns with aim and priorities set for Scotland and its people. Consider whether a mission approach will best support collaboration.</p> <p>3.ii Ensure funding and investment across Scotland is aligned with objectives</p> <p>3.iii Plan an exit strategy for Government</p>	

<sup>8</sup> Thematic actions were not necessarily identified for each thematic outcome during the workshops. This does not indicate a less important thematic outcome, it is either that no specific actions were identified in the time available during the workshops, or that actions that may respond to the outcome are allocated to another theme.



<p>4. Scotland is connected to and has influence on UK and global AI ecosystem</p>	<p>4.1 Work with others to actively contribute to discussions nationally and internationally (incl. engaging with CDEI)</p> <p>4.ii Work with others to leverage in expertise, ideas and investment (incl. engaging with Global Partnership for AI)</p>
<p>5. The governance of AI is in a continuous process of improvement, learning from within and from outside of Scotland</p>	<p>5.i Develop clear outcome focused KPIs for Scotland's AI ambitions and undertake monitoring and evaluation</p>
<p>6. AI in Scotland is an exemplar for achieving Scotland's NPF ambitions</p>	

## 8.2 Additional issues to consider when drawing up the strategy

### From workshop three

- Government must lead by its actions (e.g. playing an active role in providing data as a resource for developers to use).
- Governance of the strategy must embed and encourage risk taking. The strategy must also consider who bears the risks (industry, society, government?).
- How do we organise Scotland to deliver this strategy?
- How do we ensure connectivity with the UK and internationally?
- Scotland must seek collaborators from far and wide – not just its familiar partnerships.

### From workshop two

- Scotland needs to invest in world class players to deliver the strategy and to corral around. It needs to create a growth node that builds confidence and acts as an exemplar for achieving Scotland's ambition.
- [Key people need to] develop a 100-day plan and identify the 10 things we need to do immediately to begin to implement the strategy.
- Government's role is to make the network work faster, and ensure it works responsibly. Government needs to act as a facilitator, not a regulator.
- Government needs to work on factors that may be holding back demand - regulatory uncertainty, lack of sophisticated consumption, for example – and ensure they are addressed to keep the market moving forward.
- Government must facilitate beneficial innovations - things that need to happen to align the AI strategy with its national ambitions.

- A condition for any government intervention must be demonstrable benefit to the people of Scotland.
- Government must give authority to the relevant agencies to enable and direct the support required.
- Government must build the capacity and skills of regulators across sectors to interface with AI, apply existing and new regulation and to oversee compliance.
- Scotland's organisations and citizens need to be clear where to go to get help.

### From the orientation workshop

- How can Scotland track and adjust to rebalancing power as an important objective of the strategy? In particular, the power of US tech or Chinese AI development?
- Link the strategy to UK level and International partnerships.
- Strengthen the connection between what customers want, notice and value...with the ability to accelerate delivery.
- Is good governance alone sufficient to make AI 'trusted'. What about communications? Where does Communication fit? We need to tell a good story about Scotland and AI.
- Discussions often focus on AI development skills – but it's also important to consider user competence and responsible procurement skills as areas for development.
- Build a policy on AI into the Government's Inward Investment Plan.
- What is the intention of the strategy? It should be about people and society, trying to create an inclusive Scotland, generating social good. We need to be clear about what it is that we can see an AI strategy contributing to Scotland. On the right-hand side [of the original

ecosystem] there is a real opportunity for us, and the AI strategy needs to deliver outcomes for these three groups.

- Scotland is in a positive position with regards to resources, for example, City Region Deal, Data Driven Innovation, University of Edinburgh, Scottish National Investment Bank (SNIB). There should be strong links, but we are not socialising the ecosystem.

## 9 Investment

### 9.1 Thematic objective, outcomes and actions

Thematic objective	Scotland's AI ecosystem successfully attracts national and international investment to fund development	
Thematic outcomes	Thematic Actions	
1. R&D and innovation receives ongoing strategic investment	1.i Create a sector deal for AI (multi-agency integrated plan of action) 1.ii Create a challenge fund / seek and solve fund to stimulate innovation and de-risk investment 1.iii Create a long-term commitment to invest in AI careers so young people are encouraged to learn 1.iv Provide a start-up accelerator fund	
2. The strategy leverages existing funding mechanisms to pursue thematic objectives	2.i Engage national investors, for example SNIB and Scottish Enterprise	
3. Businesses in Scotland invest in AI	3.i Add an AI emphasis to Enterprise Network (SE&HIE) programmes of support 3.ii Tax breaks for private sector to adopt AI	
4. AI investment has ethical standards attached, including a clear focus on equality	4.i Direct renewal funding to AI that benefits all of society, alleviating harms and protecting human rights 4.ii Applications for AI funding must meet standards (will need to work with UK funding bodies)	

## 9.2 Additional issues to consider when drawing up the strategy

### From the Development of AI and AI enabled products and services workshops

- Provide significant investment in funding to ensure ongoing AI related university research.
- Implement an R&D sector deal for Scottish-based companies.
- Use incentives (not necessarily direct investment) to make Scotland an attractive place for AI specialist entrepreneurs.
- Investment in the pipeline of talent for the AI sector e.g funding doctoral training centres.

### From the Ethical and regulatory frameworks workshops

- Need to consider who is benefiting from any investment made. Often investment tends to support male employment.
- Need to understand where Scotland can fit in the cluttered AI landscape to be at forefront of attracting investment.

### From the Skills and knowledge workshops

- Identify priority sectors and technologies for investment based on Scotland's USP.
- Attract investment to capitalise on the ease with which Scotland gets social innovations off the ground.
- Target investment to AI that supports social cohesion
- Skills investment is critical to drive success or the vision. How will we invest in school and tertiary education to make this a reality?

### From the Data and data infrastructure workshops

- [Secure] collaborative investment between public, private and academic sectors.

### From the Join the dots and leadership workshops

- Ensure funding and investment across Scotland is aligned with objectives.
- Alignment in Investment Strategies (Scotland/UK/ European).
- Do we need a specific focus on an investment working group? To consider access to capital, research funding, public funding - can function to identify opportunities, make connections, provide high level governance, identify opportunities to leverage investment nationally and internationally.
- Is there a way [in the visual model] to represent 'investment' as a foundational/cross-cutting issue (incl. investment in skills), rather than a vertical?
- Policy on AI [needs to be] built into our Inward Investment Plan.
- [Scotland must avoid the] risk of siloed investments strategies.
- What is the role of Scottish Enterprise and the Scottish National Investment Bank to accelerate this?

## 10 A productive and resilient AI ecosystem in Scotland

Sections 2-9 of the report focus on thematic ambitions, outcomes, and activity. Section 10 summarises common strategic ambitions identified across the working group discussions which combine to create a potential vision for Scotland's AI ecosystem. These ambitions are grouped into two categories:

- **ambitions that define the character of the 'Scottish' AI ecosystem.** These features ensure the ecosystem works for the benefit of Scotland, and are potential points of differentiation that support Scotland's global competitiveness; and
- **ambitions required to support a productive AI ecosystem.** These features create the necessary foundations upon which activity and benefit to Scotland will be built.

*Please note: Section 10 has been developed by Anderson Solutions on the basis of the working group discussions and has not been tested with the working groups.*

### A Scottish AI ecosystem:

1. Is nurtured through strong, clear and visionary leadership
2. Is formed around strong ethical principles and citizen engagement
3. Is inclusive and diverse
4. Is dynamic and agile
5. Is interconnected and collaborative
6. Is globally focused seeking ideas, solutions, investment, and markets across the world
7. And importantly, engenders trust and is supported by a knowledgeable and engaged population

### A productive and resilient AI ecosystem in Scotland:

8. Has fit for purpose data and data infrastructure
9. Has a skilled and diverse workforce across all aspects of the ecosystem

10. Has knowledgeable, engaged, and innovative organisations including the public sector, businesses, academia, and third sector organisations
11. Attracts investment to all aspects of the ecosystem
12. Has fit for purpose ethical and regulatory frameworks
13. Is supported by and connected to policy across Government

### A revised ecosystem model – creating the roadmap

The visualisation overleaf (Figure 1, page 29) developed by Anderson Solutions and informed by the working group discussions proposes a revised ecosystem model for AI in Scotland. The model creates a high-level and long-term roadmap for AI in Scotland.

Productive ecosystems require an **energy source**, defined here as leadership and citizen engagement. The energy source provides vital fuel for the foundation layer, and therefore the wider ecosystem.

The **foundation layer** in the ecosystem contains the capacity upon which everything else depends. The foundation layer requires quality data and data infrastructure, public awareness and trust, skills, investment, regulation, ethical frameworks, and policy. A strong foundation layer fuels activity in the productive zone.

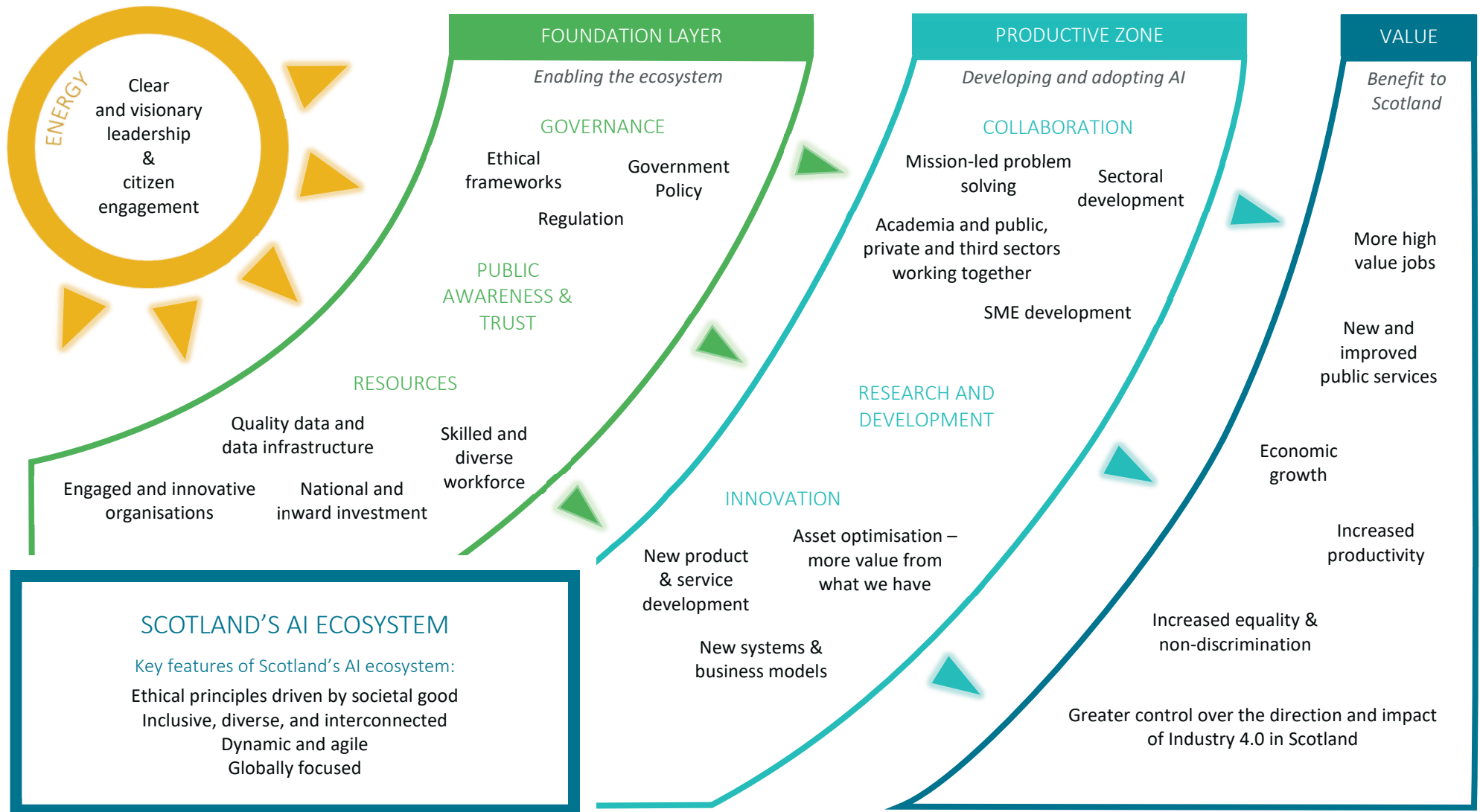
The **productive zone** is where the development and adoption of AI occurs in response to challenges and opportunities. Collaboration, R&D, and innovation are key in the productive zone. The challenges and opportunities might be internal or external and can represent a wide range of issues from national missions to sectoral opportunities to SME development. It is in the productive zone that developers of AI work together with those who could adopt AI, whether they are businesses, the public sector or third sector; and where AI can be repurposed or acquired in an effort to accelerate success. An efficient and effective productive zone generates value for Scotland.

The **value** to Scotland includes improved productivity, greater equality, new and improved public services, more high value jobs, and economic growth. If Scotland succeeds in the development of its own ecosystem, the benefit to Scotland will also include greater control over the direction and impact of the 4<sup>th</sup> industrial revolution on Scotland's society and economy.

Cross-cutting features that define the 'Scottish' AI ecosystem and will optimise the positive benefit to Scotland are also suggested in the visualisation. Building on the common themes identified, the approach to AI in Scotland is:

- to have strong ethical principles driven by societal good;
- to be inclusive, diverse, and interconnected;
- to be dynamic and agile; and
- to be globally focused.

Figure 1: Visualisation of Scotland's AI ecosystem





## Next step?

The workshop discussions have focused on the need to develop the necessary foundations for success, alongside the associated ambition and mechanisms proposed to support the development and adoption of AI in Scotland. In this section key issues are highlighted for discussion in the next step.

**Merging and refining the proposals.** The report is the first time that the workshop outputs can be appraised as a whole and inevitably there is still work to do. For example, how might all the proposals for delivery and governance roles and organisations be combined and translated into a more refined delivery and governance structure; how might the strategy be designed to ensure the dots are joined and activity does not occur in unconnected siloes; and how might gaps be addressed.

**Establishing the strategy in the wider landscape.** Participants highlighted Scottish, UK and global strategies and initiatives that have synergy with or will directly influence AI in Scotland; and how working with these complementary activities will avoid duplication, accelerate valuable activity, and support better outcomes. Clearly establishing how the AI strategy will work with, and alongside, other initiatives will be vital in communicating and engaging with others.

**Creating a short-term focus.** The discussions have acknowledged that the full ambition for AI in Scotland is unlikely to be achieved all at once and there is a need to create a focus on short-term priorities so that the energy, capacity and

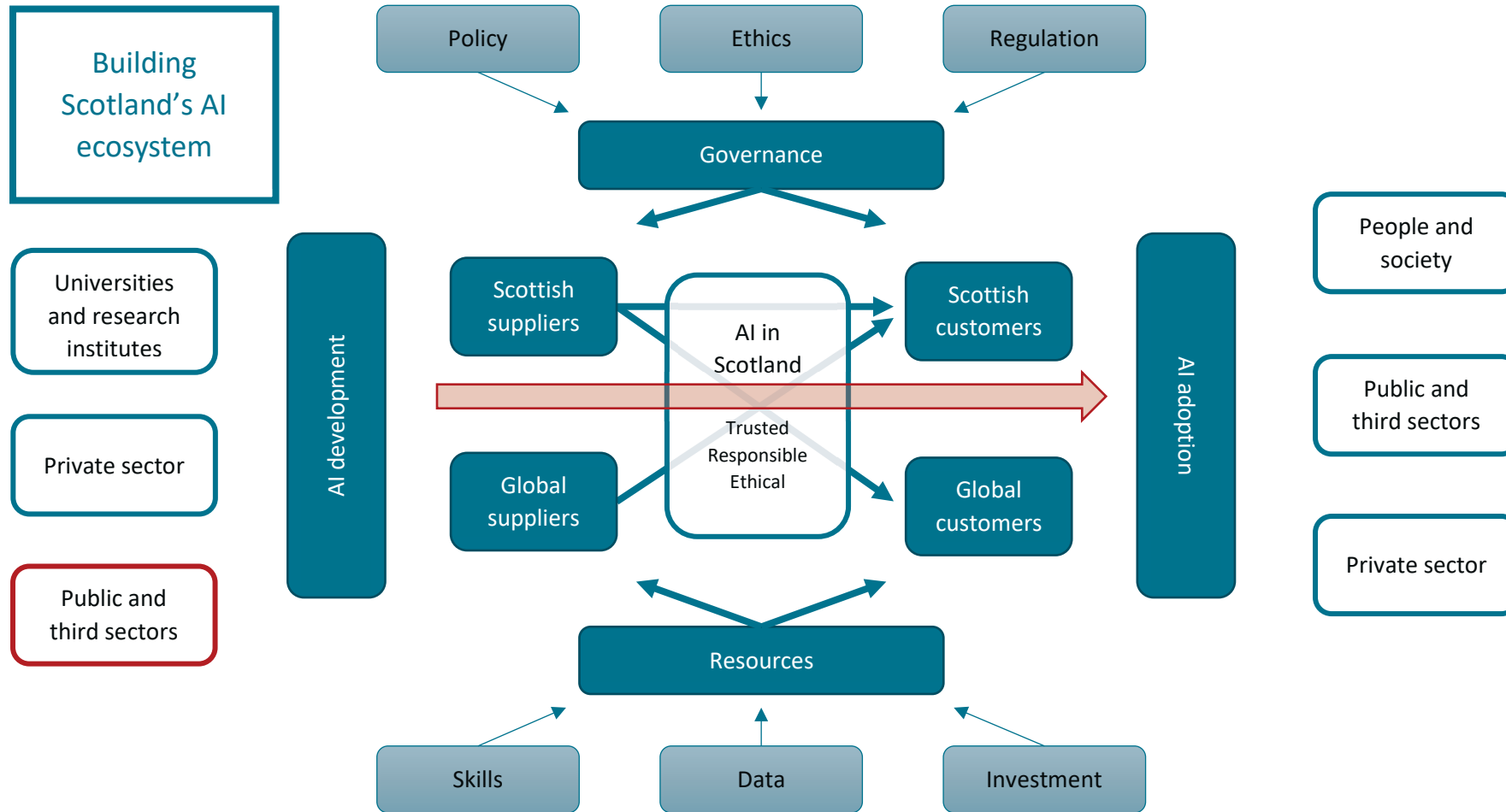
activity can be developed effectively to address an immediate goal. Working Group participants also highlighted the need for the AI strategy to be responsive and agile, as well as inspirational and compelling.

**Acknowledging the challenges.** In acknowledging the reality around AI, participants also highlighted the need to acknowledge the challenge around the anticipated speed of change in the job market, and the need to balance job losses with skills development and job creation. This issue is broader than AI and warrants consideration of where responsibility for responding to this issue sits.

Based on these observations, five questions are proposed for consideration by the DataLab and the Scottish Government:

- How will Scotland develop and operationalise its AI ecosystem in the next 12-36 months?
- What role will the AI strategy and its associated activities play in the wider policy landscape?
- Who should decide the common goal for AI in Scotland over the next 12-36 months?
- How will the development and implementation of the strategy embody and embed the agility and dynamism required of the strategy?
- How will the strategy process engage with the challenges?

## Appendix A: Original ecosystem model



Critique of the original model is reflected in the red edits shown in the diagram. The working groups advised that the public and third sectors should be included on the left-hand side as they are all creators and consumers of AI, and that the demarcation between AI development and AI adoption is more nuanced and blurred than the supplier-buyer relationship depicted in the model. Further critiques are that the individual or citizen is not sufficiently visible, and the outcomes or value of the ecosystem is not clear. These critiques, as well as the working group discussions, informed the revised ecosystem model presented in Section 9.