

## DEVELOPING SCOTLAND'S ARTIFICIAL INTELLIGENCE STRATEGY

The RSE is delighted that the Scottish Government agreed with our recommendation in our joint report with SCDI, ScotlandIS and BT Scotland that Scotland should have a national strategy for Artificial Intelligence (AI). We would be pleased to discuss with the Scottish Government and The Data Lab how we can further support the development of Scotland's AI Strategy. We are well placed to use our convening power to bring together a range of different perspectives to help inform and shape Scotland's approach to AI.

Key strategic aims, including the AI strategy being 'people centred' and AI being used as a 'trusted, responsible and ethical tool' require further consideration and development. Ethics is not a feature of an AI system, but a feature of the behaviour that people engage in when using the technology. Achievement of the strategic aims will require continual engagement between the public and the emerging technology as the envelope of the technology expands and poses new questions.

With further work on the strategy to be undertaken by thematic working groups, the current call for evidence should be considered a pre-consultation. This would allow for a more developed consultation to be brought forward in the light of the activities and deliberations of the working groups, and help ensure that Scotland's approach to AI is informed by a longer-term deliberative engagement process.

The scoping document states that while robotics and automation have links to and can make use of AI, they will not be specifically included in the strategy. Our preference would be for an overarching strategy encompassing AI, automation and robotics given the interconnections between these components. If these are to be separate strategies, it will be crucially important to ensure that there is a read across from one to the other, and a close relationship between those involved in preparing and implementing them. This could, for example, be facilitated by the creation of a joint strategic steering group.

Given that national strategies for AI often include similar aims and ambitions, we would have expected the scoping document to be clearer on where Scotland can potentially derive first mover advantage in AI. The development of a fair work strategy for new technologies, the application of AI in healthcare given Scotland's strengths and assets in this area, and putting in place a highly participatory process that enables citizens to engage critically with AI are areas in which Scotland can take an active lead.

# Summary

Regulation is under active consideration at the national and international levels but an overarching system of global regulation of AI is unlikely to be implemented soon. UK regulation of AI is likely to be heavily influenced by the commitments in the White Paper on Regulation for the Fourth Industrial Revolution and the recently created Regulatory Horizon Council. It will be important that Scotland is able to influence regulatory developments at the UK level while also identifying opportunities within this new framework to develop its own approach. Scotland's AI Strategy will need to be sufficiently flexible and nuanced about the opportunities and challenges, including those related to ethics and regulation, associated with different technologies.

While the consultation refers to the role that universities can play in supporting the strategy, there is no reference to the contribution of Scotland's colleges. Colleges will have a crucially important role in reskilling and upskilling workers to meet Scotland's future skills needs, including the delivery and application of AI.

## Introduction

- 1 The Royal Society of Edinburgh (RSE), Scotland's National Academy, welcomes the opportunity to respond to the Scottish Government and The Data Lab consultation, *The AI Of The Possible: Developing Scotland's Artificial Intelligence (AI) Strategy*.<sup>1</sup> Our response has been developed by a working group comprising RSE Fellows and Young Academy of Scotland members covering a range of expertise and experience including AI, automation, robotics, data innovation, statistical methods, Philosophy, Sociology, Computer Science, public participation, economics, regulation and ethics. While we have sought to frame our response with reference to the consultation questions where appropriate, we focus on those areas that we believe are either currently underdeveloped or missing from the plans for the AI Strategy. We should be pleased to discuss our response with Scottish Government and The Data Lab colleagues if this would be considered useful.

## Background

- 2 The RSE has been closely engaged over several years in activity aimed at laying the groundwork for the development of an AI strategy for Scotland. This includes our joint work and reports with SCDI, ScotlandIS and BT Scotland on *Building a World-Leading AI and Data Strategy for an Inclusive Scotland*,<sup>2</sup> and our influential report, *Automatic... For the people*, which discussed how Scotland can harness automation to increase economic and social prosperity.<sup>3</sup> Our reports are based on research, discussions and collaboration with a wide range of participants from business, education and civic Scotland.
- 3 We are delighted that the Scottish Government agreed with our recommendation that Scotland should have a national strategy for AI. We were pleased to host an event at the RSE in September 2019 at which Kate Forbes MSP, Cabinet Secretary for Finance, launched the Scottish Government's plans for developing an AI Strategy for Scotland.

1 AI Strategy scoping and consultation documents: <https://www.scotlandaistrategy.com/consultation-live>

2 Building a World-Leading AI and Data Strategy for an Inclusive Scotland, SCDI, BT Scotland, ScotlandIS and RSE, February 2019 <https://www.scdi.org.uk/policy/ai-and-data/>

3 Automatic... For the people?, SCDI, BT Scotland, ScotlandIS and RSE, February 2018 <https://www.scdi.org.uk/policy/automatic-for-the-people/>

- 4 The RSE had scheduled further activity to feed into the development of an AI Strategy for Scotland, including a wide-ranging series of talks, panel discussions and exhibitions on AI and its impact on society as part of the Edinburgh Science Festival in April 2020. While we have had to postpone this activity to protect public health during the COVID-19 pandemic, some elements are taking place virtually.<sup>4</sup> We are also exploring the potential of convening a virtual roundtable to discuss AI ethics and regulation and the scope that Scotland has to influence international developments in this area. We would be pleased to discuss with The Data Lab and Scottish Government how our planned policy and public engagement activity on AI can support the development of the AI Strategy.
- 5 The ongoing actions to suppress the global spread of COVID-19 and to minimise the long term societal impact of the pandemic highlight the potential role that AI can play. Some nations are, for example, using AI as a tool to track and trace contacts during COVID-19. While it does not explicitly refer to the use of AI, the Scottish Government's recently published framework for addressing COVID-19 emphasises the importance of active surveillance to identify and track the spread of the virus.<sup>5</sup> It is possible that as this is implemented it will draw upon and apply AI techniques. The battle against COVID-19 brings into sharp focus the timeliness and importance of an AI Strategy for Scotland, and the need to ensure that its development is informed by deliberative public engagement.
- 7 The approach, as set out by the scoping document, indicates that reliance will be placed on the activities of the five thematic working groups in finalising the strategy.<sup>7</sup> It might therefore be appropriate that the current call for evidence be considered a pre-consultation with a view to bringing forward a more advanced consultation in the light of the activities and deliberations of the working groups. As part of this, attention will need to be given to the development of an evaluation framework so that the efficacy of the strategy can be objectively assessed.
- 8 This also links to the comments we make on the importance of public participation in paragraphs 23–24. The RSE would be pleased to explore with The Data Lab and The Scottish Government how we can usefully support the working group process and next steps in the consultation approach. We would be well placed to contribute to this process by using our convening power to bring together a range of different perspectives to help inform and shape Scotland's approach to AI.

### Strategy coverage

*(relevant to Q.1 on the proposed definition of AI, and to Q.4 on the proposed overarching vision and strategic goals of the strategy)*

- 9 The scoping document states that while robotics and automation have links to and can make use of AI, they will not be specifically included in the strategy. However, robotics, for example, uses many AI techniques, including machine learning, while automation and AI are increasingly being brought together to support transformation of Scotland's health and social care system.<sup>7</sup> It would seem to be important to ensure that there is a strategic connection between the development of core AI methodologies and their application.

### Strategic approach and consultation

*(relevant to Q.4 on the proposed overarching vision and strategic goals of the strategy)*

- 6 The published consultation documentation would appear to have been produced within a short timeframe. The development and implementation of the strategy will need to be underpinned by sufficient resource, including time. A deliberative process is required to stimulate wide-ranging informed debate on Scotland's approach to AI.

<sup>4</sup> <https://www.rse.org.uk/rse-hours-part-elements-edscifest/>

<sup>5</sup> Coronavirus (COVID-19): framework for decision making, Scottish Government, April 2020 <https://www.gov.scot/publications/coronavirus-covid-19-framework-decision-making/>

<sup>6</sup> AI strategy thematic working groups: Developing AI and AI Enabled Products and Services; Ethical and Regulatory Frameworks; Skills and Knowledge; Data Infrastructure; and Joining the Dots.

<sup>7</sup> Health Improvement Scotland <https://ihub.scot/about-us/making-an-impact/our-approach/>

- 10** In substantiating this point we note that a recent publication from the European Commission brings together AI, robotics and the Internet of Things (IoT) in setting out the parameters for the development of a legal and regulatory framework.<sup>8</sup> This European Commission report indicates that robotics and AI share many similar characteristics particularly in terms of the way in which they can combine connectivity, autonomy and data dependency to perform tasks requiring little or no human intervention.
- 11** In order to provide for an integrated strategic approach, our preference would be for an overarching strategy encompassing AI, automation and robotics given the interconnections between these components.
- 12** We note that a recent report from the Scottish Science Advisory Council (SSAC) on Robotics and Autonomous Systems recommends a distinctive strategy for robotics and automation, complementing the AI Strategy.<sup>9</sup> If there are to be separate strategies for AI and for robotics and automation, it will be crucially important to ensure that there is a read across from one to the other, and a close relationship between those involved in preparing and implementing them. This could, for example, include the establishment of a joint strategic steering group.
- 13** These points also emphasise the importance of ensuring that the AI strategy is integrated with other relevant Scottish Government strategies and plans including but not limited to the delivery plan for Scotland's data vision being led by the Data Delivery Group, Scotland's Digital Strategy, the Future Skills Action Plan, Fair Work Action Plan, Scotland's STEM Education and Training Strategy and Scotland's Digital Health and Care Strategy.
- important that the strategy distinguishes between core AI methodologies and the application of AI technologies.
- 15** The scoping document is couched in high level terms and it would benefit from elaboration with a view to being clearer on Scotland's approach to AI. There is, for example, reference to the AI strategy being 'people centred' and to AI technology in Scotland being used as a 'trusted, responsible and ethical tool'. While we do of course agree in principle with these aims, there is a lack of clarity as to what these mean in practice and how they will be achieved.
- 16** It is important to recognise that ethics is not a feature of an AI system, but a feature of the behaviour that people engage in when using the technology. Achievement of these strategic aims will require continual engagement between the public and the emerging technology as the envelope of the technology expands and poses new questions.
- 17** Ethics, trust and responsibility will invariably mean different things to different stakeholders and, for example, a developer of a particular AI technology (who may or may not be based in Scotland) will have a view on what they mean and how they ought to be interpreted while other AI technology providers, government, users and individuals may hold quite different views. These points emphasise the need for a programme of deliberative dialogue to better understand the views, expectations and needs of all those within Scotland's AI ecosystem, and their relationship to one another.
- 18** Given the range of cognitive technologies, from speech recognition to robotics to machine learning, and that the application of different technologies will vary and be context dependent, the consultation document is silent on how the strategy will cater for this level of variation. Technologies are also at different stages of maturity and levels of sophistication. It is important that the strategy is sufficiently flexible and nuanced about the opportunities and challenges, including those related to ethics and regulation, associated with different technologies.

## Strategic clarity and definitions

*(relevant to Q.1 on the proposed definition for AI, to Q.2 on the strategy being people-centred, and to Q.7 on building confidence in AI as a trusted, responsible and ethical tool)*

- 14** While we recognise the need to avoid development and implementation of the strategy being distracted by issues of definitional detail, it will be

<sup>8</sup> Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics, European Commission, February 2020 [https://ec.europa.eu/info/sites/info/files/report-safety-liability-artificial-intelligence-feb2020\\_en\\_1.pdf](https://ec.europa.eu/info/sites/info/files/report-safety-liability-artificial-intelligence-feb2020_en_1.pdf)

<sup>9</sup> Robotics and Autonomous Systems: Shaping the Future of Scotland, Scottish Science Advisory Council, March 2020 <https://www.scottishscience.org.uk/sites/default/files/article-attachments/Robotics%20and%20Autonomous%20Systems%20Report%20-%20March%202020%20online.pdf>

## Learning from and influencing AI developments elsewhere

*(relevant to Q.5 on Scotland's AI ecosystem, to Q.6 on the strategic themes, and to Q.8 on any other aspect that Scotland's AI Strategy needs to address)*

- 19** It is important that The Data Lab and Scottish Government explore how AI is being applied internationally and how this can inform developments in AI in Scotland. It is unclear from the consultation how much account has been taken of broader UK and international developments on AI.
- 20** A snapshot of the increasing number of national and international strategies for AI technologies is available.<sup>10</sup> These typically cover economic, social and environmental opportunities and challenges, as well as issues such as data ethics. The EU Commission, for example, is developing the European approach to AI and robotics taking account of the technological, ethical, legal and socio-economic dimensions.<sup>11</sup> While the UK is leaving the EU, it will be important that in developing Scotland's AI Strategy, Scottish Government and The Data Lab consider these developments with a view to learning from approaches elsewhere and in order to identify areas of potential competitive advantage for Scotland. As well as maintaining connections with EU developments, there may be scope for Scotland to develop alliances with other small countries including, for example, the Nordic-Baltic Region and Ireland, where there are shared goals and values. Partnerships of this kind may help to increase the influence that Scotland can have on international AI developments, including its regulation and/or offer increased investment opportunities.
- 21** Connected to this, it will be important that the Scottish strategy interfaces with and is able to draw upon AI developments and infrastructure at the UK level. This includes the Office for AI, the Centre for Data Ethics and Innovation and the UK National Data Strategy. It would also seem clear that the UK is the level at which Scotland can most usefully exert influence in shaping both domestic UK and international AI developments.

## Identifying potential 'first mover' opportunities for Scotland

*(relevant to Q.3 on the benefit of AI to Scotland's people and ensuring that the benefits are shared and no-one is left behind, and to Q.8 on any other aspect that Scotland's AI Strategy needs to address)*

- 22** Given these broader UK and international developments, we would have expected the scoping document to be clearer on where Scotland can potentially derive first mover advantage in AI. National strategies for AI often include similar aims and policies and their increasing number make differentiation more difficult to achieve. However, as RSE along with SCDI, ScotlandIS and BT Scotland set out in our joint report, in some areas of AI Scotland may be an agile adopter while there may be others, including, for example, the development of a fair work strategy for new technologies, where Scotland can take an active lead, following on from the Scottish Government's Fair Work Action Plan.<sup>12</sup> The application of AI in healthcare, including its role in supporting precision medicine, would appear to be another key area in which Scotland can take the lead, building on existing strengths and assets, including the data-rich health research undertaken in Scotland and iCAIRD, the Industrial Centre for AI research in digital diagnostics based in Scotland.
- 23** Scotland, as a small country, is also well placed to ensure that the development and implementation of Scotland's AI Strategy is a highly participatory process. An informed population will be better positioned to explain and understand automated decision-making, embrace AI technologies alongside collective intelligence to improve rather than replace human decision-making, and give informed consent to data sharing which is essential to the development of data commons from which new insights and innovative services can be formulated. This is particularly apt in the current circumstances in which there is a drive internationally and domestically to harness AI to support action to halt the spread of COVID-19. Citizens should not be encouraged to trust AI uncritically; rather, they need to have sufficient awareness and understanding to enable them to adopt a sceptical user stance.

<sup>10</sup> List of countries and international organisations that have established strategies and initiatives regarding artificial intelligence: <https://futureoflife.org/national-international-ai-strategies/>

<sup>11</sup> Shaping Europe's digital future: Artificial Intelligence, European Commission <https://ec.europa.eu/digital-single-market/en/artificial-intelligence>

<sup>12</sup> Building a World-Leading AI and Data Strategy for an Inclusive Scotland, February 2019 <https://www.scdi.org.uk/policy/ai-and-data/>

**24** As well as stimulating participatory input from citizens during the consultation phase, we welcome the stated intention in the scoping paper to enable those who participate in the engagement activity opportunities to provide further feedback, and to evaluate the outputs from the working groups. We had sought to contribute to this through the range of AI activities we had planned as part of this year's Edinburgh Science Festival, which has had to be cancelled; although some of the planned RSE activity has now been held online.<sup>13</sup> The RSE would be pleased to discuss with Scottish Government and The Data Lab how we can contribute to supporting public participation in the development of Scotland's AI strategy.

## Creating Scotland's AI Ecosystem

*(relevant to Q.5 on Scotland's AI ecosystem, to Q.6 on the strategic themes and to Q.7 on building confidence in AI as a trusted, responsible and ethical tool)*

### Supply and demand

**25** There is an opportunity for government to develop new markets in Scotland through the application of AI and related technologies in the provision of public services. However, in so doing, there is a need to improve our understanding of the supply of and demand for AI in Scotland. There is demand for AI across a range of sectors of the Scottish economy, including health and social care, agriculture and insurance services among many others. However, we should not assume in the absence of a domestic supply that we can meet future demand for AI technology through 'global suppliers' given the nature and economics of the global market for AI.

### Data infrastructure

**26** Data underpins all AI and automation. Development and application of AI is reliant on access to and registry of datasets which underpin the products and services that are developed. The AI Strategy therefore needs to be embedded within the overarching data vision for Scotland which is overseen by the Scottish Government's Data Delivery Group.<sup>14</sup>

Indeed, putting in place the necessary data infrastructure is a prerequisite if Scotland is to effectively develop and apply AI technologies. This links to the preceding section on supply and demand. While we recognise that this is an area that will be further considered by one of the five thematic working groups, we would have expected this issue to be covered more substantively by the current consultation.

### Skills and resources

**27** Both the development and adoption of AI in Scotland will require a skilled workforce. It has been estimated that AI technologies could lead to the creation of 558,000 jobs and the displacement of 544,000 jobs in Scotland. While this would be a net benefit of 15,000, it would also be the "biggest shake-up in a lifetime" to Scotland's labour market.<sup>15</sup> This shake-up of the Scottish labour market implies two high level priorities: retraining for the people in jobs which will be displaced; and education and skills development for the jobs of the future. Our joint report, *Building a World-Leading AI and Data Strategy for an Inclusive Scotland*, has a section focussed on Employment, Skills and Education.<sup>16</sup>

**28** While the consultation refers to the role that universities and research institutes can play in supporting the strategy, we are surprised that there is no reference to the contribution of colleges. Scotland's colleges will have a crucially important role in reskilling and upskilling workers in Scotland in helping to develop a domestic workforce to support the delivery and application of AI in Scotland. For instance, many mature AI technologies can already be applied by suitably trained technicians. The Cumberland-Little report outlines a vision of how Scotland's colleges can support future economic growth and lifelong learning.<sup>17</sup> In addition, through the College Innovation Fund, the Scottish Funding Council has recently awarded £500,000 of Scottish Government funding to seven new college-led innovation projects which will consider future skills needs to support Scotland's future economy.<sup>18</sup> As well as highlighting the need to recognise the role of colleges, these points also make clear the need to align the AI strategy with the work of Scotland's Enterprise and Skills Strategic Board.

<sup>13</sup> <https://www.rse.org.uk/rse-hours-part-elements-edscifest/>

<sup>14</sup> Scottish Government Data Delivery Group: <https://www.gov.scot/groups/data-delivery-group/>

<sup>15</sup> UK Economic Outlook 2018: What will be the net impact of AI and related technologies on jobs in the UK?; PwC; July 2018 <https://www.pwc.co.uk/economic-services/ukeo/ukeo-july18-net-impact-ai-uk-jobs.pdf>

<sup>16</sup> Building a World-Leading AI and Data Strategy for an Inclusive Scotland, February 2019, pp. 32-39 <https://www.scdi.org.uk/policy/ai-and-data/>

<sup>17</sup> One Tertiary System: Agile, Collaborative, Inclusive (2020) <https://view.pagetiger.com/inlhij/1/PDF.pdf>

<sup>18</sup> College innovation pioneers share new £500,000 investment, SFC <http://www.sfc.ac.uk/news/2020/news-79345.aspx>

## Governance

- 29** While the consultation recognises that the approach taken to governance will determine the extent to which it is possible to create trusted, responsible and ethical AI in Scotland, the documentation is silent on the legislative and policy levers that Scottish Government and others can use to achieve this ambition.
- 30** The issue of regulation is under active consideration at the national and international levels but an overarching system of global regulation of major AI corporations is unlikely to be implemented any time soon, adding to the importance of national initiatives. In the UK regulation is likely to be heavily influenced by the commitments in the White Paper on Regulation for the Fourth Industrial Revolution (RFIR), particularly focused on the need for regulation to be agile, proportionate and adaptive to the needs of technological innovation while protecting citizens and the environment.<sup>19</sup> The new Regulatory Horizons Council<sup>20</sup> will be an important forum for such decisions, and it closely resembles the recommendation we made in our joint report for an advisory body on innovation and agile regulation.<sup>21</sup>
- 31** The regulatory system in place for AI related developments will determine: which technologies are developed; which industry sectors are able to develop them; and where these companies are located within a global innovation ecosystem. The RFIR recognises this opportunity for the UK, including the scope for UK to shape the development and adoption of international regulatory standards for AI. It will be important that Scotland plays a part to influence UK-level decisions and, in turn, international developments, while being cognisant of opportunities within this new framework for Scotland to take independent action.
- 32** In this context, the Scottish Government and The Data Lab should note that the EU Commission has recently published a paper as part of a consultation on Europe’s approach to AI on how Europe can harness the benefits of AI while addressing the risks associated with its development and deployment through the development of an EU regulatory framework.<sup>22</sup>
- 33** The comments we make in relation to governance also link to the points we make in paragraphs 19-21 about linkages to AI developments elsewhere.

<sup>19</sup> UK Government White Paper on Regulation for the Fourth Industrial Revolution, June 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/807805/regulation-fourth-industrial-strategy-white-paper-print.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/807805/regulation-fourth-industrial-strategy-white-paper-print.pdf)

<sup>20</sup> <https://www.gov.uk/government/news/new-expert-group-to-boost-uk-innovation>

<sup>21</sup> Recommendation 4 in Building a World-Leading AI and Data Strategy for an Inclusive Scotland

<sup>22</sup> White Paper: On Artificial Intelligence – A European approach to excellence and trust, European Commission, February 2020 [https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020\\_en.pdf](https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf)

### *Additional Information*

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The Royal Society of Edinburgh, Scotland's National Academy, is Scottish Charity No. SC000470

*Advice Paper (Royal Society of Edinburgh) ISSN 2024-2694*