Response from the Royal Geographical Society (with IBG)

Royal Geographical Society with IBG
Advancing geography and geographical learning

National Data Strategy

The Royal Geographical Society (with The Institute of British Geographers) welcomes this opportunity to comment on the **National Data Strategy**.

Executive summary

The Society recommends:

- A stronger commitment to data skills in the National Data Strategy, and recognition that data skills are different to digital skills (but complementary)
- That the focus on skills is not limited to a STEM (data science, AI and cyber) focus and is widened to include the significant benefits of strengthening data skills across the social sciences and humanities.
- That the National Data Strategy should make specific recognition of the benefits and importance of geospatial data (location/place data) and the skills necessary to realise the full benefits of the use of such data.
- A *National Training Programme* to build the capacities and confidence of teachers, in delivering data skills through geography [and other subjects] and specifically in the use of geospatial data skills, building upon the recognised expertise of the Society in this area
- Attention to the myriad applications of geographical information and geospatial data in the response to the Covid-19 pandemic, recognising that the pandemic is fundamentally geographical and these data and approaches have had unique value.
- Further attention to the growing AI and data capabilities that make it increasingly feasible to identify an individual's personal and protected characteristics from anonymised data (notably by aggregating location-linked information from across multiple sources), as information about current and past locations is an aspect of personal identity that has not received the same level of scrutiny as other aspects of personal data.
- Urgent attention to widening the capacity and increasing the capability for data analysis and management to better monitor and evaluate the place-based impacts of data-driven decision-making.
- That data professionals in responsible positions are Chartered with an appropriate professional body cognate to their skills, to drive up standards across all sectors
- Close coordination with the Geospatial Commission, and its six 'Geo6' partners bodies on a national location data framework, and as potential public sector location data custodians.
- Consultation with professional bodies (not just data/digital professional bodies, but those that engage with data at both strategic and operational levels across a range of sector or data-specific spheres) to test the practicality of proposed standards and practices, avoiding unintended consequences.
- That geospatial data be employed positively in reducing and mitigating carbon usage and climate-related risks, e.g. through linking of data sets to consider financial, environmental and social contexts in decision-making processes.

Our further comments and evidence underpinning these recommendations are elaborated in our responses to selected consultation questions in the remainder of this document.

About us

The Society is the learned society and professional body representing geography and geographers. It was founded in 1830 for the advancement of geographical science and has approximately 16,000 members.

Geography is the integrated study of the Earth's landscapes, peoples, places and environments. Geographers provide insights into the dynamics of these phenomena, with skills based in quantitative and qualitative methods in the natural sciences, social sciences, and humanities. Geographers are ideally placed to relate to many other fields of knowledge, which include the increasingly complex relationship between location data/geospatial data approaches and techniques, big data analysis, and broader technological and digital advancement in the collection, use and storage of data.

Foundational skills and awareness of the value of data and geospatial insights must start in the earliest stages of education in schools. Currently, geography is the only statutory school subject in which geospatial skills are embedded and which also requires extensive data/quantitative skills too. Thus the study of geography is a key vehicle to educate and inspire young people about geospatial data, as well as data skills broadly defined. This is important for those who continue to study the subject, but equally for all other students who take these skills into other fields/professional practice (whether engineering, public health, finance, design, planning etc).

The Society awards Chartered Geographer, the only internationally recognised professional accreditation for those with competence, experience and professionalism in the use of geographical knowledge, understanding and skills in the workplace. Chartered Geographers may choose to adopt the post-nominal CGeog(GIS), to signal their specialist expertise in the use and application of geographical information science and systems (GIS), and the use of geospatial data.

Geospatial data is information about where people and objects are in relation to a particular geographic location at multiple scales (local to global). This includes features on or near the Earth (gathered via direct observation and remote sensing) or in space (through satellites), or through crowd-source, administrative data and myriad of other kinds of data now created. The terms 'located' or 'location' data, 'spatial' data, and 'geographical information' are used throughout our response to refer to geospatial data. Geography – and its spatial lens – has its greatest role to play in unlocking the value of located data, especially in linking, and drawing relationships and insight from, a range of disparate datasets that have been 'meshed' across different scales and contexts.

Q1. To what extent do you agree with the following statement: Taken as a whole, the missions and pillars of the National Data Strategy focus on the right priorities.

Response: **Somewhat agree**

1.1 Taken as a whole, the missions and pillars of the National Data Strategy are a welcome evolution of the government's thinking around unlocking the value of data in government and wider UK. However, we believe more attention is needed to the proposed actions for the Skills Pillar in both the consultation document and questions, and therefore set out comments and recommendations here.

1.2 We agree that the need for data skills continues to grow across the economy, but highlight that the acquisition and execution of those skills at both foundational and advanced levels is not exclusive to STEM, notably data science, computer science, AI and cyber. Data skills are developed through a breadth of other approaches/disciplines, notably the social sciences as well as STEM, resulting in an imaginative, flexible and innovative workforce across a range of leading sectors (social scientists notably contributing to creative, digital, financial, legal and marketing). Investment in data skills should not simply concentrate on STEM areas.
A focus solely on STEM subject data skills would produce a limited outcome and restrict the full economic and social benefits of the National Data Strategy. Indeed, if the National Data Strategy is to support the Government's 'levelling up' approach, it will need to support the

analysis, review and use of multiple data sources spanning exploration of the UK's socio-economic and environmental characteristics.

1.3 The National Data Strategy must recognise and support the important contribution of the social sciences in, for example, contributing to research and innovation in data applications (such as in the digital economy, business decision making, infrastructure projects and creative industries), in underpinning data management and 'big data' as a research resource, aiding the roll out of innovation and evaluating its success; and in contributing to research to inform the implementation and delivery of the National Data Strategy itself, such as in understanding changing demographic, socio-economic and labour market needs for re-skilling and up-skilling in data-focused occupations; understanding the drivers of data-driven productivity; and exploring the responses of sectors and places to specific interventions in the delivery of the Strategy. **We strongly recommend an interdisciplinary approach, at all stages of the skills pipeline that draw on perspectives across STEM, social sciences and humanities.**

1.4 The Society welcomes the comments of Lord True CBE in the welcome to the Government's National Geospatial Strategy which identifies **the important contribution of location data to our national life and prosperity**: "As well as making everyday lives easier, location data and the innovations that spring from it have even greater potential to unite and level up the country – by connecting people, organisations and services. Location data can help us respond to the great challenges of the future such as climate change, as well as tackle the immediate threats we face today." We reiterate our comments above, that this vision will only be fully realised if perspectives of geographers and other social scientists more generally are integral to the Strategy and its interventions.

1.5 The Geospatial Commission has identified that the better use of geospatial (location-based data) could contribute £12bn gains for the UK economy. **The importance of skills is centrally identified within the National Geospatial Strategy; "unlocking the value of location data requires people with the right skills".**

1.6 The National Data Strategy consultation document suggests that 'further actions [on advanced data, digital and R&D skills] will be laid out through the government's upcoming Digital Strategy...". **We strongly caution against the conflation of "data skills" and "digital skills"**. By data skills, we refer to the ability to understand and interpret (reason) using numbers, which might be applied to specific industries, economic sectors or cross-sectoral challenges, within subject disciplines, or in research contexts. These might range from basic arithmetic to handling advanced statistical analysis, including across multiple data sets. Not all sectors or employers will need advanced data skills (e.g. offered by data scientists); improvements to baseline numerical literacy, independent of improvements to digital literacy, would still be of considerable benefit.

1.7 Among other things, the possession of these skills allows for: confidence in the manipulation of numbers, an understanding of the possibilities and limits of measurement, attentiveness to the 'real world' contexts of data (especially where it is about people or places) that are essential for explanations, and an understanding of the role of evidence in testing and modifying our understanding of social processes.

1.8 For geospatial data, skills need to be developed not only for the creation, curation and assurance of geographic information, but also critically with the contextualisation, analysis, interpretation and use of this information. **This is where geography - and its spatial lens - has a particular role to play in unlocking the value of located data, especially its role in linking and drawing relationships from a range of disparate datasets across different scales and contexts**.

1.9 The Society therefore recommends:

- **A stronger commitment to data skills in the National Data Strategy**
- **That the focus on skills is not limited to a STEM focus and is widened to include the significant benefits of strengthening data skills across the social sciences**
- **That the National Data Strategy should make specific recognition of the benefits and importance of geospatial data and the skills necessary to realise the benefits of the use of such data.**

1.10 The ubiquity of data makes it vital that citizens, scientists and policy makers are fluent with numbers and data in all its forms. However, producing and consuming geospatial data intelligently, and interpreting it to unlock economic value and deliver social benefits, does require specialised skills. These skills are needed not just by technical specialists but also (and critically) by decision-makers and consumers of geospatial data, analysis and insight. Geography has and will continue to play a key role in the delivery of geospatial and broader skills of interpretation, analysis and visualisation.

1.11 The experience of Covid-19 is vividly highlighting how key challenges play out differently and are shaped by the physical and human geographies of the UK leading to variations in different places and locations and at different scales – from the neighbourhood to the regional to the national level. These skills and competencies need to continue to be cultivated, supported and developed across the education and career pipeline, not exclusively within data science and data-centric training pathways, embracing new technologies and approaches and the ubiquity (and multiple sources) of spatial and geographical information.

1.12 We encourage the Department to refer to the following evidence:

- The Royal Society's *Dynamics of Data Skills* report and case studies (Royal Society, 2019). The case studies within that report showcase the Royal Geographical Society's work in embedding data skills into the geography curriculum.
- The British Academy's Count Us In report (British Academy, 2015) articulates the benefits of enhanced data skills and specific applications of those skills with reference to arts, humanities and social sciences.
- The Campaign for Social Sciences' report *Vital Business: The essential role of the social sciences in the UK private sector*, setting out the varied contribution of social scientists, including in data-focused roles and activities.

The focus on just STEM overlooks the contribution of these subjects and the benefits that they can provide to the UK through the use of data skills within their application.

1.13 **Beyond geography, it is important to encourage the take-up of initiatives to introduce core concepts of spatial data to other subjects** through, for example, mathematics, computer science, statistics, design, psychology, economics and business studies. The Society has supported networking between subject leaders in specific areas, but these initiatives work best at a large scale, with the involvement of multiple subject bodies/associations, including teacher bodies.

1.14 We note the ambition to train 500 public sector analysts in data science by 2021. We encourage the Department to include geospatial data science and analysis in this training, and to draw upon existing knowledge and experience within the public sector for this, e.g. Ordnance Survey and Office for National Statistics Geography.

With reference to the education and skills development pipeline for data skills, we note that:

1.15 **Foundational skills and awareness of the value of data and geospatial insights must start in the earliest stages of education in schools. Currently, geography is the only statutory school subject in which geospatial skills are embedded and which also requires extensive data/quantitative skills.** Teaching about geospatial skills is delivered in UK schools almost exclusively through geography. Thus the study of geography is a key vehicle to educate and inspire young people about geospatial, as well as data skills broadly defined. Alongside this, it is important to encourage the take-up of initiatives to introduce core concepts of spatial data to other subjects through, for example, mathematics, computer science, statistics, design, psychology, economics and business studies.

1.16 Recent revisions to the curriculum at KS3 (where geography is part of the statutory national curriculum in English schools and thus taken by all students), at GCSE (ca. 265,000 students taking this qualification each year across the UK; currently the sixth most popular GCSE); and at A Level (ca. 37,000/yr; one of the top ten A Levels) have enhanced the coverage and demand for data skills generally, and geospatial skills, analysis and applications specifically. This geospatial content is part of the taught courses and also included within the assessment frameworks for GCSE and A Level.

1.17 From 2016 to 2019 the Society was supported by the Nuffield Foundation to deliver such a series of events and resources for 1,000 teachers to support the teaching and learning of digital skills generally, as demonstrated in our Data Skills in Geography Project Review (RGS-IBG, 2019).

1.18 The Data Skills Task Force Data Skills for the Future (Accenture, 2020) report highlights that "it is critical the work in schools and colleges continues beyond successful pilots, and initiatives by The Urban Data School and Royal Geographical Society are rolled out further".

1.19 The National Data Strategy offers the opportunity to take forward new initiatives to support skills across a number of areas. **The Society has identified the following opportunity to take forward focused work:**

National Training Programme to build the capacities and confidence of teachers, in delivering data skills through geography and specifically in the use of Geospatial Data Skills

This programme would embed geospatial data skills into a training programme for geography teachers, and teachers of other subjects. There is a clear need for geospatial data skills to become an integral element of their teaching and not a 'stand-alone' technology. The RGS-IBG has a nationwide training programme which draws on partners including Esri UK, the Ordnance Survey, universities and key employers – particularly those engaged in environmental monitoring and sustainability. This provides a framework and infrastructure to deliver an enhanced geospatial data skills programme to 2,000+ teachers. This will address a current skills gap by building teachers' capacity in order to create the potential for them to impact on the education of ~300,000 young people pa (265k GCSE and 30k A level geography students). Indicative costs for a two year programme would be ~£100,000 per year (~£200,000 in total).

Q2. We are interested in examples of how data was or should have been used to deliver public benefits during the coronavirus (COVID-19) pandemic, beyond its use directly in health and social care. Please give any examples that you can, including what, if anything, central government could do to build or develop them further.

2.1 **The pandemic, and responses to it, are fundamentally geographical. Geographers' unique ability to connect and visualise data about people, places and phenomena in meaningful ways is helping new audiences to understand the pandemic as it develops, drawing attention to underappreciated impacts, supporting vulnerable populations, and revealing the stories behind the data.** We highlight the following applications of geospatial data and tools during the COVID-19 pandemic:

2.2 Commercial and consumer mapping companies including Citymapper, Apple and Google helped epidemiologists and governments assess lockdown effectiveness and disease transmission by sharing data on transport and mobility.

2.3 Tortoise Media's Corona Shock series (part 1 and part 2) used spatial visualisation based upon train routes to demonstrate spatial variation in economic impact in the UK.

2.4 A wide range of apps emerged to support social distancing and context-specific response, for example Carto's spatially referenced symptom tracker for Madrid captured real-time information about hotspots, while the Crowdless app enabled social distancing in supermarkets. The myriad of ethical issues associated with such applications continue to be explored.

2.5 Cross-sector and cross-disciplinary collaborations have been key. A key work-stream within the Royal Society's Rapid Assistance in Modelling the Pandemic (RAMP) Initiative, connects epidemic models to transport and urban analytics. In another collaboration, Leeds Institute for Data Analytics has joined the Emer2gent data alliance, with partners including IBM, Google and Rolls Royce, have been studying changes in population behaviour resulting from the pandemic.

2.6 A range of mapping and spatial dashboards emerged to track real-time health and social care data, but their usefulness was wider and more impactful because of their map-based presentation, such as that developed in the early stages of the pandemic by Johns Hopkins University. In a crowd-sourced approach, Humanitarian OpenStreetMap added specific tasks to its collaborative mapping projects.

2.7 In local government, spatial tools and analysis were used to facilitate mobility and access to services. For example Newcastle Urban Observatory, NE1 and Newcastle Council collaborated to develop a "How Busy is Toon" app, enabling residents to make informed decisions about when to visit central shopping areas.

2.8 In crucial applications of earth observation technology and skills, Copernicus EU is monitoring mobility and air quality data in Europe contributing to a joint initiative between ESA, NASA and JAXA that combines a wealth of data from Earth-observing satellites to monitor the worldwide impacts of COVID-19. The publicly-available dashboard lets users explore how the pandemic has affected airport and shipping traffic, city night lights, agricultural production, greenhouse gas emissions, air quality and water quality, amongst other things. View the dashboard.

2.9 The Society has published an extensive suite of resources for schools, teachers and students, illustrating how the use of data sets to explore issues spanning air quality, river and flooding, climate change, economic change and health. In addition, the Society is currently developing a pilot programme to support the Police Service to work with young people to collect data to support local crime prevention.

Q3. If applicable, please provide any comments about the potential impact of the proposals outlined in this consultation may have on individuals with a protected characteristic under the Equality Act 2010?

3.1 Foundational skills in data literacy should include an understanding of the ways in which power structures and inequality – across a range of characteristics – are created and perpetuated by data structures. Data skills training should include this on a widely available basis in order that people from a range of backgrounds and skill levels can access this understanding.

3.2 Data can be used to deduce an individual's personal characteristics; background, religion, political beliefs, gender identity and even medical conditions. One of the key tools in doing this is through the routine collection of location (also known as geospatial) data. To date, a person's current and past location does not appear to have obtained the same level of scrutiny as other aspects of personal data. The ways in which geospatial data is collected, used and stored is associated with numerous privacy and ethical issues.

3.3 **Growing AI capability will make it increasingly feasible to identify an individual's personal and protected characteristics from anonymised data, by scraping and processing location-based information from multiple sources. This is a topic which requires further attention if innovators are to be able to use the location attributes of data legally and ethically.** Personal location data needs to be carefully managed within future AI applications, especially in data sharing between public and private sectors, if it is not to infringe personal privacy and protected characteristics, even if inadvertently.

3.4 Data applications in social science contexts are more likely to throw up ethical considerations (especially around processes of sharing and integrating data about people and places). We encourage data professionals in STEM disciplines to engage with social science counterparts on these matters.

3.5 We also encourage the Department to consider the interests and responsibilities of those who are collecting and using data. We note that data privacy (responsibly collecting, using and storing data about people, in line with expectations of subjects and users, regulations and laws) is not the same as data ethics (doing the 'right thing' with data, considering the human impact from multiple perspectives) and we alert the Department to the Locus Charter, a proposed international set of principles and guidance for ethical and responsible practice when using location data.

Q4. We welcome any comments about the potential impact of the proposals outlined in this consultation on the UK across all areas, and any steps the government should take to ensure that they take account of regional inequalities and support the whole of the UK?

4.1 There are many benefits to building data skills in the UK population, including helping citizens to participate more fully in the democratic process, enhancing research in universities and in the workplace, and supporting the economy, taking advantage in particular of the advent of "big data". A coordinated and continuous effort at improving data skills across all phases of education and employment, across the whole of the UK, is therefore urgently needed.

4.2 **There is an urgent need across industry, government, and in local and regional institutions to widen the capacity and increase the capability for data analysis and management that monitors the place-based impacts of data-driven decision-making.** In particular, we note the inclusion in Treasury's Green Book of specific advice on Place Based Analysis of costs, benefits and risks (Green Book, Section A2), and the addition of place-based evaluation to Treasury's Magenta Book in 2020, notably a requirement to understand if the same results would be achieved in a different place or context.

4.3 The capacity to connect, integrate and analyse data is rapidly changing in an era of 'Big Data' and will continue to develop for the foreseeable future. This will not only drive new knowledge-based activities, such as smarter transportation networks and responsive and resilient cities, that are integral to 'levelling up', and to enabling new research and innovation opportunities in the digital economy.

Q5. Which sectors have the most to gain from better data availability? Please select all relevant options listed below, which are drawn from the Standardised Industry Classification (SIC) codes.

Response: **Other – all sectors benefit from the use of location/spatial data**

5.1 We alert the Department to the recent publication of a Geospatial Data Market Study report, which suggests that the geospatial data market consists of a large number of submarkets that carry out activity across the wider economy and therefore is described better as an ecosystem than as a traditional economic market. It notes that current industry definitions do not adequately capture the geospatial market and several large firms span geospatial and other digital areas: https://www.gov.uk/government/publications/enhancing-the-uks-geospatial-ecosystem.

5.2 **Every sector will gain, if the data professionals working in those sectors are competent, professional, ethical and accountable. Government may wish to demand that data professionals in responsible positions are Chartered with an appropriate professional body, to help drive up standards.** This would also ensure that qualifications leading to Chartered status are appropriately aligned. This need not necessarily be concentrated in a single profession/occupation, accreditation or professional body; many sectors and professional bodies have appropriate and relevant accreditations, such as the Royal Geographical Society's Chartered Geographer, for those with expertise in geospatial data.

Q6. What role do you think central government should have in enabling better availability of data across the wider economy?

6.1 The Geospatial Commission, as part of the Cabinet Office, has been charged with setting the UK's geospatial strategy and promoting the best use of geospatial data. Central governance and coordination of the UK's data assets, including its location data assets, creates new opportunities to open up new data and increase consistency in how trusted data are accessed, discovered, used and understood. The connection of multiple data sources using the common language of location will enable greater understanding, better decisions and smarter actions. **We encourage the Department to work closely with the Commission to unlock the unique value embedded within geospatial data.**

6.2 We **support the ongoing development of a National Location Data Framework**, as set out in the Geospatial Commission's National Geospatial Strategy (2020), and in accordance with the principles set by UN-GGIM (United Nations Committee of Experts on Global Geospatial

Information management). Such a Framework should form a core part of any national data infrastructure led by government.

6.3 Ordnance Survey (OS) produces the core reference data for the UK and manages one of the foundational national data sets. We suggest there may be benefit in central government **naming and identifying public sector data custodians for geospatial data**, including OS and other 'Geo6' partner bodies of the Geospatial Commission.

Q6a. How should this role vary across sectors and applications?

6.4 In the National Geospatial Strategy published in 2020 by the Geospatial Commission, government recognised the value of geospatial data, and proposed mechanisms to unlock access to data of economic, social and environmental value. We believe that this offers **a unique opportunity for government to link location data with other economic, social and environmental data more effectively, for the benefit of all sectors and data applications**.

Q7. To what extent do you agree with the following statement: The government has a role in supporting data foundations in the wider economy. Please explain your answer. If applicable, please indicate what you think the government's enhanced role should be.

Response: **Strongly agree**

7.1 We agree that data quality, findability, accessibility, interoperability and reusability are core to unlocking the true value of data and support government efforts to improve data foundations. We recommend the Department work closely with the Geospatial Commission when considering the role government may have to play in how geospatial data used/accessed (especially by government/wider public sector, for the benefit of the UK economy) in order to be fit-for-purpose, notably for interoperability, such as the scales, resolutions and standards applicable for such data. The Commission has signalled the adoption of the FAIR principles (findable, accessible, interoperable and reusable) for location data; we would like to see a harmonised approach across government.

7.2 We note the example of the Office for National Statistics Census 2021 team consulting with the wide range of census users about uses of census data at a range of geographical scales and in a range of location formats, and encourage other government departments using and sharing major datasets to consider geography and location data interoperability a critical element of data releases. If the UK Census 2031 is to be replaced by the collation of similar information from a range of administrative and local sources, supplemented by surveys, understanding the geographies of such data sources and surveys, and achieving standardised location data across those, will be essential for achieving interoperability.

Q10. How can the UK's data protection framework remain fit for purpose in an increasingly digital and data driven age?

10.1 Government should focus not only on developing an appropriate data protection framework, but also on ensuring the UK's data professionals, especially those in positions of responsibility, are competent, professional, ethical and accountable, regardless of their sector. This will help ensure successful development and adoption of any framework.

Q13. The Data Standards Authority is working with a range of public sector and external organisations to create a pipeline of data standards and standard practices that should be adopted. We welcome your views on standards that should be prioritised, building on the standards which have already been recommended.

13.1 We **strongly recommend consultation with professional bodies** (not just data/digital professional bodies, but those that engage with data at both strategic and operational levels, such

as marketing, management, financial/insurance, geospatial and other professional bodies with wider responsibilities).

13.2 The practicality of proposed standards can then be **tested by broad communities of expert practitioners, ensuring that standards (especially those with cross-sectoral applications) do not have unintended consequences**. Professional bodies provide easy access to such communities and are effective at engaging with their communities to provide valuable input to standards development and implementation.

Q17 Do you agree that the government should play a greater role in ensuring that data does not negatively contribute to carbon usage?

Response: **Strongly agree**

17.1 **Geographical data and approaches play an important role in the journey to net zero, carbon reduction and mitigation of other climate-related risks.** Its value is already being demonstrated in agriculture and forestry, business and finance, amongst other sectors. Integrated data – spatial data in particular – can help solve complex problems, including the geographical dispersion of risk, and improving our understanding of the environmental and social context in decision-making and investment around data practices. Advancements in technology, for example, integrating satellite and other new forms of geospatial data and analysis, have huge potential to support government and other organisations in identifying, measuring and monitoring emissions, mitigation and adaptation on an ongoing basis.

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