

## Geospatial Commission: Call For Evidence Response Questionnaire

Please submit your completed questionnaire to:

[geospatialcommission@cabinetoffice.gov.uk](mailto:geospatialcommission@cabinetoffice.gov.uk).

Clearly title your email 'Call for evidence response'.

### About you and your organisation

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**Please select which of the following best describes you as a respondent:**

<b>Respondent</b>	<b>Please mark with a X</b>
Academic	
Business representative / trade body	
Central government	
Charity or social enterprise	<b>Learned Society and Professional Body</b>
Individual	
Legal representative	
Local government	
Large business (over 250 staff)	
Medium business (50 to 250)	
Small business (10 to 49)	
Micro business (up to 9)	
Other - please state	

## Call for evidence - three key themes

We have identified three high-level themes that could help our approach to setting a strategy which are as follows:

1. **Supporting innovation in the geospatial sector**, exploring how to secure cutting edge skills, the right access to data, and opportunities from emerging technologies for the geospatial sector itself
2. **Enhancing the UK's geospatial assets**, looking at how best to align interests, avoid duplication, and instill best practice across the whole public sector
3. **Driving investment and productivity in geospatial applications**, asking in which wider sectors the most value lies from better exploitation and use of geospatial data, in the UK and internationally

## Our questions

**Q1. Is our view of the geospatial data types accurate? If not, what should be included or excluded from this?**

We encourage the commission to be inclusive as possible in the 'geospatial' data it considers from 'traditional' locational data, to Earth observation, to locational information (and potential) associated with administrative data, to crowd-sourced data, to data from the IoT etc. Standards, interoperability, versioning are key elements to the greater use, and value, of all of these.

**Q2. In addition to current government policy, what are the areas of geospatial skills where the commission could best focus, to help ensure the necessary capability within the UK for the future?**

### **Background**

The Royal Geographical Society (with IBG) is the UK's learned society and professional body for geography. We are also a membership body with >16,500 Fellows and members. We work closely with geographers in schools, universities, and in professional practice setting standards (for the discipline and individuals), accrediting programmes and individuals (notably Chartered Geographer, with a specific stream in GI/GIS), delivering mentoring and training, and profiling careers and opportunities. We also advocate for the discipline, engage the public through an extensive and broad range of programmes, and are actively engaged in knowledge exchange activities across our communities.

We recognise there are many disciplines and professional bodies cultivating and developing this

ecosystem of geospatial skills – from data science, to engineering, to design and beyond. All these all are critical. 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 insights.

Geography has and will continue to play a crucial role in the delivery of geospatial and broader geographical skills of interpretation and analyses. These core skills and competencies need to continue to be cultivated, supported and developed, embracing new technologies and approaches, and the ubiquity (and multiple sources) of spatial (geographic) information. We welcome opportunities to work with the Commission, and the geospatial and geographical communities broadly, to develop and signpost existing and new opportunities.

### ***Our approach to this call for evidence***

Our response focuses primarily on the opportunities, needs and gaps delivered through geography. In collating the evidence base to respond to the commission, we consulted our community (university academics, teachers in schools, research groups, professional geographers specifically); drew on our existing knowledge and activity in this area; reviewed published reports and online information about courses and training; analysed CPD returns of Chartered Geographers and consulted with them as employers and employees; and interviewed leading academics, in geography and beyond (business, engineering, data science).

In addition, we have also consulted, and worked with, the AGI with whom we have a strategic partnership and a programme of ongoing work, specifically focused on skills. Our insights are biased to the supply-side of skills and to geography (as noted above).

### ***General comments***

Attention and focus is needed at multiple levels, from schools through advanced research training, delivered in different formats to meet the needs of learners and professionals. Investment is needed in 'core' areas (such as geography, geomatics, surveying etc), but also new and emerging areas (including data science) and with different user communities (e.g. disaster response and risk management). 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.

We structure our response in terms of opportunities and intervention at different stages in the geospatial skills pipeline – schools, university level education, research and innovation, and professional practice. The evidence base is provided in the accompanying briefing document.

### ***In schools***

Foundational skills and awareness of the value of geospatial data and insights must start in the earliest stages of education in schools. Currently, core geospatial skills are delivered in UK schools almost exclusively through geography. Thus geography is a key vehicle to educate and inspire young people about geospatial broadly defined.

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 250,000 students taking this qualification each year; currently the 6<sup>th</sup> most popular GCSE); and at A-level (ca 30,000/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.

Policy interventions, notably the inclusion of geography GCSE in the English-baccalaureate, has encouraged more students to study geography at GCSE in England. This is not the case in Wales,

Scotland and Northern Ireland. **Opportunities to encourage broader uptake to GCSE (or equivalent) should be explored and encouraged with the respective school educational policy bodies.**

Many teachers lack experience and confidence in the delivery of the content of the new school-level curricular; they need more training, resources and support in delivering the richer geospatial content in inspirational ways. **A national programme to deliver teacher-CPD, resources, networking and mentoring is needed for teachers of geography in schools.** The Society has been working with the Nuffield Foundation to deliver such a series of events and resources for teachers to support the teaching and learning of digital skills generally. That project work comes to an end this year.

Geography has a **shortage of specialist teachers**. DfE are funding ITT scholarships and training through the Society. With this too, there is scope to support more training in geospatial skills, more awareness of applications and opportunities, and thus enhance the learning and understanding of young people.

In addition, beyond geography, opportunities exist, but more support is needed, to champion **cross-school (cross-subject) initiatives to introduce core concepts of spatial data** through other subjects (e.g. mathematics, computer science, design, economics, business studies etc). The Society has supported engagement between geographers and other subject teachers to explore such partnerships, but these need to be scaled up and other subject associations and teacher-bodies need to be engaged.

Esri UK launched a programme in April 2017 to give ArcGIS Online free to all UK secondary schools, attempting to remove two barriers - installation and cost. They also launched the Geomentors programme, working with the Society to network geospatial professionals (those with expertise) with teachers, along with resources, to support the teaching and learning of GIS. These initiatives are also championed through events such as GIS day. These programmes have been well received and successful. To date there has been uptake of ArcGIS Online in >1700 secondary schools, benefiting >70,000 students. This is the order of a fifth of secondary schools across the UK. Clearly, and importantly, there are opportunities to do more: ca. 80% of secondary schools are not accessing these resources. The Society has worked with the four exam boards and with Esri UK to promote the opportunity. We recommend the **Commission work with DfE, and the Society and Esri UK, to join together through communications and influence to extend the reach, awareness and uptake of the free software, resources and Geomentors.**

Unlocking greater value (economic, social or environmental) of geospatial data will result from new applications, innovation and creativity (as well as greater awareness and skills). Initiatives are needed to develop this **innovative imagination and capacity** amongst young people at schools. One productive route would be to launch a competition for **geospatial-apps** (modelled loosely on the ideas of Geovation but for a school students). This could work with employers/industrial and media partners to raise the profile. This RGS-IBG would be delighted to partner on this, building on experience with initiatives such as Young Geographer of the Year.

In addition, there is a need to showcase the potential and excitement of geospatial applications to school level students whose interests will lead to careers not only in geography, but engineering, mathematics, data science, business, design etc. This requires investment in a broad suite of **imaginative careers profiles** that can be used by teachers, career advisors (working through national networks) and directly with students too. This should actively link with STEM, social science and humanities disciplines too, and drawing on school Ambassadors programme (both Geography and STEM). These should be pitched at students of all ages to fire their imagination, understand the possibilities, and recognise how expertise (or just knowledge) of geospatial data, technologies and applications can lead into successful careers, address key social, economic and

environmental challenges, and benefit society.

Initiatives with schools, to showcase applications and careers, are key elements of what is also needed, **broader public relations activities to share success stories and raise the profile of geospatial** to the public focused on themes important to them. A festival, street-exhibitions, citizen-geography activities all could be elements of this. As one small example the Exhibition Road festival this summer (involving Science Museum, Imperial etc) will focus on space.

### **Higher education**

Reports (such as Geobuiz, 2018) document that the UK stands out in terms of provision of geospatial training.

In preparing for this submission we updated our directory of geospatial programmes and courses in the UK, related to geography. Through this we identified 7 specialist undergraduate courses; 215 undergraduate modules; 90 Masters degree programmes; and 156 short courses. Geospatial education is increasingly being delivered in settings outside traditional realms of GIS, remote sensing and geomatics (in engineering, architecture and planning, business, public health). A fuller understanding of these courses, parts of courses, would be valuable within as well as across higher education institutions to encourage collaboration and interdisciplinary teaching. An **accessible and comprehensive directory** of formal provision is needed, across disciplines and institutions, to identify good practice, gaps in provision and foster new opportunities.

Based on discussions with leading university based educators, we heard expressions of interest in the development of MOOCs to bring basic geospatial understanding to new entrants, and new models for interdisciplinary teaching. **Forums need to be convened to bring interested parties together and catalyse development and delivery. Critically, employers/industry need to be integral to these discussions from the outset to ensure the full suite of skills, knowledge and understanding is being delivered** (i.e. coding (e.g. in R, Python), visualisation (e.g. Tableau, Alteryx) and database management, as well as core-GIS skills).

Accessing new forms of data, especially via APIs, is also a key competence that needs to be developed, as well as an appreciation of the underlying systems that generate such data. Furthermore, particularly with new opportunities (e.g. administrative data, crowd-sourced data, human-sensor etc) and heightened awareness and concerns about personal data, confidentiality and ethics, education around professional values is important for geospatial professionals. Geoprivacy and ethical spatial data handling are key issues.

**GISRUK** (an annual academic-led conference that draws together researchers from a broad range of disciplines, including but not limited to, Geography, Environmental Science, Ecology, Computer Science, Planning, Archaeology, Geology, Geomatics and Engineering) **provides one obvious forum for an annual meeting/discussion to foreground skills training provision and skills needs** and to engage university educators.

In our interviews higher education staff, as with teachers in schools, expressed concern about **having sufficient time and resource to stay abreast of state-of-the-art technical skills** required in the rapidly evolving geospatial technical landscape. This needs to be highlighted as a priority and resources (time, funds, and opportunities) need to be made available for this. Short industrial or public sector placements/secondments could help in this realm.

Provision of geographical/geospatial training in further education and through technician level training is limited. A small number of **geospatial mapping and science apprenticeships** (level 3 and level 6) have been developed, and other standards make reference to geospatial training. The former have been developed by RICS to serve the needs of the surveying/geomatics profession. We are keen to see geographers engage with these more and to explore the extent to which they can provide **pathways for other elements of geospatial training at entry and advanced level**,

or if new qualifications need to be developed. We know of a small number of geography departments interested in **higher-level, geospatial apprenticeships, focused more on data analytics**. These conversations need to be taken forward; key stakeholders drawn together; and barriers for uptake in universities, or further education institutions, identified and addressed.

### ***Research and innovation***

In the higher education research and innovation space, there are a number of pockets of geospatial expertise and excellence – established and emerging. Programmes exist, through UKRI awards, (e.g. Future Leaders) to recognise and raise the profile of expertise and innovation more widely and to foster collaborations with industry. **A directory of expertise, proactive nominations for recognition** (with associated media profile) would serve to raise awareness of this excellence.

More geospatial awareness and training needs to be embedded in **interdisciplinary PhD training**. The UKRI doctoral training centres serve as one vehicle through which to do this. Mapping of existing provision of training across ESRC (in particular), NERC, and ESRC doctoral training centres would be a helpful first step, as would involving more industry partners and advisors in evaluating the current offer. **Focused calls, or cross-centre training programmes**, could then follow.

### ***Employers' needs***

Numerous reports have been published based on skills needs and gaps based on employment data, surveys and interviews. Some of these are summarised and collated in our companion briefing document.

Common themes relate to the lack of digital/data skills generally; to the lack of knowledge of geospatial concepts (and implications for geospatial data) amongst computer scientists, software engineers and data analysts; and to the lack of data science skills (coding, visualisation, database management etc – noted above) amongst those trained through 'traditional' geospatial routes (geodesy and surveying, cartography, GISc etc).

A stronger evidence base of needs and gaps is critical to ensuring programmes are in place such that the right skills are anticipated, cultivated and delivered for entrants at all levels in employment. Here we draw specific attention to the exciting opportunities offered by the innovative methodology developed by Nesta, which involves (near) real-time analysis of job advertisements (ca 41 million to look at skills and skills clusters and employment sectors (see the accompanying document for more details). Such results could be overlain on local authorities/journeys to work to gain insights into the regional pattern of demand and/or to draw on information in other R&D platforms (glassAI, GITHUB, academic papers etc). We would welcome the opportunity to work with the Commission and Nesta to use this approached, modified slightly, to gain new insights into existing and emerging skills needs and gaps. Key to this will be the development and use of a shared (dynamic) taxonomy of skills.

### ***Accreditation and professional standards for practitioners***

These are critical in recognising and signalling different levels of competence and expertise. Producing and consuming geospatial data intelligently, and interpreting it to unlock economic value and deliver social benefits to our citizens, **does require specialised skills**. These need to be clearly articulated and captured in a **framework of professional competencies**.

**Chartered Geographer (GI) (CGeog GI) provides one standard to independently recognise an advanced level of professional expertise and competence**. The accreditation has been adopted across the public and private sectors, but more needs to be done to encourage its alignment and uptake (e.g. with industry bodies such as the Chartered Insurance Institute and

Association for British Insurers).

Chartered Geographer is underpinned by a **competency framework and professional code of practice**. There is scope to develop this further and the Society would welcome working with the geospatial community to do that. Currently, we are collaborating the Head and Deputy Heads of the Geography Profession within GSE in government to ensure alignment of standards and expectations across departments/agencies and with Chartered Geographer. Discussions are also underway about an earlier (entry-level) professional recognition, for those in the first few years in the profession, that codifies a commitment to professional development and mentoring. This will be developed to be appropriate for those beyond the public sector to ensure transferability between sectors and workplaces.

There are very special opportunities afforded within government, and beyond, through the work of the **new profession of geographers in GSE**. The head of the profession, David Wood, and a number of the deputy heads charged with professional standards specifically, will be key to the development of geospatial training, standards, and accreditation of expertise for those involved in geospatial within government. They are particularly well placed to identify synergies and capitalise on opportunities with allied professions (e.g. the digital, data and technology profession) and in embedding good geospatial practice in the frameworks and competencies of other professions (economics, social research, statistics as examples).

**Q3. What are the geospatial skills needs and gaps in your organisations, how can these be most effectively addressed, and how can careers in the sector be best promoted?**

Please see responses above in Q2.

**Q4. Are there any publicly or privately-held geospatial datasets that are currently challenging to access or use or of insufficient quality, but which you or your organisation would find valuable if these issues could be resolved? Please explain why this would be of value, and how access/quality could be improved?**

**Q5: Do you anticipate that any changes will be needed to the both address data and the wider address ecosystem, to support emerging technologies? Please provide evidence of value to support any proposed changes.**

**Q6: How should the commission be looking to develop the UK's capability in Earth observation data, both technologically and to support an effective market?**

**Q7. Which new technologies should the commission focus on to provide new opportunities to process and exploit geospatial data for economic growth?**

**Q8. How can geospatial data and applications be used to support enhanced roll-out of future technologies?**

**Q9: What are the options for how public sector organisations could continue to invest in maintaining and enhancing our geospatial data assets?**

**Q10: What areas of the underpinning geospatial infrastructure such as positioning technologies, including GPS and indoor positioning systems, and geodetic networks and frameworks to support them, should we be prioritising the development of, in order to support the emerging requirements for geospatial data?**

**Q11: What role should the private sector have in both the development and maintenance of the underpinning infrastructure and enhancing the UK's geospatial data assets?**

**Q12. Do you face challenges when working with geospatial data from across the public sector? If so, what are they and how could value be better released? Are there any technical remedies or standards that could be adopted to improve the interoperability of geospatial data? Please provide supporting evidence of what these remedies could help to accomplish.**

**Q13. How can the Geospatial Commission act as a more effective customer for geospatial data on behalf of the public sector?**

**Q14. Are there any additional geospatial datasets, from the other partner bodies or other sources, that the public sector would derive significant benefit from having access to, that might have novel and valuable use cases? What would that access look like?**

**Q15: How can we best develop a single UK strategy, ensuring alignment between the individual strategies across the UK while still allowing for regional variations?**

**Q16: How can we best ensure effective local authority coordination and sharing of best practise, using location data to better deliver public services?**

**Q17: As a result of this analysis, we are prioritising the exploration of possible initiatives in the high-value categories identified:**

- **property and land**
- **infrastructure and construction**
- **mobility**

- natural resources
- sales and marketing

**What are the existing or potential geospatial applications which could be scaled-up or developed in order to capture economic value? (We would particularly welcome responses from industry and other bodies engaged in these sectors.)**

**Q18: Are there any other areas that we should look at as a priority?**

**Q19: What are the main potential private and public sector innovations that will rely on the use of geospatial data to rollout, and are there corresponding regulatory challenges?**

**Q20: How best can we make the UK's presence in the international geospatial world more visible?**

**Q21: Where should the UK be looking for points of comparison overseas? Who are the other international exemplars? What best practice is being modelled overseas that we can learn from?**

There is much good practice overseas. We encourage the commission to also involve international experts (e.g. from Singapore, USA, Netherlands etc) in its advisory and evaluative bodies.

Thank you for your time in completing your response to our call for evidence.

Any questions, please get in touch with the Geospatial Commission via [geospatialcommission@cabinetoffice.gov.uk](mailto:geospatialcommission@cabinetoffice.gov.uk)