THE ASSOCIATION FOR **GEOGRAPHIC INFORMATION**

FORESIGHT REPORT 2030

The AGI would like to thank the following organisations for their sponsorship which has made the Foresight project possible: CGI, ESRI UK, IDOX GEOSPATIAL, INFORMED SOLUTIONS, MGISS, ORDNANCE SURVEY AND VERISK.

We are also grateful to Ordnance Survey for their support in delivering the report design.

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CHAIRS' FOREWORD

The Association for Geographic Information is proud to publish its third foresight report, looking at the upcoming five year period and beyond.

"The geospatial information (GI) industry is undergoing radical change" was the first sentence of the first AGI Foresight Study, published in 2010. And since the only constant in life is change, that statement is probably more true now than ever. To quote the AGI Foresight Report 2030: "the geospatial sector isn't simply evolving, it's fundamentally reconstituting itself around six interconnected forces that challenge every assumption about spatial intelligence in the 21st century".

The Association for Geographic Information is a diverse, passionate membership organisation delivering on the needs of our members. We aim to achieve our mission through the three pillars that govern our activities and intentions; to nurture and connect active GI communities, to support career and skills development for GI Professionals, and to provide thought leadership to inspire future generations. The AGI Foresight Report 2030 aims to support all three pillars.

The Foresight Report 2030 is the result of a 12-month project exploring the opportunities and challenges facing the geospatial sector over the next five years. With the benefit of hindsight, the report reflects on how the geospatial industry has developed since the AGI Foresight Report 2020 (written in 2015). It then describes how over the next five years the geospatial industry will be reconstituting itself around six interconnected forces: "The next 5-10 years will witness the most significant transformation in geospatial data since the advent of digital mapping. This transformation extends beyond technological capability to encompass fundamental questions of trust, community engagement, and professional authority."

Addressing the "so what?" question, the report concludes with some calls to action for major stakeholder groups in our ecosystem – policy makers, industry and our own and other membership organisations. The AGI Council commits to studying these actions and learning how, as a membership organisation, we need to evolve.

We believe that it is important to justify the methodology we chose to create this report. At the start of this project in September 2024, the AGI Council decided that the content should reflect an independent view, without undue influence from individuals or organisations. At first we ran a quick survey to understand the main opportunities and challenges facing the geospatial industry. We are publishing an analysis of the 92 responses of that survey in a separate document. The survey outcomes formed the basis of 30 interviews with a wide variety of leaders and of Focus Group discussions in the sidelines of the OS Innovation Festival and the GEO Business Show. Two independent editors used all these materials to write up the report and its recommendations. The two independent editors reflect on their role in that process in the Editor's Note.

We believe that the chosen methodology has delivered the independence that the AGI Council has asked for.

On behalf of the Association, we would like to thank everyone who contributed their knowledge, wisdom, hopes and fears and simply hard work. There are too many contributors to mention all individually, but there are a few that warrant a special mention: Christin Walter and James Cutler are the editors of the report, Faith Clark conducted the interviews, and Richard Flemmings led the working group and kept the project organised.

We would also like to thank our sponsors CGI, Esri UK, Idox Geospatial, Informed Solutions, MGISS, Ordnance Survey and Verisk who have made the project possible. Thank you Ordnance Survey for assisting with the design of the report.

To conclude, we believe that we are at an important inflexion point for our industry and it is every leader's role to take these changes seriously. As the report states: "Without proactive adaptation, the sector risks becoming infrastructure that others control, essential but invisible, powerful yet struggling to articulate its value". We wish all readers wisdom in their interpretation of the recommendations.

Peter ter Haar and Fergus Craig
AGI Co-Chairs
November 2025

EDITORS' NOTE

CHRISTIN WALTER

JAMES CUTLER

As editors we have been blessed with not only a willing cohort of professionals from the world of geospatial each with their own story to tell, experiences and perspective (see below for a profile) but with the effort and diligence of Faith Clark in corralling these diverse voices around some central, urgent themes to deliver up the interviews from which this report is compiled. Additionally, we would like to acknowledge the commitment of Ordnance Survey and our sister geospatial organisation leaders in enabling and adding flavour to the pot.

We know there are other voices (notable interviewee absences include academia, transport and maritime for example though some of these are represented in the survey) and other sources.

We also know that with our geospatial world moving and evolving much faster than ever, this report risks being overtaken by events – Insta Maps, AlphaEarth, Niantic personal device and Meta' neural band all emerged while compiling this report! To this end we have brought some of the external, outlier and dissonant voices into the mix to give readers additional reference points in determining how this future impacts them and what their choices are in maximising the opportunity and minimising the risk that stems from them.

In terms of method, we have leant heavily into the systematic structure of the interviews, not to compile a call and response summary but to identify common themes wherever they emerge in the interviews and try to synthesise a coherent narrative illustrated with verbatim quotes from the interviews. Additional insight comes from the sector survey that AGI undertook as part of the information gathering for this report. We have drilled down into this and enriched the core narrative with salient insights from the 92 respondents.

There is always a risk with these reports that you the reader come away with a "that was interesting, so what!?". We have sought to mitigate that risk through developing some possible calls to action for major stakeholder groups in our ecosystem – policy makers, industry and our own and other membership organisations. This is by no means comprehensive but will we hope inspire you to scope out how you might prepare for, minimise risk of and maximise opportunity from this rapidly emerging geospatial era.

We would be the first to say that any and all errors of omission or commission are ours alone though we would hope that all interviewees think that we have understood their perspective even where the quotes may appear in a context other than that in which it was given.

Finally, we would like to thank the AGI Council for appointing us to this endeavour and to allowing us a lengthy leash by which to deliver. Now it is up to the geospatial community to move forward boldly, heeding the calls to action, advocating loudly the value of location intelligence and the people that help deliver it so that today's promise is realised.

Christin Walter and James Cutler

METHODOLOGICAL APPROACH FOR 2030

HORIZON SCANNING

The analysis is based on multiple sources of information, including 92 individual survey responses, 30 expert interviews, engagement with sister organisations and extensive AGI community discussions.

STAKEHOLDER GROUPS

Numerous stakeholders contributed to this report. As geospatial becomes more intertwined with other application areas, the AGI Foresight Report will need to broaden its reach to determine the future impact of Geographic Information.

DRIVING FORCES

After considering all sources of information, including the input from a diverse group of experts, and the previous work of the AGI community, six themes emerged that will be driving change leading up to 2030.

AGI COMMUNITY

The AGI community sees the purpose of the Report as both observing and challenging the current role of Geographic Information.

2030 FORESIGHT THEMES

Data in the World of Geospatial: The Next Generation

Artificial Intelligence in Geospatial: Promise, Peril and the Path Forward

Interoperability and Infrastructure in Geospatial: Evolution Over the Next Five Years

Collaboration in Geospatial: Evolution and Future Trajectories

The Great Skills Shift: How Geospatial Education Must Evolve for an Embedded Future

Earth Systems Evolution: The Geospatial-Digital Twin Nexus Transforming Climate, Finance and Construction

OUR INTERVIEWEES

AGI's foresight study has assembled industry leaders whose careers span the full spectrum of location intelligence, from foundational mapping through to cutting-edge digital transformation. What emerges from this cohort is not merely a cross-section of the geospatial community, but rather a curated assembly of thought leaders who embody the sector's evolution from niche technical discipline to mainstream digital enabler.

The diversity of interviewees reflects the sector's growing maturity. Career trajectories reveal two distinct pathways into geospatial leadership: the traditional route through geography, surveying and mapping disciplines, and an increasingly prominent pathway from adjacent sectors - finance, engineering, technology, and even art and design. As Tracie Callaghan from Natwest reflects, "I definitely would be one of those within the latter camp... I love a map. Everybody loves a map," demonstrating how geospatial now attracts talent from beyond its traditional boundaries.

Geographically, whilst UK-centric, the study captures perspectives from leaders operating on global stages. Aaron Addison at World Geospatial Industry Council, Rebecca Firth from Humanitarian OpenStreetMap Team serving communities worldwide, Will Cadell in Canada and Peter Rabley at Open Geospatial Consortium (OGC) represent British leadership with international reach and responsibility.

The professional backgrounds span the critical nodes of geospatial value creation. Government leaders like Ian Spencer (Ministry of Defence), David Henderson (Ordnance Survey), Mick Dunn and Rob Pasco from Nottingham and the Welsh Administration respectively, and Suzanne McLaughlin (Ordnance Survey Northern Ireland) provide authoritative insights into public sector transformation. Commercial technology leaders such as Charles Kennelly (ESRI UK), Nabil Lodey (1Spatial) and John Fraser (Hexagon Geosystems) represent the hardware and software foundations enabling location intelligence. The diversity of the user perspective, from Department for Environment, Food and Rural Affairs (Defra), Arup, National Health Service (NHS), Taskforce for Nature Related Financial Disclosure (TNFD), Northern Ireland Electricity, AtkinsRéalis and HR Wallingford illustrate a capability and richness of use case in established and emerging sectors alike demonstrating geospatial's expanding influence.

What unites this diverse cohort is their shared experience of technological acceleration. Each interviewee has navigated the transition from command-line Geographic Information Systems (GIS) to cloud-native platforms, from proprietary data silos to open ecosystems, from desktop analysis to real-time decision support. As Emma Hatton (Satellite Applications Catapult) observes, "There have been a lot of changes in understanding how much data is used," capturing the scale of transformation these leaders have witnessed and shaped.

The temporal perspective these leaders bring is invaluable. Many began their careers when GIS required specialist training and significant capital investment, yet now lead organisations are deploying location intelligence through consumer devices and web browsers. Their insights bridge the pioneering era of digital mapping with the emerging age of artificial intelligence and ubiquitous location awareness.

Perhaps most significantly, these interviewees embody geospatial's transition from service provider to strategic enabler. As Holger Kessler from AtkinsRéalis notes, "Perhaps we are enablers, we aren't the chosen, but we can help those specialists in flood mapping, in tree preservation, in underground assets, whatever it is we are the supporters rather than being on the front line." This philosophical shift, from technical specialists to collaborative partner, represents a fundamental evolution in how geospatial professionals perceive their role in addressing societal challenges. That is only one side of the equation though, it is for those professionals to deliver that value as partners across and within those markets and so reap their own value.

The survey respondent pool was evenly split between those with more than 20 years of experience in the industry and those with less than 20 years, ensuring a balanced perspective across generations of geospatial professionals. Interestingly, those with more than 20 years of experience expressed greater concern about the availability and capability of the geospatial workforce, whereas those with less than 20 years of experience were more focused on the geopolitical landscape and the accuracy, currency, and availability of geospatial data.

The collective wisdom represented here spans four decades of geospatial innovation, from the earliest digital mapping initiatives through to AI-enabled predictive analytics. These voices don't merely observe industry transformation; they have architected it, leading organisations that collect, process, and deliver the location intelligence upon which modern society increasingly depends.

Ten years have passed since the last AGI Foresight Report attempted to chart the course for the UK geospatial industry through what it anticipated would be a period of unprecedented change. With the benefit of hindsight, we find ourselves in a peculiar position of both vindication and surprise, where some predictions proved remarkably prescient while others fell victim to overoptimistic timelines or entirely missed transformative developments that would reshape the industry.

PREVIOUS AGI FORESIGHT: TEN YEARS ON - A TALE OF HITS, MISSES, AND SURPRISES

THE SCORECARD: WHERE WE CALLED IT RIGHT

Survey respondents looking back at the 2020 report identified Open as the most impactful theme, and this assessment rings true. The open data revolution has indeed evolved into a cornerstone for innovation and collaboration, though it manifested in ways the original report couldn't fully anticipate. The emergence of the Overture Maps Foundation in 2022, launched by Meta, Microsoft, Amazon Web Services (AWS), and Esri, exemplified this transformation. By delivering interoperable open datasets that combine community, government, and corporate data sources through structured schemas and the Global Entity Reference System, Overture disrupted traditional mapping landscapes far beyond our initial expectations.

This shift toward open data platforms has created shared infrastructure powering applications from the gig economy to climate resilience planning. The report's prediction that transparency and data accessibility would become "business as usual" has largely materialised, with government and commercial datasets now routinely available through standardised Application Program Interfaces (APIs). The emphasis on location intelligence becoming "the geography of everything" - the foundation for business decisions across sectors - has proven remarkably prescient.

INNOVATIVE TECHNOLOGIES represented another area where reality exceeded predictions, albeit through unexpected catalysts. The COVID-19 pandemic acted as an unforeseen accelerator for AI and data analytics adoption that the 2020 report had significantly underestimated. Faced with urgent needs for real-time insights, governments and health organisations rapidly deployed AI-driven geospatial tools to track virus transmission, model outbreak scenarios, and allocate resources. The fusion of spatial, demographic, and mobility data created dynamic dashboards and predictive models that informed public health decisions globally, transforming geospatial analytics from a niche capability into a frontline crisis response asset.

The report's emphasis on artificial intelligence integration proved particularly astute. Its observation that "Artificial Intelligence that can identify road features is a big part of the technology that makes autonomous driving possible" has become central to today's AI-driven geospatial revolution, even if the autonomous vehicle timeline proved overly optimistic.

BIG DATA emerged as another vindicated theme, though with crucial technological enablers the original report failed to fully appreciate. While accurately anticipating the effects of exploding data volumes and the availability of real-time data feeds, the 2020 report didn't fully consider how cloud technologies would become the backbone enabling practitioners to effectively work with this overwhelming variety and volume of information. Cloud platforms now offer the scalable, cost-effective solutions that have unlocked real-time analytics, collaborative workflows, and AI-driven insights previously out of reach.

THE GREAT MISCALCULATIONS

Not all predictions aged well. BIM & Future Cities represents the report's most significant disappointment. Despite early enthusiasm, the integration of Building Information Modelling (BIM) and Future Cities concepts has not progressed as rapidly as anticipated. While BIM offers rich, structured data for infrastructure and urban design, interoperability with geospatial systems remains limited by siloed workflows and inconsistent standards. Similarly, Future Cities initiatives which focused on smart infrastructure, digital twins, and urban analytics have struggled to leverage geospatial intelligence at scale, hampered by data integration challenges and cross-sector collaboration difficulties.

The autonomous vehicle predictions represent perhaps the report's most significant timing miscalculation. The confident assertion that "cars using Google technology would be self-driving on the road by 2020" and that "fully autonomous vehicles will be on the road in 5-10 years" proved wildly optimistic. While autonomous robotaxis operate in limited areas like San Francisco and Wuhan, the vision of ubiquitous self-driving cars replacing conventional vehicles at an 11:1 ratio remains largely aspirational, constrained by edge case complexity and safety validation challenges that proved far more stubborn than anticipated.

THE BLIND SPOTS: WHAT WE COMPLETELY MISSED

The report's greatest omission was failing to anticipate the generative AI revolution that has fundamentally altered the technology landscape since 2022. While discussing machine learning and AI for pattern recognition, the 2020 report completely missed the potential for AI systems that could generate content, code, and insights. Large language models like ChatGPT and Claude have transformed how we interact with spatial data, enabling natural language interpretation of spatial queries and synthesis of insights from multiple data sources.

Foundation models, large AI systems trained on diverse datasets that can be adapted for specific tasks, have revolutionised geospatial AI through approaches the report's more task-specific AI vision never contemplated. Modern AI can generate realistic synthetic datasets for training autonomous vehicle systems, addressing the edge case problem that has plagued the industry through AI-driven simulation platforms.

Remarkably, the report made virtually no mention of blockchain or cryptocurrency technologies, which have since become significant forces in data integrity, digital ownership, and decentralised systems. This represents a significant blind spot in forward-looking vision, alongside an underestimation of how central cybersecurity would become to geospatial infrastructure in an era of nation-state cyber threats.

POLICY AND TRANSFORMATION: MIXED RESULTS

The Policy theme showed dynamic progress, particularly in the UK context. The establishment of the Geospatial Commission set clear strategy for location data to unlock economic, social, and environmental value. The Commission's coordination efforts across government, industry, and academia, including investments in initiatives like the National Underground Asset Register, validated the report's emphasis on policy frameworks.

More recently, the integration of the Geospatial Commission into the UK Government Digital Service signals a new consolidation phase, aligning geospatial capabilities with broader AI, data governance, and public service innovation efforts. This positions the UK government to better deliver location-aware services and respond to complex challenges.

However, the report underestimated regulatory framework complexity for emerging technologies. While anticipating technical solutions, the governance challenges around AI ethics, data privacy, and algorithmic accountability have proven more significant than expected.

SKILLS AND INDUSTRY EVOLUTION: PARTIAL PROPHECIES

The prediction that "general skills of using geographic information (GI) in data analysis have broadened as GI has become more mainstream" proved accurate, but underestimated how radically AI would change skill requirements. Today's geospatial professionals need understanding of prompt engineering, model validation, and AI ethics alongside traditional GIS capabilities.

The anticipated "shortage of data analysts to meet increasing demand for big data, predictive analysis and modelling" materialised, but solutions have partly emerged through AI augmentation rather than just training more human analysts. Recent research emphasises human-machine collaboration over the increasingly autonomous systems the 2020 report envisioned.

THE MISSING ENVIRONMENTAL IMPERATIVE

One of the report's most significant oversights was underestimating how central climate change adaptation and mitigation would become to geospatial applications. Today's industry is deeply involved in carbon tracking, renewable energy siting, climate risk assessment, and environmental monitoring applications barely mentioned in the 2020 vision but now fundamental to sector relevance.

LESSONS FOR FUTURE FORECASTERS

The AGI Foresight 2020 report serves as a valuable case study in technology forecasting challenges. Its successes came from identifying broad technological trends and potential convergence points. Failures typically involved overestimating implementation speed and underestimating technical complexity.

The report's vision of geography as "the foundation on which business decisions are made" has largely materialised, but through different pathways than anticipated. AI integration with spatial data has proven transformative, though through generative AI and foundation models rather than just pattern recognition and automation.

For today's geospatial industry, the report's emphasis on collaboration, open data, and interdisciplinary approaches remains highly relevant. However, the sector has learned that technological capability alone is insufficient, successful deployment requires careful attention to ethics, governance, regulation, and user adoption that the 2020 report didn't fully anticipate.

As we look toward 2030, the AGI Foresight 2020 report reminds us that while technological trends may be predictable, their timeline, implementation pathways, and societal impacts often surprise even the most informed experts. The geography of everything has indeed arrived, but not quite as anyone expected. The industry must balance optimistic visions of technological transformation with hard-won lessons about implementation complexity, ensuring future predictions account for the messy realities of technological adoption in complex social and economic systems.

THE 6 FORCES RESHAPING GEOSPATIAL: HOW OUR SURVEY SEES 2030

When we set out to understand how the geospatial sector might evolve by 2030, we expected technological predictions and market forecasts. What we discovered instead was something far more profound: a community wrestling with its own transformation. Across 92 survey responses and thirty deep conversations, a consistent pattern emerged—the geospatial sector isn't simply evolving, it's fundamentally reconstituting itself around six interconnected forces that challenge every assumption about spatial intelligence in the 21st century.

The practitioners we spoke with didn't just describe technological change. They articulated a coming crisis of professional identity occurring alongside unprecedented opportunity for global impact. Each transformation brings both revolutionary potential and existential risk, creating a landscape where success depends not on avoiding change, but on navigating its contradictions with wisdom and intention.

THE DATA IMPERATIVE: FROM STATIC TO STREAMING INTELLIGENCE

The transformation from static datasets to streaming intelligence represents perhaps the most visible thread of change. Survey respondents consistently identified the "continued shift to cloud-based services and big data analytics" as a defining trend, but their responses reveal something deeper than technological migration.

The benefits are compelling: cloud architecture enables hyperscale, instantaneous processing and storage, lowering both financial and technical barriers for industry verticals to adopt geographic information. Real-time data feeds support dynamic analysis for disaster response, traffic monitoring, and environmental tracking. Cloud GIS integrates seamlessly with AI, machine learning, and Internet of Things (IoT), enabling spatial intelligence and predictive modelling at unprecedented scales.

Yet this efficiency comes with substantial risks. Cloud environments, accessible from anywhere, increase vulnerability to cyberattacks if not properly secured. Inadequate access controls can expose critical geospatial assets to unauthorised access. Perhaps more fundamentally, real-time data feeds can introduce inaccuracies if not validated properly, while the sheer volume of automated data raises concerns about provenance and intellectual property.

The sector faces a fundamental tension: how to maintain the trust and authority that underpin spatial decision-making while embracing systems that operate at scales and speeds that traditional quality assurance cannot match. As one survey respondent noted, "Without robust, fit-for-purpose datasets, these technologies cannot be effectively leveraged."

The solution lies not in choosing between speed and quality, but in developing new frameworks for what quality means in an era of streaming intelligence. Automation in system-of-record data management and real-time updates are becoming essential, particularly as geographic information increasingly forms part of critical national infrastructure.

THE AI INTEGRATION CHALLENGE: REVOLUTIONARY CAPABILITY, EXISTENTIAL RISK

Perhaps no force generates more excitement and anxiety than AI integration. Survey responses revealed a community simultaneously energised by AI's potential and concerned about its implications. The technology promises transformative capabilities: AI can validate existing spatial data quality while enabling collection of more granular observations. Neural networks extract features from imagery—roads, buildings, vegetation—with remarkable accuracy. Automated workflows reduce manual labour in map labelling, change detection, and spatial querying, while AI-powered interfaces allow non-specialists to interact with GIS systems, democratising access to spatial intelligence.

Yet beneath the enthusiasm lies profound risk. The misuse of AI threatens to undermine the credibility of geospatial analysis, creating misleading outputs like interpolated heat maps without proper validation. Without understanding data limitations, AI-generated products may distort meaning or propagate misinformation. As large language models begin automating metadata generation and streamlining data extraction, the sector must remain vigilant about the quality and provenance of analysis-ready products.

The concern isn't purely technological—it's epistemological. How do we maintain scientific rigour when the tools that generate insights operate as black boxes? The emergence of foundation models and conversational interfaces creates unprecedented opportunities for spatial intelligence, but potentially at the cost of transparency and traditional quality assurance methods that have defined the discipline.

Survey respondents emphasised that ethical use of AI must become a priority for both industry and government. This isn't about resisting change—it's about ensuring that enhanced capabilities serve enhanced understanding. The sector must develop new competencies in algorithmic transparency, bias detection, and responsible innovation.

INFRASTRUCTURE EVOLUTION: INTEROPERABILITY'S DOUBLE EDGE

The infrastructure conversation reveals a subtle but significant shift in how the sector thinks about integration. Traditional approaches focused on standardising data formats and protocols. The emerging paradigm prioritises interoperability—the ability for different systems to work together effectively, regardless of underlying standards.

The benefits are substantial. Governance frameworks encourage standardisation, making it easier to integrate datasets across platforms and sectors. Provenance metadata allows analysts to assess data quality and relevance. Interoperability reduces duplication, streamlines workflows, and improves collaboration between public and private entities. API-first architectures and cloud-native platforms create new possibilities for spatial intelligence, enabling seamless access to spatial information and real-time collaboration.

However, this evolution creates new dependencies and vulnerabilities. The geospatial community must invest in trustworthy data practices and robust governance frameworks to manage the risks of distributed systems. Migrating large datasets to the cloud can be complex and costly, especially when metadata and structure are inconsistent. The challenge isn't purely technical—it's governance-related, requiring new frameworks for managing risk and ensuring reliability across interconnected systems.

This shift reflects broader changes in how complex systems achieve integration, but success demands careful balance between openness and security, between accessibility and control.

THE COLLABORATION IMPERATIVE: STRATEGIC SHARING IN A CONNECTED WORLD

Perhaps the most counterintuitive finding concerns collaboration. In a sector traditionally characterised by specialised knowledge and competitive advantage, survey respondents consistently identified the need for convergence across disciplines as essential for future success.

The convergence of GIS and data science offers immense opportunities. Programming, machine learning, and software engineering capabilities push the sector beyond traditional tools and workflows. Cross-functional teams can integrate these disciplines to unlock unprecedented value from geographic information. This convergence enables new applications, from digital twins and sustainable finance to strategic infrastructure planning and environmental risk management.

Yet this shift challenges traditional business models and professional boundaries. Success requires organisations to improve data collection and validation methods while standardising formats for interoperability. The collaboration imperative extends beyond technical integration to professional development, demanding continuous learning in data ethics, cybersecurity, and interdisciplinary applications.

The risk lies in fragmentation—if the sector fails to develop coherent approaches to cross-disciplinary collaboration, other fields may absorb geospatial capabilities while traditional structures become isolated. The opportunity lies in strategic sharing that amplifies collective capability, creating new forms of professional identity that transcend traditional boundaries.

THE EARTH SYSTEMS REVOLUTION: PLANETARY INTELLIGENCE AT UNPRECEDENTED SCALE

The convergence of Earth Observation, digital twins, and climate finance represents more than technological integration—it's a fundamental shift in how societies monitor, model, and manage planetary systems. Survey respondents identified the expansion of satellite and aerial data sources as transformative, driven by increasingly sophisticated sensors ranging from thermal and hyperspectral to radar and high-resolution optical systems.

The benefits are extraordinary. Greater sensor diversity provides multi-dimensional environmental views, enabling monitoring of soil health, water bodies, infrastructure, and atmospheric conditions. High-frequency data enables real-time decision-making for agriculture, forestry, and emergency response. Satellite and drone data collection is less labour-intensive, more affordable, and safer than traditional methods, especially in remote or hazardous areas.

Yet the risks are equally significant. Overreliance on raw Earth Observation (EO) data without adequate scrutiny risks undermining trust and accuracy. Persistent monitoring can inadvertently capture sensitive information, raising ethical and legal concerns about privacy and surveillance. With numerous providers and sensor types, data formats and standards vary widely, making integration and interoperability difficult.

Success in this domain requires capabilities that stretch far beyond traditional geospatial training. The integration of machine learning, cloud computing, IoT, and remote sensing demands new competencies in climate science, environmental economics, and policy analysis. The earth systems revolution places the geospatial community at the centre of humanity's environmental response, but only if we can develop the interdisciplinary capabilities necessary to translate technical capacity into actionable intelligence.

THE SKILLS REVOLUTION: REDEFINING PROFESSIONAL IDENTITY

The skills challenge cuts deepest of all, questioning fundamental assumptions about how spatial professionals are educated and what capabilities they need. Survey respondents consistently identified a lack of visibility and understanding of GIS skills and career pathways as a critical barrier to sector growth, particularly among younger professionals focused on rapid technological change.

The opportunity is significant: integrating geospatial awareness into subjects like Geography and Computer Science can help students connect classroom learning to real-world careers. Addressing the skills gap requires coordinated effort between academia and industry—universities offering more practical experience while employers support degree apprenticeships and certification programs.

Yet the challenge runs deeper than curriculum reform. The mismatch between traditional GIS education and industry demand for data scientists who can code reflects a broader question: what does it mean to be a geospatial professional when geography is everywhere, but geospatial expertise is increasingly invisible?

The solution requires more than technical training—it demands developing professionals who can demystify geospatial data and technology, positioning geographic information as a mainstream analytical tool. This means translating insights into formats that resonate with policymakers, educators, and business leaders, showcasing how spatial intelligence solves real-world problems and drives economic growth.

THE CONVERGENCE EFFECT: TRANSFORMATION AS OPPORTUNITY

What makes these six forces particularly significant is how they converge and amplify each other. AI integration requires new approaches to skills development. Infrastructure evolution enables new forms of data processing. The collaboration imperative creates new possibilities for professional identity. Each thread both enables and constrains the others, creating a dynamic system where success depends on understanding interconnections rather than optimising individual components.

This convergence suggests we're witnessing the emergence of a new paradigm for location intelligence—one where geographic thinking becomes so fundamental to decision-making across all sectors that it transcends traditional disciplinary boundaries. The benefits are transformative: spatial intelligence could become the foundation for better decisions across all domains of human activity.

Yet the risks are equally profound. Without proactive adaptation, the sector risks becoming infrastructure that others control, essential but invisible, powerful yet struggling to articulate its value.

The window for proactive adaptation remains open, but evidence suggests it's narrowing. The choices made by educational institutions, professional bodies, and industry leaders over the next eighteen months may determine whether geospatial becomes the foundation for enhanced decision-making or whether other disciplines absorb its capabilities while traditional structures are left behind.

The great unravelling is also a great opportunity. The question is whether we'll seize it with the wisdom these times demand.

THE 2030 AGI FORESIGHT THEMES

1

DATA IN THE WORLD OF GEOSPATIAL: THE NEXT TRANSFORMATION

- Data - its collection, processing, accessibility, and application - is undergoing fundamental transformation.
- The trust challenge becomes more complex as geospatial capabilities democratise.
- The transformation of temporal data management represents one of the most significant technical shifts.
- Real - time data processing capabilities enable previously impossible applications but create new challenges around data lineage and versioning.
- AI creates a black box problem for data provenance conflicting with requirements for authoritative, traceable data in critical applications.
- Convergence across multiple domains as the dominant theme of the next 10 years.

2

ARTIFICIAL INTELLIGENCE IN GEOSPATIAL: PROMISE, PERIL AND THE PATH FORWARD

- Artificial intelligence as the most consequential technological force reshaping the geospatial sector.
- AI can accelerate traditionally computationally intensive processes.
- The shift from transparent, query able databases to opaque machine learning models represents a profound challenge for a sector built on precision and verifiability.
- The integration of AI with geospatial data amplifies existing data quality challenges.
- The emergence of geo-foundational models will democratise access to sophisticated spatial AI capabilities.
- Privacy concerns emerge increasingly requiring ethical frameworks.
- Geospatial AI systems face unique challenges around bias and hallucination.

3

INTEROPERABILITY AND INFRASTRUCTURE IN GEOSPATIAL: EVOLUTION OVER THE NEXT FIVE YEARS

- Shift in focus from standards to interoperability between disparate systems.
- Infrastructure evolution is driven by API proliferation as the primary mechanism for system integration.
- The creation of digital twins of the earth is changing how spatial analysis is conducted.
- Robust data integration capabilities with focus on data classification and proper quality assurance processes.

THE 2030 AGI FORESIGHT THEMES

4

THE GREAT SKILLS SHIFT: HOW GEOSPATIAL EDUCATION MUST EVOLVE FOR AN EMBEDDED FUTURE

- Geospatial is no longer a specialist skill set.
- Growing mismatch between educational curricula and industry demands.
- Increasing need to link space and geospatial.
- Need for data scientists with skills in coding, development of data processing pipelines and understanding of data visualisation.
- Greater need for soft skills including storytelling, raising the profile, and creating use cases.
- Re conceptualising the identity of geospatial professionals – those who can navigate the integrated digital ecosystems.
- Train AI specialist to see the opportunities for geospatial.
- Vision to make geographical thinking the invisible infrastructure across disciplines.

5

COLLABORATION IN GEOSPATIAL: EVOLUTION AND FUTURE TRAJECTORIES

- Procurement, especially big - ticket government and infrastructure procurement, often brings competitors together in alliances.
- Location intelligence, visualisation, digital twins and embedded ubiquity is seeing M&A and alliance activity around geospatial.
- Community-driven mapping and democratised geospatial data continues to resonate globally.
- A universal concern will require membership organisations, policy makers and educators to collaborate to balance geospatial education fundamentals with diverse market needs.

6

EARTH SYSTEMS EVOLUTION: THE GEOSPATIAL-DIGITAL TWIN NEXUS TRANSFORMING CLIMATE, FINANCE AND CONSTRUCTION

- Integration between physical and digital worlds.
- The convergence of earth systems monitoring, geospatial intelligence, and digital twin technologies is reshaping how we understand and respond to environmental change.
- Digital twins will allow for the creation of tools to better manage the environment and help solve challenges around climate change.
- Integration of earth observation derived information with climate adaptation using spatial analytics to inform policy, design, governance.
- Digital twins are shifting from passive 3D visualisations toward real-time operational systems.
- Need to think about people, planet and profit as a single complex entity.

1

DATA IN THE WORLD OF GEOSPATIAL: THE NEXT TRANSFORMATION

The geospatial sector stands at an unprecedented inflection point. Data, its collection, processing, accessibility, and application, is undergoing fundamental transformation that will reshape the industry over the next 5-10 years. Interviewees paint a picture of a sector poised between extraordinary opportunity and significant challenge, facing questions of trust, openness, and relevance at the intersection with rapid technological change.

THE MAINSTREAM REVOLUTION AND THE TRUST IMPERATIVE

Perhaps the most profound shift is geospatial's evolution from specialist domain to mainstream infrastructure. Ed Parsons articulates this transformation: "What has really changed is the shift from what was quite niche, a specialised area of technology or domain expertise, has now become mainstream. I say mainstream not because geo has become more accessible but because it is used by billions of people, every minute of the day".

And as Phil Cooper says: **"Without geospatial the NHS wouldn't function, transportation systems wouldn't work - we haven't done a good enough job pointing out the importance of geospatial to the UK or of explaining the value of it to our economy because it is difficult, it is a bit nuanced sometimes. Here's a big question – what happens if they turn off GPS tomorrow? Has anyone sat down in government and genuinely thought what might happen?"**

While ubiquity represents a fundamental change in how geospatial data underpins digital society, so this mainstream adoption creates a paradox of invisibility that impacts trust and credibility. As Phil Cooper continues: "We all carry around and access GIS super computers; digital maps is the obvious thing, but there are other less visible interactions... All of this is powered by geospatial technology which is largely invisible to the person making the order, but it also seems it is bizarrely invisible to our industry as we take no credit for it".

The trust challenge becomes more complex as geospatial capabilities democratise. Ian Spencer raises critical concerns about authoritative data: "We are being challenged in the sense that people are questioning why do we need government entities doing this work? Well, as much as people seem to distrust government, you do need to have experts who are able to make a determination on what's authoritative or not".

David Henderson pushes this analysis further: "Controversially I would even go as far to say that geospatial, as an industry, no longer exists... we have evolved to a point where we have a set of capabilities and expertise which influence so many aspects of modern-day life, that complement so many different forms of technology, that we have created an expert community or a community of expertise".

REAL-TIME DATA AND BEYOND

The transformation of temporal data management represents one of the most significant technical shifts. Phil Cooper identifies the fundamental change:

"What has changed is the sheer volume of data as well as the expectation around that data. We live in a world of expectation, from next day parcel delivery to streaming of the latest box office hit, and the same is true in geospatial, we expect maps to run on our phones, we expect them to be quick, and we expect them to be accurate".

This manifests in multiple dimensions. Real-time data processing capabilities enable previously impossible applications but create new challenges around data lineage and versioning. The requirement for historical analysis alongside real-time capability creates complex technical demands. Phil Cooper's comment that "Planners want to be able to see whether this has changed... And I think more people are going to want to see that without a shadow of a doubt", reveals growing demand for temporal analysis capabilities.

The shift towards API-based data consumption complicates matters. The statement that "a lot of APIs are set up just to show the most up to date" (Focus Group) highlights tension between real-time access and historical analytical needs, creating fundamental architectural challenges for data providers.

Mark Varley's perspective reveals other temporal constraints: "The problem with insurance is the 12-month policy cycle. No one is looking beyond that period, and no one is going to unless they are forced to be more future looking". This institutional temporal mismatch demonstrates how business model constraints can limit improved temporal resolution benefits.

THE AI TRANSFORMATION PROMISE AND PROVENANCE CHALLENGE

AI integration promises to revolutionise geospatial data processing but creates significant challenges around data provenance and trust. Ed Parsons sees AI's primary value in automation: "It allows us to automate processes that manually are not sustainable, and it allows us to capture and record more data than would otherwise be possible". This computational power enables previously impossible applications but raises fundamental questions about data lineage.

AI creates a "black box" problem for data provenance. "You've stopped doing data... That's the danger" highlighting how AI processing can obscure origins and transformation history of geospatial data. This opacity directly conflicts with requirements for authoritative, traceable data in critical applications.

Charles Kennelly acknowledges fundamental limitations: "[AI is] not currently very good at understanding the structure of geo, the geometries that we use. It usually gets transcribed into an image and managed in that way". While AI excels at processing text and imagery, fundamental spatial relationships that define geospatial analysis remain poorly understood. Vector embeddings, foundational geospatial models, the spatial web, context engineering, the possibilities of quantum and their convergence accelerate capability and expectation while clouding the how and increasing the distance from the data, a cad's charter without guardrails, transparency and oversight.

The transformation potential remains enormous. Charles Kennelly continues: "Within a decade the current approach will be comical. I think utilities that struggle to keep maps up to date, to keep track of assets, will use self-mapping systems". The challenge lies in maintaining data provenance and trust while achieving these efficiency gains.

STANDARDS VERSUS INTEROPERABILITY REALITY

Aaron Addison articulates a crucial distinction: "The past has been a lot about standards, the future is going to be about interoperability, because standards are an ideal and interoperability is reality". This shift recognises that perfect standardisation may be less important than practical integration but creates new challenges for data provenance tracking across heterogeneous systems.

"It would be great if you and I were using the same standard but I don't need that; as long as they work, as long as we can join up, whether by APIs or something else, it just has to work". This pragmatic approach prioritises functional integration over theoretical perfection but requires robust metadata and provenance tracking to maintain trust across integrated systems.

VOLUNTEERED AND COMMUNITY DATA ECOSYSTEM EVOLUTION

The 21st century rise of Volunteered Geographic Information (VGI) and community-driven data initiatives represents a shift in how geospatial data is created, validated, and maintained. The Humanitarian OpenStreetMap (OSM) Team's achievement, mapping areas home to one billion people over fifteen years, challenges traditional quality and authority models while demonstrating scalable impact.

Despite community data's scale and impact, quality and consistency challenges remain significant, as do questions of data origination, intellectual property and stewardship rights of contributors. Whether OSM or newer initiatives, "A key issue of concern with these data sets is their quality. Research on the value of such contributions, and on the ideal approach to harness the assistance of volunteers, is ongoing" (Rebecca Firth).

This is true also of other data sources – what is it that makes them authoritative? Much easier to publish and be damned (or per OSM /Wikipedia, corrected) than to measure or caveat. For instance, the capability behind Landsat's "science grade" 50 year archive is not replicated in the commercial space where Landsat's future is being entrusted. Dilution of integrity and confidence opens up uncertainty exacerbating the scope for experts and expertise to be challenged or ignored.

Despite compute power availability, there are voices looking to concepts such as "minimum viable data" as pragmatic approaches to getting work done (Ian Spencer, Rebecca Firth). This challenges precision standards in favour of contextually appropriate data collection but requires new frameworks and language for communicating data limitations and appropriate use.

THE CONVERGENCE OPPORTUNITY

Peter Rabley identifies convergence as the dominant theme:
"I tell my team that the next 5-10 years is all about convergence. I think we artificially define and separate our worlds and I think convergence will have a huge impact". This convergence spans multiple domains, from gaming and digital twins to building information modelling and autonomous systems.

Peter Rabley continues:
"I often have this debate with people in geospatial that we are not a vertical industry, we are horizontal and that is our strength and our efficiency". This horizontal nature positions geospatial as critical infrastructure but requires fundamental changes in how data licensing and access are managed across sectors.

Ed Parsons identifies interface evolution:
"The other area I see a profound change in is the user interface; how we interact with different information services. At the moment we spend large proportions of time fixating on our personal glass screens and I don't think that's always going to be the case".

Charles Kennelly elaborates:
"AI is going to help us do geospatial better... the biggest impact, is how people interact with geo and other technology. Instead of having to learn to use a GUI, to click buttons, we will have a conversation". This shift towards natural language interaction requires new approaches to communicating data quality, limitations, and appropriate use contexts.

CONCLUSION

The next 5-10 years will witness the most significant transformation in geospatial data since the advent of digital mapping. This transformation extends beyond technological capability to encompass fundamental questions of trust, community engagement, and professional authority.

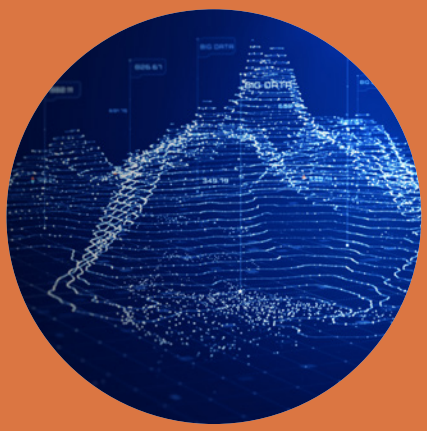
Ed Parsons captures the scale of change: "The pace of change is going to continue to accelerate powered by AI". Yet this acceleration occurs within a context where trust, provenance, and authority become increasingly complex to establish and maintain.

David Henderson's insight proves prescient: "We are collectively maturing to find our own place within the value chain of geospatial, we are recognising that nobody owns the entire value chain, and we all have our part to play".

2

ARTIFICIAL INTELLIGENCE IN GEOSPATIAL: PROMISE, PERIL AND THE PATH FORWARD

Artificial intelligence stands as perhaps the most consequential technological force reshaping the geospatial sector today. From roundtable discussions to industry practitioner insights, a complex picture emerges, one of immense promise tempered by significant challenges and fundamental questions about how we build, deploy, and govern intelligent spatial systems.



> "there's always going to be AI... there'll be a lot of money invested in it. I don't know if it'll be a big return... there'll be some big winners, but I think there could be some big losers."

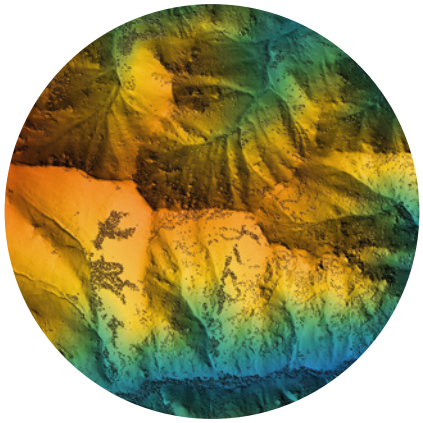
THE GEOAI LANDSCAPE: BEYOND THE HYPE

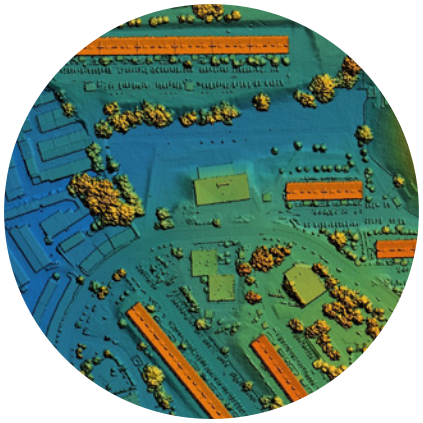
The reality of artificial intelligence in geospatial applications proves far more nuanced than breathless headlines suggest. As participants in the Focus Groups observed, "there's always going to be AI... there'll be a lot of money invested in it. I don't know if it'll be a big return... there'll be some big winners, but I think there could be some big losers".

This sobering assessment reflects deeper technical realities. A Trimble paper on AI and engineering design notes that "growth in AI capabilities does not universally follow an exponential curve. LLMs (Large Language Models) have seen spectacular improvements in recent times but this is not the same for accurate understanding of 3D building models" (Corney and Pidcock, 2025).
The geospatial domain presents unique challenges that resist one-size-fits-all AI solutions. Try asking an AI (today) to produce a topographically accurate map of say Hampshire – the results are risible, today. The importance of being able to do so in a future of ambient compute, extended reality and audio, pales compared to location integrity and algorithmic transparency.

The complexity deepens when considering AI application diversity. "There's the LLMs on the one hand and computer vision on the other... those are very different AIs" (Focus Group). This fragmentation demands sophisticated understanding of which AI approaches suit specific geospatial challenges. Who has that understanding, who knows that they do and if they don't will they look to "geospatial"?

Mark Giffin is not alone in pondering the answer: "I think maybe GIS is under threat from other systems... everyone's doing it, but they aren't GIS people so they may not do it right or we may lose some of those capabilities."





MACHINE LEARNING AND GEO-FOUNDATIONAL MODELS

The development of geospatial machine learning models reveals both potential and limitations of current approaches. Practical applications demonstrate promising results, as the Trimble paper shows "applications of machine learning on thousands of simulated energy models in an attempt to be able to quickly generate energy usage metrics from building location and information without simulation" (Corney and Pidcock, 2025), demonstrating how AI can accelerate traditionally computationally intensive processes.

However, the transition from traditional data systems to AI-powered alternatives introduces fundamental changes in how we understand and verify our work. At the roundtables came this warning: "once you've trained an AI you've stopped doing data. That's a danger" (Focus Group). This shift from transparent, queryable databases to opaque machine learning models represents a profound philosophical challenge for a sector built on precision and verifiability.

The emergence of geo-foundational models promises to democratise access to sophisticated spatial AI capabilities. Yet this democratisation carries risks. **"We are still training them to be digital surveyors who are competent in doing geospatial analysis with traditional GIS tools. Whereas what we need to be doing is training people who are data scientists"** (Peter Beaumont). The gap between traditional geospatial skills and AI capabilities creates vulnerabilities in how these powerful tools are deployed and interpreted.

THE ETHICS IMPERATIVE: NAVIGATING RESPONSIBLE AI

The ethical dimensions of geospatial AI extend far beyond academic debate into practical urgency. "One elephant in every room and that's the responsible use of AI, the ethics of AI" (Rob Pasco). The stakes are particularly high in geospatial applications where AI decisions directly impact communities, infrastructure investment, and resource allocation.

Privacy concerns emerge as central challenges. The ability of AI systems to infer sensitive information from seemingly innocuous spatial data creates new categories of privacy risk that existing regulatory frameworks struggle to address.

The ethical framework requires proactive rather than reactive approaches. "We should be driving to make sure that if we're going to use AI, that there's some standards about what is ethical AI... you can't just go ahead and develop AI without having a suitable set of ethics behind it" (Focus Groups).

The responsibility extends to ensuring equitable outcomes not just for communities but for employers and employees as well. "Are we putting this in place ethically? Has it taken someone's whole job without them being given something else to do? Is it giving equally fair outcomes in the housing sector, for example, is it accurate and will it remain accurate?" (Rob Pasco).

DATA QUALITY, CURRENCY AND COMPLETENESS CHALLENGES

The integration of AI with geospatial data amplifies existing data quality challenges while creating new ones. The fundamental issue, as identified in the roundtables, is that with traditional systems "you can see data that's in the database or not and you might be able to visually" verify it, but with AI training "all you've done is you've trained a black box AI on it" (Focus Groups).

Currency becomes particularly problematic when AI models trained on historical data must operate in dynamic environments. The Government Digital Service emphasises that "transparency about data quality and currency is often more important than the data quality / currency itself", but AI systems often obscure rather than illuminate these crucial characteristics.

Completeness challenges multiply when AI systems make inferences about missing data. While this capability offers powerful gap-filling potential, it also introduces risks of perpetuating or amplifying existing biases in geospatial datasets. As one practitioner notes, ensuring AI systems provide "equally fair outcomes" (Rob Pasco) requires constant vigilance about what data is included, excluded, or synthesised.

COPYRIGHT AND LICENSING: THE DATA TRAINING DILEMMA

The intersection of AI training and geospatial data licensing represents one of the sector's most complex challenges. The Focus Groups reveal both tensions and confusion over where regulation exists, what is coming down the track, how it might work, and who it affects, with discussion about where liability falls, who pays, and what it covers.

The fundamental issue lies in the transformation of licensing models. Traditional approaches where **"who you licensed it from, if you wish to continue using it, you still have to continue paying the licence"** (Focus Groups) break down when AI training creates persistent capabilities that exist independently of ongoing data access.

The stakes are high because "once it's gone, it's gone" (Focus Groups); once training data has been incorporated into an AI model, traditional licensing controls become largely meaningless. This requires "people who really, really get" (Focus Groups) AI technology to craft licensing terms that protect data providers while enabling innovation or a different business model.

BIAS AND HALLUCINATION: THE ACCURACY CHALLENGE

Geospatial AI systems face unique challenges around bias and hallucination that go beyond general AI concerns. "AI can join the dots accurately. And kind of identify stuff... but it can make inferences and join the dots wrongly, which would take the wrong conclusions. Two slightly different risks, aren't they?" (Focus Groups).

The consequences of these errors in geospatial contexts can be severe. Infrastructure planning based on biased AI analysis could misdirect billions in investment. Emergency response systems that hallucinate geographic features could cost lives. The traditional geospatial emphasis on precision and accuracy becomes complicated when AI systems operate in probabilistic rather than deterministic modes. **"One of the reasons why use of geospatial hasn't taken off exponentially is we have always struggled to communicate the real accuracy of the insight we are providing in the way that data scientists do"** (Peter Beaumont). AI systems that obscure their confidence levels and uncertainty ranges exacerbate this fundamental challenge.

SKILLS AND UNDERSTANDING: THE KNOWLEDGE GAP

The successful deployment of geospatial AI depends critically on building appropriate skills and understanding across the sector. The challenge extends beyond technical capabilities to fundamental awareness. "You don't just need geospatial data engineers or geospatial product managers, you need actual geospatial technology voices" interacting with the AI (Focus Groups).

This skills gap creates vulnerabilities where organisations "blindly go in and... license the way we've done before and not understand the consequences" (Focus Groups) of AI-powered data use. The rapid pace of AI development means that traditional approaches to skills development across both geospatial and tangential disciplines (legal, commercial, leadership) struggle to keep pace with technological change.

"People who are data scientists, who understand how to code and develop data processing pipelines and understand data visualisation" (Peter Beaumont) while also understanding spatial concepts inverts the idea of training geospatial experts to use AI tools. And even if as Nicki McGoh puts it "AI is a junior member of the team" and "they can only work on the things you give it and the feedback you provide" you do "need to provide guardrails and protection in the same way you would with a new graduate." Even if for Nikki Smith gigo rears its head: "Machine Learning and AI... do come with their hazards because it is only as good as the data you put in" those concepts are probably more hard-wired to data science than to geospatial. Though Mark Monmonier's "How to Lie with Maps" (1991) may predate much of this discussion it's clarion call surely resonates today more than ever even if a map is not the way in which the message is conveyed.

INFRASTRUCTURE AND INTEROPERABILITY: THE TECHNICAL FOUNDATION

The infrastructure requirements for geospatial AI extend far beyond traditional GIS systems. **"AI will be the driver... what we'll see is more and more of the data becoming cloud native. And being structured in a way that it's interoperable across the cloud native ecosystem"** (Focus Groups).

This transformation demands cloud-native architectures where "reducing the barriers to access, but also the latency for access" (Focus Groups) while "reducing access, reducing the friction... increasing understandability" (Focus Groups). The integration challenges are substantial, requiring new approaches to data standards, metadata management, and system interoperability.

CONCLUSION: FROM EVIDENCE TO ACTION

The convergence of field evidence creates an unambiguous call for coordinated action. Success requires moving beyond technological optimism to address fundamental challenges around skills, collaboration, data access, and ethical deployment.

"The ultimate measure [is] How quickly is it that I can deliver value out in society" (Tracie Callaghan). This outcome-focused perspective both cuts through technological hype to focus on practical impact and highlights the risks in doing so.

The window for shaping GeoAI's trajectory remains open, but evidence suggests it is narrowing rapidly. The choices made by stakeholder groups in the coming months will determine whether GeoAI becomes a tool for democratising spatial intelligence or deepening existing inequalities. The evidence is clear; the imperative for action is now.

3

INTEROPERABILITY AND INFRASTRUCTURE IN GEOSPATIAL: EVOLUTION OVER THE NEXT FIVE YEARS

The geospatial sector stands at a critical juncture where technical foundations underpinning spatial data exchange and system integration are changing fundamentally.

THE SHIFT FROM STANDARDS TO PRACTICAL INTEROPERABILITY

The most significant insight from the interviews is how pragmatism is increasingly informing how the sector approaches connectivity between systems. Aaron Addison noted: "The past has been a lot about standards, the future is going to be about interoperability, because standards are an ideal and interoperability is reality. I mean it would be great if you and I were using the same standard but I don't need that; as long as they work, as long as we can join up, whether by APIs or something else, it just has to work".

This represents a fundamental shift from establishing universal standards toward building practical bridges between disparate systems, recognising that while standards enable interoperability, they are not prerequisites for it.

THE RISE OF API-FIRST ARCHITECTURE

Infrastructure evolution is driven by API proliferation as the primary mechanism for system integration, with platforms providing core services rapidly leaving behind on-premise solutions. This API-centric approach comprises infrastructure evolving toward modular, composable solutions where organisations can integrate best-of-breed services rather than being locked into monolithic platforms.

> "Amazon's Earth on AWS initiative, Microsoft with their Planetary Computer, and now Google with AlphaEarth"

CLOUD AND EDGE COMPUTING TRANSFORMATION

On the decisive shift toward cloud-native geospatial infrastructure. Peter Beaumont observed: "Cloud computing and organisations such as Amazon, Google, Azure, have completely changed the landscape. They have given us access to unbelievably large datasets that we have never had access to before, and you can also run a process on that data that was impossible to do on a single workstation or even an organisational IT infrastructure".

This transformation extends beyond simple data storage to encompass creation of "digital twins of the earth" where platforms like "Amazon's Earth on AWS initiative, Microsoft with their Planetary Computer, and now Google with AlphaEarth" fundamentally change how spatial analysis is conducted.

DIGITAL TWINS AND OPERATIONAL INFRASTRUCTURE

Evolution toward operational digital twins represents a significant infrastructure shift. Mia Dibe highlighted that while digital twins have long been conceptual, "the operations side of digital twins will be accelerated with the help of AI assistants because, more than ever, these are being embedded in design and construction tools" with focus shifting to "maintenance and operation, and maybe even through to decommissioning, it's these later states within the product or the project, that are crucial for long term thinking".

This operational focus requires robust data integration capabilities where "data classification [semantic relationships] and proper quality assurance processes" become fundamental to success, enabling "smarter [buildings] and more sustainable cities" where multiple technologies begin to meld and their value be realised.

Despite advances, many long-standing infrastructure challenges remain including "data silos and a lack of interoperability, owing to vendor lock-in" with "data being fragmented and not being properly shared or understood". Issues of cost and licensing continue to cloud decision making due to absence of compelling value stories.

> "The operations side of digital twins will be accelerated with the help of AI assistants because, more than ever, these are being embedded in design and construction tools."

GOVERNMENT INFRASTRUCTURE INITIATIVES

The public sector drives significant data and infrastructure developments through initiatives like the June 2025 launch of the National Infrastructure Spatial Tool (NIST), which "aims to support better infrastructure planning at a national level" and has successfully "overcome that silo mentality" by bringing together "a broad variety of data types in order to inform policy and decision making".

With the Geospatial Commission's absorption into the Government Digital Service (GDS), whose data sharing principles emphasise developing "frameworks to address data sharing barriers" and using "data standards to support consistency across sectors, organisations and geographies" while working to "remove blockers to data sharing by embedding security into the project" carry an explicit message with respect to geospatial value.

COLLABORATIVE EVOLUTION

David Henderson sees one encouraging trend toward collaborative infrastructure development: "I do feel that we are becoming more inherently collaborative. There will always be competition between different organisations offering the same type of products and services, but even in that scenario I am seeing more collaboration. I am seeing the recognition that our whole is greater than the sum of our parts".

He notes that "nobody owns the entire value chain, and we all have our part to play" in building infrastructure necessary for effective geospatial interoperability. Big tech has been moving in this direction, investing in marketplaces that offer their own services and provide tools to build additional services on top.

CONCLUSION

Donna Lyndsay sums up the moment: "We have the data, we have the technology, we have the ability, but we aren't connecting them. However, I do think we are at a tipping point." Seizing that nettle now will for the geospatial community and their endless use cases and integrations likely involve both standards and APIs, and compromises to "just make it work". And a sliding scale of geospatially-attuned capability in delivery. That may pave the way for something close to indispensability but also to niches and irrelevance if we aren't also the messenger.

4

THE GREAT SKILLS SHIFT: HOW GEOSPATIAL EDUCATION MUST EVOLVE FOR AN EMBEDDED FUTURE

The geospatial sector stands at a crossroads where traditional education models collide with rapidly evolving industry demands. As location data becomes woven into the fabric of everyday technology, the question isn't whether geospatial will remain relevant, it's whether our education systems and professionals can adapt quickly enough to thrive in a world where geography is everywhere but geospatial expertise isn't getting any more visible or indeed valuable (to those who have that expertise).

FROM SPECIALTY TO MAINSTREAM: THE FUNDAMENTAL SHIFT

The transformation is already underway. Nabil Lodey notes: "[the big shift is] probably the move to mainstream. The geo world has always been a very specialist field (you have cartographers, surveyors, GIS analysts, etc) and now it's more about location-based services. So, you have Airbnb, Uber, Deliveroo, these are all geospatial applications with location-based delivery for specialist content".

This shift brings both opportunity and existential challenge: "as it's no longer that specialist skill set". In part at least this is because as James Kavanagh says: "Geospatial has been traditionally not very good at expressing itself, we speak in a certain language, we become almost clannish." Marc Farr says **"There are a lot of people who really understand this stuff and I don't think we have elbowed our way to the top table"**, speaking to both democratisation and (poor) communication skills.

Local government and utilities in particular were where graduates cut their teeth but those days are largely gone (and with them enterprise desktop licensing), lost to cuts and perception of niche relevance as geo enters the mainstream.

THE EDUCATION DISCONNECT: YESTERDAY'S TRAINING FOR TOMORROW'S JOBS

The growing mismatch between educational curricula and industry demands is stark. Aaron Addison observes: "When I compare them to the higher education curriculum there is a mismatch. We are training desktop GIS and there are very few desktop GIS job postings—there are postings for web mappers, for tools like Python or BI, it's like the world has moved past desktop GIS".

For Phil Cooper there is an urgent need, technically and culturally, to "bring space and geospatial together with a much tighter connection".

The problem extends beyond technical skills to fundamental thinking capabilities. "There is also a widening demand/need for skills like critical thinking to say OK your software produced a map, is that map correct? The assumption of many is that if it comes out of the software then it must be right".

THE WORKFORCE READINESS CRISIS

Industry feedback on graduate preparedness is sobering. Peter Beaumont sees a fundamental training mismatch: **"I am not sure we are training geospatial professionals with the right skills, I think we are still training them to be digital surveyors who are competent in doing geospatial analysis with traditional GIS tools. Whereas what I think we need to be doing is training people who are data scientists, who understand how to code and develop data processing pipelines and understand data visualisation".**

Liz Fox-Tucker reinforces this evolution: "skills are no longer just GI skills, they are wider data skills". That these skills should include an understanding of the impact of technology such as AI as well as its wider ethical context has become a given, if not for tech bros, then for most others.

THE DATA SCIENCE CONVERGENCE CHALLENGE

One of the most significant transformations involves intersection with data science. Peter Beaumont explains: "in between the geospatial-ists and the enterprise architects you've got the data scientists, to whom geo is just another data set; they don't care if it's a big satellite image or data from Office for National Statistics (ONS), to them it's just data and they are happy to visualise it and analyse it. But what they don't appreciate, is those little nuances of geospatial data that we all talk about, which is why the geospatial professional is still so important".

This creates both opportunity and risk: "Where this is leading is potentially the role of the geospatial analyst, as we see it today, is going to decline and will largely be replaced with geospatial data scientists. Yes, they may know ArcInfo, but they are also working with other data science tools to create visualisations and workflows, so they are becoming more of a data scientist who can code rather than GIS analyst who presses buttons".

BEYOND TECHNICAL SKILLS: THE HUMAN ELEMENTS

The skills crisis extends beyond technical capabilities to fundamental human attributes often overlooked in traditional curricula. Suzanne McLaughlin emphasises storytelling: "We need to be better at storytelling, raising the profile, be better at creating user case scenarios—the this is what we did, this is how GI helped, and we need to communicate this to future generations whilst creating an exciting working environment that is both diverse and inclusive".

Rachael Dale-Kemp highlights a crucial concern: "To me it's the skills gap... Skills, or the lack of them, will be one of our most limiting factors and biggest threats because we need to know how to use the new technologies that are coming into play".

RETHINKING PROFESSIONAL IDENTITY

Perhaps most challenging is the need to reconceptualise what it means to be a geospatial professional. Liz Fox-Tucker discussed, 'the underpinning data are not special, it's the geo, the geography, that is. That's where our added value as geospatial professionals is and where the opportunities to improve outcomes are'. In going on to discuss how this gives us the challenge or opportunity to make sure those skills and experiences are embedded into a wide variety of educational pathways she concludes "we need to be sharing our special".

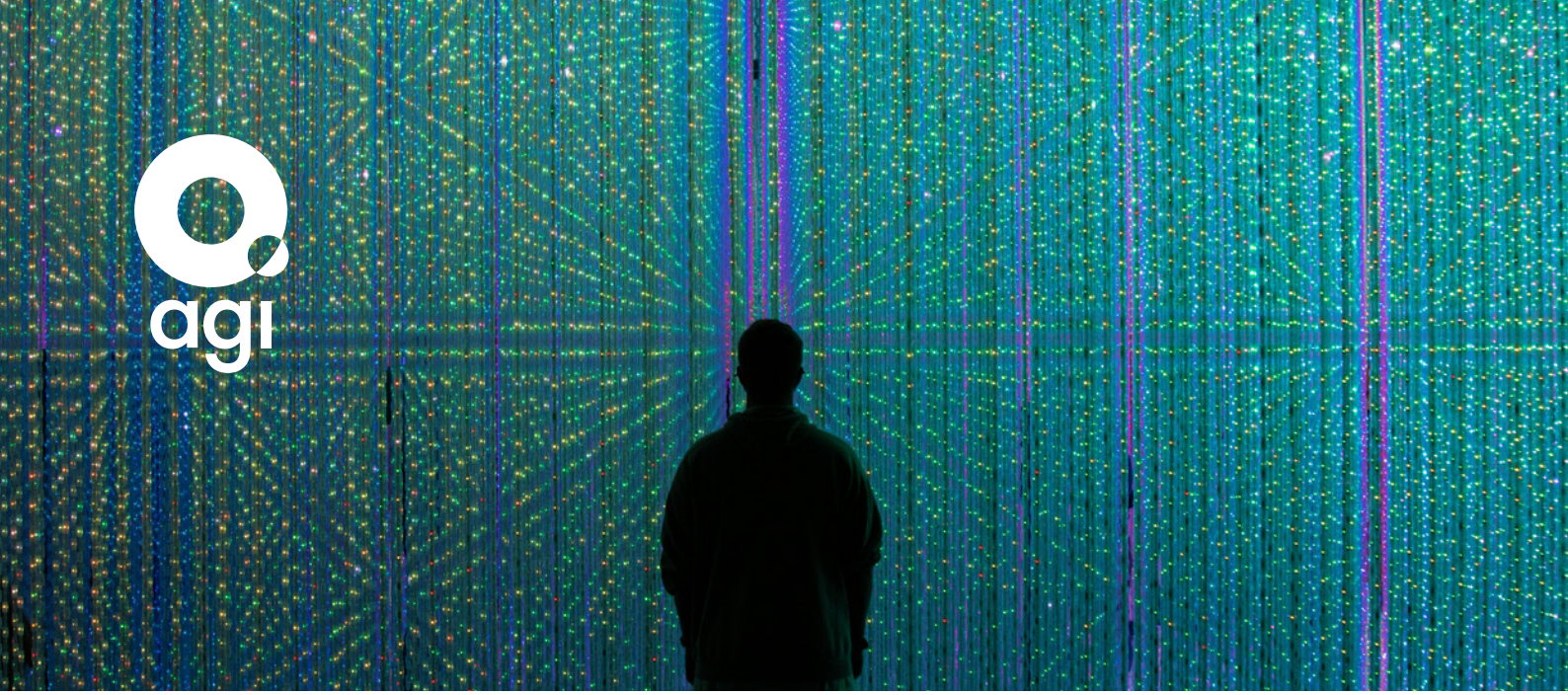
With GCSE geography student numbers rising continuously in England, Wales and Northern Ireland for the last 14 years, geography is now the 6th most popular GCSE (and 12th most popular A level), there is little doubt that geography resonates with the interests of young people (although numbers on Scotland are at odds with this direction of travel). Providing visibility of those educational and career pathways is as essential to embedding the geospatial expertise of this generation in those careers as the data is.

While Charles Kennelly argues, "every type of Information Management course should include geo", Liz likewise suggests that "the need (is) to ensure some of the basic, fundamental (geo) building blocks are in courses like construction, landscaping, to form part of these technically based qualifications". This is less a fundamental shift in professional identity and more an extension of our current one.

THE COMMUNICATION CHALLENGE

Industry professionals consistently highlight the struggle to articulate value across disciplines. John Fraser identifies a core problem: "If I look from the outside, it frustrates me that we get so hung up on trying to define geospatial. Are we geomatics, are we geospatial engineers, are we surveyors; we need to get beyond that in the sense that we can be any of them if we communicate what we do and how we are connected".

"There is lots of positivity if we can communicate the role we play in things like Apple Maps, What3Words, how you know where your Amazon driver is, because 90% of people touch on what we do, every day, without even knowing it".



TOWARDS DATA-CENTRIC TRANSFORMATION

The present and future demand professionals who can navigate integrated digital ecosystems. Mia Dibe notes: "there's a lot happening innovation-wise at pace both with core digital technologies and with discrete disciplines like BIM, GIS, and r emote-sensing. Wider integrated inherently geospatial digital ecosystems are emerging and team geospatial must provide the guardrails, guidance and tools to enable trust and collaboration".

Mia highlights the transformation scope: "In the last 20 years, we have shifted from document based to data-centric project delivery, and the same has been observed in BIM with the evolution from CAD-based design to fully integrated digital twins".

THE FOUNDATION IMPERATIVE

Amid technological complexity, some voices urge focus on fundamentals. Suzanne McLaughlin offers a crucial reminder: "We need to get the basics right, not run after shiny things. If we get the correct foundational data we can build these solutions, these digital twins. We need data quality, we need to get the basics right and we can build everything on that".

Rachael Dale-Kemp suggests a balanced approach: **"It's a combination of both. You need to train the AI specialist so they can see the opportunities for geospatial but is that just because [AI is] the current thing? So, what's going to happen in 20 or 30 years when we will still have new people coming in and we will still need them to have geospatial as a key capability because AI is just another technology".**

CONTINUOUS PROFESSIONAL DEVELOPMENT: ADAPTATION AS SURVIVAL

For existing professionals, the message is clear: continuous evolution is non-negotiable. The June 2025 UK Industrial Strategy (https://www.gov.uk/government/publications/industrial-strategy) emphasises: "in an era of rapid technological change, as new skills come to the fore and automation and AI fundamentally transform the nature of work, the strength and depth of the UK's skills pipeline, beginning with early years and school right up to the technology awareness of senior managers, will be critical".

The document highlights systemic challenges: "10% of businesses report at least one skills shortage vacancy" and "only 9% of Secondary vocational learners are studying in the in-demand sectors of engineering, manufacturing, and construction, compared to the Organisation for Economic Cooperation and Development (OECD) average of 32%".

This isn't geospatial specific, though both AGI (https://www.agi.org.uk/wp-content/uploads/2023/09/education-and-skills-report-2023.pdf) and Location Data Scotland (https://locationdatascotland.com/geospatial_skills/) have done work that signposts real issues.

While Mark Giffin does see "GIS becoming more of a career", Mick Dunn takes a broader view: "to help save GIS in local government we do a lot of geospatial training for both our team and users within the business, but what we don't do is business training", suggesting that, as inherent multi-disciplinarians, the geospatial community urgently need to recapture that mindset, engaging with users, markets, policy makers and business leaders in their language.

EMBRACING THE INVISIBLE FUTURE

The ultimate goal isn't to preserve geospatial as a distinct domain but to make geographical thinking so fundamental it becomes invisible infrastructure. Nabil Lodey observes: "we'll do all the clever stuff and the people that use it aren't geo, they may not even know they are using geo".

This vision requires education systems producing graduates who can work across disciplines, communicate effectively with diverse stakeholders, and apply critical thinking to complex, ambiguous problems. It means developing professionals who understand their value lies not in protecting specialised knowledge but in sharing it strategically to enable better decision-making across all sectors.

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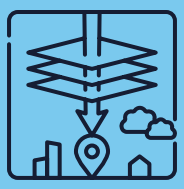


COLLABORATION IN GEOSPATIAL: EVOLUTION AND FUTURE TRAJECTORIES

Is the geospatial sector moving from traditional competitive models toward collaborative frameworks that recognise the interconnected nature of spatial challenges? As James Kavanagh frames it: "There are three elements to geospatial: there's the geography, the GIS, and the engineering side. Geospatial sits across all three areas." The theme and desire are evident, but reality is perhaps more piecemeal.

THE IMPERATIVE FOR COLLABORATION

"Collaboration is the key, right? Shrinking budgets and different ways of doing stuff means there has to be better ways of collaborating" (Focus Groups).

This imperative is driven by recognition that "the world is complex thing and there are still too many barriers to gaining clear insight. By applying the technologies which are available to us today, by bringing the data together, ensuring its interoperable, we can provide better insights to real world problems, and we can have more impact" (David Henderson). And as Ed Parsons says, "there isn't a huge amount that's new in terms of problems. What's new is in the solutions to those problems".

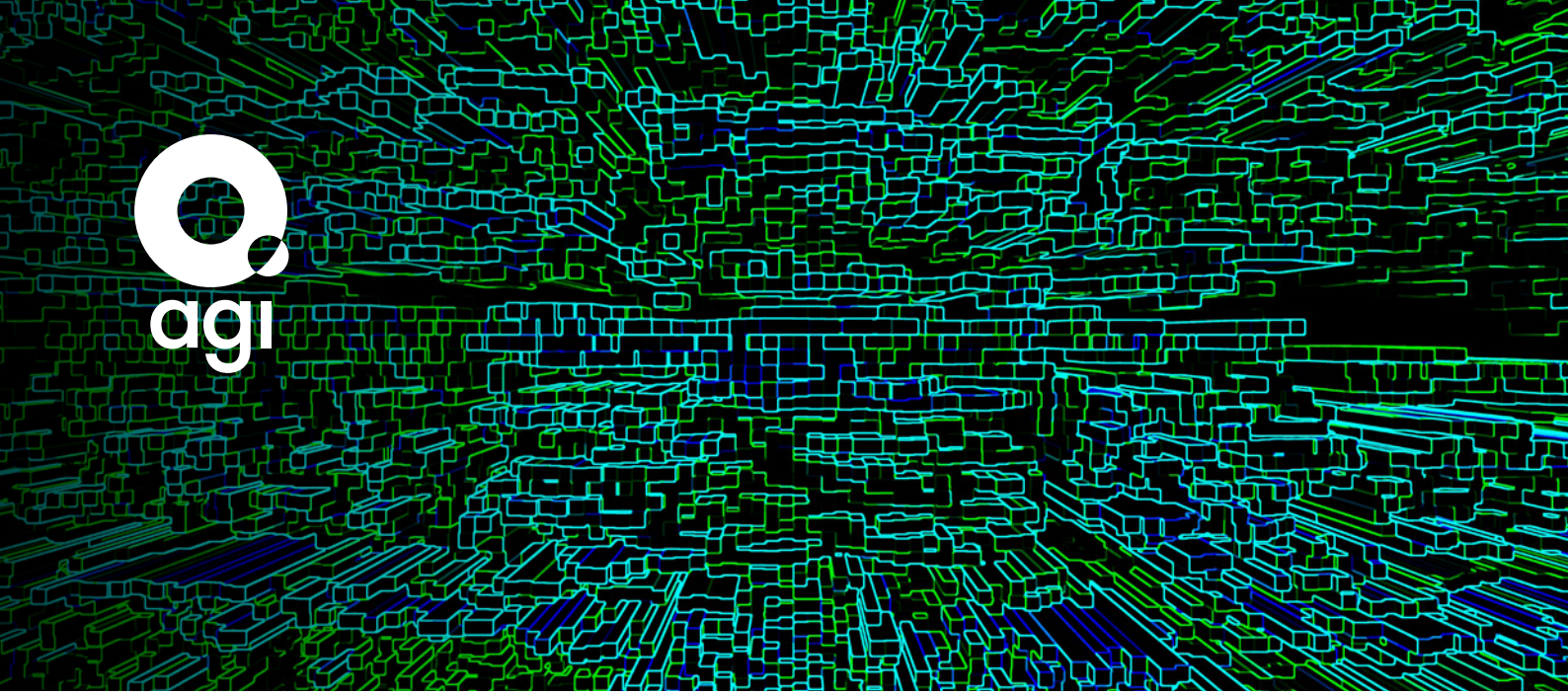
Tracie Callaghan sees collaboration through multiple lenses, with competitors in lobbying and policy formation, with suppliers including geospatial to maximise value, and in technical standards for OpenBanking. If banking can develop collaborative frameworks, why don't other sectors follow suit?

THE MATURATION OF COLLABORATIVE THINKING

David Henderson's exposure to hundreds of partners and customers leads him to observe: "I am seeing more collaboration. I am seeing the recognition that our whole is greater than the sum of our parts". Evidence is harder to find as relationships are perhaps not for sharing in competitive landscapes, especially where "nobody owns the entire value chain, and we all have our part to play".

Procurement, especially big-ticket government and infrastructure procurement, is a long-established 'prime' and 'partner' environment, often bringing competitors together in alliances. Geospatial may be at a tipping point in this context; having struggled to find a voice at the table in the past, location intelligence, visualisation, digital twins and embedded ubiquity is seeing Merger and Acquisition (M&A) and alliance activity around geospatial. That seems likely to continue.

As David says, "That requires a bit of humility (on all sides), it also requires (workable) business models and collaborative spirit".



COMMUNITY-DRIVEN INNOVATION AND DEMOCRATISATION

The role of community-driven mapping and democratised geospatial data continues to resonate globally. The Humanitarian OpenStreetMap Team exemplifies this transformation, working with communities to put maps and data into everyone's hands, with 600,000 downloads in five years and 9,000 active users from development and humanitarian organisations. There's ambition to upskill these communities to provide geospatial services meeting local needs while improving livelihoods.

Such democratisation changes power dynamics, empowering locals with improved knowledge while challenging established power structures. This is the essence of democracy, though some worry that if users don't understand data quality, provenance, or analytical choices, interpretation may be misleading. Trial and error, curiosity, and confidence to fail all build resilience. When coupled with transparency, useful tools emerge for advocacy, insight and uplift.

TECHNOLOGY-ENABLED COLLABORATION

COVID-19 accelerated digital collaboration adoption "simplifying connections" (Marek Suchoki) while "remote working has allowed collaborations to exist that wouldn't have existed if you had to go face to face" (Focus Groups).

The spatial web and technologies that translate into collaborative spatial environments allow "teams to collaborate in virtual spaces, regardless of location" using Augmented and Extended Reality (AR/XR) and AI to bring digital twins to life, creating immersive, context-aware, real-time experiences for studying cause and effect through scenario planning or for 'optioneering'.

Evidently there are those who believe the generative AI will have a role to play, Nicki McGoh picks this up: "We (Caribou) did a pilot, using generative AI, so people could ask, in their own language, not needing to worry about technical jargon so not needing to do the transition between humanitarian person to the geospatial technical person". Disintermediation of expertise via AI will be a provocative scenario for many. But when you see what Niantic's art of the possible could look like with on (portable) device AI interpreting what it sees and "translating" that into audio information or instructions that is both collaboration made real and a wake-up call for the geospatial community's place in the value chain.

CROSS-SECTOR COLLABORATION AND GOVERNMENT

Government guidance emphasises that "sustainable change is driven from the bottom up" (GDS). Tracie Callaghan recognises this creates space for pre-competitive, cross-industry collaboration for policy changes, though qualified by uncertainty about policy direction and pace of change government can deliver, "collaboration is for the greater good".

FUTURE COLLABORATION MODELS

"How do we make that next step towards collaboration? How do we do it in a hybrid way" while leveraging technology where "multiple entities have to come up with standardised documentation to make it easier to consume" (Focus Groups). APIs and the demand/expectation for them may have some of that answer.

EDUCATIONAL AND SKILLS IMPLICATIONS

The democratisation of geospatial tools creates new educational challenges. Rebecca Firth: "it's really easy to use mapping tools, to run a project where you live and get an interesting outcome, so people can be doing 'GIS consultancy' work when they are 13 years old and I don't think we are reflecting this. The steps we are taking (in education) have been very minor in comparison to the technological changes".

This raises questions about traditional educational approaches: "I don't get the impression that we are educating people to be the future workers we want".

This is a universal concern and clarion call to membership organisations, policy makers and educators to balance geospatial education fundamentals with diverse market needs. The ubiquity of geospatial places different demands on graduates from what was envisioned even five years ago.

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EARTH SYSTEMS EVOLUTION: THE GEOSPATIAL-DIGITAL TWIN NEXUS TRANSFORMING CLIMATE, FINANCE AND CONSTRUCTION

The convergence of earth systems monitoring, geospatial intelligence, and digital twin technologies is reshaping how we understand and respond to environmental change. We stand at unprecedented integration between physical and digital worlds, where Earth Observation and geospatial data more widely doesn't just inform decisions—it's instrumental in how we build, finance, and protect our future.

THE EARTH SYSTEMS REVOLUTION: BEYOND STATIC TO DYNAMIC

The transformation underway represents a paradigm shift from reactive to predictive earth systems management. As Mia Dibe notes, "In the last 20 years, we have shifted from the document-based to a data-centric project delivery, and the same has been observed in BIM with the evolution from CAD based design to fully integrated digital twins".

This evolution is accelerating through cloud computing. Peter Beaumont observes: "More recently it has been the development of cloud computing with organisations such as Amazon, Google, Azure, having completely changed the landscape. They have given us access to unbelievably large datasets that we have never had access to before", fundamentally altering our capacity to monitor and model earth systems at unprecedented scale.

The implications extend beyond data volumes. Peter Beaumont continues: "The work that Amazon is doing with their Earth on AWS initiative, Microsoft with their Planetary Computer, and now Google with AlphaEarth, are types of digital twins that will essentially allow us to create tools to better steward the earth and help solve some of those existential challenges we are facing around climate change and our abuse of the planet".

CLIMATE AND NATURE: THE DATA-DRIVEN IMPERATIVE

Nature-Related Financial Disclosure Revolution

The intersection of earth systems data with climate action is reaching a critical inflection point. Environmental monitoring is becoming mandatory through frameworks like Taskforce for Nature Related Financial Disclosure (TNFD) and Taskforce for Climate Related Financial Disclosure (TCFD) "that will be a major focus in the next five years" (Mia Dibe).

Cathrine Armour emphasises this shift: "Formulated in 2023, the framework is a series of indicators and associated metrics used to locate an organisations area of operation, to evaluate impacts, risks, dependencies, and opportunities, relative to nature and their operations". EO data provides the only framework to undertake and sustain the global record through point analyses, time series studies, or derived capabilities such as foundational geospatial models and embeddings.

Spatial Analytics for Climate Resilience

The next decade will witness unprecedented integration of Earth Observation derived information with climate adaptation strategies. Mia Dibe sees a "major potential in climate resilience modelling, using spatial analytics to inform policy, design, governance, etc, and real-use cases for leveraging Earth Observation and spatial data for biodiversity monitoring, carbon monitoring, and all those things that can be grouped under sustainable infrastructure as we are seeing more and more use of spatial data to model and mitigate environmental risks".

AI-Accelerated Earth Observation

The transformation is being turbocharged by artificial intelligence. "The whole AI for earth is going to accelerate. Its super exciting and it provides us with a new way of looking at geospatial data. Essentially, we are creating a new database of geospatial data with these vector embeddings which will allow us to do global, well certainly regionwide, analysis with much less computing power" (Peter Beaumont). As edge computing accelerates and the 'black box' moves to the edge - on satellite, on hand held device – what happens to both storage of captured data, data provenance and AI transparency (when the volumes of data militate against retention)?

INSURANCE AND BANKING: SPATIAL FINANCE REVOLUTION

Risk Assessment Transformation

The financial services sector is experiencing an accelerating shift towards location intelligence. "Every year, we publish a disclosure which gives an update on where we are across all the different sectors that we finance... we have built and developed things like financed emissions models. Answering questions such as what's the emissions associated with our lending to our agriculture customers?" (Tracie Callaghan).

This extends beyond regulatory compliance to practical risk management. The insurance sector recognises that "climate change... is fuelling demand for products which means insurers are becoming better informed and customers are better served" (Mark Varley). The sector has moved to address-level geographic risk, demonstrating business model maturity and the need to understand location and distribution of portfolio risk.

Data Accessibility Challenges

Key barriers include the ask for "better (more accurate) location data" while "the high cost of geospatial data can be prohibitive for some applications". The FAIR (findable, accessible, interoperable, reusable) principles remain a work in progress while quality and the oft-cited 'fitness for purpose' varies depending on use case, urgency and other factors. As expressed by Emer Coleman during an Open Data Institute (ODI) conversation, when the "most interesting/valuable thing that might be done with your data is done by somebody else for some other reason", those who capture the data had better document it and those using it had better have paid attention (to metadata, data quality etc) but let that not be a hindrance to innovation per se.

Emerging Solutions

Despite challenges, innovative applications are evident. As mentioned by Tracie Callaghan: "Natwest's spatially dependent solar potential proposition that was well-received by customers" demonstrated sector recognition of wider potential: "geospatial data can inform incentives and regulatory compliance, such as reforestation grants and emissions reporting". This development carries implicit acceptance that good data may cost but that cost is justifiable based on benefits.

CONSTRUCTION: DIGITAL TWINS BEYOND VISUALISATION

The construction sector is moving beyond viewing digital twins as passive 3D visualisations toward operational systems. "A client comes to us and says we need a digital twin of our physical asset, but we rarely talk about the operations and maintenance side and I would say that we haven't tackled maturity in that space" (Mia Dibe). Mick Dunn echoes this: "The biggest opportunity I see is the transition from 2D to 3D... there are different capabilities and techniques from an analytical perspective, for asset capture, for maintenance applications, and from an engagement perspective."

Mia goes further: "The operations side of digital twins will be accelerated with the help of AI assistants because, more than ever, these are being embedded in design and construction tools". The term will cease to be associated solely with foundational asset level 2D/3D. With AI and IoT feeds, it will become a platform for real-time operations and scenario modelling from local to planetary scale.

The construction sector's digital transformation is intrinsically linked to sustainability objectives. "If we do it well... these innovations will lead to smarter and more sustainable cities. We will see how these technologies can help reduce carbon footprint, improve safety and efficiency in infrastructure management".

CROSS-SECTOR INTEGRATION

The evolution towards the "Spatial Web" is creating unprecedented opportunities for cross-sector integration. "Digital twins of buildings, Augmented Reality-guided construction, Building Information Modelling integration, site safety monitoring" represent the beginning of this transformation.

The implications extend across sectors: "Traffic optimisation, public space planning with Augmented Reality, environmental monitoring, emergency response" in smart cities, and "Deforestation tracking, climate modelling, smart agriculture, disaster preparedness" in environmental management.

One contemporary example illustrates how location intelligence is the heartbeat of a successful outward looking nation careful to identify and mitigate risk factors for industry and economy alike: Nikki Smith says "BGS would talk about critical minerals... working internationally, helping organisations pull their data together, helps us secure supply chains".

And speaking of how that convergence may be felt closer to home, Marc Farr sees an NHS where "you will only have to tell people your name and address once, you won't have to read handwriting, you'll be able to get an update on an app... it will just be much easier."

THE PATH FORWARD

The digital transformation depends on capability across generations that isn't always apparent. Success means evidence-based decisions. "For the civil service, policy decision making will become more evidence based and we will have greater confidence and be able to act quicker because we have more data, more evidence, and we can process it faster" (Rachael Dale-Kemp).

We expect digitalisation to allow infrastructure to be more adaptive, resilient and sustainable. Technology allows unprecedented levels of forecasting, modelling and planning "as we move from being reactive to more proactive" (Mia Dibe).

The expectation of speed, and implied certainty, harks back to Ian Spencer's issue when decision makers needed something, how to weigh and communicate uncertainty in an impatient world. Once things are written down their authority is amplified, and caveats, guardrails and possible alternatives lost.

The problems we are trying to solve "may not have changed" as Ed Parsons says but they have become more urgent. As system thinkers nothing perhaps underscores the power and opportunity of convergence more than Donna Lyndsay's call "to look at the problems we are trying to solve (and recognise that) if you make a change in one location or to one process, that is going to have impact elsewhere. We have to think about people, planet and profit as a single complex entity".

CONCLUSION: THE CONVERGENCE IMPERATIVE

The next decade will witness unprecedented convergence between earth systems monitoring, digital twin technologies, and sectoral applications in climate, finance, and construction. Success requires moving beyond technological fascination to operational excellence, from data collection to decision support, and from sectoral silos to integrated systems thinking.

As Holger Kessler concluded, "Geography is all about the connections, all the systems are connected, so as a geographer, as a stakeholder or engagement person I think it's all about connections and helping people to see that what they do has an impact on others".

The future of earth systems lies not in any single technology, but in the connections forged between them, the wisdom with which they are deployed, and the collaborative spirit with which we address the challenges that define our time.

While mainstream discourse around geospatial technology focuses on AI adoption, climate applications, and data integration, the most compelling insights often emerge from the periphery. These dissonant voices—spanning defence practitioners questioning open data orthodoxy, healthcare professionals reimagining human-AI collaboration, and humanitarian workers challenging Western data standards—illuminate blind spots in our collective vision of spatial intelligence's future.

VOICES FROM THE MARGINS: ALTERNATIVE FUTURES FOR GEOSPATIAL INTELLIGENCE

THE GREAT DIVERGENCE: SECURITY VERSUS OPENNESS

A tension is apparent between the geospatial and wider community's open data and 'move fast, break things' ethos and traditional approaches to product development. The latter, backed by stable funding and long term agendas often in the public and defence domains, could and did put such organisations at the leading edge. As technology has changed and the possibilities it enables, particularly in the context of asymmetric competition (start-ups vs big tech, drones vs missiles for example) so has that leadership. While public sector initiatives such as Landsat and Copernicus provide foundational data sets, so the rise of small-sat constellations illustrate both that shift and the gateway that public sector investment provides to the wider economy.

Analogous to Spencer's thoughts in the context of cyber security a Focus Group participant advocated for "secured by design" principles that challenge open data orthodoxy: "Going forward it's about being secured by design...you build it as a secure platform from the word go." The ethical implications are stark when high-resolution imagery can reveal vulnerable populations, "so things like getting 5 centimetre aerial imagery, you can start spotting where vulnerable households are...there's a vulnerable person living here." Participants go on to frame the policy dilemma bluntly: "Should you be releasing that openly like in the way that you might have done with 25 centimetre stuff...You could do it. It doesn't mean you should."

It is no secret that most dimensions of our technology infrastructure, including geospatial ones such as positioning (spoofing has made front page news), data down links, data centres and all electronic communications have different levels of vulnerability and are subject to all manner of attack vectors on a close to continuous basis. Added to which there are trust issues regarding synthetic data, mis/disinformation and algorithms, Vigilance, diligence and investment in existing international and also in sovereign systems are likely to see increased collaboration opportunities as the public sector looks to leverage commercial capability and stimulate the economy.

These concerns intersect with broader geopolitical dynamics. The survey reveals worries about international monopolisation, with dominant Big Tech organisations controlling key satellite networks and cloud platforms, creating dependencies that could undermine national sovereignty. It is evident from the Strategic Defence Review and elsewhere that strategic priorities include reducing dependencies and enhancing sovereign geospatial capabilities.

Emma Hatton emphasises data vulnerability: "As creators and users of geospatial data, we need to make sure that we are constantly aware of how that data might have been impacted, how accurate that data is" given increasing "interference with some of those signals."

SUSTAINABILITY AND GLOBAL DYNAMICS

Our survey reveals emerging trends reflecting growing emphasis on sustainability, equity, and global dynamics. Geospatial technologies are increasingly supporting sustainable development goals, representing strategic recognition of location intelligence's power to drive environmental stewardship and social progress.

Participants emphasise the sector's influence: "The GI sector has had great success in influencing the development of the United Nations (UN) Sustainable Development Goals (SDG's) and Climate Reporting Standards. The value of this work cannot be understated." However, implementation challenges persist as "deforestation continues to accelerate, effective land use will become ever more important, balancing the competing demands of biodiversity and reforestation with economic and population growth."

The geopolitical landscape increasingly influences data flows and governance. As the world becomes more multipolar and distrustful of cooperation, there will be national opportunities for data independence at the cost of global datasets, impacting academia and business sectors.

> "I recently coined a phrase, when talking to an AI company, about how we run our theatres and what it boiled down to is just loads of people, talking to loads of other people, all the time. We are constantly over communicating so we came up with the concept of reducing cognitive load."

THE COGNITIVE REVOLUTION: BEYOND PROCESSING POWER

Marc Farr introduces the transformative concept of "reducing cognitive load": "I recently coined a phrase, when talking to an AI company, about how we run our theatres and what it boiled down to is just loads of people, talking to loads of other people, all the time. We are constantly over communicating so we came up with the concept of reducing cognitive load."

This human-centred approach envisions different AI potential. Farr continues: "If AI could do that, if it could make decisions based on real-time changes, do the analysis in the background, then we could focus on the provision of care or research." Rather than automating existing processes, this approach reduces mental burden on decision-makers and front-line professionals, suggesting geospatial AI's greatest value may lie in creating thoughtful, contextually appropriate information environments rather than simply processing more data faster.

MINIMUM VIABLE DATA: CHALLENGING PRECISION ORTHODOXY

Rebecca Firth presents a radical data quality reconceptualisation challenging Western assumptions: "It's effectively minimum viable data, and I think that requires a big repositioning of the expectation of what is good data. So, if you look at it from a Western perspective...we need to know the depths of foundations to millimetre accuracy."

She contrasts this with practical alternatives: "But if we looked at the same problem in Liberia that isn't the way data is captured... if we asked how deep are the foundations of a house in terms of number of fingers or this is the level of flood water in terms of ankle deep or waist deep, you have minimal viable data. Data that is usable."

This philosophy aligns with survey findings emphasising the need to "integrate non-geospatial data from other industries" and "integrate statistical data with environmental data." The approach suggests fitness-for-purpose may be more important than technical perfection, challenging standardisation orthodoxy.

INDUSTRY INCLUSION AND PROFESSIONAL CHALLENGES

Growing emphasis on industry inclusion aims to ensure diverse representation in geospatial decision-making. Survey participants emphasise: "make the community more diverse and inclusive as the community can be heavy loaded with people who are very experienced." While experience represents strength, it "also creates a lot of pockets of professional knowledge and opportunities that are insular and heterogeneous."

Communication gaps persist between specialists and other professionals. Nicky McGoh identifies generational shifts: "People are not reading 100-page documents anymore... we have short attention spans so we need to grab peoples' attention." Practically, one Focus Group participant noted: "They had to hire someone as a translator between financial services and GIS."

Marc Farr articulates the sector's challenge through his "Victor Mature paradox": "There are a lot of people who really understand this stuff but I don't think we have elbowed our way to the top table." The solution requires assertiveness: "So, we need a louder voice, more macho, and I think we have tried to do that with our network and we are having success."

HUBRIS AND DEMOCRATISATION RISKS

Cautionary voices have long warned about democratisation without professional guidance or expert involvement. Nevertheless recent times have seen denigration of those same experts and fulfilment of Monmonier's provocation. With the addition of AI it is easy to think one can know better. This is a reflection of the two sides of the point made in the UK Geospatial Strategy, that "data value increases when it is used to solve problems beyond its original purpose", enabling both amateur fact checkers and analysts and provocateurs. Nicki McGoh warns of the critical need for expertise when working with new technologies: "you need to have a level of expertise to be able to sense check the outputs...I only want to use it for things where I know enough about the topic and I am confident I can check the sources". In doing so she speaks less of oversight than of sounding boards as a route to confidence in the approach and trustworthiness of the insight. This is a discourse that is set to run and run, but by acknowledging the challenge we can at least provide a platform for informed challenge and transparent story telling.

Paul Naylor from the British Cartographic Society provides examples: "People not trained in cartography or data visualisation can make maps...there are people working within large organisations and governments who are making horrendous maps and visualisations." He cites COVID mapping as cautionary: "Early COVID maps and charts were an example of awful maps."

Tracie Callaghan identifies skill-data mismatches: "either people have all the data but don't really understand how to use it" or they "really understand the problem, but they don't have access to the data."

Investment concerns emerge from Focus Groups revealing AI venture scepticism: "a lot of startups and a lot of investments into some sort of geospatial AI don't go anywhere...they've spent billions in investment and then sometimes they don't even release the products because they don't work."

CONVERGENT TECHNOLOGIES: THE QUANTUM LEAP AHEAD

While the sector grapples with current AI implementations, transformative technologies approach largely unnoticed. Quantum computing represents the most significant absent theme, with 2025 declared the International Year of Quantum Science and Technology. McKinsey's report indicates "Quantum computing companies generated $650-750 million in revenue in 2024, and are expected to surpass $1 billion (globally) in 2025".

Quantum computing could revolutionise geospatial processing, with quantum positioning systems potentially replacing vulnerable GPS by 2050. Research demonstrates quantum enhancement to satellite image classification, enabling global-scale spatial analysis that is currently impossible.

Market Research Future's report on the spatial computing industry to 2035 supports sentiments expressed in a couple of interviews as to the how spatial computing promises interface revolution, with markets projected to grow from $8.57 billion in 2024 to $25 billion by 2035. AR apps already enable users to see hidden underground infrastructure through phone cameras, suggesting geospatial consumption will shift toward immersive, contextual interfaces rather than traditional GIS platforms. Blockchain technologies address trust and provenance challenges just as AI systems obscure data lineage. When spatial data is hashed into blockchain, entries become unchangeable records making tampering obvious. The blockchain market reached $7.9 billion in 2024, expected to reach $66.7 billion by 2033, with Estonia, Georgia, and Sweden being examples of countries implementing blockchain land registries.

SYSTEM LIMITATIONS AND IDENTITY QUESTIONS

Fundamental limitations persist despite advances. Mia Dibe offers sobering assessment: "AI isn't this magical solution; it is actually a solution looking for a problem," while Ed Parsons notes: "there isn't a huge amount that's new in terms of problems. What's new is in the solutions to those problems."

Fragmented systems constrain digital twin and IoT visions. Rob Pasco highlights accountability gaps: "Decision makers, leaders in our organisations, have other more pressing things on their minds... the right voices won't be heard in that process."

Holger Kessler questions sector identity: "Perhaps that time is done? We are geographers, we are needed but I don't think we need to think of ourselves as special." Ed Parsons adds perspective: "geo has not become more accessible" yet is "used by billions daily though we struggle to realise how successful we are."

Aaron Addison warns about external disruption: "If you want to remain relevant you have to figure out a way to go faster, or someone will do it for you."

FUNDAMENTAL PRIORITIES

Voices call for basics before advanced capabilities. Suzanne McLaughlin emphasises: "we need to get the basics right, we need data quality, not run after shiny things." Donna Lyndsay provides urgent perspective: "We are facing some enormous issues, across the planet, but these are being held back by the fact that we aren't using the tools we already have...there is a disconnect between the information available and the actions and decisions that could, and should, be being made."

Survey participants emphasise collaborative resilience: "The UK geospatial sector can navigate political and geopolitical challenges by working together to foster resilience, adaptability and collaboration, and ensure the industry has a strong, coordinated voice."

CONCLUSION: EMBRACING COMPLEXITY AND CONVERGENCE

These dissonant voices reveal a sector navigating unprecedented complexity. Spencer's security perspective challenges open data orthodoxy during geopolitical tensions. Farr's cognitive load concept prioritises human factors over technical capabilities. Firth's minimum viable data philosophy could revolutionise data collection in resource-constrained environments.

The survey findings reveal growing awareness of global responsibilities and strategic importance. From sustainability applications supporting UN SDGs to technological sovereignty concerns, the geospatial community recognizes its role extends beyond technical implementation to environmental stewardship, social equity, and national resilience.

As quantum computing, spatial computing, and blockchain mature, the sector faces convergence challenges requiring integration across technological domains rather than excellence within traditional boundaries. Organizations developing quantum literacy, spatial computing capabilities, and blockchain understanding while embracing diversity and maintaining data quality focus will be better positioned to thrive.

The convergence represents both the sector's greatest opportunity and most significant challenge. In a rapidly changing landscape where today's margins may become tomorrow's mainstream, the geospatial community would benefit from embracing complexity as resilience and innovation, listening to voices that see around corners others cannot yet perceive.

OUTLIER AND DISSONANT VOICES

SUSTAINABLE DEVELOPMENT

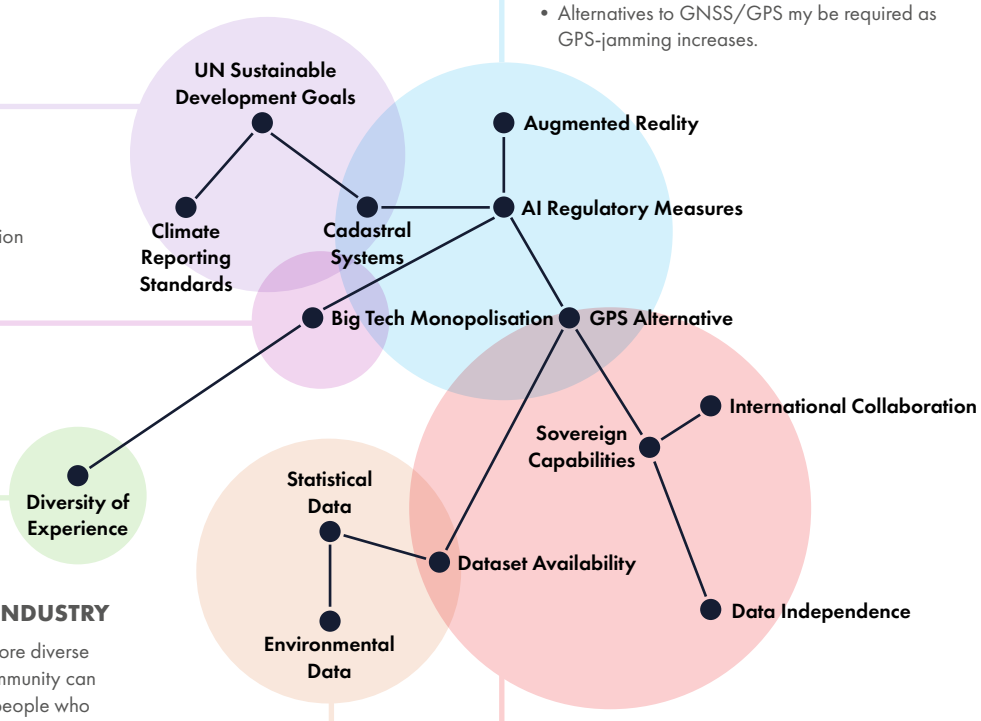
- The GI sector has had great success in influencing the development of the UN SDG's and Climate Reporting Standards. The value of this work cannot be understated, and we must continue to influence in areas of policy development. As deforestation continues to accelerate, effective land use will become ever more important, balancing the competing demands of biodiversity and reforestation with economic and population growth.
- Continued investment in shaping policy, for example, great progress with the UN SDG's and climate reporting.

TECHNOLOGICAL ADVANCES

- Creation of an advisory group on policy for the application of AI and consider the development of international agreements in outlining regulatory measures for the use of AI in geospatial.
- Invest in rich, multi-scale datasets and collaborate across sectors to unlock the potential of augmented reality.
- Investment in cadastral systems will be critical to capture the benefits of geospatial technological advancements (eg. higher frequency earth observation) for positive outcomes.
- Alternatives to GNSS/GPS my be required as GPS-jamming increases.

INTERNATIONAL MONOPOLISATION

- Increasing monopolisation of the IT and Big Tech organsations.



INCLUSION IN THE INDUSTRY

- Make the community more diverse and inclusive as the community can be heavy loaded with people who are very experienced.
- While that is a strength, it also creates a lot of pockets of professional knowledge and opportunities that are insular and heterogeneous.

DATA INTEGRATION

- Integrate non-geospatial date from other industries for sector specific opportunities.
- Integrate statistical data with environmental data including topographic mapping and Earth observations (in-situ, models and satellite data).

GEOPOLITICAL ENVIRONMENT

- International regulation on global dataset availability for common good applications ranging from monitoring of space, environment, natural disasters or health-based emergency/civilian events.
- The UK geospatial sector can navigate political and geopolitical challenges by working together for foster resilience, adaptability and collaboration, and ensure the industry has a strong, coordinated voice that is heard across the national, regional, and global stages.
- Increased defence and security spending will spur investment in sovereign geospatial capabilities, satellite infrastructure, and AI-driven intelligence, enhancing independent data assets.
- Reducing the UK's reliance on non-EU technology including global positioning systems.
- As the world becomes more multipolar and distrustful of cooperation; there will be national opportunities for data independence at the cost of global datasets accessible impacting academia and business sectors.

STRATEGIC CALLS TO ACTION: A 5-YEAR ROADMAP FOR GEOSPATIAL TRANSFORMATION

The interviews and the thematic framing that emerges speaks of a community at a critical inflection point. Success over the next five years will need coordinated action from stakeholders, here kept to three broad groups but we acknowledge that there are others, each with distinct but interconnected responsibilities for navigating the transition from specialty domain to embedded infrastructure.

The window for proactive adaptation remains open, but evidence suggests it is narrowing rapidly. As Aaron Addison warns: **"The likelihood that somebody from outside the industry will solve our problems increases dramatically"** unless coordinated action is taken. We posit a roadmap that synthesises the most critical interventions required from government, industry, and professional bodies to ensure geospatial expertise remains central to addressing 21st-century challenges.

A

GOVERNMENT AND POLICY MAKERS: ENABLING THE INFRASTRUCTURE REVOLUTION

YEAR 1-2: FOUNDATIONAL FRAMEWORK DEVELOPMENT

IMPROVE GEOAI LITERACY

Policy makers and educationalists must embed GeoAI literacy within existing educational frameworks. The UK government's commitment to "invest £187 million to bring digital skills and AI learning into classrooms across all communities" provides a foundation, but must be expanded to include spatial reasoning and geospatial AI competencies.

ESTABLISH COMPREHENSIVE DATA GOVERNANCE FOR THE AI ERA

Drawing from concerns that "it can be really hard to know when something is false or has been changed" (Ian Spencer), government must develop frameworks addressing AI-driven spatial intelligence transparency. This includes mandating data lineage tracking through machine learning processes, establishing standards for algorithmic transparency in critical applications, and creating liability frameworks for AI-derived spatial decision-making.

The urgency is underscored by the reality that traditional data verification methods break down when "all you've done is you've trained a black box AI on it". Policy frameworks must balance innovation enablement with accountability requirements. The Data Use and Access Bill, will need further policy and regulatory work to achieve that balance.

REFORM LICENSING AND ACCESS MODELS FOR API-DRIVEN INTEGRATION

Looking to core high value data sets there is a sense that we are reaching a tipping point in terms of how current licensing models designed for static datasets accommodate the real-time, API-based data access that defines modern applications. Data creators including Ordnance Survey must find a way to migrate to harmonised, machine readable data licences that support dynamic integration of location data while maintaining appropriate controls and ensuring a sustainable business model. While this may seem a direct challenge for Ordnance Survey it is one that all data creators will need to address.

To some extent this addresses concerns that "high data costs, lack of customer engagement and regulatory barriers" limit adoption, particularly for smaller organisations and innovative applications. However, the likely outcome is that those 'costs' and the real value derived are embedded in corporate business models and product offerings in a way that rewards the data creators and enables them to maintain and update that data at increasing resolution and frequency, albeit in a data-as-a-service model.The wider geospatial and space sectors have been experimenting and struggling with variations of this model and now is the time to wrestle with some new models.

YEAR 2-3: EDUCATIONAL AND SKILLS INVESTMENT

The choice facing geospatial education is stark: evolve rapidly to meet the demands of an embedded future, or watch as other disciplines absorb our capabilities while leaving our institutions behind. The window for transformation is open, but it won't remain so indefinitely.

EMBED SPATIAL REASONING IN NATIONAL CURRICULA

The fundamental mismatch where "We are training desktop GIS and there are very few desktop GIS job postings" (Aaron Addison) demands systematic educational reform. Government must integrate spatial reasoning and location intelligence literacy within existing educational frameworks, from primary through tertiary education. Charles Kennelly argues that "Every type of Information Management course should include geo the same way it does for example relational databases or AI; geo is a foundational mechanism for understanding and managing information and one that is lacking in our data science community".

YEAR 2-3: EDUCATIONAL AND SKILLS INVESTMENT CONT.

Department for Innovation, Universities and Skills (DIUS) needs to be mandating geospatial competencies in data science and AI programmes "beyond geography", supporting development of apprenticeship pathways connecting education directly to industry needs, and investing in teacher training to ensure educators can deliver integrated spatial-data science curricula.

STRATEGIC INFRASTRUCTURE INVESTMENT
Building on initiatives like NUAR, the National Infrastructure Spatial Planning Tool and, in Scotland, the AI investment commitment captured in the £750m funding of the University of Edinburgh's supercomputer, government should aim to stimulate development of "frameworks to address data sharing barriers" and "remove blockers to data sharing by embedding security into the project". This includes creating "guidance on how to unlock value from sensitive location data while mitigating security, ethical and privacy risks". As with licensing this is about more than public sector data; as the most interesting (and valuable) thing that can be done with one data set is often done by "somebody else" (for a purpose other than that for which it was collected), data custodians need to find a way to be part of that growing economic cake.

YEAR 3-5: REGULATORY LEADERSHIP AND INTERNATIONAL COORDINATION

CLIMATE AND ENVIRONMENTAL DISCLOSURE MANDATES
With environmental monitoring becoming "a major focus in the next five years" through frameworks like TNFD and TCFD, government should mandate compliance with standardised geospatial reporting requirements across all trading businesses. This positions the UK as a leader in spatial finance while creating domestic market demand for geospatial services.

INTERNATIONAL STANDARDS LEADERSHIP
As the sector shifts from "standards are an ideal" to "interoperability is reality", government should lead development of practical integration protocols that balance innovation with security requirements, data sovereignty and ethical AI governance.

B

INDUSTRY: DELIVERING RESPONSIBLE INNOVATION AT SCALE

YEAR 1-2: INFRASTRUCTURE AND CAPABILITY DEVELOPMENT

BUILD PROVENANCE-AWARE AI SYSTEMS
Industry must address the fundamental challenge that AI processing can "obscure the origins and transformation history of geospatial data". This requires developing architectures that maintain spatial understanding while providing transparency about processing methods, creating metadata frameworks supporting both real-time access and historical analysis, and implementing robust data quality communication mechanisms.

The goal is projecting and amplifying that crucial understanding and therefore trust that geospatial professionals provide of "those little nuances of geospatial data" even as AI automates processing tasks.

DEVELOP SUSTAINABLE ACCESS MODELS
Current pricing structures create barriers where organizations find geospatial data "prohibitively expensive" despite recognizing its value. Industry must develop tiered access models, API-based pricing that scales with usage rather than comprehensive dataset licensing, and targeted products addressing specific vertical market needs rather than one-size-fits-all solutions. This addresses the fundamental challenge of making geospatial capabilities accessible while maintaining sustainable business models.

YEAR 1-2: INFRASTRUCTURE AND CAPABILITY DEVELOPMENT CONT.

INVEST IN HYBRID COLLABORATION MODELS

Develop capabilities for "technical virtual collaborations and sharing of data and tools" while creating effective community engagement mechanisms. "We're never going to unlock (geospatial data value) in isolation. It's kind of a pre-competitive space" (Natwest). Industry must prioritise explainable AI systems with appropriate guardrails rather than pursuing automation for its own sake. Extending partner, alliance and channel models to more effectively embrace the value of location intelligence will mean greater flex to and opportunity for Small Medium Enterprises (SMEs), and likely more M&A and consolidation as geo becomes further embedded in the mainstream.

SPEAK TO VALUE

If this report has said anything about geospatial it is that it is ubiquitous yet somehow under-valued. Lifting the lid on that value has never been a more crucial skill. If we are only half decent advocates then our stories won't land. If we need help, be it from copywriters, marcomms or social media, we must not be afraid to ask.

YEAR 2-3: COLLABORATIVE INNOVATION AND SKILLS DEVELOPMENT

FOSTER CROSS-SECTOR INTEGRATION PLATFORMS

Industry must embrace David Henderson's insight that "our whole is greater than the sum of our parts" through developing platforms enabling integration across climate finance, construction, and insurance sectors. This includes building APIs that embed geographical thinking seamlessly into mainstream business tools, creating industry consortiums addressing shared challenges like climate risk assessment, and investing in collaborative data sharing initiatives.

ADDRESS THE CRITICAL SKILLS GAP

With concerns that "Skills, or the lack of them, will be one of our most limiting factors" (Rachael Dale-Kemp), industry must invest in comprehensive workforce development. This includes sponsoring university programmes delivering graduates with data science and spatial analysis capabilities, creating internal apprenticeship programmes bridging traditional geospatial skills with modern technical requirements, and establishing cross-industry skills development initiatives.

YEAR 3-5: MARKET LEADERSHIP AND ETHICAL INNOVATION

CHAMPION RESPONSIBLE AI DEVELOPMENT

Industry must move beyond technological capability to address ethical implementation. This includes developing "clear governance models and frameworks for ethical data use", ensuring AI systems provide "equally fair outcomes" across all applications, and creating transparency mechanisms that enable users to understand system limitations and confidence levels (without waiting for government mandate or forgiveness).

The goal is ensuring that geospatial professionals "provide the guardrails, guidance and tools to enable trust and collaboration" in AI-driven systems and their place at the table.

ENABLE THE INVISIBLE INFRASTRUCTURE VISION

Industry success ultimately requires achieving Nabil Lodey's vision where "we'll do all the clever stuff and the people that use it aren't geo, they may not even know they are using geo". This demands building systems that seamlessly embed geographical thinking into everyday business processes, creating value through improved decision-making rather than technological complexity, and developing business models that scale with societal impact rather than data volume. That vision needs leaders but it also needs the underpinnings of the wider community of practice.

C

GEOSPATIAL MEMBERSHIP ORGANISATIONS: LEADING PROFESSIONAL EVOLUTION REVOLUTION

YEAR 1-2: IDENTITY AND COMMUNICATION TRANSFORMATION

CHAMPION GEOGRAPHY OVER GEOSPATIAL SPECIALISATION

Our own and other professional bodies would do well to embrace Liz Fox-Tucker's ask that "to make sure those (geo) skills and experiences are embedded into a wide variety of educational pathways". To an extent this means an end to definitional debates about whether "we are geomatics, geospatial engineers, or surveyors" (John Fraser) and focusing collectively on demonstrating and sharing how geographical thinking enhances every profession.

BRIDGE THE COMMUNICATION GAP AND SECTORAL DIVIDES

Addressing the reality that "geospatial has been traditionally not very good at expressing itself, we speak in a certain language, we become almost clannish" (James Kavanagh), professional bodies must develop translation capabilities between geography and other disciplines, create compelling impact narratives that resonate beyond the sector, and establish communication frameworks that demonstrate value through outcomes rather than technical capabilities. AGI and others must leverage their convening power to facilitate collaboration, bringing more collaborators to the table and enabling conversations that solve problems and move actors forward. In doing so we build a bigger more inclusive tent and a wider community of practice.

YEAR 2-3: STANDARDS AND CERTIFICATION MODERNISATION

MODERNISE PROFESSIONAL COMPETENCY FRAMEWORKS

Following CICES's example of introducing "digital competencies allowing membership applicants to demonstrate specific competences in modelling, international standards, information management, and general digital competence" (Marek Suchoki), all professional bodies must more rapidly update certification requirements to reflect current industry demands.

Address and codify practices to address how, as Nicky McGoh puts it, to treat "AI as a junior member of the team; they can only work on the things you give it and the feedback you provide. You need to provide guardrails and protection in the same way you would with a new graduate" into formal competency frameworks.

This includes creating pathways for data scientists seeking geospatial understanding, developing transition programmes for traditional GIS professionals moving to data science roles, and establishing ethical frameworks for AI and data use that go beyond regulatory compliance.

ACT AS NEUTRAL COLLABORATIVE PLATFORMS

Professional organisations must leverage their unique position as David Henderson suggests: "membership organisations, such as AGI, RICS and RGS must work together to bring their communities and their beneficiaries together and, from a neutral place, afford us the opportunity to act together with greater impact and clarity".

YEAR 3-5: SECTOR LEADERSHIP AND FUTURE POSITIONING

ENABLE EVIDENCE-BASED ADVOCACY

Professional bodies must address their struggle to "provide specific examples of the value and benefit of geospatial" by developing current, compelling case study libraries, creating impact measurement frameworks that demonstrate societal value, and establishing regular publication of sector contribution metrics.

FOSTER NEXT-GENERATION WORKFORCE DEVELOPMENT

With Rebecca Firth's observation that "people can be doing 'GIS consultancy' work when they are 13 years old and I don't think we are reflecting this", professional bodies must engage with emerging talent through modernised outreach programmes, partnerships with schools delivering contemporary geographical thinking curricula, and mentorship initiatives connecting experienced professionals with technology innovators.

POSITION FOR THE EMBEDDED FUTURE

Professional organisations must prepare for a world where geography is everywhere but geospatial expertise is invisible. This requires developing frameworks for maintaining professional standards in distributed practice, creating continuous learning programmes that keep members current with technological change, and establishing international relationships sharing best practices for embedded geographical thinking.

CONCLUSION: THE CONVERGENCE IMPERATIVE
ENABLE EVIDENCE-BASED ADVOCACY

The next five years will determine whether the geospatial sector successfully transitions from specialty domain to critical infrastructure enabling better decisions across all sectors. Success requires coordinated action where government creates enabling frameworks, industry delivers accessible and responsible innovation, and professional bodies champion the evolution of geographical thinking.

The transformation is not inevitable—it demands deliberate action, sustained collaboration, and unwavering commitment to foundational principles that make integration possible. As Holger Kessler almost said, "(if) geography is all about the connections, (then) all the systems (need to be) connected". The imperative now is to forge those connections with the urgency and collaboration that the moment demands.

The window for proactive adaptation remains open, but the choice facing each constituency is stark: lead the transformation or watch others absorb geospatial capabilities while traditional institutions are left behind. The evidence is clear, the pathways are defined—the imperative now is coordinated action from the community.

INTERVIEWEE PROFILES

1. AARON ADDISON
Executive Director, World Geospatial Industry Council
Aaron has built a three-decade career spanning practitioner, academic, and industry advocate roles, now leading global industry collaboration through WGIC representing everyone from major brands like Esri and Trimble to specialist startups. He emphasises the need to move from being "mechanics to drivers" in geospatial, advocating for professionals who understand business strategy rather than just technical implementation while warning that top talent is being poached by hedge funds offering $400,000+ salaries.

2. CATHRINE ARMOUR
Director Data Initiatives, TNFD
Environmental science graduate who discovered GIS through chance introduction during early data capture days, building her career through DataView, MapInfo Asia Pacific, and UK Hydrographic Office before joining the Taskforce for Nature-related Financial Disclosures. She focuses on overcoming data access barriers for organisations implementing TNFD frameworks to evaluate their relationship with nature, emphasising the transformational moment when geospatial moved from software focus to data realisation through relational databases.

3. CHARLES KENNELLY
Group CTO, Esri Holdings
A former DJ turned accidental geospatial professional, Charles discovered his calling through an early GIS project and now serves as CTO of Esri's holding group, mentoring to develop geospatial maturity across sectors. He believes AI will fundamentally transform how people interact with geospatial technology, moving from GUI-based tools to conversational interfaces where users simply ask questions, with current data editing approaches becoming "comical" within a decade.

4. DAVID HENDERSON
Chief Geospatial Officer, Ordnance Survey
Son of a geography lecturer and former orienteering competitor, David leads OS strategy with 25 years of geospatial experience and represents the UK at UN-GGIM, with his career-defining moment during the 2001 Foot and Mouth outbreak. He believes geospatial is on the cusp of a "generationally defining transformation" and advocates for "thinking about the bigger picture" - viewing geography as the glue connecting everything with global dependencies.

5. DONNA LYNDSAY
Business Development Director, Map Impact
(at time, now independent)
A 30-year veteran who started as GIS Manager at Exmoor National Park before moving through commercial roles, originally trained as a graphic designer before transitioning to geography and now focusing on climate risk and biodiversity insights. She sees massive untapped potential in collected geospatial data that could be leveraged through machine learning and AI for holistic problem-solving, believing enormous global issues are held back by failure to use existing geospatial tools.

6. ED PARSONS
Digital Geographer and Geospatial Consultant
Self-described "accidental geographer" and former Geospatial Technologist at Google during its rapid geo expansion, plus first CTO in Ordnance Survey's 200-year history, awarded the inaugural Professional Geography Award by RGS in 2024. He sees a gradual shift towards sharing accumulated industry wisdom rather than frontline development work, recognising that while data is fundamental, the ability to simulate using quality data is crucial for unlocking geospatial potential.

7. EMMA HATTON
Head of Geospatial Intelligence, Satellite Applications Catapult
Physics graduate turned space sector professional who started at Defence Science and Technology Laboratory working on radar satellites, now managing a team supporting the UK's space economy growth through geospatial applications. She observes significant changes in data usage understanding and increased awareness of geospatial applications across sectors, focusing on promoting space data integration with other datasets to create comprehensive solutions.

8. HOLGER KESSLER
Stakeholder Engagement, AtkinsRéalis
A connector and collaborator who describes himself as "a little bit like a geospatial dating agency, making introductions and bringing people together," emphasising the interconnected nature of geographic systems. He envisions geospatial professionals as supporters and enablers for specialists in flood mapping, tree preservation, and infrastructure rather than being the "chosen ones," advocating for fundamental interconnected systems thinking.

INTERVIEWEE PROFILES

9. IAN SPENCER
Director, Defence Geographic Centre, UK Ministry of Defence
Geography graduate inspired by his upbringing in the Rhondda Valley where landscape was visibly shaped by human-geographic interaction, joining MOD in 1990 as a graduate trainee and rising to lead foundation geospatial information provision across all domains from seabed to space. He emphasises that defence requires geographic information across multiple domains for situational awareness and planning, advocating for international collaboration with professionals who understand the universal "language of geography" despite different spoken languages.

10. JOHN FRASER
President, Hexagon Geosystems
John leads ground engineering operations with extensive experience in infrastructure and construction applications of geospatial technology, integrating location intelligence into major construction and infrastructure projects. He believes 90% of people interact with geospatial technology daily without realising it and advocates for better communication to younger generations about geospatial's role in gaming, film, media, and exercise applications they already use.

11. MARC FARR
Chief Analytical Officer,
East Kent Hospitals University NHS Foundation Trust
Marc leads large analytical teams compiling healthcare data and chairs the NHS Chief Data and Analytical Officer Network, with background in geodemographics at Experian and healthcare analytics, having founded Beautiful Information before its acquisition. He observes accelerated home working trends and increased computing power availability through cloud and AI applications, noting the rise of open source capabilities and automation enabling more sophisticated healthcare data processing.

12. MARK GIFFIN
GIS Manager, Northern Ireland Electricity Networks
Geology and earth science graduate who moved into GIS through necessity rather than passion, building NIE's GIS capability from a struggling team into a 12-person operation supporting business-wide applications with career highlights including matching 850,000 meter identifiers with property reference numbers. He sees technology combination of software and data availability as the biggest driver alongside GIS becoming a legitimate career path, but warns that GIS success may threaten the profession as non-specialists create maps without understanding underlying data quality.

13. MARK VARLEY
CEO, Addresscloud
Geospatial entrepreneur with 20 years in financial services who founded Addresscloud after recognising limitations in existing geocoding software for insurance applications, building a cloud-first solution recognised as a Top 100 Best Places to Work in UK technology. He had the "penny dropping moment" realising "spatial was not special" - that geo is simply another way of organising data that becomes scalable when broken into manageable chunks through standardisation and cloud-first approaches.

14. MIA DIBE
Senior Data & AI Strategy Consultant, Arup
Architecture graduate turned smart cities and urban analytics expert who discovered her passion at the intersection of space, data and design, evolving from architecture to digital transformation and earning an MIT Technology Review Innovator Under 35 award for AI detection of construction flaws. She observes rapid mainstream adoption of AI and cloud platforms plus convergence of BIM and GIS disciplines, identifying a shift from static GIS to dynamic real-time platforms while planning to focus on nature and climate tech applications.

15. MICK DUNN
Business Development Specialist, Nottingham City Council
Seasoned GIS professional focused on local government applications who experienced his "lightbulb moment" combining GIS with financial sector experience, building Nottingham's GIS capacity from a team of two to twelve before returning as a consultant. He emphasises the evolution from individual departmental GIS users to centralised corporate GIS solutions and focuses on 3D, Digital Twins, and integrated GIS approaches for modern local government service delivery.

16. NABIL LODEY
Managing Director, 1Spatial (UK & Ireland)
Growth-focused CEO who moved from IoT sector in Dallas to geospatial, bringing cross-sector experience and business turnaround expertise to a company offering comprehensive geospatial solutions with the philosophy "there's not a geospatial problem we can't solve." He observes the critical shift from specialist geospatial field to mainstream location-based services, emphasising understanding business challenges first - urgency, impact, and context - before applying geospatial solutions.

INTERVIEWEE PROFILES

17. NICKI MCGOH
Senior Director of Funds and Programs, Caribou
Former management consultant who pivoted to development studies and international development, joining DFID during mobile technology expansion before moving to Global Innovation Fund and now working on understanding how the digital age changes lives and livelihoods. She observes widespread adoption of digital platforms and social media for livelihoods and works to mainstream Earth Observation data use in development finance through partnerships with World Bank and regional development banks.

18. NIKKI SMITH
International Digital Lead, British Geological Survey
Geologist inspired by Mount St Helens eruption in 1980 who combined her love of physical geography with remote sensing and GIS education, joining BGS as a software developer and leading development of the first digital data capture tool used by geological surveys in 80 countries. She promotes digital transformation helping geological survey organisations make data more accessible while providing capacity strengthening for sustainable development, focusing on digital workflows from capture through delivery to maximise value from datasets.

19. PETER BEAUMONT
Director Software Solutions, HR Wallingford
Geography teacher-inspired professional who studied Engineering and Geomorphology before specialising in geospatial technology, working on major projects from Pennsylvania geospatial databases to MapAction humanitarian applications and Satellite Applications Catapult international development work. He warns of political threats to geospatial advancement, particularly US political changes that could impact the global community, while advocating for professionalisation of the industry and emphasising critical importance of data integrity and ethical use.

20. PETER RABLEY
CEO, Open Geospatial Consortium
Self-described "simply a geographer" who studied at University of Michigan and Miami before building and selling multiple geospatial companies, with diverse experience from Silicon Valley investment to developing country spatial data trusts. He believes standards are more important now than 30 years ago and is excited about implementing changes that will impact the global geospatial community through improved standards and data format transitions.

21. PHIL COOPER
Global Business Development Geospatial, Amazon Web Services
25+ year geospatial veteran with Leicester University geography and remote sensing background who has worked through industry transitions from Unix PC to cloud computing, now combining technical expertise with business development for major geospatial projects. He advocates for transitioning from "GIS professional" to "geospatial professional" to reflect industry evolution and promotes cloud adoption for accelerated, cost-effective project delivery while connecting geospatial to the space industry as the "big, sexy, well-funded industry."

22. RACHAEL DALE-KEMP
Geospatial Analyst, DEFRA
Government analyst focused on evidence-based policy decision making through geospatial applications, working on identifying opportunities for AI, ML, and quantum computing integration into civil service operations. She envisions civil service policy becoming more evidence-based with greater confidence and faster action through improved data processing capabilities, while identifying skills gaps as the biggest limiting factor requiring collaboration between education, government, and industry.

23. REBECCA FIRTH
Executive Director, Humanitarian OpenStreetMap Team
Rebecca leads mapping efforts for humanitarian response and development, focusing on community-driven data collection in low and middle-income countries with HOT emphasising locally relevant mapping that reflects how communities actually describe and navigate their environment. She advocates for embracing "messiness" in mapping rather than insisting on consistent, neat data models and envisions HOT supporting local community vendors to provide high-quality, locally-relevant geospatial services rather than imposing external standards.

24. ROB PASCO
Data Scientist, Data Cymru
Physics graduate turned public service data analyst who works with Welsh local government providing statistical and research support across 22 councils, helping coordinate data collection and providing technical advice on GIS and geospatial applications. He observes economic pressures increasing demand for data science while budgets are cut, creating challenges for both specialist and operational staff, and emphasises the importance of supporting operational staff who handle data analysis alongside their primary responsibilities.

INTERVIEWEE PROFILES

25. SUZANNE MCLAUGHLIN
Chief Survey Officer & Director of Mapping, Ordnance Survey Northern Ireland
Environmental Science graduate who discovered GIS through developing a coastal vulnerability index for Northern Ireland, learning command-prompt GIS from scratch before becoming the first female Chief Survey Officer in Northern Ireland, leading 190 people creating and disseminating geospatial data. She observes the dramatic evolution from command-based GIS to web-based interfaces while recognising AI's potential for data processing, aiming to embed higher-level strategic geospatial in every government department while continuing to pave the way for female senior executives.

26. TRACIE CALLAGHAN
Climate Data Innovation Lead, Banking Sector (Natwest)
Career-long banking professional who came to geospatial later through climate data initiatives, leading internal consultancy supporting business units with climate challenges as her bank aims to halve emissions by 2030 using geospatial data. She identifies high data costs, customer engagement challenges, and regulatory barriers as key obstacles to geospatial adoption in financial services, advocating for policy changes and better data access while emphasising collaboration between geospatial and finance sectors.

27. WILL CADELL
Founder and CEO, Sparkgeo
Engineering and remote sensing background professional who founded Sparkgeo to help organizations "make the most of location and strategic application of geospatial technology," operating a 40-person company across Canada, North America, and the UK. He identifies five complementary assets (cloud, smart devices, smart space, AI, open source) that have evolved independently but offer untapped collaborative potential, believing geospatial hasn't fully exploited these opportunities and lacks a dominant design for consuming vast data amounts.

28. VARIOUS PROFESSIONAL BODY REPRESENTATIVES
Multiple interviews with representatives from RICS, CICES, RGS, and BCS reveal shared perspectives on industry development and skills evolution, with James Kavanagh emphasising "softer skills," Marek Suchocki advocating for virtual collaboration tools, Liz Fox-Tucker focusing on broader data skills, and Paul Naylor leading evolution from traditional mapping to data visualisation. They emphasise the need for diversity and evolution to avoid stagnation while maintaining relevance, with skills development expanding beyond traditional GI capabilities to include broader data science, communication, and business development competencies as collaboration between professional bodies increases.

29. MULTIPLE FOCUS GROUP PARTICIPANTS
AGI hosted informal focus group discussion sessions at the Ordnance Survey Innovation Festival 2025. These captured diverse industry perspectives on geospatial drivers and disruptors, with participants discussing AI, political changes, cybersecurity, and business model impacts. They see AI emerging as both major opportunity and potential threat with significant investment expected but uncertain returns, while political changes affecting defence spending and cybersecurity concerns around critical data infrastructure will increasingly influence geospatial system design.

30. CHRISTIN WALTER
Co-Editor
A strategic intelligence practitioner specialising in strategic foresight, strategy, and policy, with over a decade of experience in the geospatial industry. She has contributed to projects for the European Commission, UN-GGIM, and national mapping agencies, leveraging her expertise in trend analysis, systems thinking, and futures techniques. She identifies quantum computing, trust and ethics, and the convergence of GIS and data science as the key drivers shaping the decade ahead.

31. JAMES CUTLER
Co-Editor
Proven CEO, digital leader and domain expert with specific skills in digital strategy, location intelligence, DaaS/SaaS, product development, partnering, B2B, and in the SME lifecycle from foundation to exit. Previously founder of emapsite and GISL, also previously Vice-Chair, AGI and currently on board of RGS Enterprises and OpenActive Steering Committee. Lifetime digital geographer bringing that perspective to the synthesis of the words and wisdom of our interviewees.

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FORESIGHT QUESTIONNAIRE

The initial stage of the AGI Foresight Project was a wide-reaching questionnaire survey aimed at identifying the biggest themes, influences and developments, that will impact geospatial to 2030. The online survey was open during February and March 2025 and promoted via direct member communications, LinkedIn posts, a trade media press release, at AGI events, including GeoCom, and via third party promotion including other membership organisations and AGI Associate and Partner members.

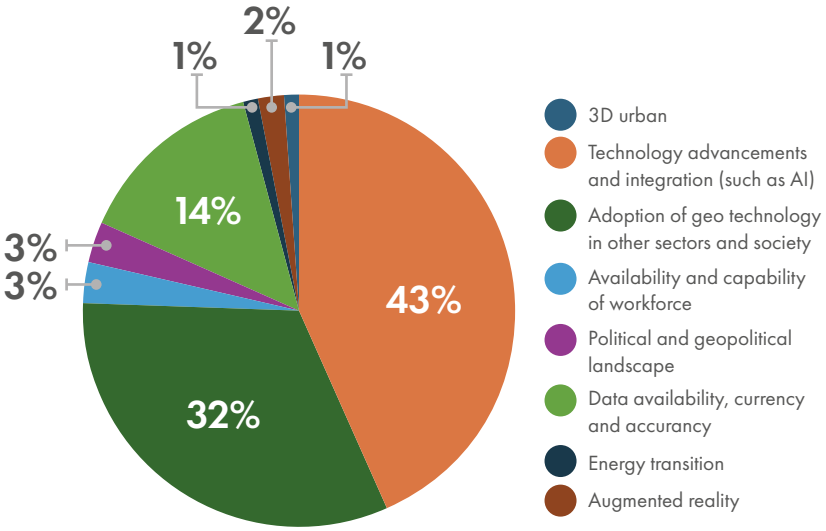
The survey received 92 responses from individuals representing companies such as Thames Water, The Crown Estate, Ramboll, Carter Jonas LLP, Newcastle University, Landmark Information, Norwegian Environment Agency, GeoData Institute, Ministry of Agriculture and Forestry, and Foresty England.

Initial analysis of the results showed that 38% of respondents felt that open data and technology had had the biggest impact in the last decade, with just 9% citing BIM and Future Cities. When considering the opportunities available for the sector, 50% believed that Technology Advancements and Integration, was the most important, with 3% backing the Availability and Capability of the Workforce. Asked to consider how these opportunities could be maximized, common themes included; training and education, data, emerging technologies, and application in other sectors and collaboration.

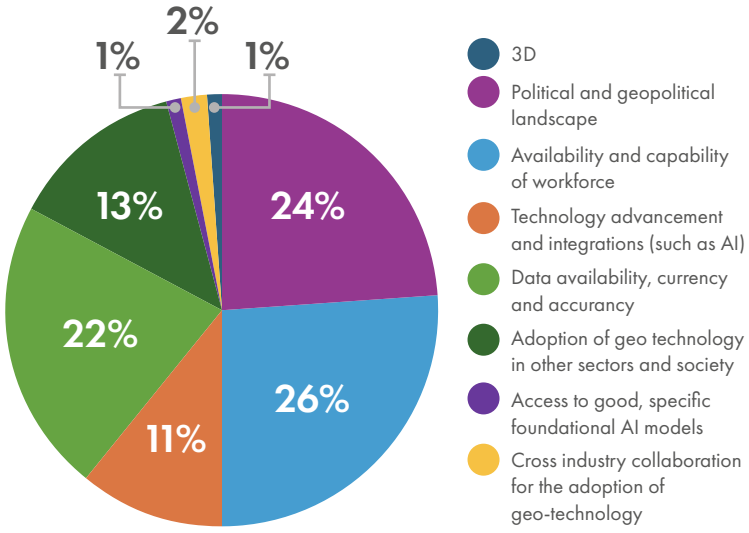
Asked about the challenges faced by the sector 27% felt the availability and capability of the workforce was the biggest, whilst 12% felt that it was the adoption of geotechnology in other sectors and society. Key issues in overcoming these challenges included data, communication and language, and new technologies. Looking at emerging trends for the period to 2030, AI and ML was ranked most important with Biotechnology lowest, and the biggest influence on the sector was also felt to be AI. Finally, the survey asked about trends that will influence geospatial over the next five years and topics that emerged included data, technology, integration and collaboration.

Detailed results of the survey will be published by AGI in a separate supplementary report document.

WHAT ARE THE BIGGEST OPPORTUNITIES FOR THE GEOGRAPHIC INFORMATION INDUSTRY OVER THE NEXT 5 YEARS?



LOOKING FORWARD, WHICH OF THE FOLLOWING DO YOU SEE AS THE BIGGEST CHALLENGE TO THE GEOGRAPHIC INFORMATION SECTOR DURING THE NEXT 5 YEARS?




AI