ISPRA Istituto Superiore per la Protezione e la Ricerca Ambientale | Sistema Nazionale per la Protezione dell'Ambiente | UN environment programme | SCIENCE POLICY BUSINESS FORUM | DATA FOR THE ENVIRONMENT ALLIANCE D E A L | co-hosted by esa → THE EUROPEAN SPACE AGENCY

Third High-Level Expert Group on Big Data and Frontier Technologies for the Planet

Towards a Big Data Revolution for the Planet:
From Uncertainty to Opportunity

Frascati, Italy | 8–10 July 2025

Third High-Level Expert Group on Big Data and Frontier Technologies for the Planet | 8-10 July 2025 | Frascati, Italy

From 8 to 10 July 2025, over 100 experts gathered in Frascati, Italy, for the Third Meeting of the High-Level Expert Group on Big Data and Frontier Technologies for the Planet. Convened by the United Nations Science-Policy-Business Forum on the Environment (UN-SPBF) and the Data for the Environment Alliance (DEAL), and co-hosted by the Italian Institute for Environmental Protection and Research (ISPRA) and the European Space Agency (ESA), the meeting advanced the DEAL process and the ongoing development of the UN Global Environmental Data Strategy (GEDS), to be presented at UNEA-7 in December 2025.

Building on the momentum and insights of the Second Expert Group meeting held in Vienna in September 2023, the Frascati gathering focused on refining draft Frascati Principles and identifying concrete pathways for a more inclusive, trusted, and interoperable global data ecosystem. Under the theme Towards a Big Data Revolution for the Planet: From Uncertainty to Opportunity, participants worked across sectors to explore how frontier technologies and new governance models can support environmental action, green investment, and structural transformation.

8th July 2025

CONTEXT AND VISION

Speaking on behalf of the Executive Secretary of the UN Science-Policy-Business Forum on the Environment Shereen Zorba, Charles Arden-Clarke, Chair of the Third High Level Expert Group called for rethinking systems and reimagining how to live more equitably, especially given the increasingly unpredictable world and unprecedented strains in our ecological systems. He highlighted the UN-SPBF as a unique space for knowledge-sharing, and drew attention to the meeting's aim to develop foundational principles and pathways to guide the development of high-integrity environmental data systems.

Inge Jonckheere, Head of the Green Solutions Division, European Space Agency (ESA), presented on the history and activities of ESA and the European Space Research Institute (ESRIN), highlighting Copernicus as the world's largest producer of earth observation data and ESA's exclusively peaceful purpose. She drew attention to the fact that all global landmass is observed every five days at a resolution of 10 meters by ESA's Sentinel missions, and that all that resulting data is freely and openly available to anybody in the world.

Charles Arden-Clarke
Chair of the High Level Expert Group

Inge Jonckheere
Head of the Green Solutions Division, ESA

"All global landmass is observed every five days at a resolution of 10 meters by ESA's Sentinel missions."

Maria Siclari, Director General of the Italian National Institute for Environmental Protection and Research (ISPRA), elaborated on ISPRA's reporting activities and its focus on knowledge for decision makers. She pointed to the release in 2025 of three major environmental reports, including on indicators and analysis, and on Italy's national environmental protection system, as well as ISPRA's contributions to the Mediterranean Action Plan.

Giusy Lombardi, Head of division, International activities and global environmental policies for the protection of biodiversity and the sea, Italian Ministry of Environment and Energy Security, welcomed the UN-SPBF's initiative, especially in a context where multilateral cooperation is more than needed. She stressed the importance of strategies addressing data access and advances in integrated data management.

Maria Siclari
Director General, ISPRA | **Video Message**

Giusy Lombardi
Head of Division, Italian Ministry of Environment and Energy Security

Pavan Sukhdev, Principal Architect of the UN Green Economy Agenda, Founder & CEO, GIST Impact, delivered the keynote presentation, stressing that sustainability is a journey and, as such, requires knowing where you are, where you want to go, and the direction of travel – all for which data is absolutely essential. He emphasized the private sector's current resource allocation as responsible for us being "off-track" on the journey towards sustainability, and underscored the role of regulation in moving in the right direction. Sukhdev described today's data landscape as fragmented, opaque, inaccessible, and characterized by data gaps, inconsistent metrics, and weak quality assurance and quality control. Still, he noted increased recognition by leading investors of the value of forward-looking sustainability data, and pointed to Norway's pension fund investments as an example of climate-risk-based divestments delivering meaningful environmental and financial impacts. He also underscored the role of Artificial Intelligence (AI) in integrating financial, scientific, and sustainability data, but cautioned that AI can only perform reliably with a robust data backbone, calling for an "AI-human partnership."

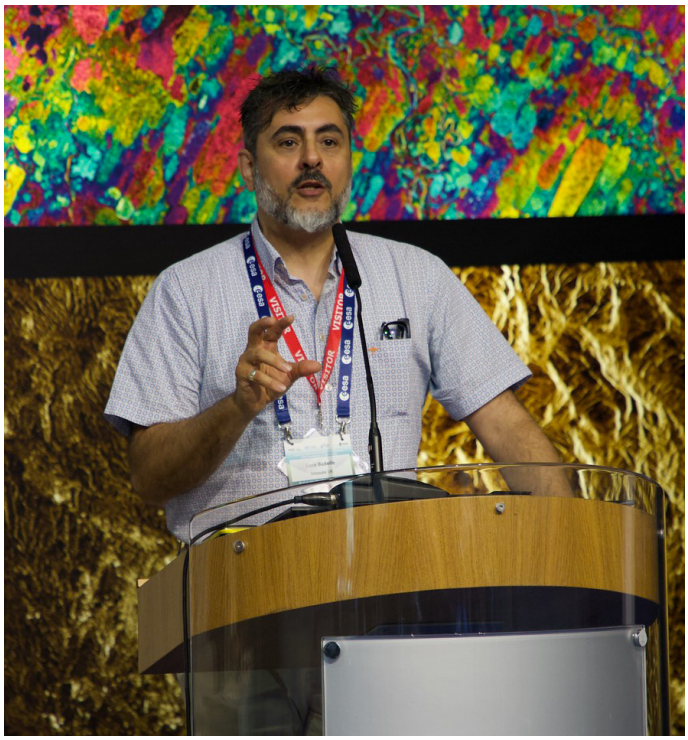
In the ensuing discussion, the group addressed the pushback from the political establishment and vested interests given a lack of pull from policy regulation, with Sukhdev pointing out that "today's externalities are tomorrow's risks and the day-after-tomorrow's losses." It was also widely acknowledged that verifiable data is key, but this brought up the question on fitness-for-purpose, and the need to address links and causes behind observed data. On a remark from the floor noting a good understanding of risks but not of opportunities, panellists pointed to innovations in regenerative farming and agriculture addressing emissions and biodiversity.

Pavan Sukhdev, Founder & CEO, GIST Impact

FROM SILOES TO SYSTEMS

Luca Budello, Geospatial Lead at Innovate UK, argued that the interconnection between natural and human systems is not adequately reflected in current data and policy approaches. He criticized the dominant focus on siloed project outputs rather than on outcomes that generate shared value for stakeholders, including the environment. Drawing from the example of the UK's National Underground Asset Register, Budello described how public and private utilities collaborated to co-design a federated digital system that enables predictive maintenance and shared infrastructure planning. This initiative, based on data licensing rather than rigid standards, demonstrates the power of systems thinking to unlock value without mandating openness. He called for a shift in mindset toward system innovation, where relationships and flows of value are prioritized over isolated outputs. To this end, Budello suggested data licenses as tools to shift behavior among data owners, and provocatively proposed the need for a "Ministry of Holistic Thinking" to institutionalize systemic approaches.

"A shift in mindset toward system innovation"



Luca Budello
Geospatial Lead, Innovate UK

Matthew Ross, Founder of Indoeden and Advisor to Blue Green Future, drew from his personal journey from financial markets to farming to highlight two overlooked systemic risks - what he called environmental "black swans." The first is "biosenescence," the natural decay of key agricultural commodities such as cacao, coffee, citrus, and coconut, which he argues is missing from global accounting frameworks. The second is demographic decline in the agricultural workforce, particularly in the Global South, where aging farmers and rapid rural-urban migration are leaving entire sectors without a next generation. Ross urged that nature be treated not just as a resource, but as infrastructure, with biosenescence fully integrated into accounting systems. Despite the gravity of these issues, he framed his talk as one of hope, emphasizing the transformative potential of agriculture - particularly when supported by AI and systemic thinking - to regenerate ecosystems and reshape global economics. He predicted that a Natural Wealth Index may one day replace GDP.

Answering questions from the audience, Ross clarified that biosenescence is not directly caused by climate change, but is intensified by deforestation and poverty, which lead farmers to adopt unsustainable practices like charcoal production. Budello highlighted the importance of improving the accuracy of local data to enable a connected "global system of systems," emphasizing interoperability and co-designed infrastructure as key next steps. Presenting Microsoft's Playing for the Planet Alliance.

Matthew Ross
Founder, Indoeden & Advisor, Blue Green Future

Trista Patterson
Director of Gaming Sustainability, Microsoft

Trista Patterson, Director of Gaming Sustainability, Microsoft, highlighted the potential for gaming for sustainability and youth engagement, saying that "not everyone can do everything but everyone can do something." She also drew attention to what is left out: the crisis in documenting the provenance of materials and traceability throughout their life spans; and the crisis in proper signalling and pricing at all levels, from household to corporations and countries.

"Investors are no longer satisfied with estimates; they demand raw, verifiable data."

Marie Luchet
Chief Sustainability Officer, AXA Investment Management

Marie Luchet, Chief Sustainability Officer, AXA Investment Management, spoke about the path to greater green capital flows and the case for verifiable, comparable sustainability disclosure. Noting the multitude of options available to companies and lack of clarity for reporting, including different interpretations of key concepts, she called for simpler, better articulated tools for sustainable investments. Luchet also highlighted certain trends, such as investors being "more sustainability-data hungry," increased interest in raw data, and a refusal to rely on estimates. She urged that the scope of the Corporate Sustainability Reporting Directive (CSRD) not be reduced and to ensure that smaller and non-state companies are included in disclosure requirements. She also emphasized double materiality, which addresses both risks and opportunities from both an inside-out and an outside-in perspective, as a key concept.

In the ensuing discussion, participants brought up the massive investment and energy needs of AI and what leadership looks like in the tech sector, as well as engagement with the investor community and disconnect with regulators. On a question on relevant data points, Patterson pointed to bias in the systems' training towards a "winner takes all mentality" and the tragedy of the commons set-up, adding that "the only relevant data point is whether the model adequately acknowledges the collective benefit."

EARTH OBSERVATIONS IN ACTION

Inge Jonckheere, Head of Green Solutions at the European Space Agency (ESA), introduced Earth Action, a new pillar within ESA's flagship FutureEO programme, which also includes Φ-Lab and EO4Society. Earth Action, she said, is designed to respond to the triple crisis of climate change, biodiversity loss and pollution by providing actionable information products rather than just raw data. Jonckheere emphasized that continuity in Earth Observation (EO), data - via long-term time series and climate variables - is essential for science-based policymaking and European industrial competitiveness.

ESA, which operates in three-year cycles, will hold its next Ministerial Council in Bremen this November to define future priorities. She also announced that BIGS - Big Data from Space 2025 will take place in Riga, Latvia, in fall 2025. ESA's approach, she stressed, is rooted in co-design with end users to ensure that data and innovation respond directly to operational and policy needs.

Nicolaus Hanowski, Head of Mission Management, ESA, said that EO accounts for about 33% of ESA's budget, representing the only domain where Europe holds undisputed global leadership. Through Copernicus, he added, Europe operates the world's largest EO data system, distributing around 500 terabytes of Sentinel data daily to more than one million registered users. He outlined the major paradigm shift from targeted, largely visual observations to comprehensive, global, multi-sensor data collection, which now includes imagery, radar, chemical, and atmospheric measurements. Hanowski emphasized ESA's open-access policy and long-term data stewardship as fundamental to its leadership. He also introduced Destination Earth (DestinE), a major initiative to create a digital twin of the planet capable of predicting extreme events. This project combines EO data with Earth system models and artificial intelligence, supported by high-performance computing infrastructure, including a newly inaugurated ESA supercomputer.

Inge Jonckheere
Head of the Green Solutions Division, ESA

Nicolaus Hanowski
Head of Mission Management, ESA

Marie-Christine Delucq, Geospatial Solutions Manager at Airbus Defence and Space, highlighted how the private sector is harnessing EO data for a range of applications, from deforestation monitoring for global supply chains to wildfire detection and agroecological planning. Delucq described how Airbus integrates high-resolution satellite imagery (e.g. from Sentinel and Pléiades Neo) with AI-based analytics to derive key environmental metrics such as tree height and canopy size, critical for assessing biomass and carbon sequestration. She also highlighted Airbus's partnership with the UN through a multi-mission service contract that federates access to data across satellites and missions via a single interface. This framework accelerates uptake among end users, she explained, who are viewed as market enablers rather than passive recipients. Airbus's Campus of EO Applications, developed with UN partners, supports this goal by offering integrated tools to enable real-world decision-making from EO data.

In answer to questions from the audience, which highlighted both the growing use and ongoing underutilization of Earth Observation data, speakers emphasized the importance of making data accessible in the right format and context, often through integration with local or ground-based information. Questions were raised about gaps in coverage, particularly in the open ocean and for specific SDG reporting needs, as well as about the development of predictive digital twin tools for extreme weather events. There was strong interest from sectors like finance, which are increasingly seeking EO data to manage risk and support decision-making.

> "The private sector is harnessing EO data for a range of applications from deforestation monitoring for global supply chains to wildfire detection and agroecological planning."

Marie-Christine Delucq
Geospatial Solutions Manager at Airbus Defence and Space

RAPID-FIRE PANEL DISCUSSION

Order Out of Chaos: Data Harmonization & Standards.

Can We Bridge the Environmental–Economic–Social-Financial Divide?

This session was moderated by Arne Bathke, Professor at the University of Salzburg.

Noting that oil and gas companies emit “orders of magnitude more” methane than they report, Antoine Halff, Co-founder & Chief Analyst of Kayrros, stressed the need to enhance trust by: continuing to demonstrate the reliability of satellite-derived data with cross-measurements; better understanding the limitations of science; and updating and educating on reporting requirements and regulations. Saying that policies are often not optimal in incentivizing and embracing transparency, Halff suggested prioritizing policy targets, for instance focusing on and outlawing methane “super emitters,” since these emissions are an avoidable accident of production and “if you can see it, it’s too big.” On standardization, Halff opined that “no one size fits all” given problems with aggregation of measurements. He pointed to the case of forestry data for nature-based solutions as an example, noting that while many things can be measured, it is very hard to translate those measurements into project ratings.

Annalisa Minelli, Knowledge Manager, ISPRA-INFO-RAC, highlighted cultural barriers and the need for data management cooperation, noting that the integration of data, information and knowledge requires major efforts at the policy level and public funding. She pointed to ISPRA's INFOR-RAC's work on interoperability for effective data governance in the Mediterranean as an example of work at the regional level leading to global goods. Minelli called for a user-centric approach to ensure data is used, and said standards can help uptake.

Annalisa Minelli
Knowledge Manager, ISPRA-INFO-RAC

Jan Bliki, Group leader in GIS and data flows, European Environment Agency (EEA), underscored the advantage of AI in reducing manual effort and the need for data enrichment by combining data from different sources and sectors. Noting that data users come from different backgrounds and have their own standards, Bilki emphasized the importance of: simple, trustworthy, and relatable data; raising responsibilities within sectors to ensure standards are transformable, possibly through AI tools; and finding connections. He expressed trust in AI scripting data and making it open, and pointed to the relevance of standards for AI large language models given the potential for increased transparency.

Jan Bliki
Group leader in GIS and data flows, European Environment Agency (EEA)

The discussion continued with participants further addressing the role of standards and taxonomy, and the importance of shared vocabularies, essential to link data and information.

They also touched upon the challenge of making space for competition and innovation allowing for tomorrow's technology, and pondered whether it is easier to produce AI than to counteract it.

Pavan Sukhdev commented that his "vision of hell" is the equation of sovereignty with "the right to lie." In response, Halff stressed the importance of satellite observations and the need for redundancy in the system, ensuring multiple sources of data exist for monitoring purposes and avoiding dependency. Halff added that, when it comes to environmental data, "there is no claim to controlling the narrative."

> "Simple, trustworthy, and relatable data"

Environmental Data For Sustainable Development Goals (SDGs) & The Global Digital Compact

Federico Fierli, Environmental Observations Policy Expert at the European Commission's Directorate-General for Research and Innovation, outlined how the digital transition is a top policy priority at the EU level. He emphasized that Earth observation has scaled dramatically in recent years, with over 150 satellites now operating in the European ecosystem.

Programs such as Copernicus, which combines satellite infrastructure with six operational services, play a foundational role in generating climate-relevant insights. Fierli also highlighted DestinE, the forthcoming digital twin of the Earth system aimed at providing tailored services down to the local level, underscoring the need for replicable, scalable solutions.

He contextualized these efforts within the broader European Strategy for Data, which aims to foster the availability and interoperability of data under fair, transparent conditions. Fierli identified key challenges: improving awareness and access to EO data, ensuring trustworthiness and usability, and designing systems that combine innovation with replicability and policy relevance.

Federico Fierli
Environmental Observations Policy Expert, European Commission

Juliano Seabra
Chief of the Innovation & Creativity Division, Inter American Development Bank

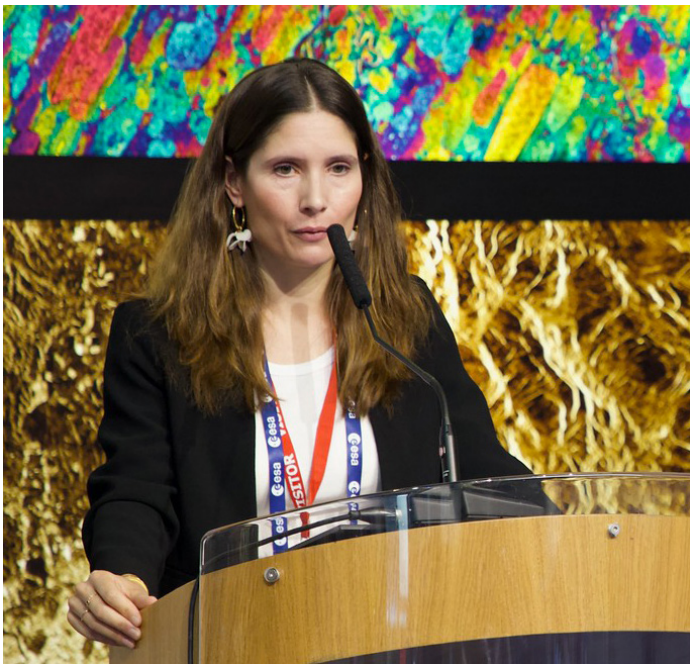
Rula Qalyoubi
Science-Policy Sub-programme Coordinator, UNEP

In a joint presentation, Louise Kessler, Program Director at I4CE, and Angela Picciariello, Senior Researcher at IISD, introduced the G20 Sustainable Finance Accountability Framework, which seeks to accelerate financial alignment with climate goals under Article 2.1(c) of the Paris Agreement.

They pointed to a persistent gap between climate ambition and financing implementation, noting that most countries know what to do, but lack the funding mechanisms to do it. The current focus, including under the "Baku to Belém Roadmap," is on scaling up financing ahead of COP30.

Their framework seeks to track national progress by developing robust, transparent indicators across three levels: commitments, operationalization (such as fiscal, monetary, and financial policy instruments), and outcomes (e.g., actual public and private capital flows).

They stressed the importance of national-level accountability and engaging stakeholders through working papers, peer reviews, and open data partnerships.



Louise Kessler
Program Director, I4CE

Ahmed Elagali, Principal Data Scientist at the Minderoo Foundation, presented Global Plastic Watch, a satellite-based monitoring platform that uses ESA's Sentinel-2 imagery and advanced AI techniques to detect plastic waste sites around the world. Over 4,000 waste hotspots have been identified across 112 countries, with many located within 200 meters of waterways.

The platform is open-source and designed to support local decision-making and regulatory action. Elagali also discussed how AI can be used to investigate the synergistic toxicity of plastic additives and chemical mixtures, helping identify emerging health risks.

Drawing a parallel with the Montreal Protocol that successfully addressed CFCs and ozone depletion, he argued that a similarly ambitious and globally coordinated approach is now needed to tackle plastic pollution under the UN Plastics Treaty (INC-5.2 negotiations).

"Over 4,000 plastic waste hotspots have been identified across 112 countries"

Ahmed Elagali
Principal Data Scientist, Minderoo Foundation

Introducing
The UN Global Environmental Data Strategy (GEDS)

Stefania Minestrini
Head, International Affairs, ISPRA

Polina Koroleva
GEDS Lead, UNEP

Stefania Minestrini, Head, International Affairs, ISPRA, introduced the GEDS, emphasizing the need to cover knowledge gaps and improve the data ecosystem.

Polina Koroleva, GEDS Lead, UNEP, presented the GEDS vision, its development, and its five pillars, namely: governance, data quality, interoperability, access and affordability, and capacity building. She highlighted capacity building as a key enabler and went through the GEDS priorities:

1. Developing national environmental data strategies and policies;
2. Strengthening environmental data quality and trust frameworks;
3. Coherent science for consistent environmental data collection;
4. Harmonizing interoperability standards for environmental data;
5. Ensuring consistent and credible product sustainability disclosure;
6. Delivering federated access to environmental data;
7. Guaranteeing equitable access to essential environmental data;
8. Building needed capacities – human, institutional and technical;
9. Enabling uptake of GEDS at country level.

Plenary Synthesis - Deep-dive One

During the first breakout sessions, participants were divided into six thematic groups and asked to conduct a so-called SWOT analysis of the proposed GEDS, namely assessing its strengths, weaknesses, opportunities, and threats in relation to their assigned theme.

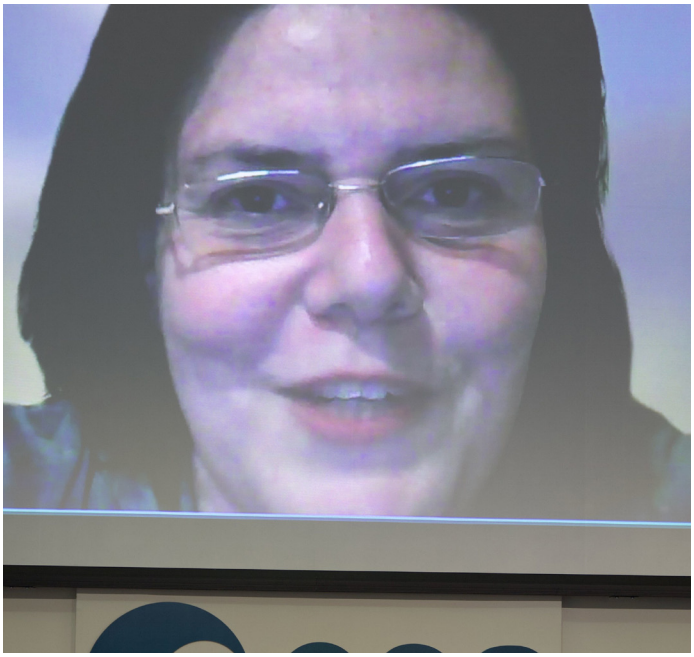
The thematic groups included governance, quality, interoperability, technology and innovation, access and capacity, and emerging issues.

Building on this analysis, each group was then tasked with proposing a set of draft “Frascati Principles” intended not only to inform the development of GEDS, but to articulate broader values and orientations that can guide efforts to build more inclusive, trustworthy, and interoperable environmental data systems.

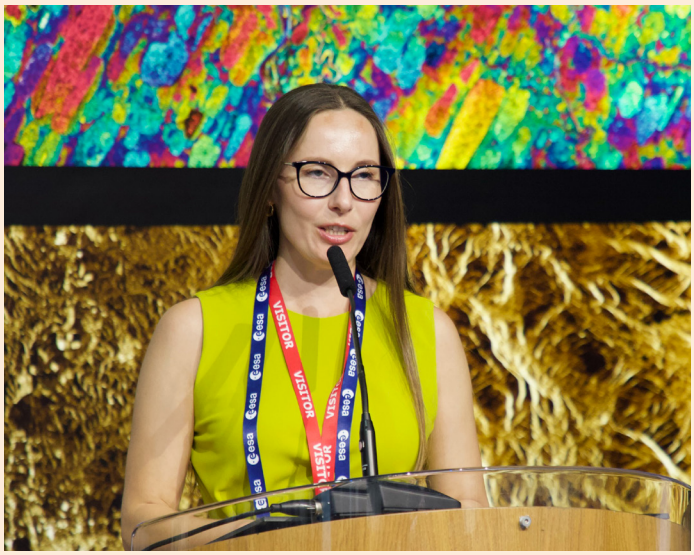
GEDS Structured Analysis & Critical Review

In response to reports from the breakout group rapporteurs, Sally Radwan, Chief Digital Officer, UNEP, provided a rationale for some of the choices made in the GEDS. She explained that the GEDS is purposely generic to avoid pushback from some Member States, but stressed that concrete use cases will be essential during implementation, particularly via tools such as UNEP's World Environment Situation Room. She supported the call for greater support to decision makers through capacity building and clearer prioritization of recommendations. She agreed that the UN cannot implement the strategy alone and emphasized the need for engagement from the private sector, Member States, and the broader data ecosystem. She also acknowledged that financing models are an important and underdeveloped area, and expressed willingness to conduct "deep dives" with interested experts.

On AI, she highlighted that quality data is a prerequisite and that human oversight must remain central to classification and validation processes, and she welcomed the emphasis on inclusion of marginalized communities alongside a practical, expert-led approach to standard-setting.

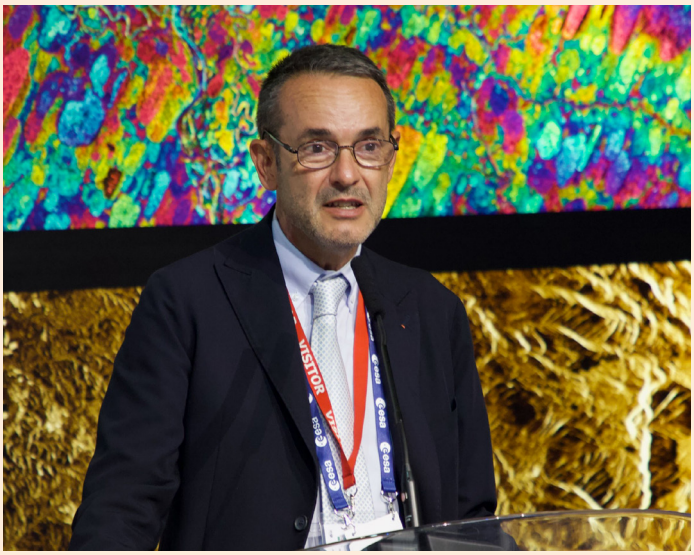


Sally Radwan
Chief Digital Officer, UNEP



Kätlin Weinzierl
Senior Advisor, Ministry of Climate, Estonia / DEAL

Reflecting on the day's proceedings, Kätlin Weinzierl, Senior Advisor, Ministry of Climate, Estonia, recounted the launching of the Data for the Environment Alliance (DEAL), a Member States-led, multi-stakeholder platform to drive environmental data development and sharing. She pointed to Estonia's leading role in data and digital transformation, and underscored the need for GEDS to be actionable and result in capacity building projects for better data governance.



Stefano Laporta
President, Italian Institute for Environmental Protection and Research(ISPRA)

Stefano Laporta, ISPRA President, highlighted key messages from the discussions, including the need for: reconciling data at different levels; reporting strategies to reach as many people as possible; satellite data interpretation, including social and economic aspects; and private sector engagement. He also emphasized the role of citizen science in complementing and advancing the democratization of data processes, adding that stakeholder consultation is essential.

9th July 2025

Recap of Deep Dive Synthesis & Recommendations – Path Towards the Frascati Principles

Rapporteur Martin Brocklehurst, Chair of the Global Alliance for Citizen Science, presented the draft Frascati principles derived from the previous day groups' discussions. These spoke to, inter alia, long-term partnerships between developers and users; transparent, flexible and modular structures to allow for growth; simple and easy-to-use systems to ensure uptake; prioritizing equity and inclusivity; standards and harmonization; and opening up new public-private partnership opportunities.

In comments from the floor, participants also stressed the importance of: including the investment, financial and private sector; AI usage and data for training a trustable AI; standards and interoperability being built by the user and data providers; supporting data providers to adhere to data standards of quality; strengthening the link between the collection of data and information to policy and decision-making; and licensing systems to bring in private data owners and encourage innovation.

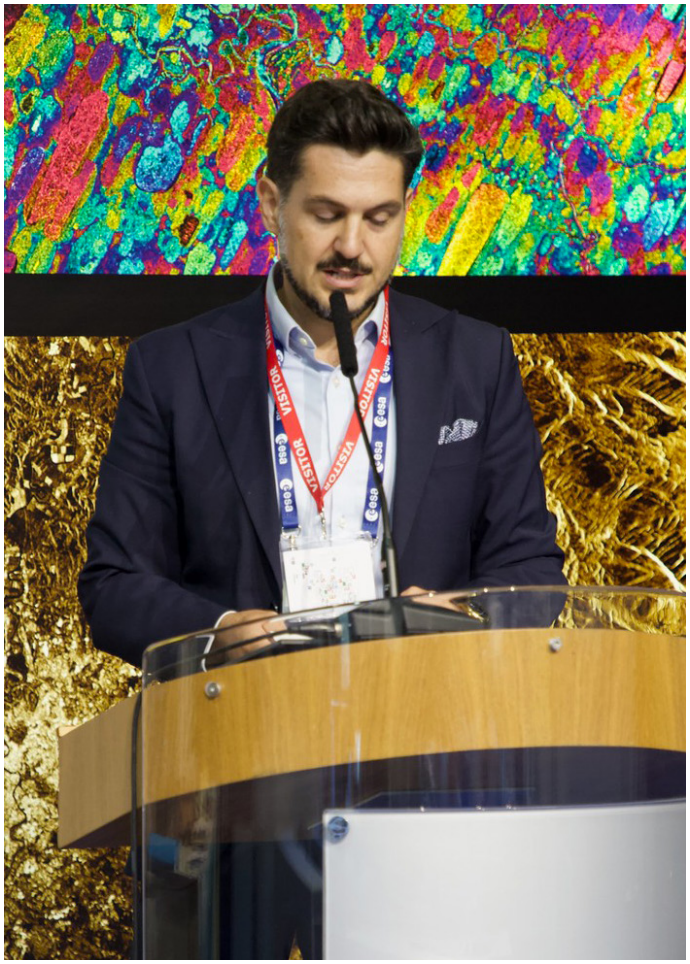
Martin Brocklehurst
Chair of the Global Alliance for Citizen Science

Investor-centric Data For Capital Allocation, Risk Assessment, and Measuring Impact:

The Case For High-integrity Comparable Data And Integrated Approaches

Levent Ergin, Chief Climate, Sustainability & Gen AI Strategist, Global Head of ESG Partnerships, Informatica, called for starting with the recognition that "the health of the markets and of the planet is inseparable." He urged a shift of focus from compliance to business value. The challenge, he said, is that models lack granularity to show how exposed banks and the financial sector are, which is partly to do with disclosure and compliance failures. Ergin cautioned against risks resulting from the recent simplification of the EU's CSRD, and underscored the need to "give capital better tools," standardizing and aligning data disclosure with corporate value. As a practical roadmap rooted in collaboration and focused on clarity, he proposed: asking investors what data they really need; mapping it against current regulations; gathering data from verified sources; having a voluntary standard to align disclosures to value; and operationalizing it, including possibly via a global data utility. Ergin also called for creating a data expert group with investor input and Environmental, Social and Governance (ESG) ratings providers to design a way to harmonize and collect data gaps and update as needed.

"The health of the markets and of the planet is inseparable"



Levent Ergin
Chief Climate, Sustainability & Gen AI Strategist, Informatica

Morgan Williams, Head of SI Data Engineering & Strategy at Robeco, reflected on how investors engage with environmental data, stressing that this has been a process of evolution rather than disruption.

ESG barely existed in 2004, he said, but today core concepts like Scope 1, 2, and 3 are widely known, and the investment community is prepared to keep evolving. He cautioned against over-standardization, noting that so-called universal standards often add complexity rather than clarity, and highlighted the need to translate between standards rather than impose new ones. Investors, he added, are already skilled at navigating institutional complexity and are learning to apply this within sustainability.

Based on Robeco's climate survey, he observed growing investor engagement in Asia and Europe, but flagged continued uncertainty due to shifting regulation. Williams outlined three principles for improving the use of environmental data: first, metrics must be clear, reliable, and science-based, grounded in peer-reviewed research; second, data should help identify investment opportunities, not just mitigate risk - very few adaptation-focused equities exist today, for example; and third, data must be decision-useful, shaped in dialogue with investors to reflect how decisions are actually made.

Morgan Williams
Head of SI Data Engineering & Strategy at Robeco

Tim Nixon, Managing Director, Signal Climate Analytics, presented on new data science uncovering material sustainability risks for investors and regulators.

He explained that, based on an analysis of a pool of regulatory filings and corporate risk disclosure requirements and their links with climate and sustainability-related risks, climate risk is recognized by companies themselves as a material financial risk. Nixon also noted that while disclosure generally does affect company value, it can do so positively, with sustainability investment often leading to substantial outperforming.

"Sustainable investment often leads to substantial outperforming."

Tim Nixon
Managing Director, Signal Climate Analytics

Nataliya Tkachenko, AI for Sustainability - Strategy Lead, Lloyds Banking, presented on quality assurance frameworks for GEO-foundation models in private finance She noted pros and cons of these GEO-foundation models, with pros including fast access to environmental indicators, scale, easy / low-code adaptation, and standardization of ESG evidence, while cons include attribution uncertainty, opacity / black boxes, data mismatches, and spatial and temporal drifts. Tkachenko cautioned that GEO-foundational models are highly concentrated by the big four tech companies (namely IBM, Google, Microsoft, and NVIDIA). They also lack full disclosure of input data-sets, finance-grade audit trails, and domain-specific validation. Still, she said, financial institutions will seek to use them to: act as a uniform curator of the balanced training data for future global models; host standardized regional datasets for fine-tuning; provide standardized confidence metrics and finance-specific benchmarks; provide interpretability tools; and maintain regulatory-aligned documentation.

An ensuing discussion highlighted the evolving but fragmented use of sustainability data in investment. Speakers emphasized the importance of integrating social factors and respecting communities, not only for ethical reasons but because they affect economic risk and social license to operate. Participants noted gaps in social data and the mismatch between ESG claims and legally mandated disclosures, raising concerns about compliance fatigue. There was debate over how to reconcile short-term financial performance with long-term climate goals, especially as high-emitting firms often outperform in the short run. While third-party data is widely used, many stressed the importance of corporate disclosures and the need for cross-sector forums to harmonize fragmented data systems. “No data is also data,” stressed Nixon in concluding words, noting non-disclosure itself, which is prominent among top 20 emitting corporations, signals risk. On being more investor-centric, Chair Arden-Clarke recalled the usefulness and widespread acceptance of SDGs indicators.

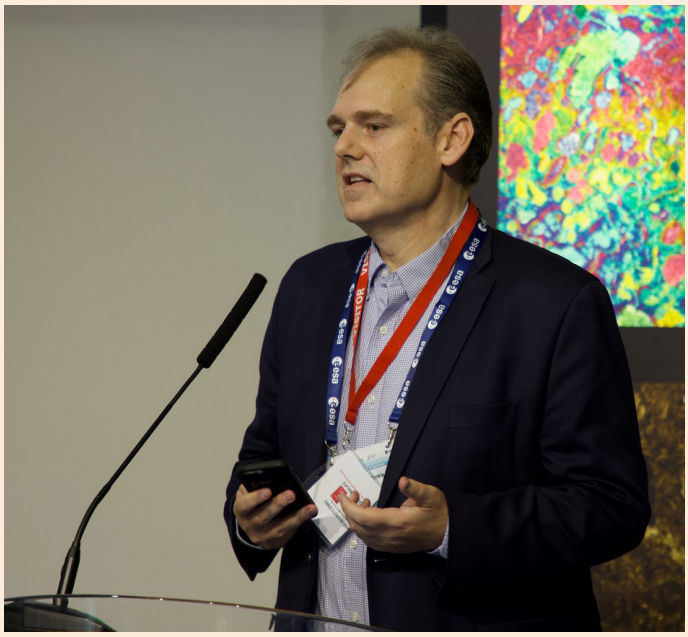
“GEO-foundational models are highly concentrated by the big four tech companies .”

Nataliya Tkachenko
AI for Sustainability - Strategy Lead, Lloyds Banking

Tech & Innovation

Robert Parkin, Distinguished Engineer and Director of Development, IBM, spoke on how generative AI is transforming access to Earth observation data and thus allowing for democratizing environmental monitoring. He presented TerraMind, the first open-sourced, multimodal and generative foundation model for Earth observation developed in partnership with ESA, which he noted was used recently for tracking chemical spills in the ocean because it could better figure out the ocean geography and find the ships faster. Stressing that we stand at an inflection point where advanced AI, massive Earth observation datasets, and urgent environmental challenges create an unprecedented opportunity to democratize environmental monitoring worldwide, Parkin called for coordinated action to: recognize generative AI as a critical strategic integration tool; develop international validation standards; and create mechanisms for equitable access.

"Recognize generative AI as a critical strategic integration tool."



Robert Parkin
Distinguished Engineer and Director of Development, IBM

Miguel Pérez Ludena, Research Lead at the Global Reporting Initiative (GRI), emphasized the need to shift focus beyond financial materiality in sustainability reporting. He explained that GRI Standards, developed with input from five stakeholder groups including financial institutions, are grounded in international agreements and widely used by the world's largest companies. However, reporting must expand beyond top-tier firms, as adoption of GRI standards - which he said can be seen as a "proxy" for environmental reporting - drops significantly outside the largest 1,000. He called for better data quality and comparability, noting that regulatory filings tend to be more trusted. Ludena also warned against over-prioritizing quantitative metrics at the expense of qualitative context, and stressed the importance of focusing on impact materiality to ensure reporting reflects real-world effects, not just investor risk.

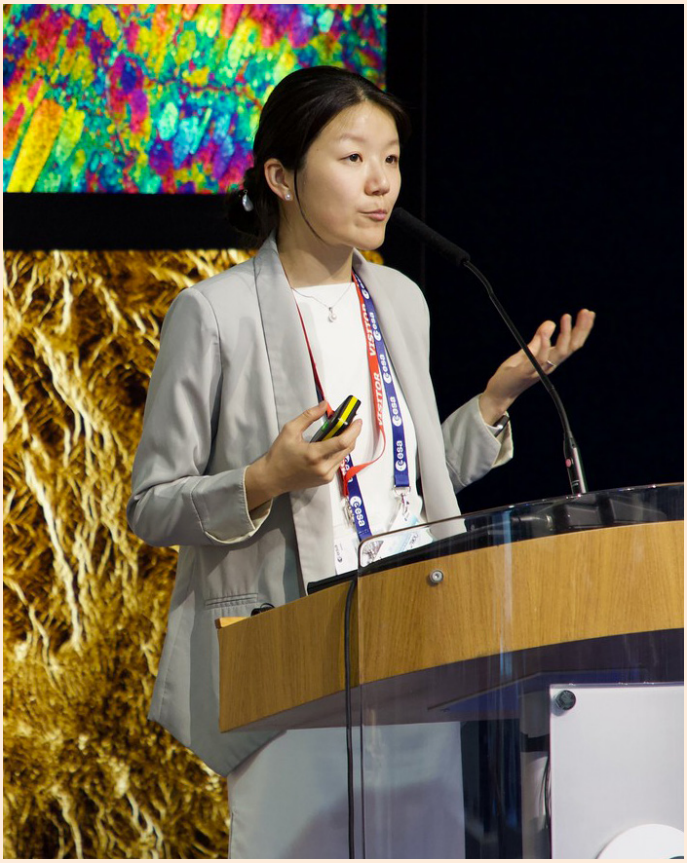
"Reporting must expand beyond top-tier firms."

Miguel Pérez Ludena
Research Lead at the Global Reporting Initiative (GRI)

Noting that there has never been a time with a greater need for turning the organization of knowledge into a service than the current AI era, Yingya Zhou, Senior Product Director, Tencent, provided examples of Tencent's experience enhancing access and collaboration on environmental data. These included: AI-based tools for organizing information in a way that promotes efficiency and cooperation between organizations; federated climate tech search tools to enhance data accessibility; and a methodology combining AI, human measurement and LIDAR to measure forest carbon sequestration in a manner that balances cost, trust and accuracy. Zhou also noted that training sessions with not-for-profit organizations and capacity building built into the development of the tools had led to a 10-fold increase in efficiency, and ways in which a decentralized knowledge network can be better for privacy.

In an ensuing Q&A, experts from the floor emphasized that better data alone will not drive the systemic change needed for sustainability. Several speakers challenged the idea that the investment sector will lead the transition, stressing that corporations are not inherently motivated to serve the public good.

Calls were made to prioritize impact materiality, not just financial metrics, and to rethink how data is created to enable meaningful change. Concerns were raised about unintended consequences, such as divestment from emerging markets due to low transparency. Others argued for more nuanced strategies like engagement over exclusion, and the need to educate financial leaders on the business value of climate action.

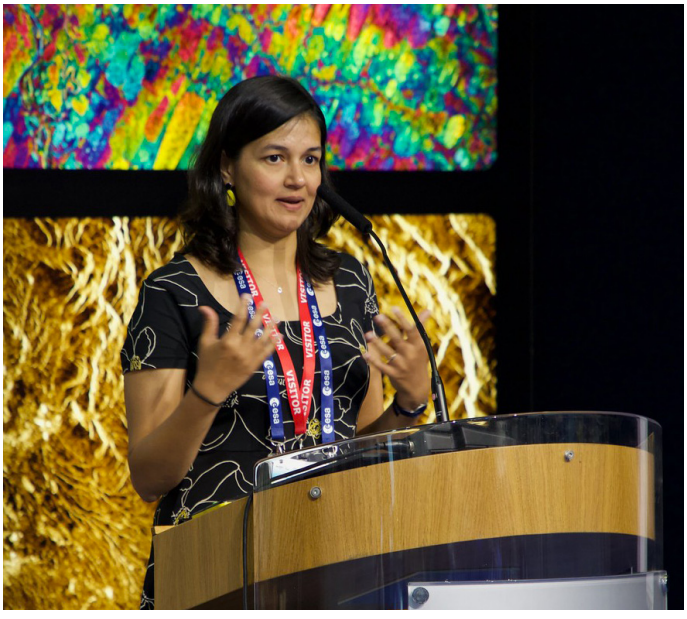


Yingya Zhou
Senior Product Director, Tencent

Pooja Mahapatra, Global Solutions Lead, Climate and Nature, Fugro, stressed that "we cannot protect what we cannot see," highlighting how little we know about the Ocean. Fugro, her company, works across geospatial data on various geographies, including the seabed, using cutting-edge technologies to support sustainable development. Geodata is climate infrastructure, she stressed, and foundational for understanding ecosystems and informing decisions. But as the planet changes more rapidly than the data we have, she called for real-time, interoperable, and accessible data.

Pooja Mahapatra shared examples like Fugro's partnership with ISPRA to map seagrass, which are key carbon sinks that are quickly disappearing yet still poorly mapped. She also highlighted Fugro's role in the Seabed2030 initiative. Beyond data collection, she stressed the need for decision-support tools and cloud-native platforms powered by AI. The private sector, she argued, is not just a data provider but a "scale enabler," especially when working through public-private partnerships. She called for long-term financing and data strategies to move from pilots to real solutions.

An ensuing discussion focused on the challenges of data use, validation, and fit-for-purpose design. Some stressed the need to start from the problem, not just the dataset, and to combine data sources thoughtfully. Concerns were raised about overreliance on AI-generated insights, based on unreliable data, without third-party verification. Some experts highlighted the resource gap in developing countries and suggested citizen science as a tool for improving data relevance and validation.



Pooja Mahapatra
Global Solutions Lead, Climate and Nature, Fugro

Nicolas Tsesmetzis, Principal Science Expert, Nature Based Solutions, Shell, spoke on the transformative potential of environmental genomics, which measures environment-DNA (eDNA) left behind in ecosystems and can be used to detect organisms and estimate biodiversity. Elaborating on the work by the Environmental Genomics Joint Industry Programme (JIP34), a global initiative to standardize and scale environmental genomics in the energy industry, Tsesmetzis extolled the technology as offering a breakthrough in that it allows for faster, cheaper, and more accurate environmental monitoring. He pointed to JIP34's support to the GEDS and its alignment with transparency, interoperability and investor-grade metrics, calling for a clear path forward to developing and adopting standardized eDNA methods.

> "Clear path forward to developing and adopting standardized eDNA methods."

Nicolas Tsesmetzis
Principal Science Expert, Nature Based Solutions, Shell,

Aakash Parekh
Chief Commercial Officer, Pixxel

Aakash Parekh, Chief Commercial Officer, Pixxel, introduced hyperspectral imaging as a major leap forward in Earth observation, offering up to 50 times more detail than conventional multispectral satellites.

He said Pixxel's 5m resolution hyperspectral satellites can detect crop stress, canopy characteristics, water quality, and methane leaks with unmatched precision. These insights, he continued, support agriculture, forestry, mining, energy, and government applications, from biodiversity mapping to national security. With three satellites launched and three more coming, he said Pixxel is building the highest-resolution hyperspectral constellation to deliver real-time, granular, and actionable environmental intelligence, from space to ground-level impact.

During the Q&A session, participants addressed: the potential to bridge the gap between satellite and ground observations and the importance of data integration; contributions of genomics to public database and sequencing processes; and the potential for genomics to be simple and inexpensive enough to become a citizen science project.

On a question regarding governance when you mix public and private data, Parekh and Tsesmetzis noted no constraints on licensing other than some governments' restrictions.

Pathways For Future Action
Standards, Systems & Interoperability

Kristian Meissner, Development Director, Finnish Environment Institute, focused on the need for in-situ measurements to improve the information value chain for biodiversity data. He stressed the importance of provenance – where and how data is derived – and the opportunity provided by novel techniques such as eDNA, although these, he said, require first agreeing on minimum requirements and addressing pathways for their uptake.

Meissner further underscored the integral role that standards can play in improving the environmental information value chain, urging the community to "stop writing papers and start writing and demanding standards."

> "Stop writing papers and start writing and demanding standards."

Kristian Meissner
Development Director, Finnish Environment Institute

Martin Kapun
Bioinformatician, Natural History Museum Vienna

Erica Key
Director US Global Hub, Future Earth

Antoine Halff, Co-founder & Chief Analyst, Kayrros, described Kayrros as an environmental intelligence firm that fuses geospatial data from 20+ constellations to monitor emissions, nature risks, and the energy transition. He emphasized the value of upstream data fusion, midstream client integration, and downstream policy relevance, while warning against conflicting datasets and monopolized standards. True standardization, he argued, often emerges from open-source communities.

As governments act as aggregators, Halff stressed that translating data into finance-ready and policy-relevant products remains a key challenge, especially when definitions of what counts as the area to be measured are political, not technical.

In an ensuing discussion, experts reflected on methods, risks, and terminology in environmental data use. They emphasized that while tools like eDNA and remote sensing offer significant promise, each method has strengths and limitations, requiring integration rather than competition.

Several speakers warned about the risks of data misuse, especially in Indigenous territories, calling for safeguards aligned with the SDGs and rights-based principles. The discussion clarified a common confusion between standardization and regulation: while standardization can foster interoperability and innovation (as in the telecom industry), rigid regulatory requirements may hinder new

Antoine Halff,
Co-founder & Chief Analyst, Kayrros

Rapporteur Steve Liang
Associate Professor, University of Calgary

Rapporteur Steve Liang, Associate Professor, University of Calgary, then reflected on the transition from data scarcity to data abundance.

He emphasized the importance of ground-truthing, equity in sensor deployment, and the need to translate sensor data into actionable insights on pollution and emissions. Open-source tools were noted as powerful, though governance remains a concern.

> "The importance of ground-truthing, equity in sensor deployment, and translating sensor data unto actionable insights on pollution and emission."

Deep-dive Two - Synthesis & Recommendations

Introducing the user-perspective session, Serena Geraldini, Expert on Earth Observation, ISPRA, drew attention to ISRA's Copernicus as a perfect example of user-centric Earth observation. She pointed to its open and free of charge data and services, providing global coverage in near real time, and designed to meet user needs. These needs, she said, are taken up in the case of Italy through the Italian National User Forum, which brings together institutional users, research institutes, universities, industries and small and medium-size enterprises from all sectors. Geraldini also highlighted the Market-place initiative, offering value-added geospatial applications and services.

"Copernicus is a perfect example of user-centric Earth observation, open, free, and designed to meet real-world needs."

Serena Geraldini
Expert on Earth Observation, ISPRA

Participants broke into five sectoral groups - Government and Policy, Finance and ESG, International Organizations, Science and Civil Society, and the Geospatial/Tech sector - to assess whether the current environmental data infrastructure meets their needs. Each group identified key challenges around data access, quality, and usability, then imagined what an ideal infrastructure would look like. This exercise aimed to validate and enrich the draft Frascati Principles by grounding them in real-world use cases and imagining future-oriented solutions.

Participants were asked to define what features would most help their sector and reflect on how improved infrastructure could benefit the environment and society at large.

Lourdes Montenegro
Research and Digitization, World Benchmarking Alliance

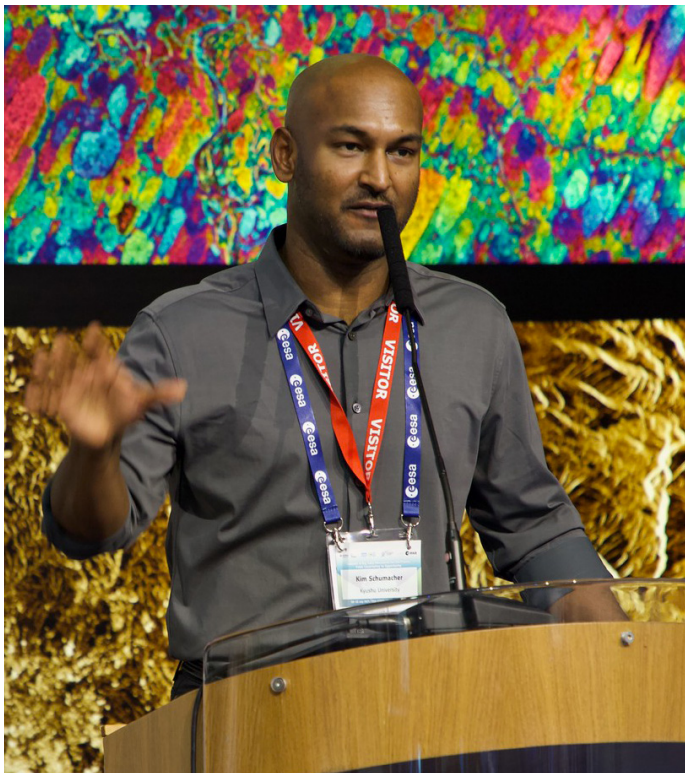
After hearing the report back from the second breakout groups, rapporteur Brooke Tanner, Research Analyst at the Brookings Institute, highlighted several recurring themes across the discussions.

First, participants emphasized the persistent challenge of data fragmentation, including concerns about reusability and the need for clear strategies around data sunsetting. Second, she said, issues of trust, provenance, and verification were widely discussed, with a strong focus on ensuring data is both fit-for-purpose and stewarded as a reliable product. Third, accessibility, particularly in terms of cost and equity, was seen as fundamental to a functioning data ecosystem.

Fourth, she emphasized that infrastructure alone is insufficient; various groups noted that persistent capacity gaps in data literacy and communication must also be addressed through targeted training and support.

"Infrastructure alone is insufficient."

Brooke Tanner
Research Analyst, Brookings Institute



Kim Schumacher
Professor of Sustainable Finance, University of Kyushu

Kim Schumacher, Professor of Sustainable Finance at the University of Kyushu, offered concluding thoughts for the day by urging the expert group to address a critical gap in their discussion thus far: credibility. While much had been said about data quality, quantity, accessibility, and reliability, little attention was paid to the erosion of trust in science and data, especially in an age of AI-driven misinformation.

Schumacher pointed to the growing disconnect between the data community and the broader public, noting that even highly credible sources such as satellite images of floods or wildfires are now routinely dismissed as fake. As AI becomes more powerful, it will not only support data analysis but also fuel skepticism and disinformation. In this shifting landscape, he argued, credibility cannot be assumed. It must be consciously built, defended, and communicated, especially to those currently disengaged from or suspicious of scientific expertise.

"Credibility cannot be assumed."

10th July 2025

PATHWAYS TO SYSTEMIC CHANGE:
Towards Data Cohesion And Interoperability

Martin Rich, Co-Founder & CEO, Future Fit Foundation, introduced the Vision for the Future project, which collects positive, inclusive and hopeful visions for 2070, creating a space where anyone can be inspired, refreshed and encouraged. He called for all to join and reach “thousands of visions for the future and have it go viral.”

Martin Rich
Co-Founder & CEO, Future Fit Foundation

> “We need thousands of visions for the future and have it go viral.”

Francois Stepman
Global Forum for Agricultural Research and Innovation (GFAR)

Lucas Pattana Kengmana
Senior Investment Strategist, New Zealand Super Fund

Sotirios Kanellopoulos, Data and ICT for sustainability policy officer, European Commission Directorate General Environment, presented the Green Deal Data Space (GDDS), a European common data space to support tracking and tracing in the supply chain.

Pointing to evident reporting fatigue – attributed to opaque supply chains, lack of standards to exchange information, disclosure concerns for fear of losing competitive advantages, and verification costs for complex data such as carbon footprint and recycled content – Kanellopoulos explained the GDDS provides a basic technology stack with reusable, digital enablers to help address the reporting challenge.

He also drew attention to the forthcoming Sustainable Green Europe Data Space (SAGE) project, which includes high-value datasets, governance and trust frameworks, and pilot use cases to foster data-driven sustainability solutions across biodiversity, climate, circular economy, and pollution monitoring.

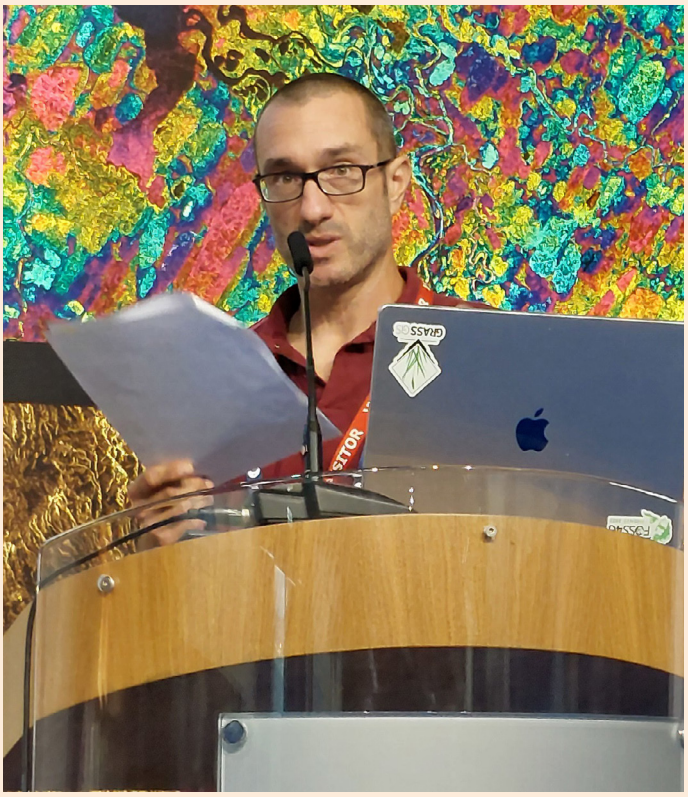
> Evident reporting fatigue – attributed to opaque supply chains

Sotirios Kanellopoulos
Data and ICT for sustainability policy officer, European Commission Directorate General Environment, presented the Green Deal Data Space (GDDS)

Raffaele Morelli, Data scientist, ISPRA, spoke on the Italian experience with value chains reporting and indicators. He highlighted in particular Drupal, a free and open-source web content management system, which supports clear visualization and storytelling, data structures, data collection validation checks, and interoperability.

Morelli emphasized Drupal's capability to adapt to the needs of organizations wanting to gather data effectively and collaboratively. He also referred to ISPRA's more than 300 environmental indicators, comprising the most complete collection of statistical data and information on the state of the environment in Italy.

> "ISPRA's more than 300 environmental indicators, comprising the most complete collection of statistical data."



Raffaele Morelli
Data Scientist, ISPRA

Pathways Rapid-fire Panel 1: Inclusion And Equity

Moderator Sherif Dawood, Deputy Director of Climate, Environment and Sustainable Development, Ministry of Foreign Affairs of Egypt, opened the session by emphasizing the importance of inclusive digital and AI transitions. He stressed that governance frameworks must ensure no country or community is left behind in accessing and benefiting from these technologies.

Pathways Rapid-fire Panel 1: Inclusion And Equity

Charles Mwangi, Director of Space Sector and Technology Development at the Kenya Space Agency, addressed the persistent data gaps in Africa. He underlined the need to strengthen infrastructure, develop human capacity, and clarify the value of space-based data.

Emerging technologies like edge computing and citizen science, including social media scraping, offer promising ways to fill data gaps. He also emphasized the importance of pilot projects and internationally agreed standards that respect national sovereignty and help harmonize datasets.

Charles Mwangi
Director of Space Sector and Technology Development at the Kenya Space Agency

Deborah Insigrano, Cooperative Development Manager, Organization of Brazilian Cooperatives, highlighted the unique role of cooperatives in environmental data governance. She explained Brazil has over 4,500 cooperatives serving 28 million people, and shared the example of ESG COOP, a program bringing together hundreds of leading cooperatives to collect standardized ESG data. She called for globally-aligned indicators and noted the potential of cooperatives to provide reliable, community-based environmental insights.

Deborah Insigrano
Cooperative Development Manager, Organization of Brazilian Cooperatives

"Brazil has over 4,500 cooperatives serving 28 million people."

Yblin Roman, Policy Lead, SIRGE Coalition, emphasized Indigenous Peoples' long-standing spiritual and ecological relationships with forests. She stressed the need to recognize Indigenous Peoples as rights holders and called for their inclusion as both co-designers and co-decision-makers in governance processes.

Roman highlighted the CARE Principles (Collective benefits, Authority to control, Responsibility, and Ethics) as essential complements to the FAIR data principles (Findable, Accessible, Interoperable, and Reusable), and noted that despite pledges, less than 1% of climate finance reaches Indigenous communities directly.

"Despite pledges, less than 1% of climate finance reaches Indigenous communities directly."

Yblin Roman
Policy Lead, SIRGE Coalition

In a standalone presentation, Arne Bathke, Professor, University of Salzburg, presented on the challenge of moving from big data to quality data. He elaborated on the notion of redundancy, noting there is plenty of it in nature. Likewise, he said, redundancy is key to ensuring data quality in that it allows for cross-validation and plausibility. He also stressed transparency as a condition of trust and agency, as well as uncertainty assessment, code of conduct, and data literacy - all essential to quality data.

During the discussion, a question from the floor brought up the difficulty of actually applying redundancy as a company and "the need for cherry picking," for example when choosing standards, or in reporting. Bathke reiterated the importance of redundancy for quality assurance, adding it is often done anyway as part of the design, as in the case of climate variables.

"The notion of redundancy, noting there is plenty of it in nature."

Arne Bathke
Professor, University of Salzburg

Dany Ghafari
SDGs Unit Lead, UNEP

Carmen Marques Ruiz
Ambassador, EU Climate Pact

Pathways Rapid Fire Panel 2: Standards & Accountability

Moderator Francesca Sartori, Head of Research and Standardization, Nokia, opened the session by emphasizing that greater accountability requires robust, streamlined standards that keep pace with change.

Ruggero Lensi, Director General, UNI - Italian Standard Body, pointed to more than 1000 ISO standards relevant to environmental data at the international level, spanning categories from AI to environmental management. In response to a question from Sartori on what is needed to move forward on accountability, Lensi referred to the need for speed.

He noted that while it takes at least two years to have a standard approved, the newly developed Online Standards Development (OSD) platform allows for asynchronous standards development, from preparatory stage through to publication. Stressing the need to find ways to be directly connected to society and industry, Lensi called for recognizing and registering and using OSD.

Francesca Sartori
Head of Research and Standardization, Nokia

Ralph Dominik, Committee Manager, ISO, Germany, explained that ISO is only a platform helping expert groups develop standards, and explained the process of going through a national standardization body for presenting or revising a standard to the ISO.

Kristian Meissner, Development Director, Finnish Environment Institute, lamented that while eDNA has proven to be a high-quality method for water and biodiversity assessment, it has not been accepted as a method standard. To ensure inclusiveness, he emphasized the importance of an open platform space where ideas for method standards can be brought together and eventually adopted.

Pathways Rapid Fire Panel 2: Standards & Acccountability

Noting the existence of many ratings without a defined purpose, or with a purpose that has changed over time, Nicole Streuli, Co-Founder & President, RepRisk, called for moving away from ratings and towards more meaningful data. She also stressed that it is the responsibility of the users to be clear about their choice of data. Once you know, she said, it's easy to find the right standard. Addressing accountability, Streuli underscored the importance of high-quality data and information, transparency, and avoidance of conflict of interest.

In comments from the floor, participants touched upon the impact of AI on the dissemination of standards, and how to translate the value of standards for acceptance by senior management. They also addressed the monetization of data as a service, with Streuli suggesting a tiered approach including licensing subscriptions for research institutions for example.

> "Moving away from ratings and towards more meaningful data."

Nicole Streuli
Co-Founder & President, RepRisk

The Frascati Principles

Rapporteurs Brooke Tanner, Brookings Institute, and Laura Bullón-Cassis, Geneva Graduate Institute and IISD, presented a short summary of solutions that emerged from the previous day's discussion and offered a revised take on the Frascati Principles, which took into account the second Deep dive. The Principles considered by the HLEG highlighted that the global big data ecosystem for the environment should:

1. Inspire common resources across the UN system and for all users, as part of long-term partnerships;
2. Be transparent, flexible, agile and modular to encourage innovation, accountability and continuous improvement, adhering to FAIR, CARE, and TRUST data principles;
3. Be human-centric, incorporating data on the nexus of human and environmental health, and building in indigenous and citizen science data as part of its core approach;
4. Be designed to be fit-for-purpose, with clear goals for each dataset that are effectively communicated to data users, and incorporate transparent, ethical new technologies;
5. Be supported by global and regional governance frameworks, reflecting national focus;
6. Improve harmonization by adopting the most suitable standards to enhance interoperability and break down systemic silos;
7. Ensure systems are simple and easy to use for all end-users to engage;
8. Actively engage and recognize the vital role of the private sector, including SMEs, and create new public-private partnership opportunities;
9. Incentivize investments for sustainability;
10. Be supported by comprehensive means of implementation;
11. Prioritize equity and inclusivity while building capacity and increasing technical and leadership competencies across the data community, and breaking data monopolies;
12. Promote accessibility and discovery across the data ecosystem, building redundancy into the data ecosystem to defend against single failure points;
13. Encourage the data community to accelerate strategic pilots that demonstrate the power of data to support policy implementation;
14. Build and defend credibility and trustworthy data, or risk losing public trust in an era of misinformation, deepfakes, and growing anti-science sentiment; and
15. Ensure that scientific insights are clearly linked to policy to inform decision-making.

Experts broadly welcomed the draft principles and offered targeted suggestions to strengthen their clarity, relevance, and ambition. Speakers emphasized the importance of co-development and co-design as essential to building trust across communities and ensuring inclusivity is not just aspirational but embedded from the start. Others called for a stronger connection to values, asking “why” and “for whom” the data ecosystem is being built. The need for datasets to be “future ready” was also raised.

The importance of transparency enabling accountability was highlighted, suggesting accountability be explicitly named under Principle 2. Speakers also called for a more concrete link between the principles and the needs of the private sector, especially in light of regulatory demands and compliance fatigue.

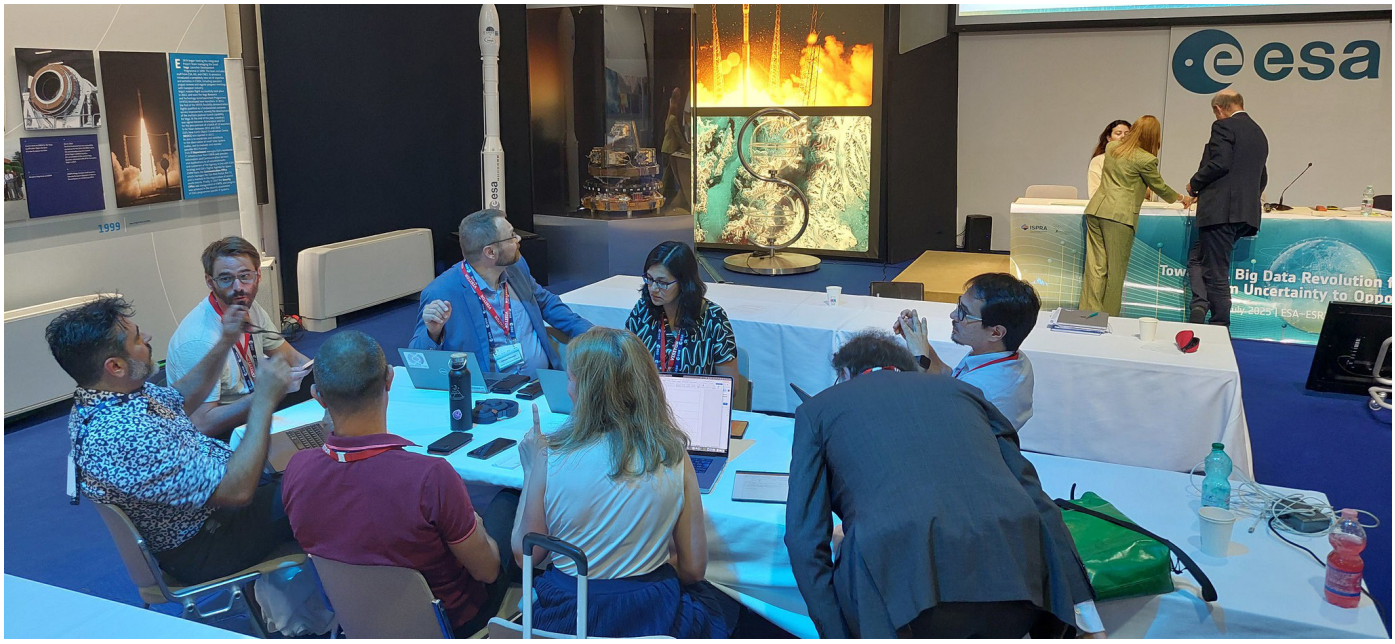
On Principle 9, comments indicated the language on incentivizing sustainability was too vague, suggesting using more direct terms like “motivate” or “mobilize.” Participants called for a clearer focus on infrastructure, technological capacity, and behavior change, particularly for the Global South. Some urged small tweaks in language or referencing the 2030 Agenda to better link the Principles with UN processes such as the GEDS.

Credibility was discussed, with a comment urging the group to strengthen Principle 14 by not just defending credibility but actively developing trust-building methodologies, particularly in light of misinformation, AI misuse, and anti-science sentiment. Another participant stressed the need to embed a greater sense of urgency into the Principles.

Finally, comments flagged concerns about data monopolies. Rather than calling to “break” them, they recommended supervision and intentional broadening of the data community to reduce dependency and support stewardship through multi-stakeholder partnerships.

Deep-dive Three - The Frascati Pathways

Experts were divided into five groups, each tasked with developing one Pathway each for three Frascati Principles. Examples included: a UN Open Data Common agreement; Revealing Real Impact: Data That Drives Investment Change; and Scaling-up the Development Data Partnership to facilitate environmental data exchange between the public and private sectors for the public good.



Closing

Martin Brocklehurst, Chair Global Alliance for Citizen Science and overall rapporteur, stressed that the success of the Frascati Principles depends on effective implementation. He urged participants to see themselves as ambassadors for the Principles and to build momentum through networks and platforms, such as the EU Climate Pact.

He called for strong political engagement, including mobilizing support for GEDS at UNEA, while also encouraging pilot initiatives beyond the UN system. Brocklehurst stressed the need to make data meaningful to ordinary people and to create an iconic, widely visible example that can galvanize public and private support.

In concluding words, Ado Lohmus, Senior Advisor at the UN-SPBF, thanked participants and confirmed that the Frascati Principles and associated pathways will feed into the second draft of GEDS, expected in August 2025. He underlined the importance of advocacy within Member States and multilateral forums like the UN General Assembly, and called on all participants to continue promoting and operationalizing the HLEG outcomes in their own networks.

Stefania Minestrini, Head, International Affairs, ISPRA | **Martin Brocklehurst,** Chair Global Partnership for Citizen Science

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Towards a Big Data Revolution for the Planet

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