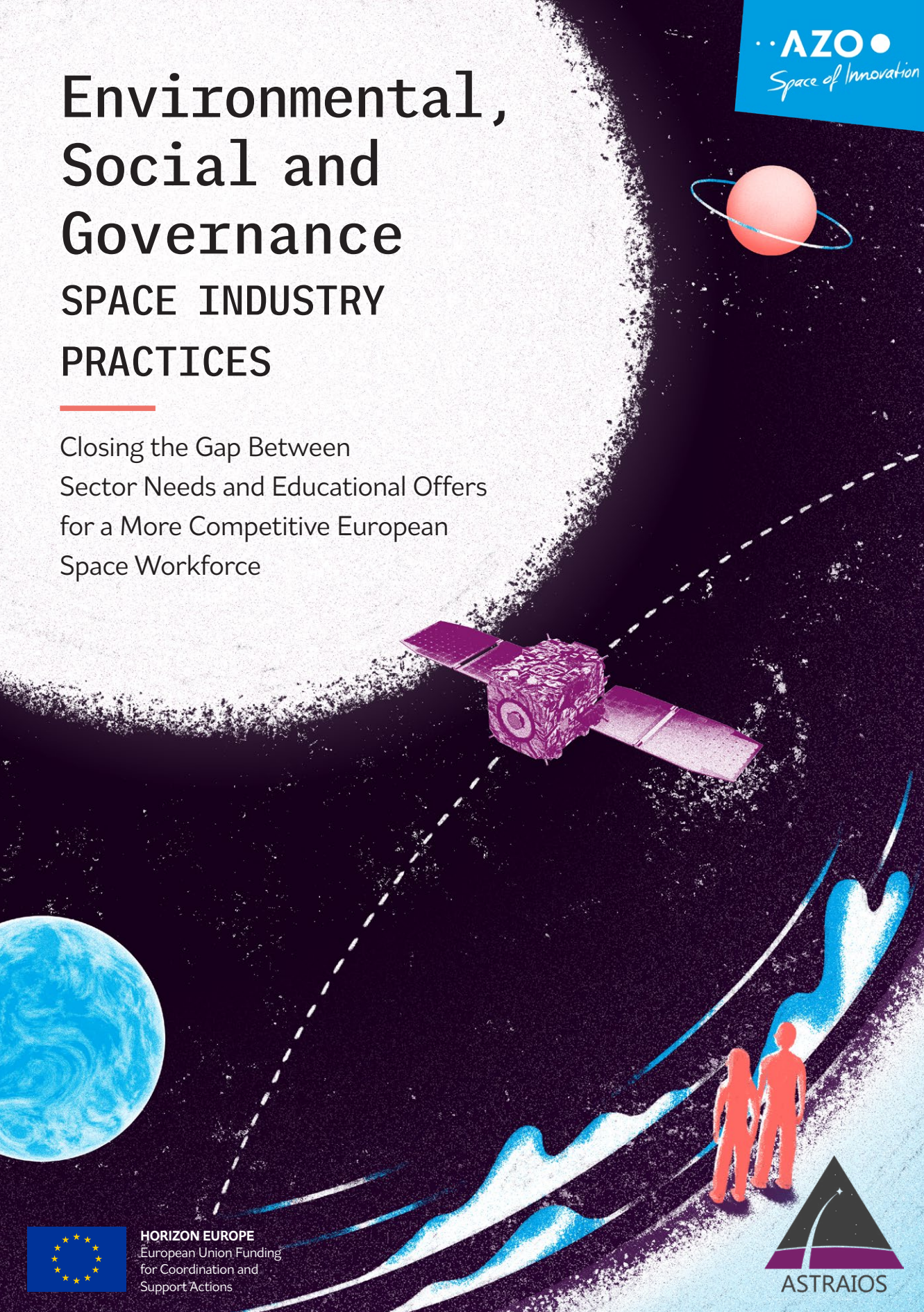
Environmental, Social and Governance

SPACE INDUSTRY PRACTICES

Closing the Gap Between Sector Needs and Educational Offers for a More Competitive European Space Workforce



HORIZON EUROPE
European Union Funding for Coordination and Support Actions

ASTRAIOS

Environmental, Social and Governance Space Industry Practices
Closing the Gap Between Sector Needs and Educational Offers for a More Competitive European Space Workforce

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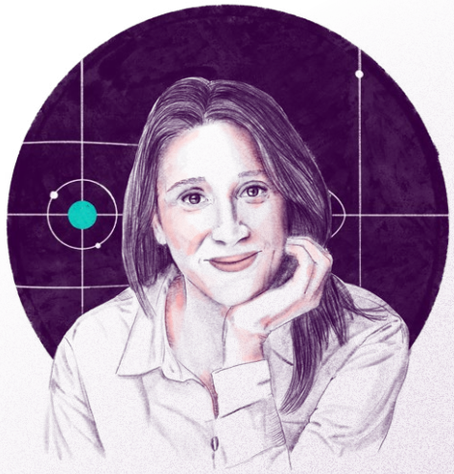


INTZA BALENCIAGA,
Senior Project Manager at AZO
Anwendungszentrum GmbH Oberpfaffenhofen

The space sector is changing fast. European institutions, such as the European Commission with its *Space Strategy for Europe* and the European Space Agency (ESA) with its *Agenda 2025*, recognise that Europe must keep innovating to stay competitive. In today's fast-paced industry, Europe needs to adapt and protect its autonomy, putting Small and Medium-sized Enterprises (SMEs) and start-ups centre stage with a bigger role than ever before.

The space sector can't thrive unless the gap between what Europe's space programmes teach and what employers need is closed completely. Tracking how jobs and hiring needs are evolving is key to spotting future skill gaps and ensuring the workforce is ready – particularly as demand grows for cross-domain and multidisciplinary expertise.

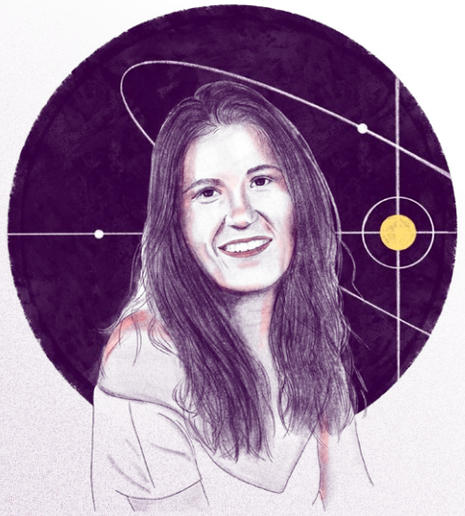
Climate change, social inequality, higher stakeholder expectations, rapid digital advances and the push to future-proof operations have put Environmental, Social and Governance (ESG) practices at the top of the agenda for many businesses across the EU space sector. ESG isn't just a box to tick – it's becoming a real competitive advantage. By the time you finish this book, you'll see why.

To better align the skills taught in Europe's space programmes with what the workforce needs, AZO – Anwendungszentrum GmbH Oberpfaffenhofen (AZO) – launched a peer-to-peer ESG learning process as part of the EU-funded ASTRAIOS *(Analysis of Skills, Training, Research and Innovation Opportunities in Space)* initiative. Over three years, ten space entities from different European regions, climates, sizes, governance models, technologies and services shared their ESG approaches, challenges, opportunities and trends. And here's the best part: they all joined voluntarily, giving their time and expertise to help shape this book. We're incredibly grateful for their openness and generosity!

This book urges academia, policymakers and industry leaders to drive innovation, integrate ESG practices and boost the EU space sector's global competitiveness. Through real-world ESG stories, we aim to inspire companies to embed ESG into their missions and help shape curriculums that will equip the next generation with the skills to tackle space industry challenges and seize emerging opportunities.

For companies, it provides insights to identify skill gaps and adopt best ESG practices. For academia, it advocates for expanding curriculums to include non-traditional courses that nurture soft skills and beyond. For EU policymakers, it provides practical insights to guide policies that support ESG integration and the development of non-traditional skills.

Ultimately, our goal is to strengthen the European space sector, making it more competitive, sustainable, inclusive and globally influential.



CRISTINA RAMOS,
Project Manager at AZO
Anwendungszentrum GmbH Oberpfaffenhofen

2. Introduction

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THE MISSION OF THIS BOOK: WHY ESG MATTERS IN SPACE

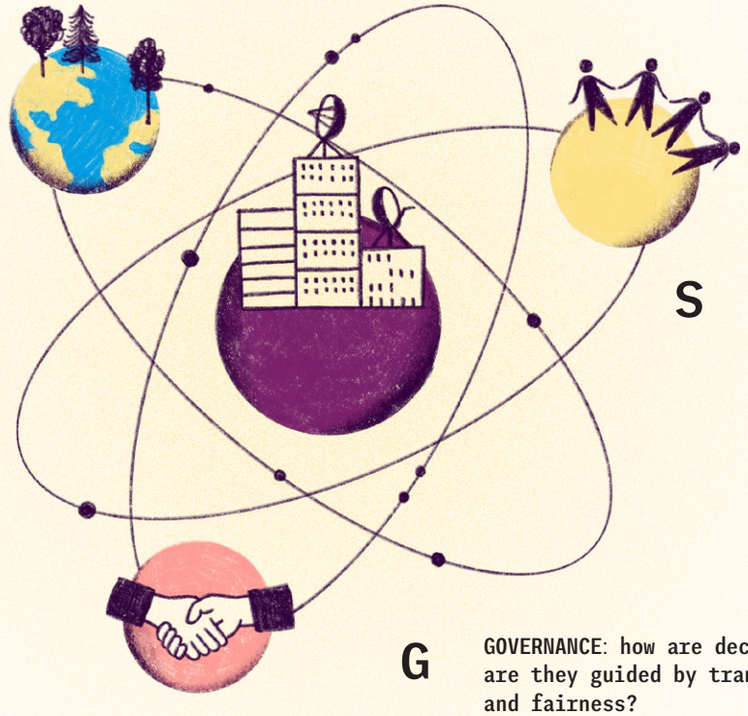
The future of space is in all our hands. As we reach further into the cosmos, we also need to think about the way we do it. Space isn't just full of exciting opportunities, it's also a delicate environment that needs our care. That's where ESG practices come into play.

"It is thanks to conscious governance of an organisation that we can, together, invent the jobs of tomorrow, better meet the challenges of our future, and play a positive role in society."

ROBIN PRADAL,
former Senior Manager at PwC Advisory

ESG is shaping the way European space companies design rockets, build satellites and even manage data. ESG reporting shapes how companies develop products, engage customers and position themselves in the market. It is a core driver of change and trust. By implementing ESG into their strategies, companies gain a greater understanding of their strengths. It gives them the clarity to make future improvements and informed decisions, build trust internally and externally, and embed accountability across functions.
Before ESG came along, investors didn't really have a way to factor in 'externalities' – things a company didn't have to pay for, but that still caused costs or harm to others. Take pollution, for example: it might not hurt a company's profits, but it can have serious consequences for the people living nearby and worldwide.
When it comes to space, ESG isn't just about protecting the environment, it's also about people. The space sector is opening, creating opportunities for individuals from all kinds of backgrounds and experiences. That's why, when looking at how a company operates, we need to pay attention to these three elements:

E ENVIRONMENTAL: how does a company's activity use energy and other resources? What kind of waste does it create, and how is that managed?



S SOCIAL: how do a company's actions affect people - employees, communities and society at large?

G GOVERNANCE: how are decisions made, and are they guided by transparency, ethics and fairness?

We're not going to dive deep into every ESG reporting format or the finer points of company governance models. Instead, this book has two goals:

1. Look at how companies of different sizes are putting ESG into practice and identify their challenges, opportunities and where things are headed.
2. Spot the industry gaps identified by ESG reporting and share ideas on how academia and EU policymakers can help close them to strengthen the European space workforce.

Think of this book as a spark for reimagining how we develop talent, build values into every mission and grow a European space ecosystem that leads with purpose. Whether you're a human resources professional, scientist, entrepreneur or policy leader, you have the power to drive innovation, champion sustainability and boost the EU's role in space – not just for today, but for the generations ready to take the baton after us.

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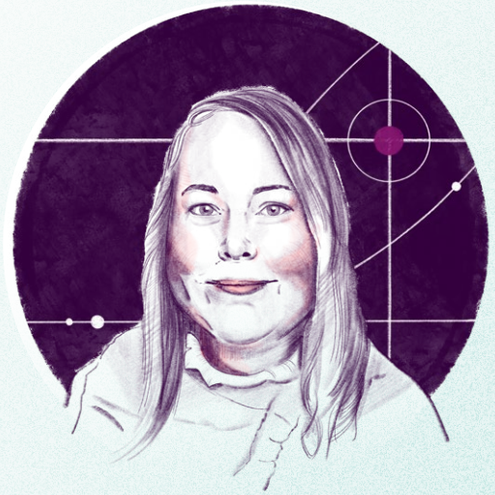
ASTRAIOS: TOWARDS A SKILLED AND COMPETENT EUROPEAN SPACE WORKFORCE

Space industry is not only about rockets and satellites. With digitalisation, automation and 3D printing now in the mix, today's space sector looks very different from the days when fundamental research was the main focus.

For the EU space sector to keep moving forwards, it needs top-quality education, skilled professionals, and chances for those professionals to keep learning and upgrading their skills. That's where the ASTRAIOS project comes in. This three-year effort brought together 10 institutions from across Europe to connect research, policy and practice – and ensure education matches the skills the industry needs.

From January 2023 to December 2025, the ASTRAIOS team has been hard at work. We've analysed the current and future space-related courses across the EU-27, studied what the European space industry is looking for, pinpointed gaps between what's taught and what's needed, and mapped out practical ways to close those gaps.

Over the course of the ASTRAIOS project, extensive data collection and analysis have revealed recurring patterns, strengths and weaknesses across Europe's space education and workforce development landscape. The final output for the project will be to establish a set of recommendations for higher education institutions, industry and employers, as well as policymakers in Europe. Europe's space sector operates within a complex ecosystem that spans government, academia, industry and civil society. While siloed approaches have led to fragmented efforts in skills development, education and innovation, the ASTRAIOS findings highlight the urgent need for integrated, cross-sector collaboration backed by EU-level policy coordination. Achieving sustainable growth and innovation in the European space workforce requires systemic mechanisms that align diverse actors, eliminate redundancies and scale successful practices across the continent.



"Taking part in the ESG workshops was such an eye-opener for me – the recommendations and best practices the participants shared were so inspiring! I was very happy to see that companies across the space sector and beyond acknowledge the value of the green transition and the importance of employee satisfaction in their governance practices."

MARI KOLEHMAINEN,
ASTRAIOS Coordinator,
Science Officer at European Science Foundation

Throughout the project, AZO has acted as the process facilitator, bringing together voices from across the space entrepreneurship ecosystem to understand their needs and explore how they put ESG into practice. We work with the ESG business community to close the gap between what's taught in academia and what the industry really needs. The goal? To unlock the full potential of the EU space workforce.

In the chapters ahead, you'll meet ten space organisations that took part in three peer-to-peer learning workshops, swapping ideas on ESG practices, trends, challenges and opportunities. You'll get to know the participants, discover some of their most innovative ESG projects and take away practical best practices you can use – whether you're building, leading or dreaming about the future of space.

ASTRAIOS

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PEER-TO-PEER LEARNING WORKSHOPS SHARING ESG BUSINESS PRACTICES THROUGH AZO

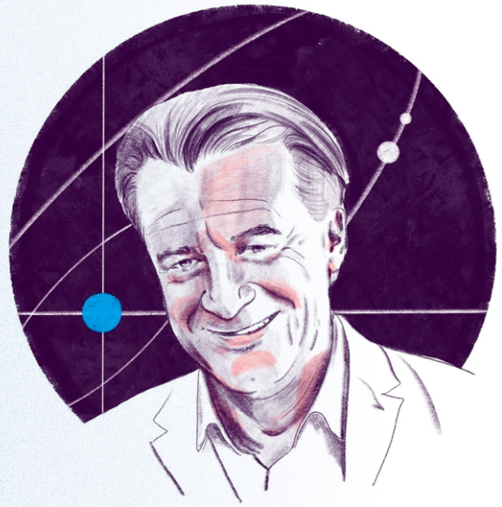
Over three years, European space companies took centre stage in a series of three peer-to-peer ESG workshops led by AZO. These entities shared their experiences, exchanged ideas and explored how ESG can drive innovation, boost sustainability and sharpen Europe's competitive edge in the space sector.

As the process facilitator, AZO set out to build a vibrant space entrepreneurship ecosystem (see Chapter 7): one where diverse ESG experiences, journeys and perspectives could be shared openly. To kick things off, AZO identified companies across Europe and invited them to complete a short questionnaire in order to gauge their ESG experience, interest in the topic and potential contributions.

The goal was to bring together a rich mix of organisations, diverse in size, maturity, ESG expertise and sector focus (space downstream, upstream and, to a lesser extent, non-space), spread across various EU regions. While we initially also targeted non-space audiences to bring different perspectives, we ended up attracting only space entities, despite their operations spanning other domains. From this pool, we selected participants who weren't just ticking ESG boxes. These were individuals and organisations eager to learn and ready to share their ESG experiences honestly. They were committed to helping us reveal the gaps between industry demands and the skills that Europe's next generation of space talent will need to thrive.

"As the process facilitator, AZO brought together a diverse mix of European space companies, creating a vibrant ecosystem where ESG experiences, challenges and ideas could be shared openly to bridge the gap between industry demands and the skills Europe's next generation of space talent will need."

THORSTEN RUDOLPH,
Managing Director at AZO Anwendungszentrum GmbH Oberpfaffenhofen



Through a series of knowledge-sharing workshops and one-on-one interviews, AZO and its partners gathered multiple ESG stories, challenges and opportunities from across the space sector. These gatherings dug into everything from cross-department collaboration headaches and messy data management to the lack of standard frameworks – and most importantly, how companies are tackling them.

In addition, we heard about real-time emissions tracking with satellites, artificial intelligence-powered ESG tools, initiatives to boost employee wellbeing and retention, and training that weaves ESG into company culture. While the focus was European, participants stressed that ESG accountability needs to be global, with plenty to gain from sharing knowledge across sectors.

What we've uncovered goes beyond influencing policy, academic programmes and industry practices. It demonstrates how ESG can drive innovation, boost resilience, enhance decision-making and fuel sustainable growth, ultimately strengthening the competitiveness of Europe's space industry.

3. Voices from the Industry: ESG in Action
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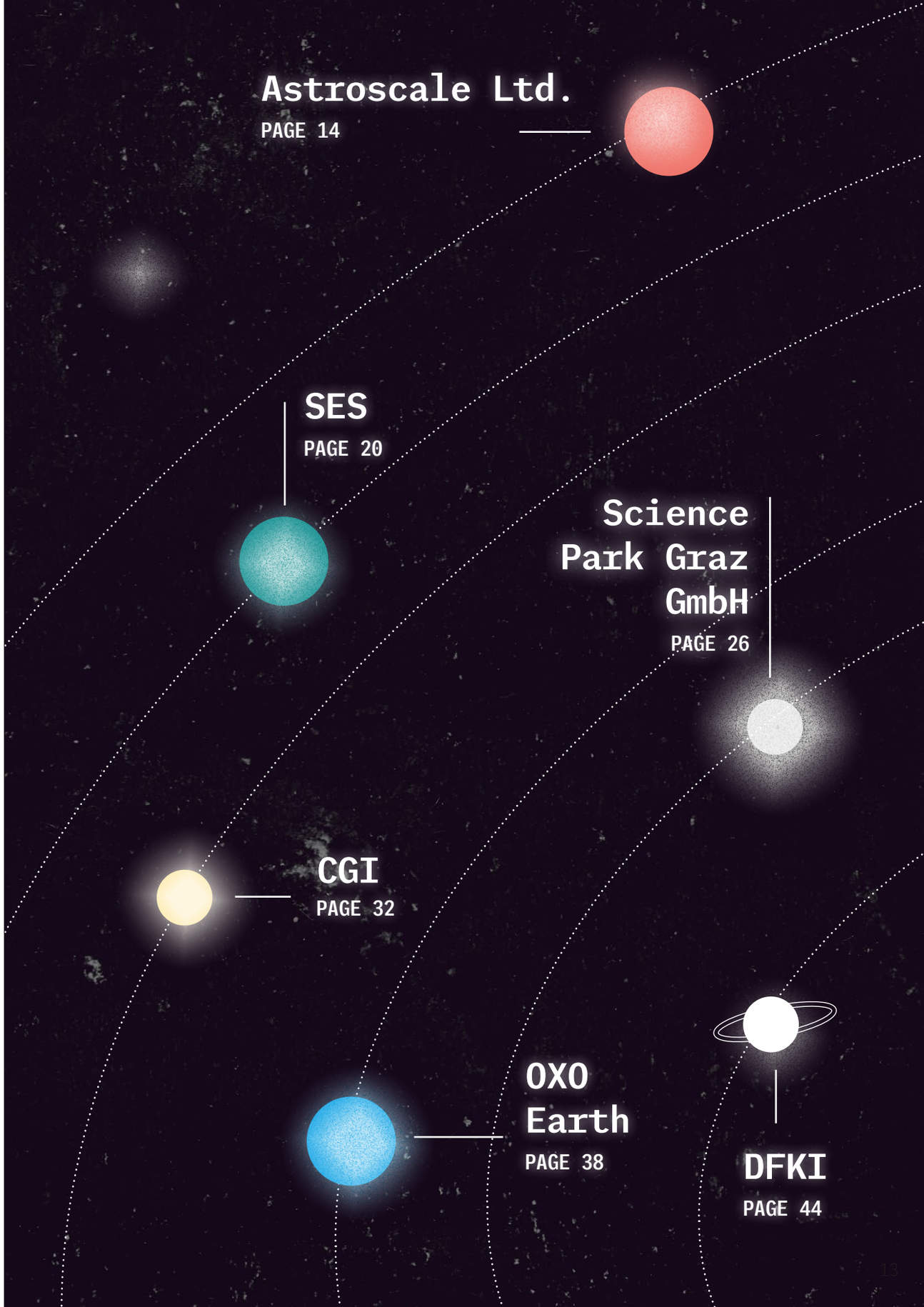
Our ESG peer-to-peer learning journey started in 2023 with a simple goal: to bring together a mix of New Space players, startups, SMEs and even a few non-space companies to exchange real-world ESG experiences.

We kicked things off with a 'get-to-know-you' workshop in December 2023 followed by a deep dive into established ESG practices in April 2024. One-on-one interviews helped us scratch beneath the surface, and by our final gathering in May 2025, we had uncovered ten standout entities ready to share their stories.

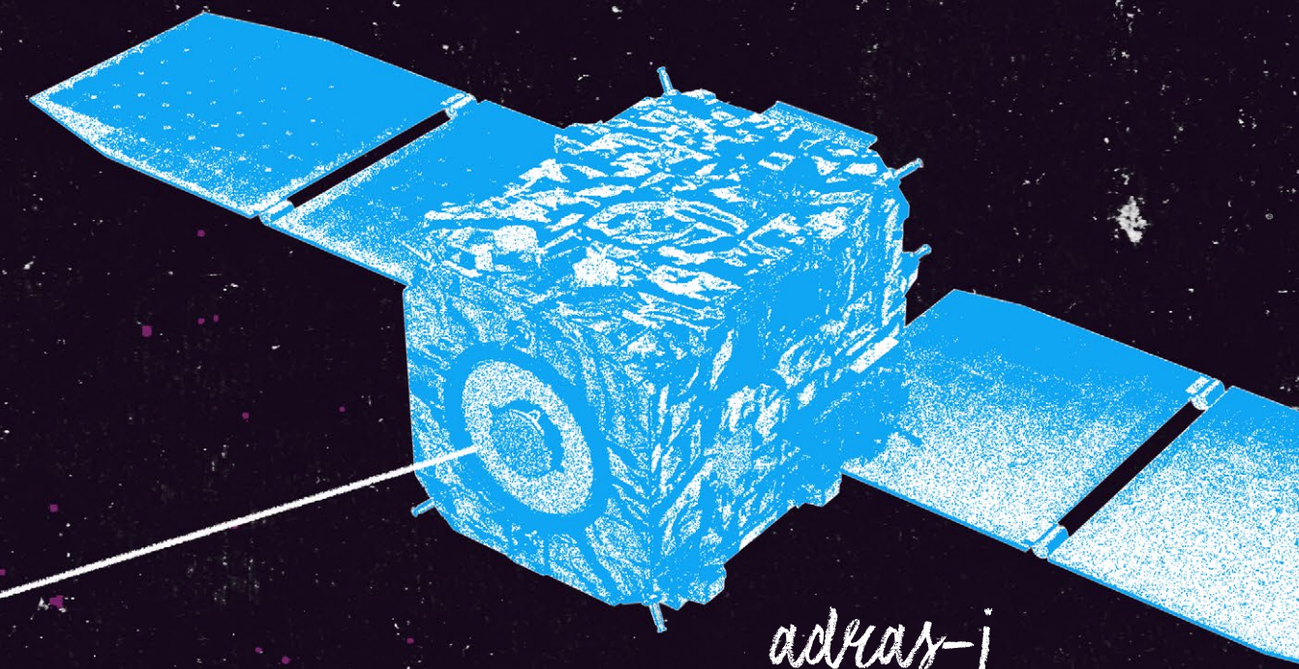
Their diverse backgrounds, spanning markets, cultures and regulations, turned every ESG discussion into a rich exchange of ideas and best practices for Europe's evolving space sector. The next two chapters introduce nine space companies and one research centre deeply embedded in the space industry sector, each at a distinct stage of their ESG journey. Six are established ESG players, including one young company with ESG at its core, and several with dedicated Human Resources (HR) teams. These organisations have integrated ESG into their operations in diverse and impactful ways (see Chapter 3). The remaining four are early-stage ESG innovators: purpose-driven startups with fresh ideas and a strong social and environmental mission, most still building the structures to make their vision a reality (see Chapter 4).

Together, they show the full spectrum of ESG in action: from the fresh energy and values of emerging businesses to the proven strategies of established ones. Their stories reveal what works and what doesn't, as well as how to turn ambition into real, lasting benefits for the environment, society and the European space industry. At the end of each organisation's story, you'll find a dedicated section on the industry's skills needs – a clear call to action for closing the gap between the space industry and academia.



MEET THE COMPANY:

Astroscale Ltd.



space debris

Founded in 2013, Astroscale has grown into a global player with offices in the UK, US, Europe and Japan, all united by one mission: making satellite operations more responsible and keeping Earth’s orbits safe for the long haul. Their business model puts both sustainability and people at the heart of everything they do: cutting environmental impact at every stage of a satellite’s life, from launch to end-of-life planning, while also prioritising the wellbeing of their team and beyond.
With innovations like debris removal, refuelling and in-orbit servicing, Astroscale isn’t just talking about a sustainable space industry - they’re helping to build it.

Key ESG Initiatives - Social Focus
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Flexible Working Hours: employees can follow core hours instead of a strict schedule, allowing them to manage personal commitments like school pickups, exercise or focused work time.

Hybrid Work Model: employees must be in the office two days a week, but teams can choose their in-office days flexibly.

Work from Abroad Policy: Astroscale recognises its diverse workforce and allows employees to work remotely from abroad for extended periods, particularly during holidays.

Nine-Day Fortnight: employees can extend their daily hours and in return take every other Friday off, with the entire company taking the same day off for a collective break.

Life Transition Support: improved support for employees facing menopause and increased awareness of shared parental leave.

Overcoming Challenges: Lessons From the Field
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Balancing business demands, regulations and employee satisfaction is no small feat. *Astroscale's flexible work policies have been well-received, but in a fast-moving industry, customers and suppliers often expect quick responses, and sometimes even externally arranged schedules, making it tricky to enforce clear boundaries.*

Lesson: the opportunity lies in turning this challenge into a strength. Astroscale is working to design policies that offer equal opportunities while respecting individual needs, using flexibility as a strategic tool for retention and engagement. The key lesson? Successful flexible work arrangements come from aligning employee needs with business priorities and legal requirements, so that everyone wins.

Bridging ESG gaps without overloading the team *is a growing challenge for a large, international company like Astroscale. As the company expands globally, different regulations in each country make it tough to create uniform ESG policies. Coordinating data collection and best practices across teams is complex, and every new initiative – whether a meeting, training or a rollout – demands time and money.*

Lesson: scaling ESG effectively means balancing ambition with capacity. Astroscale now prioritises the most important topics, measures its impact carefully and strengthens internal data collection to guide better decisions. This approach not only prevents burnout but also makes it easier to share best practices across all locations.

Overcoming resistance to knowledge-sharing is a major hurdle for Astroscale. *In the space industry, social and governance initiatives often sit within HR, but many companies don't have dedicated HR teams. This gap makes it harder to roll out governance-related ESG practices effectively and slows progress across the sector.*

Lesson: by fostering open conversations about career development and social impact, Astroscale sees a path to industry-wide change. True transformation won't happen in isolation – shared policies and collective action are essential for creating lasting cultural shifts, especially in social areas that are still undervalued and underrepresented in the space sector. Two of the Astroscale team are founding members of an HR network in the UK space sector, ConstellHR.

Lack of consistent ESG standards: *without a common ESG framework, governance and social responsibility can be treated as optional rather than essential. Standardised criteria would make ESG compliance a given, helping companies prioritise governance and social initiatives in their day-to-day operations.*

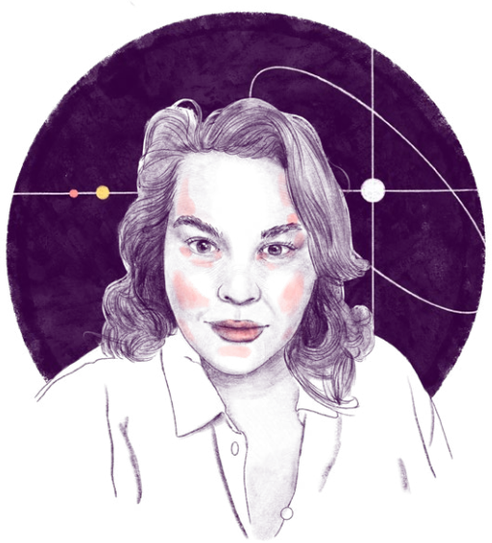
Lesson: Astroscale sees space conferences as valuable platforms for advancing ESG discussions and sharing practical implementation strategies. But with ESG expectations, regulations and labour laws varying widely from country to country, real progress will require global consensus. Collaboration between governments is key to setting consistent standards and metrics, making it easier to assess performance, compare results and accelerate ESG adoption across the industry.

A Call for Action - What Skills Are We Missing? \

Standardising ESG benchmarks, increasing HR funding and backing government initiatives can lead to a more accountable, people-centred space industry.

Advocating for policy alongside action will be integral across so many areas, from ESG to space sustainability and the responsible use of AI.

Continuing to expand on the integration of space to disciplines outside of engineering will help broaden the pool of people who are excited and equipped to join the sector – across law, business, psychology and so many other areas. Supporting the development of non-traditional routes into engineering and scientific roles in the space industry is also key to ensuring we have both the depth and variety of skills needed for the future of space. Vocational routes provide an important pathway for many individuals, which are currently vastly underutilised by the industry across most of Europe.



"Europe has ambitious space goals, but the industry won't grow without more people coming in and staying."

BETHAN MCAULAY,
Head of Talent at Astroscale

Astroscale is proving that ESG implementation in space isn't just about technology, it's about people. As the industry evolves toward sustainable and space operations, future professionals will need a strong combination of technical expertise and social skills. There is a growing demand for multidisciplinary engineers capable of designing reusable and repairable spacecraft, as well as professionals skilled in ESG practices, including social responsibility and inclusivity.

Quiz

How Much Do You Know? How is Astroscale addressing the lack of consistent ESG standards across countries?

- A *By avoiding ESG implementation in new markets*
- B *By hiring separate legal teams in every region*
- C *By advocating for collaboration among governments and standardisation*
- D *By outsourcing ESG compliance*

Correct Answer: C

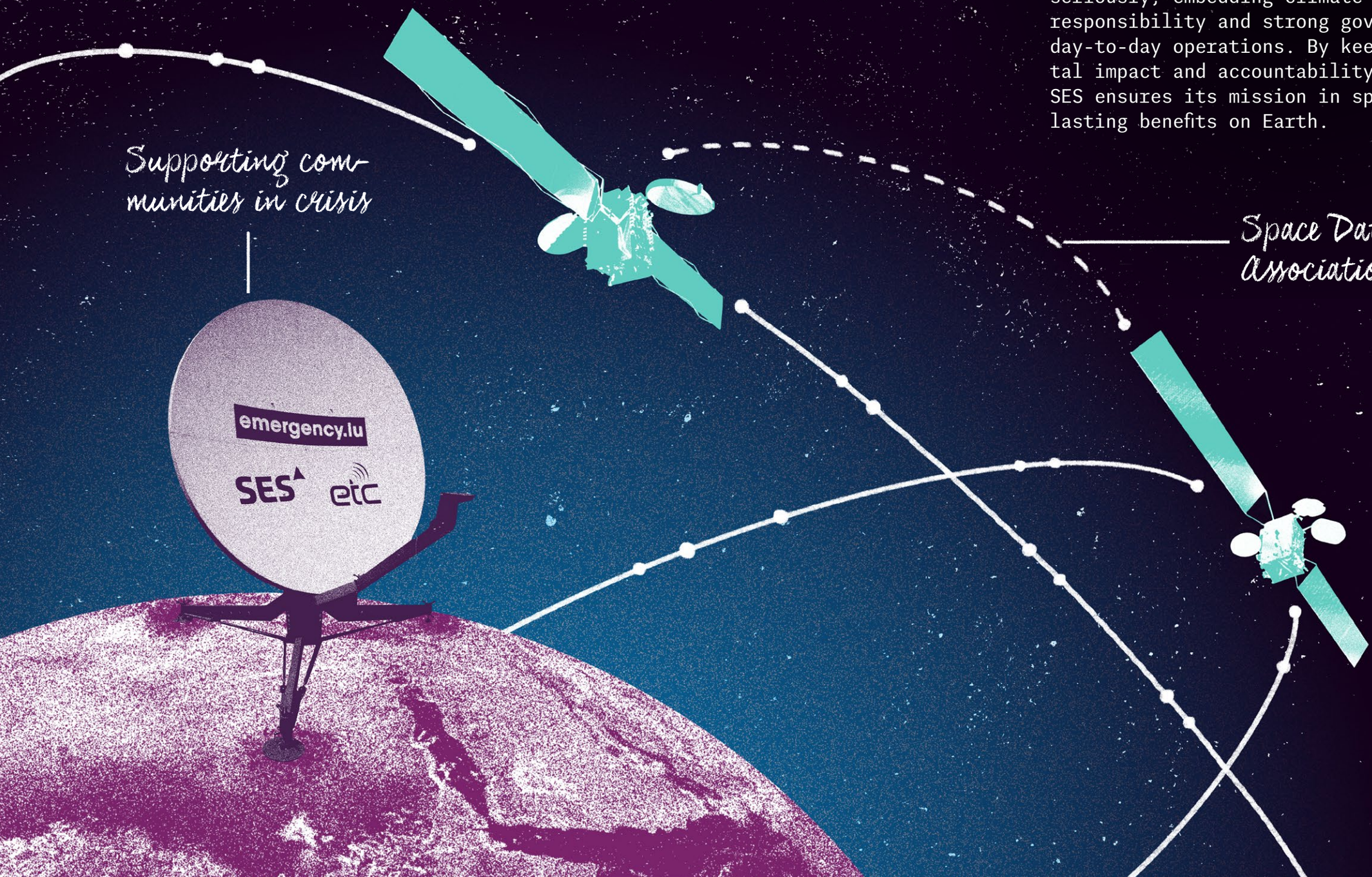
MEET THE COMPANY:

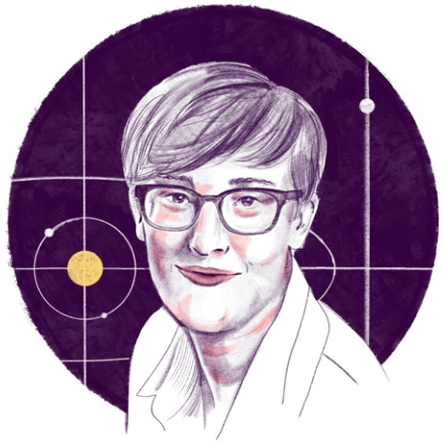
SES

Established in 1985 and headquartered in Luxembourg, with a strong presence in the United States, SES operates a multi-orbit network of 120+ satellites, backed by cutting-edge ground infrastructure and industry expertise. This setup enables SES to deliver high-quality video and data services to people around the globe. The company takes its ESG commitments seriously, embedding climate action, social responsibility and strong governance into its day-to-day operations. By keeping environmental impact and accountability at the core, SES ensures its mission in space creates lasting benefits on Earth.

Supporting communities in crisis

Space Data Association





"ESG at SES isn't just about meeting standards, it's about leading the way in responsible space operations, reducing our carbon footprint, and making a tangible social impact."

AMÉLIE WERBROUCK,
ESG Compliance and External Engagement Senior Specialist at SES

Key ESG Initiatives /

Green energy transition through energy efficiency and on-site renewable deployment: SES is exploring a shift towards enhanced energy efficiency across operations and renewable energy sourcing, ensuring safe, responsible operations to comply with industry standards.

Science Based Targets initiative through GHG management: SES has implemented data-driven tracking and reporting to reduce the company's environmental impact.

Sustainable mobility: SES encourages employees to adopt eco-friendly commuting habits through dedicated initiatives, e.g. the Luxembourg shuttle service, which connects the company's campus to the nearest train station, thereby cutting emissions through the use of electrical shuttles. On average, about 100 employees use the service daily.

Community and cross-team collaboration: SES's approach is collaboration with other departments and with external partners. To illustrate this, the 'Giving Back Days' initiative was introduced to support local communities through hands-on volunteer efforts from employees.

Digital inclusion: SES has helped bring online education, government services and healthcare to underserved communities, narrowing the digital divide and opening new opportunities.

ESG training & awareness: SES added live training sessions to its on-demand e-learning platform, making ESG education more accessible and engaging for employees.

Sustainable procurement: SES has strengthened supply chain practices to align with ESG principles, reinforcing ethical sourcing and responsible resource management.

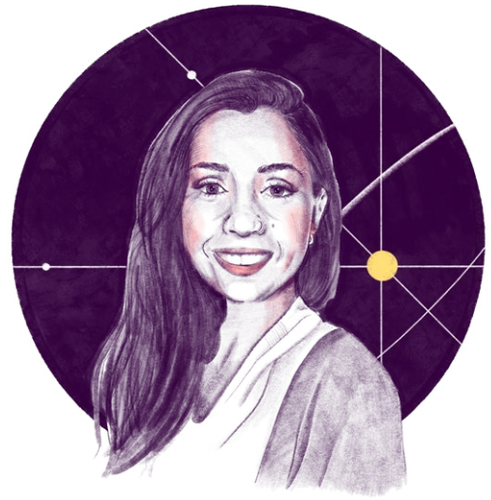
Overcoming Challenges: Lessons From the Field /

Cross-department data collection: *collecting ESG data is often a manual exercise that relies heavily on Excel, making it hard to maintain consistent and accurate information. Environmental data has faced delays, complicating timely reporting and alignment with financial deadlines. Before SES formed a dedicated ESG team, relevant data was widely dispersed across the organisation.*

Lesson: the company invested in upskilling employees through training sessions, workshops and business talks to build a strong, ESG-aware culture. By making ESG a shared responsibility and ensuring everyone understands the goals and benefits, we ensure that all our employees are well-equipped to contribute effectively.

Data-driven decision making: *the company needed more automated tools to streamline ESG tracking and meet stricter reporting requirements. The goal is to make ESG data as accessible and reliable as financial data, allowing better strategic planning and compliance.*

Lesson: SES shifted from broad commitments to clear, measurable Key Performance Indicators (KPIs) – aligning targets with strategy to track progress and embed ESG into business decisions.



"At some point, it's essential to move from aspirational goals to measurable KPIs. Pursuing too many objectives can dilute focus and create complexity, so it's critical to prioritise a few strategic goals and begin with a targeted set of key performance indicators."

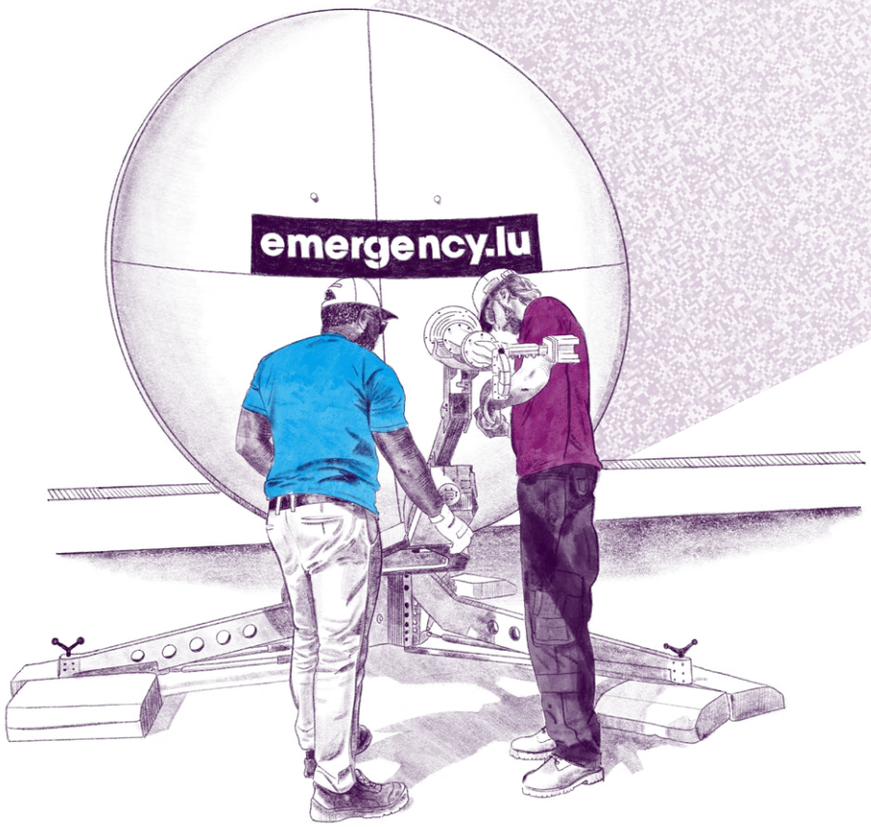
LORENZA SCARINCI,
ESG Project Manager at SES

Regulatory complexity, pressure and lack of ESG standards: *adapting to evolving ESG regulations requires alignment with business goals. The ESG sector lacks standardised tools for data collection, making it difficult to ensure consistency and compare data across companies. Recent regulations, especially the Corporate Sustainability Reporting Directive (CSRD), heighten the need for thorough data collection and stricter reporting standards.*

Lesson: we need to secure leadership buy-in for ESG, foster cross-department collaboration and allow teams to progress at their own pace. This will allow us to build a lasting ESG culture and drive the call for standardised reporting. Early cross-department ESG collaboration enables ownership, eases concerns and helps amplify the call for standardised reporting to policymakers.

Limited resources: *at first, ESG responsibilities at SES were centralised, which led to bottlenecks and made collaboration with other departments difficult, as ESG tasks were often seen as extra work. A small, dedicated ESG team was later created to lead initiatives, but with limited resources, they could not manage all the tasks alone.*

Lesson: from this, SES has learnt that success depends on engaging people early, both inside and outside the organisation. By encouraging behavioural change and sharing responsibility across departments, SES has turned ESG into a collective effort. Initiatives like the shuttle service have proved effective, but lasting change in areas like commuting and energy use requires continuous engagement. Through ongoing education and strong partnerships across the value chain, SES now frames ESG reporting as everyone's responsibility, rather than an isolated task – ensuring greater impact and stronger buy-in.



A Call for Action - What Skills Are We Missing?

ESG in the space industry goes beyond initiatives. It's about shifting mindsets, improving systems and embedding ESG into the heart of the business. SES aims at enhancing business competitiveness through ESG integration. To achieve this and to drive a successful ESG programme, a blend of qualitative and quantitative skills is needed, and the company is working on strengthening its data-driven focus. Future professionals will need strong skills in data analysis, reporting tools and digital platforms alongside communication, collaboration and change management. They must also be ready to work across cultures, navigate international standards and adapt strategies to diverse regional contexts – turning ESG from a short-term goal into a long-term driver of real impact.

Quiz

How Much Do You Know? ESG IN ACTION: Which of these is not an SES ESG initiative?

A *Luxembourg Shuttle Service*
B *Giving Back Days*
C *Space Tourism Rewards Programme*

Correct Answer: C

MEET THE COMPANY:

Science Park Graz GmbH (SPG)

200 high-tech projects

Space Connection

For over 23 years, Science Park Graz has been empowering emerging entrepreneurs, helping more than 210 high-tech projects evolve into thriving companies. Based in Austria, it is part of the AplusB (Academia plus Business) network as well as of the European Space Agency's Business Incubation Centre (ESA BIC) network, supporting the commercialisation of innovative space-enabled products and services. Science Park Graz offers tailored support to early-stage startups, combining mentoring, funding opportunities and the expertise of a dedicated team to turn innovative ideas into successful businesses.

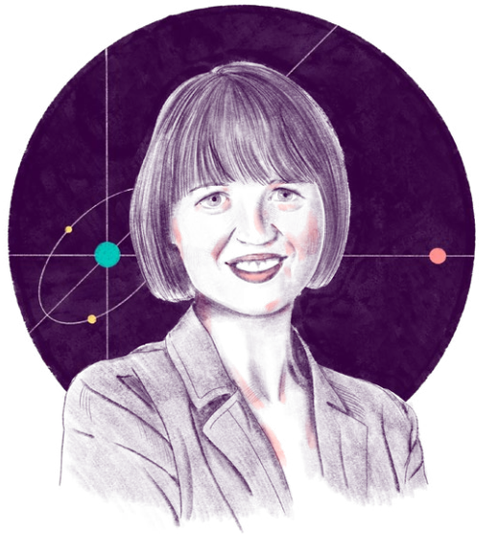
Since 2002, the high-tech incubator has taken a multifaceted approach to embedding ESG principles into the Austrian startup journey. From day one, founders are encouraged to integrate ESG considerations into their business models, ensuring visionary ideas develop into successful and responsible companies. Science Park Graz's mission is simple: turn dreamers into doers, while making ESG a natural part of building a resilient future.

Key ESG Initiatives /

Early-stage training: even before a startup incubation begins, Science Park Graz runs a structured academy programme that offers aspiring founders workshops on the United Nations (UN) Sustainable Development Goals (SDGs), sustainable business models and diversity and gender equality, laying a strong foundation for responsible entrepreneurship.

ESG reporting as a precondition: in several of their programmes, ESG indicators are built into the evaluation and selection criteria. By supporting startups developing green technologies or social impact, Science Park Graz amplifies ESG outcomes across the ecosystem. This 'impact through others' approach reflects the park's belief that high-tech as well as space startups are especially open to shaping business models around ESG impact.

Gender equality radar: alongside internal diversity and inclusion initiatives to track progress and promote equal representation, Science Park Graz requires incubated startups to attend workshops on gender bias, diversity and equity. Founders often seek guidance on building more inclusive co-founding teams, making this a key part of SPG's support.



"It can be difficult for startups to find the resources needed to focus on sustainability at an early stage, but it's important for us to teach them about the ESG aspects so they can build their business with the right mindset from the start."

INES ŠUH,
Senior Innovation Consultant
at Science Park Graz

Overcoming Challenges: Lessons From the Field /

Gap between institutional expectations and market demand: *public institutions, such as funding bodies or governmental agencies, increasingly expect startups to integrate ESG into their business models, yet many clients still operate with traditional mindsets and don't prioritise ESG reporting. For early-stage founders with limited resources, this creates a tough balancing act – meeting these requirements while trying to gain traction in a market that may not yet value ESG.*

Lesson: Science Park Graz has learnt that starting ESG integration early in the incubation process turns it from a compliance task into a growth strategy. By providing practical ways for founders to apply ESG frameworks, they help startups embed these principles into their core business, ensuring they're prepared for long-term success while building socially responsible and sustainable companies.

High costs in the short-term: *while startups often value sustainable options, these choices can be financially out of reach in the short term. For many, especially those in the pre-revenue phase, immediate cost-effectiveness tends to outweigh long-term sustainability goals.*

Lesson: startups are often more adaptable than larger companies. Providing them with the right tools, resources and knowledge early on empowers them to grow while building business models that are both sustainable and competitive from the start.

Detachment between policies and funding: *startups may receive grants or incentives tied to ESG goals, yet face regulations, such as complex incorporation procedures, high taxes and limited hiring flexibility, that make operating sustainably a challenge for small ventures.*

Lesson: in Austria, public financing institutions are increasingly asking applicants to define their ESG approach, even when their products aren't directly ESG-focused. This requirement has encouraged startups to take a closer look at their operational practices and the values they represent, leading to more intentional and responsible business strategies.

Greenwashing risk: *the push for rapid startup growth can clash with ESG principles, as speed often overshadows financial stability, social responsibility and environmental stewardship. Science Park Graz questions whether the 'scale fast' model is truly sustainable, arguing that it can lead to superficial ESG claims rather than genuine impact.*

Lesson: progress is not linear and combating greenwashing requires more than quick fixes – it's about shifting mindsets over time. While a single workshop may not directly transform a business model, the cumulative effect is clear: startups are now approaching Science Park Graz for help in finding, for instance, female co-founders or addressing gender biases. These actions show that genuine ESG values are taking root, even if the full impact emerges gradually.

A Call for Action - What Skills Are We Missing? /

Science Park Graz stresses the importance of diversity from day one, encouraging startups to build inclusive founding teams. Skills like self-awareness, active listening and inclusive leadership are no longer optional – they're essential. Future professionals must be able to make real-world decisions that balance costs, impacts and long-term results, keeping ESG goals in focus without losing market competitiveness. Many startups arrive with limited ESG knowledge but show strong willingness to learn when presented with relevant content and examples applicable to their cases. Additionally, a discussion between the startups on the issues that they are facing in their everyday work is very meaningful to them. They learn from each other how to deal with those issues they are not yet experienced with.

Introducing sustainable development and inclusive business models at the university level would help startups gain valuable insights into innovative business practices and their potential impact on growth. For both startups and incubators, fostering curiosity, adaptability and openness to evolving standards is essential for driving lasting change.

Quiz

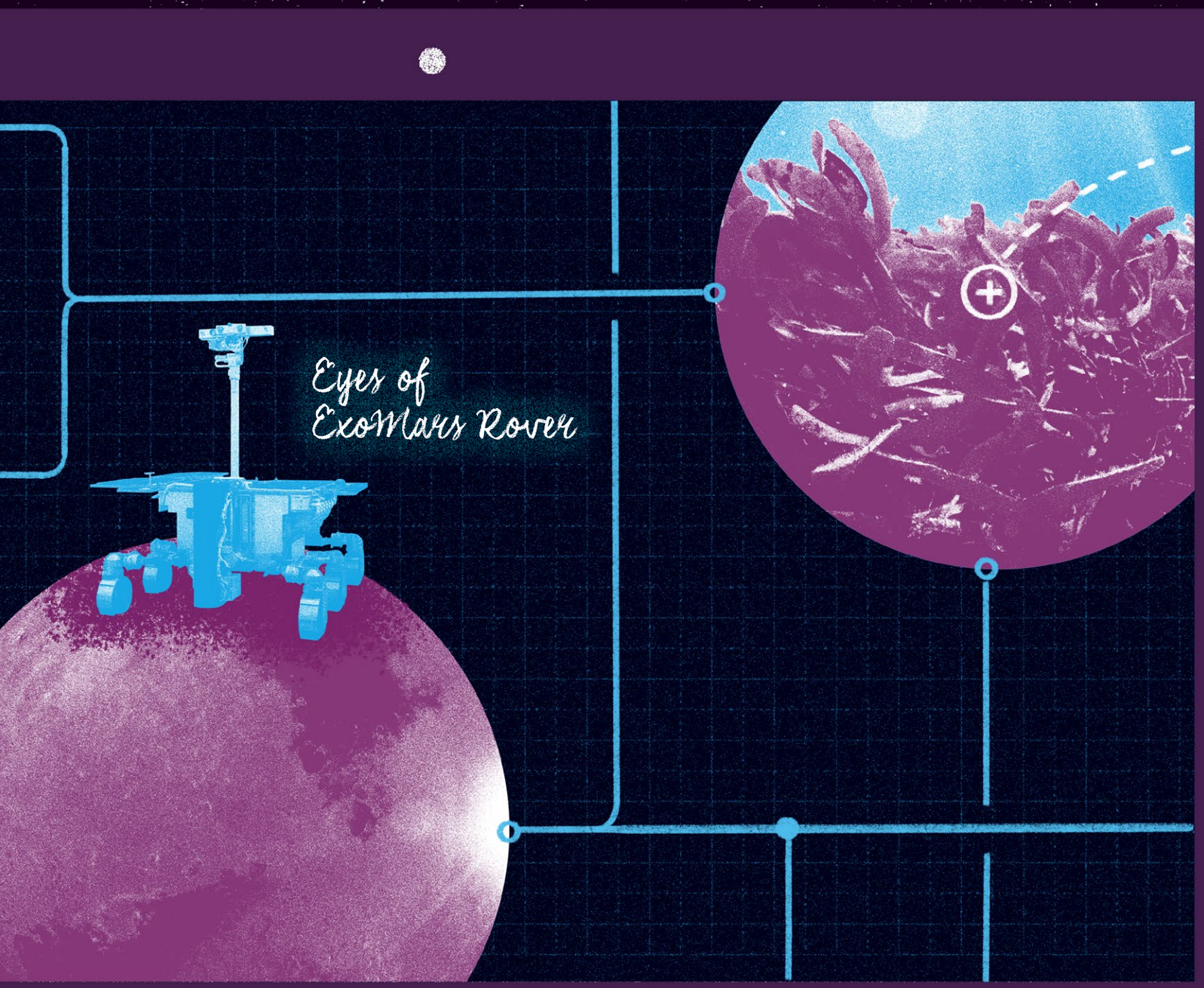
How Much Do You Know? What challenge do startups face when dealing with traditional market clients in the context of ESG?

A *Clients request too many ESG certifications*
B *Clients already have strong ESG goals*
C *Clients often don't prioritise ESG, making integration difficult*
D *Clients force startups to use only local materials*

Correct Answer: C

MEET THE COMPANY:

CGI



Founded in 1976, CGI is a multinational IT and business consulting services firm with nearly 50 years of experience helping industries design and implement operating architectures tailored to their needs. Headquartered in Montreal, CGI operates in numerous countries worldwide, including many across Europe. Its IT infrastructure is supported by data centres that manage secure storage and complex processing for both internal operations and client services.

CGI's ESG commitment is rooted in its core values, in projects delivered in collaboration with clients, and in its operating practices, supply chain management and community service initiatives. CGI's commitments align with the UN Global Compact's 10 principles and support the achievement of the UN's 17 SDGs.

Key ESG Initiatives /

Leadership on board: at CGI, ESG is one of six core values embedded deeply in its services. The Chief Executive Officer's (CEO) active involvement ensures that ESG is not just a side initiative but fully integrated into the company's overall strategy.

Social and governance focus: CGI focuses on the social and governance aspects of ESG, promoting an inclusive work environment, employee wellbeing and community engagement. The company prioritises addressing bias and ensuring decision-making aligns with these principles. Through strong governance and collaborative processes, CGI fosters responsible business practices both internally and in its relationships with clients, partners and suppliers. Globally, CGI creates opportunities for underrepresented groups in tech, while its HR policy ensures an equitable environment that supports employee growth, health and wellbeing.

Ethical business conduct & transparency: CGI's ethics and compliance programme is anchored in its *Code of Ethics and Business Conduct and Third-Party Code of Ethics*. These frameworks reflect the company's commitment to high ethical standards and full compliance with laws and regulations. CGI works to embed these principles into daily operations, ensuring they drive genuine, long-term impact across all levels – and don't just appear in reports.

Volunteering and Community Engagement: CGI's strategic ESG goal is to be a responsible corporate citizen by empowering employees to engage in their communities. Starting with simple initiatives like tree planting and supporting the elderly, the company has expanded to more impactful projects, such as helping seniors with cybersecurity, implementing a Customer Relationship Management (CRM) for a museum, and developing an app for participant tracking and safety in the Swim to Fight Cancer event.

Prevention and mitigation training: CGI provides ongoing education for its procurement team on critical issues such as modern slavery, regularly refreshing the curriculum to address emerging ESG challenges and ensure best practices are consistently applied.

Overcoming Challenges: Lessons From the Field /

Difficulties sourcing renewable energy for data centres: sourcing renewable energy for CGI's data centres has proven difficult, especially in rural areas reliant on coal power. *In some regions, switching to cleaner energy risked local job losses, creating a dilemma between advancing ESG goals and safeguarding livelihoods. This highlighted the complex balance between environmental responsibility and social impact in local economic development.*

Lesson: CGI learnt the value of solutions that address both priorities. By partnering with local associations like Anders Reizen in The Netherlands, they helped bring green energy to the attention of landlords and governments, showing that collaborative approaches can promote sustainability, strengthen the local economy and protect jobs.

"Every standard that you commit to comes with a cost and a lesson. Commit and you will learn."

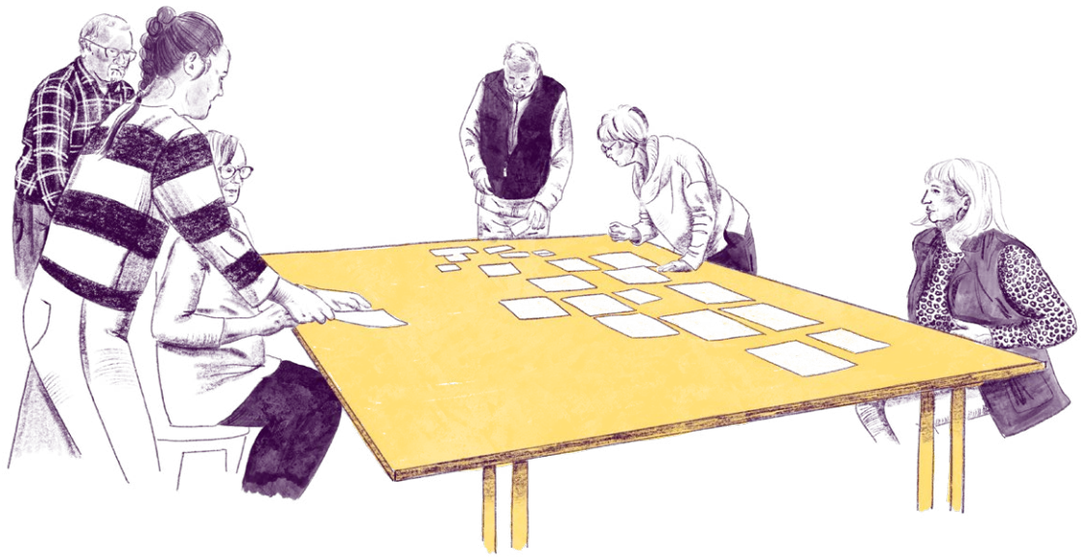
MARION BRAAMS,
Vice-President, Consulting Expert at Northwest and Central-East Europe at CGI

Lack of authentic data: *without reliable, verifiable information, it's hard to know whether progress is real or if efforts are simply greenwashing. While many ESG frameworks and free resources make it possible to advance quickly, starting late compared to peers can add pressure to show results fast.*

Lesson: start with achievable goals. CGI started small, setting realistic ESG objectives before gradually expanding its ambitions. This deliberate approach avoided rushed, superficial reporting and allowed the company to build a solid foundation. Over time, a stronger focus on data-driven decision-making has sharpened CGI's ESG strategy and delivered more meaningful results.

Business trip contradictions: *CGI faces the ongoing tension between operational needs and sustainability goals when it comes to business travel. While essential for client relationships and project delivery, travel increases the company's carbon footprint. Choices about whether to travel, as well as what means to use, require balancing cost, efficiency and environmental impact, making it challenging to align business priorities with ESG commitments.*

Lesson: effective ESG reporting is a long-term effort. Achieving meaningful change requires years of data collection to fully understand impacts and refine strategy. CGI has learnt that success hinges on patience, cross-departmental collaboration and adaptability – whether engaging local authorities or having transparent ESG discussions with clients and colleagues – to ensure business objectives and sustainability targets progress together.



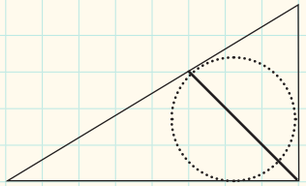
A Call for Action - What Skills Are We Missing? /

Professionals in the space sector need more than cutting-edge technical expertise: you also need all the other skills that are needed in highly technical, high-resilience environments. Mental health, stress management and people skills are essential in this sector. CGI emphasises that on the technical side, data is everything. Solid data management is key to tracking companies' performance and ensuring results are transparent, measurable and truly impactful – and not just smart-sounding buzzwords. If it gets measured, it gets done.

Quiz

How Much Do You Know? SKILLS FOR THE FUTURE
- According to CGI, what is considered 'everything' on the technical side of the space sector?

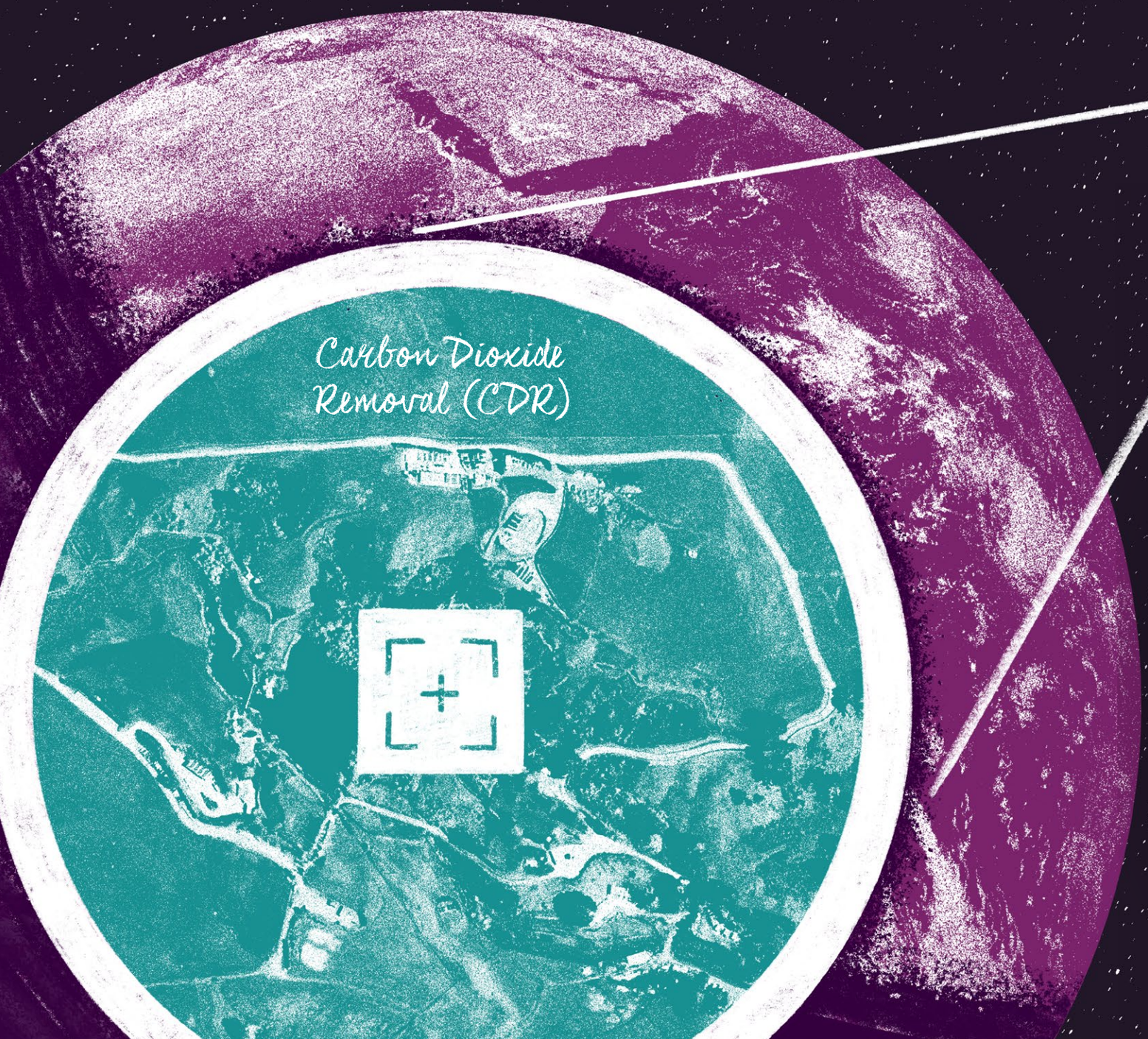
A *Innovation*
B *Data*
C *Design*
D *Strategy*

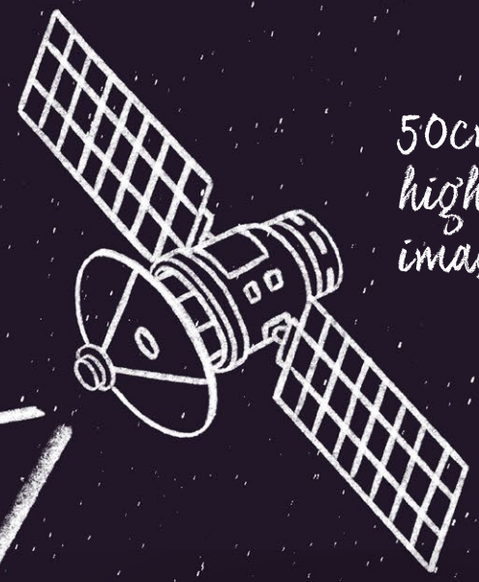


Correct Answer: B

MEET THE COMPANY:

OXO Earth





50cm/75cm high-resolution imagery

OXO Earth, a Munich-based startup founded three years ago, has embedded ESG principles at the core of its mission since its inception. The company is driven by a commitment to connect technology and nature in order to tackle climate change. Specialising in satellite-powered measurement and verification systems, OXO Earth tracks the environmental impact of forests, with a focus on carbon removal and biodiversity restoration.

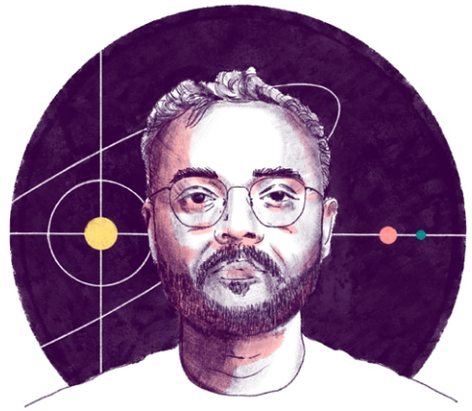
OXO Earth goes beyond data analysis to encourage businesses to understand the broader environmental and local context of their actions. Through Earth Observation (EO) data, the company not only monitors progress but actively supports carbon capture and biodiversity recovery, ensuring that sustainability is a foundational aspect of every decision and solution.

Key ESG Initiatives - Environmental Focus /

Approach to tackling environmental impact: at OXO Earth, impact is at the core of company DNA. The primary KPI is every tonne of CO_2 removed, delivering true negative emissions through carbon removal. Using an innovative Improved Forest Management (IFM) method, the startup limits reversal risk, ensuring that removals are safe, durable and free from the reputation and greenwashing concerns that often surround forest carbon storage. This makes OXO's approach a credible and secure pathway for buyers seeking to invest in high-integrity climate action.

Space technology: thanks to EO, OXO Earth monitors large areas of forests consistently and cost-effectively, allowing the company to better scale its work and track social and environmental progress across many locations.

Knowledge sharing and capacity building: the startup is continuously educating employees via 'lunch & learn' formats and by giving employees the time and money for courses on sustainable finance, product carbon footprint and life-cycle assessments. While this may seem like a big investment in the short-term, employees are paying it back in the long run.



"Sustainability is the long-term capacity of systems to endure, regenerate and balance environmental, social and economic needs. ESG, by contrast, is an accounting framework – a set of measurable criteria that investors use to assess a company's exposure to environmental, social and governance risks. In short: sustainability is the goal; ESG is the scorecard..."

HANS FARID KREH,
Founder and CEO at OXO Earth Technologies GmbH

Overcoming Challenges: Lessons From the Field /

ESG vs sustainability reporting: *confusing these two can slow down progress. ESG frameworks can enhance transparency; however, they are frequently regarded as the ultimate objective rather than a foundational step. Many companies overlook the necessity of examining how their actions affect the environment and society.*

Lesson: for OXO Earth, it became evident that prioritising impact is essential, and that ESG reporting should facilitate meaningful change.

Lack of consolidated regulation on carbon removal: *many companies are still focused on reporting environmental data but aren't making real changes to reduce or remove their own emissions. While carbon removal is essential for addressing climate change, it's not treated as a must-have.*

Lesson: it became clear that market incentives established through policies are essential; in their absence, even the most groundbreaking climate solutions struggle to scale. Consolidated regulations and political backing aimed at reducing carbon emissions proved to be vital for advancing ESG objectives.

Data alone is not enough: *often data is disconnected from the real impact it represents. Companies are tracking carbon emissions without fully understanding how those emissions affect people and entire ecosystems.*

Lesson: focus on impact over image – OXO Earth has learned the value of staying true to its mission, even when the market isn't quite ready. The business has found that honest conversations and bold ideas can influence clients, policies and other peers working in space.

Funding difficulties and short-term thinking: *a few years ago, enthusiasm and investor interest in climate technology were high. With current geopolitical shifts, that momentum has waned, which is discouraging young startups aiming to grow in this direction. Many businesses and political leaders are focused on short-term goals, often neglecting to prioritise long-term issues such as climate change and social disparities.*

Lesson: real progress takes leaders who prioritise long-term results over quick wins and commit to solutions that may take years to show results. That kind of patience and dedication is always worth it.

A Call for Action - What Skills Are We Missing? /

OXO Earth emphasises that technical skills alone aren't enough – context matters just as much. It's not only about knowing how much carbon is emitted or water is used, but also understanding where, why and what the consequences are. This demands critical thinking and the ability to connect environmental knowledge with social, political and economic perspectives. What stood out in OXO Earth's journey was that people with a background in life-cycle assessments or systems thinking were able to add high value fast.

To create real impact, OXO Earth believes future professionals must be purpose-driven, entrepreneurial and adaptable, ready to thrive in fast-paced environments where innovation and long-term vision go hand in hand. Above all, resilience is the key skill in sustainability roles. Driving meaningful change takes time, especially when that change needs to occur on a systems level.

At a broader level, effective ESG reporting requires a diverse skill set: regulatory knowledge to navigate frameworks like GRI, CSRD and the EU Taxonomy; strong data management to quantify impacts and maintain audit-ready integrity; financial acumen to connect sustainability to business performance; and the ability to identify material issues through stakeholder engagement. Equally important are communication and storytelling skills, turning complex data into clear, compelling narratives.

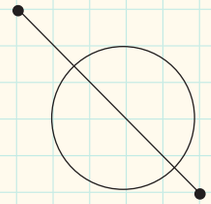
Quiz

How Much Do You Know? DATA TRAP - What key lesson did OXO Earth learn about environmental data?

A *It's only useful if connected to real-world impact*

B *It should always be stored in the cloud*

C *More spreadsheets = better outcomes*

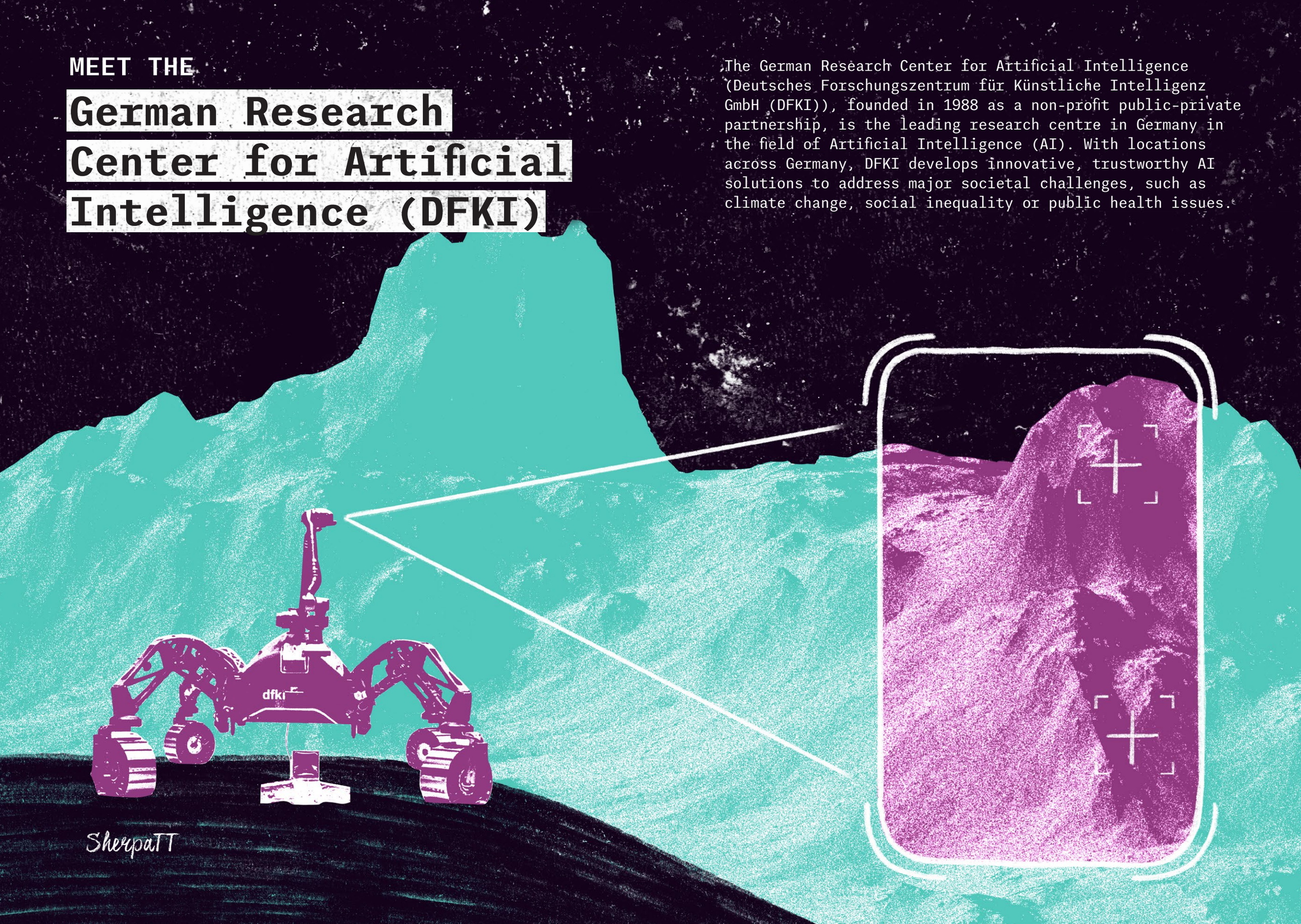


Correct Answer: A

MEET THE

German Research Center for Artificial Intelligence (DFKI)

The German Research Center for Artificial Intelligence (Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DFKI)), founded in 1988 as a non-profit public-private partnership, is the leading research centre in Germany in the field of Artificial Intelligence (AI). With locations across Germany, DFKI develops innovative, trustworthy AI solutions to address major societal challenges, such as climate change, social inequality or public health issues.



SherpaTT

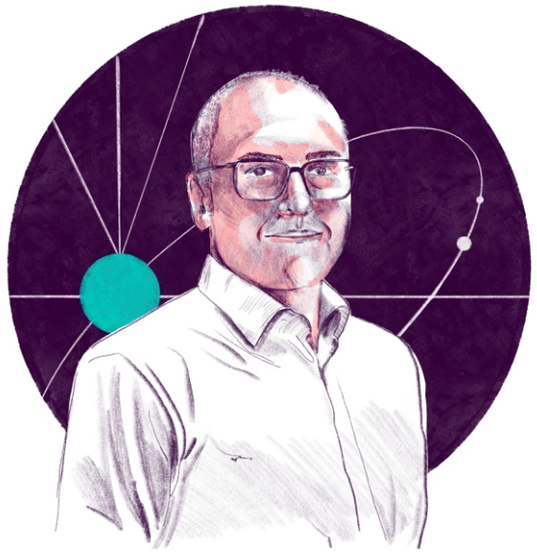
We include DFKI within the space industry because it plays a pivotal role in strengthening Europe's capabilities through its collaborations with ESA, such as ESA_Lab@ DFKI and AI4EO, applying advanced AI to satellites, Earth Observation (EO) and space safety. The DFKI Robotics Innovation Center develops state-of-the-art systems for exploration, servicing and debris removal, thereby reinforcing Europe's industry leadership in space technology. Guided by its 'AI for humanity' mission, DFKI combines scientific excellence with ESG responsibility, ensuring the European space workforce remains competitive while serving the public good.

Key ESG Initiatives /

DFKI4planet initiative: DFKI aims to develop intelligent and sustainable AI by enhancing energy and resource efficiency and integrating ESG principles early in the design process. Projects like ESCADE (see Chapter 6) illustrate how frugal innovation and edge computing can improve energy efficiency across the technology stack. Another key objective is to use AI to tackle societal and environmental challenges such as climate protection, circular economy, biodiversity and the energy transition. These efforts are coordinated through the DFKI4planet Competence Center.

Circular Economy – Green-AI Hub: DFKI focuses on developing modular and reconfigurable robotic system solutions to enhance the circularity and reuse of materials in future space missions, thereby extending the lifespan and flexibility of equipment, among others. As part of these efforts, DFKI is coordinating the Green-AI Hub, an initiative to help businesses boost resource efficiency using AI, with up to 20 pilot projects to be delivered by 2025.

Gender equality plan: DFKI's plan shapes both recruitment and leadership development, ensuring equal opportunities at all levels. It complements a broad range of educational pathways, from internships and thesis projects to early-stage research roles, all designed to attract and nurture diverse talent.



"Events such as Girls' Day and Future Day introduce students especially young girls, to robotics and AI at an early stage, opening doors that might otherwise remain closed"

DR. ING. MEHMED YÜKSEL,
Team Leader Space Robotics and Diversity Officer at DFKI

Codes of conduct: DFKI ensures that its research initiatives are transparent and human-centred, with ethics remaining central to its culture and decision-making processes. To illustrate this, the Compliance Department, Ethics Board and the AG Diversity and Gender Equality now report directly to Executive Management.

Energy-efficient AI: DFKI prioritises sustainability by continuously monitoring energy usage, committing to sourcing 100% green electricity and developing a new Berlin facility that has been awarded the highest gold certification by the German Sustainable Building Council (DGNB).

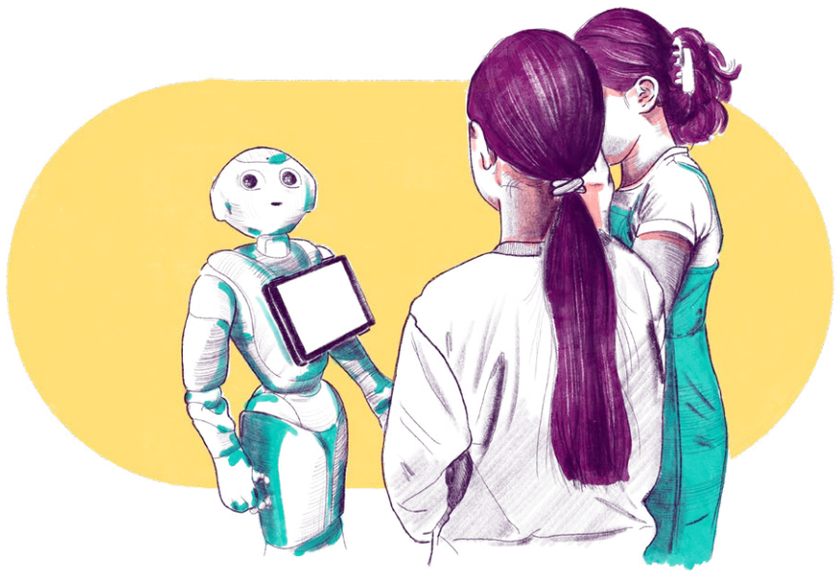
Overcoming Challenges: Lessons From the Field /

Limited resources and political constraints: *DFKI's capacity to expand ESG integration and talent development frequently depends on public funding. External factors, such as export controls, geopolitical tensions and shifting political priorities, can restrict participation in advanced technology projects and hinder information sharing. In some cases, political changes have even suspended established scientific collaborations, showing how quickly strong partnerships can be disrupted.*

Lesson: adaptability as a core strategy. DFKI has learnt that success in such an environment requires starting early, building inclusively and designing initiatives with a long-term purpose. Navigating funding constraints and political shifts demands flexibility, proactive planning and a readiness to adjust as priorities and circumstances evolve.

Integrating ESG thoroughly across teams: *making ESG part of everyday work. While DFKI already has strong initiatives, such as a gender equality plan and a code of conduct, the real challenge lies in weaving ESG into the fabric of all its work processes. That involves raising awareness, encouraging participation and improving tools to track progress – not a small task in fast-moving fields such as robotics and AI.*

Lesson: ESG works best when it's everyone's responsibility. It isn't a side project – it should be a mindset shared by every team and embedded into every project. Long-term impact comes from consistent, inclusive action – for example, running programmes such as Girls' Day and student internships that spark interest in science and technology among young people and help shape their future career paths.



A Call for Action - What Skills Are We Missing? /

As ESG principles become central to AI and robotics in space, tomorrow's professionals will need more than just technical expertise. They need to understand environmental impact, energy efficiency, circular design and how to create adaptable, resource-efficient systems with long lifespans. Space professionals should also be able to work across disciplines, assess the societal implications of technology and build inclusive, collaborative teams. In addition to engineering skills (mechanics, electronics, software, systems engineering, material science), they will need expertise in data sciences, AI, space manufacturing and robotics assembly.

Equally important are skills in ethical reasoning, respecting space laws, ensuring transparency, engaging stakeholders and making informed decisions – especially in sectors like space, where technology directly impacts lives and the environment. Updating space curricula to integrate ESG principles into technical education will equip graduates to tackle complex challenges while meeting the evolving demands of forward-thinking space organisations.

The future space ecosystem's global footprint – encompassing resource consumption, carbon emissions, space debris and unequal benefits – presents significant challenges for Earth and humanity. This calls for integrating social impact and environmental responsibility into the ecosystem. Future professionals must therefore combine sustainable design and global benefits with technical expertise and strong ethical judgment.

Quiz

How Much Do You Know? How does DFKI support the circular economy in space missions?

A *By using only solar-powered robots*

B *By producing disposable equipment for quick replacement*

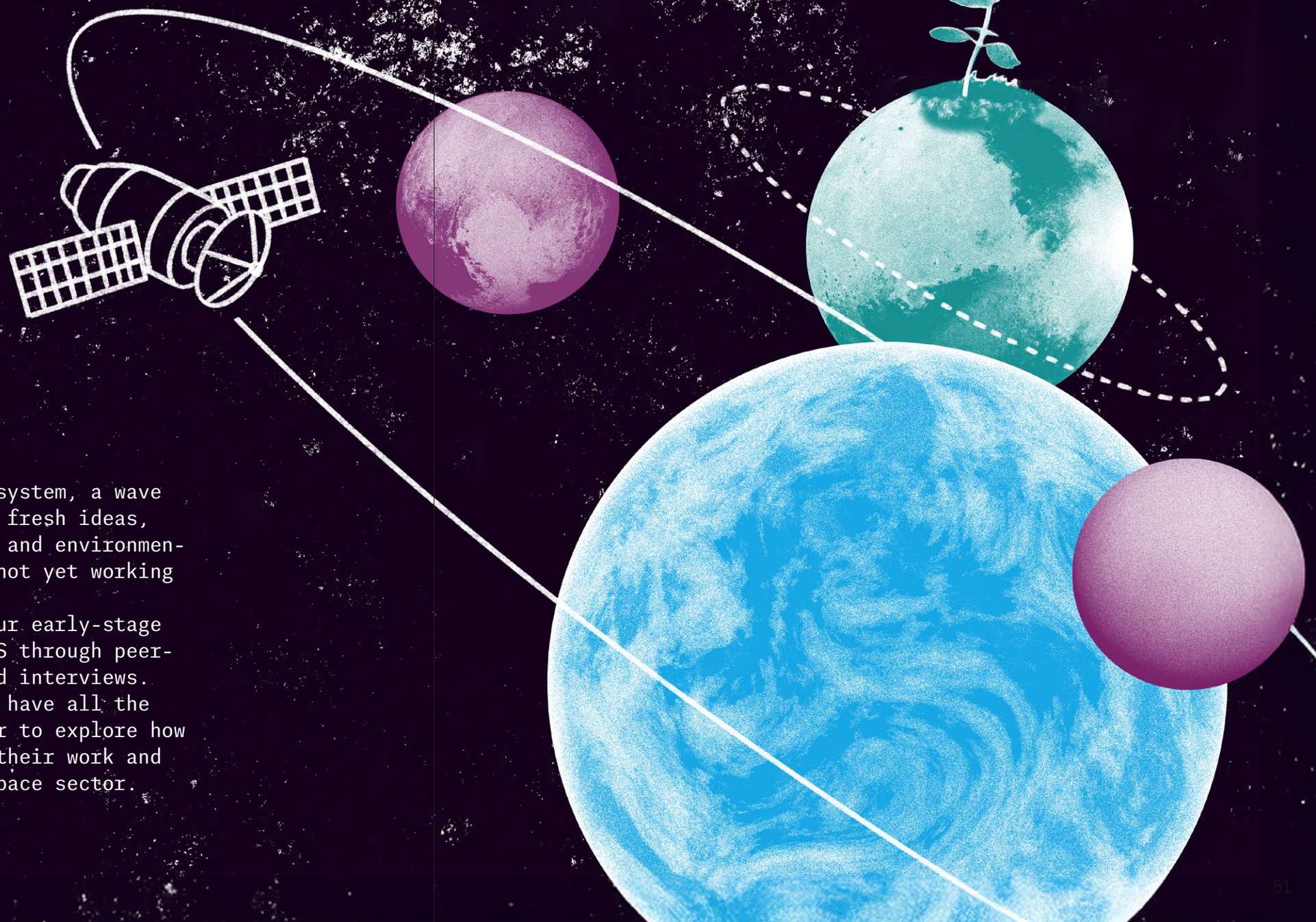
C *By modular, resilient and reconfigurable robotic systems and AI solutions for the space ecosystems of the future*

D *By banning plastic from labs*

Correct Answer: C

4. Additional Insights:

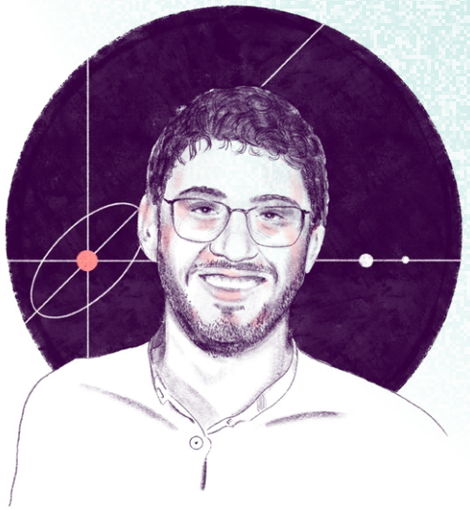
ESG Highlights From Other Key Participants



In Europe’s growing space ecosystem, a wave of young startups is bringing fresh ideas, bold missions and real social and environmental impact - even if they’re not yet working with specific ESG frameworks.
We’re excited to spotlight four early-stage companies that joined ASTRAIOS through peer-to-peer learning workshops and interviews. They readily admit they don’t have all the answers yet, but they’re eager to explore how ESG practices can strengthen their work and amplify their impact in the space sector.

Caius
/

Founded in Greece in 2022, Caius uses AI and satellite data to protect natural environments, promote sustainable tourism and support rural communities. Born from university research and a love of hiking, their first product maps and monitors forest trails, blending cutting-edge tech with a passion for the environment and social wellbeing.

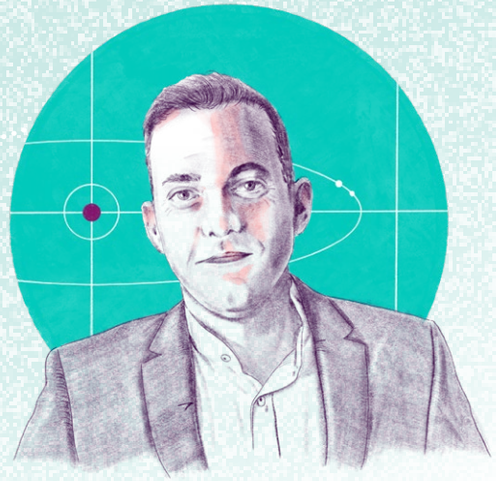


"For us, enhancing the quality of life in rural areas is the top priority. From this, a harmonious coexistence with the environment flows naturally, together with its protection and the responsible use of its resources."

GEORGIOS MENDRINOS, Chief Executive Officer at Caius

WaltR
/

Since 2018, France-based WaltR has been transforming environmental responsibility into tangible action. By leveraging satellite imaging and ground measurements, the company helps organisations measure and reduce emissions, enhance employee health and protect communities. Grounded in ESG principles, WaltR provides the data businesses need to make transparent, ethical and climate-positive decisions.

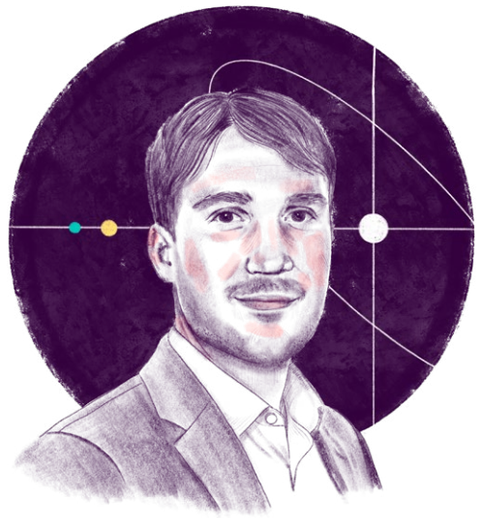


"At WaltR, we see ESG practices not only as a compliance requirement but as a driver of innovation and long-term value. By embedding ESG into our work, we strengthen transparency, support sustainable finance and help industries and authorities make informed decisions that reduce environmental impact."

PETROS MASOURIDIS,
Head of Business development Europe at WaltR

UrbanSens
/

UrbanSens, a German company founded in 2023, provides precise, localised insights on climate risks such as floods, heatwaves and other natural hazards. By combining Earth Observation data with Internet of Things (IoT) measurements, the company translates complex research into actionable intelligence that supports utility companies, energy providers and municipalities in sustainable planning and strengthening their resilience towards environmental challenges.



"At UrbanSens, we view ESG practices as the framework that links environmental data to real-world impact. They provide the structure to transform climate risk insights into decisions that build resilience and long-term value."

NILS KARGES,
Co-Founder at UrbanSens

Dreamwaves
/

Dreamwaves, an Austrian company founded in 2019, creates innovative navigation solutions for blind and visually impaired individuals. Its WaveOut app uses 3D spatial audio and virtual waypoints to guide users hands-free, with AI-powered accuracy under 20 cm in outdoor settings and under 5 cm in indoor. While built for accessibility, it's also useful for anyone seeking intuitive, screen-free navigation.

"At Dreamwaves, accessibility and inclusion are at the heart of our mission. By helping people, especially those who are blind or visually impaired, navigate the world more independently, we align social impact with technological innovation. We create sustainable solutions that require no additional hardware, reduce costs and waste, and open opportunities for equal participation in public and private spaces. We believe that true ESG responsibility means designing technology that makes society fairer and more sustainable for everyone."

HUGO FURTADO,
Founder & CEO at Dreamwaves

From mapping rural trails in Greece and tracking air quality in France to guiding visually impaired users in Austria and modelling climate hazards in Germany, these companies show that ESG isn't just about technology – it's about adaptability, trust, fit-for-purpose solutions and understanding local or individual needs. The table below captures this in detail, summarising each entrepreneur's ESG experience and focus, key challenges, lessons learned and skills gaps.

Caius (Greece)

ESG PRACTICES

*/ **Sustainable land management:** maps and digitises forest trails and roads to assist governments in managing land resources sustainably*

*/ **AI and satellite-powered solutions:** leverages AI and satellite data to protect nature, support sustainable tourism and empower rural communities*

*/ **Decentralised governance:** adopts a decentralised governance model, tailored to local needs, and provides free satellite internet in underserved areas*

*/ **Flexible work culture:** promotes a flexible work environment that supports innovation and employee wellbeing*

CHALLENGES & LESSONS

*/ **Bureaucratic hurdles:** slow implementation due to bureaucracy, but overcoming it leads to structured, long-term solutions*

*/ **Building trust:** gaining trust with authorities takes time but fosters stronger, collaborative future partnerships*

*/ **Adapting AI:** customising AI for different terrains enables cross-regional scalability, expanding impact*

*/ **Data dependence:** AI and computational models rely on mimetic processes; they must have real practices to learn from*

*/ **Tech as complementary:** technology is a tool, not a replacement - combining it with local knowledge drives meaningful change*

LOOKING AHEAD

/ Position ecotourism and rural trails as strategic assets

*/ **Greater involvement of young residents in rural areas is vital:** empower local visions through technology, networking and mentoring for faster and healthier social development*

/ Social equity as a target in rural and natural areas across Europe

/ Leverage municipal digitalisation for smart land use and disaster preparedness

/ Attract remote workers to rural hubs

TALENT & SKILLS GAPS

*/ **Lack of hands-on expertise and in-situ experience:** without professionals with practical experience, technology cannot evolve in real-world, meaningful ways*

*/ **Limited youth involvement in rural areas:** we need to empower young residents through technology, networking and mentoring to drive faster and healthier rural social development*

WaltR (France)

ESG PRACTICES

/ Air quality monitoring: *monitors air pollution and climate impact through spatial imaging and ground data*

/ Environmental assessments: *provides data-backed environmental performance assessments*

/ Carbon footprint reduction: *reduces own footprint via travel limits, low server use and emissions tracking*

/ Employee engagement: *flexible work and 'Team Weeks' encourage employee strategic decision participation*

/ Ethical governance: *the Corporate Social Responsibility team ensures ethical decisions are taken*

CHALLENGES & LESSONS

/ Scaling to structured processes: *transitioning to formal systems is challenging but enables more efficiency and sustainable growth*

/ ESG implementation: *while resource-intensive, a strong ESG framework offers long-term benefits in reputation, risk management and growth*

/ Lack of standardisation: *the absence of ESG standards risks fragmented efforts, but common frameworks can drive greater cohesion and impact*

/ Shift in EU space funding: *the focus shift from sustainability to defence presents a challenge, but also an opportunity to align funding with evolving needs and eco-friendly solutions*

/ Clear rules and prioritisation: *these are essential to navigating challenges and seizing opportunities*

LOOKING AHEAD

/ Enhance emissions monitoring technology: *invest in advancing cutting-edge solutions for more accurate and efficient emissions tracking*

/ Secure funding for sustainability and ESG training: *ensure startups have access to the necessary resources to develop strong sustainability and ESG competencies*

/ Capitalise on societal demand for ethical businesses: *tap into the growing consumer preference for companies committed to ethical practices, driving long-term value*

TALENT & SKILLS GAPS

/ Lack of balanced skill sets: *there is a shortage of professionals who combine technical, scientific and soft skills. Relying solely on technical procedures can often lead to inefficiencies and missed opportunities for innovation in the space industry*

/ Need for a participatory mindset: *universities can help us foster a culture of inclusion and engagement to drive effective governance and innovation within the workforce*

Dreamwaves (Austria)

ESG PRACTICES

/ Real-time spatial audio navigation: *develops the WaveOut app, providing blind and visually impaired users with intuitive, real-time spatial audio guidance for improved mobility*

/ User-driven innovation: *continuously collaborates with users to refine and simplify navigation, ensuring the app meets their evolving needs*

/ Commitment to inclusive design: *advocates for inclusive design principles, integrating accessibility into both technology and public infrastructure to enhance equal access for all*

CHALLENGES & LESSONS

/ Struggling to attract investment: *many initiatives face difficulties in securing funding, yet there is a growing opportunity to highlight the long-term market potential of inclusivity-focused technologies*

/ Undervaluation of accessibility tech: *accessibility solutions are often overlooked, but this represents a significant opportunity to innovate in an underserved market with high demand*

/ Inclusivity is not only a socially impactful cause but also a strategic market opportunity for businesses to tap into

LOOKING AHEAD

/ Increasing focus on digital accessibility: *build on the growing recognition of digital accessibility to create more inclusive digital experiences across industries*

/ Expand spatial audio into mobility: *leverage spatial audio technology to enhance mobility solutions, integrating a human-centred approach to improve user experience and accessibility in transportation*

TALENT & SKILLS GAPS

/ Limited expertise in social business models: *there is a gap in professionals who can effectively align space accessibility with sustainable, commercially viable strategies*

/ Need for marketing professionals with social business experience: *a critical gap exists in professionals who can bridge the gap between social impact and economic metrics, helping decision-makers see the long-term value of accessibility solutions*

UrbanSens (Germany)

ESG PRACTICES

/ Empowering vulnerable communities: *providing climate risk data to help at-risk communities prepare and adapt to environmental challenges*

/ Ethical governance: *committing to ethical governance, equal opportunities and fostering continuous learning through training and collaboration*

/ Sustainability-focused operations: *reducing environmental impact by minimising travel, optimising server use and monitoring emissions*

/ ESG compliance: *adhering to CSRD and International Financial Reporting Standards (IFRS) standards*

/ Remote-first collaboration: *embracing a flexible, remote model to drive innovation and inclusivity across global teams*

CHALLENGES & LESSONS

/ Complexity of Earth Observation data: *translating complex data into actionable insights requires ongoing iteration but enables more precise decision-making*

/ Working with authorities: *the process can be slow, but building strong relationships offers long-term impact*

Expensive/inaccessible datasets: *limited access hampers innovation, presenting an opportunity for affordable, open-source solutions*

/ Lack of shared ESG metrics: *the absence of common standards is a challenge, but universal ESG metrics could drive transparency and collaboration*

/ Need for targeted support: *European programmes like EXIST, Horizon Europe and LIFE are crucial for scaling early-stage climate-tech ideas into operational solutions*

LOOKING AHEAD

/ Transform climate risks into financial impact: *develop methods to quantify climate risks in terms of financial impact, aiding informed decision-making*

/ Integrate diverse data sources: *combine internal, ground-level and geospatial data for more comprehensive and accurate environmental insights*

/ Create open-access environmental databases: *build accessible platforms for environmental data to promote transparency and collaboration across industries*

/ Enable real-time, automated ESG monitoring: *develop systems for continuous, automated tracking of ESG metrics to streamline reporting and improve compliance*

TALENT & SKILLS GAPS

/ Systems thinking: *we need professionals who can apply systems thinking to understand the interconnectedness of environmental, social and economic factors*

/ Interdisciplinary mindset: *there is a gap in talent with the ability to integrate geospatial, technical and policy perspectives to address complex challenges*

/ Actionable problem-solving: *we need individuals who can move (and communicate) from data analysis to creating practical, real-world solutions*

Young space entrepreneurs are kicking off their ventures with commitment to ESG, but they're up against some serious obstacles. Like established companies, they face hurdles ranging from complex bureaucracy to dealing with the lack of standardised ESG metrics, limited access to crucial data and a shortage of funding. These innovators have their hands full, and to make things even trickier, many lack the right talent – especially when it comes to people with both technical expertise and soft skills like environmental risk assessment, inclusive design and ethical decision-making.

This is where universities step in. They need to equip students with systems thinking and interdisciplinary skills that blend environmental, technical and policy knowledge. By focusing on real-world problem-solving, hands-on learning, practical communication skills and social business models, academia can bridge the gap between theory and practice, shaping a new generation of professionals ready to tackle the complex challenges faced by emerging space companies.

Policymakers, too, have a critical role. They must address the fragmentation in ESG practices by creating universal frameworks and promoting open access to data. Plus, initiatives like Horizon Europe and the LIFE Programme are key to giving early-stage companies the financial support and training they need to scale their sustainable innovations. By fostering cross-sector collaboration and aligning funding with industry needs, we can accelerate progress towards a self-sustaining European space sector that champions ESG principles, driving long-term environmental, social and economic impact.

GUESS THE COMPANY QUIZ: WHAT DID YOU LEARN FROM CHAPTER 4?

Quiz

1. This company faces challenges like slow bureaucratic processes and the need to gain trust with authorities, but sees technology as a tool, rather than a replacement, for local knowledge:

A *Caius (Greece)*
B *WaltR (France)*
C *Dreamwaves (Austria)*
D *UrbanSens (Germany)*

Correct Answer: A

2. This company has a talent gap in professionals who can effectively combine social impact with economic strategies to innovate in the accessibility technology sector:

A *Caius (Greece)*
B *WaltR (France)*
C *Dreamwaves (Austria)*
D *UrbanSens (Germany)*

Correct Answer: C

5. Key Takeaways & Future Outlook /

In our peer-to-peer workshops, companies showed how ESG sparks innovation, cuts costs, attracts top talent and builds trust with stakeholders. Even better, ESG reporting shines a light on skills gaps, showing where technical know-how, interdisciplinary expertise or soft skills are missing – a key clue for aligning space industry needs with what universities are teaching.
From cleaner propulsion and inclusive hiring to transparent data reporting, ESG is reshaping how space companies plan, operate and grow. The concluding sections that follow dive deeper into these impacts.

ESG AS CATALYST FOR EU COMPETITIVENESS: COMMON CHALLENGES

Collaborating with a diverse network of space industry players revealed key insights into the motivations behind ESG reporting, highlighting structural, operational and knowledge-related barriers to effective ESG integration (see Figure 1).

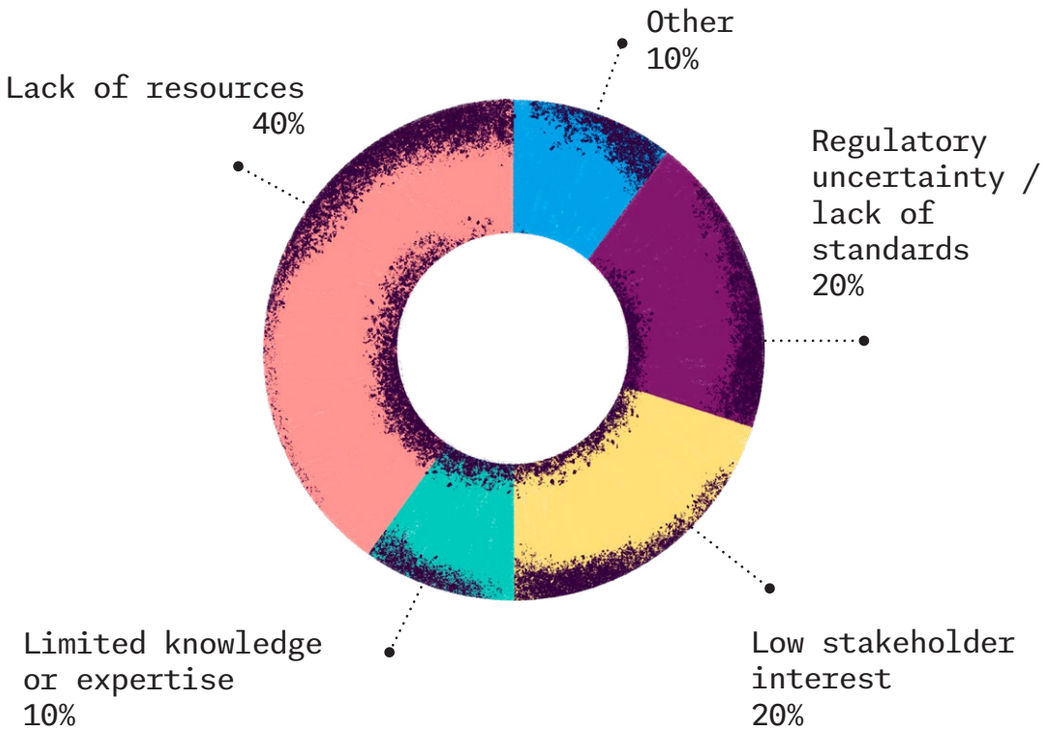


Figure 1
Data sourced from the peer-to-peer learning workshops

Every company had its own priorities, but when it came to ESG, they kept running into the same speed bumps. Here's what stood out:

1. Data headaches: getting the right ESG metrics is harder than it sounds. From finding and measuring data to reporting in a way that's useful, it's a juggling act. Throw in the challenge of mixing geospatial data with everything else (and keeping it consistent across different reporting frameworks), and you've got a full-blown puzzle. Experienced players say it can take three years just to get a solid read on past performance – especially if you're starting with scraps of information.

2. No universal 'ESG-speak': different countries, different standards, and constantly changing rules make it tough to find a shared language for ESG. Everyone's playing the same game, but the rulebook keeps changing... and sometimes it's written in another language.

3. Culture clash: folding ESG into a company's DNA isn't always smooth sailing. Old habits die hard, and supply chains can feel like a black box. Many companies still struggle to get full transparency from their suppliers.

4. Knowledge gaps: big dreams don't mean much without the right know-how. Many space entities, even the more experienced ones, still lack the skills and tools to figure out which ESG metrics matter – as well as how to track them and act on them.

5. Missing game plan: without a clear strategy, realistic targets and solid KPIs, ESG can end up as a well-meaning idea with no way to measure success.

6. Time, money and people: like many things in life, ESG reporting takes resources, and smaller companies feel this pinch the most when not seeing ESG reporting as a priority. Balancing day-to-day operations with big-picture ESG goals? Easier said than done.

7. Stakeholder curveballs: ESG needs buy-in from investors, clients, management, employees and communities. Sometimes young employees are all in... but clients aren't there yet. Managing those different speeds takes time and planning.

8. ESG ≠ Sustainability Reporting (and nor is it box-ticking): first things first: companies need to clearly distinguish between ESG reporting and sustainability reporting. They're related but not identical – and treating them as a box-ticking exercise (or worse, greenwashing) misses the point entirely. Done right, ESG isn't just about compliance; it's a strategic lever for competitiveness and long-term profitability.

9. Politics in the mix: in the space sector, political winds matter. When defence agendas dominate, as is happening now, ESG can slide down the priority list unless strong policies and political will keep it in focus.

10. Skills shortage: the space industry needs more professionals who combine technical expertise with ESG knowledge, systems thinking and environmental risk assessment. There's a lack of soft skills like resilience, emotional intelligence and adaptability, which are essential in high-pressure environments like the space sector.

THE BIG PICTURE: ESG OPPORTUNITIES & NEW TRENDS

The challenges we have outlined could have been discouraging, but instead, they're driving new ways of doing business. Through peer-to-peer learning, we saw how companies are turning obstacles into opportunities for growth, innovation and resilience, paving the way for smarter data use, better talent strategies and deeper ESG integration. Here's what's emerging:

1. Standardisation takes off: forget the patchwork of national rules and corporate quirks. The push from both young and mature space companies is on for a unified ESG language and global strategy, powered by smart data tools from the most experienced firms that don't just collect information, but also explain why it's being gathered.

2. Talent as fuel: space companies aren't just looking for engineers and data whizzes anymore – they need sustainability experts and people with social, communication and emotional skills. By offering a better work-life balance, getting involved in social projects and showing off strong values, companies can attract and retain top talent. Now's the time to shake up curriculums and start building those diverse skill sets!

3. DEIB with lift-off: Diversity, Equity, Inclusion and Belonging are no longer just buzzwords. From recruitment to promotions, inclusive policies are becoming the standard, empowering fresh perspectives and energising future talent pipelines.

4. Small wins, big impact: short-term, high-visibility ESG wins prove value fast. Companies like SES, Astroscale and CGI are focusing on a handful of goals to clearly measure returns – a smart way to get everyone on board.

5. Shrinking carbon footprints and going circular: from renewable-powered data centres (CGI hitting 95% green energy!) to satellite refuelling, repair and safe deorbiting, the industry is moving from disposable thinking to circular solutions.

6. Collaboration over command: ESG strategies work better when management, employees, clients and stakeholders help shape them. This co-creation keeps everyone engaged and ensures ESG fits real-world needs.

7. Automated ESG reporting: with regulations like CSRD raising the bar, many companies are adopting centralised, AI-driven platforms for clean, traceable and consistent ESG data.

8. Accountability everywhere: ESG isn't locked in a 'compliance' department anymore. It's showing up in product design, supply chains and executive strategy, with younger employees leading the charge.

9. The ESG ecosystem grows: from social impact tools to circular economy models, companies are teaming up across the industry. Science Park Graz has proved that peer collaboration often inspires more ESG innovation than external pressure.

10. From fuzzy targets to sharp KPIs: picking a few business-relevant ESG priorities and setting measurable KPIs keeps the work focused, strategic and impactful.

11. Digital transformation: space companies are ditching spreadsheets for real-time, AI-powered ESG insights, enabling smarter decisions, faster compliance and more stability.

12. ESG as part of the mission: no longer 'a separate department', ESG is now baked into project planning, from modular robotic components for long missions to designs that boost resource efficiency.

LASTING ESG IMPACT: WHAT COMES NEXT?

With tougher regulations like the Omnibus legislation and increasing global expectations for transparency, ESG isn't optional anymore – it's essential. Companies that don't act risk regulatory penalties, losing top talent and investors, and missing out on business opportunities.

Key Takeaway:
Lessons from participating companies show that successful ESG adoption is as much about mindset and collaboration as it is about regulations, transparency and expertise (see Figure 2).

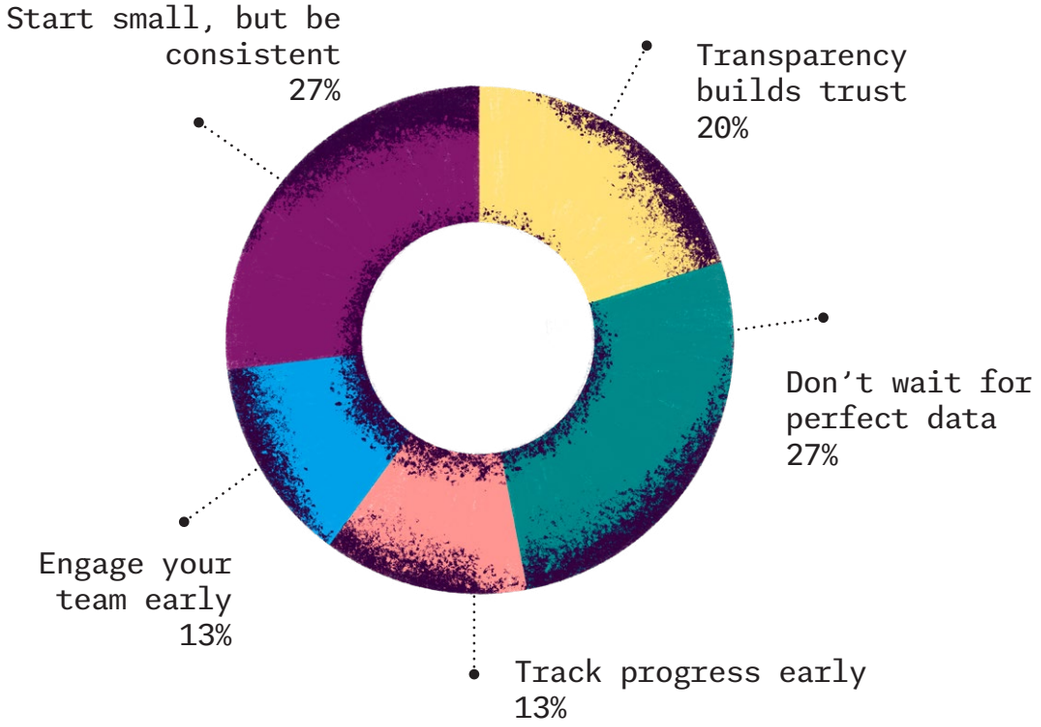
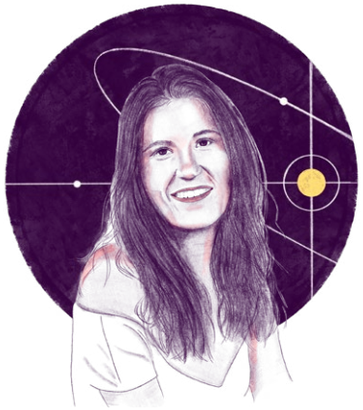


Figure 2
Data sourced from the peer-to-peer learning workshops



"Real ESG impact isn't achieved overnight – it's built through sustained effort, open communication and authentic commitment, driving innovation, trust and long-term success"

CRISTINA RAMOS,
Project Manager at AZO

"Successful companies with strong ESG practices are honest and practical, preferring to acknowledge what they're exploring rather than overpromising. AZO has been key in fostering dialogue among space industry peers and representing their needs to academia and policymakers."

INTZA BALENCIAGA,
Senior Project Manager at AZO

WHAT CAN YOU DO?

Turn ESG into a strategic advantage by focusing on these proven practices:

1. Integrate ESG into Strategy
Embed ESG into the core business plan, not as a side project

2. Start Early
Begin now – waiting only increases costs and risks

3. Set a Clear Roadmap
Define your vision, goals, targets and KPIs, and link them to business outcomes

4. Invest in the Right Tools
Use robust data systems for accurate and transparent ESG reporting

5. Build Culture and Engagement
Make ESG part of everyday work by involving employees across all departments

6. Stay Globally Aligned (to the extent you can)
Follow international ESG standards to stay compliant and competitive

7. Prioritise DEIB
Advance Diversity, Equity, Inclusion and Belonging to attract and retain top talent

8. Lead on Sustainability
Adopt practices like carbon reduction and circular economy models

9. Grow Internal Expertise
Bridge knowledge gaps through targeted training and introduce fresh perspectives from non-traditional space backgrounds, such as environmental science or social entrepreneurship

10. Track and Review Progress
Use measurable goals and regular cross-team reviews to stay on track

And don't forget to share your ESG successes internally and externally to inspire action and build your brand!

A Final Message for Space Companies Starting or Accelerating ESG:
/

Think of ESG as more than a reporting exercise: it's your onboard diagnostic system. Done right, it doesn't just tell regulators or investors where you stand – it shows you where your blind spots are. From missing technical know-how and outdated processes to gaps in soft skills or strategy, ESG reporting highlights exactly what's holding your company back from peak performance. We've learnt from our companies to start with small, high-impact goals that are measurable, using the insights gained to drive continuous improvement. Engage your teams at every level, embrace honest data over inflated claims, and treat ESG as part of your core business model, not a side project. Why? Because ESG is a competitive advantage. It helps you attract top talent, cut inefficiencies, unlock funding and win stakeholder trust. More importantly, it future-proofs your company in a space sector where resilience, sustainability, autonomy and innovation are now mission-critical.

A Message for Those Building Space Curriculums:
/

The space sector needs graduates who can navigate complex technical challenges and work seamlessly in diverse, cross-functional teams. Universities are the launchpads for tomorrow's space workforce. ESG reports don't just measure carbon or diversity – they double as 'skills scanners,' highlighting exactly what the industry is missing. And we have seen how environmental, social and technical know-how (climate risk, sustainable engineering, geospatial data, social entrepreneurship, circular design), policy literacy (ESG frameworks, compliance, ethics), digital smarts (AI for ESG reporting, advanced analytics) or soft skills (resilience, adaptability, inclusive design, emotional intelligence) are missing.
If curriculums mix hard science with these human skills, graduates won't just build satellites – they'll build sustainable space ecosystems. Think of it as moving from rocket science to rocket sense.

A Message for Policymakers:
/

Clear, supportive policies can help space companies gain a real competitive edge. Right now, the space industry is asking for less red tape, fewer bureaucratic hurdles, more open data and clearer game rules. Harmonised ESG standards, aligned and dedicated funding and targeted upskilling incentives could give startups and SMEs the thrust they need to scale sustainably, helping the space sector become more self-sufficient, resilient and globally competitive.

6. Resources for Action /

Below you will find a collection of public resources, initiatives and projects shared by ASTRAIOS, AZO and the participating entities. To find out more about the initiatives shaping a more sustainable, fair and competitive European space sector, please scan the QR codes.

ASTRAIOS
https://www.astraios.eu/

PUBLIC RESOURCES
Access to reports, catalogues and results for ASTRAIOS

https://www.astraios.eu/outputs

AZO
https://azo-space.com/

RELEVANT PROJECTS

ESA BIC Bavaria
https://space-of-innovation.com/esa-bic-bavaria-a-success-story-of-innovation-growth-and-impact/

CASSINI MATCHMAKING
https://www.cassini.eu/matchmaking/

Copernicus Masters
https://www.copernicus.eu/en/observer-copernicus-masters-unique-opportunity-transform-idea-business

ASTROSCALE
https://www.astroscale.com/

Carbon Reduction plan
https://www.astroscale.com/en/legal/astroscale-ltd-carbon-reduction-plan

SES
https://www.ses.com/

ESG Report (2024)
https://www.ses.com/sites/default/files/2025-03/SES_AnnualReport24_ESG-Report.pdf

OXO EARTH
https://www.oxo.earth/

SCIENCE PARK GRAZ
https://www.sciencepark.at/

Science Park Start-up Guide
https://www.sciencepark.at/start-up-guide/

CGI
https://www.cgi.com/

https://www.cgi.com/en/esg

ESG Report (2024)
https://www.cgi.com/sites/default/files/2025-04/cgi-2024-esg-report-en.pdf

CGI ESG Policy
https://www.cgi.com/sites/default/files/2025-05/cgi-esg-policy.pdf

DFKI

https://www.dfki.de/web

Girls' Day and Future Day
Provides young girls with access to and participation in science, technology, engineering and mathematics (STEM)

https://www.dfki.de/en/web/news/girls-day-und-zukunftstag-2025

https://robotik.dfki-bremen.de/en/about-us/promotion-of-young-talents

ESCADE
https://www.dfki.de/web/forschung/projekte-publikationen/projekt/escade

https://escade-project.de/

CAIUS

AI + satellites data platform mapping forest trails and rural infrastructure

https://www.caius.gr/

Start-up Spotlight: Downstream with Caius
https://commercialisation.esa.int/2024/11/start-up-spotlight-downstream-with-caius-scoutlabs-and-10lines/

Caius paths demonstration
https://www.youtube.com/watch?v=nrQT1LOlM6U´

WALTR

Emission monitoring services for airports, ports, cities and wider segments and industries
https://waltr.fr/

Spatial imaging and ground data platform to track air pollution and climate impact
https://gis.waltr.fr/

GEMS
https://business.esa.int/projects/gems

ARSINOE
https://arsinoe-project.eu/advancing-air-quality-monitoring-in-ports-arsnoe-project-deploys-diorama-tool-in-piraeus-port/

PROAVIA
https://www.proavia.com/en/members/waltr

DREAMWAVES

WaveOut App guides the blind with real-time spatial audio, both indoors and outdoors
https://www.dreamwaves.io/

URBANSENS

Actionable Climate Risk and Infrastructure Safety Insights
https://urbansens.de/

7. AZO - The Space Industry Network /

As a leading international consultancy dedicated to advancing innovation in Europe's space landscape since 2004, AZO plays a key role in shaping this book. By bringing together companies across the sector, from emerging startups to experienced industry players, AZO created the scenario for open dialogue, peer learning and knowledge exchange. The goal is to show how ESG can be a real driver of positive impact in space and play a key role in shaping the future of the space workforce.

With deep expertise in building bridges between start-ups, institutions and investors, AZO has long been at the forefront of the European space entrepreneurship ecosystem. From its base in Oberpfaffenhofen (Weßling, Germany), AZO can link public and private actors across the upstream and downstream sectors, resulting in a trusted partner for transforming ideas into tangible actions.

Over the past 20+ years, AZO has successfully coordinated some of Europe's most high-impact space initiatives and competitions, such as the European Space Agency's Business Incubation Centre (ESA BIC) Bavaria, with more than 250 incubated startups. It has delivered critical support services through programmes like Copernicus and Galileo Masters, Accelerators, Competitive Space Start-ups for Innovation Initiative (CASSINI) Matchmaking and EU Global Action on Space, among others. Through these initiatives, AZO has helped hundreds of startups connect with key European institutions and businesses, scale internationally, and bring their technologies to global markets.

Across these initiatives, AZO continues to foster entrepreneurship and helps shape a competitive, resilient, sustainable and responsible space ecosystem.

8. Imprint

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Main authors: Intza Balenciaga and Cristina Ramos (AZO)

Company Contributors: Astroscale Ltd. (Astroscale), SES, Science Park Graz GmbH (SPG), CGI, OXO Earth, German Research Center for Artificial Intelligence (DFKI), Caius, UrbanSens, WaltR, Dreamwaves

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This book calls on academia, policymakers, and industry leaders to drive innovation, integrate ESG practices, and strengthen the EU space sector's global competitiveness. Through real-world ESG stories, it inspires companies to embed these practices into their missions and helps shape curriculums to equip future European generations with the skills needed to tackle industry challenges. The insights shared here were collected through the EU-funded ASTRAIOS project, coordinated by AZO - Anwendungszentrum GmbH Oberpfaffenhofen, with heartfelt thanks to the companies and project partners whose valuable contributions made this work possible.