

**INTERSESSIONAL PANEL OF THE UNITED NATIONS COMMISSION
ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)**

**Geneva, Switzerland
6 November 2026**

**Contribution by UNIDO
to the CSTD 2026-2027 priority theme on
“Data Governance for Development: From Asymmetry to Equitable Stewardship”**

DISCLAIMER: The views presented here are the contributors' and do not necessarily reflect the views and position of the United Nations or the UN Trade and Development.

UNIDO inputs to issue paper at the inter-sessional panel meeting of the United Nations Commission on Science and Technology for Development (CSTD)

1. What key challenges do countries face in building and leveraging data capacities, including infrastructure, ownership and stewardship, free and trusted cross-border data flows, interoperability and benefit-sharing? *

** (Please provide examples and, where possible, quantitative evidence or indicators of these challenges and their impacts)*

UNIDO treats data as one of five interdependent enabling pillars of industrial transformation, alongside infrastructure, innovation ecosystems, capital and governance. Its diagnostic work—notably the AI & Digital for Industry Navigator (AIDIN), developed with Oxford Insights—shows that data capacity, rather than ideas alone, is often a binding constraint to inclusive and sustainable industrialization under SDG 9.

The gap is significant: an estimated 2.6 billion people remain offline globally, while a global digital skills gap of around 85 million workers is projected by 2030. Key challenges include:

- **Infrastructure and availability**

Many countries lack the connectivity, computing capacity, secure data platforms and machine-readable, “AI-ready” data—structured, accessible and with clear provenance—on which digital transformation depends. In many countries, one key challenge refers to the lack or insufficiency of digital infrastructure, including secure data platforms, interoperable data systems, updated statistical registers (for linking data sources), as well as human resources with the required skills and clear roles in this area. In industrial statistics, this is often reflected in outdated survey frames, weak access to administrative data, incomplete coverage of certain parts of the business sector (e.g. MSMEs and informal producers), limited granularity, and delays in producing short-term indicators. Data is frequently siloed across operational-technology (OT) and information-technology (IT) systems, and many SMEs lack the capacity to bridge these silos. Countries also face significant challenges in collecting, managing and sharing data needed for renewable energy deployment, hydrogen value chains and industrial decarbonization. For green hydrogen, data gaps exist across the value chain—from renewable electricity generation and electrolyzer performance to certification, carbon-intensity measurement and trade-related traceability.

- **Interoperability**

Factories and value chains require shared data spaces, common standards and trusted data-sharing frameworks. Another challenge is institutional fragmentation. Relevant data

could be held by many different institutions: national statistics offices (NSOs), different ministries, regulators, customs authorities, revenue authorities, academia, and private businesses, with unclear mandates for data sharing, quality assurance, data protection and metadata documentation. In addition, the data may be compiled using different units, concepts, definitions, and classifications, while implementation of international standards and recommendations remains uneven. Underdeveloped or outdated data-governance regimes are a primary brake on data-driven industrial transformation. Fragmented regulation, unclear mandates, data localization measures, and lack of trusted transfer mechanisms frequently affect institutional cooperation. All this reduces interoperability and increases duplication, inefficiencies, and respondent burden. In sectors such as renewable energy, hydrogen value chains and industrial decarbonization, fragmented energy and industrial datasets and a lack of common standards further constrain transparency, traceability and investment decision-making.

- **Ownership and stewardship**

The concentration of data and computing capacity in a limited number of economies risks locking developing countries into the role of data suppliers to, or consumers of, digital solutions developed elsewhere. Access to valuable datasets is often concentrated among a small number of actors. The asymmetry in the data economy is another important challenge. Data access reserved to specific actors may limit the benefits of this asset. In other cases, data is collected domestically, for example by businesses, but then is transferred abroad for further processing and utilization. Additionally, even if valuable data are generated and can be accessed, many countries have limited capacities to process, store, govern, analyse, and commercialize it domestically. AI systems trained on non-representative datasets may also perform poorly in local industrial contexts. Together, these trends raise important questions regarding data and compute sovereignty, as well as equitable participation in the digital economy.

- **Trusted cross-border data flows**

Trusted flows require coherent governance frameworks and trusted transfer mechanisms. Fragmented regulation, unclear mandates, data localization measures, and lack of trusted transfer mechanisms frequently affect institutional cooperation and restrict data sharing across borders. Many countries also face limited capacity to govern cross-border data flows. Trusted flows require coherence across international standards and governance frameworks, including those governing data management, cross-border data exchanges and emerging digital technologies such as artificial intelligence. Trusted flows also require coherence across separate international standards domains—AI management under ISO/IEC JTC 1/SC 42 and data governance and cross-border flows under ISO/IEC JTC 1/SC 32—which remain insufficiently coordinated. In emerging sectors such as renewable energy deployment, hydrogen value chains and industrial decarbonization, trusted cross-border data flows are essential to support certification, traceability, trade and investment.

- **Benefit-sharing and measurement gaps**

Developing countries remain underrepresented in many of the datasets that drive diagnostics, investment decisions and technological innovation. A country lacking data on a particular indicator is not necessarily performing poorly, yet data gaps can nevertheless



reduce visibility and limit opportunities for investment and participation in higher-value segments of global value chains. Data asymmetries can also result in situations where data generated domestically create value elsewhere, while limited domestic capacities constrain countries' ability to capture the associated economic and development benefits. In emerging markets such as green hydrogen, gaps in data on carbon intensity, certification and trade-related traceability can reduce investor confidence and hinder the participation of developing countries in emerging hydrogen markets. For UNIDO, these challenges affect the ability of countries to monitor industrialization, technological upgrading, environmental performance, MSME participation, and gender inclusion, among others, thereby limiting progress towards inclusive and sustainable development.

AIDIN is designed to make these gaps visible by assessing maturity across the five enabling pillars and translating the results into sequenced Industrial Transformation Pathways, helping countries move from understanding where they stand to identifying targeted actions for strengthening their data and industrial capabilities.

2. Analysis How do inequalities affect the way data is generated, collected, governed and used for development? In particular, how do biases in data collection and use, such as gender data gap, affect policymaking, service delivery and development outcomes? *

** (Please provide examples, evidence and any measures being taken to address these disparities)*

UNIDO recognizes that inequalities affect every stage of the data lifecycle—from data generation and collection to governance, use and value creation. The capacity to generate, govern and derive value from data remains concentrated in advanced economies, while developing-country firms—especially MSMEs—and vulnerable population groups are often underrepresented in the datasets on which industrial policies, investment decisions, artificial intelligence (AI) applications and development interventions increasingly rely. As a result, inequalities can become embedded in data systems, leading to biased diagnostics, exclusionary policies and unequal development outcomes.

- **Skewed representation and unequal visibility in data systems**

Inequalities shape who is visible in data systems and therefore whose needs and priorities are reflected in policies. Groups who are underrepresented or unrepresented in formal economic activity or business registration or that lack access to digital services or finance institutions are often underrepresented in official statistics, administrative records, and digital resources. This can lead to biased diagnostics and poorly targeted policies.

Developing-country firms, particularly MSMEs, are also underrepresented in many of the datasets on which industrial AI and policy increasingly rely. AI systems trained on non-representative or foreign data can produce biased or inaccurate results for local industries and populations, while standards developed elsewhere may act as de facto barriers to participation in global markets. Gaps in how a country is reflected in global datasets can

distort diagnostics, investment decisions and policy priorities, and a data gap is not the same as poor performance.

Similarly, developing countries often have limited access to high-quality energy and industrial data, reducing their ability to design evidence-based policies and attract investment in renewable energy, green hydrogen and industrial decarbonization projects. Data gaps are particularly pronounced among SMEs, rural communities and women entrepreneurs, whose contributions to clean energy value chains are frequently underrepresented. As a result, policies and financing mechanisms may fail to adequately address their needs.

- **Gender data gaps and socioeconomic inclusion**

Gender inequalities in data systems, particularly gaps in sex-disaggregated and gender-relevant industrial data, have direct implications for inclusive and sustainable industrial development under SDG 9. Gender data gaps are a clear example of how inequalities in data collection and use can affect policymaking, service delivery and development outcomes. In manufacturing, many datasets still lack sufficient sex-disaggregated detail by sector, enterprise size, informality, wages, occupation, education and skills, or access to finance. Without these breakdowns, policymakers may underestimate occupational segregation, barriers to higher-quality jobs, unequal access to technology and finance, or the gendered impact of automation and industrial upgrading.

In many countries, industrial statistics continue to capture aggregate employment and output but provide limited insight into gender dimensions such as job quality, access to technology, enterprise ownership or decision-making roles. They often fail to account for the disproportionate burden of unpaid care and domestic work, which constrains women's participation, productivity and career progression in industry. As a result, key structural barriers affecting women remain insufficiently understood and addressed in industrial policymaking.

This is reflected in persistent patterns across the sector: women are often overrepresented in lower-technology and lower-wage segments of manufacturing and underrepresented in technical and leadership roles, despite accounting for around 40 per cent of the industrial workforce. However, without adequate and granular data, these disparities are not fully captured, particularly in higher-productivity and technology-intensive sectors. This can lead to industrial policies that are not fully aligned with the objective of inclusive and sustainable industrialization.

- **Biases in administrative, digital and AI-driven data**

Bias can also arise in the use of administrative and digital data. Data generated through tax, social security, digital payments, online platforms, or e-commerce may systematically exclude some segments of the business community, such as informal workers, MSMEs, rural firms, or women-owned businesses. If such data are used without analysing coverage and correcting for bias, they may lead to policies that reinforce existing inequalities. This is increasingly important as AI and automated decision systems rely on historical data that may reflect past imbalances and lack of representation.

These risks become more significant as AI and automated decision systems increasingly rely on historical data that may reflect past imbalances and lack of representation. Where inequalities already exist in labour markets, access to finance, technology adoption or

business ownership, AI systems may reproduce or even amplify those disparities. Likewise, Industry 4.0 and digital transformation risk widening socioeconomic divides unless inclusion is deliberately measured and addressed rather than assumed.

As highlighted in the Industrial Development Report 2024, major transformations such as digitalization and the green transition may leave vulnerable groups behind if they are not supported by inclusive, data-driven policies. In the absence of gender-responsive data, women risk being excluded from emerging industrial opportunities linked to Industry 4.0, advanced manufacturing and climate-related value chains.

- **Unequal capacity to participate in governance**

Inequalities also affect countries' and firms' ability to participate in data governance systems. Instruments such as digital registries, conformity documentation systems and traceability mechanisms often assume that firms can generate and maintain structured data. Where such capacity is absent, firms—particularly MSMEs—may be excluded not only from markets but also from the governance mechanisms designed to protect and support them.

More broadly, inequalities in data capacities affect who can generate value from data and participate in digital transformation. Limited national capacities to collect, manage, govern and use data can constrain countries' ability to shape policy, influence standards and benefit from emerging technologies. This can reinforce existing asymmetries between countries and economic actors and reduce the developmental benefits that data can generate.

- **Measures to address disparities**

UNIDO addresses these challenges through a combination of data, policy and capacity-building initiatives. AIDIN incorporates sustainability and inclusion indicators—including gender-related indicators—across all five pillars of industrial transformation, helping countries identify where inequalities may be constraining development outcomes. Its transparent, publicly sourced indicators and accessible AI assistant help lower barriers to participation and support more evidence-based policymaking.

UNIDO also promotes inclusive data collection, improved representation of developing countries in global datasets, and capacity-building initiatives that strengthen countries' ability to generate, manage and use high-quality industrial, digital and energy data. Through technical assistance, tiered compliance pathways for SMEs, Centres of Excellence and the AIM Global Trust Fund, UNIDO supports youth- and gender-responsive skills development and seeks to expand women's and young people's participation in industrial and digital transformation processes.

Working with countries to improve how they are represented in global datasets is itself an important entry point for development. By strengthening data availability, improving sex-disaggregated and inclusion-sensitive statistics, and expanding participation in data governance systems, countries can develop more targeted policies, improve service delivery and promote more inclusive and sustainable industrial development.

3. Based on your organization's work, what national strategies, regulatory frameworks or policy instruments have been effective in promoting equitable and interoperable data governance? What are the lessons learned? *

** (Please describe any specific challenges, failures or successes encountered during implementation) **

Effective national approaches combine data and digital governance and reflect the institutional context, development priorities and long-term objectives of each country. From UNIDO's experience, the most successful approaches combine enabling legal frameworks, clear institutional mandates, interoperable standards and practical implementation mechanisms that link data governance to concrete development outcomes.

- **National strategies and regulatory frameworks**

A key foundation is a modern statistical law that provides national statistical offices (NSOs) and the broader national statistical system with a clear mandate to coordinate official statistics, access administrative and other data sources (including from the private sector), protect confidentiality, and ensure professional independence. Such legislation, together with national data strategies or data governance frameworks, can define institutional roles and responsibilities for data stewardship, quality control, metadata standards, data-sharing procedures and mechanisms for cross-border data flows. Equally important are data protection and safeguard frameworks that enable data sharing within institutional mandates while ensuring that data remain secure, confidential and trusted.

At the broader governance level, UNIDO supports Member States in developing national strategies, enabling policy and regulatory environments, and governance sandboxes that are sequenced to each country's level of institutional and technical maturity. Effective approaches recognize that governance measures must be adapted to national capacities and implemented progressively rather than applying frontier-level requirements where foundational capabilities remain limited.

- **Policy instruments promoting interoperability and equitable governance**

Specifically for official statistics, effective instruments include quality assurance frameworks, well-defined statistical business process models, interoperable standards, data-sharing agreements, secure microdata access arrangements, and open-data approaches where appropriate. These measures help ensure consistency, interoperability, trust and transparency across institutions and sectors. In this regard, the Global Digital Compact calls for effective and interoperable national data governance frameworks, privacy protections, common data and metadata standards, and strengthened national capacities.

UNIDO's experience also shows that standards-based approaches can help operationalize data and AI governance. For example, ISO/IEC 42001:2023 can provide a structured and interoperable basis for AI and data governance while allowing adaptation to national and

sectoral contexts. Other useful instruments include registration and disclosure mechanisms combined with proportionate, risk-based obligations, which help establish transparency while keeping reporting and compliance burdens manageable, particularly for SMEs.

A key lesson is that integration is generally more effective than duplication. Building on existing industrial safety, quality infrastructure, statistical and data-protection frameworks is often more efficient than creating parallel governance systems. Data-protection frameworks should therefore be viewed as enablers of secure industrial data exchange rather than barriers to data sharing.

In sector-specific contexts, successful approaches have included national digitalization strategies linked to energy-transition objectives, renewable energy information systems, hydrogen roadmaps, and regulatory frameworks supporting data sharing, certification and traceability. Common standards, interoperability mechanisms and transparent monitoring systems have proven essential for tracking renewable energy deployment, emissions reductions and hydrogen sustainability attributes.

- **Lessons learned and implementation experience**

From UNIDO's experience, data governance reforms work best when linked to concrete statistical and policy use cases. Improving industrial data governance should not be framed as a methodological or IT exercise, but as a way to improve policy decisions based on better business registers, industrial surveys, and a wide range of additional data sources that can provide relevant information on underrepresented or invisible subgroups of the population, both people and businesses.

Several broader lessons emerge from implementation experience. First, governance only takes root when the foundations beneath it—namely infrastructure, data, skills and capital—are in place. Governance frameworks cannot function effectively where the underlying capacity to generate, manage and use data remains weak.

Second, practical implementation matters. A registry cannot be populated if firms cannot generate conformity documentation, and risk tiers cannot be applied without nationally calibrated benchmarks. Likewise, data-sharing frameworks cannot succeed without adequate institutional capacity, incentives and readiness.

Third, approaches work best when they are demand-driven and adapted to national circumstances. UNIDO's diagnostic tools, including AIDIN, support the identification of priorities and help sequence interventions according to countries' maturity across infrastructure, data, innovation, capital and governance.

Fourth, data governance should be integrated into sectoral planning from the outset. In areas such as renewable energy, hydrogen and industrial decarbonization, common standards, interoperability and transparent monitoring systems are essential for tracking renewable energy deployment, emissions reductions and hydrogen sustainability attributes.

Finally, interoperability must be designed from the start. Alignment with international standards, common data and metadata standards, mutual recognition arrangements and trusted cross-border data-sharing frameworks are essential for ensuring that national systems remain compatible with regional and global data ecosystems.

4. Can you share examples of initiatives that have helped reduce asymmetries and promote more equitable data stewardship in development sectors such as public services, education, health and agriculture? *

**(Please provide examples, lessons learned and remaining challenges where possible)*

UNIDO reduces data and capability asymmetries primarily by bringing shared infrastructure, trusted data practices and global expertise within reach of developing-country industries, with positive spillovers into adjacent development sectors. Key initiatives include open and accessible knowledge platforms, digital public goods, capacity-building programmes, innovation ecosystems and sector-specific data systems that help countries and enterprises participate more effectively in data-driven development.

- **AIM Global Centres of Excellence**

A central example is UNIDO's network of **AIM Global Centres of Excellence**. This growing network of more than 20 modular Centres of Excellence is aligned with national priorities and connected through the AIM Community Platform, linking global expertise to local SMEs through demonstration projects, financing opportunities and advisory services. Several Centres support sectors with direct development relevance, including Cuba's Agro-industrial Innovation Centre of Excellence, Panama's Digital Economy Centre, the China-Africa-UNIDO digitalization pillar in Ethiopia, and a Centre in Barbados serving as a launchpad for Small Island Developing States (SIDS).

These initiatives have produced tangible results. Examples include digital-maturity diagnostics conducted for approximately 120 enterprises in North Africa and the connection of more than 70 manufacturers through a Smart Manufacturing Innovation Centre in the Western Balkans. By providing access to expertise, tools and networks that would otherwise be unavailable, these initiatives help reduce capability gaps between advanced and developing economies.

- **Open data platforms as public goods**

UNIDO has also promoted more equitable access to data, knowledge and digital solutions through open platforms. The **Digital Economy Solution Navigator** consolidates close to 700 solutions from innovators in 97 countries into a single openly accessible and transparently sourced platform. This initiative is being expanded into the **AI & Digital for Industry Navigator (AIDIN)**, a country-level maturity diagnostic that links identified gaps to relevant UNIDO solutions and incorporates an AI assistant to help non-specialists engage with complex industrial data.

The combination of transparent indicators, open access and accessible tools helps reduce information asymmetries and lowers barriers to participation, particularly for countries and institutions with limited technical capacity.

- **Sectoral knowledge as a public good**

UNIDO also promotes equitable data stewardship through the development and dissemination of sector-specific knowledge products. For example, UNIDO's work on **AI-enabled cement and concrete decarbonization**—a sector responsible for approximately 6 per cent of global CO₂ emissions—has generated openly available knowledge and practical guidance. Real-world deployments have demonstrated potential benefits including energy savings of up to approximately 6 per cent, reductions in clinker use of approximately 5 per cent, and productivity improvements ranging from 2 to 10 per cent.

In the energy sector, UNIDO supports renewable energy and green hydrogen programmes that strengthen data systems for resource assessment, project monitoring, emissions accounting and sustainability certification. For hydrogen in particular, digital traceability and certification systems can help developing countries demonstrate compliance with international sustainability requirements and improve access to global markets. Such initiatives contribute to reducing information asymmetries between countries and supporting more equitable participation in emerging green industries.

- **Skills development, innovation and capacity-building**

UNIDO further addresses asymmetries through skills development and innovation ecosystems. Initiatives such as the **AI & Digital Skills for Industry curriculum**, the **ScaleX open-innovation platform**, including testbeds and policy sandboxes, and regional efforts to develop shared digital public goods help ensure that solutions, data and technical capabilities move beyond pilot projects and become more widely accessible.

These programmes support the development of local capacities needed to generate, manage and use data effectively, thereby enabling broader participation in digital transformation and reducing dependence on external expertise.

- **Lessons learned**

Several lessons emerge from these experiences.

- First, reducing asymmetries requires more than access to technology alone. Access to trusted data, skills, financing, institutional support and interoperable infrastructure are equally important.
- Second, open platforms, shared knowledge resources and digital public goods can significantly reduce barriers to participation by making expertise, data and tools more broadly accessible.
- Third, local ownership and capacity-building are critical. Initiatives are most effective when they strengthen national and local capabilities rather than simply transferring technologies.
- Fourth, trust, transparency and interoperability remain essential. Common standards, transparent monitoring systems, traceability mechanisms and trusted data governance practices are critical for enabling meaningful participation in global value chains and emerging sectors such as green hydrogen.

Despite significant progress, important challenges remain. Scaling successful initiatives beyond pilot projects often depends on the availability of interoperable data infrastructure, financing and baseline data-governance capacities. In many countries,

limited technical capacity, fragmented data platforms and the lack of internationally recognized standards continue to constrain effective data sharing and use.

An additional challenge is extending successful approaches developed in industrial settings more systematically into public-service, health, education and agriculture data ecosystems. Strengthening interoperability across these sectors, while ensuring equitable access, trusted governance and local ownership, remains an important area for future work.

5. What mechanisms or institutional arrangements have proven useful in fostering collaboration on data governance for development among different stakeholders (e.g., university-industry, private-public, or multi-stakeholder initiatives)?

From UNIDO's experience, effective collaboration on data governance requires institutional arrangements that bring together government entities, the private sector, academia, development partners and communities of practice around clearly defined objectives and practical use cases. The most successful mechanisms combine strong institutional coordination, clear governance arrangements, trusted data-sharing frameworks and sustained stakeholder engagement.

- **Multi-stakeholder coordination mechanisms**

Useful mechanisms usually take the form of multistakeholder groups, including inter-ministerial dialogues, councils, sectoral committees, or other partnerships that promote exchange and collaboration among different stakeholders, including national statistical offices (NSOs), government agencies, the private sector, academia and communities of practice. These arrangements work best when objectives are clearly defined and specific, for example establishing mechanisms for secure data exchange so that specific types of administrative records can be used for official statistics and evidence-based policymaking. For industrial data, collaboration is particularly important because relevant data are often scattered across many actors beyond the NSO, including Ministries of Industry, revenue and customs authorities, central banks, investment agencies, environmental authorities and private businesses. Effective arrangements therefore require established data-sharing agreements, confidentiality rules, interoperable standards, agreed validation rules and regular producer-user dialogue. It is also important that the NSO retains a central role in quality assurance, standards, metadata management and dissemination.

This is particularly important in emerging areas such as artificial intelligence, digital platforms, environmental measurement and circular-economy data, where responsibilities often cut across institutions and clear mandates may not yet be fully established.

- **Public-private and multi-stakeholder partnerships**

UNIDO acts as an ecosystem-shaper through the Global Alliance on AI for Industry and Manufacturing (AIM Global), which brings together more than 500 members across over 70 countries, including governments, industry, academia, international organizations and

civil society. AIM Global serves as a platform for dialogue, knowledge-sharing, policy development and collaboration on data and AI governance issues.

A key mechanism within this ecosystem is the network of AIM Global Centres of Excellence, which bring together government, industry, academia, technology providers and expert networks as national or regional hubs for demonstration, skills development, innovation and policy experimentation while ensuring local ownership. These Centres create practical spaces where different stakeholders can collaborate on common data, innovation and digital-transformation challenges.

Public-private co-development arrangements have also proven useful. Examples include the development of AIDIN in collaboration with IBM and Oxford Insights and the Digital Economy Solution Navigator, which bring together public institutions, private-sector partners and technical experts to create shared digital resources and governance tools.

- **Communities of practice and knowledge-sharing networks**

Communities of practice provide another important mechanism for collaboration by converting distributed expertise into shared guidance, standards and knowledge products. UNIDO's work on AI-enabled cement and concrete decarbonization is an example of how expertise from different technical disciplines and organizational units can be brought together to develop common methodologies, evidence and practical guidance that can be shared widely.

The AIM Community Platform, integrated with UNIDO's Solutions Platform, further supports collaboration by enabling real-time exchange of solutions, challenges and expertise across institutions, countries and stakeholder groups.

- **Governance, financing and standard-setting arrangements**

Sustained collaboration often requires dedicated governance and financing mechanisms. Examples include the AIM High-Level Advisory Board, AIM Working Groups that contribute to policy and standards development, and the AIM Global Trust Fund, which supports Centres of Excellence, women- and youth-focused skills development initiatives, and shared measurement frameworks.

For the use of private-sector data, clear rules on access, reproducibility and public-interest use are critical, together with robust mechanisms for quality assessment and safeguards against commercial influence or other sources of bias. Trust, transparency and clarity of roles are essential preconditions for successful collaboration.

- **Sectoral experience: renewable energy and hydrogen**

In renewable energy and hydrogen sectors, public-private partnerships and multi-stakeholder platforms have proven particularly effective. Collaboration among governments, industry, research institutions, standards bodies and development partners helps establish common methodologies for measuring emissions, verifying sustainability criteria and sharing data securely across value chains.

Digital traceability systems, certification frameworks and common reporting standards provide practical examples of how collaboration can support both data governance and market participation. These mechanisms help strengthen trust, improve transparency and facilitate interoperability across national and international value chains.

- **Lessons learned**

- Collaboration mechanisms work best when they are linked to concrete use cases and clearly defined objectives rather than broad coordination mandates. Stakeholders are more likely to engage when collaboration helps solve specific policy, statistical or operational challenges.
- Effective collaboration requires agreed governance rules, data-sharing agreements, confidentiality protections, quality assurance mechanisms and clear accountability arrangements.
- Interoperability must be built into collaborative arrangements from the outset. Common standards, metadata frameworks, validation rules and agreed methodologies are essential for meaningful data exchange across institutions and sectors.
- Long-term collaboration requires sustainable governance and financing mechanisms. Dedicated coordination platforms, communities of practice, advisory bodies and trust funds can help maintain engagement, support capacity development and ensure continuity beyond individual projects or initiatives.

6. What major bilateral, regional, or international partnerships have helped advance equitable and interoperable data governance? *

** (Please describe the benefits of participating in these partnerships, as well as any challenges related to coordination, capacity, trust, interoperability or benefit-sharing)*

At the international level, equitable and interoperable data governance depends on partnerships that bring together governments, international organizations, standards bodies, academia, the private sector and development partners around common standards, shared principles and practical cooperation mechanisms. These partnerships support the development of interoperable governance frameworks, strengthen national capacities, promote data stewardship and facilitate the exchange of knowledge, expertise and resources across countries and sectors.

In the context of the UN80 initiative, dedicated efforts are being undertaken to strengthen the governance, accessibility and interoperability of UN system data, particularly under Work Package 16 on the UN System Data Commons. The dedicated work package aims to establish an online portal serving as a single entry point to publicly available UN system statistics and data, while recognizing these resources as global public goods. Aligned with

broader initiatives such as the Global Digital Compact and the Digital Public Goods Alliance, it seeks to improve the visibility, interoperability and overall quality of UN system data.

The United Nations system, including UNIDO, also participates in other initiatives aimed at enhancing data interoperability, particularly the Statistical Data and Metadata Exchange (SDMX), which is a core component of the UN System Data Commons. SDMX facilitates the implementation of data exchange mechanisms, common standards, and data discoverability, all of which are particularly important in the context of the growing use of artificial intelligence.

- **Global frameworks and international governance processes**

At the international level, the United Nations Statistical Commission and its different inter-agency groups and committees provide the core architecture for global statistical standards and guide the collection, production, processing, dissemination and use of data. They also promote data stewardship and guide the role of national statistical offices (NSOs) and other institutions in mainstreaming data governance.

Another example is the developments on the UN Data Commons, which have brought together many different United Nations entities together with private-sector partners to establish a common platform for disseminating UN data under common standards and shared principles.

UNIDO also contributes actively to broader international governance processes. As co-chair (with UNCTAD) of Global Digital Compact Objective 2 and contributor to Objectives 4 and 5, UNIDO supports international cooperation on data governance, digital cooperation and AI-related issues. UNIDO also co-leads Cluster 1 of the Global Dialogue on AI Governance and serves as rapporteur on AI's economic implications for the Independent International Scientific Panel on AI.

- **Standards bodies and interoperability initiatives**

Standards-setting partnerships play an essential role in promoting interoperability and trust. Through its liaison with ISO/IEC JTC 1/SC 42, UNIDO contributes industrial and developing-country perspectives to international AI standards. At the same time, UNIDO highlights the importance of coordination with data governance and cross-border data-flow standards developed through ISO/IEC JTC 1/SC 32, as well as complementary frameworks developed by organizations such as the OECD, ITU, ILO and UNCTAD.

- **Regional, bilateral and multi-stakeholder partnerships**

UNIDO advances equitable and interoperable data governance through layered partnerships, from global norms to regional alliances and private-sector collaboration. AIM Global regional chapters and Centres of Excellence—including initiatives in India and the Western Balkans, the BRICS Centre for Industrial Competencies, the China–Africa–UNIDO Centre of Excellence, the Alliance for Industry 4.0 and Smart Manufacturing in Africa (AISMA), and the Global SIDS Industrial Transformation Platform—help tailor cooperation to regional priorities while promoting interoperability, knowledge-sharing and capacity development.

At the bilateral level, partnerships with the European Union, Japan, China, the Russian Federation and Austria, as well as private-sector partners including IBM, Huawei, Microsoft, Google, NVIDIA, Oxford Insights and Anthropic, have supported the development of digital tools, governance approaches, innovation platforms and capacity-building initiatives that help broaden participation in digital transformation and data-driven development.

- **Sectoral partnerships in renewable energy, hydrogen and industrial decarbonization**

International partnerships supporting renewable energy, hydrogen development, climate action and industrial decarbonization have contributed to improved data governance and knowledge-sharing. Such partnerships facilitate technology transfer, harmonization of standards, capacity-building and the development of certification systems necessary for international hydrogen trade.

Collaboration among governments, industry, research institutions, standards bodies and development partners has helped establish common methodologies for measuring emissions, verifying sustainability criteria and sharing data securely across value chains. Digital traceability systems, certification frameworks and common reporting standards provide practical examples of how collaboration can support both data governance and market participation. These mechanisms help strengthen trust, improve transparency and facilitate interoperability across national and international value chains.

- **Benefits of participation**

The benefits of these partnerships include shared standards, improved efficiencies, greater interoperability, enhanced comparability of data, strengthened national capacities and increased user trust. Partnerships also create opportunities to pool demand, resources and expertise, while helping ensure that local needs and developing-country perspectives influence global standards and governance frameworks.

Participation can also facilitate access to technical expertise, emerging methodologies, certification systems, digital tools and international markets that may otherwise be difficult to access, particularly for developing countries and smaller institutions.

- **Remaining challenges and lessons learned**

Despite these benefits, important challenges remain. Coordination costs can be significant, particularly where mandates overlap or where multiple governance forums operate in parallel. Fragmented mandates, uneven capacities among partners, differences in legal and regulatory frameworks, inconsistent metadata practices and difficulties inherent in collaboration among governments, international organizations and private-sector actors can all complicate implementation.

Partnerships also continue to face challenges related to trust, interoperability, financing, capacity asymmetries and equitable benefit-sharing. In emerging areas such as AI, the coexistence of multiple standards bodies and governance processes can create fragmentation and increase coordination requirements. In renewable energy, hydrogen

and industrial decarbonization, differing regulatory approaches, varying technical capacities and the absence of universally recognized standards may limit participation and interoperability.

UNIDO's experience suggests that partnerships are most effective when they combine common standards with practical implementation support, ensure meaningful participation of developing countries in governance processes, and balance global interoperability with flexibility to address national priorities and capacities. Trust, transparency, data stewardship and equitable participation remain essential conditions for successful collaboration and sustainable governance outcomes.

7. How can international cooperation strengthen equitable and interoperable data governance to ensure that data contributes to shared prosperity and sustainable development? In what ways can the UN CSTD contribute to this effort?

International cooperation is essential for strengthening equitable and interoperable data governance and ensuring that data contributes to shared prosperity and sustainable development. As data ecosystems, digital technologies and value chains become increasingly interconnected across borders, international cooperation can help address capacity gaps, promote common standards, facilitate trusted data sharing and ensure that the benefits of the data economy are more broadly shared.

- **Strengthening national data systems and governance capacities**

International cooperation should strengthen national data systems as providers of public goods. This requires sustained financing to develop the necessary statistical and digital infrastructure, data-exchange mechanisms, institutional frameworks and human resources. Strong national systems are fundamental to ensuring that countries can generate, govern and use data effectively for policymaking, industrial development and public service delivery.

International cooperation should also create the conditions and standards that promote interoperability while reflecting different legal and institutional contexts, development priorities and levels of readiness. A single governance model may not be appropriate in all circumstances. Cooperation should therefore support context-sensitive approaches while promoting common principles, standards and mechanisms that enable data exchange and collaboration across borders.

In addition, international cooperation should help address coverage gaps as well as systematic bias and exclusion in data systems. Strengthening the visibility of underrepresented populations, enterprises and countries in datasets is essential for ensuring that development policies are based on accurate and representative information.

- **Promoting interoperability, trust and inclusive participation**

Data risks and value chains are increasingly transnational, while the capacity to govern and benefit from data remains unevenly distributed. International cooperation can help reduce these asymmetries by promoting trusted, interoperable data governance as a shared public good rather than a compliance burden.

This includes supporting inclusive standard-setting processes so that developing countries help shape data governance norms rather than being limited to supplying data or adapting to systems designed elsewhere. It also includes promoting shared public goods such as technical assistance, benchmark datasets, testing platforms, reference databases, digital public goods and capacity-building mechanisms that markets alone may not provide at sufficient scale.

International cooperation should further support differentiated and maturity-based pathways that recognize varying levels of institutional and technical readiness, while encouraging mutual recognition mechanisms that facilitate compliance and interoperability across jurisdictions. Such approaches can help improve coordination across different standards domains, including those related to data governance, cross-border data flows and artificial intelligence.

- **Trusted cross-border data flows and benefit-sharing**

An important area requiring international cooperation is the development of cross-border data flows that are effective while guaranteeing data protection and generating trust. This includes strengthening privacy protection, cybersecurity, accountability mechanisms and human rights safeguards while promoting trusted frameworks for data exchange.

International cooperation should also support equitable benefit-sharing. Strong data governance frameworks can help countries capture greater value domestically through improved skills, digital and statistical infrastructure, innovation ecosystems, domestic AI capacity, industrial upgrading and better public services. This is particularly important for developing countries, which should be empowered not only to participate in global data ecosystems but also to derive meaningful economic and development benefits from them.

- **Cooperation in renewable energy and hydrogen**

International cooperation is also essential for developing common frameworks for renewable energy and hydrogen data, sustainability certification, emissions accounting and cross-border data exchange. Such cooperation helps establish common methodologies, promotes interoperability and supports international trade in emerging green industries. Partnerships in these sectors facilitate technology transfer, capacity-building and the development of certification and traceability systems that enable countries to demonstrate compliance with international sustainability requirements. Particular attention should be given to ensuring that developing countries can capture value from the growing hydrogen economy and benefit from data-driven energy transitions that support sustainable industrial development.

As the United Nations specialized agency for inclusive and sustainable industrial development under SDG 9, UNIDO seeks to help reduce the data and AI divide by supporting trusted, interoperable and inclusive governance approaches. UNIDO contributes through technical assistance, capacity-building, public goods, standards engagement and multi-stakeholder partnerships.



Initiatives such as the AI & Digital for Industry Navigator (AIDIN) provide transparent diagnostic tools that help countries assess readiness and identify priorities across infrastructure, data, innovation, capital and governance. The AIM Global network of Centres of Excellence further supports implementation by connecting global expertise with local needs and strengthening national capacities for digital and industrial transformation.

The CSTD is well positioned to support international cooperation on equitable and interoperable data governance by serving as a neutral and inclusive forum for dialogue, knowledge-sharing and policy coordination.

In particular, the CSTD could:

- **Provide a neutral platform for developing countries to articulate data-governance priorities and feed them into broader UN processes**, including ECOSOC, the 2030 Agenda and the Global Digital Compact.
- **Promote coherence across the UN system and the wider standards community**, including the Global Digital Compact, WSIS processes, ISO/IEC, ITU, UNCTAD and UNIDO, helping to reduce duplication and fragmentation.
- **Encourage inclusive and context-sensitive governance approaches** that recognize differing levels of readiness and capacity while supporting interoperability and mutual learning.
- **Support the development and dissemination of digital public goods, common standards and capacity-building initiatives**, particularly in areas related to data infrastructure, interoperability and trusted cross-border data flows.
- **Advance benefit-sharing, inclusion and capacity development**, including for women, youth, least developed countries (LDCs), small island developing States (SIDS) and other groups at risk of being left behind.
- **Promote dialogue on equitable access to data and participation in emerging governance frameworks**, including those related to artificial intelligence, renewable energy and hydrogen economies.

8. Please indicate contact person(s) responsible for projects/policies and international collaboration in case CSTD would require further clarifications on inputs provided.

UNIDO's Division of Strategic Engagement and Coordination: sec@unido.org