



TRENDS
Thematic Research Network
on Data and Statistics

Counting on The World to Act

A Roadmap for Governments to Achieve
Modern Data Systems for Sustainable Development

A REPORT BY THE SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK'S
THEMATIC RESEARCH NETWORK ON DATA AND STATISTICS (SDSN TRENDS)

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Counting on The World to Act is the second flagship report from SDSN TReNDS. It builds upon and complements the 2017 version of *Counting on the World*, which provided a vision for the data for development revolution by laying out suggestions and examples of how the international community and national governments can improve the quality of data and information used to inform policy- and decision-making. A preview of the concepts presented in this report was featured in the July 2019 edition of *Nature*, in “Sustainable Development Will Falter Without Data” (Espey 2019).

The titles of both TReNDS reports were inspired by the UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development, of which five members are now members of SDSN TReNDS. Its report, *A World That Counts*, was published in 2015. It provided a comprehensive assessment of the state of current data and information systems and the potential offered by the “data revolution” for the monitoring and achievement of sustainable development. It is our intention to build upon that seminal work, providing a more up-to-date, practical pathway to achieve modern data systems that integrate the most promising aspects of the data revolution for sustainable development.

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Acronyms

C4DC	Contracts for Data Collaboration	IIASA	International Institute for Applied Systems Analysis
CDO	Chief Data Officer	ITT	Indian Institute of Technology
Cepei	Centro de Pensamiento Estratégico Internacional	IUCN	International Union for Conservation of Nature
CGD	Citizen-generated data	KBA	Key Biodiversity Area
CIDE	Centro de Investigación y Docencia Económicas	LA	Los Angeles
CIESIN	Center for International Earth Science Information Network	LDA-SI	Local Data Action Solutions Initiative
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo	MOU	Memorandum of understanding
CRVS	Civil registration and vital statistics	NGO	Non-governmental organization
CSO	Civil society organization	NGS	National Geographic Society
CTGAP	Cape Town Global Action Plan	NSDS	National Strategies for the Development of Statistics
DAC	Development Assistance Committee	NSO	National Statistical Office
DSA	Data sharing agreement	NZ	New Zealand
ECOSOC	UN Economic and Social Council	ODI	Overseas Development Institute
GPSDD	Global Partnership for Sustainable Development Data	ODIN	Open Data Inventory
GWG	UN Global Working Group on Big Data for Official Statistics	ODW	Open Data Watch
HLG-PCCB	High-level Group for Partnership, Coordination, and Capacity-Building for Statistics for the 2030 Agenda	OECD	Organisation for Economic Co-operation and Development
IAEG-SDGs	Inter-agency and Expert Group on Sustainable Development Goal Indicators	OPHI	Oxford Poverty and Human Development Initiative
IBA	Important Bird and Biodiversity Area	PARIS21	Partnership in Statistics for Development in the 21st Century
IDA	International Development Association	PMNCH	Partnership for Maternal, Newborn and Child Health
IEAG	UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development	SDGs	Sustainable Development Goals
		SDSN	Sustainable Development Solutions Network
		TReNDS	Thematic Research Network on Data and Statistics

TRIPP	Transportation Research and Injury Prevention Programme
UK	United Kingdom
UN	United Nations
UN-GGIM	UN Committee of Experts on Global Geospatial Information Management
UNDESA	UN Department of Economic and Social Affairs
UNDRR	UN Office for Disaster Risk Reduction
UNECA	UN Economic Commission for Africa
UNEP	UN Environment Programme
UNEP-WCMC	UN Environment World Conservation Monitoring Centre
UNHCR	Office of the United Nations High Commissioner for Refugees
UNSC	UN Statistical Commission
UNSD	UN Statistics Division
US or USA	United States of America
USGS	US Geological Society
WEF	World Economic Forum



Executive Summary

Eradicating poverty and hunger, ensuring quality education, instituting affordable and clean energy, and more – the Sustainable Development Goals (SDGs) lay out a broad, ambitious vision for our world. But there is one common denominator that cuts across this agenda: data. Without timely, relevant, and disaggregated data, policymakers and their development partners will be unprepared to turn their promises into reality for communities worldwide. With only eleven years left to meet the goals, it is imperative that we focus on building robust, inclusive, and relevant national data systems to support the curation and promotion of better data for sustainable development, focusing on:

- **getting the governance right**, with an empowered national statistician or relevant national data coordinator who is enabled to collaborate with third parties, and is actively encouraging a more inclusive national and international statistical system;
- **a strong legal and policy scaffolding** to ensure data interoperability and comparability, supporting the capacities and culture to integrate and analyze data from different sources in a collaborative manner;
- **incentives for innovation** to actively support public and private data access, collaboration, and innovation at the local, national, and international levels; and
- **finding the money** to ensure the long-term production, analysis, and adoption of the vital data (and derived indicators) needed to manage progress towards sustainable development.

These actions respond to the key challenges laid out in the 2017 report of the Sustainable Development Solutions' Thematic Research Network on Data and Statistics (SDSN TReNDS), *Counting on the World*, such as acute capacity gaps, lack of political leadership, and inadequate financing. The problems are well known and, fortunately, there are some signs of progress. In particular, the growing evidence base in the use of satellite imagery and earth observation data that is being used to augment traditional statistical methods. Nevertheless, persistent data gaps and lags remain the reality in many countries. Countries in Africa and Asia, on average, have data available to monitor a mere 20% of SDG indicators (United Nations 2018)¹.

“Poverty and basic health data, such as that relating to child stunting, is often five or more years out of date, while birth registration is often even older. Administrative data like what children are learning, whether hospitals have enough medicine and whether people have access to transport are grossly underfunded in many parts of the world – if funded at all.”

(SDSN TRENDS 2017)

The 2017 report details how collaboration among a broad set of actors must occur across all stages of the data process – from collection and cleaning through dissemination and analysis – and how catalyzing this collaboration requires an array of innovative institutional arrangements, roles and responsibilities, and incentives. But with limited progress two years on – for example, with 50-plus of the SDG indicators still undefined – it is time to revisit these recommendations, focusing on the central agents of change: governments (Inter-agency and Expert Group on Sustainable Development Goal Indicators 2019).

In this report, TReNDS details an action plan for governments and their development partners that will enable them to help deliver the SDGs globally by 2030. Our recommendations specifically aim to empower government actors – whether they be national statisticians, chief data scientists, chief data officers, ministers of planning, or others concerned with evidence in support of sustainable development – to advocate

¹ Only 35% of sub-Saharan African countries (16 out of 46) have poverty data collected since 2015 (World Bank 2019). Meanwhile, policymakers struggle to accurately track the estimated 25.4 million refugees missing from national statistics worldwide, or to reliably monitor shoreline change to curb erosion rates within 24% of the world's sandy beaches (UN High Commissioner for Refugees 2017; Luijendijk et al. 2018).

for, build, and lead a new data ecosystem. These recommendations draw inspiration from best practices and notable examples from the Philippines, Bangladesh, Colombia, and other regions. These country examples, in particular, illustrate the power of governments to make big changes under significant resource constraints.

We highlight four priorities of an innovative and inclusive national data system that will help world leaders to take stock of progress, but also make real-time course corrections – redirecting services and investments in response to acute needs – and forward-looking projections. Essential to this latter imperative is that intra-national datasets can be compatibly integrated as parts of planetary-scale evaluations.

First, we need a **strong system of data governance**, with an empowered national chief statistician working across government to ensure a supportive policy and regulatory framework for new data practices. The chief statistician should foster collaborations that produce higher-frequency and better-quality data, promote greater openness and availability of data, and advocate for effective cross-governmental data systems to improve national efficiency.

To facilitate this change, countries should review their legal frameworks or statistical legislation to fully integrate the use of new and non-traditional data sources in the official statistical system, as well as redefine or expand the role and mandate of the chief statistician. Countries may also consider appointing an additional data coordinator, such as a chief data officer (as in France), who can support the chief statistician and help to advocate for data innovation across government. Such appointments can also spur progress at the subnational and international levels. Buy-in from city officials is critical to ensuring data is sufficiently disaggregated to support front-line service delivery.

Crucially important is a supportive international policy environment that encourages governments to partner with new actors and try innovative approaches. Chief statisticians, in their capacity as members of the UN Statistical Commission (UNSC), should push for the UNSC to extend its role and become a more inclusive international platform for data sharing and coordination. The UNSC needs to engage beyond the “usual suspects” and build trust and common cause among official and unofficial data providers, specifically around data gaps and capacity challenges. Governments should also call for the UNSC to take on a broader mandate, providing guidance and setting standards on data across the entire data and statistical system, including facilitating data sharing with non-governmental partners.

A clear **legal and policy scaffolding** or framework is also critical for strengthening stakeholder trust and creating an

enabling environment that encourages data sharing and interoperability. For example, in the context of natural disasters, the lack of agreed hazard terminology is a prime example of a policy standards issue; governments and private entities, such as insurance companies, are struggling to collate, report, and share information on hazards as per their commitments under the SDGs, Paris Climate Agreement, and Sendai Framework for Disaster Risk Reduction. Where such confusion exists, governments and the UN should bring together epistemic communities to agree upon clear national, regional, or global terminology and data collection standards (such as the Hazard Terminology and Classification Review, co-facilitated by the UN Office for Disaster Risk Reduction and the International Science Council). As another approach, open data policies can help to foster collaboration and trust. *Counting on the World to Act* discusses the power and potential of the “open by default” movement, as well as the legal, commercial, and privacy issues that ought to be considered when deciding how to make data public. Another way to encourage collaboration between public and private entities within a secure operating framework (particularly where open by default policies are not necessarily appropriate) is for governments to establish responsible data usage guidelines, threat assessments, impact assessments, trusted user frameworks, data protection acts, and data sharing agreements.

A supportive policy environment is essential to realizing the ambition of an **open, innovation-oriented system**. TReNDS’ vision is a user-centric system that actively supports public and private data users and encourages collaboration at the local, national, and international levels. Such a system should enable access to new technologies and the uptake of new data sources (e.g. from private partners, academic sources, and citizens), as well as the development of new technical capacities. To this end, we endorse and encourage the adoption of the UN Environment Programme’s proposed digital ecosystem framework, which would incentivize and support private actors in sharing information and using advanced technologies to provide better access to data. Additionally, we recommend the establishment of good practice coalitions and platforms – such as POPGRID, another consortium to which TReNDS contributes – to make international data sources, methods, and innovations more standardized and accessible across countries.

Finally, but crucially, all of these actions and opportunities depend on the availability of **adequate financing**. As documented by PARIS21, the Sustainable Development Solutions Network, Open Data Watch, and others, there exists a substantial financing gap for data and statistics. The full report highlights three ways in which governments and their development partners can mobilize the financial

resources needed to close this shortfall. First, in advocating for domestic and international financing we need a common message highlighting the returns on investing in these data. One example: The joint NASA/US Geological Survey Landsat program, which operates satellites that provide Earth observation data, has enabled discoveries and interventions across science and health and provided an estimated worldwide economic benefit as high as US\$2.19 billion a year as of 2011 (Espey 2018a). Second, we call for the High-level Group for Partnership, Coordination, and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development to establish clear, quantifiable goals for governments and their development partners that motivate investment in data and track resource mobilization to fill key data gaps and build statistical capacity at local and national levels. We also support the High-level Group's efforts to develop a practical implementation framework for the Cape Town Global Action Plan and the Dubai Declaration. Third, we call for governments and their partners to improve the efficiency of financing for data by agreeing to common operating principles, such as aligning with the National Strategies for the Development of Statistics and focusing on sectoral funding rather than piecemeal approaches. They should also consider a coordinated donor platform for statistics to better align resources and ensure no country or region is left behind. The Bern Network on Financing Data for Development should play an important role, helping to mobilize donor support for such a platform and to identify the best institutional mechanisms and practices.

Four years have already elapsed since world leaders committed to achieve the SDGs in their countries by 2030. Only eleven years remain. Now is the time for action, not theorizing. This TReNDS report provides concrete and pragmatic recommendations that aim to identify, replicate, and scale success stories from around the world. Governments are in the driver's seat, determining the direction and speed, but they will need a substantial and diverse coalition of partners to achieve the systemic change that a modern data ecosystem demands. TReNDS is one such coalition of technical partners standing by to help.



CHAPTER 1

Introduction: Taking Stock of Progress

In 2017 the Sustainable Development Solutions Network's Thematic Research Network on Data and Statistics (SDSN TReNDS or TReNDS) released a report, *Counting on the World*, that set out a vision for evolved national and global statistical systems. These systems would integrate data from across the whole of government, as well as from non-governmental actors and businesses, to help national statistics offices cope with the rising demand for data and capitalize on new technologies and approaches.

TReNDS laid out four pathways to build new data ecosystems for sustainable development, relating to governance, principles and standards, innovation, and financing. The pathways corresponded to and built upon the areas of action identified in the report of the UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG), *A World That Counts*, as well as the recommendations laid out in the Cape Town Global Action Plan (CTGAP) (IEAG 2014; UNSD 2017a). In this report we reexamine these pathways, reflecting upon the past two years of progress and setbacks, and refine our recommendations based on what is working in different countries around the world and the actors that can affect the greatest change: governments. Strong, government-led data ecosystems will help to improve service delivery and ensure greater protection of individuals' information and privacy. Intra- and inter-government collaboration will also improve, and Sustainable Development Goal (SDG)-related, evidence-informed decisions and results reporting will increase.

Fortunately, we are making some progress. In the last few years the coverage of census data has increased dramatically, catalyzed by computer-assisted methods and other technological innovations. This means we now have a much better handle on exactly how many people live in each country and their precise location, thereby helping to better target government services and interventions. Furthermore, the expanding use of satellite imagery is helping to augment traditional survey methods, giving us robust interim estimates on population movement and change. And statisticians and policy makers have joined together in response to the call to "leave no one behind" – for example, establishing new standards for the measurement of aging through a new expert "City Group" (UNSD n.d.).

There is also growing consensus among national statisticians, data scientists, academics, and private sector representatives on the required direction of travel: the need to innovate, to work in partnership, and to look to non-official sources of data to supplement official statistics. This was particularly evident at the two World Data Forums convened in January 2017 in Cape Town, South Africa and October 2018 in Dubai, United Arab Emirates. At these events, and in their subsequent outcome documents, representatives from the UN system, from national governments, from private companies, academia, non-governmental organizations (NGOs), and citizen groups committed to "take decisive actions to transform how data and statistics are produced and disseminated to inform development policy decision, with the vital support of governments and in closer partnership with stakeholders from academia, civil society, the private sector, and the public at large" (UNSD 2017a).

Nevertheless, challenges remain (as highlighted by the limited progress detailed in Annex 1). A 2018 UN survey found that in Africa and Asia, on average, data for only 20% of SDG indicators is currently available, and the World Bank has found only 35% of the African continent has poverty data collected since 2015 (UN 2018; World Bank 2019). Furthermore, there are huge numbers of people who still go uncounted; such as the 25.4 million refugees in the world who are missing from national statistics (UNHCR 2017). Our knowledge of the environment is also limited; for example, there is still no reliable, global-scale assessment of historical shoreline change, in spite of evidence to suggest that 24% of the world's sandy beaches are eroding at rates exceeding 0.5 meters per year (Luijendijk et al. 2018). Furthermore, critical institutions are not resourced to cope with rising data demands. Recent estimates from the Partnership in Statistics for Development in the 21st Century (PARIS21) consortium and the Overseas Development Institute (ODI), building on a 2015 estimate from SDSN and partners, suggest a shortfall of US\$700 million per annum in national statistical systems, resulting in acute data gaps, data publication delays, insufficient data disaggregation, and more (Calleja and Rogerson 2019).

To improve the quality of data and information for decision-making worldwide, we need to reach consensus on what works and – equally important – what does not. We need to

highlight positive success stories, and we need to make a compelling case for investing in data – e.g. showcasing the life-saving potential of innovative health tracking systems in Bangladeshi slums, and the US\$2 billion global economic benefit of the US government launching and investing in the Landsat earth observation program (Dahmm 2018a; Espey 2018a). Such examples need to be used in a coordinated, strategic effort to win the attention and investment of international and domestic financiers thereby meeting the US\$700 million per annum shortfall.

This report lays out current challenges relating to governance, laws and standards, uptake of innovation, and financing, and then seeks to provide practical strategies to overcome them, including by highlighting successful country and city-level practices. It updates the recommendations made in TRenDS' 2017 report, *Counting on the World*, following evaluation of their feasibility and uptake in the intervening years. It lays out an action plan for governments, specifically, to kick-start the kind of systemic change that we need. We only have eleven years left to meet the ambitious SDGs so there is no more time for theorizing. We have to identify what works and rapidly scale it, moving from piecemeal approaches to transformative change.



The UN Statistical Commission has the opportunity to play a bigger role in coordinating the data ecosystem across the UN and improve in other areas.
SOURCE: UNSD/SHIRLY ANG

CHAPTER 2

Getting the Governance Right

“Good governance of the data revolution for sustainable development will require the creation of open, equal platforms for collaboration.”

(TRENDS 2017)

To govern the new ecosystem of data providers – and ensure they are providing high-quality data in a responsible manner and over a sustainable time period – we need new more inclusive and agile institutions. Traditionally, official statistics have been produced by National Statistical Offices (NSOs), with the standards and methods being overseen by the UN Statistical Commission (UNSC). These institutions continue to play vital leadership roles. But consensus is growing around the idea that we need to bring non-governmental actors into the tent, recognizing that they have a valuable role to play in data production, technical assistance, technological support and more (TREND 2017; UNSD 2017; IEAG 2014). Bringing academic partners, private companies, NGOs and others into formal processes also provides the opportunity to establish common standards, agree upon key principles, and create mechanisms to support public-private partnerships. In this chapter we reflect upon the reforms required both within NSOs and at the international level through the UN Statistical Commission. We also look at the crucial role of local governments in monitoring sub-national activity around the SDGs.

A. National Institutions: The Evolving Role Of The National Statistical Office

Over the past few years, there has been a widespread call for NSOs to evolve from producers of data to coordinators of the broad data ecosystem, responsible for identifying a wide range of data sources and assessing their quality and rigor before using these data to compile national statistics. The Organisation for Economic Co-operation and Development (OECD) goes so far as to suggest NSOs become “clearing

houses” of data, responsible for certifying new data sets and methods (Prydz 2014). However, as NSOs reform themselves, it is essential that they receive strong support from the executive (Head of State) and other, senior-level ministerial positions to coordinate the broad range of national data actors and ensure they are sufficiently resourced².

New Functions

Recognizing the need for higher-profile data leadership in government, the 2017 edition of *Counting on the World* called on countries to consider adopting chief data officers (CDOs) to support the NSO and chief statistician with additional data coordination and advocacy in government. Originating in 2003 with big tech and financial businesses per Wiseman (2018), the position of CDO – a high-profile coordinator of data partnerships, production, and use – has increased in popularity and prominence in government over recent years across different geographies and levels of authority – for example, at the country level in France and Estonia, and sub-nationally across the United States (see Box 1). Our initial recommendations emphasized the potential benefits of appointing a CDO within NSOs where this position could mobilize political capital, encourage third-party partnerships, help to coordinate data sharing across government departments, encourage novel applications of existing government data, and attract resources. For example, in France the CDO and the associated agency, Etalab, are not involved with the production of new statistics (which is firmly the remit of the NSO); however, they support the use and governance of existing, raw data (Banzet and Chignard 2019). Anyone can submit a request to the CDO for assistance with a particular data set (Banzet and Chignard 2019). Etalab’s general interest entrepreneurs program works with ministerial officials to promote data applications, such as using administrative data to help job seekers or develop tools to improve road safety (Etalab 2018). A key value add here is the focus on turning data into insights, useful for different government departments. This encourages evidence-based policy- and decision-making and improves the perceived value of the NSO.

² As highlighted by the successful reforms enacted in the Philippines, further documented in Espey (2018b).

Recent experiences show that there are a variety of ways to establish these functions in government, including by empowering the national statistician and the existing NSO to fulfill these duties. In New Zealand and the Philippines, for example, the National Statisticians are mandated to coordinate data across all of government, bring in new methods and partnerships, and encourage innovation with great success

(Dahmm 2018b; Espey 2018b; Government of New Zealand 2019). Table 1 provides an overview of the traditional and new responsibilities that are increasingly falling to the national statistical system and should be managed either by the National Statistician or CDO. Further discussion on CDOs and their utility at ministerial and local levels is provided in Box 1.

BOX 1 The Emergence of Chief Data Officers at Local and National Levels

The CDO role has evolved from the sub-national level to the federal level worldwide (Wiseman 2018). Examples abound from France, to Estonia, to New Zealand, to the US.

France became the first country to appoint a national CDO in 2014 (Banzet and Chignard 2019). The role is appointed by and reports to the Prime Minister from Etalab, a group within the French government that promotes open data and data modernization. It does not have formal links with the NSO, but its position provides the ability to work across all ministries (Banzet and Chignard 2019). In Estonia, the CDO is a non-political appointee in the Ministry of Economic Affairs and Communications, reporting to the Chief Information Officer (Velsberg 2019). The position is separate from Statistics Estonia (which is under the Ministry of Finance) but relies on Statistics Estonia for data and statistics, and there is some overlap on governance and other issues (Velsberg 2019). In contrast, the role of Government Chief Data Steward in New Zealand is held by the executive director of Statistics New Zealand, providing them with a platform to advocate for the value of data across government (Government of New Zealand 2019). Yet another model is seen in the United States, where CDOs have been operating in individual federal agencies, often reporting to Chief Information Officers (Wiseman 2018).

Critical to the success of the CDO, regardless of location or exact remit, is executive-level support (Shah 2019; Wiseman 2019). Moreover, the CDO can be an advocate for data. In the example of Estonia, CDO Ott Velsberg advocates for data use and education, saying, “It is really a spokesperson role in that sense. Creating a data driven drive that isn’t necessarily present in the public sector” (Velsberg 2019).

CDOs to date have also served convening roles, exemplifying collaboration and new ways of working (Shah 2019). For example, in France, a number of ministries have data officers who deal with information or statistical systems, and the national CDO meets every other month with these officials to facilitate knowledge sharing (Banzet and Chignard 2019). Under new legislation, Estonia will

introduce Data Stewards throughout the entire government, and the CDO is working with Statistics Estonia to describe data governance core principles on how to reeducate these data stewards (Velsberg 2019).

CDOs can also play a very helpful role promoting open data standards by addressing both technical and administrative issues (Shah and Eggers 2018). For instance, nine different data sets from the French government have been identified as key for social and economic development, and Etalab ensures these data sets are published openly and with regularity (Banzet and Chignard 2019).

On a practical level, CDOs have also performed useful functions expediting data applications and brokering dispersed data source; ministerial-level CDOs in particular allow sector-specific engagement and capitalization on unique knowledge and connections to maximize the impact of data use. For example, to tackle the opioid epidemic in the United States, sub-national and agency-level CDOs are brokering data from different agencies and levels of government to inform policymakers – e.g. at the state level, the CDO of the State of Connecticut coordinates data sharing from various state agencies and publishes accidental overdose death data sets on the state’s Open Data Portal (Shah 2019; Martinez 2018). At the federal ministerial level, the CDO for the US Department of Transportation has led the gathering of troves of data from state and local governments on road conditions, transit usage, accidents, and more; one application has been a geospatial database of transit routes and schedules for travelers and researchers alike, the National Transit Map (Wiseman 2018).

With these successes serving as models, countries should consider creating ministerial and local CDOs to complement the national statistical system, strengthen the wider data ecosystem, and originate data solutions from within responsible agencies.

TABLE 1 Changing Functions of the NSO and a Potential Division of Labor Between the Chief Statistician and Chief Data Officer

	CORE FUNCTIONS	NEW FUNCTIONS
Primary Role	Manage the impartial production of official statistics.	Broker new partnerships to produce, clean, compile, and analyze data and produce official statistics
Responsibilities	<p>Produce official statistics including data on social, economic, and environmental conditions, as well as national accounts</p> <p>Coordinate and oversee agreed data partners</p> <p>Conduct data quality assurance, testing and evaluation</p>	<p>Connect and coordinate data activities across government</p> <p>Identify new data partners and new data sources for the government (ministries and departments) in partnership with the NSO</p> <p>Broker the partnerships, including overseeing legal partnership agreements</p> <p>Conduct internal advocacy to ensure the government maintains a spotlight on data for sustainable development, makes its data openly available, and uses an evidence-based approach to policy- and decision-making</p> <p>Build data science capacity across government</p>
Expertise	Statistical methods to tertiary degree level	Coordinating multi-stakeholder partnership agreements, familiarity with both official and non-official data sources, understanding of data science methods
Reports to	N/A – produces data for government, but is administratively independent	Either the head of government, the Chief Statistician, or another ministerial-level position, but with a dotted line to the NSO to ensure adherence to the same data quality standards

Amended Laws and National Development Plans

For an NSO to launch a program of modernization – including potentially appointing a CDO – a strong and open statistical law and/or policy framework is required. This must empower the national statistician to engage with third parties and use their data, as well as perform other essential functions like coordinating data compilation across government entities. The CTGAP identified this as a central and urgent action for

all countries, to “enhance the status, independence and coordination role of national statistics offices” as well as encourage the development of “a mechanism for the use of data from alternative and innovative sources within official statistics” (UNSD 2017). Sadly, many countries in the world still have laws and policies that actively limit these activities. For example, Nigeria’s Statistics Act, 2007 explicitly says that official statistics are those produced by the national bureau

of statistics, line ministries, public authorities, state statistical agencies, and local government statistical units, making no provision for the national bureau to vet, sanction, and use data generated by third parties, even if it is of exceptionally high quality and directly measures the outcomes they wish to track (Government of Nigeria 2007). In Tanzania a similarly stringent act is in place that makes it illegal for independent groups to publish what the government deems “false official statistics” or to disseminate information that would result in the “distortion of facts” (Mwema 2017). The result of this was the arrest of opposition politician Zitto Kabwe in 2017 for violating the law for remarks he made about Tanzania’s economic growth. But in June 2019, thanks to pressure from citizens and donors, the Parliament passed an amendment lifting some of the restrictions and also giving every person the right to collect and disseminate statistical information, removing criminal liability for publishing independent statistics (Nyeko 2018).

In addition to the appropriate laws, equally important are national strategies for the development of statistics and national development plans stressing the significance of data. For example, Ghana has made statistics a clear focus in its national development plans and SDG planning (Republic of Ghana 2017). The Coordinated Programme of Economic and Social Development Policies (2017-2024) highlights the establishment of a national database as a flagship initiative and emphasizes the need to strengthen civil registration and vital statistics (CRVS) systems (Ibid). And the country’s 2019 Voluntary National Review places significant focus on the need for statistics for the SDGs – particularly for reliable and timely sex-disaggregated data (Republic of Ghana 2019). Furthermore, the Ghana Statistical Service has launched an SDG data reporting platform as a step to make data easily accessible and ensure the integrity of official statistics³. Such efforts highlight the importance of national government, particularly the national statistical office, in supporting the use of data for the SDGs.

Increased Human Resources and Capacity

The expanding remit of NSOs – to include cross-government data coordination, analysis, and external partnerships – places a heavy burden on many agencies that are already underfunded and resource-constrained. As such, skill development and recruitment should be a major priority for every country in the world.

For national statisticians taking on responsibilities for brokering partnerships with external actors and across government, having skills in political negotiation will be critical, while at the junior- and mid-level, analytic capacities will need to be increased to translate raw data into useful insights for

policymakers. Familiarity and training in geospatial data is particularly pressing, given the plethora of free imagery now available that can be usefully overlaid with most survey-based methods to enable geographic disaggregation. Familiarity with big data, artificial intelligence, and writing algorithms will also be useful as technologies evolve and become more accessible to the public sector.

But it is not just new technologies and innovations brought on by the data revolution that require more capacity and resources; more traditional data such as basic economic, social, and geographic statistics need ongoing investment and well-trained staff. Capacity to monitor inequalities, such as gender-based inequalities, needs focus as well. Increasing awareness and understanding of persistent biases and gaps in gender data collection have placed pressure on national and international statistical systems to respond. To address these issues, the African Centre for Statistics of the UN Economic Commission for Africa (UNECA), in partnership with Data2X, has initiated a project aimed at improving the production and use of gender data within African national statistics systems through the creation of a strong and vibrant network: The Gender Data Network. The main goal of the project is to raise the standard of gender data production to better link with demand for these data, improve the effectiveness of communication of and about gender data, encourage their use, and build capacity across participating countries. The knowledge gleaned from this network will also aid development partners to design effective interventions to move the field of gender data and statistics forward. In this regard, the network fosters gender data expertise, facilitates cross-country learning, enables capacity building and training, enhances coordination mechanisms, and provides a platform for members to raise and solve issues they face. The Gender Data Network may serve as an example for other data sectors.

To support the recruitment and retention of skilled people, an effective back office is required with strong human resource capacity, as well as efficient administrative and financial management services. This requires investing in these essential support functions: allocating sufficient overhead on grants, gifts, and investments to support these professions.

³ Available here: <https://sustainabledevelopment-ghana.github.io>

B. Local Institutions: Building Data Leadership and Capacities

Strong, inclusive national institutions are vital for effective coordination of the broad range of data producers now in operation. However, with 84% of the world's current population living in urban and peri-urban areas, the engagement of local governments is critical to success (Scruggs 2018). Among other things, local governments can collect disaggregated data, validate data with local residents, and add nuance to aggregate national statistics. Fortunately, municipalities, metropolitan regions, and provinces the world over are starting to engage with the SDGs, setting cutting-edge examples for local initiatives that successfully promote sustainability.

Since 2016, TReNDS and SDSN Cities (SDSN's urban program) have supported more than nine cities and local regions to develop and document local data solutions in support of sub-national SDG monitoring⁴. The Local Data Action Solutions Initiative (LDA-SI) explores themes related to indicator localization ("How can we tailor the global indicators to the subnational context and identify additional local indicators to promote SDG action and achievement?"), data platforms (identifying data dashboard models to provide easy-to-use granular data on SDG dimensions), the use of third-party data (filling sub-national data system gaps with citizen-generated data, telecommunications data, and similar) and national-to-local data integration (specifically, focusing on methods for aligning and integrating national and subnational SDG reporting systems)⁵.

A range of common lessons and practices have emerged from these case studies, including the vital importance of local government leadership and engagement. In all of the regions, the active engagement of the mayor and other city officials has been crucial to shore up broad support across local residents and ringfence dedicated time and resources for data collection, as well as data uptake in policy design. Grantees noted, however, that political support was more easily built when an SDG effort was formulated around existing policies, initiatives, and monitoring frameworks. In Patiala, India, for example, the SDG strategy was developed around the stated priorities of the city's leadership, as aligned with SDGs related to health, clean water and sanitation, infrastructure, sustainable cities, climate change, and governance (SDGs 3, 6, 9, 11, 13, and 16) (see Box 2). This simple, connect-the-dots approach was found to reduce any skepticism and improve buy-in from local officials (Varma 2019). In the case of Los Angeles, where the mayor has played a leadership role in promoting the SDGs, the grantee team (including representatives from the city government and local universities) developed a list of proposed local SDG

indicators that aligned with LA's Sustainable City pLAN (Bromaghim 2019). The team aimed to propose a set of targets and associated indicators that would enable a more coordinated government effort to achieve the SDGs.

⁴ Including Aruba (Kingdom of the Netherlands), Belo Horizonte (Brazil), a network of municipalities in Colombia, Patiala (India), Los Angeles (USA), Bristol (UK), all since 2018. In 2017 we worked with Baltimore (USA), the Northern California Bay Area (USA), and a network of municipalities in Brazil. For more information, visit: <https://www.sdsntrends.org/local-data-action>

⁵ For more information, visit: <https://www.sdsntrends.org/local-data-action>.

BOX 2 Local Data Action in Patiala, India

In 2018, Community Systems Foundation's OpenCities Institute was selected as a grantee of the LDA-SI, aiming to craft a localized SDG indicator framework for Patiala, India. Critical to identifying priorities in Patiala was a multi-stakeholder approach. The project team identified stakeholders from the city who could support the SDG localization process, including municipal entities and leaders (such as the Commissioner and Joint Commissioner and the Municipal Corporation); local academics from the Thapar Institute of Engineering and Technology and The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology (ITT) Delhi; and non-governmental organizations. The project team convened these groups throughout the project, starting in June 2018 with a priority-setting meeting to share the most pressing issues in the city of Patiala: solid waste management, air pollution, parking management, stray animals, and road safety. An August 2018 session brought together urban experts and practitioners across sectors, from UN-Habitat India to TRIPP, ITT Delhi to ICLEI South Asia. This session served not only to gather information from the stakeholders, but to proactively seek their feedback on the localization methodology. The participants of this session also emphasized the value of further multi-stakeholder workshops in the city to determine if the priorities defined by the municipal corporation matched with the needs of the citizens. Through these participatory approaches, the project team ensured its prioritization and methodology aligned the global to the local. For more information, see Varma (2019).

BOX 2 Local Data Action in Patiala, India
continued



FIGURE 1 A prototype of Patiala's dashboard aligning the SDGs with local indicators.

SOURCE: COMMUNITY SYSTEMS FOUNDATION / OPENCITIES INSTITUTE

Across SDSN's sub-national work, partnerships with city-level actors, universities, and local civil society organizations (CSOs) have proven essential as local governments seldom have the internal capacity to develop SDG-aligned monitoring frameworks. They also do not have the bandwidth to identify new data sources, validate third-party data options, and ensure their indicators can be harmonized with regional or national SDG monitoring frameworks (to the greatest extent possible). For these purposes, partnerships with local universities (which can potentially benefit from student capacity) and local CSOs have been highly effective, where coordinated by a clear local government focal point and/or SDG working group that can help to ensure results are integrated into local government plans.

C. Global Institutions: Reforming the UN Statistical Commission

The international data community – comprised of national statistical offices, multilateral institutions, research institutes, and NGOs – has made great strides in its efforts to include more actors in the production of data and statistics for sustainable development. For example, in 2016 the Global Partnership for Sustainable Development Data (GPSDD) was established, a multi-stakeholder consortium in support of the data revolution for sustainable development, with strong support from the UN (including the Chair of the Board, the Deputy Secretary-General). There is also great potential to create a more inclusive environment for advances in data and statistics at the regional level (see Box 3). In 2017 and 2019 the UN Statistics Division worked in partnership with the GPSDD and other stakeholders to host a World Data Forum – a space for governments, CSOs, and private companies to share new and alternative approaches to data collection and monitoring, with particular emphasis on the monitoring of the new SDGs. These kinds of informal spaces are already helping to match supply and demand, enabling countries to articulate what they want to monitor and to invite non-governmental actors to help them fill gaps. But as important as these spaces and networking opportunities are, their informal nature renders them unable to establish accountability framework or key standards for all of the partners involved. To produce strong, reliable, multi-stakeholder partnerships that will endure for the duration of the SDGs and beyond, more formal mechanisms are required – mechanisms that can ensure the quality and security of the data being produced with the same rigor of those produced for official statistics.

At the highest level of the global statistical system is the UN Statistical Commission (UNSC), established in 1947. The UNSC brings together the chief statisticians from Member States from around the world and a number of agencies engaged in statistical activities. The UN Statistical Commission is the highest decision-making body for international statistical activities, notably responsible for the setting of statistical standards, the development of concepts and methods, and their implementation at the national and international level. The UNSC has played an important role in the governance and quality assurance of official statistics and in building a united and professional community for official government statisticians from around the world. For example, it developed a set of Fundamental Principles of Official Statistics that has guided and guarded the work of NSOs and their independence (UNSD 2013). Given its successful track record convening NSOs and systematizing national statistical approaches, as well as its international mandate and eminence, the UNSC is a natural convening space for the wide range of data providers

BOX 3 Taking a Regional Approach to Statistical Modernization

Regional cooperation is critical for transboundary issues. It is often only by using a regional approach that governments can address economic, social and environmental conditions. For example, water or forestry systems may span multiple countries and require effective regional cooperation for their sustainable management. Therefore, cooperation around data and statistics at the regional levels is also crucial. However, to date, regional economic and political groups have been largely ignored by the global multilateral system.

Moving forward, the regional level is an ideal platform to develop data and evidence (analytical), organize programmatic interventions (operational), and exchange knowledge

and experiences among countries (convening). This can be achieved by increasing resources (financial, human and technological) to promote the use of official and non-traditional data sources within regional entities, such as regional economic commissions. With this in mind, a strategic framework for statistical capacity development to deliver the SDGs should be established. It should set out the roles and areas of work for different institutions at the global, regional, and national levels to help to align the funding, functions, governance, and organizational arrangements, and could share the burden of monitoring and achieving such a complex sustainable development agenda.

Written by Cepei

looking to support the SDGs. And for this reason, it should play a leadership role in advancing the uptake of new methods and approaches to improve the quality of data for sustainable development.

However, in spite of its achievements, the UNSC has not kept up with a number of emerging areas and the demand for more, better, and more timely official statistics. These include: filling crucial data gaps in many countries, such as in gender and poverty data; harmonization of surveys and tools used for collecting microdata; focusing on administrative data systems and improving their linkages to the official statistics in many countries; and insufficient focus on barriers to data dissemination and use. Many of these issues were acknowledged as areas needing improvements in the CTGAP, jointly developed by members of the UNSC, UNSD, and other international data actors represented in the GPSDD (UNSD 2017). However, the CTGAP falls short of considering the governance of official statistics and specifically how the UNSC Commission and its various bodies could be updated to accommodate these needs and evolutions, while maintaining the overall goals and strengths of the Commission.

To improve the inclusivity, responsiveness, and efficiency of the Commission and all of its processes within the context of the new global data ecosystem, it will be important to do the following:

1. Clarify the role of UN Statistical Commission in the new data ecosystem, defining the roles of new actors to improve coordination and increase representation of emerging data communities

Before taking on any coordination of external actors, the UN Statistical Commission would benefit from clarifying certain ambiguities in its scope of governance. For example, with recent changes to the global data ecosystem and the increasing prominence of geospatial data, the linkages between the UNSC and the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM) are unclear. It is also unclear if the UNSC has any governance responsibilities for big data groups within the UN, such as the Global Pulse initiative.

In 2017, TRenDS called for the UNSC to “expand its annual meeting to include a dedicated session with non-governmental actors and experts (TRenDS 2017). As of 2019 there have been some advances in the inclusivity of the UN Statistical Commission, with more non-governmental actors invited to attend and observe the traditional special seminar held in advance of the annual UNSC meeting, and to observe the main proceedings; however, there is still no formal space for non-governmental actors to actively participate and provide inputs.

Lack of coordination with private providers, academics, NGOs, and others – and excluding these actors from technical decision-making processes – risks inefficiencies and lost for building partnerships, sharing knowledge, technical assistance,

facilitating links between different data communities, and sharing modern tools. There are several ways to improve the UNSC's inclusiveness; for example, it can provide opportunities for NGO groups to share materials, encourage Member State representatives to include civil society representatives in their formal delegations (as done by Colombia, among others), and invite into its meetings external experts on specific topics and agendas. The overall goal is to strike a balance between preserving the efficiency of the UNSC sessions and benefiting from the perspective and expertise of those outside the current system.

2. Improve coordination across the UN

The UN Statistics Division – the operational agency that supports the Commission, under the UN Department of Economic and Social Affairs (UNDESA) – could benefit from a broader mandate to coordinate statistical activities across UN agencies, particularly statistical units of regional commissions. With expanding data sources and the increasing role of big data and private sector data to complement official statistics, many areas could benefit from a “one UN solution” – e.g those needing legal and procurement solutions, developing memorandums of understanding (MOUs) with new data providers, procurement of special services, and acquisition of IT tools. Better collaboration across UN agencies will not only improve efficiency but also aid advances in the field through better sharing of data and information among agencies, countries, and regions.

Across the UN there have been some informal discussions about a UN-wide Chief Statistician. Although the establishment of this role may help break down the silos between different UN agencies and regional commissions, it would be very complicated to implement and likely need to be phased in over time. One way of encouraging better coordination across the UN would be to consider encouraging the appointment of CDO roles within different agencies and regional economic commissions, with clear mandates to coordinate with each other and the UNSD. These appointments could focus on building linkages and addressing new challenges and opportunities in the data ecosystem, such as links with the private sector and use of big data and disruptive technologies.

3. Focus the UN Statistical Commission meetings on strategic priorities

Focused attention on SDG monitoring has highlighted acute challenges in both global and national statistical systems, such as huge differentials in countries' statistical production capacity. The UNSC should take on some of these challenges

directly as part of its official agenda. Subjects such as national accounts, balance of payments, and price statistics have been on the agenda of the Commission for many years and are tabled annually. They take up the bulk of the annual meeting time and attention⁶. Time allocated to these recurrent issues should be shortened or brought to the Commission less frequently to make room in the agenda for emerging topics, including pressing SDG monitoring challenges. When an expert agency is invited to provide background information on thematic discussions at the Commission and emerging, cross-sectional topics do not fall into its areas of expertise, the UNSC could call in additional, related agencies or experts in the CSO and academic communities to collaborate.

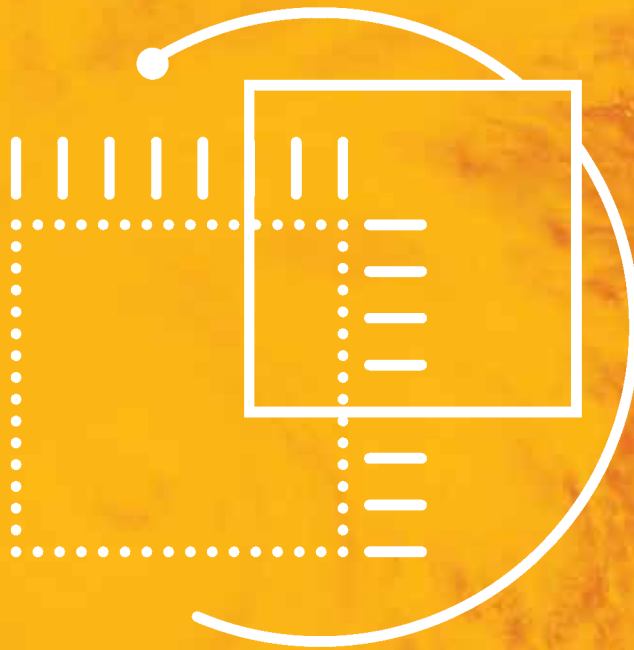
4. Conduct periodic self- or external evaluation of the UN Statistical Commission, covering both operations and focus areas

From time to time, the UNSC has surveyed the members to measure the impact of its decisions through its working groups and Friends of Chair groups (mandated technical working groups traditionally focused on new forms of measurement). One example is the recent polling of countries to learn how far countries have adopted and implemented the Fundamental Principles of Official Statistics (UN Economic and Social Council 2019). Moving forward, the Commission should consider complementing such surveys with a semi-frequent, light-touch evaluation. Questions to consider might include the breadth of membership and inclusivity of the UNSC, the benefits countries derive from participation, and the quality and depth of substantive debates. Most importantly, the evaluation could track progress towards fulfilment of the goals in the CTGAP. Donors with significant investments in official statistics and a results-oriented focus would most likely be interested in supporting such periodic evaluation.

⁶ See agendas from past UN Statistical Commission sessions, available at unstats.un.org/unsd/statcom.

ACTIONS

1. Local governments should look to bolster their statistical capacity to monitor local sustainable development challenges and share data upwards with national government. They should work with local expert groups like universities and, where resources permit, appoint dedicated data officers with the support and backing of the mayor or another relevant executive.
2. National governments should empower their national statistical offices with capacity, resources, and the right policy and legal frameworks to take on coordination of data curation and use across the whole of government. They should empower the NSOs to partner with third parties as appropriate to use high-quality, vetted data to supplement official statistics.
3. National statisticians should be mandated to coordinate this change, working with a supportive Chief Data Officer who can focus on data use across government and partnerships (where necessary and practical).
4. Internationally,
 - a. Member States should call for reform of the UN Statistical Commission to ensure more focus on and resources allocated to addressing data gaps and capacity issues, as well as establishing a more inclusive governance structure that invites in expertise from non-governmental groups.
 - b. Member States should push the UNSC to assume greater responsibility for the UN data ecosystem, encouraging coordination with newly-appointed agency and regional economic commission CDOs while also improving its inclusivity and inviting in external parties as active participants in formal proceedings.
 - c. With such a broad mandate, it will be important to encourage frequent self-evaluations and ensure UNSC meetings focus on the most pressing political and SDG-related challenges.



Internationally-agreed terminology, such as in the context of natural disasters, is critical for governments to collate, report, and share information related to the SDGs and other commitments.

SOURCE: NASA VIA UNSPLASH

CHAPTER 3

The Legal and Policy Scaffolding

In *Counting on the World*, TReNDS recommended the UN Statistical Commission and wider partners adopt nine principles identified by the IEAG to “facilitate openness and information sharing, and protect human rights” (IEAG 2014). We also recommended expanding efforts to establish joined-up data standards for official and non-official data, e.g. relating to data design, collection, analysis, and dissemination. These recommendations could be achieved through revisions to the Fundamental Principles of Official Statistics (as led by the Friends of the Chair group) and through the inclusion of non-governmental actors in thematic or epistemic discussions on SDG indicators. These are important processes through which to bring national and international data providers together, and can help the community set common frameworks and practices. However, such processes can only go so far. Effective data stewardship across government, private, and non-governmental actors requires common policies, legal frameworks, and terminology⁷.

A. Terminology

Institutional mechanisms that facilitate data partnerships are essential, but only if all of the actors around the table speak the same language. Without internationally-agreed terminology, countries can use wildly different methodologies and achieve very different results. Controlled vocabularies are an essential component of technical data standards as they provide a precise and agreed definition of what is being measured or counted. For example, the term “affected” within a disaster risk reduction context might have a different meaning based on an individual country’s classification of who is directly or indirectly affected. This can impact the response from government agencies and non-governmental organizations, influencing related data and how its collected and analyzed. The lack of agreed hazard terminology is a prime example of how, without clear terminology, governments struggle to collate, report, and share information as per their commitments under the SDGs, Paris Climate Agreement, and Sendai Framework for Disaster Risk Reduction.

Fortunately, in the case of hazards, a Technical Working Group on Sendai Hazard Definitions and Classification – co-facilitated by the United Nations Office for Disaster Risk Reduction and the International Science Council – is working

to develop new hazard definitions and classifications, working with a wide variety of stakeholders to ensure the list is robust and reflects the full spectrum of local and regional terminology. Where ambiguities exist on terminology in the SDG indicator list, UN custodian agencies and the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) should convene broad epistemic communities and aim to forge consensus as a matter of urgent priority.

B. Open Data Policies

A useful policy mechanism through which to encourage cooperation and trust is an open data policy, which encourages the promotion of data that is “licensed for re-use by anyone, free of charge, subject only to discretionary provisions that the source be attributed or that future distribution of the data be sublicensed under a share-alike provision on the same or similar open terms” (ODW 2019a).

As quantities of data have increased around the world, calls for publicly-produced data to be made freely available have also increased. New movements and organizations around open data (Open Data Charter), open government (Open Government Partnership), and open knowledge (Open Knowledge International) have emerged over the past two decades to support the public’s right to information. This right is further supported by the Fundamental Principles of Official Statistics, a set of ten principles that lay out the professional and scientific standards for NSOs. The first

⁷ Assuring the responsible and effective use of data requires that an organization develops necessary skills and procedures. Both business and government have recognized the need for data stewardship: the creation of mechanisms for responsibly acquiring, storing, and using data (SAS 2014; USGS n.d.; Rosenbaum 2010). Data stewardship depends on data stewards, or individuals throughout an organization who can address issues of data access, are accountable for data quality, and can advocate for data management, among other responsibilities (USGS n.d.). In this way, professionalizing the role can help bring predictability and scale to data collaborations (GovLab 2019). Moreover, stewardship suggests a fiduciary responsibility and a consideration of the public interest (Rosenbaum 2010). And its value extends beyond partnerships with the private sector; applying the core principle of data responsibility in the work of NGOs can help improve humanitarian responses (UN Office for the Coordination of Humanitarian Affairs and the Centre for Humanitarian Data 2019).

principle, which arguably incorporates the remaining nine and embraces the core principle of open data, states: “Official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honor citizens’ entitlement to public information” (UNSD 2013).

In addition, in recent years the World Wide Web Foundation have strongly advocated for data to be “open by default,” i.e. publicly disclosed unless there is a legitimate reason for it not to be. There is an emerging trend towards this; as of 2016, 112 countries had passed legislation governing access

to information, up from only 14 in 1990 (World Wide Web Foundation 2016; Right2Info 2012; Loesche 2017). In countries with robust access to information laws (which enable public access to information held by public authorities), the concept of making data open by default then emerges as a preferred policy approach for implementing and operationalizing the legal duty to proactively disclose information and data by creating a presumption in favor of openness. Over 65 countries have committed themselves to this approach by signing up to the Open Data Charter, whose first principle is “open by default” (ODW 2019a).

BOX 4 Putting Countries in the Driver’s Seat: Open Data at the National Level

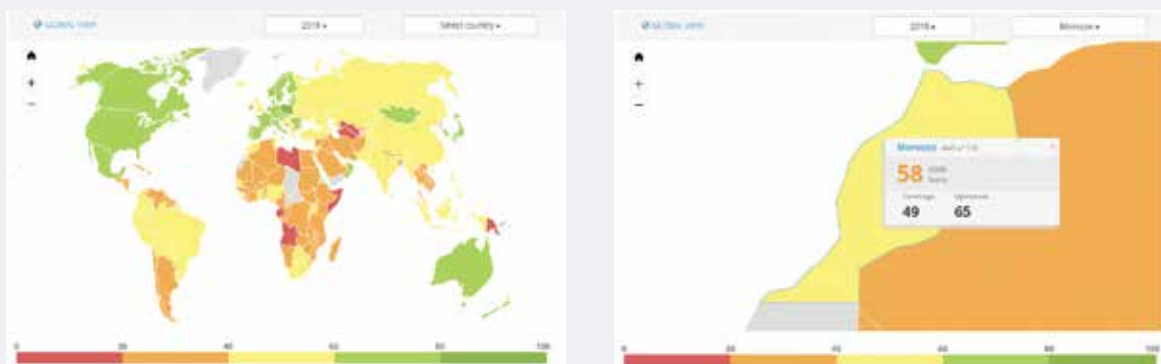


FIGURE 2 Open Data Watch’s Open Data Inventory illustrates the current state of openness around official statistics, including progress at the country level.

SOURCE: OPEN DATA WATCH

The Open Data Inventory (ODIN) 2018/19 is the fourth edition of an index compiled by Open Data Watch to assess the coverage and openness of official statistics in 178 countries (ODW 2019b). The purpose of ODIN is to provide an objective and reproducible measure of the public availability of national statistics and their adherence to open data standards.

Results from 2018 indicate that national statistical systems are becoming more open. Most of the countries that made the greatest progress over the last year did so by improving the openness of existing data. Between 2017 and 2018, the openness elements with the highest average improvement were terms of use or data licenses (with an average increase of 20 points on a scale from 0 to 100) and metadata availability (with an average increase of 10 points). Some of the countries that made the largest positive changes amended or adopted open terms of use or developed a new data portal.

One of the countries that made such progress was Morocco, whose openness score increased from 25 to 65 between 2017 and 2018. After the publication of the 2017 edition of ODIN, Morocco’s High Commission for Planning set forth to create a data portal that would allow users to better access existing and new data. Combined with a newly constructed open terms of use, the result was a dramatic increase in openness. All openness criteria improved in 2018 except metadata availability, although the High Commission has stated that work in this area is on its future agenda.

The improvements to both data availability and openness in Morocco were a result of government coordination, political support, and adequate funding. It highlights what is possible when both human and financial resources are available and allocated to the data agenda. Several other countries have had similar success with their open data efforts, including Jamaica, Singapore, and Oman. Exerting minimal efforts to adopt open terms of use or publish in non-proprietary formats has resulted in major gains.

However, as noted by ODW, open by default is a complicated concept that requires a more nuanced approach to determine where exactly the boundaries of what can and cannot be shared lie. “For instance, taking the example of aggregated official statistics mentioned in the paragraph above, while it is important that the public have access to statistical products (“information”), to what degree are they entitled to the underlying data that are used to produce them? Under an open by default approach, does an NSO have a duty to share the microdata that are used to compile official statistics? If so, in what form?” (ODW 2019a).

It concludes that opening data through an open by default approach should be the preferred method for administrative authorities seeking to be as open as possible. Yet it is also crucial that the limits of this approach are understood and that guidance is provided to practitioners to enable and empower them to take informed decisions about which data should be open, and which closed. In instances where open policies are not possible, e.g. due to confidentiality concerns, governments can still encourage collaboration between public and private entities within a secure operating framework by establishing trusted user frameworks, data protection acts, and data sharing agreements.

BOX 5 The Next Frontier of Open Data Policies: Microdata

Microdata are data on the characteristics of a population – such as individuals, households, or establishments – collected by a census, survey, or experiment. These data can be aggregated up to the regional or national level into indicators that allow countries and other stakeholders to monitor the SDGs and determine whether development efforts have their intended effect and reach the people who need them most. Granular information about vulnerable populations, however, may get lost in data at the aggregate or macro-level. Microdata are therefore critically important for promoting the disaggregation of indicators for the monitoring of the SDGs. Because microdata potentially contain information about individuals, which can be a threat to privacy, the opening up of microdata by governments is even more contested than the move for open macrodata. “However, to harness the full potential of microdata, it is necessary to explore ways in which governments can open microdata as much as possible while ensuring privacy concerns are respected.

Despite a consensus that open microdata are beneficial, practical guidelines on how to implement open microdata do not exist. Microdata are collected using many different instruments and processes, and countries typically use a mix of instruments with different structures and frequencies combined with statistical methods. Classifications, coding, and scales used to report data may also differ between instruments and countries and over time. These combined complications make them more difficult to standardize and develop guidelines for than macrodata. Further, depending on the type of instrument used and characteristics of the data included, restrictions may be placed on the data; the microdata made available to the public may be modified to preserve confidentiality, subject to restrictions on their use, or have limitations on access to users. In many cases, no

access to microdata is provided at all. This lack of coherence of the openness and availability of microdata can lower use by researchers and the public at large and prevents microdata from being used to unlock innovation by public and private actors. It also creates mistrust in data among those that have or have not been given access. Often researchers complain that large development agencies that have privileged access do not do enough to use or share these data.

In order to address these challenges, a research project by Open Data Watch is analyzing the metadata stored alongside microdata for 15 African countries and deriving a set of standards that countries or international agencies can use to evaluate their current practices, as well as establishing guidelines for the dissemination of existing or future microdata. Using tools like this, policymakers can improve the legal and policy framework surrounding microdata and ensure data serves its purpose as a public good.

C. Legal Frameworks

Not only do a lack of shared terminology and unclear policies prohibit productive inception conversations, but they considerably hamper formal legal partnerships and constrain the enabling environment for data sharing between entities⁸. Law and regulatory frameworks are where the rubber hits the road: where the exact details of who produces, owns, uses, controls, and stores the data are specified.

In more than 100 countries worldwide, data protection acts help to ensure that data held by private companies are subject to the same protections as those held by governments – for example, to uphold individuals' privacy. They also help establish a common operating framework valid not only for data protection, but also for effective data sharing (Banisar 2019). However, that leaves more than 90 countries and territories worldwide without effective common frameworks. In such instances, the bilateral legal agreements put in place by private companies and public entities to share information become exceptionally important as they dictate how data will be exchanged, who will own it, who will store it, how privacy will be maintained, and more.

In 2018, TRenDS, in partnership with the World Economic Forum, University of Washington, and the GovLab at New York University, launched an initiative called Contracts for Data Collaboration (C4DC), aimed at improving understanding of the specific legal conditions that can enable effective data sharing between public and private entities, as well as across public entities. Our objective is to create an online library of data sharing agreements, with supporting analysis, to help data collaborators learn from past examples and craft effective agreements. Ultimately, we aim to lower the barriers to negotiating such agreements and thereby encourage more public-private data partnerships. The project addresses a range of audiences, including governments and NSOs, but also business, civil society, and academia. We aim to provide these groups and others with a range of tools to facilitate understanding of the opportunities and challenges related to formalized data sharing, underpinned by written agreements. Data collaboratives have to negotiate questions around data rights, ownership, use, control, and risk. Developing trust and an understanding of the range of legal possibilities are important to navigating these questions.

In Colombia, for example, Cepei has piloted an innovative project with the Bogotá Chamber of Commerce to reconcile local data sources on economic growth, infrastructure, and industrialization now, available to Colombia's national statistical office (Rodriguez 2019). Although the collaboration has been a success, securing the necessary arrangements proved more difficult than initially anticipated. Cepei was

able to analyze the Chamber of Commerce data in less than two months, but the process of negotiating a one-and-a-half-page agreement to enable them to do so took over six months (Ibid). Similarly, Development Gateway – which promotes data-driven development solutions – regularly finds that it takes three to four months to negotiate data sharing agreements (DSAs) with its partners (Hatcher-Mbu 2019). Flowminder took an entire year to negotiate a three-way data sharing agreement in Ghana among themselves, Vodafone, and Ghana Statistical Services (Li 2019).

DSAs may be challenging to negotiate but they generally share common elements; they all concern the routine sharing of data sets between organizations for an agreed purpose. They can also involve a group of organizations arranging to pool their data for specific purposes. Within the context of the C4DC project, an analytical framework has been developed to parse the many terms in DSAs into logical categories along a list of easily accessible questions: Why is the agreement formed? Who is involved? What are the data? How will data actions be managed? When will data actions take place? Where will these actions take place, and are there jurisdictions to consider? These overarching questions lead into more detailed analysis that is intended to document structured data actions and facilitate user understanding of real-life DSAs. An open repository of analyzed agreements will lend clarity around data action issues that can result in high transaction costs and delays when negotiating the terms of a DSA.

As of this writing, over 40 agreements have been analyzed using the framework. The initial sample has included concise MOUs and extensive legal agreements. The agreements span Africa, Europe, North America, and Latin America, and cover data describing issues from climate change to poverty. They concern data being shared between businesses, governments, and civil society, and capture arrangements at the local, national and international levels. While accessing a wider pool of agreements has at times been difficult, this highlights the potential value of the project. Initial analysis and key informant interviews have underscored the difficulties in negotiation and some of the variety in approaches. Many collaboratives take a less formal route and only form non-binding agreements. By bringing issues of accessibility, complexity, and the time it takes to negotiate agreements into the open, the repository will help users gain a better understanding of the issues at stake and make better informed decisions when negotiating and entering into new agreements.

⁸ As recognized in the CTGAP, which called on national governments to revise statistical laws and regulatory frameworks in order to develop a mechanism for the use of data from alternative and innovative sources within official statistics.

To further catalyze such work and make such tools more available to national governments, it should be supported and advanced by the UN Global Working Group (GWG) on Big Data for Official Statistics (a partnership of Member States and international agencies established at the 45th UN Statistical Commission, working together to investigate the benefits and challenges of big data for sustainable development), who should ultimately aim to develop a set of legal guidelines relating to public-private data collaboration.

ACTIONS

1. Where ambiguities exist on terminology in the SDG indicator list, UN custodian agencies and the IAEG-SDGs should convene broad epistemic communities and aim to forge consensus as a matter of urgent priority.
2. Countries should put in place clear open data policies that commit governments to make data open by default with explicit exemptions relating to confidentiality of microdata, thereby supporting public sector data sharing and collaboration.
3. The UN Global Working Group on Big Data for Official Statistics should amplify work initiated by TReNDS, the GovLab, the University of Washington, the World Economic Forum, and others on legal standards for public-private data sharing – for example, deepening the analysis, sharing replicable best practices, and eventually developing guidelines on effective legal agreements for collaboration.



Satellite imagery are among the frontier technologies improving our understanding of topics such as population.
SOURCE: NASA VIA UNSPLASH

CHAPTER 4

Incentives for Innovation

The data revolution for sustainable development is fundamentally about using new, frontier technologies to produce data, conduct analysis, generate insights, and disseminate results that might support our progress towards a more sustainable future. Frontier technologies are constantly changing but include artificial and machine intelligence,

robotics, sensors, drones, cutting-edge spatial technology, and insights derived from telecommunications data. In addition, as part of the data revolution, efficiencies are being derived from lower-tech approaches such as using citizen-generated data and smartphones to speed up existing survey-based approaches (see Box 6).

BOX 6 Using Frontier Technologies to Support Sustainable Farming in Latin America



Surveyors in Mexico collect data from farmers through the MasAgro program.

SOURCE: CIMMYT

The International Maize and Wheat Improvement Center (CIMMYT) offers farmers useful information to make timely and better-informed decisions in Colombia, Guatemala, and Mexico. The data from CIMMYT aims to increase agricultural productivity and income, help farmers adopt sustainable practices, and adapt to climate change. To achieve this objective, CIMMYT focuses on monitoring, evaluation, and accountability, using innovative field research practices and frontier technologies to monitor, analyze, and understand Latin America's agri-food systems.

For example, under the MasAgro program in Mexico, CIMMYT generates data on sustainable agriculture from nearly 150,000 plots (Liedtka et al. 2017). Extension agents undertake field surveys with farmers who describe important crop cycle dates, management practices, inputs used, costs incurred, yields achieved, and more. Field technicians enter the information received in an electronic

log developed by CIMMYT called the MasAgro Electronic Log. They also load geographic information onto ODK Collect, an open data collection system. All submissions are subsequently saved and stored on CIMMYT's servers for further cleaning and interpretation.

The survey-based data describing crop management practices and yields are then pooled and combined with weather records and soil readings. Thorough descriptions of the conditions in which the crops grew complement the data gathered to help make correlations between yields and income achieved. Empirical modelling techniques are also used to look for correlations or patterns that show limiting factors and optimal sustainable management practices for each plot. Technicians then go back to farmers and provide them with a comprehensive analysis of the advantages and shortcomings that their specific practices had. Farmers also receive individual sustainability scores. To offer farmers across Mexico even more specific and timely agricultural recommendations, CIMMYT recently developed an app for the Android operating system (AgroTutor) that complements the work of extension agents.

Data gathered has been used by the Mexican government to support its recent Maize for Mexico strategy, which aims to increase maize yields while protecting native biodiversity and traditional farming methods (Govaerts forthcoming). The data was also used to inform the National Development Plan 2019-2024, specifically the plans and budget for 2.8 million small and medium farmers who have been identified as potential beneficiaries of Mexico's Agricultural Production for Wellbeing program (Narváez Narváez 2017).

Written by members of CIMMYT

In *Counting on the World*, we discussed the potential for frontier technologies to support safer systems for data sharing (e.g. through end-to-end encryption services), but their applications are endless. For example, satellite and drone data are being integrated with other sources of data to map ecosystem extent; satellite imagery and telecommunications data are being combined with census records to produce more accurate and timely population, migration, infrastructure, and housing estimates; and telecommunication and sensor data are being used to track informal commuter patterns, transport systems, and economic opportunities⁹. But the majority of these new technologies and approaches are being used exclusively by private industries and, to a lesser extent, academic institutions, largely in the Global North (Martin 2005). We need to move towards a system that enables the equitable sharing and exchange of technology for the public good. This chapter recommends a digital ecosystem: a network of technological platforms that enable rapid transfer of methodologies, technologies, and algorithms between public and private entities in support of sustainable development. But before we can stand up such a system we also need more human exchange. We need epistemic communities to come together to explain their new data collection methodologies, investigate their merits and demerits, and find ways to make their methods more accessible to those who most need technical assistance.

⁹ See The Global Biodiversity Information Facility (www.gbif.org), POPGRID (<https://www.popgrid.org>), and Digital Matatus (http://www.digitalmatatus.com/intro_full.html).

A. Thematic Collaboratives for Methodological Exchange

To encourage widespread innovation, the uptake of new data sources, and new technological capacities, we need to put in place the right operating frameworks, as discussed in Chapter 2. But we also need better systems to encourage interoperability; greater accessibility to new methods, technologies and techniques; and more capacity development and training. Without strong systems in place, the uptake of these exciting technologies by governments will be inefficient and piecemeal at best.

By way of example: To help systematize new innovative methods and to increase their accessibility, TReNDS is actively supporting the data collaborative POPGRID. POPGRID aims to bring together many of the old and new population estimate providers, from governments, to academic institutions, to multilateral organizations. These stakeholders are being brought together to discuss new methods for monitoring population and change, rigorously assess the validity and robustness of those methods, and make them more accessible to countries in need of better population estimates (e.g. as a tool between decennial census rounds or in the absence of a census). Methods being discussed include satellite imagery-based estimates, estimates taken from telecommunications data, other forms of social media and digital data, and – most fundamentally – the classic, survey-based census.

BOX 7 Interoperability

The data revolution for sustainable development is not just about access to frontier technologies and new approaches. It is also about improving the quality of our data systems, and more specifically, the interoperability of those systems. As discussed in *Counting on the World*, “Data interoperability is one of the biggest barriers to effective public use of private data – particularly with regards to disaggregation, as data need to be in a comparable format and/or use comparable standards if they are to be overlaid or combined” (TReNDS 2017). It limits the sharing of private and public data, but also the sharing of public data between agencies and government departments.

Ultimately, interoperability “is the ability to join-up and merge data without losing meaning” (Joined-up Data Standards Project 2018). As GPSDD notes, “In practice, data is said to be interoperable when it can be easily reused and processed in different applications, allowing

different information systems to work together. Interoperability is a key enabler for the development sector to become more data-driven” (GPSDD 2019).

Across public and private spheres, data interoperability is a huge challenge. Fortunately, it is a solvable one. As noted by GPSDD and UNSD, “The technologies and methods needed to make data speak to each other already exist. The most serious impediments to interoperability often relate to how data is managed and how the lifecycle of data within and across organizations is governed” (GPSDD 2019). The solution is a relatively simple one: more coordinated, centralized, standardized data processes, under an evolved NSO, and a more inclusive global statistical system (as discussed above). But there is only so far that policy and regulation can go. We must also create incentives for the private sector to align the standards used for their data technologies, production, and insights.

Ultimately, the consortium aims to help clarify the utility of new methods and approaches for different policy purposes and regions, making it easier for countries to sort through what is available and decide which new methods might make the most sense for their specific context.

These approaches could easily lend themselves to a variety of other core data and indicators that are essential for sustainable development monitoring, such as poverty mapping, urban growth and change, ecosystem monitoring, and more. New approaches, such as citizen science, can support these efforts (see Box 8). In this instance, CIESIN, TRenDS, and the GPSDD are acting as the secretariat of the POPGRID initiative. Such an institutional arrangement could easily be applied to other sectors, with UN custodian agencies or leading academic institutions convening epistemic communities and national government representatives to establish standards and guidelines for assessing new methods and develop mechanisms through which to make them more accessible and responsive to countries' needs.

B. Moving Towards a Digital Ecosystem to Encourage Open Innovation

The end goal of such collaboration and exchange should be the creation of a digital ecosystem, as proposed by the UN Environment Programme (UNEP) (Figure 3): “a complex distributed network or interconnected socio-technological system’ with adaptive properties of self-organization and scalability” (UNEP 2019). In essence, this would be a series of interconnected digital platforms that connect data on different themes, making it comparable, accessible, and open for those seeking to use data for sustainable development purposes. The platforms would enable data to be connected to publicly available algorithms that could enable the production of insights; for example, the latest satellite imagery could be automatically combined with deforestation algorithms to look at daily tree loss and provide real-time estimates from new data sources the minute they become available. Through such a system, governments, companies, and NGOs could derive immediate insights that help them to design effective policies and processes. Being a distributed system, anyone could contribute and, through group participation, it should encourage a “race to the top” where the best possible methods and data sources become the ones most frequently used. It could also help to overcome government and corporate manipulation of data, thereby providing an automated check-and-balance of sustainable development measures.

UNEP proposes that the digital ecosystem support environmental monitoring, but it could well be applied to the broader

sustainable development agenda – for example, to monitor urban sprawl, infrastructure development, and more.

A key point in the UNEP proposal is that we need to create a new incentive structure and infrastructure to encourage private actors who currently monopolize digital technologies to share their information, thereby overcoming data and digital asymmetries between countries and between the private and public sectors. A key component of this incentive structure would be private company access to public data, with which they could better understand new markets and opportunities, while concurrently ensuring the protection of privacy and confidentiality.

“It is time for stakeholders in all domains to unite in building an open digital ecosystem of data, algorithms and insights in order to provide actionable evidence on the state of the environment and interactions between the economy, society and the environment.”

(UNEP 2019)

Although a compelling investment case will need to be made for this, it will also need to rest upon a new social contract among companies, governments, and citizens “where mutual obligations and responsibilities are spelled out. The cost of doing business anywhere in the world should be the release of relevant non-commercial data into the global data ecosystem that can be used to measure SDG progress” (UNEP 2019). Another sticking point is likely to be how to foster trust to enable safe data access and sharing. Open source software may be one solution but, as discussed in Chapter 2, better understanding of legal arrangements, contracts, and frameworks is also essential to take such an infrastructure to scale.

To take forward this recommendation, UNEP proposes the UN Science-Policy-Business Forum on the Environment as the primary incubator for the practical implementation strategy. TRenDS proposes this be broadened to also include a social and economic science and policy advisory body, such as an UN Economic and Social Council (ECOSOC) working group,

with participation from crucial external partners (such as private company representatives and academic representatives) and coordinated by the GPSDD. This ecosystem approach should look to coordinate with and capitalize upon existing initiatives and infrastructure, such as the Global Platform for Data, Services and Applications, currently being advanced by a committee under the GWG. But most central are national

governments, which should lay the foundations for such a system by making publication of non-commercial data a core operating principle for all private data providers operating in their country. Governments should also lead by example, making all public data open by default while respecting the privacy and confidentiality conditions noted above.

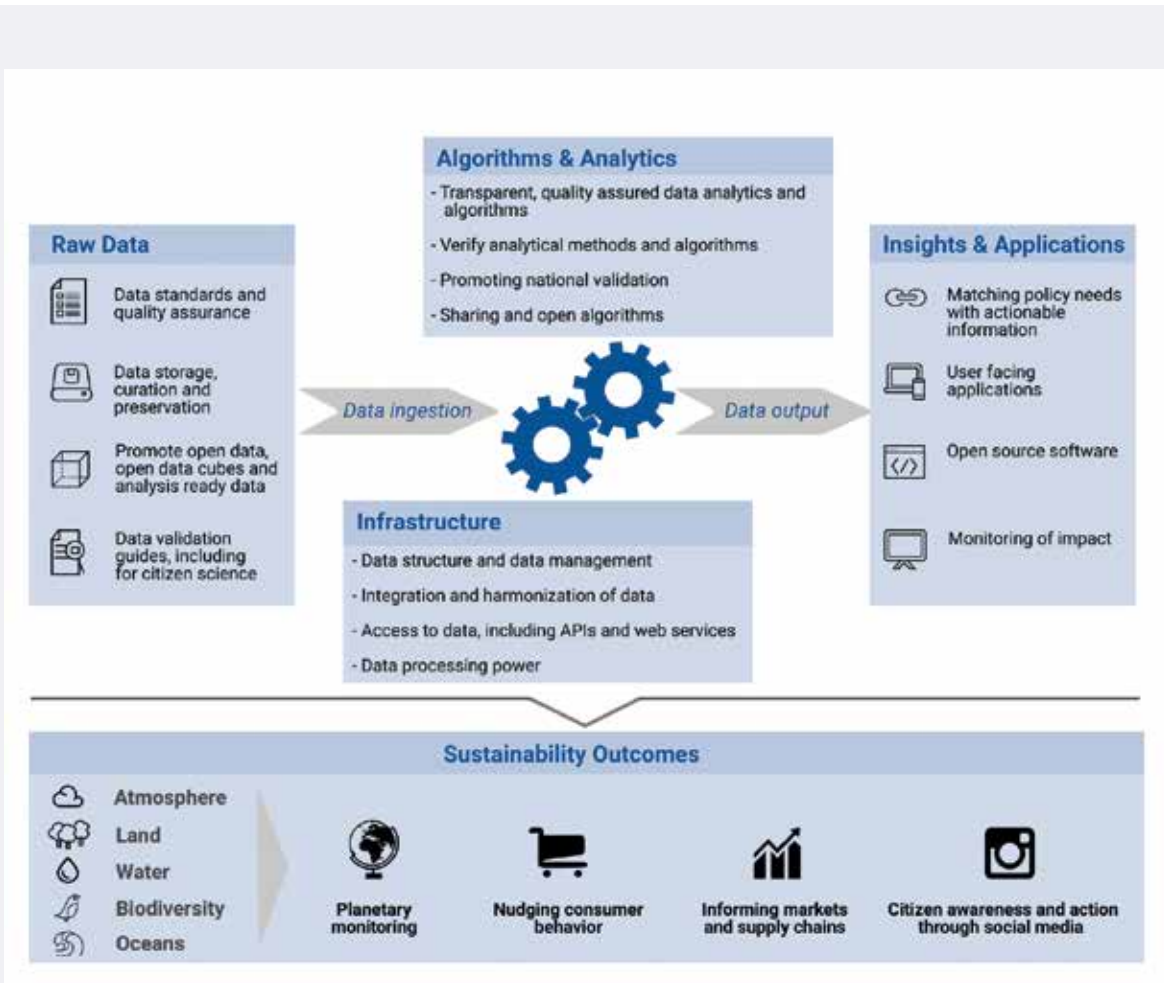


FIGURE 3 The UN Environment Programme's proposed digital ecosystem.

SOURCE: CAMPBELL AND JENSEN (FORTHCOMING)

BOX 8 Using Broad Forms of Data: The Potential Offered By Citizen Science



More and more citizen science programs are joining the data ecosystem, such as Sustainable Coastlines' Litter Intelligence, which collects long-term, open access scientific data on marine litter.

SOURCE: SUSTAINABLE COASTLINES

In the 2017 edition of *Counting on the World*, we focused on encouraging greater uptake of citizen-generated data (CGD) by NSOs. Two years on, there has been progress in the citizen science domain in systematizing approaches towards CGD.

CGD are data that people or their organizations produce to directly monitor, demand or drive change on issues that affect them (Piovesan 2017). Citizen science, another term to describe CGD, refers to public participation in scientific research in its broadest definition. Even though a wide variety of definitions is used to describe the term citizen science, they all encompass two main concepts: public participation and knowledge production.

Citizen science can differ across research fields and in terms of design processes, participation levels, and engage-

ment practices. There are top-down approaches aimed at systematic investigation and trying to achieve certain research objectives, or more bottom up, community-driven practices for collecting evidence to influence policy.

Citizen science has great potential for contributing data to the SDG monitoring and reporting process. There are already examples of citizen science informing the SDGs, such as the following indicators on protected areas (Fritz et al. forthcoming):

15.1.2. Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

15.4.1. Coverage by protected areas of important sites for mountain biodiversity

Key Biodiversity Areas (KBAs) are sites designated as significantly contributing to the global persistence of biodiversity (UNSD 2017b). 21% of the world's KBAs are fully, and 44% are partially, covered by protected areas (UN Environment World Conservation Monitoring Centre,

BOX 8 Using Broad Forms of Data: The Potential Offered By Citizen Science *continued*

International Union for Conservation of Nature and National Geographic Society 2018). The largest subset of KBAs is formed by Important Bird and Biodiversity Areas (IBAs) that are identified using data on birds (Birdlife International 2017).

Citizen science projects such as eBird collect data on bird distribution, abundance, habitat use, and trends. eBird volunteers from around the world gather around 7.5 million bird observations on a monthly basis, which has led to contributions of more than 100 million bird sightings per year (Cornell Lab of Ornithology n.d.). eBird, in addition to many other bird monitoring and biodiversity citizen science projects (e.g. iNaturalist, etc.) contribute to the IBA monitoring scheme managed by Birdlife International.

In addition to global reporting, citizen science is also informing national-level SDG monitoring efforts. The charity group Sustainable Coastlines is delivering Litter Intelligence, a large-scale citizen science program to collect long-term, open access scientific data on marine litter, used to scale up solutions to this problem. From its headquarters in Aotearoa, New Zealand, the group is collaborating with the Ministry for the Environment, Statistics New Zealand, and the Department of Conservation on implementing the program.

The data collection methodology uses a localized adaptation of the UNEP/Intergovernmental Oceanographic Commission marine litter survey guidelines as co-developed by the collaborating government departments, who also worked together in the project design phase in 2016 and 2017. Statistics New Zealand has applied the principles and protocols for producers of Tier 1 statistics to the data framework to ensure that the data are of an appropriate standard for use in environmental reporting by government bodies nationwide, as well as for international reporting (including the SDGs). In March 2019, Sustainable Coastlines submitted its initial Litter Intelligence data set to the Marine Environment reporting team, comprising 29 detailed litter surveys conducted between October 2018 and March 2019 by citizen scientists at 21 official beach monitoring sites around New Zealand (Howitt 2019). As of this writing the data set has passed through all the quality assurance

checks required by Statistics New Zealand and will be included in the official environmental report *Marine 2019*, slated to launch in October 2019 and produced by the Ministry for the Environment and Statistics New Zealand.

The potential offered by citizen science to SDG monitoring is not limited to these examples. IIASA is currently leading a research effort, together with a team of experts and in partnership with UNEP, as part of the SDGs and Citizen Science Community of Practice under the European Commission H2020-funded WeObserve project and the Citizen Science Global Partnership's SDGs and Citizen Science Maximization Group. The objective of the research is to provide a detailed analysis of the current and potential contribution of citizen science to SDG monitoring. Such efforts do not only put forward a concrete proposal and an evidence-based action plan to address the current data needs, but also demonstrate the value of collaborations among the citizen science community, custodian agencies, and NSOs, while at the same time placing citizen involvement and evidence-based policy making at the heart of the SDG process. In addition, they have the potential to increase awareness and capacity within the citizen science community on the SDGs and vice versa.

Collaborations among NSOs, custodians, and the citizen science and CGD communities are also important for developing robust methodologies for assuring the quality and accuracy of citizen science data and assessing their representativeness. Structures such as an Interagency Expert Group on CGD (as suggested by TReNDS in the previous edition of *Counting on the World*) or UNEP's Science-Policy-Business Forum on the Environment can also be used to build support, demonstrate the value of citizen science to countries and the statistical community, and provide an official body that could create guidelines on using citizen science data.

Written by Dilek Fraisl, IIASA, TReNDS member

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ACTIONS

1. Encourage Member States, working with UN custodian agencies and the UN Statistical Commission, to stand up thematic collaboratives for methodological exchange where new approaches to measurement of specific indicators and issues can be evaluated, debated, and categorized to make them more accessible to NSOs and other relevant government departments.
2. Members of ECOSOC, working with the UN Science-Policy-Business Forum on the Environment and the Global Platform, should advance the concept of a digital ecosystem for sharing data, algorithms, and infrastructure. This should build upon and complement the Global Platform for Data, Services and Applications being advanced by the UN Statistics Division and the UN Global Working Group on Big Data for Official Statistics.

DAC HIGH LEVEL MEETING

18-19 February 2016
OECD Conference Centre, Paris



The OECD Development Assistance Committee (DAC) and others could support a data funding pooling arrangement for systems that have been underfunded through other mechanisms.
SOURCE: OECD/ANDREW WHEELER VIA FLICKR

CHAPTER 5

Show Me the Money

In 2015, SDSN, ODW, and partners estimated the cost of producing a representative set of SDG indicators in 77 of the World Bank's International Development Association (IDA) and "blend" countries to be between US\$13.5 and US\$14.2 billion dollars over the period 2016 to 2030 (SDSN 2015). That included US\$11.4 to US\$12.1 billion for surveys, censuses, and improvements to CRVS and education management information systems (EMIS). The recommended set of surveys and the unit costs of surveys and censuses were provided by institutions and experts familiar with the instruments and data collection process. The remaining US\$2.1 billion was for real sector statistics and the development of geospatial and environmental monitoring capabilities. The cost estimation methodology is described in *Data for Development* (SDSN 2015).

In 2016, partners of the GPSDD updated the above estimates to include additional surveys for monitoring gender violence and literacy levels, time-use modules in labor force surveys, annual agricultural surveys, and improvements to health management information systems (HMIS), bringing the total to US\$17.0 billion, of which US\$14.9 billion was for surveys, censuses, CRVS, EMIS, and HMIS. The 2016 update is documented in *The State of Development Data Funding* (GPSDD 2016).

Based on the above estimates, SDSN and partners identified a data financing gap of at least US\$ 500-600 million per annum, of which at least US\$200 million was required of the international community (SDSN 2015). In 2019, PARIS21 and ODI recalculated these figures to include additional investments in statistical capacity based on the recommended actions in the CTGAP, and estimated the international community needs to provide an additional US\$700 million per annum (ODI 2019).

The Sustainable Development Goals (SDGs) place high importance on using data to monitor and ultimately achieve sustainable development, and include such commitments as disaggregating data by income, gender, age, race, ethnicity, migratory status, disability, and geographic location to ensure we leave no one behind (Target 17.18) (UN 2015). The SDGs also include specific targets to increase availability of data for management and monitoring of sustainable development and to build the capacity of countries to use it (17.18 and 17.19). But in spite of these compelling objectives, the inter-

national community has been reluctant to fill the funding gap for data and statistics.

The result is acute data gaps, issues of data timeliness, and concerns about accuracy. As of 2019 the IAEG-SDGs reported that approximately half of SDG indicators do not have available data, while 88 indicators had no defined methodology and a further 34 had a methodology, but data was not yet being collected and reported for them in most countries (IAEG-SDGs 2019). "That means that even relatively sophisticated national statistical offices may have hands-on familiarity with only some 40% of the eventual full range of SDG indicators" (Rogerson 2019).

Furthermore, there are huge numbers of people who still go uncounted, such as the 25.4 million refugees in the world who are missing from national statistics (UN 2018). Overcoming the systematic under-investment in data requires a coordinated, concerted approach consisting of three pillars: advocacy, coordination, and new funding mechanisms (as identified by the Bern Network on Financing for Development Data or "Bern Network" in January 2019, see Box 11).

A. Build a Case for Investing in High-Value Data

When advocating for increased investments in data, the international data community needs to show not only the social and environmental benefits, but also the economic incentives and the return on investment that can be derived from well-functioning data systems. For example, it has been estimated that the worldwide economic benefit of the US-funded Landsat earth observation program is equivalent to US\$2.19 billion per year (as of 2011), and there are huge cost savings per annum from recurrent investment, ranging from US\$350 million to US\$436 million for federal and state governments, non-governmental organizations, and the private sector (Espey 2018a). Likewise, a valuation report found that the New Zealand census returns NZ\$5 to the national economy for every NZ\$1 invested (Dahmm 2018b). The Philippines has invested into a new ID system and expects to see resulting taxation efficiency savings of 2% of GDP over the next five years, equivalent to US\$6 billion (Espey 2018b). Meanwhile, the BudgetIT project in Nigeria has exposed corruption scandals,

such as a 41 million Naira (approximately US\$110,000) investment that claimed to be funding a non-existent youth center in Kebbi State (see Box 9 and Espey 2018c). Such examples should be used in a coordinated and strategic

advocacy campaign that not only appeals to national governments and multilateral investors, but also to private and philanthropic investors looking to build systems with maximum social, environmental, and economic returns.

BOX 9 The Return On Investment From Data Systems

An SMS-based system called **mTRAC**, implemented in Uganda, has supported significant improvements in the country's health system – including halving of response time to disease outbreaks and reducing medication stock-outs, the latter of which contributed to a reduction in malaria-related deaths.

NASA's and the US Geological Survey (USGS)'s **Landsat** program – satellites that provide imagery known as earth observation data – is enabling discoveries and interventions across the science and health sectors, and provided an estimated worldwide economic benefit as high as US\$2.19 billion per year as of 2011.

BudgIT, a civil society organization making budget data in Nigeria more accessible to citizens through machine-readable PDFs and complementary online/offline campaigns, is empowering citizens to partake in the federal budget process, and is helping to minimize waste and corruption.

International nonprofit **BRAC** is ensuring mothers and infants in the slums of Bangladesh are not left behind through a data-informed intervention combining social mapping, local censuses, and real-time data sharing. BRAC estimates that from 2008 to 2017, 1,087 maternal deaths were averted out of the 2,476 deaths that would have been expected based on national statistics.

Atlantic City, New Jersey police are developing new approaches to their patrolling, community engagement, and other activities through **risk modeling** based on crime and other data, resulting in reductions in homicides and shooting injuries (26%) and robberies (37%) in just the first year of implementation.

In 2013, the Philippines merged multiple data producing agencies into a single institution: the **Philippine Statistics**

Authority. The creation of the Philippine Statistics Authority has improved timeliness of national and regional accounts; opened up national statistical data, including microdata; innovated the way the Philippines conducts household survey and censuses; and is deriving value from a new national identification system.

According to a 2014 study, the **New Zealand census** returns to the national economy NZ\$5 for every NZ\$1 invested. The census's contributions to other areas, such as inclusion and empowerment of the Māori, are documented in this case study.

“Household surveys are a powerful analytical tool that can shed light on how households interact with services and how interventions affect their wellbeing. This case study evaluates the return on investment from the **Living Standard Measurement Study** – for example, helping to improve the beneficiary targeting of the Malawi Farm Input Subsidy Program (FISP) and to investigate the impacts of FISP on smallholder agriculture.

Civil registration and vital statistics are the backbone of effective national service delivery. CRVS data is also key to monitoring 12 of the 17 Sustainable Development Goals and 67 of the 230 SDG indicators. This case study shows the immense value that can be derived from CRVS investment for governments and for society at large.

With two-thirds of the world's population facing water scarcity at some point during the year, increasing the reliability of water access is essential to sustainable development. The sensor-driven **Smart Handpump** project showcases one data technology that is revolutionizing the way water services can be delivered.

Full case studies are available at: sdntrends.org/valueofdata

B. Gain Support Through Shared Priorities to Implement the SDG Agenda

In addition to a coordinated advocacy campaign featuring examples of the value of investing in data, the data community may do well to consider some more quantifiable, public goals that help the global community to track progress in building national data systems. It has been said that the Millennium Development Goals (the predecessors to the SDGs) “broke new ground [...] catching the attention of millions of policy makers at national and international level [sic]” due to their simplicity and ability to focus resource investments (Solberg 2016). For the international data community, a short-list of 8 to 10 clear, compelling goals that draw upon the CTGAP, the targets in the SDGs, and priorities articulated through the UN Statistical Commission could be a powerful rallying tool to focus energies and investments and communicate objectives more effectively. Goals might focus on themes such as:

- **leaving no one behind through investments in the census** (e.g. increase investments in the 2020 Census and support to all countries to improve their interim population estimates using new methodological approaches, such as those identified by POPGRID);
- **improvements in disaggregated data** (e.g. Target 17.18: “By 2020 increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts”) (UN 2015);
- **advances in civil registration and vital statistics (CRVS) system coverage** (e.g. increase investments in the 100 low- and middle-income countries that lack functional CRVS systems and that under-record or completely fail to record vital events of specific populations) (PMNCH 2012);
- **advances in data openness and transparency** (e.g. via a measure of the Open Data Inventory (ODW 2019b);
- **new data partnerships for innovation** (e.g. a target number of countries to have established multi-stakeholder partnerships in order to fill key data gaps in national statistics, either for SDG monitoring or high-frequency data for policy- and decision-making, drawing upon new data sources such as big data and telecommunications data);
- **the widespread utilization of geospatial imagery** (e.g. all countries are utilizing geospatial imagery and other earth observation data for improved environmental monitoring and geographic disaggregation, in partnership with national earth observation agencies and teams);

- **leveraging the use of citizen science** (e.g. contributing data to the SDG monitoring framework but also mobilizing action by engaging citizens in the implementation of the SDGs; this could help building awareness on societal challenges, promoting behavior change and thus delivering the transformations needed to achieve the SDGs); and
- **supportive governance frameworks** (e.g. all countries have a governance framework or statistical law that enables the utilization of third-party data, including that provided by private companies and academic institutions).

Such goals would not only make it easier for us to communicate what we want to donors but also to our own governments, and make it easier for the disparate global data community to pull in the same direction. As John F. Kennedy once said, “By defining our goal more clearly, by making it seem more manageable and less remote, we help all people to see it, to draw hope from it, and to move irresistibly towards it” (Kennedy 1963). The High-Level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development (HLG-PCCB) is perhaps best placed to devise such a list, given that it is comprised of a representative group of Member States and has representation from regional and international agencies, and should look to do so fast, to focus attention on data in the run up to the 2019 SDG Summit under the auspices of the UN General Assembly.

C. Build a Coalition Around a Set of Commitments Involving All Stakeholders

Exacerbating the problem of underfunding for data is the fragmentation of data funders and funds. The data landscape is undermined by many of the same problems affecting development financing in other sectors, including the fact that funding coming from multiple sources – domestic, bilateral, philanthropic, and multilateral, including loans (Rogerson 2019). Funding is also limited to relatively few donors – according to Rogerson, “just five, four of which are multilaterals supplying over two-thirds” of official development assistance (Rogerson and Calleja 2019). Loan financing accounts for 38% of all development data funding, which is much higher than the percentage of loan financing used to fund global education (4%) or health (15%), for example (Ibid). Of the multilateral funding, multi-donor trust funds account for approximately US\$150 million of disbursements per annum, coming from the World Bank, the African Development Bank, and International Monetary Fund (ODW 2016). There are more than 50 different instruments being used, varying

in size and scope from under US\$10 million per disbursement to upwards of US\$50 million per disbursement (Ibid).

To ease the burden on countries looking to access international assistance, current funding arrangements need to be streamlined and coordinated around a set of common principles. They need to be provided with full transparency so that geographical allocations can be tracked and we can avoid the problems of certain countries being over-funded, while others are left behind. In general, aid for statistics should adhere to the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action, as well as the subsequent Busan Partnership for Effective Development Co-operation (OECD 2005; OECD 2008; OECD 2011). Donors should commit to, at a minimum:

- **ownership:** supporting recipient countries to set their own strategies and prioritize their investments;
- **alignment:** aligning investments to the national strategy for statistics, using local systems to channel resources;
- **harmonization:** coordinating among donors, simplifying procedures and sharing information;
- **results:** a clear focus on long-term, quantifiable outcomes and results;
- **mutual accountability:** accountability on both sides – recipients and donors – for the success of their investments;
- **inclusive partnerships:** inclusion of all partners, bilateral, multilateral, foundations, et al. in discussions on investments and coordination; and
- **capacity development:** a strong emphasis on building the capacity of national statistical and financial systems so that countries can mobilize the necessary resources domestically over the medium to long term.

In addition, the Paris Declaration and the Accra Agenda call for donors to disclose their plans for donations over a three- to five-year window. If this were adhered to, it would be far easier to coordinate pooled investment and to ensure fair, balanced system and geographic investments.

BOX 10 Promising Examples Of Country Ownership and Donor Alignment

Since its establishment in 1999, PARIS21 has been a key advocate of in-country donor coordination, which they suggest can promote “transparency, alignment and cost effectiveness” for both donors and recipients. In a presentation to the HLG-PCCB in May 2019, the group cited a number of countries taking positive steps to better align their donors behind their National Strategies for the Development of Statistics (NSDS) and/or other government-determined investment priorities (PARIS21 2019). For example, Bhutan’s NSO convened a series of multi-stakeholder taskforces and workshops, some with participation from donors, to inform and ensure alignment with their new NSDS for 2018-2019. In Tanzania and Rwanda, the governments have set up additional mechanisms such as statistical coordination committees comprised of members of the NSO, key ministries, and their leading donors, and in doing so has incentivized more streamlined basket funding measures.

Source: PARIS21 (2019)

Discussions through the Bern Network (see Box 11) have clarified that although the data agenda for the SDGs is a priority, it would be unlikely for any of the bilateral and multilateral donors to come forward with significant contributions to set up a new general funding facility, aimed at strengthening weak foundational statistical systems around the world. However, there seems to be interest in funding data systems for certain sectors. Also, other opportunities have been identified to get to more and better funding for data. Based on stakeholder consultations, six areas look promising for donors and partner countries to come together and agree on a set of common actions and commitments:

1. Encouraging national governments to increase allocation of domestic resources for the data agenda and, hopefully, to make a public commitment to invest more in data.
2. Engaging with bilateral donors to promote use of national systems for monitoring and evaluation where research shows a significant amount of resources are allocated, and to create efficiency gains by promoting shared and open data.

3. Leveraging multilateral development funds such as IDA, which is envisaged to complement domestic resource allocations to fund significant investments in statistical capacity-building.
4. Setting up mechanisms to improve cooperation and coordination among donors and recipient countries based on the principles noted earlier, e.g. through a clearing house system or mapping the supply and demand for data.
5. Establishing a data funding pooling arrangement supported by OECD Development Assistance Committee (DAC) and non-DAC donors for systems that have been underfunded through other mechanisms.
6. Sharing knowledge and leveraging investments in sectoral data, where donors are making significant targeted investments in strengthening particular data sectors such as health or agriculture. The aim is to broaden the objectives to also contribute to improving foundational statistical systems, not just certain parts of the systems.

The articulations of these six initiatives and the commitments built around them should be released and endorsed by the data and donor community at the 2020 UN World Data Forum. Given the scale of resource gaps and the multiplicity of donors (each with a targeted set of sectors or countries), the multilateral and bilateral donors should agree on a set of consolidated operating principles and an information-sharing platform to help coordinate all of the diverse actors at play. The Bern Network and the upcoming World Data Forum would be an opportunity for a global commitment around these common set of principles.

BOX 11: THE BERN NETWORK ON FINANCING FOR DEVELOPMENT DATA

The Bern Network on Financing for Development Data is an open, multi-stakeholder collaboration with the objective of supporting the 2030 Agenda for Sustainable Development by promoting more and better financing for data. Composed of aid and development agencies, national statistical offices and ministries, international organizations, private sector partnerships and civil society groups, its aim is to advance the implementation of the CTGAP and work towards a robust funding framework to be presented at the UN World Data Forum 202 in Bern, Switzerland.

ACTIONS

1. The High-level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development, working with the Global Partnership for Sustainable Development Data, should coordinate the international data for development community to shortlist a set of 8 to 10 clear, compelling goals that focus attention and investment on clear priorities. In support of this, they should develop and showcase compelling evidence of the return on investment from data systems.
2. Countries should take charge to improve donor coordination at the country level. A common set of principles for aid alignment, and using tools such as country project inventories to minimize duplication and proliferation of funding approaches, should be pursued as soon as possible among partner groups such the Bern Network on Financing Data for Development.



CHAPTER 6

Time to Act: A Roadmap

Data production and governance in the 21st century is different from ever before; it involves more actors, more rules, more regulations, more expertise, and more capacity. The only legitimate actors to set the rules of this new game and shepherd all of the actors into an effective ecosystem are national governments. And within governments, it is national statistical offices who are best placed to coordinate the transformations required. However, worldwide NSOs are underfunded and under-capacitated, and many are subject to restrictive government laws and policies that prevent them from coordinating government data production and use or forging external partnerships.

This needs to change urgently. The sustainable development challenge requires evidence-based solutions, interventions based upon good-quality and timely data that tell us what is going on now and can help us look ahead to predict and prepare for the future. To devise such solutions, governments need strong national data ecosystems that capitalize on rapid innovation across both the public and private sectors, harnessing new technologies, new infrastructure, and experimental approaches. The NSO must situate itself at the epicenter of this ecosystem, coordinating actors and processes and ensuring quality and rigor. This will require capacity-building across NSOs, including partnership management and technological upskilling, to help turn raw data into useful insights. It will also require significant, supportive policy development to drive open data efforts, govern new partnerships, and ensure citizens' rights to privacy.

This transformation will be tricky; in many countries, donors have dictated national data agendas and this relationship needs to be redefined. Some new partnerships will inevitably fail. Some legal frameworks will be found lacking. But the scale of 21st-century sustainable development challenges necessitates that we try new ways of doing business.

This report highlights a few of the potential solutions at hand and some of the steps that governments can take to institutionalize them, bringing about the sea change we need. It has also considered the roles of Member State-led bodies like the UN Statistical Commission, UN Science-Policy-Business Forum on the Environment, and others, all of which will have pivotal roles in coordinating activity globally, ensuring standards, providing comparability of methods, and similar. These entities are coordinated at an operational

level by global secretariats in New York and Paris, but it is country-level stakeholders that determine their agendas. Member States should use their seats in these bodies to ensure that the innovation they are cultivating at national levels is reflected in and supported by the international data system.

Table 3 summarizes the recommendations laid out in this report, identifying a lead agency for each and providing a recommended timeline for its fulfillment. As with the inaugural *Counting on the World* report, SDSN TReNDS commits to monitor progress on these recommendations over the long term and provide independent analysis on the state of the global data ecosystem. Only with decisive action now will we achieve the data revolution for sustainable development, and put in place the data building blocks essential for achieving the SDGs.

TABLE 3 An Updated Roadmap For Urgent Action

PATHWAYS FOR ACTION	RECOMMENDATIONS		LEAD AND/OR GROUP TO FACILITATE	TIME-FRAME
Governance	1	Local governments should look to bolster their statistical capacity to monitor local sustainable development challenges and share data upwards with national government. They should work with local expert groups like universities and, where resources permit, appoint dedicated data officers with the support and backing of the mayor or another relevant executive.	National and local governments	Ongoing
	2	National governments should empower their national statistical offices with capacity, resources, and the right policy and legal frameworks to take on coordination of data curation and use across the whole of government and to partner with third parties as appropriate to use high-quality vetted data to supplement official statistics.		All countries by 2020
	3	National statisticians should be mandated to coordinate this change, working with a supportive Chief Data Officer who can focus on data use across government and partnerships (where necessary and practical).		All countries by 2020
	4	Internationally: a. Governments should call for reform of the UN Statistical Commission to ensure more focus on and resources allocated to addressing data gaps and capacity issues, as well as a more inclusive governance structure that invites in expertise from non-governmental groups. b. Member States should push the UN Statistical Commission to assume greater responsibility for the UN data ecosystem, encouraging coordination with newly-appointed agency and regional economic commission CDOs while also improving its inclusivity and inviting in external parties as active participants in formal proceedings. c. The UNSC should commit to frequent self-evaluations.	National governments as members of the UN Statistical Commission, with support from the UN Statistics Division	At the 51st UN Statistical Commission, 2020
Legal & Policy Frameworks	5	Where ambiguities exist on terminology in the SDG indicator list, UN custodian agencies and the IAEG-SDGs should convene broad epistemic communities and aim to forge consensus as a matter of urgent priority, with clear lines of communication and collaboration with beneficiary NSOs.	UN agencies with active participation from national governments	By the end of 2020
	6	Countries should put in place clear open data policies that commit governments to make data open by default with clear exemptions relating to confidentiality of microdata, thereby supporting public sector data sharing and collaboration.	National governments	All countries by 2020

PATHWAYS FOR ACTION	RECOMMENDATIONS	LEAD AND/OR GROUP TO FACILITATE	TIME-FRAME
Legal & Policy Frameworks <i>continued</i>	7 The UN Global Working Group on Big Data for Official Statistics should amplify work initiated by TReNDS, the GovLab, the University of Washington, the World Economic Forum, and others on legal standards for public-private data sharing – for example, deepening the analysis, sharing replicable best practices, and eventually developing guidelines on effective legal agreements for collaboration.	The UN Global Working Group on Big Data for Official Statistics	By end of 2020
Open Innovation	8 Encourage Member States, working with UN custodian agencies and the UN Statistical Commission, to stand up thematic collaboratives for methodological exchange where new approaches to measurement of specific indicators and issues can be evaluated, debated, and categorized to make them more accessible to NSOs and other relevant government departments.	National governments and UN custodian agencies	By end of 2020
	9 Members of ECOSOC, working with the UN Science-Policy-Business Forum on the Environment and the Global Platform, should advance the concept of a digital ecosystem for sharing data, algorithms, and infrastructure. This should build upon and complement the Global Platform for Data, Services and Applications being advanced by the UN Statistics Division and the UN Global Working Group on Big Data for Official Statistics.	UN Science-Policy-Business Forum on the Environment, ECOSOC, and the Global Platform under the GWG	For launch by March 2021
Capacity & Resources	10 The High-level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development, working with the Global Partnership for Sustainable Development Data, should coordinate the international data for development community to shortlist a set of 8 to 10 clear, compelling goals that focus attention and investment on clear priorities. In support of this, they should develop and showcase compelling evidence of the return on investment from data systems.	High-Level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development	By March 2020
	11 Countries should take charge to improve donor coordination at the country level. A common set of principles for aid alignment, and using tools such as country project inventories to minimize duplication and proliferation of funding approaches, should be pursued as soon as possible among partner groups such the Bern Network on Financing Data for Development.	National governments with support from the UN Statistical Commission, Bern Network on Financing Data for Development, with the Global Partnership for Effective Development Co-operation	By March 2021

ANNEX 1

Summary of Progress Against Recommendations from *Counting on the World (2017)*

TABLE 4 Summary of Progress Against Recommendations From *Counting On The World (2017)*

PATHWAYS FOR ACTION	RECOMMENDATION	LEAD	TIMEFRAME	PROGRESS REPORT	
Governance & Leadership	1	Establish Chief Data Officers in all countries	Office of the Deputy Secretary-General	By the UN General Assembly 2018	CDOs appointed in at least 4 countries and a wide number of sub-national governments world-wide; see, for example, the Civic Analytics Network facilitated by the Harvard Kennedy School. However, there has also been a strong movement to empower Chief Statisticians to take on these functions – as in the Philippines and New Zealand – to great effect.
	2a	Expand the annual meeting of the UN Statistical Commission so that the official proceedings include a session for non-official data producers to showcase their data and open it up for methodological review. These sessions could be structured around individual SDGs or types of relevant data e.g. CRVS, population estimates, geospatial, or earth observation measures.	UN Statistical Commission, with UN Statistics Division and the High-Level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development	By March 2018	More actors have been invited to participate in the thematic debates at the UN Statistical Commission and observe proceedings, with select non-governmental actors and UN agency representatives also invited to speak.
	2b	Expand the membership of the IAEG-SDGs to include representatives of non-governmental data producers.			Non-governmental data producers regularly attend the IAEG-SDGs meetings and participate in related processes, together with international agencies. The IAEG-SDGs also launched a process on data disaggregation that is mostly formed of NGOs and other stakeholders. The first output was a report submitted at the UN Statistical Commission in 2019.
	3	Establish a Heads of State-level Taskforce or High-level Panel (akin to the High-level Panel on the Post-2015 Development Agenda) on the Data Revolution, including the theme of “leave no one behind” within the monitoring agenda.	Office of the Deputy Secretary-General	By March 2018	No action taken; however, data is expected to be a major priority in the Secretary-General's strategy for the 2020-2030 “Decade of Delivery.” Amina Mohammed, Deputy Secretary-General, continues to chair the board of the Global Partnership for Sustainable Development Data.

PATHWAYS FOR ACTION		RECOMMENDATION	LEAD	TIMEFRAME	PROGRESS REPORT
Governance & Leadership <i>continued</i>	4	Establish SDG data roadmaps that articulate the functions of the National Statistical Office, Chief Data Officer, and other local data partners – including academia, private companies and non-governmental organizations – in all low-income countries without current, effective national strategies for the development of statistics and/or work to align these with SDG-related data requirements.	National governments with support from the Global Partnership for Sustainable Development Data	Completed by December 2018	Public, national SDG data roadmaps are now available in seven low-income countries as a result of strong national leadership and coordination from the UN Statistics Division and GPSDD (GPSDD 2017). More and more countries are aligning their national strategies for the development of statistics with their SDG monitoring requirements, including putting in place data exchange agreements across government. Guidance on how to produce national data roadmaps is available from the GPSDD and the Conference of European Statisticians (GPSDD 2017; UN Economic Commission for Europe 2017).

PATHWAYS FOR ACTION	RECOMMENDATION	LEAD	TIMEFRAME	PROGRESS REPORT
Principles & Standards	5 At the first multi-stakeholder UN Statistical Commission, agree on a set of principles as part of a new global Data Compact. Invite private companies, NGOs and research institutions to become signatories to the Compact. In signing the Compact these institutions commit to respect the principles established and to be held accountable to them at each annual meeting of the UN Statistical Commission.	UNSD with the GPSDD	By March 2018	No action taken, though the UN Global Working Group on Big Data for Official Statistics continues to work on principles and methods for public-private collaboration. This should be brought to the attention of the HLG-PCCB for their action and attention.
	6 Concurrent to the agreeing of principles, establish a committee to develop detailed standards to ensure data integrity across public and private actors. Mirror these processes at the national level.	UN Statistical Commission	By March 2018	Same as above
	7 International agencies should support lower income countries / low- and middle-income countries to put in place essential data protection safeguards like data protection laws and acts.	Statistical Commission, with the World Bank, the International Monetary Fund, and the Organization for Economic Cooperation and Development	Ongoing	Currently there is no systematic program of support but international institutions have developed some guidance notes, working papers, training programs, forums, and workshops. Examples include: <ul style="list-style-type: none"> • UN Development Group guidance note on data privacy, ethics and protection (UN Development Group 2017) • World Bank working paper on international data flows and privacy (World Bank 2018) • Training programs from the World Intellectual Property Organization (World Intellectual Property Organization 2019) • UN Capital Development Fund on protecting financial consumer data in developing countries (UN Capital Development Fund 2018) • Events on digital development and data protection from the Internet Governance Forum (Internet Governance Forum 2018)
	8 International agencies like the UN, World Bank, and OECD should help low-capacity countries to establish strong legal and regulatory data frameworks within which non-governmental actors should operate.	National governments	Ongoing	The UN Statistics Division is working to assist countries on Statistical Legal Framework & use of new data sources within a joint UNSD / Department for International Development project and the UNDESA-wide project on SDG implementation. A workshop on this topic was organized by UNSD in Tanzania in June 2019.

PATHWAYS FOR ACTION		RECOMMENDATION	LEAD	TIMEFRAME	PROGRESS REPORT
Technology, Innovation & Analysis	9	Instigate an annual challenge at the World Economic Forum Annual Meeting or the 2019 World Data Forum on data sharing innovations from private companies.	World Economic Forum and the GPSDD	January 2018	No actions taken, though SDSN TRenDS, the GovLab at New York University, University of Washington, and the World Economic Forum have a joint project (Contracts for Data Collaboration) that includes developing a repository of good practices in public-private data sharing. This will be showcased at various events throughout 2019-2020.
	10	UN Statistics Division should update and identify gaps in their UN Classifications Registry to include classification systems being used by other international and large-scale epistemic communities, as well as relevant national systems, thereby making available common standards and registries for all entities looking to make their data interoperable.	UN Statistical Commission	March 2019	No actions taken.
	11	The newly-created GPSDD working group on citizen-generated data should look to establish an inter-agency and expert group on CGD (or a "City Group") that can help to set standards and common methods for CGD to encourage greater uptake of CGD by NSOs. The group should promote the creation of CDOs within government who can help ensure a steady stream of high-quality CGD is being fed into the national data collection process.	GPSDD	September 2017	No action taken, though IIASA and other partners have established two communities of practice (supported by the European Commission-funded WeObserve project) on the contribution of citizen science to the SDGs and on the interoperability and standards for citizen science which are looking to establish a comprehensive inventory of robust citizen science approaches that can be utilized for SDG reporting.

PATHWAYS FOR ACTION	RECOMMENDATION	LEAD	TIMEFRAME	PROGRESS REPORT	
Capacity & Resources	12	Establish a partnership between the UN Statistical Commission and United Nations Educational, Scientific and Cultural Organization / the Global Partnership for Education for data literacy training in schools.	UNSD	March 2018	No actions taken; however, PARIS21 has launched a comprehensive program on NSO leadership training and a manual on the development of national strategies for the development of statistics (PARIS21 2017; PARIS21 2018)
	13	Multilateral institutions, governments, and philanthropic donors should establish a global financing facility for statistics, which consolidates and focuses the inflow of data-related resources to capacity constrained countries and statistical systems and the production of global standards, as well as leverages private investment for SDG monitoring.	GPSDD to instigate dialogue. Lead financial management institution to be identified.	Initiated by early 2019	A multi-stakeholder group – the Bern Network on Financing Data for Development – has been established to investigate the feasibility of such a facility, and includes bilateral and multilateral donor representatives. Discussions are underway with the World Bank about such a coordination mechanism to better align funding for data and statistics.
	14	The GPSDD facilitates a global public-private sponsorship platform for national statistical capacity.	GPSDD	Launched at WEF, January 2018	No actions taken.

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