

E-government for policy integration

1.1. Introduction

The sustainable development goals, which are at the heart of the 2030 Agenda for Sustainable Development, are closely interrelated. Advancing one goal will trigger progress on the others. This integrated nature has shed new light on the need for integrated policy making. Integrated policies and Whole-of-Government (WoG) approaches allow governments to pursue sustainable development more effectively, by taking into account the interrelations between economic, social and environmental dimensions as well as between the sectors and sub-sectors addressed by the goals and targets.

WoG denotes public service agencies working together across organisational portfolio boundaries in a shared response to particular issues. WoG is closely associated with “Connected” and “Joined-Up” government concepts (UNDESA, 2012; Government of Australia, 2004).

The growing importance attached to WoG approaches has been accompanied by a more integrated approach to e-government and online service delivery. There is a trend towards providing service delivery through “one-stop-shops” online, or through other systems, including call centres, allowing to manage public services in interrelated areas. WoG approaches to policy making and WoG approaches to service delivery and e-government are mutually reinforcing. Both are complex endeavours and face challenges related to institutional dynamics, regulations, technological difficulties, capacities and resources as well as cultural and developmental dimensions. At the same time, both can provide significant benefits to people by making it easier for them to interact with public administrations and get responses to their queries and needs.

This chapter examines how e-government can support integrated service delivery in the economic, social and environmental dimensions of sustainable development, while also supporting integration across these three dimensions. It also looks at how e-government can support policy integration and institutional coordination by bridging the silos that exist between organizations. Several countries have been successful and lessons may be drawn from their experiences.

1.2. Whole-of-Government service delivery and the three dimensions of sustainable development

E-government can help connect individual systems and government functions, as well as public services, into a coherent system, thus enabling enhanced WoG service delivery in the economic, social and environmental areas. The integration of services, enabled by WoG and e-government, also helps deliver interlinked social-economic-environmental activities together, this allows to build on synergies



Photo credit: UN Photo/Mark Garten

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while avoiding trade-off and unwanted impact of measures in one area on measures in other areas (UNEP, 2009).

1.2.1. Recent developments in Whole-of-Government service delivery

WoG service delivery, enabled by e-government technology, can offer people services from various public agencies bundled together as a single, joined-up service in a one-stop-shop. For people, it means that interacting with public administration becomes much simpler. Achieving such an integrated approach to public service delivery depends on (i) the use of a common organisational and technical platform to ensure back-office integration, so that internal processes are coordinated and run smoothly together, (ii) robust interoperability (i.e. that each system is compatible and works with other systems), and (iii) an infrastructure that supports the use of electronic identity cards and signatures. Some countries have successfully implemented such a service. However, by and large, WoG service delivery, including interoperability does not function well in many countries yet, regardless of their level of income. Ensuring that an integrated approach is effective and sustained across ministries and agencies remains challenging. In the OECD, most countries face important interoperability challenges, notwithstanding their concerted efforts to address them (OECD, 2012).

There is no comprehensive data available about the extent of the current interoperability and implementation of WoG service, but the 2016 United Nations E-Government Survey offers some insight. The Survey provides indicators to measure interoperability and the degree to which countries have implemented WoG systems that are seamlessly connected online. These indicators relate to the following (UNDESA, 2012):

- One-stop-shop service platform;
- Advanced search features (since integrated portals typically include an advanced search feature that may index content from dozens of government websites);
- Digital ID features that enable different systems to seamlessly exchange information; and
- Online tracking system that permits citizens to check on the status of online transactions. As with an identity management feature, such a system implies that the national website or portal used by people for transactions is able to communicate with the system that government officials use to process the transaction.

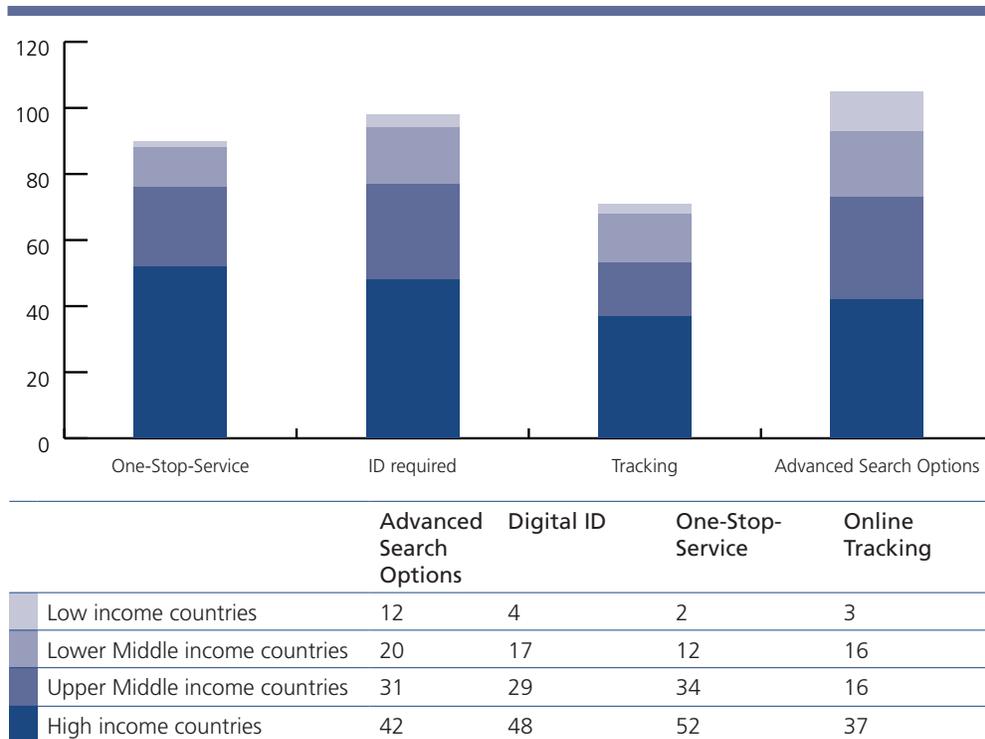
According to the 2016 *Survey*: 90 countries (including over 50 developing countries) provide a link to a one-stop-shop service platform; 105 countries provide advanced search features; 98 countries require digital ID for online or mobile services; and 71 countries provide an online tracking system. Below Figure 1.1 shows the breakdown of countries that provide these features by income group.

Increased integration requires building appropriate legal frameworks and security systems to guarantee the privacy and confidentiality of personal data.

According to the 2012 United Nations E-Government Survey data, government websites of 79 countries provided a privacy statement, and only 39 countries had a visible security policy with a secure link clearly featured on their government website (UNDESA, 2012).

According to the 2016 *Survey*, a privacy statement is now available on the national portal of 101 countries. In 141 countries, the government offers a security feature such as https and a digital certificate for online services, and in 113 countries “personal data protection” legislation is available online.

Figure 1.1: Number of Countries offering WoG-related online features, by income group



The ultimate purpose of countries' service integration effort is to achieve people-centred services. One example of people centred services is the "Government 3.0" initiative of Republic of Korea. It aims at governments' active sharing of data and removing barriers between agencies for better collaboration. The ultimate goal is to provide people-centric services that are relevant for each individual. Methods aimed at overcoming barriers between different ministries include granting budget adjustment authority to inter-ministerial cooperation task forces and the provision of incentives (e.g., offering extra points in performance evaluations to organisations for excellence in collaboration) (Nam, 2013).

Increasingly, people are demanding people-centred services. Governments are thus called upon to place people at the centre of multi-agency, multi-jurisdictional interactions. In addition, people in some countries have the possibility to create their own integrated electronic portfolio of services based on their individual needs (i.e. personalized services). A noteworthy example is "My People" services in Denmark (Millard and Carpenter, 2014).

1.2.2 Whole-of-Government services in the economic, social, and environmental areas

By integrating a range of online services and providing people with one-stop-shops, some governments have become more effective in delivering services in economic, social or environmental areas.

Within the social area, such services include e-employment. Examples are the Malaysian Electronic Labour Exchange, the Egyptian joint government jobs portal, the Italian Employment Information System and the European Employment Service [EURES]. The European Union has also been focusing on packages that bundle services oriented to the possible life events of a person; for instance, employment, health and childcare (European Commission, 2015).

In the field of social welfare service delivery, successful integration and service delivery cases include the Slovenian Ministry of Justice and Public Administration's initiative for e-Social

Security (Government of Slovenia, 2013), and Turkey's integrated social assistance services system (ISASS) (see Box 1.1).

In the area of healthcare, it is possible to leverage e-health tools for better access to information and enhanced quality of care. The newest trend is e-health integration. It is achieved through the use of open source information technology and is updated with continuous feedback from clinicians and technicians in all phases of healthcare service development (Dinevski et al., 2010).

Box 1.1. Turkey: Integrated Social Assistance System (ISASS)



ISASS is a Government-to-Government (G2G) e-government system that was launched in 2009 and is now in its final phases of development. As of March 2014, seventeen million assistance cases were provided via ISASS, which resulted in great savings in time and resources, as well as increased transparency and accountability.

The level of integration ISASS has achieved goes beyond what has been achieved in many other countries. ISASS integrates 16 public institutions via web service and incorporates information from 1001 local social assistance offices. All social assistance processes ranging from applications to payments can be carried out in an electronic platform. For example, information about all government-funded social assistance cases can be accessed in one centre.

Source: Government of Turkey, 2015; KOÇ, 2011.

Institutional arrangements for data sharing among government institutions are important for effective integration.

Another important e-health trend is telemedicine with integrated web-enabled video cameras ("webcams"), an innovation that has the potential to broaden access to specialists to a much wider pool of patients (Wicks et al., 2014). One pertinent example comes from the Thai Ministry of Public Health, which has developed an initiative called the Webcam Connected Microscope ("WebScope"). The initiative aims to reduce the incidence of malarial mortality and to control drug resistant malaria among the target populations, who tend to be the poorest people in remote border areas. Webscope integrated innovation system reduces the time needed to confirm appropriate treatment to within two days of reporting. The system uses cloud-computing technology, a means of storing information on the Internet, for the standard sharing of the application (Government of Thailand, 2015). Another example is "Danish Briefcase." This mobile solution can connect a patient in his or her own home with professional medical and healthcare personnel through video and audio channels, using a broadband Internet link (Millard and Carpenter, 2014).

Notwithstanding these countries' successes, there are many challenges. In fact, difficulties in delivering e-healthcare are an international challenge and similar problems are often reported across countries. For example, the proliferation of several e-health technologies has made it difficult to fully exchange clinical data, for example, patients' medical records. As a result of achieving a high adoption rate of e-health services, e-healthcare has partly become "a victim of its own success" (Kierkegaard, 2013).

In developing countries, these problems are even more pronounced. For example, due to significant barriers such as the lack of basic ICT infrastructure, African countries suffer from fragmentation and lack of standardisation, which is at the heart of interoperability (Adebesin, 2013). Latin American countries are reported to have similar problems (Montenegro, 2011).

In poverty eradication, there are notable cases where service integration has resulted in a proven track record of improved rural livelihoods.

Regarding integrated services for environmental protection, Austria's integrated electronic data management (EDM) system for the environment is a noteworthy example (see Box 1.3). It

Box 1.2. India: ICT-based land registry and management system

India initiated the Bhoomi ICT-based land registry and management system, implemented by the Government of Karnataka, which has led to land administration reform. The most significant achievement of Bhoomi has come from the electronic integration of the registration department with land-acquiring bodies, banks and other financial institutions. This electronic integration has resulted in streamlined land record administration activities and simplified transactions.



Source: Government of Karnataka, India, 2014

Box 1.3. Austria: Electronic Data Management (EDM) for integrated environmental services

Electronic Data Management (EDM) is the Austrian Federal Government's integrated e-government system for the entire environmental field. It has a single sign-on for all users and all applications, integrating the entire business process. The development of the system has led to an increase in the exchange of knowledge among the federal government, the provinces, district administrations and other stakeholders, all of whom can communicate via this central e-government platform. According to the Austrian Government, EDM is one of the most modern and effective e-government tools in the whole of Europe. Efforts are contemplated to build cross-sectoral understanding among government institutions.



Source: Mochty, 2009

shows that introducing ICT into an administration challenges both the legislative process and workflows within distinct authorities and agencies. As a consequence, traditional workflows have to be adapted and some organisational changes are required to ensure efficiency.

1.2.3. Whole-of-Government service delivery across the three dimensions

Delivering integrated services in each of the three dimensions of sustainable development is already a challenge. However, delivering integrated services across the three dimensions is even more of a challenge. Many countries struggle to deliver integrated, interconnected and cross-sectoral services due to sectoral specialisation or "departmentalisation". This often results in partial solutions that are inadequate from a broader sustainable development point of view (Berger and Steurer, 2009).

Sustainable development challenges require a holistic and integrative response. Development in the socio-economic and environmental areas should not be pursued as competing agendas to be "traded-off". Policy interventions designed to have impact on one area can ultimately have far reaching and wider consequences than those initially intended, including on other areas (Berger and Steurer, 2009). The need to deal with the integrative challenges of sustainable development becomes even more visible when dealing with a host of closely interlinked policy domains, such as food security, sustainable agriculture, climate change and biodiversity protection (ECOSOC, 2015). For example, ensuring food security requires as much attention to increasing environmental sustainability as it does to improving rural livelihoods and healthcare (UNESCAP, 2015; UNESCWA, 2015).

One approach to deal with the integrative challenges of sustainable development that warrants much attention is "smart cities." While there is no clear and consistent definition of a "smart city", the term generally refers to the management of urban environments through ICT. A large part of the smart city concept hinges on the potential for technology not only to collect and process data, but to transform that information into intelligence and to integrate it across services (Jones, 2013). Generally, these services are provided to people within a well-defined geographic area that is large enough to have sufficient resources, but small enough so that the city government is close to the needs of people and businesses. This combination enables smart cities to deliver services, while saving resources (World Bank, 2012).

The smart city model is being studied as an approach to sustainable development as smart city service integration can assist in the management of large-scale projects, with much emphasis on back-end innovation, involving interaction and a solid information architecture. Further, smart cities harness systems thinking (i.e. a holistic approach that takes into account how various systems interrelate and connect to the larger system) in sectors such as economic, building, transportation and energy infrastructure, and environment.

At the beginning of 2013, there were approximately 143 on-going or completed self-designated smart city projects in the world. Among these initiatives, North America had 35 projects (e.g., Seattle in the United States of America, Toronto in Canada); Europe, 47 (e.g. Barcelona in Spain, Southampton in the UK); Asia, 50 (e.g. Songdo in the Republic of Korea); South America, 10 (e.g. Rio de Janeiro in Brazil), and the Middle East and Africa, 10 (e.g. Abu Dhabi in United Arab Emirates, Cape Town in South Africa; Lee et al., 2014).

Smart cities are actually considered “building blocks” of sustainable development, particularly given the fact that roughly 66.4 per cent of the world’s population is expected to live in cities by 2050. From the public service perspective, cities are critical as a large proportion of services for people and businesses are usually delivered at the local level. Moreover, smart cities can have positive social and environmental impact and constitute a “fusion point” for all levels of government. This fusion point both enables and obliges a more practical, joined-up and people-centric approach to delivering services than what national or regional government agencies can do individually. With smart cities, cities have a greater motivation and opportunity to promote efficiency and collaboration among multiple agencies and layers of government across different sectors (Hodgkinson, 2011; Hawley, 2014).

The case of the Brazilian smart city, Rio de Janeiro, shows that e-government can promote joined-up public services across the three dimensions of sustainable development (see Box 1.4).

Box 1.4. Brazil: Rio de Janeiro, a smart city’s integrated service delivery across the three dimensions of sustainable development



Source: Government of Turkey, 2015; KOÇ, 2011.

The promise of smart cities is that they are able to collect, analyse and channel data in order to make better (and often real time) decisions at the municipal level through improved use of technology.

The city of Rio de Janeiro takes full advantage of ICT to improve data collection and coordinate its city services in a holistic manner, in real time. Its operation centre was initially established as a way to improve the city’s emergency response system following the 2010 floods. Staffs from 30 different municipal agencies monitor the city’s multiple sectors, including transportation, energy, communications, public safety and health. They obtain essential data (especially with the help of Big Data analytics), with relevant information such as weather forecasts. In doing so, city officials are able to anticipate and respond to problems in a multi-sectoral, integrated manner in real time.

1.3. E-government support for integrated policymaking

Delivering WoG public services requires breaking down the silos between public sector agencies, which have grown out of agency mandates to deliver specific services and programs. The ultimate challenge is to ensure more integrated policymaking.

Policy integration entails taking into account inter-linkages among different areas of policy. Integration here implies that policymaking in any one area takes into account the effects of (and on) policies and outcomes in other sectors and areas. Such a holistic approach helps ensure that policies are coherent across the full range of sustainable development dimensions,

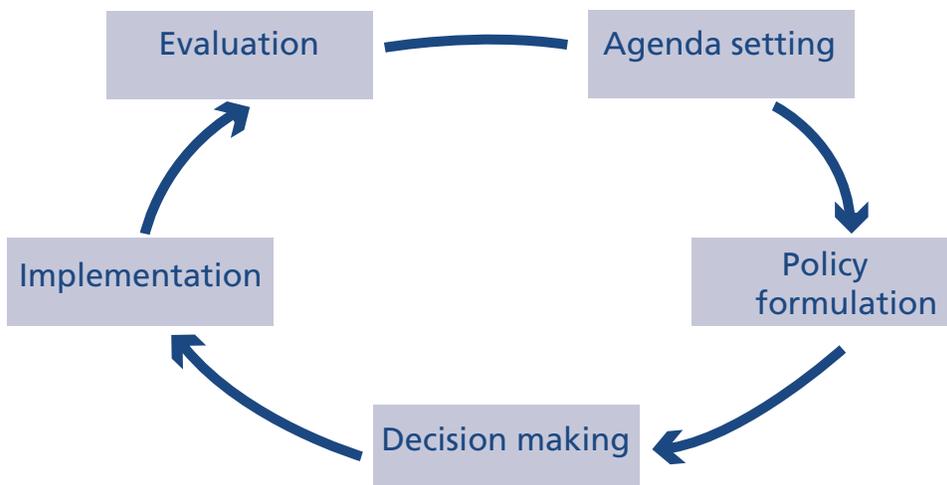
and that the effects of policy in one area do not contradict or undermine desired outcomes in others (ECOSOC, 2015).

The need for an integrated approach to policymaking has been expressed in major international agreements, including the 2030 Agenda for Sustainable Development (United Nations, 2015a), which calls for enhanced policy coherence in its target 17.14. Another seminal document, Agenda 21, also highlights the need to improve decision-making processes so as to achieve the progressive integration of economic, social and environmental issues (United Nations, 1992). Integration should happen not only between the three dimensions but also between sectors or thematic areas. This is illustrated by the 2030 Agenda; the goals are closely related with one another through the targets that refer to multiple goals. Integrated policymaking is needed to trigger progress on sustainable development in interrelated areas (Le Blanc, 2015).

E-government has an important role to play in policy integration. To better understand this role, policymaking can be disaggregated into stages and sub-stages, which make up a “policy cycle” (see Figure 1.2). The phases of policymaking begin with agenda setting (i.e., consideration of a problem or issue that requires government attention). It moves to the policy formulation phase (i.e. consideration of options to address the problem), and then to decision-making (i.e. prescription of a particular course of action). In the policy implementation phase (i.e. translation into action), the selected direction and approach translates into action on the ground. Finally, policy outcomes are monitored and evaluated in the policy monitoring and evaluation phase, often leading to setting a new agenda. An “integration filter” – or a search for the appropriate inter-linkages – may be applied at every stage of the continuous (and not necessarily linear) policy cycle (UNEP, 2009). E-government can support policy integration at almost every stage of the cycle (UNEP, 2009).

WoG service delivery, enabled by e-government, belongs to the policy implementation phase (as discussed in section 1.2); however, there are applicable examples across the policy cycle. In the case of policy modelling and integration, e-government helps integrated policy formulation for informed decision-making in Hammarby, Sweden (see section 1.3.1), while e-government in the Australian social services has greatly assisted in the integrated policy implementation phase (see section 1.3.1). The Electronic Ayil-Okmotu system in Kyrgyzstan belongs to the decision-making phase (see section 1.3.1); likewise e-government tools like Big Data analytics (to be discussed in section 1.3.2) also belong to the decision-making phase, while simultaneously being helpful for evaluation.

Figure 1.2. Policy cycle



Source: UNEP, 2009

1.3.1. E-government, policy integration and sustainable development

E-government provides a useful tool to enable policy integration for each dimension and across all of the three dimensions of sustainable development and between different sectors or sub-sectors. In the environment field, the Hammarby Sjostad project in a city-district in Stockholm is an example of sustainable urbanism in the world. The strength of the Hammarby model is its holistic approach to otherwise separate functions such as waste and energy management. Available e-government tools have been used in a very conscious way to model environmental sustainability and environmental policy development.

The Hammarby Model uses a computerised environmental assessment tool called the Environmental Load Profile (ELP) to assess the environmental load from a whole city district. ELP is based on two concepts - environmental systems analysis (ESA) and life cycle assessment (LCA). The purpose of the LCA is to evaluate the total environmental impact of the whole life-cycle of a product, process or activity. Here, e-government was adopted to enhance collaboration among decision-makers and support the coordination of sustainable development policies across different urban organisations and stakeholders (Gaffney, 2007). In fact, effective coordination and engagement within city departments, as well as between city departments and stakeholders, has been the hallmark of Hammarby's success (Navara and Bianchi, 2013). The example of Australia's joined-up, integrated service delivery of social security and health, illustrates how e-government enables policy integration in the social area (Box 1.5).

Box 1.5. Australia: e-government and integrated social policy implementation



The significance of e-government for integrated policy implementation is evident in the co-joined service delivery of the Australian Government's Maternity Immunisation Allowance and Child Care Benefit service delivery. Child benefits are made conditional on a child being fully immunised. Due to this conditionality, social protection (with its goal of reducing child poverty) becomes co-joined with public health. Moreover, e-government – in the form of automatic electronic data exchange between computer systems in two government agencies – provides the means with which to efficiently administer the family payments, which are conditional on childhood immunisation status.

The networked nature of e-government has given rise to a growth in the conditionality of policy, whereby eligibility for a government service or policy in one policy domain becomes conditional upon the policies and data that fall within another policy domain.

Source: Henman, 2005

In the economic field, a relevant policy integration case is OECD countries' utilisation of e-government, which has proven helpful for dealing with the 2008 economic and financial crisis. It is estimated that e-government has allowed several OECD governments (e.g., Hungary, Ireland, Luxembourg, Mexico, the Netherlands and the United Kingdom) to focus on transforming the public sector into a more effective whole, more people-focused and more responsive in service delivery. To better respond to the financial and economic crisis in 2008, these countries prioritised the implementation of e-government activities that enhanced coherence in service delivery. Foremost, this included back-office integration, which required major structural and organisational changes that challenged existing responsibilities and divisions of labour within and across levels of government (OECD, 2009).

While there are successful cases of sectoral policy integration between services in the social, economic or environmental area, such integration is still challenging. Moreover, these challenges only grow when integrating policy and WoG service delivery across the three dimensions of sustainable development, as more is required than just coordinating sectoral interventions (UNESCAP, 2015). This is particularly the case with policy issues that have a strong cross-cutting and interconnected nature, such as food security and climate change (Dominic and Meijers, 2004).

Achieving the effective integration of the three dimensions of sustainable development goes beyond merely “aggregating” independently formulated policies across the different domains (United Nations, 2014b). Integrated policymaking is thus seen as different from “policy coordination”. The OECD observes that policy integration is quite distinct and more sophisticated than policy coordination (OECD, 1996). Policy integration requires more inter-sectoral interaction with cross-cutting objectives than policy coordination, which is when organisations essentially have the same sectoral objectives. Good policy integration occurs when one joint policy is developed and implemented by all relevant sectors.

Achieving sustainable development requires governments to reach new levels of effectiveness and to develop new capacities for integrated policymaking around a clear vision. As the Government of Singapore puts it, this is actually part of the challenge of moving “from integrating services to integrating government” (Government of Singapore, 2006). To meet this challenge, the Government took a WoG approach with its “Sustainable Development Blueprint”. This cross-sectoral approach brought together all relevant ministries to analyse and identify emerging sustainable development challenges and determine how to tackle them (Clark, 2012).

Rio de Janeiro (see Section 1.2.3) presents an interesting case of policy integration. In this example, thirty different city agencies have become fully integrated into a single operations centre, resulting in a significant organisational shift from the previously segregated and “siloesd” city departments. Thanks to ICT, including Big Data analytics, the city can now pursue more integrated policymaking. The operation centre is a manifestation of a major cultural change for the city which is working towards a strategic, coordinated vision for integrated service delivery across the three dimensions of sustainable development.

At the same time, it is also important to note that such policy integration successes at the local and municipal levels may also be partly attributable to the fact that local governments have an inherent advantage in policy integration in certain contexts. At the local level, the fragmentation of sectoral ministries in charge of delivering services can be mitigated by the smaller number of actors and greater overlap in practice. For example, given the overlapping responsibilities of local government staff, inter-sectoral committees to promote integrated policies for certain public services can have a fewer number of institutional representatives at the local level than the central government does. This can make the need for integration more apparent at the local level, and it can make coordination smoother and more efficient (UNDESA, 2015a).

1.3.2. Big Data analytics as a policy integration tool

The outcome of the Third International Conference on Financing for Development highlighted the importance of high-quality, disaggregated data for policymaking as well as for monitoring progress in implementing the 2030 Agenda (UN, 2015b). As stated above, e-government supports effective policy integration. The data system that is typically a corollary of e-government offers particular benefits for enhancing this integration and should be strengthened.

Some progress has been made in developing new methodological standards for official statistics, including more integrated systems of data compilation across sustainable development’s three dimensions. Environmental accounting is one such example. However, given the scarcity of data reflecting the co-evolution and relationships of each dimension, developing an integrated view across dimensions remains a major challenge.

Indeed, data strengthens governments’ capacities to formulate and carry out integrated policies and increases the potential for policy integration among government agencies. For example, the MAX tools are a web-based means to collect and share data across multiple areas of government in the United States of America. The MAX Community, a government-wide collaboration site, and MAX Collect, a data collection tool, together facilitate increased information gathering and

sharing, collaboration, and knowledge management across the US Federal government. Several Government departments use these tools to share information, including budget information, within their own departments and with other Federal agencies. They also use the US Federal MAX tools to collaborate on a number of initiatives (Government of the United States, 2014). In this instance, data are indeed very much the foundation of policy integration.

The significance of data use for the timely evaluation of alternatives and evidence-based policymaking in the post-2015 era cannot be overemphasised. According to the United Nations Independent Expert Advisory Group, the use of data that was boosted by the adoption of the Millennium Development Goals (MDGs) will only intensify, as the world implements the 2030 Agenda for Sustainable Development (United Nations, 2014d).

As emphasised at the Third International Conference on Financing for Development Conference (UN, 2015c), data access alone, however, is not enough. Without the proper tools, data itself is of little value. To fully realise data for achieving, monitoring and reviewing Sustainable Development Goals, governments need to be able to make sense of the flood of information, which requires analytic tools. Thus, broad access to the tools necessary to turn data into useful, actionable information is vital.

In this context, Big Data analytics offers particular benefits as a tool to strengthen policy integration for sustainable development. According to the United Nations (2012), Big Data analytics refers to tools and methodologies that help transform massive quantities of raw data into useful insights. These Big Data tools and methodologies build on powerful algorithms to detect patterns, trends, and correlations in the primary data, and they also utilise advanced visualisation techniques. Big Data analytics can help assess the impact of sectoral policies across the three dimensions, and thus support cross-sectorally integrated policies, which tend to face more complexities and uncertainties than single dimension policies. Predictive modelling and computer simulations are some of the techniques that can be used to analyse and manage the sectoral trade-offs (Dominic and Meijers, 2004).

The potential of Big Data analytics to transform information and data into useful insights and to support decision-making processes of complex, interdependent issues is recognised by an increasing number of governments. At the international level, this potential was highlighted in the report of the Secretary-General's High-Level Panel of Eminent Persons (United Nations, 2013) and the Secretary-General's Synthesis Report to the General Assembly (UN General Assembly, 2014a). Drawing on a report by the Secretary-General's Independent Expert Advisory Group on the Data Revolution for Sustainable Development (United Nations, 2014c), the latter emphasised the importance of good-quality data and sophisticated data analysis. The report noted that as the world's computing power continues to grow, these gains can help improve understanding of development contexts and the quality of development decision-making.

The significant potential of Big Data analytics for sustainable development hinges on an adequate understanding of the many interactions involved in policymaking, as well as the entirety of the impacts of a specific policy. Policymakers need to understand the various impacts of their individual agencies' policy decisions. The core benefit of Big Data analytics is that it offers the essential analytical capacities to support formulating policies based on an assessment of the whole range of impacts (UNEP, 2009). Its systematic use can lead to informed decision-making and provide a foundation for sustainability-focused policymaking.

The benefits of using Big Data analytics for policy integration and integrated service delivery can thus be significant and tangible. As seen in the case of Rio de Janeiro (see section 1.2.3), Big Data analytics technologies indeed represent a great opportunity for governments to bring disparate and relevant data together, from across various silos. Merging this data allows for a fuller picture of sustainable development challenges and opportunities from a WoG perspective, thereby helping to achieve more integrated policymaking (Paredes, 2013).

Despite the fact that combining data analysis efforts has resulted in some challenges, such as the differing ways the two agencies collect data and information, the US Department of Housing and Urban Development - US Department of Veterans Affairs (HUD-VA) collaboration has been very effective. Working together, the agencies have created information that allows programme managers to understand how veterans access services and to identify where there are overlaps between the agencies and service providers. Furthermore, through the use of strong analytics, agency staff and leaders can learn about problem spots and areas that require attention at every point in the process, from distributing vouchers to getting leases signed.

In view of the increasing importance of data and analytics, some governments like Australia recently established a new office to work on WoG service analytics. The Government set out to consolidate service data from across government agencies in order to assess the potential of delivering more people-centric services and to improve the total experience of dealing with government. To this end, the Government established the Australian Digital Transformation Office (DTO) within the Department of Communications so that agencies could adopt a coordinated WoG approach to service delivery. Starting from July 2015, the DTO acts as a digital champion across the government and helps agencies with limited digital expertise realise the benefits of digital government (Pearce, 2015).

Big Data analytics are used in both developed and developing countries— at least, for sectoral policy interventions. Some state governments in India have already embarked upon setting up an analytics systems (e.g., Rajasthan and Karnataka), which can help improve the efficiency of the Indian welfare programme and eradicate poverty (Thukral, 2014). In China, the Government is taking steps to deal effectively with the country's growing air pollution problem by deploying advanced analytics and other technological tools (Greengard, 2014).

These and other similar efforts often need to be supported with technical assistance so that developing countries, notably the Least Developed countries and SIDS, can build their data collection and analytical capacities, as underscored in the Addis Ababa Action Agenda on Financing for Development (UN General Assembly, 2015b).

At the national level, governments can contribute to policy integration and integrated service delivery by:

- Regulating data sharing – deciding what data need to be provided openly (e.g., financial transparency for publicly listed companies) and what data should be properly anonymized to protect the privacy of individuals;
- Adopting an Open Data policy for its own data;
- Promoting data standards that make sharing more effective; this should include awareness of data quality, provenance and ownership;
- Developing the data analysis and management skills of public servants and national statistical capacity;
- Strengthening national statistical agencies as providers of data, as most of the Big Data applications need to be calibrated against official traditional data; and
- Promoting the blending of traditional and alternative data sources in the production of official statistics to fully leverage the benefits of Big Data

Critical data to inform sustainable development policymaking are often missing in many countries, such as reliable geospatial data and information on trade-offs and synergies between SDG areas.

Governments may wish to explore practical solutions for data generation and use that could be adapted and scaled up. In Africa, there are innovative initiatives to collect and use data, often spurred by the rapid deployment of mobile phones. A good example is Nigeria's innovative data collection, integration and dissemination case. Nigeria's MDG Information System – an online interactive data platform – gives the location and status of health, water and education facilities. The data are freely available online and were collected by trained enumerators who compiled local information using Android-based smartphones and Global Positioning System (GPS). With this platform, all government health and education facilities, as well as water access points were mapped across Nigeria within two months (UNDESA, 2015b).

Data analytics solutions are also becoming economically viable due to the low cost of storage and processing in cloud infrastructures, as well as relatively cheap bandwidth (fixed and wireless), which permits the transmission of data sets from fields across nations and regions (Bilbao-Osorio et al., 2014). Increasingly, powerful and useful applications and services will be made available over the Internet and delivered via cloud computing models – with no up-front investment and a pay-as-you-go model (Hodgkinson, 2011).

1.4. E-government and institutional coordination

The cases presented in the previous sections showcase the role of e-government in advancing policy integration and institutional coordination – both within a particular sector and cross-sectorally. This section looks in more details at how e-government helps bring the various silos of government closer together in support of institutional coordination and change. The section furthermore looks at how the increasing demand for WoG integration, among other factors, cause changes in the coordination and development of e-government development itself.

1.4.1. Institutional coordination through e-government

As mentioned, e-government technologies provide opportunities for WoG government service delivery and policy integration, helping bring the silos of government closer together. This is partly because e-government makes institutional coordination among agencies technically easier, helps lower the coordination cost of working across agency boundaries, and facilitates better communication and sharing of information, data, operations and procedures (Fountain, 2013).

Another reason for this enhanced coordination is that the inherent technological attributes of digital systems influence institutional coordination. Among these attributes are norms of efficiency, streamlining, and a tendency towards standardisation and convergence as way of coordination (see Box 1.6).

It is important to note that effective institutional coordination through e-government and integration in service delivery at the policymaking level requires a profound shift that is generally difficult in practice. This represents a paradigm shift towards a connected and people-centred government, where agencies and levels of government share objectives, data, processes and infrastructures across organisational boundaries. Making it happen requires investing in cross-sectoral capabilities, robust infrastructures, transformational leadership, and e-government supported cross-agency coordination mechanisms (Hanna, 2011).

1.4.2. Institutional coordination of e-government development

As explained in previous sections, e-government helps institutional coordination and integration. At the same time, the structure and management of e-government itself is affected by growing demand for WoG integration and such factors as need for governments to deliver natural disaster relief, provide information security, and become more people-centric in delivering

Box 1.6. The European Commission Office of Harmonisation of the Internal Market (OHIM): Breaking up silos internally and across Europe

The European Commission Office of Harmonization of the Internal Market (OHIM) is an example of how e-government can be used to break through silos and improve institutional coordination. Through the development of public services related to the Community Trademark, as well as networked relationships with national trademark offices, this programme gave rise to an integrated yet federated trademark system in Europe.

OHIM's portfolio of digital information, systems and tools indeed very much influenced OHIM's institutional set-up and coordination. Digitisation had powerful effects on communication and coordination by creating shared technical standards, data and communication channels, as well as a drive towards interoperability. New tools and systems gave rise to continued streamlining of work processes in the back office, breaking up silos and creating better integration within OHIM.

This new digitisation also helped strengthen connections to the network of national trademark offices in Europe. For example, the Trade Mark View tool was an important means of deepening harmonisation through shared resources and information. The tool focuses on developing and supporting a "common trade mark search engine tool". Overall, the new digitisation tools and systems helped further OHIM's mandate to move beyond mere coexistence with national offices to greater interoperability across the entire network of national trademark and design offices in Europe.

Source: Jane Fountain (2010): *The Office of Harmonization in the Internal Market: Creating a 21st Century Public Agency*. National Centre for Digital Government. Paper 38; Jane Fountain (2011): *Disjointed Innovation: The Political Economy of Digitally Mediated Institutional Reform*. Paper prepared for presentation at the 2011 Annual meeting of the American Political Science Association, Seattle, Washington; Jane Fountain (2014): *On the effects of e-Government on Political Institutions*. Routledge: New York.

services. The result is a trend towards more integrated management of e-government through the creation of new Chief Information Officer (CIO) roles and authority bodies, or an equivalent arrangement. Such a position or entity is designed to improve coordination and cooperation both at the ministry and government-wide level.

According to the 2014 United Nations E-Government Survey, there is an increasing number of countries with a government-wide CIO institution or equivalent authority body for coordinating national e-government development—starting from 29 countries in 2008; 32 countries in 2010; 60 countries in 2012 and up to 82 countries in 2014. The CIO offices are at different institutional levels and have varying functions and responsibilities. Some of the countries that established CIO roles, offices and/or key e-government authority bodies between 2013 and 2014 include: Bhutan (2014), Ireland (2013), Jamaica (2014), Japan (2012) and Kenya (2013) (Kim, 2014). The number of CIO offices has now increased to 111 countries in 2016 (see Table 1.1).

Table 1.1. Increasing number of countries with Chief Information Officers (CIO) or equivalent role

Year	Number of countries	% of 192/193 UN Member States
2008	29	15%
2010	32	17%
2012	60	31%
2014	82	42%
2016	111	58%

Sources: Kim, Ran (2014): *Role and Positioning of E-government Leadership: Trends and Issues* New York: United Nations; UNDESA (2012): *United Nations E-Government Survey, E-Government for the People*. New York: United Nations; UNDESA (2014): *United Nations E-Government Survey, E-Government for the Future We Want*. New York: United Nations; UNDESA (2016; refer to the Tables in Annex): *United Nations E-Government Survey: E-Government as an Enabler of Sustainable Development*. New York: United Nations.

The expectation is that the presence of a national coordinating authority can help overcome internal barriers and focus on a WoG approach. The role of CIOs includes responsibilities such as "cross boundary broker" and policy leader; with the potential for government transformation highly dependent on the working relationship between CIOs and other ministries and agencies (Kim, 2014).

1.5. Conclusion

A number of lessons learned can be summarized as follows:

- The sustainable development challenge is fundamentally a challenge of integration. To meet this challenge, governments should aim to deliver integrated services, not only between economic, social and environmental areas but also between various sectors, subsectors and activities.
- Some governments have successfully integrated services in the three individual dimensions and across these dimensions, thus taking a WoG approach to service delivery. This has been accompanied by a trend to make public services as a whole, people-centered.
- Effective, integrated service delivery will inevitably require underlying policy integration. Such integration, however, presents a major challenge for many countries. For example, formulating integrated policies requires deep insight into a range of complex issues across the three dimensions of sustainable development.
- E-government (including Big Data analytic tools) serves as an enabler of policy integration. It provides governments with several of the elements needed for policy integration, such as increased insight into complex issues and analysis of a situation or policy. It also offers opportunities to re-engineer existing decision-making processes and information flows. Moreover, e-government will inevitably help “siloes” governments integrate — causing a change in the institutional set-up and coordination of the government. The automated systems used in e-government inherently require a certain level of standardisation, convergence and interconnectivity in order to work. This technological integration may then carry over into better institutional connectedness and integration.
- While e-government is clearly an enabler of WoG service delivery and policy integration, the opposite is also true. The development of e-government itself increasingly hinges on an integrated approach. Trends show an increasing number of countries with a government-wide CIO institution or equivalent authority body for coordinating national e-government development.
- The value of having reliable access to data and statistics, including related tools (e.g. Big Data analytics), is well established. Therefore, it is important to build developing countries’ capacities in data collection and analysis for improved policymaking in pursuit of sustainable development, as emphasised in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development and the 2030 Agenda.