# 1. Why and how should national statistical offices implement digital transformations?

This chapter outlines the benefits of a successful digital transformation in national statistical offices as well as the difficulties for NSOs in low and middle-income countries in turning potential into reality. Based on findings from six country example NSOs, the chapter offers recommendations for a successful digital transformation.

## 1.1. **Why harness a digital transformation?**

The dramatic growth of digital technologies is having a wide array of impacts on public services, such as fostering innovation, revolutionising communications and increasing trade and investment.

However, unlike digitisation or digitalisation, which refers to the automation of processes and incorporation of technology, a digital transformation is a fundamental change across the processes and infrastructure of organisations in order to achieve previously unattainable outcomes (Figure 3.1). Such a fundamental digital transformation requires substantial initial investments, for instance, for procurement and capacity development and in new procedures and governance systems.

However, digital transformation is challenging for NSOs in low and middle-income countries, which have had limited exposure to digitalisation and yet must identify digital approaches and tools most relevant to their context amid the rapid pace of technological change.

NSOs often lack consistent and sufficient financial resources to sustain a digital transformation. This can pose a real threat to the very identity of NSOs at a time when new (and big) datasets and more complex indicators are needed to understand and monitor the main challenges of the 21st century, such as climate change and sustainable development.

The next chapter presents specific recommendations to assist national statistical offices (NSOs) in achieving successful digital transformations. Given the considerable diversity in situations, needs and contexts, the recommendations should not be regarded as compulsory or appropriate for all NSOs. Each NSO, following its own digital transformation journey, should instead identify those that are most relevant. However, the choice of recommendations to implement must be grounded in hard facts — an evaluation of the NSO's current digital landscape, for instance. NSOs and their partners should refrain from cherry-picking recommendations without first having a deep and fact-based understanding of the current situation and acute needs. The Data Flow Analysis Framework (PARIS21, 2021[1]) can be used in this context to assess the maturity of an NSO's digital data flows: To identify current bottlenecks, the framework starts from the end of the statistical production chain (data dissemination) and looks across the chain to understand the root causes of the identified problems and challenges.

The recommendations outlined here are organised along the four dimensions of digital transformation, but most are, in essence, multi-dimensional. Thus, while the recommendations are classified by dimension (individuals, technologies, organisation and processes, system and/or environment), they should be understood as probably having significant implications for other dimensions as well.

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**Box 1.1. Statistical frameworks and models**

The worldwide statistical community develops and promotes various frameworks and models aimed at improving, modernising and harmonising the production of official statistics. Most of them offer specific information and recommendations related to NSO's digital transformation:

**GSBPM** (Generic Statistical Business Process Model) describes and defines the set of business processes needed to produce official statistics. It provides a standard framework and harmonised terminology to help statistical organisations to modernise their statistical production processes, as well as to share methods and components. The GSBPM can also be used for integrating data and metadata standards as a template for process documentation, harmonising statistical computing infrastructures, and providing a framework for process quality assessment and improvement. It subdivides the statistical production into eight phases (specify needs, design, build, collect, process, analyse, disseminate, evaluate) and according sub-processes. Within a digital transformation, each phase will be associated with various digital tools, approaches and methodologies. The GSBPM can therefore be seen as a background template that can be used to facilitate and systematically plan, organise and implement an NSO's digital transformation.

**GAMSO** (Generic Activity Model for Statistical Organisations) describes and defines the activities that take place within a typical organisation that produces official statistics. It extends and complements the Generic Statistical Business Process Model (GSBPM) by adding additional activities needed to support statistical production, such as the management of IT resources and data and information flows. The GAMSO describes activities – that is, what statistical organisations do – while the GSBPM describes the process – that is, how statistical organisations undertake the activity of statistical production.

**GSIM** (Generic Statistical Information Model) is a reference framework of internationally agreed definitions, attributes and relationships that describe the pieces of information used in the production of official statistics (information objects). It enables generic descriptions of the definition, management and use of data and metadata throughout the statistical production process. Within a digital transformation, it can serve as a template to design and develop the data structures and concepts that will ultimately shape the digital data flows. GSIM objects can, for example, be the inputs and outputs of a GSBPM sub-process.

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## 1.2. How to harness a digital transformation? Recommendations for NSOs and their partners to implement a successful digital transformation

### *Overall recommendations*

**Identify the expected benefits of the digital transformation**

A digital transformation should not be undertaken for its own sake. The expected gains and benefits must be clearly identified, formulated and prioritised. (This study is meant to help NSOs initiate and frame the process.)

**Consider all four dimensions**

When planning a digitalisation project and/or activity, consider the four dimensions (individuals, technologies, organisation and processes, system and/or environment) and, in the beginning, avoid focusing exclusively on the purely technological aspects.

**Describe the status quo**

Start with a multi-dimensional digital assessment to explicitly understand and describe the status quo and to identify the concrete barriers and drivers in the NSO, national statistical system and/or country/territory.

**Know the specific legal and regulatory context**

It is important, from the start, to be aware of any legal restrictions that could impact digital transformation. For instance, national laws prohibit some NSOs from obtaining administrative data from line ministries even when these data are digitally accessible. Big data and cloud computing especially raise new challenges with respect to data security and privacy that national data protection laws and regulations often do not sufficiently address. Gaps in the current legislation must therefore be identified and addressed alongside the relevant national institutions.

**Position the NSO as a national/territorial data steward**

Start by embracing data stewardship at all levels. With "stewardship", we understand all the tasks and responsibilities aimed at coordinating and facilitating smooth data flows within the NSS. The digital future of an NSO will involve the acquisition, processing and integration of data from a wide array of sources (other ministries, big data, remote sensing, etc.). These require not only very specific skillsets but also the guarantee of a high level of compatibility and standardisation, e.g. with respect to data models, quality, ontologies or processing. NSOs should, therefore, also take a proactive role by actively engaging with other stakeholders, for instance, in the specific training of future statisticians (data science, remote sensing, artificial intelligence, etc.) and in the development and implementation of standards related to data collection, processing and dissemination.

### *Individual-level*

**Be user-driven and user-centric**

Mostly aimed at achieving the objective of:

- user-centricity
- competitive advantage

Before designing a digitalisation project, key questions should be asked: Who will use the data and/or technology/portal? How will they use it, and for which needs or to solve which problems? What do these potential users actually need and want? Are the divergent needs of the various user groups sufficiently understood (e.g. those of data users versus those of solutions users)?

It is equally important to consider the requirements of internal users (NSO staff) when designing digital solutions, including by identifying the approaches, processes, tools and/or technologies that can improve the work of NSO staff and any current constraints in their daily work.

In general, preconceived assumptions about the user needs must be deconstructed very early on: Data and information providers often have a very biased understanding of users' needs; even users themselves tend to be biased and not know precisely what they need. User requirements need to be broken down to the actual problem that is to be solved, regardless of the user's past experiences with solutions to this problem.

**Build on a long-term learning and development strategy for the staff**

Mostly aimed at achieving the objective of:

- effectiveness and quality gains
- more capabilities for innovation

Elaborate on a comprehensive learning and development strategy focused on addressing future competency requirements. Remote sensing and data science, for example, will require advanced and specific analytical and technical skills that might currently not be available within the NSO and, in some cases, might be fully lacking within the country/territory. Even the deployment and maintenance of technologically advanced tools will necessitate specific profiles and expertise. Close co-operation with universities and training institutions might also be envisioned to develop the relevant curricula that will develop the next generation(s) of statisticians.

### *Technologies*

### Embrace an open source-by-default approach

Mostly aimed at achieving the objective of:

- effectiveness and quality gains
- more capabilities for innovation

Without ruling out proprietary technologies, free and open source technologies should be favoured. These can open new doors in terms of:

- the rapidity of technological adoption (open source tools can always be tested and evaluated without any prior administrative overhead in terms of licensing)
- long-term sustainability (due to the absence of license costs)
- expandability (an increase in the number of users does not directly involve higher costs, as can be the case with some licensing models)
- a greater chance for advancing the internal capacities (e.g. through self-hosting, maintenance and custom development around open source technologies).

It cannot be stressed enough, though, that open source does not necessarily mean free. As would be the case with proprietary tools, running an open source technological stack — for the dissemination of statistical data, for example — requires internal (workforce) or external (financial) resources for the hosting and maintenance of the technologies and for the training of users.

### *Organisations and processes*

### Ensure tight co-ordination across all NSO digital projects and activities

Mostly aimed at achieving the objective of:

- Effectiveness and quality gains
- more capabilities for innovation

Externally funded projects, in particular, can sometimes be driven by funders' ideas, agendas, objectives and tools, which tends to increase the digital chaos and entropy within NSOs. Regardless of the financing source, the steering, overview and co-ordination of any digital project must stay firmly in the hands of the NSO. It is important to seek and implement complementarity and synergies among projects, activities and partners and to avoid duplication of effort.

### Be bold and agile

Mostly aimed at achieving the objective of:

- More capabilities for innovation

Digital technologies evolve very fast, ideas change constantly, and opportunities appear and disappear all the time. Therefore, experimentation and iteration are critical components of innovation. To respond to this

ever-changing environment, NSOs need to integrate some elements of agility into their structure. Since the very concept of agility is often contrary to the (very hierarchical and structured) way NSOs traditionally function, this could take the form of a small structure in parallel to the conventional statistical system. A data innovation lab, for instance, can allow the NSO to easily, flexibly and quickly try out and test new approaches and technologies before deciding if and how these might be integrated into the statistical system. Such a lab can offer NSO staff hands-on training and the freedom to fail when doing experiments (sandbox). This could be the best way for NSO staff to get comfortable with new ways of working and experimenting with various dataflow options and be a safe place to apply analytical methods to multiple data sources.

**Pilot, learn and upscale**

Mostly aimed at achieving the objective of:

- Effectiveness and quality gains
- more capabilities for innovation

Do not aim to accomplish the entire digital transformation at once but rather focus on specific pilot interventions (e.g. data innovation for one specific survey), which must be designed to fit into the NSO's digital strategy, and must be conceptualised in a way to increase the likelihood of ulterior upscaling (e.g. to other surveys).

## *System/environment*

**Develop and build upon a digital strategy**

Mostly aimed at achieving the objective of:

- Effectiveness and quality gains
- more capabilities for innovation
- competitive advantage
- data stewardship

The six-country examples clearly highlight the need for comprehensive information technology or digital strategy, based on the status quo and long-term objectives, to steer digital projects and activities. Such a strategy should provide a clear framework that all digital projects should fit within, thus avoiding a multiplicity of ad hoc and uncoordinated projects.

Ultimately, this digital strategy should also be mainstreamed into the national strategy for the development of statistics to ensure that the digital transformation supports the NSO's core processes and objectives and is not running independently or disconnected from other core developments and activities.

Also, this digital strategy should be in harmony with the national digital plans if existing or in the pipeline. This also means that NSOs could actively contribute to their national digital plans. Examples include Statistics Norway, which shares experiences on the development and use of basic public registers, including population, business, property and address registers, in implementing the Digital strategy for Norwegian development policy. (Ministry of Foreign Affairs of Norway, 2018[2]; Statistics Norway, 2018[3])

**Use the principles for digital development to frame sustainable digital transformation**

Mostly aimed at achieving the objective of:

- Effectiveness and quality gains
- more capabilities for innovation

The *Principles for Digital Development* should be used as the overarching framework for conceptualising digitalisation interventions. The nine principles, fully compatible with the approach and suggestions of this
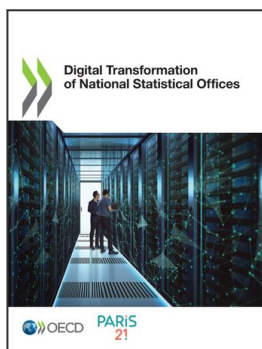
report, are designed to help integrate best practices into technology-enabled programmes. They include guidance for every phase of a digital project's lifecycle and are part of an ongoing effort among development practitioners to share knowledge and support continuous learning. The principles, which emphasise the long-term sustainability of digital solutions, are particularly well suited for institutions and projects with limited financial resources.

An example of a digital project developed with the Principles for Digital Development in mind is STATBUS, an open source technical solution for statistical business registers:

- A first version was developed to fit the needs of the Kyrgyzstan National Statistical Committee (principle: design with the user).
- The entire architecture of the system is designed to be expandable to other contexts and use cases (principle: design for scale).
- It meets the United Nations Economic Commission for Europe guidelines for statistical business registers (principle: understand the existing ecosystem).
- To facilitate future uptake, it has been released under an open source license (principle: use open standards, open data, open source and open innovation; principle: build for sustainability).
- It was adapted and is currently being deployed for other statistical offices in Europe and Africa (principle: re-use and improve).
- It is now administered jointly by representatives of Statistics Norway, Statistics Sweden and the African Union's StatAfric (principle: be collaborative).

## References

Ministry of Foreign Affairs of Norway (2018), *Digital strategy for Norwegian development policy*, https://www.regjeringen.no/en/dokumenter/digital-strategy/id2608197/. [2]

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# Digital Transformation of National Statistical Offices