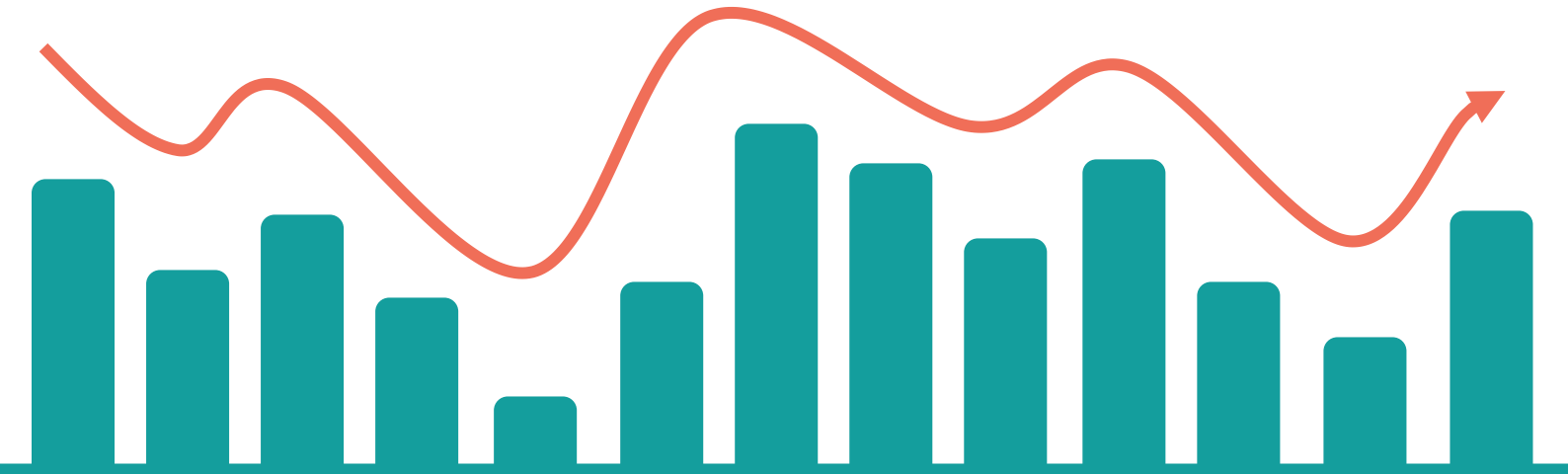
PARIS 21

Proposing a framework for Statistical Capacity Development 4.0



1. RATIONALE AND FRAMEWORK DESCRIPTION

Introduction

In 2017, the Board of PARIS21 endorsed the creation of the Task Team on New Approaches to Capacity Development for developing a guiding framework for Capacity Development 4.0. The concept was first introduced at the first UN World Data Forum in Cape Town, earlier that year. A paper by Niels Keijzer and Stephan Klingebiel (2017) laid out the foundations for the work of the Task Team. This paper describes the resulting framework, which aims to guide national statistical systems, alongside other relevant resources, to better respond to the needs of their stakeholders, and thus support appropriate decisions about the 2030 Agenda - as well as regional and national policies.

The new framework takes into account the gaps in statistical capacity, as well as the new challenges posed by the new data ecosystem and the 2030 Agenda. It is the result of wide consultation and collaboration with national and international actors in the field of statistical and capacity development. The framework is a living document that seeks to benefit from practical experience, and thus it is open to new contributions and suggestions.

While it describes 'statistical capacity 4.0', the framework is not intended to provide insight into how capacity development programmes should be designed or implemented. Instead, it provides a theoretical lens through which all the aspects that contribute to the capacity development landscape (e.g. assessments, programmes, reports) can be analysed and understood.

The new data ecosystem

The expansion of information technologies, and the growing number of people connected to information systems and networks, has led to a radical change in how citizens and governments interact. Until recently, collecting, sharing, storing and accessing data and information required significant effort and resources, and only a few actors (individuals or institutions) could afford to do so. The state derived its legitimacy from being the single centralised organisation with sufficient capacity to carry out these activities, and, more importantly, to use this knowledge to guide policy.

Today, every individual and organisation with an internet connection can produce and access data and information. The range of available data sources continues to expand, and data producers are proliferating across various sectors of society. At the same time, new data sources – including big data, citizen-generated data, as well as fake data – are burgeoning in response to today's

information needs. The heightened demand for and explosion of data has led to its commodification and the subsequent creation of an information market. As this market develops, new actors who are competing for users' preferences are challenging the monopoly over the information provided by official institutions, eroding the legitimacy of the state as a source of reliable knowledge. This market is what is conventionally called the 'data ecosystem'.

According to the United Nations Development Programme, the data ecosystem involves traditional as well as non-traditional sources, innovations, and new knowledge and information (UNDP, 2017 a, b). The stakeholders involved in the ecosystem are "constituencies that hold a special interest in data, such as data producers (those involved in generating or collecting data), data users (those who process and analyse data for various purposes), infomediaries (those who digest raw data into usable information and disseminate it), and data objects (those whom the data is about)" (UNDP, 2017b:). The data ecosystem consists of "multiple data communities that interact with one another on all types of data, [and] use innovative technologies on the data value chain" (UNDP, 2017 b:).

While governments retain the responsibility of ensuring their citizens' well-being by selecting effective and efficient policies, this 'competition' brings new challenges. Alternative sources can make civil society distrustful of the information produced and used by government, and thus reduce their confidence in the state's ability to guide development. As a result, citizens may choose to trust policy makers who follow their instinct instead of evidence when making decisions. Information overload renders the panorama confusing for the average person, and most do not have the expertise to discern what is trustworthy from what is not.

In the era of fake news and fake data, providers of official statistics need to amplify their voices and differentiate themselves from the other data providers by demonstrating the reliability and quality of their products. They need to proactively seek to instil public trust in their statistics. Moreover, they need to educate and guide citizens in how to distinguish between types of information. These new responsibilities require new capabilities. At the same time, new areas require reliable, timely and granular data for policy intervention, such as those highlighted by the Sustainable Development Goals, which also requires more efforts from the national statistical system

In spite of the challenges, the new data ecosystem presents new opportunities for producers of official statistics:

1) The potential for sharing knowledge and benefiting from the innovations developed by other actors, including non-traditional data sources.

2) The potential for establishing more inclusive partnerships at national and international levels to meet the challenges that governments face, as well as for increasing the effectiveness and efficiency with which users' needs are met (including policy makers, the international community, citizens, etc.).

Making the most of these opportunities also requires producers of official statistics to acquire new capabilities for interacting with actors outside of their traditional reach.

The need to rethink statistical capacity development

The Sustainable Development Goals Agenda is a comprehensive framework that requires action in a wide range of areas. United Nations member countries have agreed to achieve 169 targets by 2030 – such an ambitious plan requires governments to make the right decisions and track their progress against those targets so they can react quickly when policies are not having the desired effects. In this context, assisting countries to develop their capabilities in the area of data and statistics has become a widely recognised priority.

The question of how to develop the capacity of governments in this task was widely discussed at the first UN World Data Forum in 2017, which aimed to propose new and more effective ways of enhancing national statistical systems and the capabilities of other actors who engage in the production and use of statistics. These objectives are embodied in the Cape Town Global Action Plan on Data for Sustainable Development. This increased interest by the international community has stimulated a re-think of how capacity development has been delivered until now. Besides considering how to help national statistical systems acquire the new capabilities demanded of them by the new data ecosystem and the 2030 Agenda, those involved have also revisited what has been accomplished so far, and what aspects have been left out of international co-operation.

Most evaluations of international co-operation in statistics signal that technical assistance has been the main kind of support given to national statistical systems. "Assistance has been given for skills enhancement at the individual level (…). In some cases, funds (…) are provided or leveraged to support member States in carrying out primary data collection (…) with a view to increasing the quantity of official statistics." At the systemic level, support takes the form of "norms, standards and tools as well as assistance to increase the quality of statistical outputs and to provide a mechanism for achieving better cross-country comparability of official statistics." (UNSG, 2016: 21)

There are several reasons why technical support is favoured over other possible interventions, such as accompanying institutional strengthening. The main one is the need of donors to focus on tangible and measurable results (e.g. number of available indicators) in order to show their

taxpayers the results of their investment. This narrow scope has created an almost linear association between lack of capacity and lack of knowledge, leading the international community to provide training in response to any perceived need. As a result, local knowledge and needs are downplayed in the name of international comparability and monitoring. The needs of national policy makers are rarely addressed (UNSG, 2016: 29) and modest attention is paid to how the data are used (Open Data Watch, 2015).

"In reality, the way in which (and extent to which) knowledge translates into practice depends on the nature of [the] surrounding environment" (Denney and Mallet, 2017: 12). However, the aspects that affect how knowledge and resources are used in practice are rarely addressed. A new and effective way of delivering capacity development "must explicitly acknowledge the real political economy challenges on the ground and aim to work within these constraints to improving data, and/or aim to alter the current incentives for producing and using good official statistics." (sic) (Krätke and Byiers, 2014: 1).

Another essential aspect is that the capacity of producers of official statistics is affected by their function in the political system. "There are tradeoffs affecting the development of policies on statistics: on the one hand, they [the government] need data to make better informed decisions, and on the other, data can be used as a tool by citizens to hold them to account, which can therefore go against their interests" (Taylor, M, 2016: 2). The independence of the national statistical system from political intervention depends largely on what interest prevails (making better decisions or avoiding public scrutiny).

What does the Capacity Development 4.0 framework look like?

It is against this background that the Capacity Development 4.0 concept has been introduced by PARIS21. Capacity development 4.0 can be defined as *the process through which a country's national statistical system, its organisations and individuals obtain, strengthen and maintain their abilities to collect, produce, analyse and disseminate high quality and reliable data to meet users' needs* (see the section on *Dimensions of the CD4.0 Framework*).

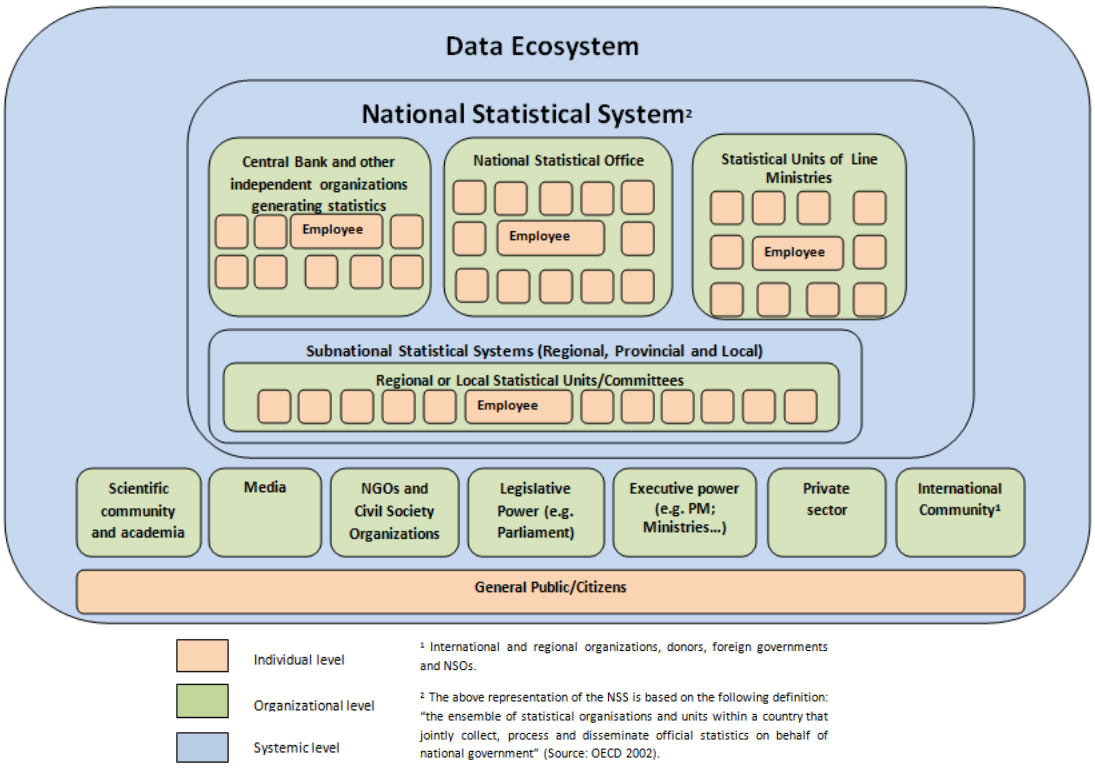
- In the CD4.0 framework, three subjects (levels) need to be considered when assessing the capacity of a national statistical system: the individuals, the organisations and the system as a whole. The framework links the capabilities needed to these levels. The individual level consists of individual capacities within a statistical organisation. An 'individual' refers, for

example, to a statistician, an employee of a line ministry, or National Statistical Office (NSO) manager in charge of official statistics.

- The organisational level involves organisation-wide practices. An 'organisation' in this context is any producer of official statistics, such as the NSO and line ministries.
- The systemic level refers to interactions among data communities. A 'system' can be understood as: 1) the collection of all previously mentioned individuals and organisations; as well as 2) the various channels and interactions that connect them (Denney and Mallett, 2017). These are both hard (such as statistical laws and statistical development plans) and soft (such as relationships governed by power dynamics and social norms).

Capacity Development 4.0 parallels *Industry 4.0*, a concept that emphasises the interactions among machines, sensors and people, and the ability of systems to support humans in making decisions. In the case of statistics, several systems --embedded within others- interact to help users make informed decisions: subnational statistical systems, the national statistical systems and the data ecosystem. Each of these can be thought of as a semi-closed network of actors: although permeable to what is occurring in other systems, each has its own independence and rules. Figure 1 represents the various levels, organisations and individuals that form the data ecosystem, and that are comprised in CD 4.0

Figure 1: **The various levels of the data ecosystem**



The definition of a national statistical system (NSS) varies between countries and organisations. This framework uses the OECD definition: "the ensemble of statistical organisations and units within a country that jointly collect, process and disseminate *official statistics on behalf of national government*" (OECD, 2002). This definition does not include users of official statistics and data, administrative data suppliers, private data producers, or producers of official statistics from other countries (other NSOs or foreign agencies, governments and international organisations that belong to the international community). While these actors are not part of the NSS, their interaction with the NSS is essential for the CD4.0 framework.

The CD4.0 framework identifies five targets of capacity development that range from the most formal/visible aspects to the most informal/intangible (Following the framework proposed by Denney and Mallet, 2017):

1) **Resources:** the means (human, physical, financial, legal) required to produce an output. The fast pace of technological change and the ever-growing amount of unstructured data being produced require new physical infrastructure to sustain statistical production processes. Clouding services are needed to process large datasets, such as call detail records; and tablets and cellphones are necessary for computer assisted personal interviewing. These imply changes in the human capital of the data-producing organisation: digital data collection eliminates the coding and data entry steps, thus shifting the workforce composition.

One specific type of resource is the legal framework, since laws affect the actions of individuals and organisations. However, they only have an effect on what the system produces only when they are enacted and enforced. For example, a law indicating that the choice of methods for official statistics should only be guided by scientific considerations will only have coercive power if infringements are punished. Laws fix the values and practices of a society, and enforce them by establishing sanctions.

2) **Skills and knowledge**: the cognitive and non-cognitive abilities (e.g. information processing, teamwork) required to perform a task. Knowledge can also be institutionalised through regulations, procedures, etc. This is usually called 'institutional memory'. The new data ecosystem requires both individual and organisational skillsets to be updated. An example is data visualisation and the ability to work with unstructured data. Along the same lines, the UNECE Modernisation Committee for Organisational Frameworks and Evaluation has proposed a new competency framework for big data teams (See UNECE Statistics Wikis, 2016). This work emphasises the need for creative thinking and problem solving to contribute to organisational innovation processes.

3) **Management:** this entails the combination of skills and knowledge with other resources to produce an output. It can also be defined as the "judicious use of means to accomplish an end" (Merriam-Webster, 2017). For the NSS to meet its goal of producing timely, comprehensive and quality data, clear strategies need to be established, including setting goals, agreeing on outcomes, acquiring and distributing resources accordingly and allocating tasks and responsibilities between actors. Moreover, individuals need to be motivated through a conscious effort by leadership. Without management capabilities, despite the most up-to-date technical skills and the best infrastructure, staff would not be able to provide the timely data needed by policymakers and citizens.

4) **Politics and power**: the formal or informal interactions among the units of a level. This target responds to the question, 'How are they interacting?' Institutions and individuals are interdependent and can influence each other. Understanding power relations within an organisation can help to improve its overall performance. For example, *workplace politics* are strategic activities, attitudes or behaviours of staff members in the workplace that aim at gaining or keeping power (see *Dimensions of Capacity Development 4.0*). In the case of budget-constrained NSOs that offer low compensation for their workers, such strategies may revolve around determining who gets sent to training abroad in order to obtain extra income. LL actors have agency, which is the ability to affect outcomes by means of action (whether intentionally or not). It follows that they will try to maximise their agency by consciously outlining a course of action that would lead them to success. In this sense, even regular work activities have a political component.

5) **Incentives**: the motives guiding individuals and organisations. This responds to the questions 'why are they interacting?', 'why are they choosing such a course of action?' and 'what is inciting their actions'. For capacity development to work, it needs to engage with people's motivations for changing the way things are done. For example, improving employees' career expectations can give them the incentive to improve the work processes in an organisation.

Figure 2 matches the main types of target capacity with each level of the national statistical system. The interaction between a target and a level is referred as a 'category' (e.g. individual resources). The capacity components are the 'dimensions' (e.g. professional background). For clarification of the dimensions, please see the section on *Dimensions of Capacity Development 4.0*at the end of this paper.

The conceptual framework agreed by the members of the CD4.0 Task Team is further developed and discussed in the related literature, and constitutes a basis for the implementation and measurement activities undertaken by the group.

Figure 2: **Capacity Development 4.0 conceptual framework matrix**

Target/Level	Individual	Organisational	System
Resources	Professional background	Human resources Budget Infrastructure	Legislation, principles and institutional setting Funds infrastructure Plans (NSDS, sectoral…) Existing data
Skills and knowledge	Technical skills Work 'know-how' Problem solving and creative thinking	Statistical production processes Quality assurance and codes of conduct Innovation Communication	Data literacy Knowledge sharing
Management	Time management and prioritisation Leadership	Strategic planning and monitoring and evaluation Organisational design HR management Change management Fundraising strategies	NSS co-ordination mechanisms Data ecosystem co-ordination Advocacy strategy
Politics and power	Teamwork and collaboration Communication and negotiation skills Strategic networking	Transparency Workplace politics	Relationship between producers Relationship with users Relationship with political authorities Relationship with data providers Accountability
Incentives	Career expectations Income and social status Work ethic and self-motivation	Compensation and benefits Organisational culture Reputation	Stakeholders' interests Political support Legitimacy

2. THE DIMENSIONS OF CAPACITY DEVELOPMENT 4.0

- **Statistical capacity:** the ability of a country's national statistical system, its organisations and individuals to collect, produce, analyse and disseminate high quality and reliable statistics and data to meet users' needs (Eurostat, 2014; World Bank, 2017).

- **Statistical capacity development:** refers to the process through which a country's national statistical system, its organisations and individuals obtain, strengthen and maintain their abilities to collect, produce, analyse and disseminate high quality and reliable data to meet users' needs (UNDP, 2009; Eurostat, 2014; World Bank, 2017)

Individual

- **Individual:** refers to a single person who works for the NSS, independently from the organisation he/she belongs to and his/her rank or position, e.g. a statistician, an employee of a line ministry, an NSO manager in charge of official statistics.

Resources

- **Professional background:** the educational background, graduate field of specialisation (e.g. Science, Technology, Engineering and Mathametics, management etc.), experience of working, skills and familiarity with a field of knowledge (e.g. National accounts, poverty, health etc.) gained through actual practice and fundamental for a statistical organisation (Merriam-Webster 2017; Collins Dictionary 2017; Online Business Dictionary, 2017).

Skills and knowledge

- **Technical skills:** the practical ability to carry out specific assignments; often mechanical, ICT, mathematical, scientific and/or other technology-related skills[1] such as proficiency with a standard statistical package (e.g. R; Stata; SPSS) to carry out data processing, analysis and dissemination (Doyle, 2017; OECD, 2016). They include the degree of confidence that an employee has in the skills he/she possess that enable him/her to be proactive.

[1] In the classification used by the OECD skills for job indicators, technical skills include operation analysis, technology design, equipment selection, installation, programming, operation monitoring, operation and control, equipment maintenance, troubleshooting, repairing, quality control analysis. (Classification used by the OECD skills for job indicators (OECD.Stat, 2017).

- **Work know-how:** an employee's knowledge and understanding – gained through experience – of work practices, processes, statistical concepts, definitions and classifications, business models, and organisational culture in use in their organisation, as well as about the power relationships within and between organisations – for example, how decisions are taken (Mahal, 2010; Pietrzak and Fraum, 2005; OECD, 2014).

- **Problem-solving and creative thinking:** the traits that support defining, approaching and analysing a problem in a technically correct manner and from a fresh perspective to devise new ways for carrying out tasks, meeting challenges and solving problems (McKay, D. 2017).

Management

- **Time management and prioritisation:** the efficiency with which an individual organises his/her time and prioritises his/her various tasks and activities (Oxford Dictionary, 2017).

Leadership: the ability of a manager to provide direction to others. It involves establishing a clear vision; sharing it with others, providing information, knowledge and methods for realising it; as well as coordinating and balancing the conflicting interests of members and stakeholders, mobilising and energising their efforts towards set objectives. Related abilities are talent management and strategic thinking.[2.] (Ward, 2017; Rouse, 2017; OECD, 2001a).

Politics and power

- **Teamwork and collaboration:** the ability to work co-operatively and efficiently with others "with interdependent goals and common values and norms to foster a collaborative environment", while rising above any personal conflicts. Teamwork is crucial for leveraging diverse skillsets (OECD, 2014; Cambridge Dictionary, 2017).

- **Communication and negotiation skills:** the ability to effectively and efficiently convey information to others. Negotiation is a particular communicative situation where two or more individuals (each with his/her own aims, needs, and viewpoints) seek to discover a common ground and reach an agreement.

[2] Leadership can be associated with self-confidence, strong communication and management skills, creative and innovative thinking, perseverance in the face of failure, willingness to take risks, openness to change, and levelheadedness and reactiveness in times of crisis. It is a crucial variable for enhanced management capacity and for organisational performance. Leadership refers specifically to the ability of the organisation management staff to set and achieve challenging goals, take sound and decisive actions, outperform the competition, and inspire and motivate the organisation's entire staff to perform well.

- **Strategic networking:** the ability to build and maintain mutually trusting relationships and networks within the statistical organisation and outside, "with people who are, or might become, important actors in achieving strategic-related goals"[3] (e.g. policy-makers, private sector employees, statisticians working in other organisations) in order to develop partnerships with other institutions of the NSS (OECD, 2014; Strategic Networking 2014; Miller, 2017; Tchume, 2014).

Incentives

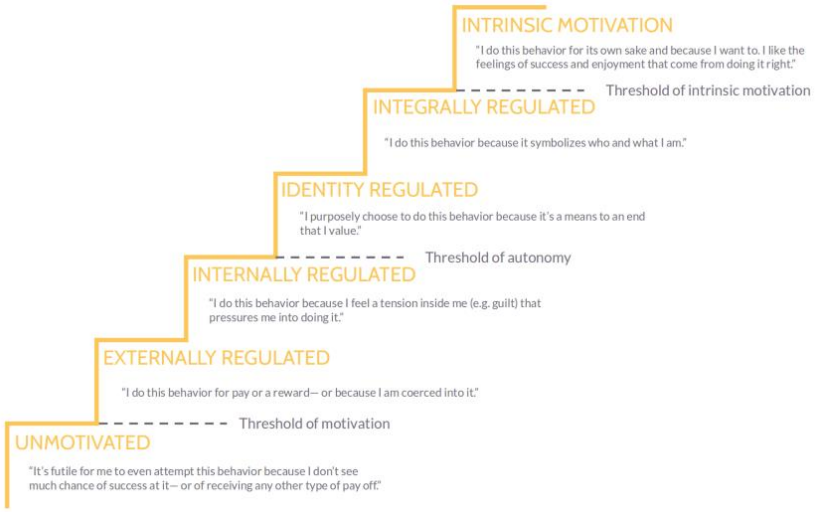
- **Career expectations:** the expectations surrounding development and advancement opportunities within the specific statistical institution or beyond. In public institutions, promotion schemes/advancement processes might be rigid, resulting in excessive turnover of high-performing individuals.

- **Income and social status:** Income refers to the financial rewards for work including wages, salaries, bonuses, merit awards and other incentive payments; and pensions or superannuation. Closely related, social status is an individual's relative rank in a hierarchy of prestige, the reputation or esteem associated with a position in society (Merriam-Webster, 2017).

- **Work ethic and self-motivation:** Work ethic refers to the set of values that guide an individual's attitude to work e.g. honesty, diligence, reliability. Self-motivation means finding reasons and strength to complete a task without external influence. Figure 3 describes the types of motivation that employees can have.

[3] These strategic goals might include specific personal career goals and personal growth, knowledge exchange or development of the organisation.

Figure 3: **Types of employee motivation**



Source: Rogers, D. , 2015

Organisational

- **Organisation:** a structure with "planned coordination of the activities of a number of people for the achievement of some common, explicit purpose or goal through division of labour and function, and through a hierarchy of authority and responsibility" (Schein, 1980: 16), e.g. any producer of official statistics such as the NSO or line ministry.

Resources

- **Human resources:** all the employees working for an organisation. Producers of official statistics are labour-intense organisations, employee "costs typically represent 70% to 80% of the total budget" of a statistical office (Van Muiswinkel, W.J, 2013: 2). For this reason, human resources are the most valuable asset for the institutions in the NSS.

- **Budget:** the financing that the organisation has in place for functioning (including data collection, processing and dissemination, technological upgrades, capacity development, etc.). It involves the budgeting process of calculating monetary costs of regular activities plus extraordinary costs for new and/or strategic activities (e.g. a major survey or a census) over a specific timeframe (Oxford Dictionary, 2017).

Infrastructure: the office spaces, facilities, vehicles, IT devices and virtual resources (such as software, hardware, virtual data storage) that support the functioning of a statistical organisation.

Skills and knowledge

- **Statistical production processes:** all of the processes involved in the production and dissemination of statistical outputs, as described in the Generic Statistical Business Process Model (UNECE Statistics Wiki, 2018): the phases and sub-processes that organisations follow to decide what to produce; to design and implement data collection, process, analyses, ensure quality control and dissemination of statistical products; and to conduct evaluations of past implementation to improve future activities. They involve part of what is commonly known as 'statistical infrastructure': the knowledge produced by the organisation on statistical methods, such as procedural manuals and concepts.

- **Quality assurance & professional codes of conduct:** "a planned and systematic pattern of all the actions" within an organisation aimed at guaranteeing the quality of statistical products according to established requirements and standards,[4] and at securing trust in official statistics (Dekker, A, 2001; OECD, 2007; UNSD, 2012; Eurostat, n.d.). Organisations typically have guidelines for implementing quality management. Codes of conduct are bodies of principles (e.g. respect, professionalism, honesty, integrity and confidentiality, etc.) governing the work and the expected behaviour of NSS personnel (OECD, 2009; Royal Statistical Society, 2017).

- **Innovation:** the organisation's ability (e.g. by creating a fostering environment) to become more efficient by developing new or improved statistical products, methodologies or processes; new communication and dissemination strategies; new organisational methods; new workplace organisations or partnerships with stakeholders, etc. (OECD, 2005). Innovation is also concerned with absorption capacity – the ability to assimilate new knowledge (whether internal or external) and to implement it effectively (Cohen and Levinthal, 1989). Closely related, modernisation is broadly defined as applying common statistical production processes, standards and tools across statistical systems (national, regional and international), enabling international comparison and exchange; and the integration of non-traditional data sources to deliver statistics in a timely and cost-efficient way.

- **Communication**: the ability of the NSS organisations to convey official statistics in a way that is professional and technically correct, yet adapted to specific audiences to make them meaningful and

[4] According to the OECD Glossary of Statistical Terms, "Quality is viewed as a multi-faceted concept that is viewed in terms of seven dimensions, namely: relevance; accuracy; credibility; timeliness; accessibility; interpretability; coherence (OECD Statistics Directorate, 2002).

persuasive for external organisations/stakeholders. This is done by providing clear narratives, applying various techniques and using appropriate language and media, such as storytelling and data visualisation (Government Statistical Service, 2016; Merriam-Webster, 2017).

Management

- **Strategic planning and monitoring and evaluation:** strategic planning is the process by which the organisation defines a vision (referring for example to its role in society) with specific objectives (such as accelerating lead times for key indicators), followed by a sequence of steps to achieve them.[5] As the steps to achieve objectives are generally comprised of projects, strategic planning involves project management. Monitoring and evaluation tracks "progress towards objectives, identifying problems and strategies, and making adjustments to plans" (Sera, Y. and Beaudry, S, 2007; Bryson, J 2017).

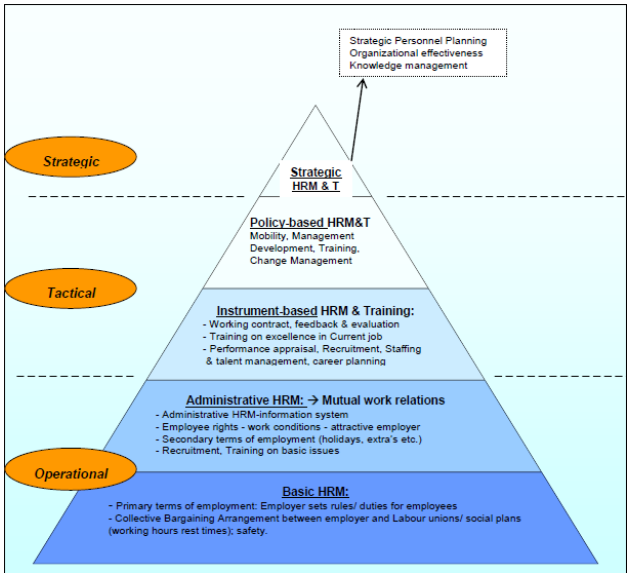
- **Organisational design:** the distribution of roles and responsibilities between positions and units (such as directorates) or subject-matter structures, as well as the technological resources needed by them, in order to run statistical production processes efficiently and achieve the defined strategic objectives (see **strategic planning and monitoring and evaluation**). It includes outlining a workflow that reduces redundant activities (e.g. General Activity Model for Statistical Organisations), and accelerates decision-making processes, etc.

- **Human resources management:** the process by which an organisation obtains appropriate staff in terms of numbers, educational and skills mix, and its policy to develop them further through training and development programmes at all levels, in order to meet its knowledge requirements. It includes the entire spectrum of creating, managing, and cultivating the employer-employee relationship[6]. Figure 4 describes the types of human resources management and training activities.

[5] This includes setting priorities, systematically coordinating and aligning actions and resources with the defined goals, and ensuring that the agency/organisation's employees are working toward common goals.

[6] This includes conducting job analyses, planning personnel needs, hiring new employees for the right jobs, managing wages and salaries, evaluating performance, communicating with all employees at all levels and developing employees' abilities and competencies (e.g. motivation, career plans, training plans), in order to enhance their motivation and productivity (Ferris, Rosen and Barnum, 1995; International Labour Office).

Figure 4: **Types of Human Resources Management and Training activities**



Source: Van Meuswinkel, W.J., 2013.

- **Change management:** an approach for creating an environment that supports change in order to deal with a rapidly evolving environment. It involves communicating the need for change and training staff in how to manage it. It also implies anticipating and tackling risks through risk management[7] (Van Muiswinkel, W.J, 2013; Rouse, 2018; Association for project management, 2017; Shore, D. A., 2017). Change management is crucial for harnessing the data revolution.

- **Fundraising strategy:** the plan an organisation lays out in order to secure funding for its statistical activities. It includes budgeting; defining a timeline; identifying possible resources and funders; and the required actions and activities, such as negotiating with national authorities and/or external partners, foundations, companies, etc.

Politics and power

- **Transparency:** the steps that an organisation takes in order to inform citizens in a comprehensible, accessible, and timely manner about (1) its activities, policies, accounts and the regulations and procedures that it follows (e.g. for handling confidential data) (OECD, 2002; PARIS21, 2014; ECOSOC, 2013; UN Public Administration Network, 1999); and (2) the evolution of key indicators (such as poverty rates). It involves making datasets available, publishing metadata,

[7] Risk management refers to "The identification, analysis, assessment, control, and avoidance, minimisation, or elimination of unacceptable risks." (Online Business Dictionary, 2017).

providing information on the methodology used to calculate them and disseminating the results in such a way that they are comprehensible for all audiences. In this sense, it signifies 'open data'.[8]

- **Workplace politics:** the strategic activities, attitudes or behaviours of staff members in the workplace that aim at gaining or keeping power and serving self-interest (or the interests of the organisation). It can also refer to the use of power for policy decisions such as resources allocation in the framework of the organisation (Cropanzano, R and Kacmar, K, 1995; Collins Dictionary, 2017; and Management Study Guide, n.d.).

Incentives

- **Compensation and benefits:** the rewards granted to employees in return for their labour and to motivate them to deliver their tasks. In some countries, the remuneration schemes of the public sector are rigidly hierarchical according to grades, which may fail to encourage the behaviour and performance that are supportive of the institution (HR Council Canada, n.d).

- **Organisational culture:** a system of shared values, norms of conduct, underlying beliefs and expectations which governs the behaviour of employees within an organisation, i.e. how they act, interact with each other and external stakeholders and perform their jobs. A strong organisational culture that adapts to changes in the environment (**change management**) is crucial to the success of a statistical organisation (Jex, J. and Cheffers, J. n.d.; Study, n.d.; Rick, 2015 and Katzenbach et al., 2016). Some organisations are process-oriented (thus rigid and hierarchical), while others are results oriented (generally more flexible and flat). The potential for adapting to a changing context and to users' needs depends largely on this orientation.

- **Reputation:** the external perception of an organisation's ability to produce quality and timely statistics and to function according to the legal and ethical standards applicable to the public administration (Merriam-Webster, 2017). It is linked to **communication**, since it is through regular contacts with the media and the public and proper branding that NSS organisations maintain and enhance their reputations.

[8] Open data can be defined as "…digital data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime, anywhere" (The International Open Data Charter, 2015).

System

- **System:** the complex and interconnected network of individuals, institutions, organisations and stakeholders whose activities, mechanisms and actions relate to data and statistics at the regional, national and international levels. It also refers to the various channels and interactions that connect them, whether formal or informal (Denney and Mallett, 2017).

Resources

- **Legislation, principles and institutional setting:** all the written laws that guide the compilation, production and dissemination of official statistics in the NSS, as well as the principles guiding them (e.g. the UN Fundamental Principles of Official Statistics) to which the country subscribes. Institutional setting refers to all the organisations that are involved in the enforcement of such laws, as well as the organisational structure that the law stipulates (e.g. whether there are subnational systems) (OECD, 2015).

- **Funds infrastructure:** the sources of funds for the execution of statistical activities and all associated dealings, e.g. whether they are provided by the national government, a foreign/international institution or the private sector.

- **Plans (NSDS, sectoral…):** any sanctioned "strategy for developing statistical capacity across the entire national statistical system (NSS)" or any of its components, which provides "a basis for effective and results-oriented strategic management" (PARIS21, 2014).

- **Existing data:** the collection of information that the NSS has acquired, such as raw data (e.g. administrative records, microdata), manuals and codes, and officially validated or produced statistics (e.g. indicators). "Data" is understood broadly as "individual facts, statistics, or items of information" (Bhargava, R. et al., 2015). This includes part of what is generally called 'statistical infrastructure': classifications and code lists, business registers - business, household and population, sampling frames and databases.

Skills and knowledge

- **Data literacy:** Data literacy "encompasses elements and principles from each of the sub-kinds of literacy (such as media, statistical, scientific computational, information and digital literacies). It is based on four key pillars that form its foundation: data education, data visualisations, data

modelling, and data participation" (Bhargava, R. et al., 2015). Data literacy involves the role of data in public debate, the efforts towards the promotion of data by the NSS and the extent to which society in general is able to engage critically with data.

- **Knowledge sharing:** the ability of organisations and individuals to successfully pass skills and knowledge (such as best practices) on to others, in order for them to apply them autonomously in varying settings. An example is when the outgoing NSO head mentors her/his successor to take the lead of the organisation

Management

- **NSS co-ordination mechanisms:** the formal processes by which the governance of the NSS sets its policy direction, i.e. the implementation of the **legislation, principles and institutional setting**. Policy direction implies defining procedures, operational standards and methodological criteria for ensuring the synchronisation, consistency and efficiency of actions, activities, responsibilities and outputs (Edmunds, 2005; OECD, 2015; Byfuglien, 2014).[9] It involves the governance structure (such as the co-ordinating role and leadership responsibilities of an organisation, the council/board, the advisory committees, etc.).

- **Data ecosystem co-ordination:** the partnerships and consultations involved in co-ordinating the data produced by the multiplicity of stakeholders involved in the data ecosystem.[10] It takes into account technical challenges such as interoperability and harmonisation between various data sources, quality standards and definitions (Bhargava, R. et al., 2015; PARIS21, 2017; IEAG, 2014).

- **Advocacy strategy:** the approaches, techniques and messages for "defending or recommending an idea before key people" (PARIS21, 2010). In the statistical context it covers efforts to promote the use of statistics and support for statistical development.

[9] According to the OECD Glossary of Statistical Terms (2007), the NSS refers to "the ensemble of statistical organisations and units within a country that jointly collect, process and disseminate official statistics on behalf of national government" . NSS coordination mechanisms implies consultation and collaborations between data producers (e.g. statistical council, statistics board/committee) within the NSS.

[10] Data ecosystems can be defined as "complex adaptive systems that include data infrastructure, tools, media, producers, consumers, curators, and sharers. They are complex organisations of dynamic social relationships through which data/information moves and transforms in flows." (Bhargava, R. et al., 2015). The data ecosystem includes the NSS. The coordination aims at ensuring consistency and efficiency of actions, activities and outputs between producers of data in the context of the emergence of non-traditional sources, and the explosion in the volume and production of data.

Politics and power

- **Relationship between producers:** the interactions and collaboration between the organisations that produce official statistics (NSOs, statistical departments of ministries, Central Bank, etc.). This can occur through national conferences and seminars, council meetings, joint outputs or projects, peer reviews, assessments, and working groups/task teams. While the statistical law and/or the NSDS together with their implementation stipulate instances of exchange and co-ordination, the strength of the ties (and to what extent the institutions are willing to co-operate) depends on these more informal interactions.

- **Relationship with users:** the interactions (their frequency, their modality, the content, etc.) between institutions of the NSS and the users of official statistics (such as academia, the private sector and policymakers).

- **Relationship with data providers:** the interactions (their frequency, modality, the content, etc.) between NSS statistical organisations that process, analyse, produce and disseminate statistics and the organisations that collect, compile and own raw data.

- **Relationship with political authorities:** the interactions between institutions of the NSS and those in the government with "capacity to impose duties on others" (Christiano, 2013). These relationships define the degree of 'professional independence' of the NSS institutions. In other words, the freedom to define the methodology for data collection, analysis and dissemination; to select the most appropriate resources (technological, physical and human) and data sources; to interact with users and provide a scientific explanation of findings; and take decisions regarding internal administration, regulation and management (Raza, 2009; Kori, 2016).

- **Accountability:** the actions that NSS institutions take to guarantee that the needs of users of official statistics are satisfied; and to ensure that their obligations regarding citizens' best interest and scientific standards when selecting methods for data collection, analysis and dissemination are met. Accountability is the supreme ethical criterion for official statistics producers.

Incentives

- **Stakeholders' interests:** a stakeholder is any individual or group (including an organisation) directly or indirectly concerned with official statistics and the functioning of the NSS (or affected by it, regardless of being part of it). Every stakeholder has certain ideological predispositions and

political preferences on the matter, and sets a course of action to make them prevail (for example, owners of administrative records may oppose changing privacy laws that would force them to share their data). Stakeholders' interests are part of the external environment in which the NSS functions; and they can either create roadblocks or be supportive of statistical work.

- **Political support:** the endorsement and support of political authorities for statistical activities, for the development of the NSS's statistical capacity, and for the recognition of the importance of quality and timeliness of official statistics in informing public debate and planning, monitoring and evaluating policies.

- **Legitimacy:** the perceptions or beliefs of civil society regarding the prestige and authority of the NSS and the statistics it produces and which reflect the state of development of society and the nation in its name (representation). For official statistics, the sources of this authority are the statistics law and the scientific methods used to compile the statistics.

3. REFERENCES

- Association for project management (2017). Change Management Retrieved December 01, 2017, from https://www.apm.org.uk/body-of-knowledge/delivery/scope-management/change-management/
- Bhargava, R. et al. (2015). Beyond Data Literacy: Reinventing Community Engagement and Empowerment in the Age of Data." Data-Pop Alliance White Paper Series. Retrieved February 26, 2018, from https://datatherapy.files.wordpress.com/2015/10/beyond-data-literacy-2015.pdf
- Bryson, J. (2013). Strategic planning for public and nonprofit organisations. Auckland, N.Z.: Royal New Zealand Foundation of the Blind.
- Byfuglien, J. (2014). Coordnation of the production of official statistics: good practices, mechanisms and tools. UNDA 9th tranche: Kick-off meeting 10 – 11 December 2014, Almaty, Kazakhstan. UNECE. Retrieved February 26, 2018, from https://www.unece.org/fileadmin/DAM/stats/documents/technical_coop/2014/mtg3/S2_Jan_Byfuglien.pdf
- Christiano, T. (2013). Authority. In Stanford Encyclopedia of Philosophy (Spring 2013 ed.). Retrieved from https://plato.stanford.edu/archives/spr2013/entries/authority/.
- Cohen, W., and Levinthal, D. (1989). Innovation and Learning: The Two Faces of R & D. The Economic Journal, 99(397), 569-596. doi:10.2307/2233763
- Collins Dictionary (2017). Retrieved November 21, 2017, from https://www.collinsdictionary.com/
- Cropanzano, R. and Kacmar, K. (1995). Organisational politics, justice, and support. Westport, Conn [u.a.]: Quorum Books.
- Dekker, A. (2001). Adapting new technologies to census operations. Symposium on Global Review of 2000 Round of Population and Housing Censuses: Mid-Decade Assessment and Future Prospects, Statistics Division, Department of Economic and Social Affairs, United Nations Secretariat New York. Retrieved February 26, 2018, from http://unstats.un.org/unsd/demographic/docs/symposium_06.htm#_Toc8547016
- Denney, L. and Mallett, R. with Benson, M. S. (2017), "Service delivery and state capacity: findings from the Secure Livelihoods Research Consortium", Secure Livelihoods Research Consortium, London, https://securelivelihoods.org/publication/service-delivery-and-state-capacity-findings-from-the-secure- livelihoods-research-consortium.

- Doyle, A (2017). Technical skills list and examples. The Balance. Retrieved from https://www.thebalance.com/technical-skills-list-2063775
- Eurostat (n.d.). The Eurostat Quality Assurance Framework. Retrieved February 26, 2018, from from https://unstats.un.org/unsd/dnss/docs-nqaf/Eurostat_QAF%20leaflet.pdf
- ECOSOC [United Nations Economic and Social Council] (2013). Resolution adopted by the Economic and Social Council on 24 July 2013. 2013/21. Fundamental Principles of Official Statistics. Retrieved November 26, 2017, from https://unstats.un.org/unsd/dnss/gp/FP-Rev2013-E.pdf
- Edmunds, R. (2005). Model of Statistical Systems. PARIS21 Document Series #6. PARIS21 – OECD/DCD. Retrieved February 26, 2018, from https://www.paris21.org/sites/default/files/2101.pdf
- Eurostat (2014). Statistics in development cooperation - improving statistical capacity. [online] Retrieved November 22, 2017, from http://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_in_development_cooperation_-_improving_statistical_capacity
- Government Statistical Service (2016). The government statistician group competency framework. Retrieved January 30, 2018, from https://gss.civilservice.gov.uk/wp-content/uploads/2016/03/GSG-Competency-Framework_March2016-1.pdf
- HR Council Canada (n.d.). Compensation and benefits. Retrieved January 25, 2017, from http://hrcouncil.ca/hr-toolkit/compensation-overview.cfm
- IEAG (2014). A World that Counts: Mobilising the Data Revolution for sustainable development, Independent Expert Advisory Group on a Data Revolution for Sustainable Development
- Jex, J. and Cheffers, J. (n.d). Change management through transformation. Australian Bureau of Statistics. Retrieved February 26, 2018, from https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.54/2014/Australia_Change_management_through_transformation.pdf
- Katzenbach, J., Oelschlegel, C., Thomas, J. (2015). 10 principles of organisational culture. Startegy+Business. Retrieved January 28, 2018, from https://www.strategy-business.com/article/10-Principles-of-Organisational-Culture?gko=71d2f
- Klingebiel, S., & Keijzer, N. (2017). Realising the Data Revolution for Sustainable Development: Towards Capacity Development 4.0 (PARIS21 Discussion paper No. 9). Retrieved http://www.paris21.org/sites/default/files/CapacityDevelopment4.0_FINAL_0.pdf
- Kori, E. (2016). Challenges to academic freedom and institutional autonomy in South African Universities. International Journal of Teaching and Education, Vol. IV, No. 1.

- Krätke, F., & Byiers, B. (2014). Implications for the data revolution in Sub-Saharan Africa. Retrieved from: http://ecdpm.org/wp-content/uploads/DP-170-Political-Economy-Official-Statistics-Africa-December-2014.pdf
- McKay, D. R. (2017). Are you a problem solver? The Balance. Retrieved January 28, 2018, from https://www.thebalance.com/problem-solving-525749
- Mahal, A. (2010). How work gets done: Business Process Management, Basics and Beyond. Technis Publications New Jersey.
- Management Study Guide (n.d.). Workplace politics – Meaning and reasons for office politics. Retrieved December 01, 2017, from http://www.managementstudyguide.com/workplace-politics.htm
- Merriam-Webster (2017). Retrieved November 21, 2017, from https://www.Merriam-Webster, 2017.com/
- OECD (2016). "Skills for a Digital World", Policy Brief on The Future of Work, OECD Publishing, Paris.
- OECD (2015). Recommendation of the OEDC Council on good statistical practice. Retrieved February 26, 2018, from http://www.oecd.org/statistics/good-practice-toolkit/Brochure-Good-Stat-Practices.pdf
- OECD (2009). The Role and Code of Ethics for Official Statisticians. Retrieved January 25, 2018, from http://www.oecd.org/site/progresskorea/44115732.pdf
- OECD. (2007). OECD Glossary of Statistical Terms. Retrieved November 26, 2017, from https://stats.oecd.org/glossary/glossaryPDF.zip
- OECD. (2005). "The Measurement of Scientific and Technological Activities: Guidelines for Collecting and Interpreting Innovation Data: Oslo Manual, Third Edition" prepared by the Working Party of National Experts on Scientific and Technology Indicators, OECD, Paris, para. 146
- OECD. (2002). Measuring the Non-Observed Economy: A Handbook. OECD, IMF, ILO, Interstate Statistical Committee of the Commonwealth of Independent States , Annex 2, Glossary. Retrieved November 26, 2017, from https://stats.oecd.org/glossary/detail.asp?ID=1726
- OECD.Stat. (2017). Skills. Retrieved December 01, 2017, from https://stats.oecd.org/Index.aspx?DataSetCode=SKILLS_OECD Statistics Directorate. (n.d.).
- Online Business Dictionary. (2017). Retrieved November 21, 2017, from http://www.businessdictionary.com/
- Open Data Watch (2015): Partnerships and Financing for Statistics: Lessons Learned from Recent Evaluations. online: https://opendatawatch.com/knowledge-partnership/partnerships-and-financing-for-statistics-lessons-learned-from-recent-evaluations/

- Oxford Dictionary. (2017). Retrieved November 22, 2017, from https://en.oxforddictionaries.com/
- Pietrzak, T. and Fraum, M. (2005). Building Care er Success Skills. ASTD Press.
- PARIS21. (2017). Data Ecosystem. [online] Available at: http://www.paris21.org/data-ecosystem [Accessed 21 Nov. 2017].
- PARIS21. (2014, July 26). NSDS Guidelines. Retrieved November 26, 2017, from http://nsdsguidelines.paris21.org/
- PARIS21. (2010). Advocating for the National Strategy for the Development of Statistics Country-level Toolkit.
- Raza, R. (2009). Examining autonomy and accountability in public and private tertiary education. Human Development Network The World Bank. Retrieved November 26, 2017, from http://siteresources.worldbank.org/EXTHDOFFICE/Resources/5485726-1239047988859/RAZA_Autonomy_and_Accountability_Paper.pdf
- Rick, T. (2015). What is organisational culture. Retrieved December 01, 2017, from https://www.torbenrick.eu/blog/culture/organisational-culture/
- Rogers, D. (2015, July 19). What is employee autonomy and why is it so important? Retrieved from https://peakon.com/resources/guides/what-is-employee-autonomy-and-why-is-it-so-important/
- Rouse, M. (2018). Change Management. Techtarget Search CIO. Retrieved January 26, 2018, from http://searchcio.techtarget.com/definition/change-management
- Royal Statistical Society (2017). Code of conduct. Retrieved January 25, 2018, from http://www.rss.org.uk/RSS/Join_the_RSS/Code_of_conduct/RSS/Join_the_RSS/Code_of_conduct.aspx?hkey=3170e215-12c6-4948-b023-e7253a4600a8
- Schein, E. H. (1980). Organizational Psychology (3rd ed.), Prentice-Hall, Englewood Cli□s, NJ
- Sera, Y. & Beaudry, S. (2007). Monitoring and Evaluation. The World Bank. Retrieved November 26, 2017, from http://siteresources.worldbank.org/INTBELARUS/Resources/M&E.pdf
- Shore, D. A. (2017). What could go wrong? How to manage risk for successful change initiatives. Harvard Extension School. Retrieved November 26, 2017, from https://www.extension.harvard.edu/professional-development/blog/what-could-go-wrong-how-manage-risk-successful-change-initiatives
- Study. (n.d.). What is Organisational culture? Definitions and characteristics. Retrieved December 01, 2017, from https://study.com/academy/lesson/what-is-organisational-culture-definition-characteristics.html
- Taylor, M., (2016), The Political Economy of Statistical Capacity: A Theoretical Approach. Inter-American Development Bank Discussion Paper IDB-DP-471,

https://publications.iadb.org/bitstream/handle/11319/7794/ThePolitical-Economy-of-Statistical-Capacity-A-Theoretical-Approach.pdf?sequence=2

- UN Public Administration Network (1999). Transparency in Government. Presentation for the ILEA Seminar. Retrieved November 26, 2017, from http://unpan1.un.org/intradoc/groups/public/documents/un/unpan012062.pdf
- UN Secretary General (UNSG) (2016) Evaluation of the contribution of the United Nations development system to strengthening national capacities for statistical analysis and data collection to support the achievement of the Millennium Development Goals and other internationally agreed development goals, A/71/430, online: http://www.un.org/ga/search/view_doc.asp?symbol=A/71/431
- UNDP (2017a). Mapping and assessment of the data ecosystem in Mongolia. Innovations and new technologies for SDG monitoring. Interconsulting Group. [Unpublished]
- UNDP (2017b) Data Ecosystems for Sustainable Development. online: http://www.undp.org/content/dam/undp/library/Sustainable%20Development/Data%20Ecosystems%20for%20Sustainable%20Development.pdf?download
- UNDP (2009) Capacity Development: a UNDP primer. http://www.undp.org/content/dam/aplaws/publication/en/publications/capacity-development/capacity-development-a-undp-primer/CDG_PrimerReport_final_web.pdf
- UNECE Statistics Wikis. (2018). GSBPM v5.0. Retrieved May 24, 2018, from https://statswiki.unece.org/display/bigdata/Competency Profiles
- UNECE Statistics Wikis. (2016). Competency Profiles for Big Data Teams. Retrieved May 24, 2018, from https://statswiki.unece.org/display/bigdata/Competency Profiles
- UNSD (2012). Glossary. Template for a Generic National Quality Assurance Framework. Retrieved November 26, 2017, from https://unstats.un.org/unsd/dnss/docs-nqaf/NQAF%20GLOSSARY.pdf
- Van Muiswinkel, W.J. (2013). Future Challenges in Human Resources Management and Training in National Statistical Offices. Statistics Netherlands. Retrieved November 26, 2017, from https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.54/2014/Netherlands_-_Future_challenges_in_HRMT_-_22_March_2013.pdf
- World Bank (2017) Data on Statistical Capacity. [online] Retrieved November 22, 2017, from http://datatopics.worldbank.org/statisticalcapacity