Interlinkages of the 2030 Agenda for Sustainable Development

Prepared by the Interlinkages Working Group of the Inter-Agency and Expert Group on
Sustainable Development Goal Indicators (IAEG-SDGs)

Contents

Abstract

The 2030 Agenda for Sustainable Development provides a conceptual framework of 17 goals and 169 targets. An abundance of interlinkages exist between them, which can be either reinforcing or competing. By identifying strong and positive interlinkages (correlation) between targets and indicators, countries can leverage efficiency by directing statistical reporting and policy to those with the greatest potential for positive externalities. In turn, this allows countries to prioritize the allocation of scarce resources toward targeted programs and projects whose interlinked nature optimizes the potential for robust, sustainable development outcomes.

Executive Summary

In September 2015, UN Member States adopted the 2030 Agenda for Sustainable Development, an ambitious global blueprint to achieve a better and more sustainable future for all. Made up of 17 goals and 169 targets which are integrated and indivisible, the SDGs are intended to balance the economic, social and environmental dimensions of sustainable development. To develop the indicator framework for SDG monitoring, the United Nations Statistical Commission established the Inter-agency and Expert Group on Sustainable Development Goals (IAEG-SDG). This framework was agreed upon by member states in March 2016, and adopted by the 48th Statistical Commission and 71th General Assembly in 2017.

While the SDGs are organized within a framework of goals and targets that represent individual components of sustainable development, they are inherently interdependent. Measures taken to achieve progress on one, may be reinforcing, or perhaps competing with the achievement of others. When progress on one goal or target results in positive or negative externalities on another, this relationship is described as an interlinkage. Not surprisingly, the complex network of interlinkages within the SDG framework, as well as likenesses across other frameworks, is incredibly vast. Due to the breadth and depth of these relationships, the Commission proposed that a working group be created, which reports to the IAEG-SDG, and has been tasked with examining the interlinkages between SDG indicators and leveraging the efficiencies identified through this process to facilitate statistical reporting of the global SDG indicator framework.

Although SDG interlinkages can be interpreted in a large variety of ways, this report synthesizes some existing approaches; highlighting best practices across other conceptual frameworks including the Institute for Global Environmental Strategies (IGES), the Aichi Framework, the Conference of European Statisticians (CES), the indicator framework Drivers, Pressures, State, Impact and Results (DPSIR), as well as modelling proposed by the Italian National Institute of Statistics (ISTAT) as a country-led example.

By determining where interlinkages exist between the goals, targets and indicators of the SDG framework, as well as the type (reinforcing or competing) and strength of these relationships, countries can identify where they might allocate scarce resources, and target policy, most effectively. Leveraging the efficiencies presented by interlinkages can inform the strategic direction of disaggregated statistical reporting to support targeted projects and programs.

Ultimately, identifying interlinkages is a means for countries to identify areas on which to focus their efforts, with the objective of achieving sustainable development that leaves no one behind.

Background

In September 2015, UN Member States adopted the 2030 Agenda for Sustainable Development, noting that the 17 goals and 169 targets are integrated and indivisible, and that they balance the economic, social and environmental dimensions of sustainable development. The General Assembly tasked the United Nations Statistical Commission to develop the underlying global indicator framework, indicating that the framework was to be developed by the Inter-Agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDG) and would, "be simple yet robust, address all Sustainable Development Goals and targets, including for means of implementation, and preserve the political balance, integration and ambition contained therein," noting specifically that, "the interlinkages and integrated nature of the Sustainable Development Goals are of crucial importance in ensuring that the purpose of the new Agenda is realized. If we realize our ambitions across the full extent of the Agenda, the lives of all will be profoundly improved and our world will be transformed for the better" (A/RES/70/1).

The IAEG-SDGs was created in March 2015 at the forty-sixth session of the United Nations Statistical Commission. It is composed of 27 representatives from a regionally-balanced group of Member States and includes other Member States, regional and international agencies, as well as other key stakeholders (civil society organizations, academia and the private sector), as observers. These observers are also invited to attend its meetings and provide input during consultations. The IAEG-SDGs was tasked with providing a proposal for a global indicator framework for the follow-up and review of the 2030 Agenda to be considered by the Statistical Commission at its forty-seventh session in March 2016, where the framework was then agreed upon by Member States.

As noted at the 47th session of the Statistical Commission, monitoring and reporting on the more than 230 indicators will be a monumental task and will require significant investment and the creation of new strategies and data collection mechanisms. Additionally, the 2030 Agenda should allow for analyses that bridge the social, economic and environmental dimensions of the framework. While each goal and target represents a different facet of sustainable development, many of them are interdependent, whereby progress on one can affect advancement on another. In order to effectively monitor the complex network of interlinkages within the SDG framework, an understanding of what interlinkages exist must first be established. As a result, the Commission proposed that a working group be created, which reports to the IAEG-SDG, and is tasked with examining the interlinkages between SDG indicators and leveraging these possibilities to facilitate statistical reporting of the global SDG indicator framework.

The purpose of this report is to present the work completed to date by the working group on interlinkages and to demonstrate the breadth and depth of interlinkages related to sustainable development. The report outlines the mandate of the working group and defines interlinkages in the context of the Sustainable Development Goals; and examines interlinkages within the SDG framework across: goals; targets; the 5 thematic areas of the SDGs (peace, people, planet, prosperity, partnerships); the 3 dimensions of sustainable development (economic, social, environment); and across other statistical frameworks. This report also seeks to provide examples of possible applications, implications, and a best practice example from the Italian National Institute of Statistics (ISTAT).

Defining interlinkages

As noted in resolution A/RES/70/1, the goals and targets of the 2030 Agenda are interlinked and indivisible. While the SDGs are organized within a framework of 17 separate and distinct goals (with 169 targets), they are inherently interdependent. Measures taken to achieve progress on one goal may be mutually reinforcing or perhaps hindering the achievement of others. Any time progress on one goal or target results in positive or negative externalities on another, the relationship between them is described as an interlinkage. This relationship is also dynamic, in that different policy and reporting choices for one target may result in varying effects on others. Choosing the most effective among these will thus, be subject to optimizing welfare in the context of society, geography (among other contributing factors) at each level of decision making. For example, policies and programming designed to alleviate poverty (Goal 1) will undoubtedly impact health (Goal 3) and education (Goal 4) outcomes, reduce inequality (Goal 10), improve city planning (Goal 11), and enhance gender equality (Goal 5).

It is vital to acknowledge interrelationships of the framework in order to support effective decision making and policy development to support the SDGs. In recognizing the synergies and trade-offs of targeted development policies and programs, states can leverage the efficiencies yielded by interlinkages. With respect to statistics, understanding how various statistical frameworks are interlinked can enable countries to better monitor progress towards the 2030 Agenda, and to enhance data collection, acquisition and discovery processes. Measures such as multi-dimensional poverty statistics and calculations of healthy life years are examples of combinations of social data for overarching analyses of interlinkages. The Agenda follow up will need to be complemented by similar analyses to enhance the communication and planning of development more broadly. The statistical community will work on making available the data to underpin such analyses. Since such work has not been undertaken before, the need for cooperation between experts and stakeholders will play a pivotal role in overall success.

Defining and identifying interlinkages is complex, as they can be interpreted in a variety of ways. Additionally, the existence and nature of interlinkages can vary due to factors such as geographic and social contexts, so while these networks can be made at the international level, it is also important to take more local considerations into account. Targets relating to topics such as fishing regulations, which have a propensity to greatly effect SIDS, would have much greater effects on overall relationships to goals for economic welfare, health, and preparedness in these countries than in an arid, landlocked state. Within the 2030 Agenda itself, interlinkages can be examined in several ways: between goals or targets; across the 3 dimensions of sustainable development (economic, social, and environmental); and, across the 5 thematic areas of the 2030 Agenda (peace, planet, people, prosperity and partnerships). Interlinkages can also be identified between the SDG framework and various other statistical frameworks. Once identified, these relationships can be leveraged to improve efficiency of time and resources allocated to the SDGs and other frameworks, by integrating the work being done on overlapping or duplicated efforts. Prior to the creation of the Interlinkages working group, analysis on this topic had already begun. Some key examples of previous works have been incorporated into this report.

There are conceptual frameworks, such as the SDG framework, and there are analytical frameworks, such as the System of National Accounts for economic statistics or the System of Environmental and Economic Accounts for economic and environmental statistics, that connect statistics in a coherent way to enable analyses with a common system boundary. An analytical framework such as a system for sustainable accounts that connects the social issues with the economic and environmental has yet to be invented. The various components in the SDG Agenda can be connected in models, either conceptual or models outlining cause-effect logic.

The indicator framework Drivers, Pressures, Impact Results (DPSIR) was developed by the OECD and the European Environmental Agency and sorts indicators in five separate categories named Driving forces, Pressures, States, Impacts and Responses and examines the interactions between human activity and the environment. This framework is useful as it illustrates that different types of statistics are needed depending on what type of follow up is intended. It can also be used to understand that the statistics that show the sizes and trends of particular problems need to be combined with statistics that show what society can do to overcome those problems.

Mandate of the Interlinkages Working Group

The Interlinkages Working Group was initially comprised of 10 IAEG-SDG member countries. In 2016 membership was opened to interested stakeholders and another 8 members from multilateral organizations, civil society and academia joined the group.[1] The primary objective of the Working Group is to identify possible interlinkages in the statistics underlying the global SDG indicators and research and identify ways in which these interlinkages can be leveraged to facilitate global, regional and national SDG monitoring and analysis.

The Terms of reference for the group includes 5 specific tasks. These are to:

1. Identify interlinkages between the goals and targets and within the statistics underlying the indicators included in the global SDG indicator framework;
2. Identify some integrated analyses that have been tested on national or international level to show examples of such integrated analysis;
3. Identify areas and frameworks that can facilitate the monitoring of those goals, targets and indicators identified as being interlinked;
4. Identify best practices of integrated data collection and its transfer to other countries to assist in the development of integrated statistical systems; and,
5. Propose strategies for using these interlinkages and starting a discussion on how the statistical system can help with bridging policy fields and support a more integrated analysis of the economic, social and environmental developments as expressed in the SDG monitoring system.

Between October and December of 2017, the Interlinkages Working Group undertook a global consultation on interlinkages and has examined and included examples of some of the work

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[1] The working group consists of the following countries: Bahrain, Cameroon, Egypt, France, Sweden, Tanzania, Philippines, Netherlands, and is co-chaired by Canada and China. In 2017, 8 additional members were added to the group: 3 from academia, 3 from international and regional organizations and 2 from civil society.

being carried out by academia and other organizations on interlinkages. Several other international organizations have also examined how to assess the interlinkages of the SDGs. One example is the Joint Research Centre of the European Commission, which in its SDG project examined interlinkages (Miola, et al., 2018) and suggested 4 main approaches to establish interlinkages. These include: (a) the argumentative approach, which relies on interpretation of the goals and targets and mostly based on expert judgements and/or the examination of keywords for goals and targets and text analysis; (b) the literature approach, which is based upon examination of evidence from scientific publications that establish causal relations of variables related to Goals and targets; (c) the data-driven approach, which examines statistical techniques to study historical behavior of SDG indicators; and (d) the modelling approach, which uses statistical modelling to understand interactions related to the interdependences across the SDGs. Additionally, some legal instruments are interlinked under the umbrella of sustainable development and should also be considered as a component of interlinkages, including – but not limited to - legislation for: universal access to justice and social services, human rights and liberties, protection of labour rights, natural resources, and the environment.

Interlinkages within the 2030 Agenda

As noted by the General Assembly, the 17 Goals guiding the 2030 Agenda for Sustainable Development are interlinked and indivisible by nature. For example, Goal 3 – Good Health and Well-being – cannot be attained unless Goal 2 – Zero Hunger – has been attained, and both are interlinked with Goal 10 – Reduced inequalities – and Goal 8 – Decent Work and Economic Growth. These interlinkages are important to understand when measuring progress towards the achievement of the 2030 Agenda, as well as developing policy and programming, as there are important implications and trade-offs that should be considered.

Not surprisingly, given that the goals are interlinked, so too are the 169 targets. Understanding interlinkages at the target level can enable a more complete measurement of the framework as a whole. Because the Global Indicator Framework has already been endorsed by countries and many indicators are already being reported on (or will be reported on), using targets and indicators from within the framework to enhance measurement of others leverages resource efficiencies and reduces any additional reporting burden on countries.

The mapping of interlinkages across goals and targets of the 2030 Agenda resulted in a vast network of interlinkages. Using Goal 3 as an illustrative example (excerpt from analysis and mapping of all indicators within the Global Framework), we can see the extent to which this is the case from Figure 1, below. For instance, for target 3.8 - Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all, there are interlinkages with some of the targets in Goals 1, 2, 4, 5, 6, 7, 8, 10, 11, 16 and 17. Given this, it is possible to use these other indicators to supplement measurement of the indicators associated with target 3.8. It is important to note that, the group assumed that by default, all targets and indicators under a goal are interlinked (see for complete Goal 3 example, refer to Annex 1).

FIGURE 1 - Goal 3 Interlinkages

Goal 3 and Targets	Interlinkages between Goal 3 and other goals within the current framework	Interlinkage between Goals and targets and indicators within the current framework
GOAL 3: Ensure healthy lives and promote well-being for all at all ages	1. No poverty 2. Zero Hunger 4. Quality Education 5. Gender Equality 6. Clean Water and Sanitation 7. Affordable and Clean Energy 8. Decent Work and Economic Growth 9. Industry, Innovation and Infrastructure 10. Reduced Inequalities 11. Sustainable Cities and Communities 12. Responisble Consumption and production 13. Climate Action 14. Life Below Water 15. Life on Land 16. Peace, Justice and Strong Institutions 17. Partnerships for the Goals	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a, 1.b 2 - 2.1, 2.2 4 - 4.1, 4.2, 4.3, 4.7 5 - 5.1, 5.2, 5.3, 5.6, 5.c 6 - 6.1, 6.2, 6.3, 6.4, 6.a, 6.b 7 - 7.1 8 - 8.1, 8.3, 8.5, 8.6, 8.7, 8.8 9 - 9.1, 9.c 10 - 10.1, 10.2, 10.3, 10.4, 10.7 11 - 11.1, 11.2, 11.3, 11.5, 11.6, 11.7, 11.b 12 - 12.4 13 - 13.1, 13.3 14 - 14.1, 14.2 16 - 16.1, 16.2, 16.3, 16.4, 16.6, 16.7, 16.9, 16.10, 16.a 17 - 17.13, 17.16, 17.18

*Red indicates indirect interlinkage

In October 2017, the Interlinkages Working Group undertook a global consultation that included the examination of interlinkages across the thematic areas of the 2030 Agenda (peace, people, planet, prosperity, partnerships). Since some reporting for the 2030 Agenda could be undertaken by thematic area, the group requested that respondents identify to which theme they felt each goal most closely aligned. Overall, most goals were found to fit within the theme of People, followed by Planet. Not surprisingly, goals related to Water, Life on Land and Climate action were primarily associated with the theme Planet. For some goals, the breakdown was more diverse. The consultation found that for Goal 1 – end poverty in all its forms - the primary theme was people, however, prosperity, partnerships, and peace were also noted, and that the goal could also be associated with the theme of planet. This provides a good illustration of how traditional reporting of issues such as poverty could be examined in a more holistic manner, as the ripple effects from social issues may be expansive.

The global consultation also noted that for some SDGs, targets are very interlinked across the Agenda. For example, 16.5 was considered to be highly relevant to all other targets and goals, as corruption limits accessibility to development services – fuels illegal activity such as human and wildlife trafficking, organized crime and discourages domestic and foreign investment. A summary of the comments from the global consultation can be found in the annex.

Two goals are integrated in their set-up, namely the goal on cities (Goal 11) that connect, social, economic and environmental issues on areas, and the sustainable production and consumption goal (Goal 12), that connect environmental pressure with economic activities, with some social and health aspects included. There are existing statistical practices that serve to inform policies with facts about geographical areas through the combination of statistics and geographic information, on the one hand, and, on the other hand, the environmental pressures from economic activities that connect the use of natural resources with environmental pressure and economic activities in the System of Environmental and Economic Accounts. The state of social goals on poverty, food, health, education, gender, water, energy, decent jobs and peaceful societies can be assessed by statistics that can further the Agenda for these in a combined way.

Additional work investigating the interlinkages within the SDG framework has been undertaken by a number of NGOs, multilateral organizations, academic and civil society groups. One such example comes from the Institute for Global Environmental Strategies (IGES), which undertook an extensive analyses to measure the correlation between indicators within the framework, using time series data. The group maps these interlinkages on a cross-cutting grid (link to example for Bangladesh in footnotes)[2] to show potential reinforcing and conflicting relationships between indicators (determined by the value of the correlation coefficient). By determining the correlation between indicators, this gives an estimate of possible externalities from targeted policy for one on the other. If the correlation coefficient is strong and positive, it is likely that targeting the improvement of one indicator will also result in growth toward the second. Alternatively, a strong negative coefficient suggests that the resources allocated toward the first, may reduce or hinder progress toward the second. With this in mind, the network of IGES-proposed interlinkages identifies targets with varying degrees of leverage. Indicators identified as having the highest degree of leverage for the greatest number of other targets can then be targeted as key areas for strategic policy, but also for prioritizing data collection and statistics. Once the data are visualized, the interlinkages create a network of targets which can be disseminated by target country and goal, and which show the complex interrelationships within the SDG framework (Figure 2). The study is regional, covering eight Asian states[3], though similar models could be replicated and used elsewhere.

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[2] IGES SDG Interlinkages Dashboard, Bangladesh: https://sdginterlinkages.iges.jp/files/Dashboard_BGD_V2.0.pdf
[3] Bangladesh, Cambodia, China, India, Indonesia, Japan, The Republic of Korea, Philippines and Viet Nam.

FIGURE 2: Interlinkages network chart, Sustainable Development Goal 1 (China)
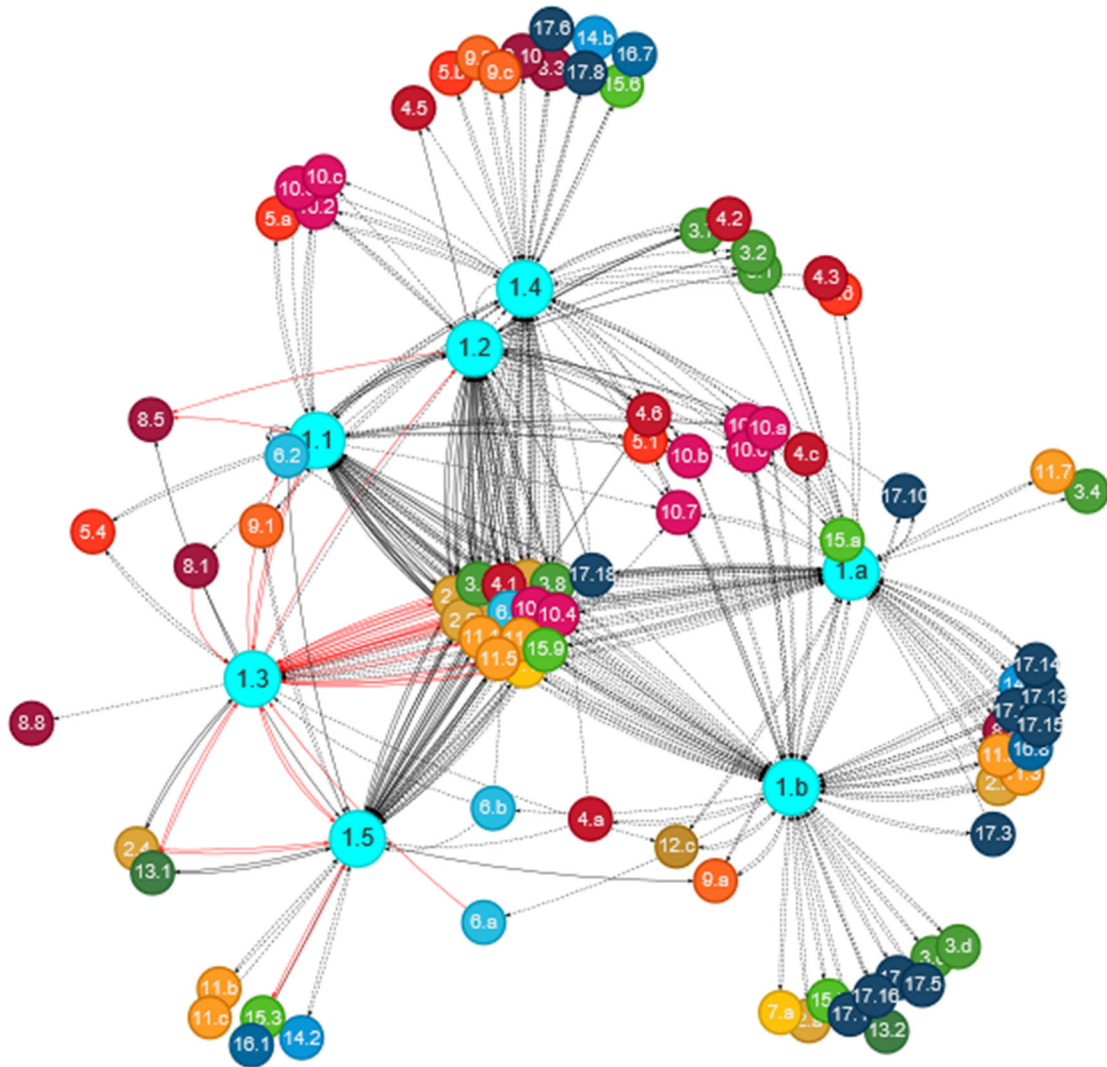
Source: IGES SDG Interlinkages Analysis & Visualisation Tool (V2.0) (2018)

Interlinkages across other statistical frameworks

The SDGs include some indicators that align closely with other existing frameworks and these can be used to support the analysis of interlinkages within the 2030 Agenda. This section outlines some of the experiences from these frameworks and discusses how existing frameworks might be leveraged in the measurement and monitoring of the SDGs.

The Aichi Targets and the SDGs

The Aichi Biodiversity Targets are a set of global targets established under the UN Convention on Biological Diversity. The 20 targets are grouped under 5 strategic goals related to biodiversity and, not surprisingly, these are closely related to the SDGs.

The 5 goals of the Aichi are:

Goal A – Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.

Goal B – Reduce the direct pressures on biodiversity and promote sustainable use.

Goal C – Improve the biodiversity by safeguarding ecosystems, species and genetic diversity.

Goal D – Enhance the benefits to all from biodiversity and ecosystem services.

Goal E – Enhance implementation through participatory planning, knowledge management and capacity building.

Between the SDG and Aichi frameworks, there are interlinkages at both the goal and target level. For example, Aichi Goal D - Enhance the benefits to all from biodiversity and ecosystem services, is linked to SDG Goals 1, 3, 5, 6, 7, 8, 9, 10 11, 13, 14 and 15. At the target level these interlinkages are even further diversified. As an example, consider SDG target 3.9 – by 2030, substantially reduce the number of deaths and illnesses from hazardous chemical and air, water and soil pollution and contamination – which is interlinked with Aichi targets 8, 13, 14, 16 and 18. Interlinkages between the SDG and Aichi frameworks have been visualized to facilitate understanding in Figure 3 (below).

FIGURE 3 - Aichi Targets and the SDGs

Links between SDGs and Aichi Targets

The CES Framework and the SDGs

The *Conference of European Statisticians (CES) Recommendations on measuring sustainable development* (CES, 2014) were developed in 2009-2013 by a joint UNECE/Eurostat/OECD Task Force. The impetus for undertaking the work was the need to harmonise the approaches used by countries and organizations in measuring sustainable development. This work preceded the 2030 Agenda for Sustainable Development.

The CES recommendations provide an endorsed and universal framework for measuring sustainable development, combining a strong theoretical basis and a clear link with policy needs. The recommendations were a breakthrough as they provided a common approach to which all existing methodologies and indicator sets could be linked.

The CES framework links the themes that are used by policy makers and the general public, such as health, labour, education, water, climate, energy, etc. Additionally, the CES recommendations draw on three conceptual dimensions of wellbeing as defined in the Brundtland report: the needs of the present ('here and now'), future generations ('later') and people living in other countries ('elsewhere'). These three dimensions are linked to 20 policy relevant themes that cover the environmental, social and economic aspects of sustainable development.

In October 2015, the CES bureau set up the task force on adjusting the CES recommendations on Measuring Sustainable Development to the SDGs. An important output of this work is the identification of:

- interlinkages between SDGs and underlying targets;
- which SDG targets are related to a specific topic (such as health, labour, water, air, energy); and,
- which statistical area can provide information to assess progress on a specific target.

The Task Force attempted to map the SDG targets and CES themes one to one, though this approach left out information that is necessary for monitoring the achievement of the target. However, if an exhaustive mapping of SDG targets to all CES themes was completed, the result would be too complex to remain effective. To keep a balance between too general or too exhaustive an approach, the Task Force decided to base the mapping on the main focus ("essence") of each SDG target. The other aspects of the targets were included as secondary matches. For example, in the case of target 2.4, the main focus of the target is on food production (CES Theme 3 'Food and nutrition'), but the target also relates to themes 10 Ecosystems, 13 Climate, 18 Physical capital and 21 Production. One challenge noted by the task force was the mapping of the means of implementation and governance related targets. These targets were found to mostly link to theme 17 "Institutions", which thus becomes overly broad. To ensure specific means of implementation, the Task Force mapped the means of implementation targets as much as possible to the subject matter that they refer to. The results of the mapping between the 2 frameworks is visually represented below. For a specific example using the CES framework, see **Annex 4.**

Figure 4: Primary links between the SDG and CES adjusted thematic framework
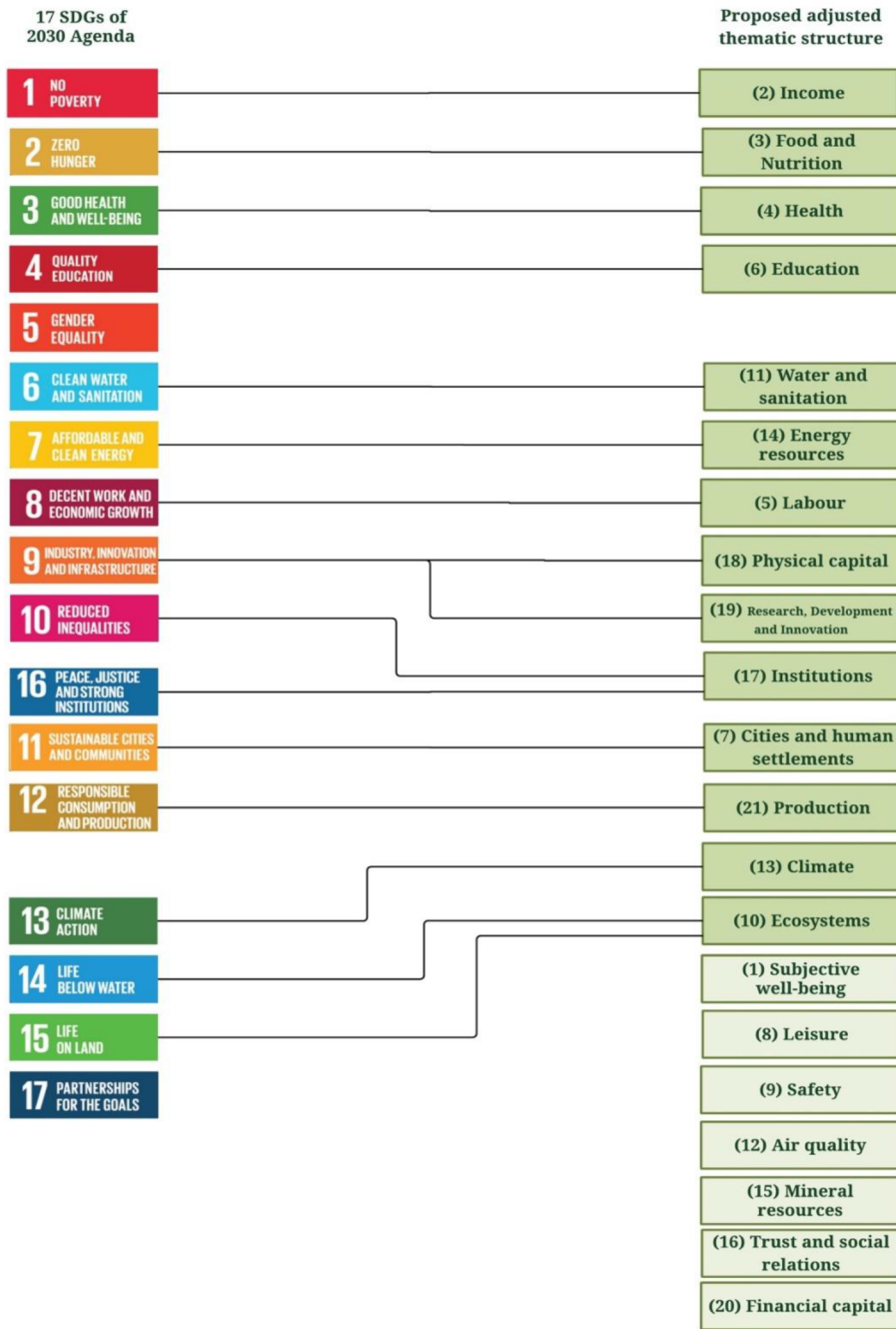
The System of Environmental Economic Accounting (SEEA) and the SDGs

The SEEA is an internationally used and widely accepted framework of standardized definitions, classifications and accounting concepts. It has been developed and revised by the UN as an environmental accounting system to cover stocks, flows and economic activities linked to the environment. Due to its modular conception, it can be enlarged by additional modules covering additional environmental-economic activities as they are identified.

The SEEA itself does not contain predefined indicator sets. However, the SEEA is a system of accounts, meaning that it provides the statistical framework to measure many facets of the environment and economy in a coherent and integrated way, Thus it provides a conceptual basis upon which an integrated indicator framework can be built.

Therefore, the first advantage of indicators produced from the SEEA would be that they would be internationally comparable based on an internationally agreed standard. In addition to that, data availability would already be given for many countries, as more than 100 countries have already adopted the SEEA for their national environmental accounting. Capacity building will be easier achieved and less cost intensive. Using the SEEA would also reduce the reporting burden as countries do not have to implement a new data collection, validation and dissemination process.

As a second advantage, the SEEA covers a wide range of thematic fields, including agriculture, forestry, fishery, energy, emissions, land, water, environmental activities and material flows. With that, at least goals 2, 6, 7, 8, 12, 13, 14, 15 and part of goal 17 are addressed in a broader context and respective indicators can be developed. Furthermore, the SEEA is aligned with the System of National Accounts (SNA), linking also to goal 1, 9, 10 and 17.

As outlined above, the SEEA could provide a supporting mechanism for global SDG monitoring and assist in the derivation of high quality and internationally comparable SDG indicators. These SEEA-derived indicators would be characterized by their policy relevance and methodological quality, provided by the already wide-spread accounting approach. Furthermore, due to the numerous established SEEA accounts, many thematic fields of the SDGs can be addressed.

The DPSIR framework and the SDGs

The Drivers, Pressures, State, Impact and Results (DPSIR) indicator framework was developed by the OECD and the European Environmental Agency as a causal framework for describing the interactions between society and the environment. It aims to recognize and measure the mutual dependence between social and environmental decisions and policies. The framework organizes indicators into five separate categories named Driving forces, Pressures, States, Impacts and Responses and examines the reciprocated externalities resulting from human activity and the environment. This framework is useful as it illustrates that different types of statistics are needed, depending on the type of follow up that is intended. It can also be used to understand that statistics showing the size and trends of particular problems should be combined with statistics that can support policy interventions to overcome those problems. The framework is inherently similar and complementary to the study of SDG interlinkages, as it is a mapping tool of relationships between society and the environment. If applied to the goals and targets of the

SDGs, the DPSIR framework can be used as a cross referencing tool and as an additional layer to inform sustainable policy- and decision-making.

There are many other existing statistical frameworks that could be used as a complement to the Global Indicator Framework for SDGs. Annex 1 provides a list of some of the frameworks that could be considered.

Tying statistical frameworks together through international standards

This section will begin by looking at how to tie together statistics within the three domains of environmental statistics, social statistics and economic statistics, and will then move on to how to link these systems together. For instance, in the EU, social statistics cover several different dimensions[4]. The current system for producing European statistics on persons and households based on data at the individual level is made up of a number of separate domain-specific regulations, which specify the exact topics to be covered and the technical requirements for data collection. There are currently five legal bases for conducting European social surveys, which relate, respectively, to the Labour Force Survey (LFS), European Statistics on Income and Living Conditions (EU-SILC), the Adult Education Survey (AES), the European Health Interview Survey (EHIS), and the Survey on Information and Communications Technologies (ICT) usage in households (ICT-HH). Two European surveys are conducted on the basis of an informal agreement only: the Household Budget Survey (HBS) and the Harmonised European Time Use Survey (HETUS).

FDES, the Framework for the Development of Environmental Statistics (UN, 2013), is expected to contribute significantly to improved monitoring and measurement of the environmental dimension of sustainable development and the 2030 Agenda. The use of the FDES in national statistical systems will enhance developments in this field of statistics, as it is a multipurpose and flexible tool to address specific environmental policy concerns and priorities of countries and can accommodate their levels of statistical development.

The Environment Statistics Section of UNSD prepared a preliminary correspondence between the environmentally-related SDG targets and indicators and the Basic Set of Environment Statistics contained in the FDES (UNSD, 2018). An excerpt of this report is provided in **Figure 5** below, wherein interlinkages between the frameworks are expanded for all relevant targets and indicators. This analysis also elaborates on the context and extent to which FDES indicators are related to the Global Indicator Framework by FDES component and sub-component, with supporting information providing further detail.

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[4] Brussels, 24.8.2016 COM(2016) 551 final 2016/0264 (COD) Proposal for a Regulation of the European Parliament and of The Council, establishing a common framework for European statistics relating to persons and households, based on data at individual level collected from samples.

Figure 5: SDG Indicators and the Basic Set of Environmental Statistics of the FDES 2013

SDGs		FDES			Supporting Information
Target	SDG Indicators	Location in the FDES: Component Sub-Component and Topic	Statistics used in the SDG Indicator corresponding to BSES (SDG Indicator can be compiled either fully or partially from BSES statistics)	Statistics related to but not directly used in SDG Indicators OR Statistics related to Tier III indicators (either fully or partially linked to BSES)	
1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	1.4.2 Proportion of total adult population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure (Tier II)	Component 2: Environmental Resources and their Use, Sub-component 2.3: Land, Topic 2.3.1 Land Use		2.3.1.c. Land ownership	The FDES statistic covers area of land rather than population required for the SDG indicator but it provides useful complementary data. The FDES statistic on land ownership is defined to include other forms of secure tenure rights, in addition to ownership.
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	1.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population (Tier II)	Component 4: Extreme Events and Disasters, Sub-component 4.1: Natural Extreme Events and Disasters, Topic 4.1.2: Impact of natural extreme events and disasters	4.1.2.a. People affected by natural extreme events and disasters 4.1.2.a.1. Number of people killed 4.1.2.a.2. Number of people injured 4.1.2.a.3. Number of people homeless 4.1.2.a.4. Number of people affected		The Sendai Framework for Disaster Risk Reduction covers both natural or manmade hazards as well as related environmental, technological and biological hazards and risks. The FDES statistic also includes the number of missing persons.
		Component 4: Extreme Events and Disasters, Sub-component 4.2: Technological Disasters, Topic 4.2.2: Impact of technological disasters	4.2.2.a. People affected by technological disasters 4.2.2.a 1. Number of people killed 4.2.2.a.2. Number of people injured 4.2.2.a.3. Number of people homeless 4.2.2.a.4. Number of people affected		The FDES statistic also includes the number of missing persons.
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product (GDP) (Tier II)	Component 4: Extreme Events and Disasters, Sub-component 4.1: Natural Extreme Events and Disasters, Topic 4.1.2: Impact of natural extreme events and disasters	4.1.2.b. Economic losses due to natural extreme events and disasters (e.g., damage to buildings, transportation networks, loss of revenue for businesses, utility disruption) 4.1.2.c. Physical losses/damages due to natural extreme events and disasters (e.g., area and amount of crops, livestock, aquaculture, biomass)	4.1.2.d. Effects of natural extreme events and disasters on integrity of ecosystems 4.1.2.d.1. Area affected by natural disasters 4.1.2.d.2. Loss of vegetation cover 4.1.2.d.3. Area of watershed affected 4.1.2.d.4. Other	Ecosystems affected by disasters can be considered complementary statistics.
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters		Component 4: Extreme Events and Disasters, Sub-component 4.2: Technological Disasters, Topic 4.2.2: Impact of technological disasters	4.2.2.b. Economic losses due to technological disasters (e.g., damage to buildings, transportation networks, loss of revenue for businesses, utility disruption) 4.2.2.c. Physical losses/damages due to technological disasters (e.g., area and amount of crops, livestock, aquaculture, biomass)	4.2.2.d. Effects of technological disasters on integrity of ecosystems 4.2.2.d.1. Area affected by technological disasters 4.2.2.d.2. Loss of vegetation cover 4.2.2.d.3. Area of watershed affected 4.2.2.d.4. Other (e.g., for oil spills: volume of oil released into the environment, impact on ecosystem)	Ecosystems affected by disasters can be considered complementary statistics.

SNA, **the System of National Accounts**, is the internationally agreed standard set of recommendations on how to compile measures of economic activity. The SNA describes a coherent, consistent and integrated set of macroeconomic accounts, with a set of internationally agreed concepts, definitions, classifications and accounting rules. In addition, the SNA provides an overview of economic processes, recording how production is distributed among consumers, businesses, government and foreign nations. It shows how income originating in production, modified by taxes and transfers, flows to these groups and how they allocate these flows to consumption, saving and investment. Consequently, the national accounts are one of the building blocks of macroeconomic statistics forming a basis for economic analysis and policy formulation (UN, 2018).

The Sendai Framework for Disaster Risk Reduction has 7 global targets related to SDGs and cuts across different aspects and sectors of development. Interlinkages between the two frameworks exist both directly and indirectly, including 25 targets related to disaster risk reduction in 10 of the 17 SDGs, firmly establishing the role of disaster risk reduction as a core development strategy (for example, by reducing exposure and vulnerability of the poor to disasters or building resilient infrastructure). There are several goals and targets that can contribute to reducing disaster risk and building resilience, even where disaster risk reduction language is not explicit. These include targets related to promoting good health and well-being; resilient infrastructure, societies, food supplies and economic markets; and, building the necessary resources and capacities to reduce overall risk and facilitate timely recovery - both in preparation for, and in response to, disasters. (UNISDR, 2014)

Figure 6: Interlinkages between the Sendai Framework and Agenda 2030

Targets (Sendai Framework)	SDGs
a. Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015.	1, 2, 3, 4, 6, 8, 9, 10, 11, 13, 16, 17
b. Substantially reduce the number of affected people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020 - 2030 compared to the period 2005-2015.	1, 2, 3, 4, 6, 8, 9, 10, 11, 13, 16, 17
c. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.	1, 2, 3, 8, 9, 11, 13, 14, 15, 16
d. Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.	1, 2, 3, 4, 6, 9, 10, 11, 15, 17
e. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.	1, 2, 11, 13, 17

f. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.	1, 2, 3, 6, 9, 10, 11, 17
g. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.	1, 3, 11, 13, 17

The System of Environmental-Economic Accounting (SEEA), is a framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment. It contains internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics and accounts. The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA). The framework uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics. The SEEA is a multi-purpose system that generates a wide range of statistics, accounts and indicators with many different potential analytical applications.

The countries involved in developing the system of environmental and economic accounts (SEEA) have piloted how to link the basic data in common classifications for statistical analyses. In this process, some of the ideas that were tested turned out to be useful and others less so. In general, the data that is generated in the economic system has been usable and provided good insights. However, data on stocks that have to be estimated and data on the state of environment and valuations of damages have proven better to deal with in a research and modelling context.

Statistical systems that produce robust statistics that better reflect the underlying interlinkages between social, environmental and economic activities, can enhance their abilities to support informed and evidence-based decision-making. Developing and leveraging systems like the FDES, SNA, and SEEA and having these implemented globally also allows for greater comparability of figures and facilitates partnerships and knowledge sharing on best practices. Ultimately, statistics that are produced to recognize interlinkages produce figures that lead to more comprehensive, inclusive and sustainable policies and legislation.

Interlinkages and the dimensions of development

Environmental and economic data and the SDGs

Over the last twenty years, many questions regarding the economy and environmental parameters have been tested by national statistical offices, and others have been modelled by the research community. The areas that have been tested fall within the goals relating to water, energy, growth and employment, sustainable production and consumption, climate change, and, to a certain extent, land degradation and biodiversity loss.

That means there is some experience on possible linkages between six goals, even if it does not yet answer all possible questions. There are ways to investigate how the use of a certain resource impacts the environment, and how certain economic actors contribute to that process. Here, the common denominator is linking the economy and the environment has been the economic actors in society as they are classified in the economic statistics of industries, state and households: the ISIC code for the industries; (agriculture, forestry, fishing, mining, construction, service industry etc.), and the equivalent classifications for government and household spending. Using the industry (rather than a single company or a more loosely defined sector) as the main interlinking category has several advantages. First, it is an internationally harmonised classification so that comparisons can be made. Second, it is aggregated so that the secrecy requirements of the source data need not be compromised. Third, it provides more details than a national data point would.

To measure environmental indicators, the basic physical data most commonly employed has been energy use by industry, which can then be recalculated into air emissions. This can also be achieved using data on other resource uses such as water, materials and land use. These accounts also make it possible to see how economic instruments such as taxes and subsidies are distributed over the economy and over product groups with different environmental pressures. Typical results from the accounts show that the basic industries are the ones that create the greatest environmental externalities in the economy and that this gradually diminishes as one moves up the value chain (with the exception of the transportation industry that uses a lot of fossil fuels). Technology and energy systems are important when it comes to environmental pressures resulting from economic activities. Pathways exist where economies can be made cleaner and greener at the same levels of productivity, and interlinkages of the SDG framework could be used to explore, leverage and monitor these opportunities.

Socioeconomic data and the SDGs

Investing in institutions, practices or activities that promote poverty alleviation, sustainable agriculture, vaccinations and health systems, education, reproductive health and equal rights for vulnerable groups, clean water, clean energy and decent jobs will be necessary to reach the goals of the Agenda. Innovation for sustainable industry and infrastructure, economic equality and effective planning is called for, as well as rule of law and cooperation to reinvent the economy so that emissions of greenhouse gases can be curbed and that climate, societies and ecosystems on land and water can continue to sustain the planet's inhabitants. Peaceful cooperation is a prerequisite to be able to reach the goals as well as making sure that the incentives are right to leave no one behind.

The statistical system has developed a system for measuring the well-being of people that includes a number of components. The components can be tied to individuals such as health (measured subjectively or objectively), freedom from violence, annual income, education, employment, or the ability to react to sudden shocks or changes in personal expenditures. Other aspects, such as housing standards and possibilities to take part in political life and the availability of close friends, are measured in some countries. The components do not add up to a total number, but they show aspects of life that are important to for overall welfare. For international comparisons of social determinants, life expectancy is often used, sometimes in

combination with some life satisfaction metric. Life expectancy is calculated for the expected time a newborn (for example) will live given a set of mortality rates. High infant mortality and deaths from childbirths, wars and accidents lowers the life expectancy considerably. Within the same country, the life expectancy and quality of life between different groups can vary enormously. The situation for the coming generations will also depend on the decisions that are taken now. The health of the biosphere and the ecosystems has been taken for granted but with a growing population and rapidly changing climate there is a need for better planning of economic and natural resource use. In particular, the need to reform the economy so that it does not depend on fossil fuels or on management practices that destroy the ecosystems is a key challenge.

Underlying every standardized economic statistic, is the story of those contributing to the big picture. Whether it be identifying who is working, who has access to jobs and resources, or who is excluded, demographically disaggregated socioeconomic statistics are the backbone for national estimates. In an evidence-based political environment, statisticians, researchers and policymakers must all recognize and investigate the interlinkages between underlying factors of productivity (such as health, geography, access to services and technology, etc.) and economic growth, to assess needs and improve systematic processes relating to their areas of expertise. Ideally, by leveraging statistical interlinkages with(in) the SDG framework, we would also be able to undertake data analyses to say more about how the social issues and the economy interact, and provide better mechanisms for intervention. If the areas of poverty, agriculture and food security, health, education, gender, growth and employment, as well as inequality could be analysed together, that would be a starting point for informing about the process and results of development.

The state of social goals on poverty, food, health, education, gender, water, energy, decent jobs and peaceful societies can be assessed through the use of statistics, which can then inform robust policies that address these issues in a combined way. Measures such as multi-dimensional poverty statistics and calculations of healthy life years are examples of combinations of social data for overarching analyses. The statistical community will continue to work on making available the data to underpin such analyses. Since such work has not been undertaken before, the need for cooperation between experts and stakeholders from many different areas will be needed.

There are several underlying considerations for leveraging data interlinkages to monitor and report on social issues and the economy. For instance, countries with statistical registers that collect data at the individual level, the combination of data on income, age, gender, birth place, address and education may in principle be easy to combine. However, the issue of protecting the individual from having their privacy exposed to the government or the analysts must be taken very seriously. When such data is used by researchers, it is released (without the identification of individuals) for specified research questions and with instructions on how long the data set can be used before it is to be destroyed.

When such data is presented as statistics, it is released for groups of people (e.g. women, men, certain age groups or income groups) so that there is adequate disaggregation to inform targeted social policy, but that no individuals can be identified. The details that can be investigated in a

research project on a smaller group of people are typically not possible to follow for the whole population. Also, the more data that is gathered about an individual, the more sensitive it becomes. Still, the statistical community have experience to build the basic statistics and to increase the capacity of nations to provide their own statistics is a good first step. In the SDG-process we should take the opportunity to discuss what interlinkages would be most valuable to describe between the economy and the social issues.

Social Institutions and the SDGs

Several of the Sustainable Development Goals describe institutions that can provide a structure for the building of a sustainable society and can act as much as a driver for development - at a local, regional or national level - as health, education and income can at the individual level. It is important when considering mechanisms for monitoring and reporting on these goals, that underlying interlinkages are considered as a component of these changes.

Goal 9 - Industry, Innovation and infrastructure - describes enabling factors that could be the basis for social, environmental or economic development. When states have economic growth and foster free and open market policies in which property rights are protected, industry tends to diversify, leading to further growth and employment, and ultimately to a greater number of goods and services available to citizens. Innovation can act as a driver for this growth by maintaining market competitiveness and improving efficiencies, while infrastructure acts as a foundation from which this growth can occur. Goal 9 also ties in closely with goals 7, 8, 11, 12 and 13, again highlighting the abundance of interlinkages which might be leveraged for data or policy purposes.

Goal 11 – sustainable cities and communities – is a goal that focuses on areas where a lot of change and development is happening and a goal that is cross-cutting in its very set-up. For example, we cannot effectively monitor progress towards sustainable cities without considering attempts to increase clean energy use; making cities more resilient to natural disasters and the effects of climate change; reducing inequality; improving systems of social services, justice and politics; and, investing in infrastructure. Likewise, goal 16 'Peace and justice' represents broad concepts that will need to be measured by a multitude of data that are not necessarily linked to the social, environmental or economic sphere, but more an institutional setting of whole nations or regions.

The last goal of 'Governance including statistical capacity building' is also more of a process to achieve the goals rather than a set of data that countries have been reporting and analysing already. This goal is of particular interest to interlinkages, as it underpins the need to develop statistical capacity, including but not limited to, leveraging the use of interlinkages for data exploration, analysis, reporting and processes. Additionally, it ties in to all other goals as part of the reporting mechanism, but also as an area for innovation, as a means to inform effective and inclusive evidence-based policy, and in developing the necessary partnerships to achieve the ambitious objectives set out by the SDGs.

Modelling interlinkages within the SDG framework

Statistics are often used in modelling efforts where researchers can investigate how to understand the causes and effects of the various phenomena that the statistics are measuring. Specifically for issues that are investigated at a global level, it is necessary to make assumptions and align data series so that they can be used to answer various analytical questions. Such analysis is of interest to the 2030 Agenda and cooperation between researchers and statisticians can hopefully be an efficient way to understand what data items are most crucial to follow up.
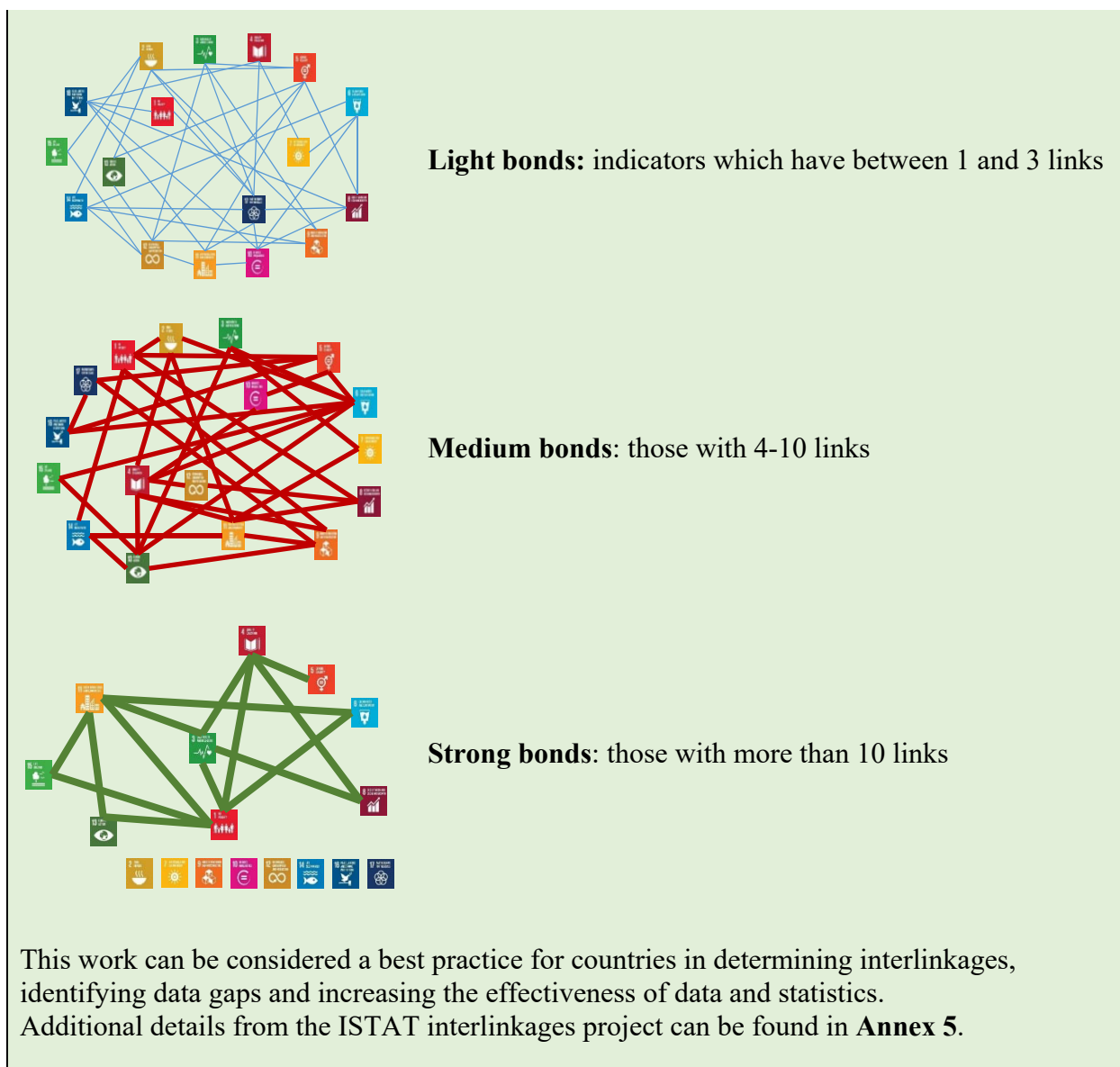
The authors of a recent literature overview have compiled results from studies on reciprocal dependencies between the 17 Sustainability Development Goals (Ekener and Katzeff, 2018) with a special interest for ecosystem services. The overview shows that several studies suggest that maintaining ecosystem services is essential for achieving other sustainability goals. In particular, they conclude that achieving sustainability goals 14 (Marine and Marine Resources) and 15 (Ecosystems and Biodiversity) is a prerequisite for achieving all other goals. Studies also indicate that SDG 7 (Sustainable Energy for All) is essential for achieving all the other goals (ibid).

Country Highlight: Italy

As noted, much work has already taken place in the examination of interlinkages. For example, the National Statistical Office of Italy (ISTAT) has done significant research. To face the need to jointly meet both international and national demand, with particular attention to territorial and gender disaggregation, 235 national statistical measures have been made available by ISTAT in a national statistical platform. This includes 117 indicators related to the IAEG-SDG framework. They note that there are 3 objectives of the work on interlinkages:

1. The first aim was to make complex statistical information more usable, so that it becomes a shared asset to support national policies, including the integrated analysis of social, economic and environmental dimensions and their interrelation.
2. The second is to facilitate the production of statistical information, aimed at filling information gaps, in identifying the right proxies or the most appropriate specific national indicators. The analysis of interlinkages can facilitate the identification of gaps in statistical reporting pertinent to sustainable development, and to develop proxy indicators or data exploration which aim to bridges these gaps.
3. The third objective, no less important, proposes the use of links (interlinkages) identified to facilitate the use of statistical measures and the monitoring, even crossed, of the objectives of sustainable development.

ISTAT used IAEG-SDG metadata, which defines, where present and well detailed, the possible links with indicators of other Goals. ISTAT then compiled, quantified and synthesized interlinkages into three levels of 'interlinkage strength' bonds:

Light bonds: indicators which have between 1 and 3 links

Medium bonds: those with 4-10 links

Strong bonds: those with more than 10 links

This work can be considered a best practice for countries in determining interlinkages, identifying data gaps and increasing the effectiveness of data and statistics.
Additional details from the ISTAT interlinkages project can be found in **Annex 5**.

How interlinkages can be practically applied

During the 2018 HLPF, it was noted that while the conceptualization of interlinkages is useful, it is only the first step in leveraging their efficiencies. Once interlinkages have been identified, it is necessary to use the information in the development of policies and assessment of impact of decisions, as well as in data exploration and collection to inform these processes. A better understanding of the trade-offs related to policy implementation should be acknowledged and examined. In the figure below an example is reported from the JRC-EC KnowSDGs Platform (Knowledge Base for the Sustainable Development Goals) (Miola, et al., 2018) project which identifies the main policy nodes by combining the results of the literature review on the identification of inter-linkages with the results of the classification of EU policies along the SDGs and its targets (European Commission, 2018). The network reported in this figure consists

of nodes based on interlinkages identified in the literature . Moreover, each single node includes the list of EU policies relevant for that specific target.

This basic exercise makes possible the visualizations of co-benefits (green) and tradeoffs (red) of the current policies, and further analysis on a case by case basis allows the identification of policies to exploit synergies, minimize tradeoffs and define policy coherence within the SDG framework.

Figure 7: Visualizing policy nodes – focus on Goal 6
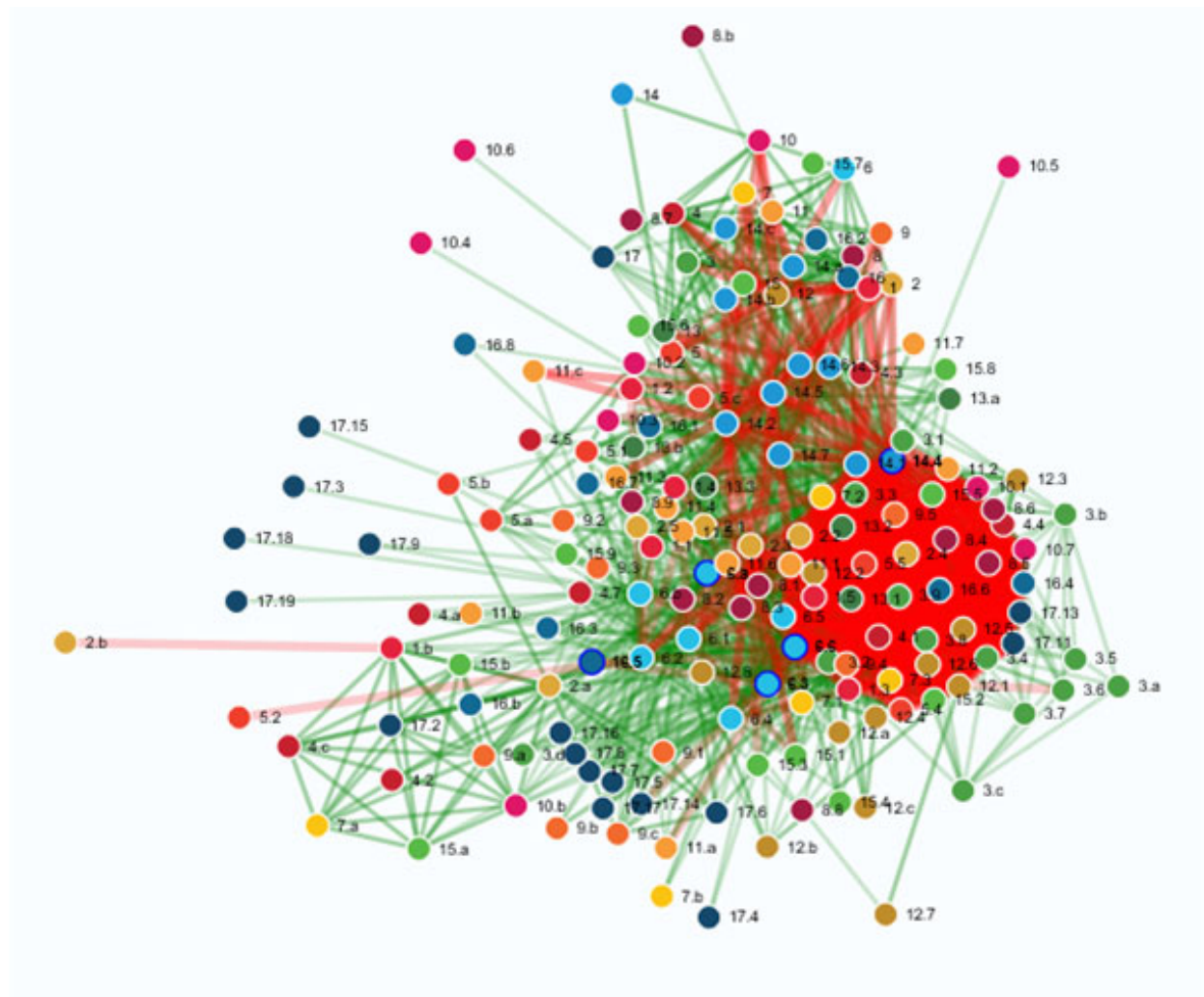
Figure Description: The European Commission is measuring and visualizing interlinkages of the Global Indicator Framework using their KnowSDGs platform. Developers used web-scraping technology to filter EU policy publications and mapped these against Agenda 2030 targets to identify "key policy nodes." The data visualization of these interlinkages (shown above for SDG 6) illustrates synergies between policies and the SDGs in green and trade-offs in red.

While the need for high quality, reliable, timely and disaggregated data is essential for the global indicator framework, there are complementary data decisions that can and should be used with

other data. Operationalization and formalizing of interlinkages will enable better implementation of coherent policy.

> *While data are critical for reporting and monitoring, for policy development to be successful, there is a requirement that policymakers and stakeholders from diverse domains come together to allow for a more efficient and broader aggregation of information from science and stakeholders. Moreover, recognizing that there can be significant impacts across domains from policy will necessitate adjusting governance structures to reduce or eliminate negative outcomes and understand the impact of trade-offs.* (HLPF, 2018)

Global consultations are crucial in ensuring the effectiveness and success of identified inter-linkages for prudent use of resources. The inter-linkages between the SDG Framework and analytical frameworks such as the System of National Accounts for economic statistics or the System of Environmental and Economic Accounts for economic and environmental statistics, and international organizations, namely the Joint Research Centre of the European Commission, who in its SDGs project examined inter-linkages and suggested 4 main approaches to establish inter-linkages.

The development of national policies as noted in the 2018 High Level Political Forum, and assessment of impact of decisions, as well as in data exploration and collection connect statistics in a coherent way to enable analyses with a common and term boundary.   In-depth review highlights the importance of the conceptualization of inter-linkages as useful, and also as the first step in leveraging their efficiencies.

Next Steps

Moving forward, the interlinkages group will continue its analysis and review of existing statistical frameworks, policy tools and mechanisms, and legislation, to determine how countries can most effectively identify and leverage SDG interlinkages. This work will include an in-depth review of the SEEA as a mechanism for leveraging efficiencies as it pertains to economic activities and the environment. Other frameworks, such as the DPSIR and Aichi, may supplement this work and provide further insights into how countries can best respond to the data and policy needs of the 2030 Agenda. Additionally, the group plans to undertake a review and analysis of how policymakers can leverage interlinkages to prioritize and target policies to those areas in which positive externalities are greatest. This will also provide direction to national statistical offices to specify areas in which measurement, monitoring and reporting that can best inform policies and people more generally.

Partnerships and collaboration will be another crucial element in states' ability to identify and leverage efficiencies from interlinkages. Policy departments and national statistical systems will need to work closely with stakeholders to ensure that the data and policies being developed are benefiting all, in an inclusive and sustainable manner. This will include analysis and review of national and international legislation to determine the extent to which these align with the ambitions of the SDGs, and where they might also be leveraged to enhance statistical reporting

for the 2030 Agenda. In conclusion, a systematic approach involving all key stakeholders is pertinent and wider consultation on the development of a robust framework on inter-linkages will take place.

Conclusion

The 2030 Agenda for Sustainable Development presents global opportunities for local, regional and international partnerships that have never before been explored. It also provides a globally agreed framework for sustainable development within which all countries can monitor, analyze, report and compare results in order to provide a universal snapshot of what we've collectively accomplished and what and where challenges still remain to be overcome. That being said, the framework is also incredibly ambitious, comprised of 169 targets and 232 unique indicators. When unpacked further (accounting for sub-indicators), the framework includes over 500 individual data series for which countries are requested to collect, analyze and disseminate statistics. Although many of these can be reported using official national statistics that are already being collected and disseminated, there are many indicators for which data has never before been collected. Although this presents a great opportunity for many national statistical systems and their partners to explore innovative new data sources and techniques, it also presents a significant challenge.

With the speed and volume of data being produced worldwide growing exponentially, the SDGs present a new opportunity to harness this valuable resource in a way that is inclusive and sustainable for all. With limited means, national statistical systems must identify ways in which scarce resources can be most effectively leveraged to meet growing demands. Work on interlinkages in the SDG framework is one way in which countries and organizations can identify areas where they may be able to take advantage of relationships between targets and indicators in a way that yields the most sustainable, inclusive outcomes from existing resources.

There are many ways that interlinkages can be interpreted, some of which have been highlighted in this document. Decision makers may examine interlinkages in a way that reflects broader thematic priorities of the organization or government they represent, or perhaps by means of implementation (CES framework). Another option is to determine commitments to existing standards and frameworks, in order to align statistical reporting and policy development in a way that is mutually beneficial. Examples of this approach include the Aichi Framework, the FDES, SNA and SEEA, and many others (Annex 3). It is also possible to take a more quantitative approach to the analysis of SDG interlinkages; determining whether the relationship between indicators is reinforcing or conflicting, by means of correlation analyses between all indicators with available time series data (IGES, Annex 2). Similarly, it is possible to build a "mapping" framework of indicators which quantifies the degree to which SDG targets are interlinked by identifying these relationships and organizing them within certain thresholds (ISTAT, Annex 5) to describe the continuum of those with the weakest connections and those with the strongest (based on the sum of the number of links and interactions between them).

Interlinkages provide an opportunity for national statistical systems to identify priorities for data exploration and statistical reporting, and policymakers the ability to target interventions to those

areas in which benefits are greatest. Although research on SDG interlinkages would benefit from a larger body of work and perspectives, existing literature like this report act as a starting point for improving statistical reporting on the SDG, and consequent evidence-based policy. Most importantly, interlinkage mapping provides a cadre that can be used to predict, plan and inform decision-making that is inclusive, sustainable, and that leaves no one behind.

Annex 1: Illustrative Example of interlinkages within the SDG framework (Goal 3)

Goal 3 and Targets	Interlinkage between Goals and targets and indicators within the current framework	Goal 3 Indicators	Interlinked indicators
GOAL 3: Ensure healthy lives and promote well-being for all at all ages	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a, 1.b 2 - 2.1, 2.2 4 - 4.1, 4.2, 4.3, 4.7 5 - 5.1, 5.2, 5.3, 5.6, 5.c 6 - 6.1, 6.2, 6.3, 6.4, 6.a, 6.b 7 - 7.1 8 - 8.1, 8.3, 8.5, 8.6, 8.7, 8.8 9 - 9.1, 9.c 10 - 10.1, 10.2, 10.3, 10.4, 10.7 11 - 11.1, 11.2, 11.3, 11.5, 11.6, 11.7, 11.b 12 - 12.4 13 - 13.1, 13.3 14 - 14.1, 14.2 16 - 16.1, 16.2, 16.3, 16.4, 16.6, 16.7, 16.9, 16.10, 16.a 17 - 17.13, 17.16, 17.18		
3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	1 - 1.1, 1.2, 1.3, 1.4, 1.a, 1.b 2 - 2.1, 2.2 4 - 4.1 5 - 5.1, 5.3, 5.6, 5.c 6 - 6.1, 6.2 8 - 8.1, 8.2, 8.5 8 - 8.6 10 - 10.1, 10.2, 10.4 11 - 11.1, 11.2, 11.5, 11.a 16 - 16.6, 16.7, 16.9, 16.10, 16.b 17 - 17.18 (policy)	3.1.1 Maternal mortality ratio	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2 4 - 4.1.1 5 - 5.1.1, 5.3.1, 5.6.1, 5.6.2, 5.c.1 6 - 6.1.1, 6.2.1 8 - 8.1.1, 8.2.1, 8.5.1, 8.5.2 8 - 8.6.1 10 - 10.1.1, 10.2.1, 10.4.1 11 - 11.1.1, 11.2.1, 11.5.1, 11.a.1

			16 - 16.6.1, 16.6.2, 16.7.2, 16.9.1, 16.b.1 (women and girls) 17 - 17.18.2
	1 - 1.1, 1.2, 1.3, 1.4, 1.a 4 - 4.3, 4.4, 4.5, 4.6 5 - 5.1, 5.6, 5.a, 5.c 8 - 8.5 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1, 11.2 16 - 16.9	3.1.2 Proportion of births attended by skilled health personnel	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 4 - 4.3.1, 4.4.1, 4.5.1, 4.6.1 5 - 5.1.1, 5.6.1, 5.6.2, 5.a.2, 5.c.1 8 - 8.5.1 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 16 - 16.9.1
3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a 2 - 2.1, 2.2 4 - 4.1.4.2 5 - 5.1, 5.2 (gender-specific) 6 - 6.1, 6.2 7 - 7.1, 7.2 8 - 8.1, 8.5 9 - 9.1 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1 16 - 16.9	3.2.1 Under-five mortality rate	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2, 2.2.1, 2.2.2 4 - 4.1.1, 4.2.1, 4.2.2 5 - 5.1.1, 5.2.2 6 - 6.1.1, 6.2.1 7 - 7.1.1, 7.2.1 8 - 8.1.1, 8.5.1 9 - 9.1.1 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 11 - 11.1.1 16 - 16.9.1
	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a 2 - 2.1, 2.2 4 - 4.1.4.2 5 - 5.1, 5.2, 5.5, 5.6, 5.a 6 - 6.1, 6.2 7 - 7.1 8 - 8.1, 8.5 9 - 9.1 10 - 10.1, 10.2, 10.3, 10.4	3.2.2 Neonatal mortality rate	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2, 2.2.1, 2.2.2 4 - 4.1.1, 4.2.1, 4.2.2 5 - 5.1.1, 5.2.2, 6 - 6.1.1, 6.2.1 7 - 7.1.1 8 - 8.1.1, 8.5.1 9 - 9.1.1 10 - 10.1.1, 10.2.1,

	11 - 11.1 16 - 16.9		10.3.1, 10.4.1 11 - 11.1.1 16 - 16.9.1
3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a, 1.b 2 - 2.1, 2.2 4 - 4.1.4.2, 4.7 5 - 5.1, 5.2, 5.3, 5.6 6 - 6.1, 6.2 7 - 7.1 8 - 8.1, 8.5 9 - 9.1 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1 16 - 16.9 17 - 17.6	3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations 3.3.2 Tuberculosis incidence per 100,000 population 3.3.3 Malaria incidence per 1,000 population 3.3.4 Hepatitis B incidence per 100,000 population 3.3.5 Number of people requiring interventions against neglected tropical diseases	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2, 2.2.1, 2.2.2 4 - 4.1.1, 4.2.1, 4.2.2 5 - 5.1.1, 5.2.2 6 - 6.1.1, 6.2.1 7 - 7.1.1 8 - 8.1.1, 8.5.1 9 - 9.1.1 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 11 - 11.1.1 16 - 16.9.1
3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a 2 - 2.1, 2.2 4 - 4.1, 4.3, 4.4, 4.7 5 - 5.1, 5.2, 5.3, 5.a, 5.b, 5.c 6 - 6.1 8 - 8.5 9 - 9.1 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1, 11.6 12 - 12.a 13 - 13.1, 13.3, 13.b 16 - 16.1, 16.2, 16.3, 16.7, 16.9, 16.10, 16.b	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.2.1, 2.2.2 4 - 4.1.1, 4.3.1, 4.4.1 6 - 6.1.1 8 - 8.5.1, 8.5.2 11 - 11.1.1, 11.6.2 12 - 12.a.1
		3.4.2 Suicide mortality rate	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 5 - 5.1.1, 5.2.1, 5.2.2, 5.3.1, 5.3.2, 5.a.2, 5.b.1, 5.c.1 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 16 - 16.1.3, 16.1.4,

			16.2.1, 16.2.2, 16.2.3, 16.3.1, 16.3.2, 16.7.2, 16.9.1, 16.10.2, 16.b.1
3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a 4 - 4.7 8 - 8.5 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1 16 - 16.1, 16.2, 16.4	3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2 8 - 8.5.1 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 11 - 11.1.1 16 - 16.1.3, 16.2.2, 16.4.1
3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	9 - 9.1 11 - 11.2	3.6.1 Death rate due to road traffic injuries	9- 9.1.1 11 - 11.2.1
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a, 1.b 2 - 2.1 4 - 4.1, 4.3, 4.6 5 - 5.1, 5.3, 5.4, 5.6, 5.a, 5.b, 5.c 6 - 6.1, 6.2 7 - 7.1 8 - 8.5 10 - 10.1 11 - 11.1 16 - 16.9 17 - 17.18	3.7.1 Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2 4 - 4.1.1, 4.6.1 5 - 5.1.1, 5.3.2, 5.4.1, 5.6.1, 5.6.2, 5.a.2, 5.b.1, 5.c.1 6 - 6.1.1, 6.2.1 7 - 7.1.1 8 - 8.5.1, 8.5.2 10 - 10.1.1 11 - 11.1.1 16 - 16.9.1
		3.7.2 Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2 4 - 4.1.1, 4.6.1 5 - 5.1.1, 5.3.2, 5.4.1, 5.6.1, 5.6.2, 5.a.2, 5.b.1, 5.c.1 6 - 6.1.1, 6.2.1 7 - 7.1.1 8 - 8.5.1, 8.5.2 10 - 10.1.1 11 - 11.1.1 16 - 16.9.1 17 - 17.18.1, 17.18.2

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a, 1.b 2 - 2.1 4 - 4.1, 4.3, 4.6 5 - 5.1, 5.3, 5.4, 5.6, 5.a, 5.b, 5.c (women's health) 6 - 6.1, 6.2 7 - 7.1 8 - 8.1, 8.2, 8.5 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1 16 - 16.9 17 - 17.1, 17.18	3.8.1 Coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population)	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2, 1.b.1 2 - 2.1.1, 2.1.2 4 - 4.1.1, 4.6.1 5 - 5.1.1, 5.3.2, 5.4.1, 5.6.1, 5.6.2, 5.a.2, 5.b.1, 5.c.1 6 - 6.1.1, 6.2.1 7 - 7.1.1 8 - 8.5.1, 8.5.2 10 - 10.1.1 11 - 11.1.1 16 - 16.9.1 17 - 17.18.1, 17.18.2
		3.8.2 Proportion of population with large household expenditures on health as a share of total household expenditure or income	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2 8 - 8.1.1, 8.2.1, 8.5.1, 8.5.2 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 11 - 11.1.1 17 - 17.1.1, 17.1.2
3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.a 6 - 6.1, 6.2, 6.3 10 - 10.1, 10.2, 10.3, 10.4 11 - 11.1, 11.6 12 - 12.4 14 - 14.1 15 - 15.3	3.9.1 Mortality rate attributed to household and ambient air pollution	11.6.2
		3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2 6 - 6.1.1, 6.2.1 10 - 10.1.1, 10.2.1, 10.3.1, 10.4.1 11 - 11.1.1
		3.9.3 Mortality rate attributed to unintentional poisoning	6 - 6.3.1, 6.3.212 - 12.4.1, 12.4.2

3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate		3.a.1 Age-standardized prevalence of current tobacco use among persons aged 15 years and older	
3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all	1 - 1.1, 1.2, 1.3 1.4, 1.5, 1.a 6 - 6.2 9 - 9.5 10 - 10.a 11 - 11.1 16 - 16.6 17 - 17.8	3.b.1 Proportion of the target population covered by all vaccines included in their national programme	1 - 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.4.1, 1.a.1, 1.a.2 6 - 6.2.1 11 - 11.1.1
		3.b.2 Total net official development assistance to medical research and basic health sectors	
		3.b.3 Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis	
3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States	10 - 10.4 8 - 8.6 11 - 11.1	3.c.1 Health worker density and distribution	11.1.1
3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	1 - 1.5 11 - 11.b 13 - 13.1, 13.3	3.d.1 International Health Regulations (IHR) capacity and health emergency preparedness	11 - 11.b.1, 11.b.2 13 - 13.3.1, 13.3.2

Legend:
Red indicates indirect interlinkage
Blue indicates keyword match between targets, this is previous work undertaken on SDG target text analysis

Annex 2: IGES SDG interlinkages Analysis and Visualization tool (V2.0)

SDG interlinkages Analysis and Visualization tool - Institute for Global Environmental Strategies **IGES https://sdghub.com/project/sdgs-interlinkages-and-data-visualization/**

This interactive and innovative resource, compiled by the Institute for Global Environmental Strategies, enables the exploration and visualization of linkages between different SDG targets for nine Asian countries including Japan, China, India and Republic of Korea. Users can select a particular SDG targets and explore how each target interacts with those for other goals in particular geographies. It also presents time series data running from 2001 to 2014. While predominantly designed to aid governments in policy making, this tool also has useful implications for businesses that are looking to identify how their interactions with certain goals stand to impact upon the wider SDG network of goals targets. This tool also allows users to compare indicator-specific data and target-specific interlinkages among countries.

Annex 3: Other statistical indicator frameworks that may be interlinked to SDGs

There are numerous statistical indicator frameworks that may be interlinked to the Global Indicator Framework for the Sustainable Development Goals. Many of the frameworks are thematic, while some are regional and others are national. It is likely impossible to elaborate all of the interlinkages across these frameworks, however it is important to note that these interlinkages exist. Here we provide only a few examples of indicators and frameworks that may be interlinked with the Global Indicator Framework and may be useful in the wider measurement of progress towards Sustainable Development.

Indicator Frameworks

Aichi Biodiversity Targets [4]

Global City Indicators Facility (GCIF)

Community Foundations Vital Signs Indicators (Canada & worldwide),

Human Development Index

Genuine Progress Index,

Canadian Index of Well Being

IPCC Climate Change Indicators

Ecological Footprint (Global Footprint Network)

System of Environmental-Economic Accounting (SEEA)

WHO monitoring framework for action on the social determinants of health (SDH)

UNESCO – Thematic indicator frameworks for education

The Gender-related Development Index and Gender Empowerment Measure

World Economic Forum's Gender Gap Index (GGI)

The Africa Gender and Development Index (AGDI)

The African Women's Progress Scoreboard (AWPS)

UN Habitat – City prosperity Initiative

Canadian Environmental Sustainability Indicators (CESI)

Pan-Canadian Education Indicators (Canada)

European Union Sustainable Development indicators (EU)

World Development Indicators (World Bank)

OECD – Water and Energy Nexus

Pan Canadian Public Health Network – Indicators of Health Inequalities

Federation of Canadian Municipalities – Quality of life reporting System

OECD Better Life Initiative Compendium of OECD well-being indicators

WHO – Indicator framework for the Global Strategy for Women's and Children's and Adolecents' health

Energy Indicators for Sustainable Development (EISD) International Atomic Energy Agency

Energy Efficiency Indicators (EEI) – International Energy Agency

Sendai Framework for Disaster Risk Reduction

UNECE Climate change-related statistics

Annex 4: Examples of using the CES framework in the context of SDGs

Identifying targets related to a specific theme and identifying interlinkages – based on examples of the theme of Health and Saftety.

Theme 4 "Health" from the CES framework corresponds with SDG 3 "Good health and well-being". Twelve out of the thirteen targets from Goal 3 map to the CES theme Health. In addition, health issues are also addressed in Goals 1 *""No poverty"*, 5 *"Gender equality"*, 6 *"Clean water and sanitation"*, 10 *"Reduced inequalities"*, 12 *"Responsible consumption and production"* and 15 *"Life on land"*. The mapping table in Annex II identifies in total 24 targets related to health, many of which would not be immediately visible without the thematic structure in the CES framework. These targets are listed in the table below. The part of the text that is related to health is underlined and the link to health explained in column 3.

Identifying interlinkages between the SDG targets through the CES framework can provide input to the working group on interlinkages, set up under IAEG-SDG. The interlinkages show how the different goals and targets are related. This helps understanding the impact of a variable (or of a policy) on all the targets it relates to.

Table 1: **Interlinkages between SDG targets related to the CES Theme *4 Health***

Goal	**Target** (the health related aspects are underlined in the text)	**Link to health**	**Match** (**X** – primary, Δ - secondary)
1	1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in <u>poverty in all its dimensions</u> according to national definitions.	Health dimension of poverty	Δ
1	1.3 Implement nationally appropriate <u>social protection systems</u> and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable.	Health related social protection	Δ
1	1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as <u>access to basic services</u>, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.	Access to health services	Δ

Goal	Target (the health related aspects are underlined in the text)	Link to health	Match (X – primary, Δ - secondary)
1	1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions.	Health dimension of poverty	Δ
3	☐ 12 out of 13 targets (all except 3.6)		
5	5.1 End all forms of discrimination against all women and girls everywhere.	Discrimination in health (e.g. access to health services, maternal health, etc.)	Δ
5	5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences.	Access to sexual and reproductive health	x
6	6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.	Access to sanitation and hygiene as a health precondition	Δ
6	6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.	Access to freshwater as a health precondition	Δ

Goal	Target (the health related aspects are underlined in the text)	Link to health	Match (X – primary, Δ - secondary)
10	10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard.	Inequalities in health	Δ
10	10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality.	Health related social protection and inequality	Δ
12	12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.	Impact of pollution on human health	x
15	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.	Ecosystem services for health	Δ

Another example is CES theme 9 Safety which is not a goal *per se* in the 2030 Agenda. However, this topic is addressed by several targets under different SDGs. These targets can be found under goals 1 *"No poverty"*, 3 *"Good health and well-being"*, 5 *"Gender equality "*, 11 *"Sustainable cities and communities"* and 16 *"Peace, justice and strong institutions"*. In total twenty SDG targets are mapped with the CES theme 9 *"Safety"*.

Table 2: **Inter-linkages between SDG targets related to the CES Theme *9. Safety***

Goal	Target and description	Link to safety	Match (X – primary, Δ - secondary)
1	1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.	Exposure to extreme events	x
3	3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents.	Road traffic accidents.	x
3	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	Deaths and illnesses from pollution (air,water,soil)	Δ
3	3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.	Risk reduction and management of health risks.	Δ
4	4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all.	Safe learning environments	Δ
5	5.1 End all forms of discrimination against all women and girls everywhere.	Safety of women and girls	Δ

5	5.2 Eliminate <u>all forms of violence</u> against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.	Eliminate violence against women and girls	**x**
5	5.3 Eliminate all <u>harmful practices</u>, such as child, early and forced marriage and female genital mutilation.	Eliminate all harmful practices for women	**x**
6	6.2 By 2030, achieve <u>access to adequate and equitable sanitation and hygiene</u> for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.	Access to sanitation and hygiene	Δ
8	8.7 Take immediate and effective measures to <u>eradicate forced labour</u>, end modern <u>slavery</u> and <u>human trafficking</u> and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms.	Forced labour, slavery and human trafficking	Δ
10	10.3 Ensure equal opportunity and reduce <u>inequalities of outcome</u>, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard.	Inequalities in safety	Δ
10	10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve <u>greater equality</u>.	Equality in safety	Δ
11	11.2 By 2030, provide access to <u>safe</u>, affordable, accessible and sustainable <u>transport systems</u> for all, improving <u>road safety</u>, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.	Safe transport systems, road safety	**x**
11	11.5 By 2030, significantly reduce the <u>number of deaths and the number of people affected</u> and substantially decrease the direct economic losses relative to global gross domestic <u>product caused by</u>	People affected by disasters	**x**

	disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.		
11	11.7 By 2030, provide universal access to <u>safe</u>, inclusive and accessible, green and <u>public spaces</u>, in particular for women and children, older persons and persons with disabilities.	Safe public spaces.	Δ
16	16.1 Significantly reduce <u>all forms of violence and related death rates</u> everywhere.	Violence and related death rates	x
16	16.2 End abuse, exploitations, trafficking and <u>all forms of violence</u> against and torture of children.	End violence against children	x
16	16.3 Promote the <u>rule of law</u> at the national and international levels and ensure equal access to justice for all	Rule of law	x
16	16.4 By 2030, significantly reduce <u>illicit</u> financial and <u>arms flows</u>, strengthen the recovery and return of stolen assets and combat all forms of <u>organized crime</u>.	Illicit arms flows, organized crime	x
16	16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to <u>prevent violence and combat terrorism and crime</u>.	Prevent violence, combat terrorism and crime	x

Annex 5: Best practices – ISTAT

THE MAPPING OF THE SDGS: WORKING HYPOTHESES BY ISTAT

1.1 Why it is important to analyze the links between objectives, sub-objectives and indicators

The activities of constructing a statistical information platform useful for monitoring the Sustainable Development Goals cannot be separated from the essential reference of the indicators defined by the UN-IAEG-SDGs: currently over than 230 indicators, and further indicators will be added on the occasion of the revision planned for 2020.

To face the need to jointly meet both international and national demand, with particular attention to territorial and gender disaggregation, 235 statistical national measures have been made available by ISTAT in the national statistical platform implemented related to 117 UN-IAEG-SDGs indicators.

The information required by the UN requires a considerable effort in terms of production of statistical information and analysis, due also to the complex interconnections between social and economic development and environmental issues. It is a challenge, but also an opportunity for the National Statistical System and for the users of statistical information, which makes concrete the principle "Better statistics for better life".

The complexity is inherent in the conceptual development that led to the definition of the SDGs and to the current development of the statistical frameworks of reference. To tackle the analysis of this complex information platform, the links and interactions between objectives (Goal) and targets should be considered to build a possible "mapping" framework of indicators.

Understanding and explaining the links helps to identify the critical points and the crucial elements of sustainable development, in the perspective of three main aims.

The first aim is to make complex statistical information more usable, so that it becomes a shared asset to support national policies, including the integrated analysis of social, economic and environmental dimensions and their interrelation.

The second is to facilitate the production of statistical information, aimed at filling information gaps, in identifying the right proxies or the most appropriate specific national indicators. The analysis of interrelations can help to identify critical dimensions and make explicit the philosophy underlying the statistical measures to be developed. This can facilitate the identification of proxy indicators, as it allows to focus on the fundamental dimensions of each target, trying to make the most of the statistical information available. The aim is to make the indicators more comprehensible and thus help the development of the activities that must lead to the implementation of missing indicators.

The third objective, no less important, proposes the use of links (interlinkages) identified to facilitate the use of statistical measures and the monitoring, even crossed, of the objectives of sustainable development. The integrated statistical systems, such as the current ISTAT statistical

platform, and the study of the interactions between the different domains of the SDGs can support monitoring and choices on the synergistic actions to be developed, the definition of priorities, the identification of the relevant dimensions to be monitored.

In this section, some analyses launched to explore the nature of the interlinkages between the Goals, will be described, as examples. The results presented refer to statistical measures, used as a tool to identify these interactions and use different visualization techniques to take account of the different purposes.

1.2 The network of SDGs: United Nations IAEG-SDG metadata

To facilitate statistical production at global, national and regional level and monitoring objectives, it is appropriate to identify interlinkages in statistical measures that are useful for monitoring.

The following analysis considers the information contained in the metadata of UN-IAEG SDGs, which define, where present and well detailed, the possible links with indicators of other Goals. Specifically, for each of the indicators that have metadata, the other indicators with which there are interrelations are indicated. These links were considered in matrices and visualized using graphs.
It is necessary to state that for some indicators metadata are not yet present (because they are TIER III[5] indicators) or they are not adequately structured (because metadata is also evolving). The links defined between the indicators explain the interactions between the objectives; the 2030 Agenda can therefore be represented as a network in which some thematic areas are well connected to each other, and often they are also "exhaustive and mature" in terms of structured statistical information (many Tier I indicators). In other cases, the statistical indicators identified are still being defined and the connections with the overall system are weaker.

The synthetic representations of the relations between the goals are made through the sum of the number of links indicated, without taking into account, in this first analysis, the direction of the same. Based on this approach, the graphs related to light bonds (from 1 to 3 links), medium bonds (from 4 to 10) and strong bonds (more than 10) were highlighted.

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[5] The indicators were classified by UN-IAEG-SDGs according to three levels (Tier I, II and III). At the first level belong all the indicators with consolidated methodology and standards, and regularly produced by the Countries; in the second level there are indicators that, despite having consolidated methodology and standards, are not regularly produced; the third are indicators for which a shared methodology and standards are not available.

Figure 1.1 - Statistical indicators to monitor the SDGs by type of bonds - Light bonds
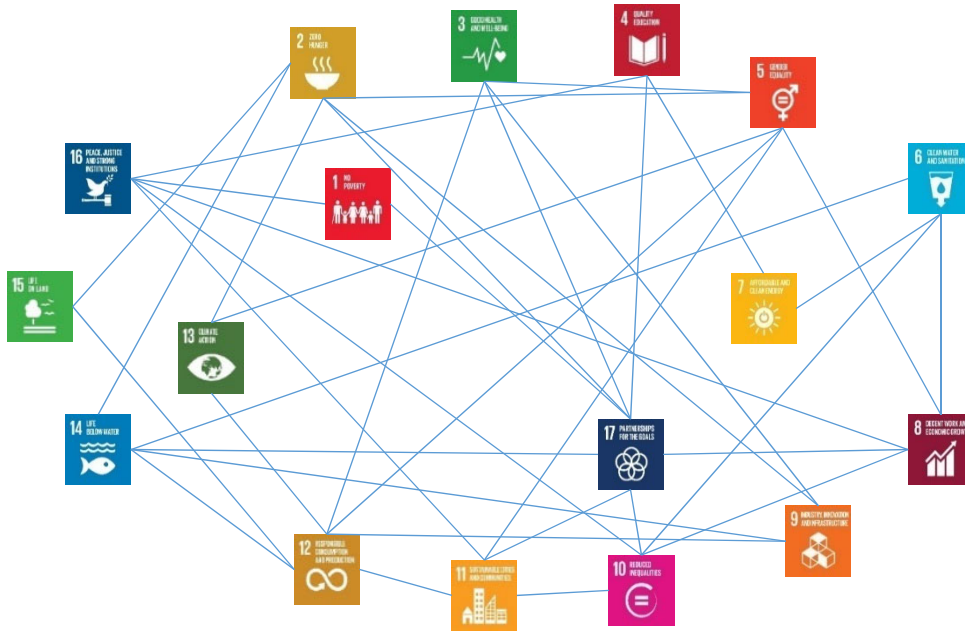

Figure 1.2 Statistical indicators to monitor the SDGs by type of bonds - Medium bonds.
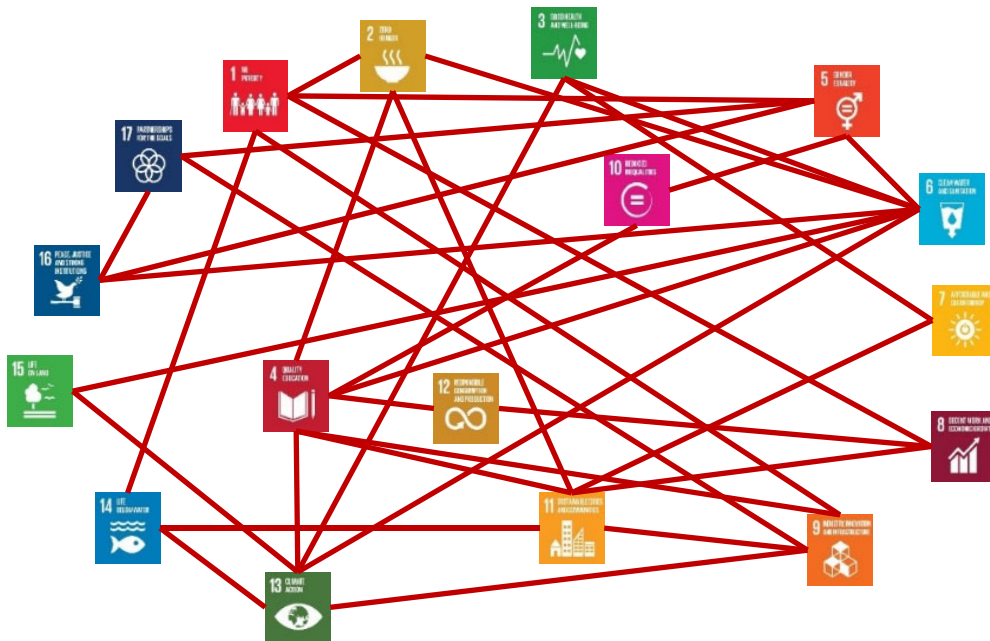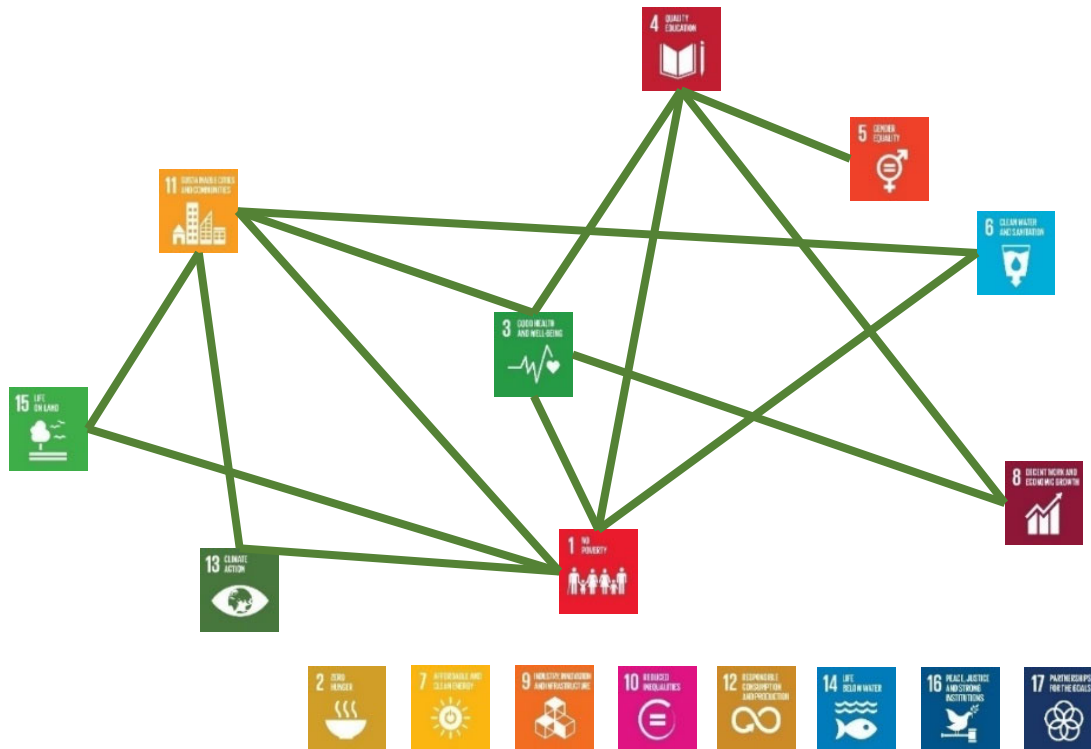
Figure 1.3 Statistical indicators for monitoring the SDGs by type of links - Strong bonds

The analysis shows that the network based on UN metadata is connected and inclusive, leaving no development goal excluded. In fact, there are no isolated nodes that cannot be reached through the paths that can be developed. The only objective that has a link with all the others (16 links) is the Goal 11 related to the cities, which are crucial for the sustainable development of the planet. Widely connected and central in the network, it results, with 14 links, goal 4, (Quality education), followed by 13 links from goals 1 (zero poverty), 5 (gender equality) and 6 (clean water).

The analysis by intensity (strong, medium, light) of the reports shows how, while for the medium and light bonds, the network of objectives concerns all 17 objectives, the strong links exclude eight goals. From the analysis it is possible to highlight, for example, how quality education (goal 4) has strong positive links with health and wellbeing (goal 3), with gender equality (goal 5), with 'obtaining decent work and economic growth' (goal 8) and poverty reduction (goal 1).

1.3 The network of SDGs: the National Strategy for Sustainable Development for the Planet

Another type of analysis considers the possibility of navigating among goals and their interconnections by analyzing the strategic objectives indicated by the Italian National Strategy for Sustainable Development, defined by the Ministry for the Environment and Protection of the Territory and the Sea.
This was structured in the five areas indicated by UN: People, Planet, Prosperity, Peace and Partnership. Each area consists of a system of strategic choices set out in national strategic

objectives, specific to the Italian reality, which links each national strategic objective with the targets of the 2030 Agenda objectives.

For example, the network of interconnections created for the Planet area is reported, borrowing the three "strategic choices" defined by the strategy: I - Stop the loss of biodiversity, II - Ensure sustainable management of natural resources, III - Creating resilient communities and territories, preserving landscapes and cultural heritage.

Figure 1.4 Statistical indicators to monitor the SDGs The interrelation of strategic choices in the National Strategy Planet area
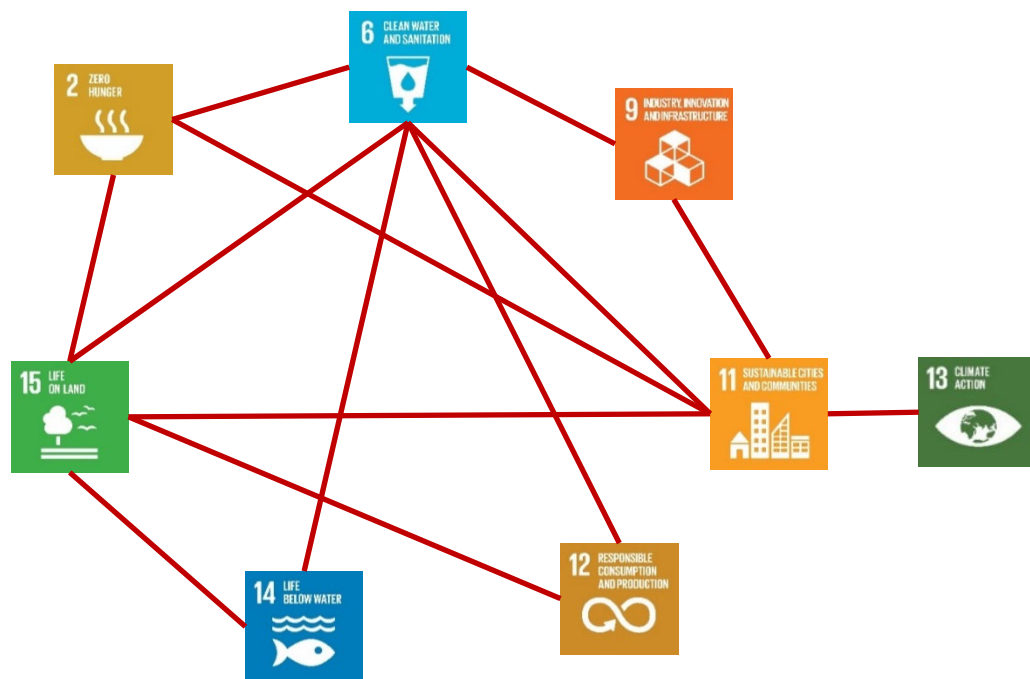
1.4 The network of SDGs: statistical sources

Another approach to connect the SDGs indicators, aimed above all to the progressive implementation of the statistical platform, is that relating to common sources. In this case, the paths that could be chosen are significant, because they explain the potentialities connected to the development of integrated analyzes starting from the same source of data.

Three surveys carried out by ISTAT produce many of the indicators present in the Italian SDGs system. The Eu-Silc survey provides 14 indicators, which cover 6 SDG indicators divided into 4 goals. The work force survey makes it possible to produce 13 indicators, which cover 8 SDGs

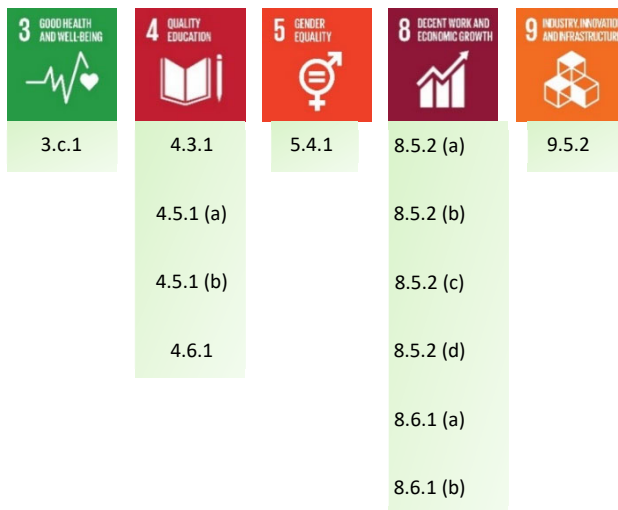indicators divided into 5 goals. Finally, the survey on the aspects of daily life provides the largest number of indicators (19), which cover 14 SDGs indicators distinguished in 10 goals.

Figure 1.5 Statistical Indicators to monitor the SDGs by source type

1 NO POVERTY	7 AFFORDABLE AND CLEAN ENERGY	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES
1.2.2 (a)	7.1.2	10.1.1 (a)	11.1.1 (a)
1.2.2 (b)		10.1.1 (b)	11.1.1 (b)
1.2.2 (c)		10.1.1 (c)	11.1.1 (c)
1.2.2 (d)		10.2.1	
1.4.1 (a)			
1.4.1 (b)			
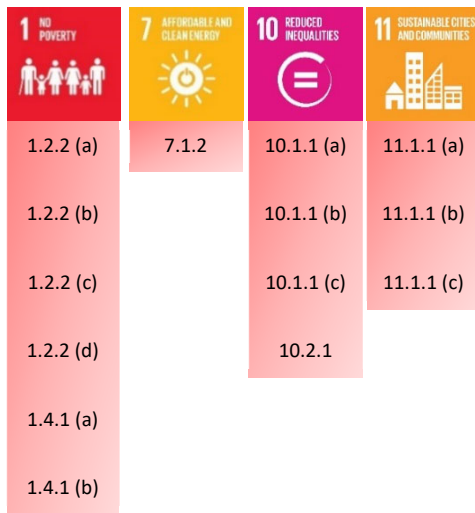
Source: EU-SILC

Figure 1.6 SDGs Statistical Indicators by type of source – Labour force survey

3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
3.c.1	4.3.1	5.4.1	8.5.2 (a)	9.5.2
	4.5.1 (a)		8.5.2 (b)	
	4.5.1 (b)		8.5.2 (c)	
	4.6.1		8.5.2 (d)	
			8.6.1 (a)	
			8.6.1 (b)	

Source: Labour Force Survey, ISTAT

Figure 1.7 SDGs Statistical indicators by type of source - Aspects of everyday life

2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	11 SUSTAINABLE CITIES AND COMMUNITIES	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS
2.2.2 (a)	3.4.1	4.4.1	5.b.1	6.1.1 (a)	7.1.1	9.c.1	11.2.1	16.6.2 (a)	17.6.2
2.2.2 (b)	3.5.2	4.5.1		6.1.1 (b)				16.6.2 (b)	17.8.1
2.2.2 (c)	3.a.1							16.6.2 (c)	

Source: AVQ Aspetti della vita quotidiana, ISTAT

Looking ahead, it will be important to consider this approach by sources, in order to further develop the synergies and routes already active in the National Statistical System, such as, for example, environmental statistical information and that related to climate change.

1.5 Future analyses

To better explain the interconnections among Goals, Targets and indicators, can have, as mentioned, a triple purpose:

• facilitate understanding of the dimensions and complexity of sustainable development, thus sharing its philosophy;
• make best use of the statistical information available by exploiting the interconnections to ensure the greatest possible coverage of all Targets of the Goals;
• facilitate the choices related to competing strategies.

The possibility of identifying interconnections and interactions between objectives seems particularly useful.
The activities planned by ISTAT provide for a further development of this type of analysis, to take into account the evolutions in terms of available metadata on the interdependence of specific thematic paths (for example: work, food, climate, natural resources, energy) and considering deeper analyses on specific paths.

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