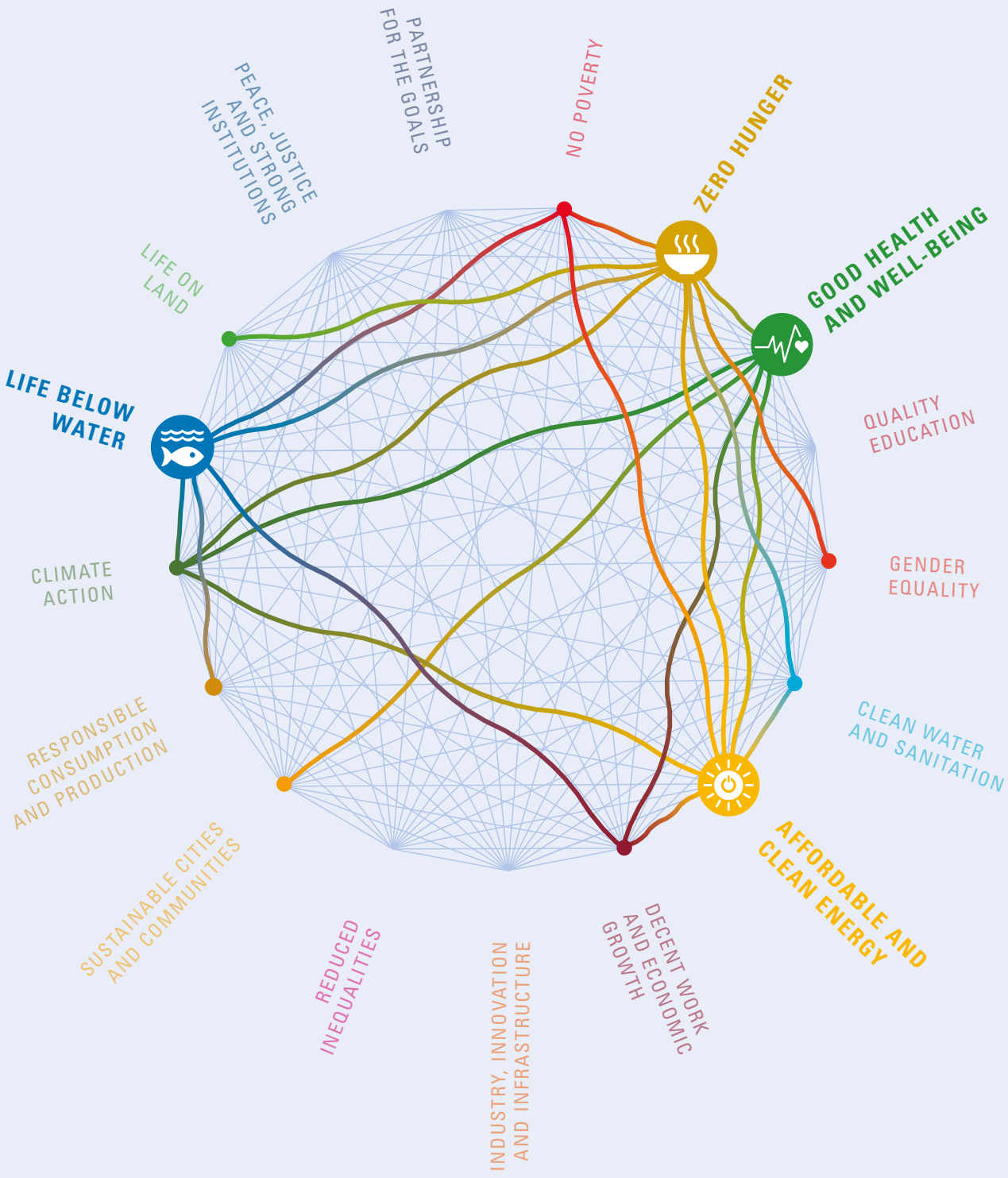
NO POVERTY
ZERO HUNGER
GOOD HEALTH AND WELL-BEING
QUALITY EDUCATION
GENDER EQUALITY
CLEAN WATER AND SANITATION
AFFORDABLE AND CLEAN ENERGY
DECENT WORK AND ECONOMIC GROWTH
INDUSTRY, INNOVATION AND INFRASTRUCTURE
REDUCED INEQUALITIES
SUSTAINABLE CITIES AND COMMUNITIES
RESPONSIBLE CONSUMPTION AND PRODUCTION
CLIMATE ACTION
LIFE BELOW WATER
LIFE ON LAND
PEACE, JUSTICE AND STRONG INSTITUTIONS
PARTNERSHIP FOR THE GOALS

EXECUTIVE SUMMARY

The United Nations' *2030 Agenda for Sustainable Development* was adopted in September 2015. It is underpinned by 17 Sustainable Development Goals (SDGs) and 169 targets. National policy-makers now face the challenge of implementing this indivisible agenda and achieving progress across the economic, social and environmental dimensions of sustainable development worldwide. As the process moves towards implementation, there is a need to address the scope and systemic nature of the 2030 Agenda and the urgency of the challenges. This requires a wide range of tools and science-based analysis to navigate that complexity and to realise the ambition.

This report explores the nature of interlinkages between the SDGs. It is based on the premise that a science-informed analysis of interactions across SDG domains – which is currently lacking – can support more coherent and effective decision-making, and better facilitate follow-up and monitoring of progress. Understanding possible trade-offs as well as synergistic relations between the different SDGs is crucial for achieving long-lasting sustainable development outcomes. A key objective of the scoring approach described here is to stimulate more science-policy dialogue on the importance of interactions, to provide a starting point for policy-makers and other stakeholders to set their priorities and implementation strategies, and to engage the policy community in further knowledge developments in this field.

UNDERLYING PRINCIPLES

All SDGs interact with one another – by design they are an integrated set of global priorities and objectives that are fundamentally interdependent.

Understanding the range of positive and negative interactions among SDGs is key to unlocking their full potential at any scale, as well as to ensuring that progress made in some areas is not made at the expense of progress in others. The nature, strengths and potential impact of these interactions are largely context-specific and depend on the policy options and strategies chosen to pursue them. SDG16 (good governance) and SDG17 (means of implementation) are key to turning the potential for synergies into reality, although they are not always specifically highlighted as such throughout the report. For many if not all goals, having in place effective governance systems, institutions, partnerships, and intellectual and financial resources is key to an effective, efficient and coherent approach to implementation.

Policymakers, practitioners and scientists working at the global, regional, national and local levels on implementing or supporting the implementation of the SDGs are the intended audience for this report.

KEY FINDINGS

- The four SDGs analysed in detail in this report (SDG 2, SDG 3, SDG 7, SDG 14) are mostly synergistic with the other SDGs.

- Using a 7-point scale, a team of scientists evaluated the key target-level interactions between an 'entry goal' and all other goals, and attributed a score to these interactions based on their expert judgment and as justified through the scientific literature. The score most often allocated is +2 ('reinforcing').

- The assessment identified 316 target-level interactions overall, of which 238 are positive, 66 are negative, and 12 are neutral.

- This analysis found no fundamental incompatibilities between goals (i.e. where one target as defined in the 2030 Agenda would make it impossible to achieve another). However, it did identify a set of potential constraints and conditionalities that require coordinated policy interventions to shelter the most vulnerable groups, promote equitable access to services and development opportunities, and manage competing demands over natural resources to support economic and social development within environmental limits.

- The process of systematically identifying and scoring interactions across the 17 SDGs using a common terminology is very valuable. It allows broad multi-disciplinary and multi-sectoral conversations, makes it possible to synthesise knowledge and to scope knowledge needs, and provides rational and concrete focal points (clusters of targets that need to be addressed together) for an integrated approach to implementation and monitoring.

- This approach provides a basis for a science-policy dialogue on translating integrated science for the achievement of the SDGs. As a tool for policy coherence, it provides an understanding of the conflicts and synergies to be managed across government departments and sectors, understanding where the emphasis should be put for efficient and effective action, and identifies who needs to be brought to the table to achieve collective impacts across multiple interacting policy domains.

- There is clearly no one-size-fits-all approach to understanding target interactions, and building on this work will require a commitment to continuous iteration and improvement.

SCIENCE-INFORMED ANALYSIS OF THE SUSTAINABLE DEVELOPMENT GOALS AND THEIR INTERACTIONS

ASSESSMENT FRAMEWORK

The framework on which this work is based identifies causal and functional relations underlying progress or achievement of the sustainable development goals and targets: positive interactions are assigned scores of +1 ('enabling'), +2 ('reinforcing') or +3 ('indivisible'), while interactions characterised by trade-offs are scored with -1 ('constraining'), -2 ('counteracting'), or -3 ('cancelling'); neutral interactions between SDGs are assigned 0. By systematically assessing the interactions and relationships between goals and targets, this report supports horizontal coherence across sectors.

The framework informs, but is not in itself a priority setting exercise nor is it a comprehensive mapping of all potential interactions. It can be applied at multiple scales (international, national, sub-national) through a thematic or geographic entry, and the analysis is based on existing literature and expert judgment.

SCORING EXAMPLE: EFFECTS OF CLEAN ENERGY ON AIR QUALITY AND HEALTH

Sustainable energy that is carbon-free is largely also pollution-free. This means that, in most cases, efforts to increase energy access (target 7.1), expand the share of renewables in the energy mix (target 7.2), and promote energy efficiency (target 7.3) will lead to a simultaneous reduction in air pollutant emissions. As a consequence, interaction between the SDG7 targets and target 3.9 (reducing air pollution) is considered reinforcing and so is allocated a score of +2. Nevertheless, achieving SDG7 may not in itself be enough to meet the air quality targets of SDG3: additional pollution control technologies and measures may be required.

FIRST APPLICATION

Key interactions for Food/Agriculture (SDG2), Health (SDG3), Energy (SDG7) and Oceans (SDG14) are tested using the scoring frame-work. This selection represents a mixture of key goals aimed at human well-being, ecosystem services and natural resources – it does not imply any prioritisation. This selection also covers a range of development and environmental priorities, including three goals under review at the 2017 High-Level Political Forum (SDG2, SDG3, SDG14). Each of these goals exhibits both positive and negative target-level interactions with the other SDGs.

In attempting to combine expert judgment, the seeking of new evidence in the scientific literature and extensive deliberations about the character of different interactions, it soon became clear that despite starting from similar understanding about interactions and the main conceptual underpinnings of the framework, the different

teams quickly developed different interpretations of how to apply the framework and score the interactions. This poses a challenge in terms of replicating the study.

Nevertheless, a strength of the approach was that it generated a highly iterative process for deepening the understanding of target interactions. Each team had valuable debates about the terms of the scale and several revisions were made to scores in different chapters over the course of the work. In fact, in many respects it could be argued that the process of deciding on the score was possibly more valuable than the final result, since it required a detailed study of the literature, a consideration of the issues and potential context dependencies, a review of limitations and gaps in current knowledge, and discussion with others. To this extent, the assessment becomes a vehicle for triggering the conversation, interpretation and learning process.

SDG 2: END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

Together with ending poverty, eradicating hunger around the world is central to the 2030 Agenda. SDG2 frames this in the context of eradicating malnutrition through increasing agricultural production sustainably. SDG2 in itself is a compelling case for recognising and managing interdependencies: achieving food and nutrition security, and increasing agricultural production and income for farmers, while achieving resilient and sustainable food systems will be challenging to achieve simultaneously.

KEY INTERACTIONS WITH OTHER GOALS

2 + 1

Eradicating poverty cannot be achieved without ensuring food and nutrition security for all. While SDG2 is a strong enabler for SDG1, increasing agricultural production, productivity and incomes require complementary policies that benefit the poor and vulnerable communities in rural areas and reduce their exposure to adverse environmental shocks.

2 + 3

Health and well-being cannot be achieved without access to a sufficient quantity and quality of food. How the SDG2 targets related to increasing agricultural production and productivity are implemented, will have a major influence on soil and water quality, land use, and ecosystem health and functioning, which are key environmental determinants of health. Other factors such as rural income stability from agriculture and related sectors are also important. Achieving SDG3 supports SDG2, because a healthy population is essential for achieving nutrition and agricultural production targets.

2 + 5

Achieving the targets related to access to food, quality nutrition for all, and agricultural incomes will provide key enabling conditions for women's empowerment and gender equality as it opens up development opportunities for women. Conversely, gender equality and enhancing women's rights can help achieve the targets related to sustainable, increased food production and nutrition, and can enhance the role of women in agriculture.

2 + 6

Food production is strongly dependent on and affects the quality and availability of water, because boosting agricultural production can increase water withdrawals and worsen land and water degradation. Moreover, achieving nutrition targets requires access to clean water and sanitation. Counteracting these potential trade-offs will require sustainable agricultural systems and practices, and enhanced water governance to manage growing and competing demands on water resources.

2 + 7

Agriculture, food production and consumption are strongly dependent on energy services; conversely biomass and agricultural waste are potential sources of renewable energy. However, competition over the same resources (land, water) can result in trade-offs between both goals.

2 + 13

Agriculture is an important source of greenhouse gas emissions and so contributes to climate change. Conversely, climate change has wide-ranging impacts on agriculture and food security through extreme weather events as well as long-term climatic changes (such as warming and precipitation changes) and will significantly constrain the achievement of SDG2. Sustainable agricultural practices play an important role in climate adaptation and mitigation (such as improving soils and land quality, genetic diversity, and bioenergy).

2 + 15

Healthy ecosystems provide vital services, from soil and water quality, to genetic diversity and pollination. Agriculture is a key driver impacting ecosystems. Sustainable agricultural systems and practices contribute to ecosystem health. However, increased agricultural production and productivity, if not sustainable, can result in deforestation and land degradation, jeopardising long-term food security. A careful balance is needed between achieving food for all and conserving and restoring ecosystems.

→ **75 target-level interactions:**
50 (positive), 1 (neutral) and 24 (negative)

IMPLICATIONS FOR IMPLEMENTATION

Eradicating hunger and ensuring food security is a bottom-line requirement for achieving sustainable development and well-being. This will require a careful and context-sensitive assessment of the needs and critical trade-offs that may occur with other goals and targets. Multi-level governance and multi-stakeholder partnerships, capacity development from the institutional to the individual level, resource mobilisation towards research, innovation and technology development to mitigate trade-offs and supportive policies and investments are needed to realise the full potential of SDG2 and related targets and goals.

SDG 3: ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES

Health is both a key enabler and a critical outcome of sustainable development. The health of people and the health of the planet are fundamentally interdependent. Poverty is a structural factor influencing health. In the future, climate change is likely to become the key determinant of health. There are strong synergies among the SDG3 targets which require progress to be made on all 12 targets to achieve health outcomes for all.

KEY INTERACTIONS WITH OTHER GOALS

3 + 1

Universal health care linked with a strong workforce and supportive research infrastructure underpins all health targets. Reducing communicable diseases combined with enhanced sexual and reproductive health care can reduce newborn, infant and maternal mortality. Controlling tobacco and reducing substance abuse and exposure to hazardous chemicals also reduces mortality.

3 + 2

Health cannot be achieved without access to sufficient and quality nutrition. Moreover, food production and agricultural practices may also affect health directly, including through improved soil and water quality, and indirectly through changes in incomes. But if not properly managed, increasing agricultural productivity could harm health through, for example, damaging ecosystems and increasing pathogen habitats.

3 + 8

A healthy population is a prerequisite for development and underpins economic growth. The interaction between health and economic growth is mostly synergistic because economic growth, when sustainable and equitable, enables health and well-being through access to decent work, food, housing, medical care and education, which in turn contribute to higher productivity and

income generation. However, the synergies are highly dependent on economic development being directed towards enhancing social and natural capital to achieve long-term health gains.

3 + 11

Cities concentrate a growing part of the global population and have a critical influence on physical and mental health. Sustainable urban planning, and decent and affordable housing support mental health and access to health services, and reduce non-communicable diseases and limit environmental impacts.

3 + 13

Climate change is already having significant impacts on health. Many of these impacts are direct (such as the effects of heat stress on ability to work outside), while others are indirect and arise through climate change that promotes the spread of disease or contributes to food and water insecurity, or to mass movements of people. Failure to address the climate action goal will make achieving the health goal impossible. As well as major long-lasting health impacts, climate mitigation would have some immediate health benefits (such as through better air quality).

→ 86 target-level interactions: 81 (positive) and 5 (negative)

IMPLICATIONS FOR IMPLEMENTATION

Implementing the health dimensions of the SDGs will require strengthening national health systems, dedicated laws and regulations to protect people and the natural environment from harmful substances, increased investment in health but also infrastructure that supports health and well-being (i.e. sustainable urban design and planning), and policies that mainstream health concerns from the local (city planning, health and safety in work places) to the global scale (preventing and preparing for large epidemics, engaging in multi-stakeholder alliances to tackle antimicrobial resistance, preparing for health impacts of climate change).

SDG 7: ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

Modern energy is fundamental to human development, and the services that energy makes possible are widespread throughout the industrialised world. But not everyone has access to the benefits that modern energy can provide.

KEY INTERACTIONS WITH OTHER GOALS

7 + 1

Ensuring the world's poor have access to affordable, reliable and modern energy services supports the goal of poverty eradication. However, decarbonising energy systems by promoting renewables and increasing energy efficiency could cause price shocks, and so prevent universal access to modern energy supplies. Because some of the poorest parts of the world have some of the highest renewable energy potential, making use of this potential could help to reduce poverty.

7 + 2

Energy supports food production; conversely, agriculture can play an important role in meeting the energy goal, especially through biofuels. A well-studied (potential) trade-off is competition between biomass for energy and crops for food.

7 + 6

Thermal cooling and resource extraction require substantial amounts of water; while wastewater from the energy sector releases large quantities of thermal and chemical pollution into aquatic ecosystems. In most cases, increasing the share of renewables in the energy mix and increasing energy efficiency would support the water targets. However, expanding biofuels or hydropower use could increase pressure on water resources.

7 + 8

Deploying renewables and energy-efficient technologies can encourage innovation and reinforce local, regional and national industrial and employment objectives. Decarbonising energy systems through greater use of renewables and energy efficiency could constrain economic growth in some countries.

7 + 13

An immediate and significant increase in renewables and increased energy efficiency is an essential part of efforts to keep global warming to well below 2°C above pre-industrial levels. Providing access to modern energy services to all will not exacerbate climate change.

→ 58 target-level interactions:
46 (positive), 10 (neutral) and 2 (negative)

IMPLICATIONS FOR IMPLEMENTATION

The transition towards clean, efficient and modern energy for all will require policies geared toward avoiding potential negative impacts as well compensation mechanisms that support the most vulnerable groups. Policies to manage the energy-land-water nexus are critical for avoiding competition over resources and adverse environmental impacts. Policy frameworks that help mobilise investment would be helpful in achieving each of the three SDG7 targets.

SDG 14: CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

The oceans provide vital services to people and the planet. A decline in ocean health, productivity and resilience due to increasing human pressures by mostly land-based pollution, climate change-induced warming and sea-level rise, ocean acidification and over-exploitation of marine resources is a major threat to achieving sufficient nutrition, livelihoods and economic growth, especially for coastal communities. Other important ecosystem services such as recreation and coastal protection are also affected. Achieving SDG14 strongly depends on progress under other goals.

KEY INTERACTIONS WITH OTHER GOALS

14 + 1

Healthy, productive and resilient oceans and coasts are a critical enabler of poverty alleviation, environmentally sustainable economic growth, and human well-being, especially in coastal communities. But despite various co-benefits for building resilient communities, achieving SDG14 could limit access to the resources and ecosystem services necessary to alleviate poverty.

14 + 2

Oceans are essential for ensuring food security and meeting nutritional needs. Establishing marine protected areas could limit access to marine resources for food and nutrition security; however, fisheries and other natural resource uses generally benefit from sustainable practices and balanced conservation measures. Increased agricultural production could damage ocean health through nutrient run-off and related pollution.

14 + 8

Sustainable growth of marine and maritime sectors supports employment and economic growth. Short-term resource exploitation may impact the productivity and resilience of oceans and coasts while trade-offs are possible where management and conservation measures limit economic growth.

14 + 11

Coasts are attractive for urban development, often due to opportunities for economic activities and the availability of natural resources, but coastal settlements are a major factor in increasing environmental pressures along the coast-sea interface. Conflicts may occur where ocean and coastal conservation limit options for housing, infrastructure or transport upgrading, but achieving SDG14 also reinforces sustainable urban planning and resilient coastal settlements.

14 + 12

Achieving SDG14 and sustainable consumption and production go hand in hand, not only in ocean-based industries and coastal communities. Ending overfishing, sustainably managing marine and coastal ecosystems and reducing marine pollution supports the efficient use of natural resources and reduces food loss while sustainable consumption and production patterns will reduce marine pollution and support sustainable resource extraction practices.

14 + 13

Oceans and coastal ecosystems both affect and are affected by climate change. Thus, achieving SDG14 and SDG13 is highly synergistic, such as through conservation of coastal ecosystems acting as blue carbon sinks. Careful management is needed to ensure that climate adaptation and coastal and marine protection measures do not conflict.

→ 97 target-level interactions:
61 (positive), 1 (neutral) and 35 (negative)

IMPLICATIONS FOR IMPLEMENTATION

Achieving SDG14 without compromising the achievement of other SDGs means much needed protection and restoration measures for coastal and marine ecosystems must be carefully balanced against the sustainable exploitation of marine resources. Integrated management and planning across geographical scales and administrative silos, particularly at the regional level, will enable coastal states to better safeguard, conserve and sustainably use ocean resources within their jurisdiction and in areas beyond national jurisdiction. The current ocean governance framework is fragmented and needs to be strengthened. In addition, ocean literacy is still poor and enhanced capacity building and awareness raising are needed to support the implementation of SDG14 at all levels. Ocean and coastal monitoring frameworks need to be further developed, harmonised and strengthened, since they provide the data to assess progress in the full implementation of SDG14.

NEXT STEPS

The conceptual framework and assessment of key interactions between the four Sustainable Development Goals presented here are intended to represent a starting point for further work towards a more complete understanding of how the full set of goals fit together. The framework guides a more detailed analysis and enables structured deliberations on how to implement the 2030 Agenda coherently, in order to maximise development outcomes. Making interactions explicit and understanding the full impacts of policies and actions across goals, stimulates important knowledge gathering and learning processes and has very concrete and tangible value for achieving efficiency and effectiveness in goal implementation, for driving meaningful multi-stakeholder partnerships, and for country-level monitoring, evaluation and review.