

# Sustainable Development Goal 2: joining-up standards for ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture

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*Beata Lisowska*

*Data Scientist, Development Initiatives*

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## Introduction

Sustainable Development Goal 2 (SDG2) deals with ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture. Under the Millennium Development Goal (MDG) framework this fell under a broader goal: eradicate extreme poverty and hunger.

This shift from associating hunger with extreme poverty and unemployment to a focus on sustainable agriculture has meant an increase of indicators directly associated with hunger from three to fourteen. Of the fourteen indicators, only two have their origins in the MDGs. The rest have been developed by the Food and Agriculture Organization of the United Nations (FAO).

This discussion paper is the second in a series and follows [\*The Sustainable Development Goals: Joining-up new standards in a disconnected world\*](#), which introduces the SDG framework in the context of the challenges involved in creating new data standards. This paper focuses in detail on SDG2 in relation to other existing data standards that inform and contribute to it. It discusses the mapping between SDG2 targets and indicators and the sector classifications used for data on financial flows that may impact on these outcomes, particularly the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC)'s Creditor Reporting System (CRS) for external flows and UN Classification of Functions of Government (COFOG) for domestic resources.

This paper is from the Joined-up Data Standards project, which aims to map the intersections between existing standards, highlighting unnecessary incompatibilities where they exist and advocating for better interoperability between related datasets. Through mapping SDG2 to other key data standards that are important for agriculture, food security and health it is possible to evaluate how well this goal can be implemented and monitored.

## Summary of findings

SDG2 is an ambitious goal that combines the problems of hunger, food security and sustainable agriculture. It is perhaps not surprising that consultations on its content, led by the FAO, are ongoing and in February 2016 major changes are still being introduced (see Table 1). Ten of the fourteen indicators still lack either a clear methodology or easily available data to support them (see Table 2).

As discussed in our [recent paper](#), creating new indicators can be a challenging exercise. In addition to the scientific rationale for their selection, indicators should ideally have a 'rear-view mirror': available historical data coverage to provide a credible baseline. This is also important in that many indicators suffer from incomplete datasets that require gaps to be filled with estimates based on statistical modelling: the more data points available, the better the model and the better the estimated values. Furthermore, indicators require clear, credible and peer-reviewed methodologies for data collection and analysis.

SDG2 also highlights another challenge facing the architects of new monitoring systems: how to provide simple solutions to complex and disputed problems. The case in point here is food security, which is measured through food balance sheets (that show the availability of food in a country) and through Food Insecurity Experience Scale (FIES) surveys (that measure insecurity through the eyes of a person who suffers from it). We argue that a standards-approach (with no matching expertise in food security) is sufficient to conclude that the selected indicators do not do justice to the target.

The ongoing lack of methodology or consistent baseline for six of the indicators has led us to search existing monitoring standards for potential candidates (see Table 2). For two of the indicators currently lacking any methodology we find at least three potential candidates.

The success of the SDGs depends not only on monitoring their progress but also on ensuring that there is sufficient financing available to meet targets. Are international donors matching the targets? Are domestic resources being allocated similarly? The first question can be answered by assessing the compatibility of the purpose codes used by the OECD DAC CRS, the second by the COFOG. The mapping between SDG2 and CRS codes, however, highlights the absence of specific one-to-one relationships between targets and CRS codes. The only possible matching is done based on a broad relationship to sub-sector definitions within such general sectors as 'basic health' or 'agriculture'. A similar problem is encountered when mapping to COFOG.

## Contributing and related standards

The primary contribution to SDG2 comes from indicators developed and maintained by the [FAO](#) (supported by the International Fund for Agricultural Development and the World Food Programme).

The [World Health Organization Indicator and Measurement Registry](#) (WHO-IMR) provides a collection of curated indicators on health-related topics. The indicators are regularly reviewed and each indicator is accompanied by detailed metadata that includes definitions, data sources and methods of estimation. SDG2 includes two of the WHO indicators in its framework.

[World Development Indicators](#) (WDI) is a collection of over 800 indicators on global development. The World Bank collates these indicators from a variety of international organisations and regularly curates its database.

The OECD DAC CRS is a database for donor countries and multilateral agencies to account for their aid spending. Spending is classified in 26 'sectors' (or purpose codes) and 151 'sub-sectors'. These sectors have also been adopted by the publishing standard of the [International Aid Transparency Initiative \(IATI\)](#), which provides more timely and forward-looking data on development activities.

The monitoring of domestic resources can be assessed from data on government expenditure. The governments of developing countries are encouraged by the International Monetary Fund (IMF) and World Bank to present their expenditure using a medium term expenditure framework (MTEF) that classifies flows by 'function group' and 'budget group'. These groups relate to socioeconomic activity and are based, as recommended by the IMF and World Bank, on the UN [COFOG](#).

## Findings

### Availability of metadata for the SDG2 indicators

A [revised list](#) of indicators was published on 19 February 2016 reflecting significant changes to the SDG2 indicators since the previous revision in December 2015 that are shown in Table 1.

Table 1: Changes to Indicators – February 2016

Original (as of 17 Dec 2015)	Revised (as of 19 Feb 2016)	Tier
2.2.2 Prevalence of wasting	2.2.2 Prevalence of malnutrition	I
2.3.2 Total factor productivity	2.3.2 Average income of small-scale food producers, by sex and indigenous status	III
2.4.2 Percentage of agricultural households using irrigation systems compared to all agricultural households	Removed	
2.4.3 Percentage of agricultural households using eco-friendly fertilizers compared to all agricultural households using fertilizers	Removed	
2.5.1 Ex situ Crop Collections Enrichment Index	2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities	III
2.5.2 Percentage of local crops and breeds and their wild relatives, classified as being at risk, not-risk or unknown level of risk of extinction	2.5.2 Proportion of local breeds, classified as being at risk, not-at-risk or unknown level of risk of extinction	II
Not present	2.a.2 Total official flows (official development assistance plus other official flows) to the agriculture sector	I
2.b.1 Percentage change in import and export tariffs on agricultural products	2.b.1 Producer Support Estimate	II

These late changes have not improved the overall state of indicators for this goal. The Inter-Agency and Expert Group on SDG Indicators has designed a tier system for assessing the quality of the agreed indicators. As Table 2 shows, only five of the fourteen indicators (described in detail in Table 3) currently meet the standard expected. Big challenges lie ahead, not only to agree on methodologies for Tier III indicators, but to discuss methodologies for improved coverage of Tier II indicators.

Table 2: Methodological development and data availability

Tier	Definition	SDG2 count
I	Established methodology exists and data are already widely available	5
II	Methodology has been established but data are not easily available	5
III	An internationally agreed methodology has not yet been developed	4

Table 3: SDG2: Targets, indicators, methodology, data

Target	Indicator	Methodology	Data availability	Source	Tier
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1 Prevalence of undernourishment	<a href="#">Food balance sheets</a>	1990–2016	FAO	I
	2.1.2 Prevalence of population with moderate or severe food insecurity, based on Food Insecurity Experience Scale	<a href="#">FIES</a>	2014	FAO	II
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	2.2.1 Prevalence of stunting among children under five years of age	<a href="#">DHS / MICS</a>	1990–2016	WHO	I
	2.2.2 Prevalence of malnutrition	<a href="#">Child Growth Standards</a>	1980–2016	WHO	I
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size	ND	NA	FAO	III
	2.3.2 Average income of small-scale food producers, by sex and indigenous status	ND	NA	FAO	III
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	<a href="#">Agricultural surveys</a>	NA	FAO	II
2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium or long term conservation facilities	ND	NA	FAO	III
	2.5.2 Proportion of local breeds, classified as being at risk, not-at-risk or unknown level of risk of extinction	<a href="#">Domestic Animal Diversity Information System</a>	1996–2016 (gaps)	FAO	II
2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries	2.a.1 Agriculture Orientation Index (AOI) for government expenditures	<a href="#">Government Financial Statistics / Classification of functions of government</a>	2001–2012 (coverage)	FAO/IMF	I
	2.a.2 Total official flows (official development assistance plus other official flows) to the agriculture sector	<a href="#">OECD DAC CRS</a>	1961–2014	OECD	I
2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round	2.b.1 Producer support estimate	<a href="#">Policy transfers to agricultural producers</a>	Data available for 76 countries	OECD	II
	2.b.2 Agricultural export subsidies	ND	NA	FAO	III
2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility	2.c.1 Indicator of food price anomalies (IPA) (CBB)	<a href="#">Compound growth rates</a>	Gaps in coverage	FAO	II
	MDG closeMatch				
	MDG broader/narrowerMatch				

## SDG2 gaps and other standards

The Tier System, and the Expert Group's acceptance to use it as a framework for ongoing work, recognises that indicator design must take the availability of existing data into account. In other words, SDG indicators should, by definition, make use of methodologies already in use elsewhere. This, for SDG2, is the business of food security experts. From a standards view it is possible, however, to provide an overview of the terrain. Table 4 shows some of the options available to the experts. Most of these are maintained by the FAO itself and we have tabulated them using the Simple Knowledge Organisation System (SKOS) mapping methodology that defines degrees of equivalence between two different concepts (see Appendix 1)

**Table 4: Related indicators from other existing standards**

Target	Indicator	FAO closeMatch	FAO narrowerMatch	FAO broaderMatch	Non-FAO Match
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size	Average value of food production	Per capita food production variability	Value added, Agriculture, Forestry and Fishing	Agriculture value added per worker (World Bank WDI)
		Agriculture Production Index Number	Cereal import dependency ratio	Value of agricultural production	
		Food Balance Sheets		Value of agricultural production	
	2.3.2 Average income of small-scale food producers, by sex and indigenous status				
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture		Percentage of arable land equipped for irrigation	Agricultural census	
			Permanent meadows and pastures		
			Total area equipped for irrigation		
			Permanent crops		
			Conservation agriculture area: >30% ground cover		
2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium or long term conservation facilities				Ex-situ Crop Collections (Biodiversity International)
	2.5.2 Proportion of local breeds, classified as being at risk, not-at-risk or unknown level of risk of extinction				Red List Index (International Union for Conservation of Nature)
2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round	2.b.2 Agricultural export subsidies			Food Balance Sheets	

## Measuring food insecurity

Target 2.1 pledges to, “by 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round”. It has two indicators: prevalence of undernourishment; and prevalence of population with moderate or severe food insecurity.

Food insecurity is a complex issue and to attempt to monitor it with a single indicator is a controversial step that has been a [subject of debate](#) for many years. The term is often mistakenly and interchangeably used for nutrition insecurity, undernourishment and hunger while it actually encompasses domestic and international supply of food, famine, access to food and food distribution at both national and household level. It is not surprising that with such a broad scope comes a diverse range of measurements.

The indicator selected is the [Food Insecurity Experience Scale](#) / FIES, a tool developed by the [Voices of the Hungry](#) project that allows for a direct measurement of people’s access to food. However, this approach only monitors the final element in the food security chain and fails to measure components such as food availability, affordability and safety.

The [Global Food Security Index](#), on the other hand, [incorporates 33 indicators](#) covering affordability, availability and quality and safety of food. These come from a range of standard-setting bodies including FAO, WFP, IMF, World Bank and WHO. They are, in the main, established indicators with good ranges of data points.

We make no claims to expertise in the field of food security. Nevertheless, from a standards point of view it is fair to conclude that a complex issue such as food security cannot be measured by a single indicator. The FAO itself [suggests](#) that the FIES should be used in combination with other measures to offer a more comprehensive understanding of the causes and consequences of food insecurity.

The other indicator for this target – the prevalence of undernourishment – is calculated by the FAO using nationally aggregated food supply and food use data called [food balance sheets](#). This method of calculating the level of undernourishment has been [criticised](#) as it only shows the supply side of data and not food at a household level; in other words, when the food is available in the country but the citizens cannot afford it. A further problem with the food balance sheets is the [“incompleteness and inaccuracy of the basic data”](#) in developing countries.

## Measuring the impact of external resource flows: SDG2 and the OECD DAC CRS

Mapping the SDG targets to the purpose codes of the OECD DAC CRS provides an important insight into the readiness of the international financial assistance framework to support the least developed countries in achieving the SDGs. In February 2015 the OECD DAC Working Party on Development Finance Statistics published a [comprehensive review of purpose codes and policy markers in light of the SDGs and post-2015 agenda](#). This discussed a preliminary mapping between SDG targets and OECD DAC sectors and highlighted that although the mapping of SDG goals to top-level CRS sectors is relatively good, mapping of targets is problematic due to difficulties in one-to-one mapping. The target–sector relationship is difficult to establish in the many instances where sectors are either too specific or too broad to match neatly to a particular SDG target.

In an ideal world it should be possible to relate each SDG indicator directly to a CRS sector or sub-sector. Such a one-to-one mapping would establish a direct connection between CRS inputs and SDG outputs.



In practice, mapping indicators to sectors for SDG2 shows that most indicators are related to more than one sector (see Figure 1), so it will be difficult to estimate the value of external resources that are intended to have a direct impact on the monitored target.

Similarly, when mapping specific CRS sub-sectors to SDG targets the one-to-many mapping poses challenges for the aid effectiveness experts (see Figure 2).

This absence of clear relationships is problematic and more work will be needed from the OECD DAC and SDG experts to bring official development assistance into closer alignment with the SDGs.

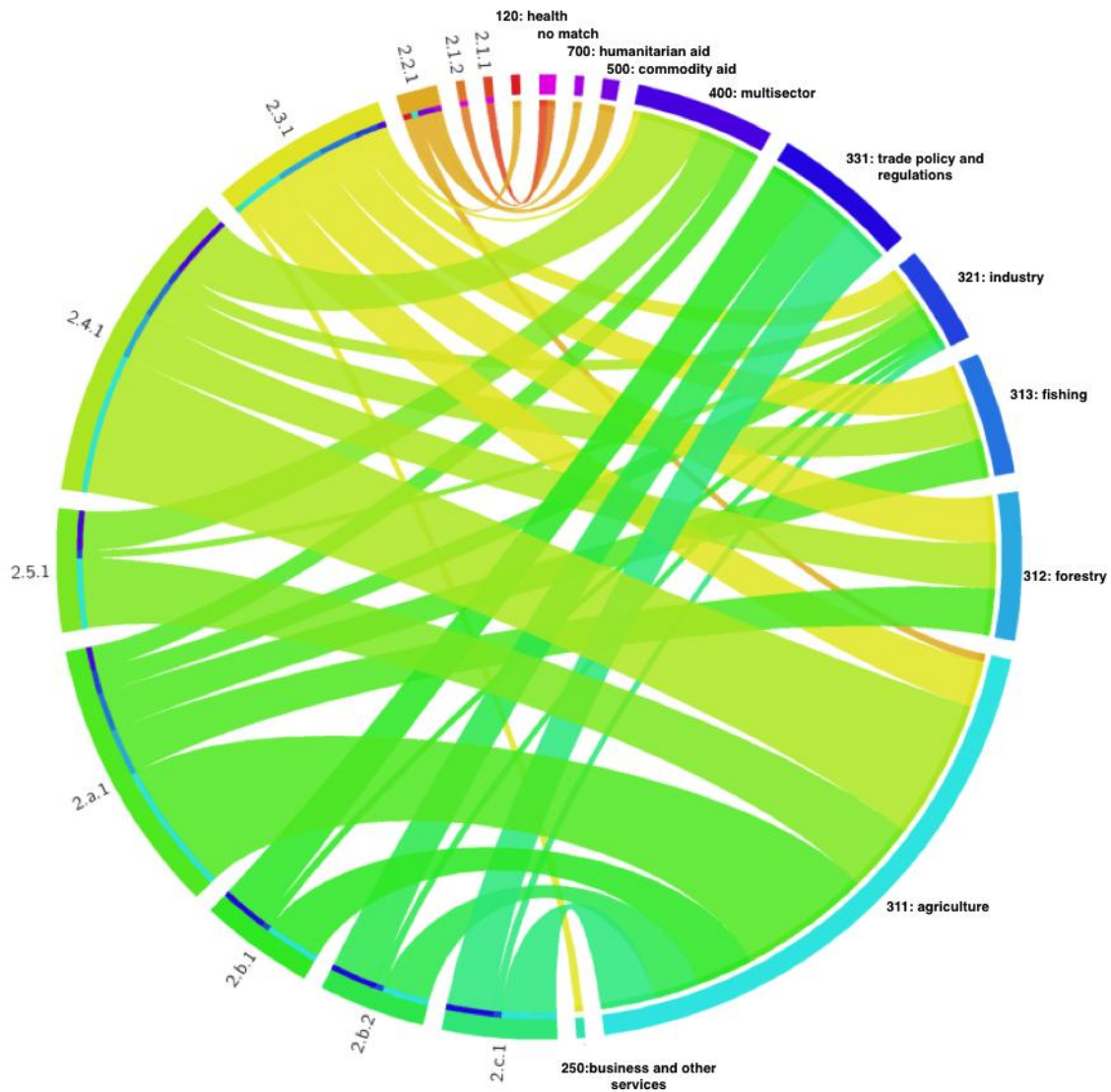


Figure 1: SDG2 indicators mapped against top-level CRS sectors

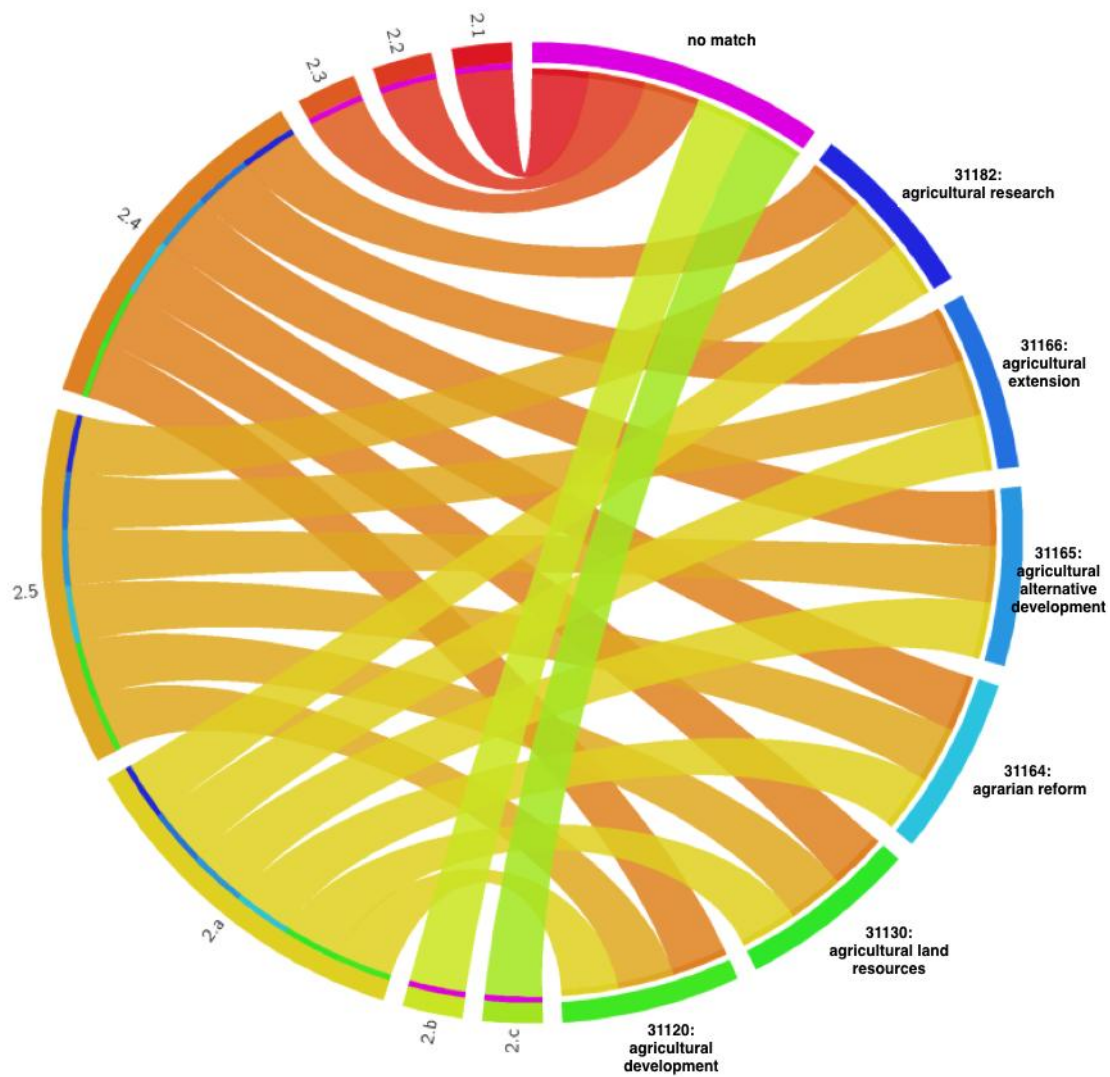


Figure 2: SDG2 targets mapped against CRS sub-sectors related to agriculture

### Measuring the impact of domestic resource allocation: SDG2 and COFOG

The mapping between SDG2 and [COFOG](#) is important for two reasons. Firstly, this classification is a basis to the Agriculture Orientation Index (AOI), an indicator that monitors investments in rural infrastructure, agricultural research and technology development. Secondly, the COFOG classification serves as a blueprint for a medium term expenditure framework (MTEF), a method for planning and reporting government expenditure promoted by the IMF and World Bank. COFOG classification of domestic resources can therefore shed light on how countries plan to meet the SDGs at national level.

The mapping shows a poor relationship between the two standards. COFOG targets can be mapped to such general sectors as agriculture, forestry and fishing or health (indicators related to wasting, stunting and malnourishment) or environment. COFOG does not incorporate such subjects as sustainable agriculture or sectors that could be mapped on a one-to-one ratio to ending hunger and achieving food security. Fig 3 summarizes these findings.

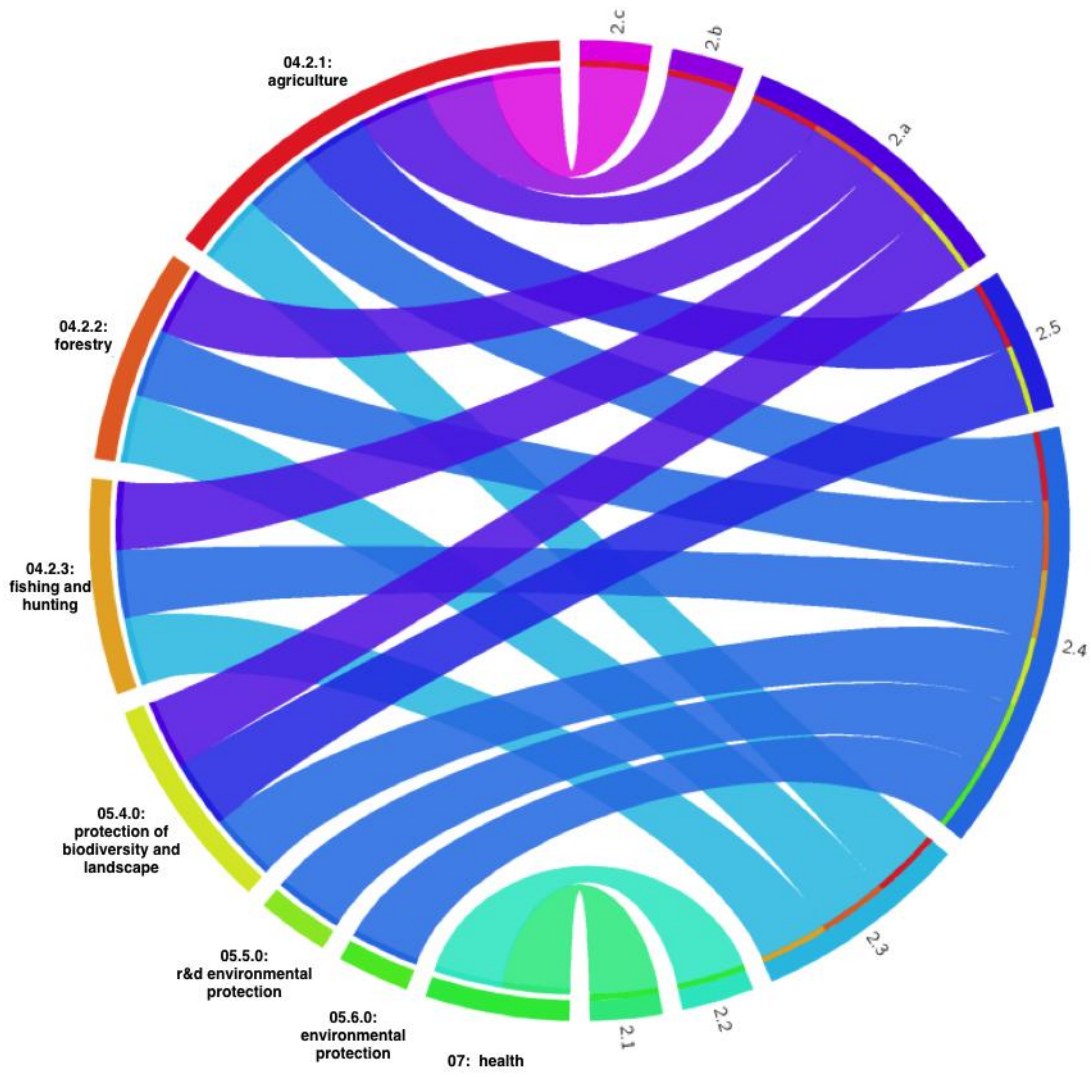


Figure 3: SDG2 targets mapped against COFOG sub-sectors related to agriculture

## Conclusions

Many challenges still lie ahead for the Inter-Agency and Expert Group on SDG Indicators. SDG2, as it stands, suffers greatly from a large number of indicators that lack the methodology and data to support them. This is a result of an ambitious goal with broad targets that aims to monitor specific processes that, up till now, have not been the focus of the global development efforts. At the second meeting of the [Open Ended Working Group](#) (OEWG) on SDGs of the Committee on World Food Security (CFS) held on 24 February 2016, the International Fund for Agricultural Development [urged the CFS](#) to bring in specialised knowledge to the thematic review of SDG2. This is crucial in establishing a working monitoring framework for this goal.

### **Standards require both methodology and data**

For an indicator to serve its purpose it needs both a credible methodology and data – a baseline as well as realistic data collection opportunities in all countries. The Expert Group has recognised this with the introduction of its tier system for assessing indicators. The fact that only five out of fourteen SDG2 indicators currently meet acceptable standards is an indication of the huge amount of work that still needs to be done.

### **Building on experience**

It is right and proper that the goals and targets of the SDGs reflect the ideals and aspirations of the global community. The biggest lesson to be learned from the process to date is that the starting point in the design of standards must involve a review of existing standards. As this discussion paper demonstrates, in many instances relevant data sources and methodologies do already exist and need to be more effectively harnessed. An effective monitoring framework can be compiled through a global analysis of all existing indicators, assessing their universality and quality, and co-opting the best and most appropriate into the SDGs. This is a central thrust in a joined-up approach to data and standards. There are data and methodologies that already exist that are available to the SDG2 designers.

### **Making the connection between inputs and impacts**

For the resources being committed to meeting the SDGs to have maximum impact they need to be monitored within a compatible framework. Joining-up the classifications used to define inputs, outputs and impacts across disparate reporting systems is a huge challenge but is possible, as the examples in this paper demonstrate. Pragmatic improvements rather than ideal solutions represent the best chances of success.

## Appendix: A methodology for mapping standards

Defining relationships between incompatible standards has become a lot easier over the last decade as a result of the development of [SKOS](#) – the Simple Knowledge Organisation System. SKOS provides a standard language for defining non-exact relationships such as ‘broader’, ‘narrower’, ‘close’ and ‘related’ matches between concepts (definitions) across taxonomies (standards). It is also a component of the [semantic web](#) – a set of standards that promote common [linked data](#) formats and exchange protocols across the Internet.

If one taxonomy contains a single classification for ‘health’ while another contains separate classifications for public health, primary health and so on, SKOS allows for the codification of the relationship – ‘primary health’ in taxonomy B is a narrower match of ‘health’ in taxonomy A – in a way that allows databases, web pages and other information systems to seamlessly understand and represent this link. Similarly, the ability to describe a relationship as a ‘close’ rather than ‘exact’ match allows for greater accuracy in mapping

Our research has been facilitated through the use of [PoolParty](#) software, a thesaurus server developed by the [Semantic Web Company](#). This platform stores and maps the data standards analysed in this paper and outputs cross-referenced data to build visualisations (‘chord diagrams’) using [Circos](#) software.

### SKOS mappings and terms used in this paper

**Concepts** are the building blocks for mapping relationships. They are defined terms in a **Concept Scheme**, a grouping of concepts or taxonomy serving a particular purpose. In the case of the JUDS project ‘Sectors’, ‘CRS’ and ‘COFOG’ are concept schemes. Sectors, sub-sectors and elements are concepts in the concept scheme.

**Matching Concept** refers to a relationship between two concepts from different concept schemes. This is a custom relationship created to map concepts that cannot be linked through established SKOS mapping.

**Exact Matching Concept** refers to a concept that has exactly the same functional definition as a corresponding concept in another concept scheme.

**Close Matching Concept** is used when a given concept is not an exact match of a concept in another concept scheme. This relationship denotes that the concepts cannot be interchangeably used but are similar enough.

**Narrower Matching Concept** defines a relationship between two concepts in different concept schemes where the subject is a subset of the object.

**Broader Matching Concept** defines a relationship between two concepts in different concept schemes where the object is a subset of the subject.