

The Agenda 2030 Compass



Summary

Businesses, governments and civil society groups around the world are increasingly committed to achieving sustainability. One way to gauge the societal benefits of a given investment option, research strategy or policy is to consider how it might affect progress towards the Sustainable Development Goals. The SDGs are complex, however, and in some contexts, actions that contribute to achieving one goal may undermine progress on another.

The Agenda 2030 Compass project has developed an innovative approach to understanding synergies and trade-offs between SDGs, to help decision-makers achieve the greatest societal benefit. Developed as a spinoff from the Swedish steel industry's 2050 vision "Steel Shapes a Better Future", the 2030 Compass has two key components:

- *The Context Mapper* identifies the potential for positive or negative interactions among SDGs in a particular context (such as a country), based on factors such as socio-economic conditions, the energy mix and the physical environment.
- *The Strategy Analyser* provides a simple, robust workshop-based process and toolbox to analyse the sustainability implications of a planned intervention within that context.

The 2030 Compass can be used in a wide range of settings and has been successfully tested in case studies involving product design, housing development, and local and regional strategies. Participating organisations, including start-up companies, consultants and public sector entities, have shown a strong interest in continuing to use the tool. The project partners are currently setting up an organisational platform to make the Compass more widely available.

Keywords

Sustainable Development Goals, SDGs, sustainability analysis, planning tools, SDG tools, strategy assessment, product sustainability assessment, co-creation, collective intelligence

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Sammanfattning

Företag, regeringar och civilsamhällen runt om i världen är allt mer engagerade i frågorna om hållbar utveckling. Ett sätt att bedöma de samhälleliga fördelarna med ett givet investeringsalternativ, forskningsstrategi eller policy är att överväga hur det kan påverka framstegen mot mål om hållbarutveckling. De globala hållbarhetsmålen (SDG:erna) är dock komplexa och i vissa sammanhang kan åtgärder som bidrar till att uppnå ett mål undergräva framsteg på ett annat.

Agenda 2030-Kompassen har utvecklat ett innovativt tillvägagångssätt för att förstå synergier och avvägningar mellan SDG:erna, för att hjälpa beslutsfattare att nå maximal samhällsnytta. Utvecklad som en spinoff från den svenska stålindustrins vision från 2050 "Stål formar en bättre framtid", har Agenda 2030-Kompassen två nyckelkomponenter:

- En funktion för att kartlägga olika samhällskontexter (the Context mapper) som identifierar potentialen för positiva eller negativa interaktioner mellan SDG:erna i ett visst sammanhang (som ett land), baserat på faktorer som socioekonomiska förhållanden, energimix och fysisk miljö.
- En funktion för att analysera strategier (the Strategy Analyser) som tillhandahåller en enkel, robust workshopbaserad process och verktygslåda för att analysera hållbarhetskonsekvenserna av en planerad intervention inom ramen för kontexten

Agenda 2030-Kompassen kan användas i en mängd olika sammanhang och har framgångsrikt testats i fallstudier som involverar produktdesign, bostadsutveckling samt lokala och regionala strategier. Deltagandeorganisationer, inklusive nystartade företag, konsulter och offentliga aktörer, har visat ett stort intresse för att fortsätta använda verktyget. Projektets olika parter håller för närvarande på att skapa en organisatorisk plattform för att göra Kompassen mer allmänt tillgänglig.

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1. Introduction

Around the world, there is growing demand for sustainable lifestyles, products, services and infrastructure, in line with the United Nations' Agenda 2030 and its 17 Sustainable Development Goals (SDGs). This makes it strategically important for businesses, governments and civil society to understand how to actually achieve sustainability.

Yet the SDGs are complex, and it may not always be evident how a real-world decision might affect the achievement of the SDGs. Will a new production process, product or policy help advance the SDGs, or work against them? Are there synergies or trade-offs that decision-makers need to be aware of? Could an action that is beneficial for one SDG be harmful for others? Without a full understanding of these complexities, decision-makers may not be able to foresee problems – or they may miss out on valuable opportunities.

The Agenda 2030 Compass Project has worked to address that challenge. Through close collaboration with industry, public authorities, researchers and civil society organisations, the project developed a methodology and toolbox to help decision-makers assess the potential sustainability impacts of different investment options, research strategies and policies in specific geographic areas, time frames and/or sectors.

The project had several specific objectives:

- To build a robust, well-documented and tested approach and platform (including a methodology, metrics and a toolbox) for strategic decision-making about options to deliver societal benefit by contributing to the attainment of the SDGs;
- To develop an international network of expertise on the 17 SDGs and their targets and how they relate to one another, which, put together, can shed light on vicious and virtuous cycles in the implementation of Agenda 2030;
- To familiarise the Swedish steel industry and other interested parties in Sweden and abroad with the approach behind the Agenda 2030 Compass and its utility;
- To build awareness and competences among all involved actors about the nature and utility of the SDGs; and
- To increase participants' ability to apply the competences they acquired through the project to their own processes.

Recognising that the SDGs – and the factors affecting their achievement – interact in complex ways that vary across societal contexts, the project worked with relevant stakeholders to map specific contexts. The idea is that each context map will show how the SDGs interact with one another in that context, based on a combination of empirical data, collective intelligence and expert panel assessments. The project has taken the necessary steps to construct maps that can be assembled in a toolbox, supported by a scientifically robust methodology, which can be used for collective reflection and evaluation. The goal is to have decision-making tools to ensure that a planned intervention contributes as much societal benefit as possible, accounting for both direct and indirect sustainability impacts that may occur as a result of positive or negative societal feedbacks.

The project deliverables include a user-friendly, computer-based tool (the 2030 Compass) to analyse how well a planned intervention might deliver societal benefit,

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based on SDG interactions; a co-creation-based process and methodology developed by the project; a proposal for future hosting and continuous updating of the 2030 Compass; scientific publications; and a dialogue platform, including presentation materials, documentation on results, and experiences from the co-creation process.

This work builds on a collaboration since 2015 between the Stockholm Environment Institute (SEI) and Jernkontoret to help the Swedish steel industry achieve its 2050 vision “Steel Shapes a Better Future” (Jernkontoret 2013). The results will contribute to the Metallic Materials Strategic Innovation Programme by providing a way to assess the sustainability of any set of interventions or portfolios. As demonstrated by case studies for this project, the 2030 Compass can also be applied in a wide range of other settings, in Sweden and globally. In addition, from a scientific perspective, the work provides valuable new insights on how a collective intelligence methodology can be applied to enhance assessments.

The next section of this report describes how this project grew out of a research collaboration with Swedish steel companies, and how the approaches for assessing SDG interactions and for co-creating knowledge have evolved. Section 3 provides a detailed description of the methodology developed for this project and how it was implemented. Section 4 presents the results of the work, key insights and reflections on how the project achieved its goals. Section 5 concludes with next steps for the 2030 Compass and potential future research.

2. Background and state of the art

This section describes the origins of the Agenda 2030 Compass and reviews the state of the art in two key areas of research that underpin the 2030 Compass work: SDG interaction-based assessments, and SDG based approaches for strategic decision-making.

2.1 Project background and context

The Agenda 2030 Compass project is the third stage of a collaboration between SEI and Swedish steel producers initiated by Jernkontoret (the Swedish Steel and Iron Producers' Association) in support of the vision "Steel Shapes a Better Future" (Jernkontoret 2013). Launched in 2013, the vision committed the industry to technical excellence, creativity and partnership, and resource efficiency, with the overarching goal of ensuring that "only products of value to the community leave our plants".¹

To turn the vision into action, Jernkontoret brought SEI together with Swedish steel companies for a process of knowledge co-creation, resulting in two subsequent projects funded by the Hugo Carlsson Foundation.

2.1.1 Swedish steel industry for increased societal benefit

The first joint project, Swedish Steel Industry for Increased Societal Benefit (*Svensk stålindustri för ökad samhällsnytta*), was carried out in 2015–2016. It used an explorative scenario methodology to develop a strategic 10-point action plan for the industry to meet the vision's commitments (Hallding et al. 2016).

The project team suggested that the SDGs, which had just been adopted, could serve as a useful framework to assess the industry's commitment to deliver societal benefit. The SDGs' *transformative* nature fits well with the industry's aims and comparative advantages in technology, creativity and partnerships to deliver high-end solutions. The SDGs' *universal* nature would enable the industry to assess the societal benefit of future processes and products across global markets. Finally, the SDGs' *indivisible* nature would provide a comprehensive view of the societal benefit delivered, avoiding the risk of judging performance only against a few SDGs while ignoring others.

2.1.2 Methodology and toolbox development for assessment of societal benefit creation in the Swedish steel industry

A second project – Methodology and Toolbox Development for Assessment of Societal Benefit Creation in the Swedish Steel Industry (*Utveckling av metod och verktyg för bedömning av samhällsnytta inom svensk stålindustri*) – followed in 2016–2018. It focused on developing a prototype Agenda 2030 Compass to use the 17 SDGs and their targets to assess how a new product or process could contribute societal benefits or constrain progress.

The project built on research by Weitz et al. (2018), who developed a systematic approach for examining interactions among the SDGs and applied it to Sweden. Working with the steel industry, the team created a workshop-based methodology for structured assessment of the potential direct impacts of an intervention on the SDGs, as well as a

¹ Central to the vision is the Swedish term "samhällsnytta", which was originally translated as "value to community". The concept is broader, however, better conveyed by "societal benefit", implying not only that the industry's products are valuable, but also that the industry is committed to eliminate any production process or product that may have negative societal impacts, by hindering progress towards one or more SDGs.

prototype tool to analyse how direct impacts could translate into indirect impacts across all SDGs, considering country- and policy-related differences (Hallding and Blixt 2020).

Significant interest was expressed – both within the steel industry and more broadly – in further developing the tool to support decision-making in different contexts. The current Agenda 2030 Compass project was designed to develop the prototype into a structured process that uses the SDGs to support organisations in the development of sustainable solutions. The project addressed two main research questions:

- Could combinations of empirical data and expert judgement be used to characterise SDG interactions in different contexts?
- How could an SDGs-based analytical approach be made useful for strategic decision-making processes in different contexts?

The rest of this section examines the state of the art in these two areas of research.

2.2 Existing approaches for SDG interaction-based assessments

Analysing interactions among the different SDGs and their targets is a fairly new, but active scholarly field. Several approaches and methods have been applied by researchers around the world – some more qualitative, others more quantitative.

Some qualitative analyses have taken a nexus approach, inspired by studies of the water-energy-food nexus in development, to investigate linkages among the SDGs (see, e.g., Boas et al. 2016). Nerini et al. (2019), meanwhile, investigated how progress on SDG 13 (climate action) interacts with the other 16 goals by drawing on a range of academic publications.

A prominent quantitative approach, in Nilsson et al. (2016), described SDG interactions using a scale from –3 (mutually cancelling) to +3 (indivisible). Weitz et al. (2018) followed that approach in discussing SDG interactions with experts in different fields to understand SDG interactions in the Swedish context in particular. Working with the experts, the researchers constructed a matrix of all 272 (17x17) interactions. The International Council for Science used the same approach for an in-depth analysis of interactions between SDGs 2, 3, 7 and 14 (ICS 2017). Similarly, Coopman et al. (2016) explored SDG interconnections by using a classification and scoring system to assess linkages among SDGs in the European Union.

Some studies have applied network analysis to SDG interactions. For instance, Le Blanc (2015) examined the words used in SDG and target descriptions, while Dawes (2020) used qualitative information from the ICS report to map out networks, which it assessed quantitatively using dynamic models. Lusseau and Mancini (2019) fed World Bank data on SDG-relevant indicators (e.g. access to electricity) into a linear mixed effect model (MEM), mapping out two sets of networks. They concluded that the centrality of an SDG in the network depends on the country's income level, and that more conflicts among SDGs might arise in higher-income countries, while progress on one SDG usually would have a positive impact on other SDGs in lower-income countries.

Pradhan et al. (2017) used statistical correlation analysis, based on UN indicators of SDG progress, to look for synergies and trade-offs between data pairs and thus between SDGs. They found that positive correlations among SDGs would outweigh the negative trade-offs, but also that the relationships vary across countries. A key

lesson from these and other studies is that SDG interactions are highly context-specific and depend on the location and time frame chosen for the analysis, among other factors (Nilsson et al. 2018).

A growing body of research has applied such analyses to specific countries or SDGs. Allen et al. (2019), for instance, combined a multi-criteria analysis with a network analysis to 22 Middle Eastern countries and found that delivering on SDGs 2, 6, 7 and 12 would be of particular importance for the region. Collste et al. (2017) assessed interactions between SDGs 3, 7 and 4 using an integrated assessment model (iSDG). Bastos-Lima et al. (2017) examined interactions between the SDGs and the Reducing Emissions from Deforestation and forest Degradation (REDD+) framework. The UN Economic and Social Commission for Asia and the Pacific, meanwhile, investigated interactions between SDG 6 and the other goals, using mapping tools and a qualitative “systems approach” (ESCAP 2017).

Prior work that has sought to analyse the nature of SDG interactions has primarily involved eliciting inputs from small groups of experts (Nilsson et al., 2016) or translating into quantitative terms published studies that describe the nature of those interactions in a qualitative manner (Fuso Nerini et al., 2019). In this project the 2030 Compass CoLab sought to use expert crowdsourcing to obtain inputs on SDG interactions from a broader and more diverse group than has typically been consulted in prior studies.

Crowdsourcing and open innovation exercises have used online platforms to surface creative new ideas or to identify trends that can shape the future (for a review, see Cricelli et al. 2022). The MIT Center for Collective Intelligence, a collaborator on the 2030 Compass CoLab, has significant experience in this field (Malone et al. 2017; Malone and Bernstein 2022).

2.3 SDG-based approaches for strategic decision-making

Di Lucia et al. (2022) reviewed a range of analytical methods for SDG interaction analysis in the literature to assess the extent to which they might be suitable for supporting decision-making processes. Table 1 summarises the findings for six methodological approaches.

As discussed further in Section 3, the Agenda 2030 Compass methodology includes substantial elements of several of those approaches:

- **Self-assessment:** An intervention’s impact on the surrounding societal context is essentially assessed on the basis of participant’s knowledge.
- **Expert judgement:** The assessment of the societal impact of a certain intervention is structured and involves systematic judgement of participants with expert knowledge, while the creation of societal context maps involves both expert panels and expert crowdsourcing in combination with empirical data analysis.
- **Statistical analysis:** Analysis of historical data has provided an important input in the research process to develop a methodology for creating societal context maps based on empirical data.
- **Systems dynamics (SD) modelling:** The Agenda 2030 Compass process and tool support are based on a straightforward systems model, where the indirect societal effects of an intervention are calculated by applying a vector of the intervention’s direct SDG impacts on an SDG interaction matrix that is specific to a certain societal context.

Methods	How interactions are analysed	Purpose of analysis	Examples of applications
Self-assessment	Interactions are characterised exclusively based on the pre-existing knowledge of users	- Scoping (problems and objectives)	SDG Impact Assessment Tool
Expert judgement	Systematic judgement by a group of experts is used to characterise relations between pairs of SDG targets	- Scoping (problems and objectives) - Prioritisation (objectives)	Scientific studies and SDG Synergies tool
Literature-based	Evidence from the scientific literature is used to qualify interactions between SDGs	- Scoping (problems and objectives) - Prioritisation (objectives) - Search for alternative actions	Scientific studies and SDG-IAEA framework
Statistical analyses	Statistical techniques are applied to analyse the relationship between pairs of SDG targets based on historic data.	- Prioritisation (objectives) - Monitoring	Scientific studies
System dynamic modelling	System thinking and stock and flows models are used to simulate impacts of interventions on SDGs over time.	- Scoping (problems and objectives) - Prioritisation (objectives) - Search for alternative actions - Evaluation of alternative actions	Scientific studies and iSDG model
Coupled component modelling	Computer models from different disciplines are combined to simulate the impacts of scenarios on a set of SDGs over time	- Evaluation of alternative actions - Monitoring	IMAGE model applied at regional/global scale and CLEWs framework applied at local level

Table 1. Typology of methods for SDG-based interaction analysis to support decision-making processes, *Adapted from Di Lucia et al. (2022), which includes references for each approach.*

Di Lucia et al. (2022) conclude that “decision-makers prioritize methods that are simple and flexible to apply and able to provide directly actionable and understandable results.” To ensure that the 2030 Compass produces actionable results, much of the work relies on **knowledge co-creation** methods (see, e.g., Voorberg et al. 2015; Gebauer et al. 2010), where the project team has worked in close cooperation with case study partners and a range of other stakeholders.²

² For a more detailed discussion of knowledge co-production in the 2030 Compass work, see Gerger Swartling, A., Axelsson, K., Dahlin, J.-K., Hallding, K., and Skånberg, K. (forthcoming). “Putting the SDGs into action: Insights from co-creation processes in Swedish organisations.”

3. Methodology and implementation

This section delves deeper into the principles that underpin the 2030 Compass methodology and the tool's architecture, including taking a closer look at each of its components.

3.1 Overall methodological approach

The 2030 Compass builds on the growing body of scholarship and decision-making tools described in Section 2, all premised on the idea that the sustainability impacts of any given action, investment or policy intervention can be assessed in terms of its effects on the achievement of the 17 SDGs.

The 2030Compass helps decision-makers to assess the potential societal benefits and impediments of a planned intervention by providing a way to quantify the SDG impacts of an action. While the direct effects of an action are fairly straightforward to assess, understanding indirect effects requires information about how the 17 SDGs interact with one another: how, in any given societal context, actions to advance one SDG are likely to also support or undermine another. Figure 1 presents the 2030 Compass SDG interaction-based methodological approach, while Figure 2 illustrates the architecture of the tool, with its two main components: the *Strategy Analyser* and the *Context Mapper*.

The *Strategy Analyser* is a workshop-based and tool-supported assessment process, making use of the Context Mapper, to analyse the direct and the indirect effects of a planned intervention in a specific societal context. The *direct effects* are assessed in a facilitated workshop setting and expressed as a vector, i.e. an array of assessments for each of the 17 SDGs using a scale from +3 for “strongly reinforcing” to –3 for “strongly conflicting” adopted from Nilsson et al. (Nilsson et al. 2016). The direct effects on each SDG will generate indirect, knock-on effects on all the other SDGs. These *indirect effects* are calculated by applying the vector of direct effects to a *context matrix* that contains information about how each SDG interacts with all the other SDGs in a specific societal context.

The SDG interaction matrix is provided through the *Context Mapper*, the 2030 Compass functionality for generating an SDG interaction matrix for any given societal context, usually at the country level. This requires determining how key factors in that specific context, such as the energy mix or the sectoral makeup of the economy, affect and are affected by SDG interactions. The Context Mapper uses those factors to assign a value to each SDG interaction in that societal context, using the same +3 to 3 scale.

SDG interactions with high potential for synergies or trade-offs are flagged as *acupuncture points* requiring special attention. The societal benefit (*samhällsnytta*) of the intervention is the sum of its direct SDG impacts and the resulting indirect effects. As the relative strength of the direct and the indirect effect components is usually difficult to assess, the total societal benefit cannot be calculated as a single number. However, the purpose of the tool is not to provide a single “score” for the action being analysed, but rather to inform group discussions with stakeholders to co-create knowledge and enable decision-makers to refine their plans over several iterations to maximise societal benefits. The Context Mapper and the Strategy Analyser are described in further detail in the following sections.

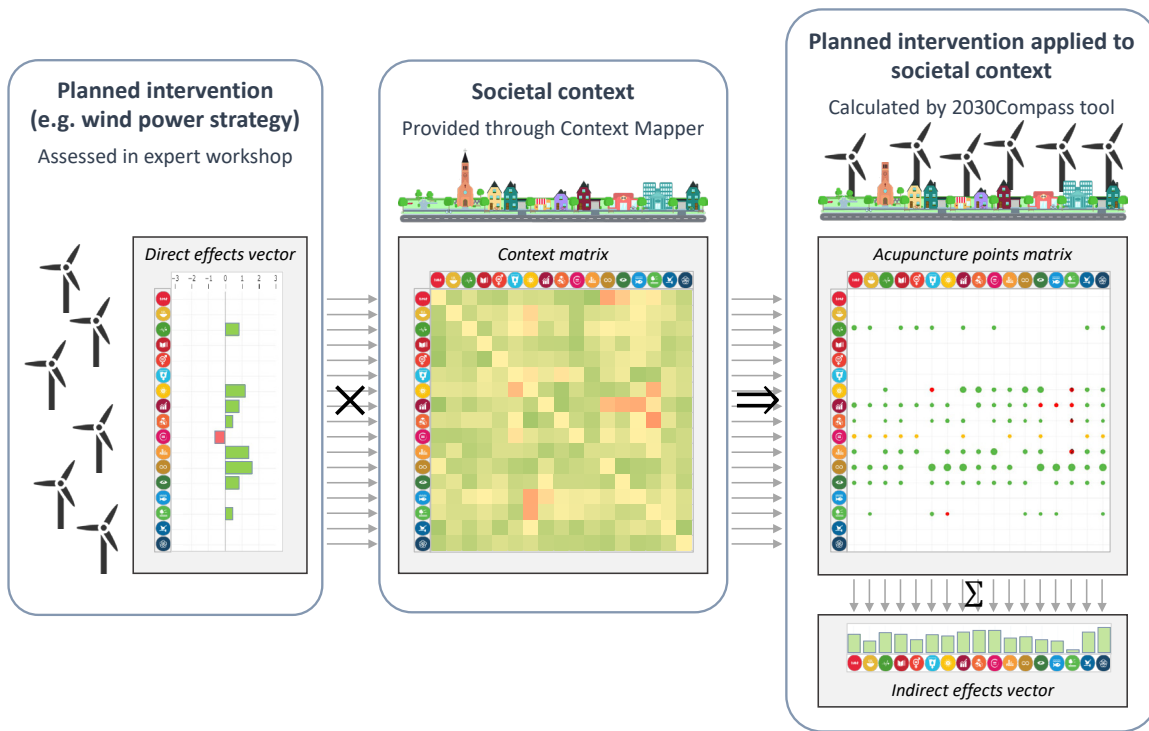


Figure 1. 2030 Compass methodological approach.

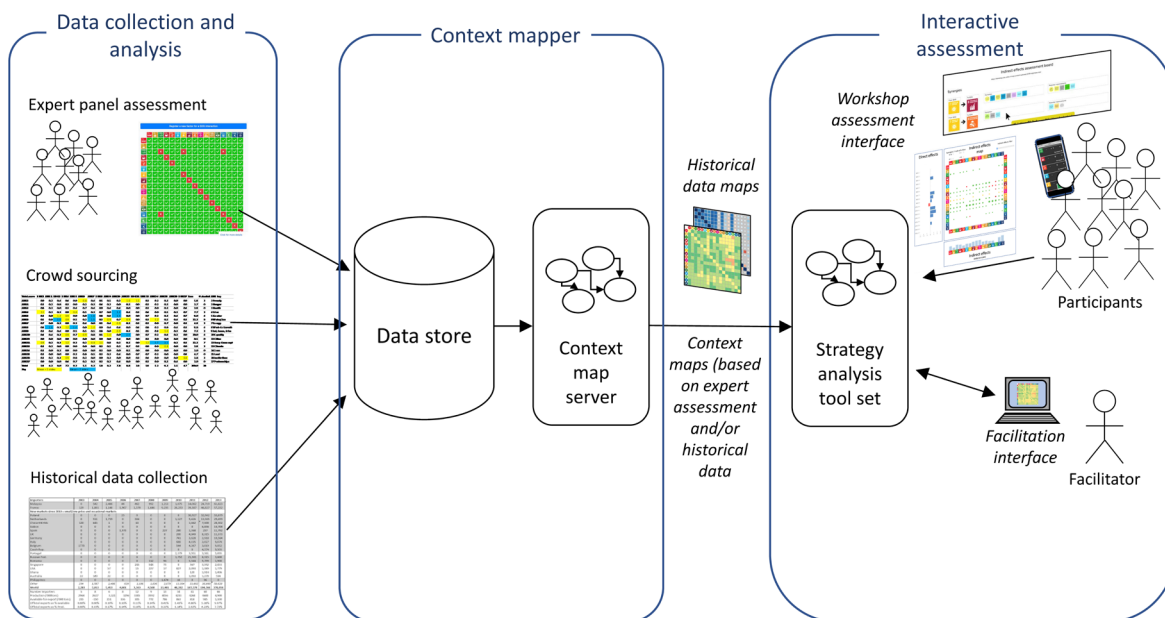


Figure 2. 2030 Compass architecture.

The mathematical expression behind the *Strategy Analyser* is based on matrix algebra. The vector of indirect effects i is calculated as the product of the transposed Context matrix C^T and the direct effects vector d .

$$i = C^T d$$

$$\underbrace{\begin{bmatrix} c_{1,1} & \cdots & c_{1,17} \\ \vdots & \ddots & \vdots \\ c_{17,1} & \cdots & c_{17,17} \end{bmatrix}}_C \underbrace{\begin{bmatrix} d_1 \\ \vdots \\ d_{17} \end{bmatrix}}_d = \underbrace{\begin{bmatrix} c_{1,1}d_1 + \cdots + c_{1,17}d_{17} \\ \vdots \\ c_{1,17}d_1 + \cdots + c_{17,17}d_{17} \end{bmatrix}}_{C^T d} = \underbrace{\begin{bmatrix} i_1 \\ \vdots \\ i_{17} \end{bmatrix}}_i$$

To study the effect on individual SDGs the Acupuncture Matrix A can be constructed, where the strength and direction of the indirect effects for each SDG pair are displayed. It is calculated as

$$A = C \circ [d \ d \ \dots \ d]$$

where $[d \ d \ \dots \ d]$ is a 17×17 matrix of repeated Direct Effects vectors as columns. It is important to note that the multiplication in the equation above is an element-wise multiplication. Given that the multiplication is element-wise, it can be verified that summing each column in the Acupuncture Matrix will return the Indirect Effects vector.

$$\underbrace{\begin{bmatrix} c_{1,1} & \cdots & c_{1,17} \\ \vdots & \ddots & \vdots \\ c_{17,1} & \cdots & c_{17,17} \end{bmatrix}}_C \circ \underbrace{\begin{bmatrix} d_1 & \cdots & d_1 \\ \vdots & \ddots & \vdots \\ d_{17} & \cdots & d_{17} \end{bmatrix}}_{d \ d \ \dots \ d} = \underbrace{\begin{bmatrix} c_{1,1}d_1 + \cdots + c_{1,17}d_1 \\ \vdots \\ c_{17,1}d_{17} + \cdots + c_{17,17}d_{17} \end{bmatrix}}_A$$

3.2 The 2030 Compass Context Mapper

In order to build a “context map” of SDG interaction pairs, the project used a combination of three approaches: a) empirical analysis of historical correlations of factors that are significantly linked to SDG interactions; (b) expert-based identification of factors that affect the strength of specific SDG interactions; and (c) expert-based analysis of SDG interactions in a specific societal context. The analysis drew on literature reviews and historical analyses of data sets as they relate to the SDGs and their targets, and identified indicators for key factors that were available in global data sets. By combining qualitative and quantitative methods (an approach known in social science as “triangulation”; see, e.g., Denzin 1978), we were able to cross-validate the results of our analysis and deepen our understanding of SDG interactions.

Although SDG interactions depend strongly on the societal context (Nilsson et al. 2018; Weitz et al. 2018), developing context maps for each of the roughly 200 countries in the world entirely on the basis of country-level expertise would not be feasible. We therefore asked experts to identify key factors that would determine how SDG pairs interact in different contexts, and which could be linked to publicly available data. Those factors were measured by indicators such as income level, land use, inequality and education levels. In this way, we were able to construct a “factor map” showing SDG interactions corresponding

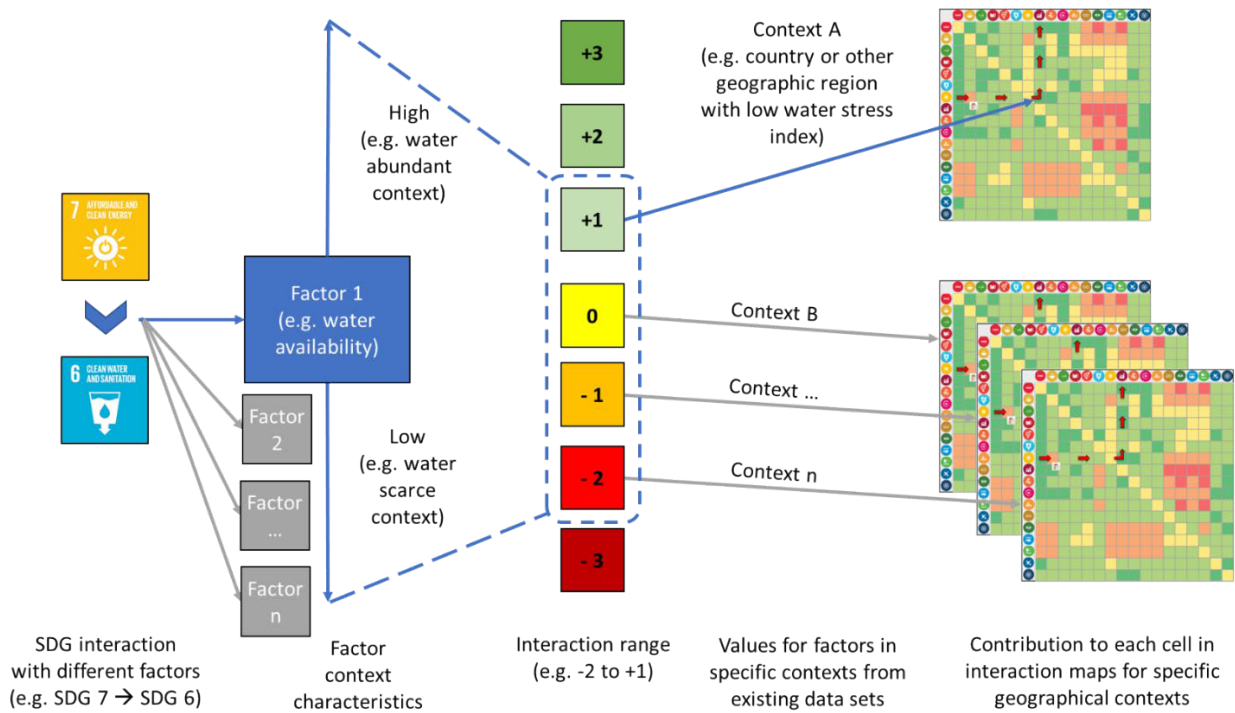


Figure 3. Translating an explanatory factor into a colour-coded SDG context map.

to particular values of those factors, presented as a colour-coded 17x17 matrix. Figure 3 illustrates how the consideration of one such factor would be reflected in the context map.

Figure 3 shows an interaction being characterised on the basis of a single factor – level of water stress – but also the potential for several factors to affect a single interaction. Using global data sets, the factors can be quantified for each specific context. We developed a test set of 10 countries with very different preconditions to compare results and assess reliability. We found that the empirical data-based context maps were indicative of the strength and direction of SDG interactions in a given country. Country-level expertise is still needed to refine the analysis, but the amount of work involved is significantly reduced by the initial data analysis. As part of this project, context maps were developed for Sweden, Poland and India. Depending on data availability, we estimate that maps for other countries (or subnational areas) could be built with country-level experts in as little as two or three days.

3.2.1 The SDG Expert Panel

To develop the list of explanatory factors to be considered in building the context maps, in late 2019 and early 2020, the project team convened a panel of 17 experts on the 2030 Agenda. The panellists were invited to discuss and quantify SDG interactions, using the scale from -3 to +3 scale described above (Nilsson et al. 2016; 2018). The guiding question was: “If one makes progress on SDG X, how does this affect progress on each of the other SDGs?”

Each panellist represented one SDG. Working in pairs over 16 rounds (one for each interaction involving their assigned SDG), the panellists identified factors that would determine whether each interaction would be positive, negative or neutral. The factors – more than 700 altogether, often accompanied by detailed notes from the experts – were then compiled and grouped into themes by the project team. A web-based application was developed by the project to document the expert panel’s work.

3.2.2 Crowdsourcing through the 2030 Compass CoLab

Aiming to broaden the range of perspectives reflected in the Context Mapper, the project team deployed an online platform to gather input on SDG interactions from around the world. This enabled greater participation by experts from the Global South in particular, who had been underrepresented in prior work on SDG interactions, which mainly included researchers based in Western Europe and North America. It would also enable more experts overall to participate, since they could contribute asynchronously, as their schedules allowed.

Prospective participants were recruited from three sources: SEI’s network, the UN’s Sustainable Development Solutions Group, and the MIT Climate CoLab, which has attracted a community of more than 100,000 people interested in developing creative ideas about how to address climate change. From this pool, 163 participants were selected, based on their experience with government agencies, NGOs or private companies active in sustainable development, or on their enrolment in university graduate programs in relevant fields.

3.2.3 The 2030 Compass Context Mapper software

The Context Mapper is a suite of software tools developed by the project team, written in R, for generating factor and context maps based on historical data available in global data sets for most countries.³ The process involves several steps. First, a context-free global map was constructed (see Background Report 2.1 for a detailed description of the process). The results are shown in Figure 4. The data for SDG 16 (peace, justice and strong institutions) were insufficient, so those fields in the map are blank. Most of

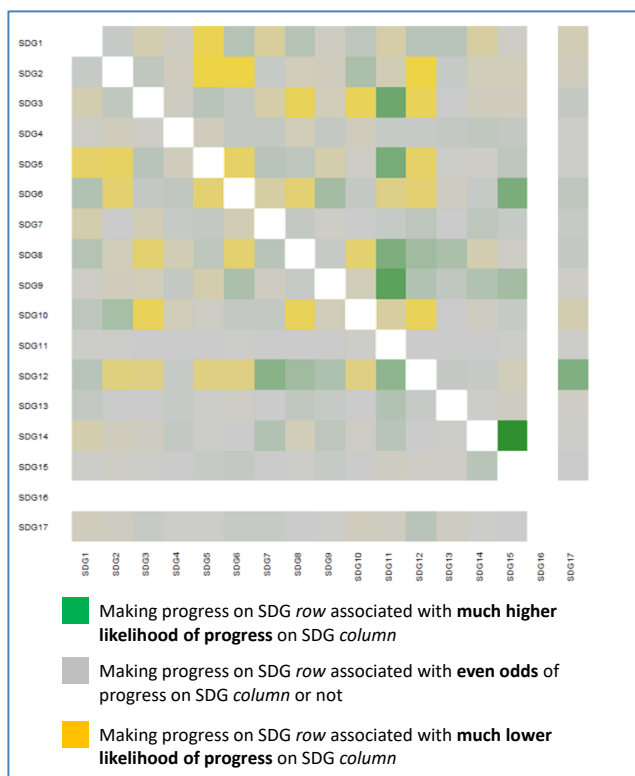


Figure 4. The global context map.

³ The code was released under an open-source license and is available at <https://github.com/sei-international/Compass-Context-Mapper>.

the values are low, which is anticipated with the global context, but some SDGs show tendencies. In particular, several SDGs reinforce SDG 11 (sustainable cities); SDG 14 (life below water) reinforces SDG 15 (life on land).

A second key building block was to create “factor maps” to serve as the basis for the context maps, identifying representative indicators for both factor themes and meta-factors.

Factor themes are clusters of factors within a particular category, such as agriculture or economic conditions. The factors identified by the SDG Expert Panel and Compass CoLab participants were put through a natural language processing tool that categorised them into 59 clusters. The project team manually reviewed the clusters and adjusted them as needed.

Meta-factors were then identified as a shorter list of indicators for which the data sets showed a significant degree of orthogonality – that is, independence from one another (see Background Report 2.2). This degree of independence was measured using p-values, which provides a regression coefficient that ranged from X to Y, with 0 meaning correlated and 1 meaning orthogonal. The fact that some degree of correlation remains in the data sets for these indicators means that combining meta-factors to describe interactions introduces some error to the results.

Countries were then categorised by quintiles under each indicator – for instance, the countries in the lowest 20% by per capita income, then the next-lowest 20%, and so on. Finally, a calculation was made of the SDG interaction scores (using the same –3 to +3 scale) corresponding to each factor level, and the statistical significance of those scores was estimated.

Once the factor maps were created, national context maps were constructed by entering the relevant indicator data to determine the levels of all the factors for the specified country.

3.3 The 2030 Compass Strategy Analyser

The 2030 Compass Strategy Analyser contains the co-creation-based and tool-supported methodology and process to assess the sustainability of different strategies. The 2030 Compass method and process is built around a series of discrete steps divided into four blocks (Figure 5).

The workshop process is typically divided into three half-days, with facilitated homework exercises in-between. The pilot test case workshops were all conducted online, but the process can easily be conducted in person as well, and the schedule can also be adjusted. A glossary of key terms used is provided in Appendix 1; they are also explained in context below.

Block A is preparatory, a partly facilitated process involving two roughly one-hour meetings and regular check-ins. In the four pilots implemented within the framework of the project, it was carried out using a virtual board made on the app MURAL, as shown in Figure 6.⁴ The task in this block is threefold:

Specify the strategy to be analysed – that is, the policy, product, process, investment or other type of intervention (or set of interventions) planned by the organisation, including its key objectives and characteristics.

⁴ See <https://start.mural.co>.

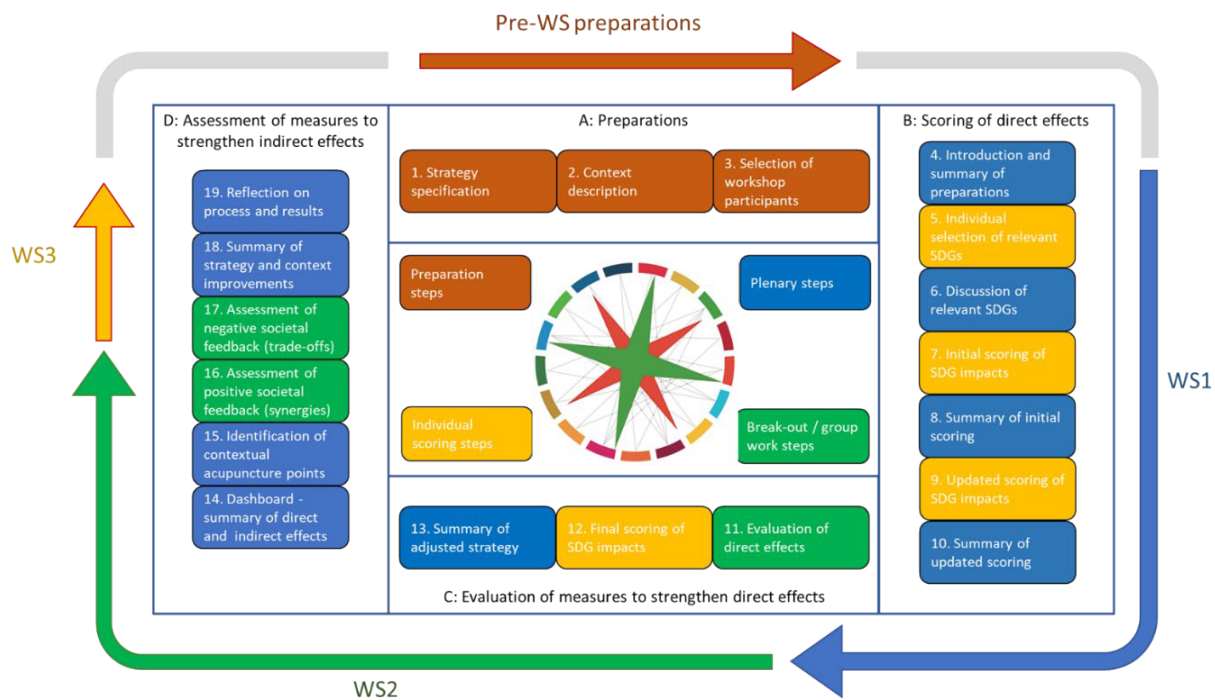


Figure 5. The 2030 Compass workshop process.

Describe the context for the case. This is based on the location(s) where the strategy will be implemented. The work is supplemented by descriptions of the targets for each SDG and other SDG-related materials.⁵ The strategy specification is used to identify specific SDG aspects that are particularly relevant and key areas of interest, based on the sector(s) involved, local conditions, known socio-economic or environmental concerns, etc.

Select the workshop participants – at least 3–4 people, and no more than 10 (for a web-based process). Participants are identified by the strategy owner in dialogue with the facilitator, based on the nature and composition of the organisation and the knowledge needed. The group should be diverse enough to include people with some experience and knowledge of all aspects of the case to be discussed and the context in which it should be analysed. Participants should also be familiar with the SDGs, particularly the goals that are deemed to be most relevant for the analysis (see below). Ahead of the workshop, the MURAL board is provided to participants as a simple score card to help them learn about the case in advance and review the SDGs.

Block B is a scoring of the expected direct effects of the strategy on the SDGs. This is the first part of the workshop sessions, organised as a series of individual assessments alternating with discussions to arrive at a first collective assessment:

Introduce the 2030 Compass approach – the process leader describes the methodology, the key steps involved, and the agenda for the session. Someone from the organisation (the strategy owner) then summarises the preparatory work and presents the strategy.

⁵ These may include, for example, the official SDGs website, <https://sdgs.un.org>; the SDG Tracker, <https://sdg-tracker.org>; and the Knowledge for Sustainable Development Interactive Repository of SDG Interactions, <https://datablog.cde.unibe.ch/index.php/2019/08/29/sdg-interactions/>.

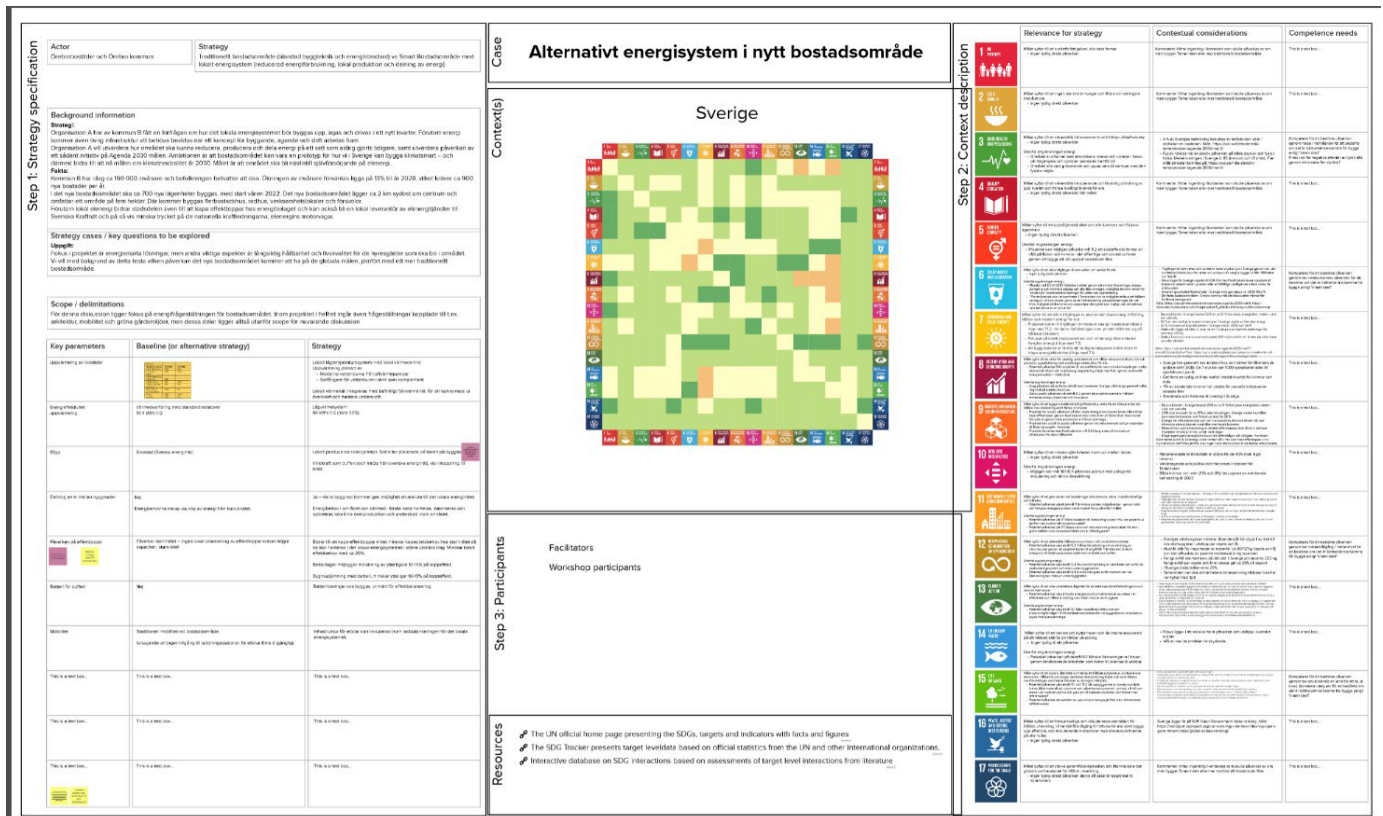


Figure 6. MURAL board for workshop preparations.

Select the relevant SDGs, guided by the 2030 Compass tool. Each participant makes an individual assessment of which SDGs they think are most relevant to the strategy – that is, which goals are likeliest to be directly affected, positively or negatively, in this societal context.

Discuss and agree on the list of relevant SDGs – the process leader presents the results, and participants are invited to explain their assessments. After discussions the group agree on which SDGs to use as the basis for the analysis.

Workshop participants score SDG impacts, using the 2030 Compass tool's Initial Scoring Assessment function. This is an individual judgement call, rating the strategy's expected impact on each SDG on a scale from +3 (strongly promoting) to –3 (strongly restricting), with 0 indicating no influence. If the strategy could have both negative and positive impacts, participants are urged to focus on the negatives, as they may require remedies. Figure 7 shows the selection and scoring interfaces.

Summarise the initial scores – this is done by the process leader, who shares an anonymised summary of the individual scores and facilitates a discussion, asking participants to explain why they chose specific scores. This is also an opportunity for participants to calibrate their scoring. Figure 8 shows how the summary is presented.

Block B concludes with two final steps:

Update scoring of SDG impacts – based on reflections from the group discussions, the participants are invited to update their individual scoring.

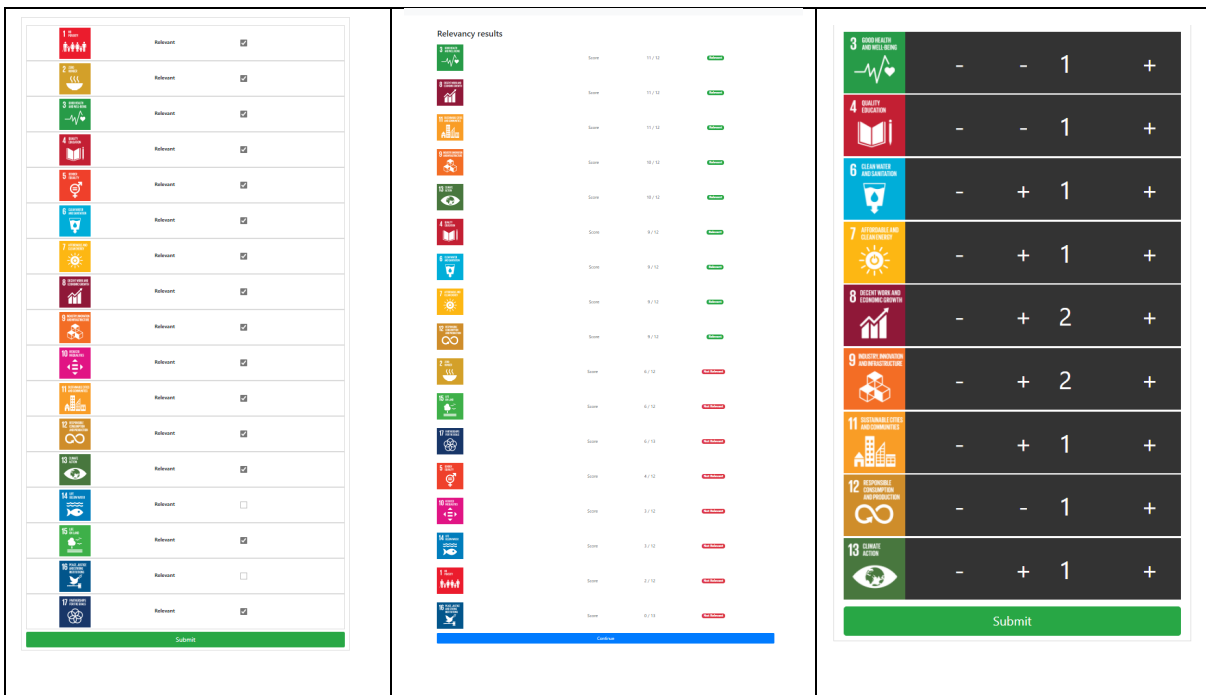


Figure 7. Interface for individual selection of relevant SDGs (left); presentation of results from joint selection of relevant SDGs (middle), and scoring tool used for the initial individual scoring exercises, the updated scoring and final scoring.

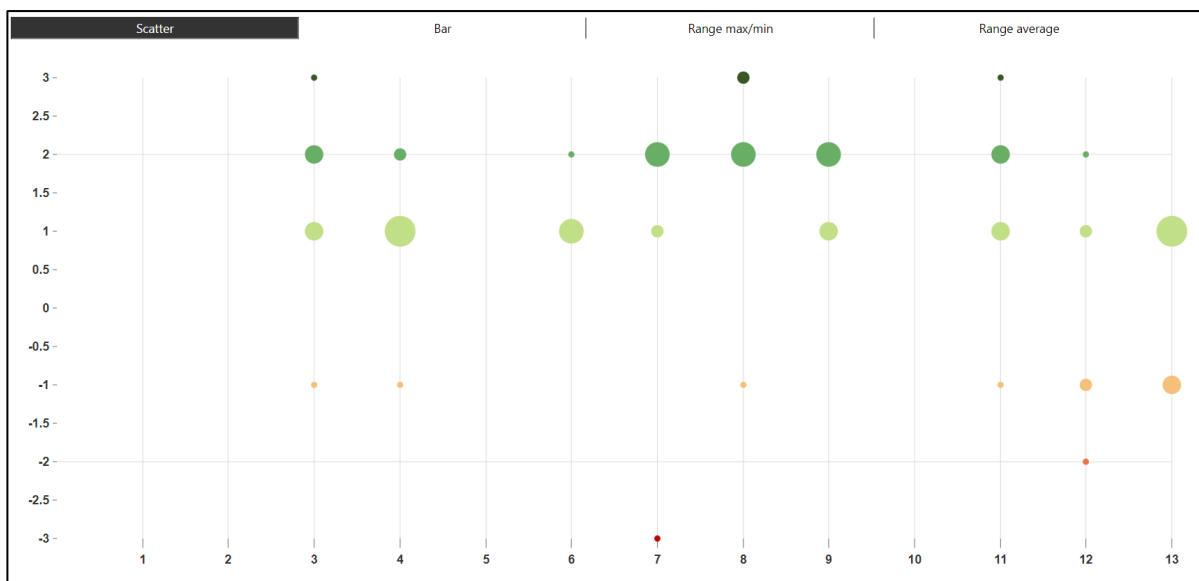


Figure 8. Presentation of results from the initial scoring exercise, updated scoring and final scoring. In addition to the “scatter” graph, the tool can present the scoring results as bars, as a range with a maximum and minimum, and as the range average.

Summarise the updated scoring – the process leader presents the results of the updated scoring, in the same way as in the previous round. The results are the point of departure for the next block of work.


Block C is a team exercise to discuss the strategy’s expected impacts on SDG progress more in depth and generate suggestions for ways to improve it to strengthen its direct positive effects and minimise its negative impacts. The group work uses a technique known as “think-write-share”, for which a MURAL board was created to guide participants (Figure 9).

Step-by-step Think-write- share instructions

What is Think-Write-Share?

Think-Write-Share is designed to provide users a structured approach to critically think through any question and serves as a starting point for hearing all voices in any discussion. This tool is very effective for enabling critical and creative thinking.


Think-Write-Share is based on the simple notion that it is often better to think something through before presenting it to others.



Step 1: THINK!

The first step is to think. What is the question at hand that you are going to consider and respond to? Did you understand the question? If not, then ask the facilitator!


- When you understand the question: think through the different considerations and responses that come to your mind.
- Then jot them down on a notepad and think through which of your ideas that you consider being most important.



Step 2: WRITE!

The second step is to write down your best two or three ideas on sticky notes. But before you go ahead and jot down a few words that make sense to you, or try fitting a small novel on the sticky note, consider how to present your idea. It is important that the others can read and understand your idea also after the workshop.

- One idea or concept on each sticky-note
- Keep it short
- Keep it simple
- Be specific so that your point gets through to the group




Step 3: SHARE!

The third step involves the whole group. The facilitator invites you one and one to present one of your ideas.

- If you have thought of proposing an idea that is similar to what someone else in the group have already proposed, then chose one of your other ideas.
- If your proposal is not identical but somewhat akin to another idea ask the facilitator to put it side by side with that note.

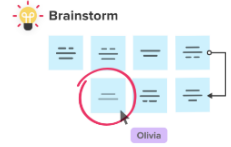
When everyone has presented their first idea the facilitator will invite you to a second and possibly also a third round of sharing ideas.



Using Think-Write-Share in Mural

Think-write-share was developed for IRL workshop with real people interacting in a room with pens, sticky notes, whiteboards and flip charts. In Mural we simulate the same features. But as we are not in the same room we cannot arrange the seating in a nice half-circle in front of the whiteboard, and we have no personal spaces for keeping the sticky notes.

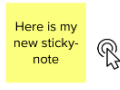
Therefore we have adopted Think-write-share to fit the the virtual room.



Adding and editing a sticky-note

Adding a sticky-note is the most simple thing you can do in Mural: Just double-click at the place in the Mural board where you like your sticky-note to appear.

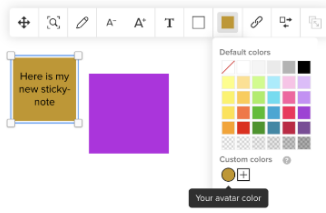
- Write down your idea on the sticky-note or - even better - copy and paste it from the notepad on your computer where you have prepared your ideas
- The font size will adjust automatically - so don't bother about that
- If you want to change something, just select the note again by clicking it and either write new text or change the text by double-clicking the text to enter a text edit mode
- Don't change the size of the sticky-note - all notes needs to be the same size



Selecting your colour for the note

It will be a lot easier to identify who has written a certain note if all participants chose their predefined and unique avatar colour for the notes.

- To set your avatar colour just select your note by clicking it once and chose the "colour" tool on the pop-up context menu - just as in the figure below
- Now, all your subsequent notes will be in your colour



Adding notes in the workshop

As are no "personal spaces" on the Mural board, you will add a sticky-note with your first idea directly in a frame on the Mural board that we have prepared for the different group exercises. The example below illustrates the set of frames that we use for assessing the strategy's direct positive and negative impacts on a certain goal and the potential for improvements to strengthen the strategy.

- Add your first note by double clicking in a frame and follow the steps in the preceding instructions
- To make it easy to add notes without covering others' notes the frames are set to align the sticky-notes automatically in a grid structure




Figure 9. MURAL board developed as an introduction for workshop participants to the think-write-share method used in the 2030 Compass group work.

The process leader introduces the MURAL board, and the group exercise begins:

- **Discuss the strategy's direct effects on the SDGs – one SDG at a time.** For each SDG, participants think on their own about impacts, first positive and then negative; write them down on sticky notes; and place them on the MURAL board (see Figure 10). When they are finished, they share their reflections with the group and consider ways to improve the strategy. This process is then repeated to cover all the relevant SDGs.

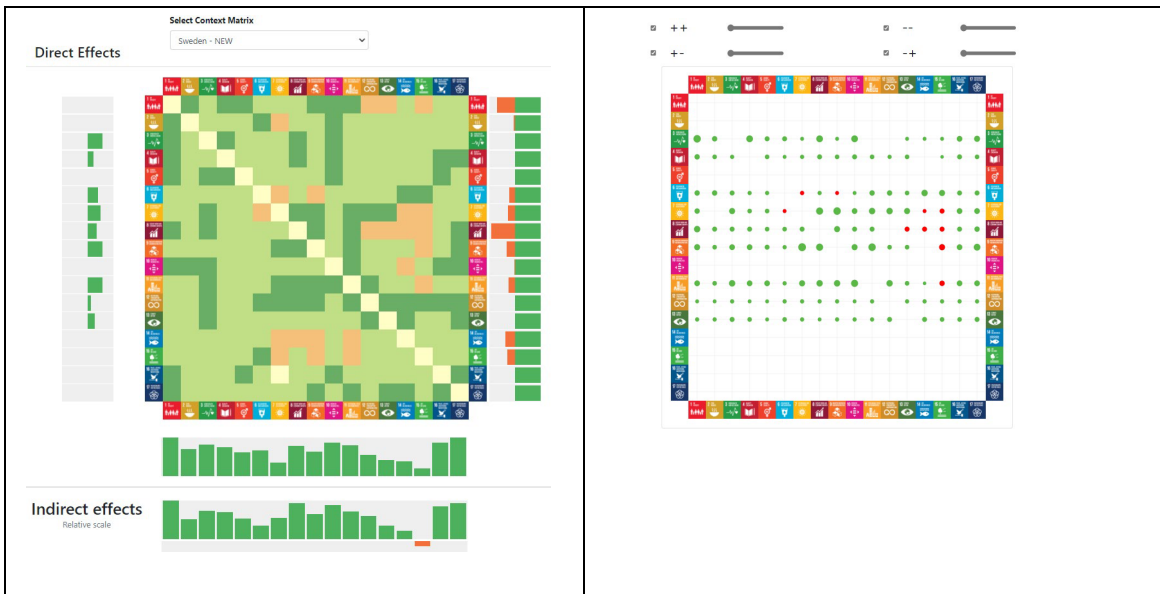


Figure 11. Dashboard view in the 2030 Compass tool (left). The bars on the right of the matrix sum up the positive and negative values in the cells in that row separately (showing how much positive and negative influence the SDG in that row has on all the others). The bars directly below the matrix sum up the net value in the column (how much the SDG in that column is influenced by other SDGs altogether). The direct effect appears at the very left, and the indirect effects are summed up at the bottom, as indicated by the headings. The Acupuncture view (right) shows all interactions. Filters above the matrix can be used to highlight the most important synergies and trade-offs.

In the next steps, participants again work together, using the think-write-share approach, to evaluate the strongest synergies and trade-offs and come up with potential improvements.

Evaluate positive societal feedback (synergies), focused on the dynamics at play when the direct effects of the strategy meet the societal context. Guided by the process leader, participants focus their work on one pair of SDG interactions at a time (see Figure 12).

Evaluate negative societal feedback (trade-offs) – this follows the same process as for synergies, but with an emphasis on finding ways to reduce or avoid trade-offs.

Synergies



Trade-offs



Figure 12. Indirect effects assessment board in MURAL.

The second workshop session can end after working through one or two SDG pairs of each type (synergies and trade-offs). Participants can continue their analysis as homework, and discuss their findings at the start of the third workshop session.

The two final steps of the Strategy Analyser process focus on synthesis and reflection:

Summarise the strategy and context improvements – the process leader facilitates a discussion to distil the key takeaways of the analysis, as well as thematic reflections and other cross-cutting issues that may have emerged. This will become the basis for the executive summary of a report that outlines the project results.

Reflect on the process and results – as a final step, participants are invited to share their impressions of and reflections on the 2030 Compass methodology and process. Again, the think-write-share method is used, this time with a matrix of strengths, weaknesses, opportunities and threats (SWOT analysis), as shown in Figure 13.

Synergies



Trade-offs



Figure 13. SWOT analysis for process reflection in MURAL.

4. Results and discussion

The project has produced the Agenda 2030 Compass, a systematic approach to assess the potential sustainability impacts of different investment options, research strategies and policies in a given context, and to identify improvements to avoid trade-offs and strengthen synergies. The Compass consists of two main components:

- The 2030 Compass Context Mapper – a tool that can be used to develop a context map for anywhere in the world, with relatively little effort, and
- The 2030 Compass Strategy Analyser, a workshop-based, tool-supported methodology that can be used to evaluate the sustainability (societal benefit) of any planned strategy, policy or investment, once a context map is in place.

In addition, the project provided insights from four pilot applications of the Agenda 2030 Compass methodology, as well as lessons about the benefits and limitations of different approaches to gathering insights about SDG interactions, globally and in specific contexts, that can inform future work.

4.1 The 2030 Compass Context Mapper

To date, the 2030 Compass Context Mapper has been used to create a detailed context map for Sweden, basic maps for Poland and India, and test applications for other countries as well. Given the strong foundation provided by the contributions of the SDG Expert Panel and the 2030 Compass CoLab participants, creating additional maps in the future would not require repeating the steps described in Section 3.2. Instead, as noted earlier, the data inputs and knowledge needed to produce a map could be gathered by working with country-level experts in as little as two or three days. That said, a broader range of perspectives could be gathered by replicating the CoLab approach, within the country of interest or more broadly. The establishment of the Compass CoLab platform created a global network of almost 200 SDG experts who could be involved in future assessments.

It is important to recognise, however, that the empirical data used by the Context Mapper – for factors such as population growth, economic transitions, changing energy mix, urbanisation and other aspects of development – are all historical, not forward-looking. This means that the resulting interaction scores, while accurate for past conditions, may not reflect likely conditions 5–10 years from now. The context maps need to be updated regularly and complemented by expert assessments to reflect evolving conditions, as well as anticipated changes in SDG interactions. One approach that has been discussed in the project team is to work with alternative SDG interaction scenarios or complementary interactions assessments using the Compass CoLab to enrich the analysis of possible synergies and trade-offs.

4.2 The 2030 Compass Strategy Analyser

The strategic assessment process created through this project can be applied in three different ways, depending on the needs of the strategy owner. They could also be combined into a tailor-made process:

1. **One strategy, one context:** The workshops focus on assessing the societal benefits (SDG impacts) of a single strategy in a single context, and on refining the strategy to maximise synergies and minimise trade-offs, thus achieving greater benefits. The steps described in Section 3.3 reflect this use case.

2. **Several alternative strategies, one context:** The workshops focus on comparing the impacts of different alternative or complementary strategies in a specific context (and, as appropriate, also consider ways to refine the different options).
3. **One strategy, several contexts:** Similar to the first use case, but also comparing the expected impacts of a given strategy across several contexts – for instance, for international projects, or when multiple locations are being considered.

Four case studies were carried out to pilot-test the 2030 Compass process and tools, all using the context map developed for Sweden. Table 2 summarises the studies.

Organisation	Strategy tested	Participants and workshops
Stilride – Small start-up company making lightweight steel electric scooters	Sustainability aspects of the company’s light-fold (“industrial origami”) production of e-scooters compared with current scooter production methods, with a view to enhancing synergies and mitigating trade-offs to increase societal benefit	3 participants / 2 sessions
Ascend – Management consultancy specialising in sustainable business transformations	Smart energy housing solution developed for a residential area by Örebrobostäder (municipal housing company) with the aim to achieve greater local self-sufficiency and progress towards the SDGs compared with a traditional energy system	4 participants / 3 sessions
Kalmar municipal administration	A new mobility strategy with the aim to shift from a current 60% share of private car based mobility to a 60% share of walking, cycling and public transport, taking into account broader urban development objectives	7 participants / 2 sessions
Ramboll – large management and engineering consultancy in collaboration with Skåne Regional Council	Innovation strategy for the Skåne region in light of the 2030 Agenda	9 participants / 3 sessions

Table 2. Case studies and strategies tested (number of participants excludes the two process leaders and two experts from SEI).

All four case studies involved the first use case – one strategy, one context. However, in the Stilride study, participants reflected on, but did not fully analyse, how the strategy could also provide societal benefit in other contexts, such as in developing countries. The Stilride and Kalmar case studies focused on strategies that are under development, while the Örebro and Skåne studies reviewed existing strategies. The results of the analyses are presented in separate reports; for illustration, Box 1 presents a sampling of the discussions in Kalmar.

Box 1. A 2030 Compass perspective on a new mobility strategy for Kalmar municipality

As Kalmar municipality is growing, a new mobility strategy is being developed to promote sustainability, residents' health and well-being, and the needs of local businesses. A key objective is to increase the share of trips made by walking, cycling and public transport from 40% to 60% by 2035 (the rest are made in cars) and to create more green spaces.



Kalmar harbour © Wikimedia

The 2030 Compass workshop process identified several potential direct benefits of the new strategy, including reduced greenhouse gas emissions (SDG 13) and pollution levels (SDG 15), as well as improved health and well-being (SDG 3) and safer roads. The strategy's emphasis on inclusion was expected to improve gender equality (SDG 5) and reduce inequalities (SDG 10).

The process resulted in proposals for making walking, cycling and public transport more attractive – for instance, through greenery along bike routes (SDG 3), guides, bike parking, sheltered public transport stops, and the integration of educational and cultural initiatives in public transport (SDG 4). Other suggestions included the importance of planning for extreme weather events, such as torrential rains (SDG 13), and integration of green and blue infrastructure.

Using the 2030 Compass acupuncture point analysis, the workshop identified a number of indirect trade-offs and potential synergies. A central proposal concerned the importance of sustainable urban design (SDG 11) and the “15-minute city” concept, which aims to ensure that key public services can be reached within a 15-minute walk, bike ride or public transport trip. Reducing the need to drive can also help reduce disparities between car owners and those who cannot afford them (SDG 10). Another suggestion addressed the potential for sustainable growth and job creation through better coordination on sustainable mobility solutions for the larger Kalmar County region, including regional actors such as neighbouring municipalities, regional businesses, and the Swedish Transport Administration (SDG 17).

4.3 Reflections on the 2030 Compass approach

As a stand-alone reflective research activity, the project team gathered input from the case study participants through pre-workshop interviews, SWOT analyses at the end of the workshops, a web-based evaluation, and follow-up interviews. The following reflections build on the structured feedback from workshop participants and conclusions drawn by the project team.

Although knowledge of the 2030 Agenda and the SDGs varied across the organisations (and within them), all had high expectations for the 2030 Compass to help delivering sophisticated analysis about sustainability synergies and trade-offs associated with their respective strategies.

Key strengths that were highlighted by case study participants included the opportunity to exchange knowledge and learn with others; a more holistic understanding of the 2030 Agenda, including SDG interactions; the ability to generate concrete ideas for improving strategies; and the ease of participation, with an intuitive process and an

accessible digital format. Several opportunities were identified, including the potential to use the 2030 Compass regularly to test different strategies and to foster collaborative learning within organisations.

On the risk side, participants highlighted that results may depend on the knowledge, experience and competencies of participants. It is therefore crucial to recruit the right people to avoid missing important perspectives. This risk was seen as greatest when discussing the indirect impacts of strategies, some of which may not be evident without deeper knowledge on specific subjects.

Overall, participants expressed satisfaction with how the 2030 Compass process had helped them learn about the SDGs and work as an organisation to ensure that their strategies contribute to sustainability and create societal benefit. They were particularly positive about the think-write-share based group work, while recognising that some steps in the process were inherently challenging and requiring the kind of good professional facilitation that was provided by the project team. Facilitator qualities that were particularly mentioned by the participants included the ability to carefully lay out the process and tools to participants at the outset; to guide them through the process, leading and stimulating discussions without proactively suggesting solutions; and to help the group synthesise its conclusions, in conversation and as part of a final report.

To cover all these needs in the four case studies, there was a process leader who was responsible for the overall facilitation, supported by a co-facilitator who was responsible for reflection and feedback on contents. Scaling up the use of the 2030 Compass tool will require structured training and certification of process leaders to ensure good outcomes.

Due to the pandemic, the 2030 Compass process, which was originally meant to be conducted in person with software support, was revised to work fully online. The use of the MURAL platform enabled the team to mimic the use of whiteboards, sticky notes and other artefacts commonly used in workshops. At the same time, the 2030 Compass tool had to be used for several tasks – making it necessary to switch back and forth between apps, each with different login procedures. Going forward, opportunities should be explored to better integrate MURAL and the 2030 Compass tool or smooth transitions between them. As pandemic restrictions are lifted, in-person applications of the methodology will provide a complementary approach to implement strategic assessments.

Finally, as highlighted by Di Lucia et al. (2022), a key challenge in these types of sustainability assessments is to strike a balance between a process that is simple, transparent and easy to implement with groups, and an analysis that generates relevant and reliable results. The feedback from case study participants strongly indicates that the 2030 Compass has succeeded in that regard. Still, it is important to design each case study carefully and to tailor the facilitation, implementation and follow-up to the characteristics of each case, including scope of the strategy, contextual focus, and participants' needs and expectations.

4.4 Reflection on different approaches to gather insights about SDG interactions

The research behind the 2030 Compass provided several lessons on the relative merits of different approaches for representing the context in which a planned intervention takes place, and how the way it is modelled may affect sustainability outcomes directly and indirectly. Key insights concern how to handle direct versus indirect effects, as well as the limits of dynamic modelling compared with expert judgement-based assessments.

While it is fairly straightforward to assess the direct effects of a certain intervention on each of the SDGs, the assessment of indirect impacts is more complex. The indirect effects are “dynamic” in nature, as they emerge as a knock-on effect when a direct impact alters the preconditions for positive or negative developments of other SDGs. These dynamics are captured by the SDG interaction matrix, which is only valid for a specific societal context, spatially and temporally. As it is not feasible to assess the relative strength of the direct and indirect effects, it is not possible to calculate the combined impact of direct and indirect effects – a “total societal benefit score”. Therefore, direct and indirect effects need to be addressed separately when assessing the total scope of potential for positive societal synergies and negative trade-offs.

It is very difficult to model dynamically the future outcomes/impacts of an intervention. To begin with, the SDGs are the result of a politically negotiated process and were not developed as a basis for dynamic modelling. Moreover, each SDG contains a broad range of preconditions and sub-targets, adding a layer of complexity that makes it extremely difficult – if not impossible – to assign them an aggregate score. As a result, a dynamic model could at best describe what could happen if a certain, fixed set of preconditions were anticipated and the exact aspect of each SDG could be specified. Even then, any unanticipated event would likely invalidate the results.

Therefore, the 2030 Compass has been developed not as a quantitative modelling tool, but as a process for structured collective reflection on and assessment of the potential for a certain intervention to provide robust sustainability improvements across all SDGs, both as direct impacts and indirectly through societal knock-on effects.

There are clearly trade-offs between a comprehensive and easy-to-apply process with actionable results on the one hand, and a more rigorous “scientific” process with quantitative results on the other. A conclusion from the research on the 2030 Compass is that using “triangulation” to bring together different methods, as an incremental process that combines empirical data, algorithms and expert assessment, can help us gradually reach deeper insights in sustainability synergies and trade-offs of different types of interventions in various contexts. We also identified some limitations to the Context Mapper methodology used in this project, which are discussed in the WP2.1 report.

5. Conclusion and ways forward

The Agenda 2030 Compass has established a new co-creation-based process and tool to support decision-makers to assess the societal benefit of a planned intervention by analysing its sustainability implications in a specific societal context, based on how it may affect the attainment of the SDGs, both directly and indirectly.

The approach was successfully tested in four case studies, demonstrating its usefulness across multiple settings. Although the case studies were all set in Sweden, contexts maps could be created to support applications in any country with as little as two or three days' work. Should participants want more detailed maps, the project has also demonstrated how both an expert panel and a crowdsourcing platform can be used to generate more insights about SDG interactions in a specific context.

The research team has identified a number of areas with potential for further research to expand on the work done in this project and apply the 2030 Compass tool more widely:

- **Context maps:** Further development of the methods researched in the project to combine empirical data with expert assessments to generate context maps for different places;
- **Development of the process:** Further refinement of the different steps of the process, as well as development of an expanding body of evidence through successive workshops;
- **Analysis of experience-based data:** Research to understand users' experience with the tool, as well as with the application of resulting insights, could inform the further development of the 2030 Compass tool;
- **Analysis of change processes:** Each case describes a change process; continued work could involve learning about how the processes of change took shape, and what some of the driving forces and challenges were along the way.

The 2030 Compass shows significant promise as a decision-making tool to ensure stronger benefits across society. The research team is committed to continuing to develop the methodology and the tool itself, in collaboration with both existing and new partners. As momentum builds around the world to tackle climate change and build a truly sustainable and inclusive future, the 2030 Compass can help stakeholders make more informed decisions.

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Appendix 1: Glossary

The 2030 Compass project has developed a terminology to make it easier to refer to specific features. Below are definitions of key terms:

Acupuncture points: SDGs/targets where interventions will have substantive impact in relation to the strategy in the given context.

Context mapper: A component of the 2030 Compass that based on data, assessments and algorithms can generate an SDG interaction matrix for a specific context.

Direct effects: SDGs/targets where the effects of a strategy have a direct impact. The direct effects are assessed by the workshop participants.

Indirect effects: SDGs/targets where impacts from a strategy are caused through the direct impact on other SDGs/targets. The indirect effects are calculated through the SDG interaction map and thus assessed by the SDG tool.

Scoring tool: A component of the 2030 Compass that compiles an aggregate assessment of a strategy's impacts on specific SDGs based on workshop participants' individual assessments.

SDG interactions: The degree of synergy or trade-off on another SDG resulting from progress (or regress) on one SDG.

SDG interaction map: A matrix showing the strength of the SDG interactions ranging from +3 (strongly reinforcing) to -3 (strongly conflicting), with a score of 0 indicating a neutral interaction.

Societal context: A location, usually territorially and/or typologically defined, with a specific set of SDG interactions that are contingent on the area's preconditions. A context could be a specific country, region or city, or another area that is defined by a limited set of key parameters, e.g. income, access to energy water and sanitation, and social stability factors.

Strategy: An organisation-specific plan to reach specific objectives set by the organisation and which may have positive or negative impacts on the SDGs in a certain location. A strategy could involve different kinds of interventions, such as policies, products, materials, production process, modalities, etc. to be implemented in a specific context.

Strategy owner: The organisation responsible for the strategy to be assessed.

Vector: A vector is mathematically defined as a quantity having direction as well as magnitude. In the project, vectors are used to represent scoring of SDG interactions using the averaged seven-point scale. Vectors include 17 elements, one for each of the SDGs, and characterise direct effects, the strategy being considered in the workshop context and the indirect effects.

Appendix 2: Project Organisation and participants

Name	Organisation
Karl Hallding	Stockholm Environment Institute
Timothy Suljada	Stockholm Environment Institute
Katarina Axelsson	Stockholm Environment Institute
Åsa Gerger Swartling	Stockholm Environment Institute
Eric Kemp-Benedict	Stockholm Environment Institute
Sara Talebian	Stockholm Environment Institute
Emily Ghosh	Stockholm Environment Institute
Anisha Nazareth	Stockholm Environment Institute
Susie Bresney	Stockholm Environment Institute
Stefanie Chan	Stockholm Environment Institute
Ylva Rylander	Stockholm Environment Institute
Marcus Carson	Stockholm Environment Institute
Somya Joshi	Stockholm Environment Institute
Robert Laubacher	MIT Center for Collective Intelligence
Carlos Botelho	MIT Center for Collective Intelligence
Oliver Meindl	MIT Center for Collective Intelligence
Ricarda Schäfer	MIT Center for Collective Intelligence
Mathis Stolz	MIT Center for Collective Intelligence
Christian Burkhardt	MIT Center for Collective Intelligence
Henrik Blidh	Swedwise
Christoffer Bäckström	Swedwise
Daniel Grindelid	Swedwise
Teres Wåhlén.	Swedwise
Gert Nilson	Jernkontoret
Eva Blixt	Jernkontoret
Rasmus Östlund	Jernkontoret
Anna Ponzio	Jernkontoret
Jon-Erik Dahlin	Consultant, Snowflake Education
Kristian Skånberg	Consultant
Stefan Bößner	Consultant

Description of the project organisation

The project is coordinated by Jernkontoret in its role as Programme Office for the Strategic Innovation Programme on Metallic Materials. The main implementation is led by the Stockholm Environment Institute (SEI) in close cooperation with research partners, MIT Centre for Collective Intelligence (CCI) and business partner, Swedwise (formerly Foxway). The total budget is 10,151,927 SEK.

The project comprises six work packages, as follows:

WP1	Management	Administrative management of the project
WP2.1	SDG Panel	Establishment of SDG expert panel and development of method for SDG interaction assessment
WP2.2	Crowd sourcing	Establishment and development of crowd sourcing platform for SDG interaction assessment
WP3-4	Model design	Development of software tool
WP5	Participatory process	Development of process for assessment of SDG impacts of strategic alternatives
WP6	Dialogue and communication	Communication and dialogue about project development and results

Appendix 3: Publications

In addition to this report, the published outputs of this project include:

Manuscript in preparation for refereed publication:

Gerger Swartling, Å., Axelsson, K., Dahlin, J.-K., Hallding, K., and Skånberg, K. (2022, forthcoming). *“Putting the SDGs into action: Insights from co-creation processes in Swedish organisations.”*

Internal reports:

Nr	Title	Authors
E1	WP2.1 Report	Timothy Suljada, Eric Kemp-Benedict, Stefan Bößner, Emily Ghosh
E2	WP2.2 Report	Robert Laubacher
E3	WP3 Report	Jon-Erik Dahlin
E4	WP5 Report	Karl Hallding, Katarina Axelsson, Åsa Gerger Swartling, Kristian Skånberg
E5	Case study report: Stilride	Karl Hallding
E6	Case study report: Ascend	Karl Hallding
E7	Case study report: Kalmar municipality	Katarina Axelsson, Åsa Gerger Swartling, Kristian Skånberg, Karl Hallding
E8	Case study report: Ramboll / Region Skåne	Katarina Axelsson, Kristian Skånberg, Åsa Gerger Swartling, Karl Hallding
E9	Workshop report on future development opportunities	Rasmus Östlund

Appendix 4: Other dissemination

Briefs:

Hallding, K., Suljada, T., Axelsson, K., Gerger Swartling, Å., and Davis, M. (2022, forthcoming). "The Agenda 2030 Compass: A tool for knowledge co-creation to achieve societal benefit." Brief. Stockholm Environment Institute.

Hallding, K. and Blixt, E. (2020). "Agenda 2030 Compass: A strategic decision-support tool grounded in the SDGs." Brief. Stockholm Environment Institute. <https://www.sei.org/publications/a2030-compass-decision-support/>

Seminars and other presentations:

Nr	Title	Authors	Date- place
K1	Agenda2030-Kompassen, Ett verktyg för ökad hållbarhet Agenda2030-Kompassen, Ett verktyg för ökad hållbarhet - Metalliska materials Programkonferens 2020 - YouTube	Karl Hallding and Eva Blixt	March 2020 Metallic Materials annual conference
K2	The SDG Workbench for Agenda 2030 Infotrek and Swedwise contribution to SAS Hackathon 2020 - The SDG Workbench for Agenda 2030 (short) - YouTube (12) Infotrek and Swedwise contribution to SAS Hackathon 2020 - The SDG Workbench for Agenda 2030 (long) - YouTube	Infotrek and Swedwise	March 2020, Infotrek and Swedwise contribution to SAS Hackathon 2020
K3	Agenda 2030-kompassen – vägen till samhällsnytta genom FN:s globala mål Industrinytta Agenda 2030 - YouTube	Karl Hallding and Hanna Friberg, SSAB	March 2019, Metallic Materials annual conference

Appendix 5: Description of the programme

Projektet Agenda 2030 Compass är en del av det strategiska innovationsprogrammet

Metalliska material

Det strategiska innovationsprogrammet **Metalliska material** är ett samverkansprogram mellan Jernkontoret, Svenskt Aluminium och Gjuteriföreningen som delfinansieras av VINNOVA och löper under åren 2013–2019.

Programmets syftar till att förverkliga den strategiska innovationsagendan **Nationell samling kring metalliska material** vars långsiktiga vision är att svensk metallindustri ska vara ett centralt element i världens strävan att forma en bättre framtid. Det innebär att dess erbjudanden till kund måste ligga i den absoluta tekniska, ekonomiska och miljömässiga framkanten och utvecklas av drivna och engagerade människor. Samtidigt ska tillverkningsmetoderna ha ett så litet miljömässigt fotavtryck som det bara är möjligt.

Programmet stödjer insatser inom sju insatsområden för förnyelse, tillväxt och ökad konkurrenskraft:

- Utveckla erbjudandet!
- Öppna värdekedjan!
- Öka materialutvecklingstakten!
- Öka flexibiliteten!
- Öka resurseffektiviteten!
- Minska miljöpåverkan!
- Öka kompetensen och attraktiviteten!

Programmets insatser består förutom FoU-projekt som valt i öppna utlysningar, även av strategiska projekt och aktiviteter.

Programkontor, med ansvar för ledning och administration av programmet, är Jernkontoret.

Radera ej denna rad

Appendix 6: Sustainability

Effect of the project: As a desk-based project, the actual implications of the process and tool would only be felt during its application. However, there have been positive effects generated by the project through the capacity and competence it has developed among project participants and case study stakeholders.

Reference case: The reference case would be a counter-factual where the process and tool were not developed by partners and with case study stakeholders.

	1. Raw materials	2. Production	3. Use	4. Recycling	5. Residuals
A. Use of resources	0	0	0	0	0
B. Emission of greenhouse gases	0	0	0	0	0
C. Other emissions	0	0	0	0	0
D. Influence on the natural environment	0	0	0	0	0
E. Working environment and health	0	0	0	0	0
F. Human rights	0	0	0	0	0
G. Equality and diversity	0	+	+	0	0
H. Economic advantage for companies	+	+	+	+	+
I. Economic advantage for society	+	+	+	+	+

Area (e.g. A-I, E-4)	Describe how the project affects this aspect of sustainability	
Positive aspects (+)	G	Equality and diversity was promoted by bringing a greater understanding of competence areas that are important for decision-making in the development and use of the process and tool
	H, I	The process and tool development identified new and lucrative opportunities for business and society in exploiting unaddressed aspects of Agenda 2030 that have direct and indirect linkages to main lines of business of partners and case study stakeholders
Negative aspects (-)		

The Swedish Iron and Steel Producers' Association

Jernkontoret

Since its foundation in 1747, Jernkontoret has been owned jointly by the Swedish iron and steel companies. Jernkontoret represents Sweden's iron and steel industry on issues that relate to trade policy, research and education, standardisation, energy, the environment and sustainability as well as transportation issues. Jernkontoret also manages the joint Nordic research on steel. In addition, Jernkontoret draws up statistical information relating to the industry and carries out research into the history of mining and metallurgy.

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The **Agenda 2030 Compass** is an innovative tool developed by **Stockholm Environment Institute (SEI)** and **Jernkontoret** (the Swedish steel producers' Association). The purpose of the Agenda 2030 Compass is to increase various social actors' understanding of how they can work for increased societal benefit, in line with UN's global goals under the 2030 Agenda.

Project partners include the Swedish Steel and Iron Producers' Association **Jernkontoret**, **Stockholm Environment Institute (SEI)**, **MIT Center for Collective Intelligence** and the company **Swedwise**. The project is led by **Jernkontoret** and financed by the strategic innovation programme **Metallic Materials**, managed by **Vinnova**, Sweden's Innovation Agency.



Jernkontoret



SWEDWISE



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