

# Digital Sustainability Playbook



Version 0.5 – November 2025

Part of a Sustainable Supply Chain Framework  
co-developed by



and the



## Table of Contents

<b><i>Introduction</i></b> .....	<b>4</b>
<b><i>Sustainable Supply Chain Framework</i></b> .....	<b>4</b>
<b>Use Case Library</b> .....	5
<b>Sustainability Reference Architecture</b> .....	5
<b>Solution Building Block Repository</b> .....	7
<b>Solution Development Copilot Platform</b> .....	7
<b><i>Digital Sustainability Maturity Model</i></b> .....	<b>8</b>
<b>Transparency</b> .....	9
<b>Acceleration</b> .....	9
<b>Process Optimization</b> .....	9
<b>Product Optimization</b> .....	9
<b>Digital Technology Optimization</b> .....	10
<b><i>Business Value</i></b> .....	<b>11</b>
<b>Business Value Portfolio</b> .....	11
UN Sustainable Development Goals.....	11
GRI Standards .....	12
Corporate Sustainability Reporting Directive (CSRD) .....	12
Scientific Base Target Initiative (SBTi) .....	12
Business Value Portfolio Example.....	12
<b>Business Value Scorecard</b> .....	13
Business Value Scorecard Example .....	13
<b><i>Sustainability Data Model</i></b> .....	<b>15</b>
<b><i>Sustainability Use Cases</i></b> .....	<b>16</b>
<b><i>Business Capabilities</i></b> .....	<b>18</b>
Business Capability Example .....	19
<b><i>Digital Capabilities</i></b> .....	<b>20</b>
<b>PLM</b> .....	21
<b>ERP</b> .....	21
<b>CRM</b> .....	21
<b>MES</b> .....	21
<b>EAM</b> .....	21
<b>SCM</b> .....	21
<b>Data Spaces</b> .....	21
<b>Digital Product Passports</b> .....	22
<b>Digital Twins</b> .....	22
<b>Agentic AI</b> .....	22
<b>Copilots</b> .....	22

<b>IaaS .....</b>	<b>22</b>
<b>PaaS .....</b>	<b>22</b>
<b>Monitoring.....</b>	<b>22</b>
<b>CS (Control Systems).....</b>	<b>23</b>
<b><i>Digital Sustainability Roadmap .....</i></b>	<b>23</b>
<b>Strategy Execution .....</b>	<b>24</b>
<b>Center of Excellence.....</b>	<b>24</b>
<b>Strategic Alignment .....</b>	<b>24</b>
<b>Portfolio and Investment Processes .....</b>	<b>25</b>
<b>Business Process Management and Enterprise Architecture .....</b>	<b>25</b>
<b>Enterprise Performance, Risk and Compliance Management.....</b>	<b>25</b>

## Introduction

The purpose of this Playbook is to support organization on their sustainability transformation journey and in particular help with the creation and execution of a Digital Sustainability Strategy.

The Digital Sustainability Playbook itself is part of the Sustainable Supply Chain Framework and is referring to the other framework components as industry best practices to successfully define and deliver a digital sustainability strategy.

The MIT Alumni Energy, Environment and Sustainability Network and Platform Industrie 4.0, together with its partner ecosystems have created the Sustainable Supply Chain Framework as a tool and approach to accelerate the development of digital sustainability solutions in global supply chains, while improving the quality of those solution at the same time. Every day that a digital sustainability solution gets into production earlier or has a new functionality implemented earlier, has a positive impact on the sustainability performance of the organization. The acceleration also means less effort and the money saved that can be invested in other digital sustainability innovations.

This playbook is not supposed to be a cookbook, where you follow a specific recipe, but rather an approach that needs to be tailored to the specific organization, that wants to use digital technology on their sustainability transformation journey. Still it mentions all the required ingredients and is based on the vast amount of experience INOVIA Solutions has around strategy design and execution through enterprise architecture.

In the digital and sustainability sphere there are many approaches, guideline, standards, reference models, etc., but we found that while those help with specific aspect of the sustainability challenge, they do not address it holistically. The Sustainable Supply Chain Framework was not created to reinvent the wheel, but rather put what is already out there in a framework that can be used for strategy execution and solution development. Any potential gaps in the framework discovered by using it in practice, will be filled, as it is set-up as part of an open-source project that resides on a public GitHub page (<https://github.com/mitsf09/sscf/wiki>) and follows the Creative Commons 4.0 licensing model.

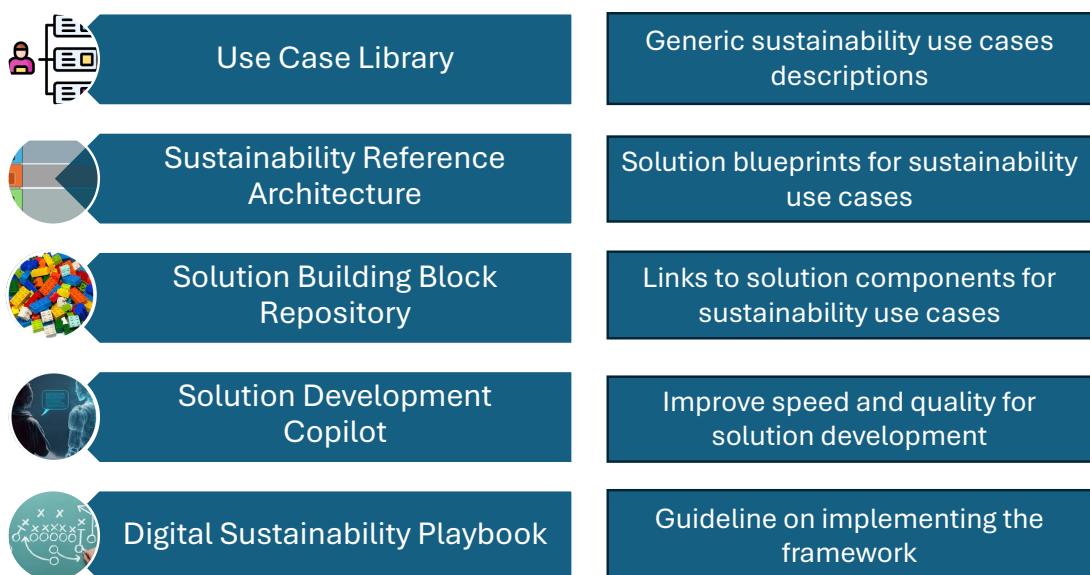
As of November 2025, the Sustainable Supply Chain Framework is governed by the Digital Sustainability Group of the MIT Alumni Energy, Environmental and Sustainability Network and is co-developed with the MIT Innovation Network.

## Sustainable Supply Chain Framework

Most organizations are part of a (global) supply chain and while they can control their own sustainability impact, they pass their impact on to their customers included in their

product and services and they are impacted also by the input they receive for their supplier and business partners.

Because the sustainability challenges and opportunities in a global supply chain cross the boundaries of many organizations, it is difficult to address them end-to-end, as the strategies, business planning and used technologies are very different across the supply chain participants. Here the usage of standards helps, especially as data is exchanged between supply chain partners. In order to leverage the standards to create business benefits, each organization needs to make certain digital investments. As many standards are already available or in development, the Sustainable Supply Chain Framework refers to them, based on specific business challenges and opportunities, described as use cases within the framework.



*The Sustainable Supply Chain Framework*

## Use Case Library

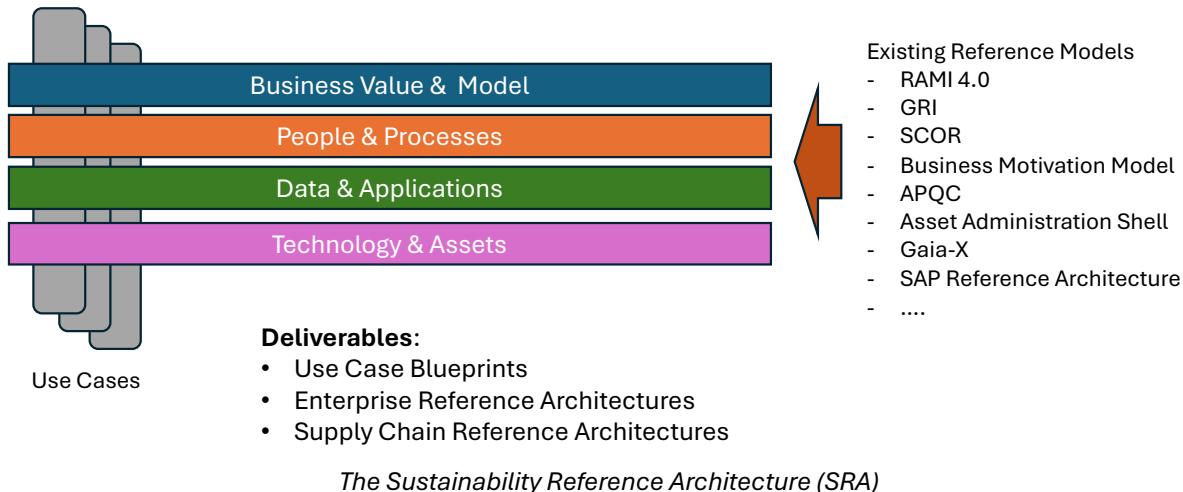
This is a collection of use cases that describe business challenges and opportunities in the realm of sustainability, where the respective solution is described as a reference model in the Sustainability Reference Architecture.

The Use Cases are documented on the GitHub Wiki of the Sustainable Supply Chain Network.

The organization can use this Use Case Library to see if the use case it has already collected and documented (see section “Sustainability Use Cases” in this Playbook) can be extended. If it has already identified Sustainability Use Cases that are in the Use Case Library, it benefits from the existing solution blueprints in the Sustainability Reference Architecture.

## Sustainability Reference Architecture

The Sustainability Reference Architecture (SRA) provide blueprints for the design of a solution implementing a use case.



The SRA is a “living reference architecture”. This means it grows with every reference model that is added. Besides its use case centric content, the SRA also contains reference model that cover specific Solution Layers. One example is the Asset Administration Shell and its asset-specific sub-models, that are part of the Data & Application Layer. Another example is the APQC Process Content Framework, that sits in the People & Process Layer or the GRI metrics that belong into the Business Value & Model Layer. This means that even if you don’t find specific solution blueprints in the S2A for one of your use cases, you can still find valuable reference content in form of reference models in a specific Solution Layer or you may be able to reuse parts of a use case specific reference model.

We are always interested to add use case specific reference models. In order to protect the potentially included IP, we abstract an organization-specific model into an industry-specific reference model that becomes open-source IP and part of the SRA.

A description of the SRA can be found here on the GitHub Wiki of the Sustainable Supply Chain Framework.

The SRA models are also available as content for the following architecture modelling tools:

- BizzDesign HOPEX

As all models are in a standard modelling notation, either ArchiMate, BPMN or UML, they can be imported in any modelling tool that supports those standards.

If you implement your use cases as part of a strategic sustainability roadmap, the SRA can give you the required business and technology capabilities.

If you define and implement a Digital Sustainability Maturity Model as described in this Playbook you can map the use cases and capabilities against the different maturity levels.

In order to optimize the implementation of digital sustainability solutions, we recommend looking into how your existing solution development process can be improved. After the low-code/no-code “movement”, generative AI is now ready to

support the software developer with what is now known as Co-Pilots. Besides the Cloud Platform vendors, Co-Pilots now also make their way into the business application and automation world. Co-Pilots do not only reduce the time and effort in solution development, but also increase the quality of the code and configuration.

There is an elephant in the “solution development room” tough. The low-code/no-code approach already reduced not only the efforts of coding, but also the percentage coding has in the end-to-end solution development life cycle. GenAI and Co-Pilots further reduce this percentage. In the past, testing benefited already from automation and so did solution deployment with approaches like DevOps and software containers. What remained excluded from productivity and quality improvement in the last 20-30 years were the early phase of a solution delivery project, so analysis, architecture and design.

Here the Sustainable Supply Chain Framework introduced the concept of a Solution Development Copilot to reduce effort and increase quality in the early phase of a project. This is more needed than ever before, as the solution are getting more complex. We are no longer talking about only the implementation of a business solution, like ERP or CRM, but for example Digital Twins that usually have a two-digit-number of software products required to build an end-to-end solution. This increased complexity has especially impact on the solution architects that have to design a solution for a specific use case.

## Solution Building Block Repository

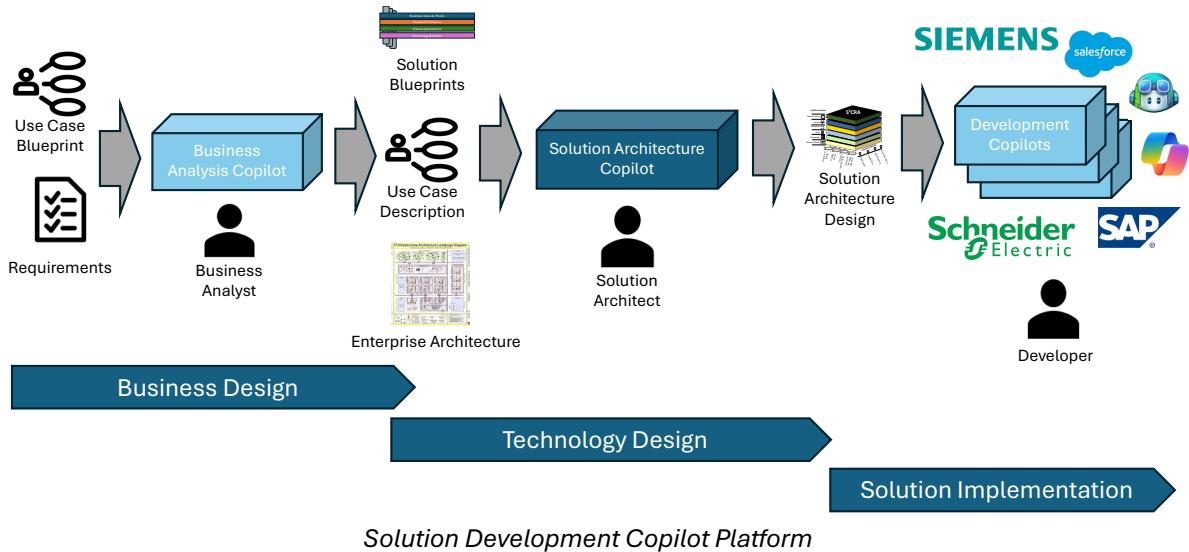
For each implemented use case, whose reference model is in the SRA and hence can be used by the Solution Development Copilot Platform, the used technologies and products are documented in the Solution Building Block Repository. As the same functionality can often be implemented with different products and technologies the Solution Building Block Repository can also give you an indication of the available technology options you can chose from for the implementation.

The Repository can be found on the Sustainable Supply Chain Framework GitHub Wiki and also in the following modelling tools:

- BizzDesign HOPEX

## Solution Development Copilot Platform

The Sustainable Supply Chain Framework was initially developed to help small and medium-sized manufacturing with the implementation of sustainability regulation in the EU using digital technologies like Digital Twins and Data Spaces. The Solution Development Copilot concept was designed as an accelerator in the development of digital sustainability solutions.



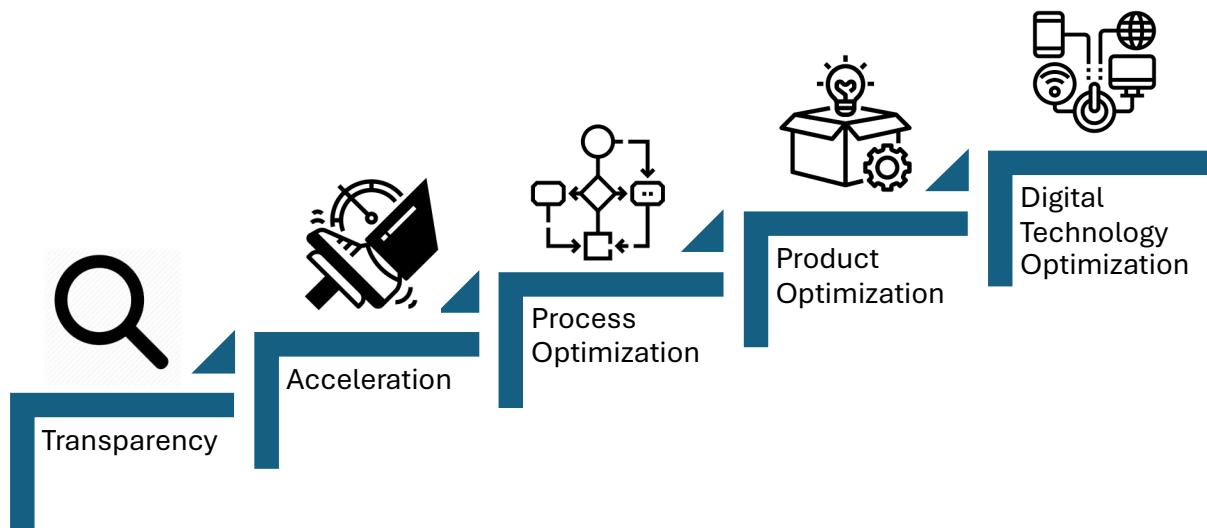
The Solution Development Copilot Platform uses and integrates Copilots that are based on specific roles in the solution development life cycle. While there are a lot of copilots already for developers already, Copilots for Business Analysts and Solution Architects are still in the research phase as of October 2025.

The MIT Alumni Energy, Environmental and Sustainability Network is running an open-source project to create a Business Analysis and a Solution Architecture Copilot.

Solution Architecture Co-Pilot, with a MVP of the Business Analysis Copilot planned to be available in Q1 2026.

## Digital Sustainability Maturity Model

The Digital Sustainability Maturity Model (DSMM) describes how the topic of digital sustainability can be introduced into an organization over time, building up capabilities that support a prioritized portfolio of sustainability use cases.



*The Digital Sustainability Maturity Model*

## Transparency

The Transparency level provides insights into the current sustainability performance of the organization. This supports use cases like CSRD reporting.

From a digital perspective the enablers are a sustainability data model, based on a business value portfolio and Digital Product Passports as well as Data Spaces to securely exchange standardized sustainability data in the supply chain.

## Acceleration

The Acceleration level leads to faster development of higher quality digital solutions that support all sustainability use cases.

From a digital perspective the enabler is a Solution Development Copilot Platform, where genAI co-pilots are used in the different phase of a digital solution development. This is described in more detail in chapter Solution Development Copilot in this document.

Also blueprints for sustainability use cases are used to accelerate digital solution development. These blueprints can be found in the Sustainability Reference Architecture of the Sustainable Supply Chain Framework.

## Process Optimization

The Process Optimization Level strives to achieve reducing the sustainability impact of an organization by implementing digital enablers to lower for example carbon emissions from production or reduce waste.

From a digital perspective the key enablers are Digital Twins, that support use cases like the reduction of energy consumption in manufacturing operations.

## Product Optimization

The Product Optimization Level strives to achieve reducing the sustainability impact in the supply chain, especially the suppliers and customers of an organization.

On the supply side topics like embedded carbon footprint and human rights violations are examples and on the customer side topics like increased product safety and energy efficient use of products

From a digital perspective the key enablers are Digital Twins, Digital Product Passports and Data Space.

## Digital Technology Optimization

The Digital Technology Optimization Level looks at the sustainability impact of the digital technologies themselves and how they can be reduced. Topics here contain the sustainability performance of digital hardware, e.g. the embedded carbon footprint or energy consumption or “green software development”, as promoted by the Green Software Foundation. Also, the use of renewable energy for operating the digital technology landscape is part of this level.

Each maturity level contains a set of use cases with associated business and digital capabilities that are needed to implement the use cases. More on this in the chapter on Sustainability Use Cases.

# Business Value

The topic of business value aligns with the “Level 1 – Transparency” of the Digital Sustainability Maturity Model.

## Business Value Portfolio

Every organization expects that its investments in digital solutions generates business value for the organization. Business value in the context of sustainability is broader than the understanding coming from financial accounting, where revenue, cost and profit determine how business value is measured. There are recognized sustainability framework on the market that show what could be defined as business value for an organization. Based on these reference models, a business value portfolio for the organization can be defined. Here a couple of this framework as a starting point for develop an organization-specific business value portfolio:

### UN Sustainable Development Goals



<https://sdgs.un.org/goals>

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The 17 SDGs are broken down into 186 targets which can be found broken down by goal here: <https://www.un.org/sustainabledevelopment/?s=sdg+targets>

After an organization has determined which of the 17 goals are relevant for them, they can dig deeper by evaluation the associated target and see if they can extract sustainability objectives and targets for them.

## GRI Standards

The Global Reporting Initiative (GRI) has developed a number of standards around metrics to measure sustainability impact. Those are available as a cross-industry standards, but also for some specific industries and business functions:

<https://www.globalreporting.org/how-to-use-the-gri-standards/gri-standards-english-language/>

## Corporate Sustainability Reporting Directive (CSRD)

This EU regulatory framework for sustainability reporting as part of the annual (financial) reporting also provides guidance on how sustainability impact of the organization and the supply chain can be measured: [https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting\\_en](https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en)

## Scientific Base Target Initiative (SBTi)

The Science Based Targets initiative (SBTi) is a corporate climate action organization that enables companies and financial institutions worldwide to set target for combating the climate crisis.

SBTi develops standards, tools and guidance which allow companies to set greenhouse gas (GHG) emissions reductions targets in line with what is needed to keep global heating below catastrophic levels and reach net-zero by 2050 at latest.

The SBTi is incorporated as a charity, with a subsidiary which will host the target validation services. Partners are CDP, the United Nations Global Compact, the We Mean Business Coalition, the World Resources Institute (WRI), and the World Wide Fund for Nature (WWF).

Organizations sign up for a specific GHG emission reduction target publicly and progress is tracked and also publicly available. Reducing its carbon emission if high the priority list for most organizations. Publicly committing to a reduction target

<https://sciencebasedtargets.org/>

## Business Value Portfolio Example

In this example we introduce our fictional company MITCo, the produces batteries, has different manufacturing sites around the world and their HQ in the EU, hence it needs to be compliant with the CSRD and CSDDD regulation of the EU. Therefore, MITCo looked at the European Sustainability Reporting Standards (ESRS) for guidance on what they would consider a business value beyond the normal financial KPIs.

### *Climate Change*

- Increase the use of renewable energy
- Total GHG emissions (Scope 1, 2 and 3)

#### *Pollution*

- Total amount of substances of (high) concern used
- Total wastewater

#### *Water*

- Total Water usage

#### *Biodiversity*

- Minimize land use

#### *Circular Economy*

- Use of recycled resources

#### *Own Workforce*

- Reduce safety incidents
- Retain health

#### *Supply Chain Workforce*

- Fair Pay
- No forced labor
- No child labor
- No human rights violations

#### *Customers*

- Customer Satisfaction
- Reduce number of complaints

## Business Value Scorecard

From the identified Business Value Portfolio, a strategic goal/objective system can be developed, following the concept of the Balanced Scorecard (<https://online.hbs.edu/blog/post/balanced-scorecard>).

As objective categories we suggest either the 3 categories of the Triple Bottom Line (People, Planet, Profit) or the concept of ESG (Environmental, Social, Governance)

It is important to understand that business value can be quantitative or qualitative and where value can't be directly measured, proxy measurements may be available. Goal should be to define metrics for all objectives, so progress toward target values can be tracked and reported. This is especially important as sustainability often has the reputation of generating additional effort and costing money, without having any value for the organization.

The Business Value Scorecard implements that Business Value domain of the Business Value & Model Layer in the Sustainability Reference Architecture.

Once the goals and objective are defined, it is important to embed them into the KPI system of the organization. Without that, it is unlikely the objectives and hence strategic goals can be achieved.

## Business Value Scorecard Example

MITCo has decided to combine the BSC with the Triple Bottom Line to structure their Business Value Scorecard.

Category	Objective	Metric	Target value
People.OwnWorkforce	Reduce safety incidents	Number of incidents	0
	Retain employee health	Sick days/working days	<10%
People.SupplyChainWF	Fair Pay	Number deviations from ILO standards	<10%
	No forced labor	Number of incidents	0
	No child labor	Number of incidents	0
	No human rights violations	Number of incidents	0
People.Customers	Increase customer satisfaction	NPS score	>=9
	Reduce number of complaints	Number of complaint tickets	<100 p.a.
Planet.ClimateChange	Increase the use of renewable energy	Percentage of renewable energy use	100%
	Decrease total GHG emissions (Scope 1, 2 and 3)	SBTi Targets	Targets hit
Planet.Pollution	Total amount of substances of (high) concern used	Percentage of all materials used	< 1%
	Total wastewater	Liters p.a.	0
Planet.Water	Total freshwater usage	Percentage of all water usage p.a.	<10%
Planet.Biodiversity	Minimize land use	Percentage biotopes inside location of total location size	>10%
Planet.Circular Economy	Use of recycled resources	Percentage of recycled resources	>50%
Profit.Operational Efficiency	Increase OEE	OEE = Availability x Performance x Quality	>90%

	Reduce material waste	Waste material/used material	<5%
Profit.CostOfSales	Reduce COS	Sales cost/ # products sold	<10%
Profit.CostOfAdmin	Reduce administrative cost	Administrative cost/ # products sold	<5%
Profit.RevenueGrowth	Increase revenue	Revenue growth p.a.	>10%

The Business Value Scorecard need to be integrated with and linked to the KPI framework of an organization to ensure everyone understands how she contributes to the success of the company and also create accountability to achieve the business objectives.

## Sustainability Data Model

Here a quick reminder on how we define sustainability: People + Planet + Profit. We understand that at the moment the term Sustainability is mostly used to refer to the Plant dimension of the Triple Bottom Line, sometimes it includes the People dimension, but rarely the Profit dimension. Therefore, we will call it Business Value Data Model, as it ties directly into our Business Value Portfolio and Scorecard.

Usually, enterprise data models already exist for different purposes that are implemented in data warehouses/lakes and analytics solutions. What we are suggesting here is to create a new view on the existing data, and where required, enhance the existing enterprise data model. Focus of this view is a data collection for the purpose to measure business objectives and KPIs. If the digital solution(s) to support this can make data available real-time, as it changes, you get view on the real-time performance of an organization. Real-time of production data is of course different from “real time” data on customer satisfaction or financials, so we define real-time in a way that data becomes available as soon as it is created or changed.

As the Business Model Data Model is conceptionally close to the actual digital data, we recommend using UML as a standard modeling notation to document it.

The Business Value Data Model becomes a key component of the Data & Application Layer in the Sustainability Reference Architecture.

The first version may be developed via a specific use case, but it will develop into an Enterprise Business Value Model over time.

As this Data Model is not only very specific for an organization, but also pretty large, we refrain here from showing an example, trusting that based on the description of what it is and the chapter on Business Value, this provides enough guidance to design and implement such a model.

# Sustainability Use Cases

(still to be aligned with SSCF Wiki)

Once the business value from sustainability is identified, this value can be broken down into sustainability use case that enable the creation of the business value and are supported by digital solutions.

The Playbook list a set of use cases that are further details in the Use Case Library of the Sustainable Supply Chain Framework: <https://github.com/mitsf09/sscf/wiki>.

This list of Sustainability Use Cases will be expanded over time, based on the activities around the Sustainable Supply Chain Framework.

Name	Short Description	Business Value
Sustainability Reporting	Gather, consolidate and report scope 1, scope 2 and scope 3 sustainability impact data, including, but not limited to carbon emissions. Requirements can come from legislation, like for example the German Supply Chain Act. Includes the Catena-X PCF use case.	<ul style="list-style-type: none"><li>- Compliant with legal requirements, e.g. CSRD reporting.</li><li>- Transparent towards investors and shareholders</li><li>- Tracking of achieving SBTi targets.</li></ul>
Catena-X PCF	Standardized calculation and exchange of PCF data in the Automotive Data Space Catena-X	<ul style="list-style-type: none"><li>- Less effort in calculating the PCF around different suppliers.</li><li>- Allows comparison of its own PCF with competitors.</li><li>- Allows easier management of carbon footprint in the supply chain</li></ul>
Supply Chain Due Diligence Check	Allows the risk-based evaluation of its own supply chain around environmental and social criteria. Based on Catena-X Due Diligence Check use case.	<ul style="list-style-type: none"><li>- Have proof of a sustainable supply chain.</li><li>- Enables risk reduction in supply chain.</li></ul>
Track & Trace	Track a product through the supply chain	<ul style="list-style-type: none"><li>- Finding defect products is easier.</li><li>- Identifying anomalies during transport, e.g. stops, routes, ...</li><li>- Enable proof of product provenance</li></ul>
Supply Chain Incident Management	Notification on compliance incidents in the supply chain around environmental and social topics, e.g. pollution, human rights, etc.	<ul style="list-style-type: none"><li>- Minimize risks in supply chains</li><li>- Identify bad actors</li><li>- Contribute to sustainability reporting</li></ul>
Solution Development Accelerator	Accelerate the development of digital sustainability solutions through model-based development and genAI.	<ul style="list-style-type: none"><li>- Reduce time and efforts for solution development</li><li>- Increase solution quality</li></ul>

	Includes the Catena-X Integration use case.	
Catena-X Integration	Blueprint for integration of business processes and digital landscapes into Catena-x.	<ul style="list-style-type: none"> <li>- Enables significant reduction of IT integration cost with supply chain partners.</li> </ul>
Energy Management	Monitor energy consumption of assets and suggest action to reduce it.	<ul style="list-style-type: none"> <li>- Lower carbon emissions</li> <li>- Lower energy cost</li> </ul>
Waste Reduction	Reduce waste from the manufacturing process	<ul style="list-style-type: none"> <li>- Lower production cost</li> <li>- Lower pollution from production</li> </ul>
Predictive Maintenance	Predict when asset maintenance is necessary, based on current and historical data from assets and using ML.	<ul style="list-style-type: none"> <li>- Lower the maintenance cost</li> <li>- Increase availability/OEE of assets</li> <li>- Reduce environmental impact through reduction of maintenance material and spare parts.</li> </ul>
Warehouse Automation	Replace manual labor with robotic solutions.	<ul style="list-style-type: none"> <li>- Increase worker safety</li> <li>- Decrease warehousing cost</li> <li>- Reduce number of errors</li> </ul>
Manufacturing Safety	Identify and even predict situations that can lead to injuries or other health issues, also long term	<ul style="list-style-type: none"> <li>- Improved safety record</li> <li>- Less (long-term) health issues</li> <li>- Reduce cost from sick days</li> </ul>
Digital Product/Material Passport	Implementing a DPP solution and integrated it into business processes and digital landscape	<ul style="list-style-type: none"> <li>- Regulatory compliance</li> <li>- Enhance customer trust and brand loyalty</li> <li>- Lower integration cost for exchange of product and material data</li> <li>- Better access to product and material data for decision making</li> </ul>
Circular Economy	Manage product after the usage period, e.g. through reuse, re-manufacturing or recycling	<ul style="list-style-type: none"> <li>- Contribute to reaching sustainability goals</li> <li>- Reduce resource cost</li> <li>- Improve resilience of supply chain through reduced dependencies</li> </ul>
Digital Product Services	Sell digital services, e.g. predictive maintenance, on top of the product or even offer the product as a service, e.g. EaaS (Equipment as a Service)	<ul style="list-style-type: none"> <li>- Increase revenue</li> <li>- Increase customer satisfaction</li> <li>- Increase own competitiveness</li> </ul>
Green DC/Cloud Services	Using cloud services that are powered by renewable energy	<ul style="list-style-type: none"> <li>- Reduce (scope 3) carbon emissions</li> </ul>
Green Software Development	Develop software in a way that minimized compute consumption when running	<ul style="list-style-type: none"> <li>- Reduce (scope 3) emissions</li> <li>- Lower IT infrastructure cost</li> </ul>
On Demand Computing	Run software only, if it is used	<ul style="list-style-type: none"> <li>- Reduce (scope 3) emissions</li> <li>- Lower IT infrastructure cost</li> </ul>

The identified use cases need to be prioritized to create a sequence for the implementation roadmap. Also, potential dependencies between use cases need to be considered, when prioritizing them.

While the criteria for prioritizing use cases are specific to every organization, here a couple of best practice criteria that can be considered:

- Business case, meaning business value generated vs. required investment
- Complexity of the digital solution
- Creation of a competitive advantage
- Learning for the organization
- Impact on brand awareness
- Reuseable capabilities for implementation of other use cases

For a use case to be implemented, the organization needs to use, adapt or build different business and digital capabilities.

As the use cases are aligned to a maturity level in the Digital Sustainability Maturity Model, the relationship between maturity level, use case and business & digital capabilities can be put on a strategic roadmap.

## Business Capabilities

Besides changes and upgrades to existing business capabilities, new business capabilities maybe required for implementing a use case. This is especially likely if a use case changes the business model or even creates a new business model for the organization.

We start defining what business capabilities are needed for the implementation of the individual use cases in the portfolio. This may show gaps in the existing business capabilities.

For each business capability a business capability model is created. This consist of the two middle layers of the Sustainability Reference Architecture, so people & processes and data & application.

Data and application are modelled digital product independent and are represented as Digital Capabilities in the business capability model.

What specific technologies and products are needed, is defined as part of the Digital Capabilities design. It is not unusual that a specific business functionality can be implement by products of multiple vendors. Some of them the organization may already have, and others are available on the market. If none of those two scenarios is true, a custom development is required. In the context of Digital Capabilities, the activities of a digital sustainability strategy need to be aligned with existing technology strategies and roadmaps in the organization.

While no industry standard around business capabilities exist, there are many reference models that can serve, individually or in combination, as a starting point to document the business capabilities of the organization. Some examples are:

- APQC PCF
- SCOR
- Industry Reference Models of the Business Architecture Guild

The Sustainability Reference Architecture of the Sustainable Supply Chain Framework will, over time, also build business capability maps for different industries.

## Business Capability Example

This example is based on the PCF of APQC. It shows the top level and details of one business capability area.



## 5.0 Deliver Service (20025)

<b>5.1 Establish service delivery governance and strategies (20026)</b>	<b>5.2.2.6</b> Monitor and manage resource capacity and availability (20056) <b>5.2.3</b> Enable service delivery resources (12127) 5.2.3.1 Develop service delivery training plan (12128) 5.2.3.2 Develop training materials (12129) 5.2.3.3 Manage training schedule (12131) 5.2.3.4 Deliver operations training (12132) 5.2.3.5 Deliver technical training (12133) 5.2.3.6 Perform skill and capability testing (20057) 5.2.3.7 Evaluate training effectiveness (12135)
5.1.1 Establish service delivery governance (20027) 5.1.1.1 Set up and maintain service delivery governance and management system (20028) 5.1.1.2 Manage service delivery performance (20029) 5.1.1.3 Manage service delivery development and direction (20030) 5.1.1.4 Solicit feedback from customer on service delivery satisfaction (20031)	
5.1.2 Develop service delivery strategies (20032) 5.1.2.1 Define service delivery goals (20033) 5.1.2.2 Define labor policies (20034) 5.1.2.3 Evaluate resource availability (20035) 5.1.2.4 Define service delivery network and supply constraints (20036) 5.1.2.5 Define service delivery process (20037) 5.1.2.6 Review and validate service delivery procedures (20038) 5.1.2.7 Define service delivery workplace layout and infrastructure (20039)	
<b>5.2 Manage service delivery resources (20040)</b>	<b>5.3 Deliver service to customer (20058)</b>
5.2.1 Manage service delivery resource demand (20041) 5.2.1.1 Monitor pipeline (20042) 5.2.1.2 Develop baseline forecasts (20043) 5.2.1.3 Collaborate with customers (20044) 5.2.1.4 Develop consensus forecast (20045) 5.2.1.5 Determine availability of skills to deliver on current and forecast customer orders (20046) 5.2.1.6 Monitor activity against forecast and revise forecast (20047) 5.2.1.7 Evaluate and revise forecasting approach (20048) 5.2.1.8 Measure forecast accuracy (20049)	5.3.1 Initiate service delivery (20059) 5.3.1.1 Review contract and agreed terms (20060) 5.3.1.2 Understand customer requirements and define refine approach (20061) 5.3.1.3 Modify/revise and approve project plan (20062) 5.3.1.4 Review customer business objectives (20063) 5.3.1.5 Confirm environmental readiness (20064) 5.3.1.6 Identify, select, and assign resources (20065) 5.3.1.6.1 Establish people objectives (20066) 5.3.1.6.2 Establish engagement rules (20067) 5.3.1.7 Plan for service delivery (20068)
5.2.2 Create and manage resource plan (20050) 5.2.2.1 Define and manage skills taxonomy (20051) 5.2.2.2 Create resource plan (20052) 5.2.2.3 Match resource demand with capacity, skills, and capabilities (20053) 5.2.2.4 Collaborate with suppliers and partners to supplement skills and capabilities (20054) 5.2.2.5 Identify critical resources and supplier capacity (20055)	5.3.2 Execute service delivery (20069) 5.3.2.1 Analyze environment and customer needs (20070) 5.3.2.2 Define solution (20071) 5.3.2.3 Validate solution (20072) 5.3.2.4 Identify changes (20073) 5.3.2.5 Obtain approval to proceed (20074) 5.3.2.6 Make build/buy solution (20075) 5.3.2.7 Deploy solution (20076)
	5.3.3 Complete service delivery (20077) 5.3.3.1 Conduct service delivery/project review and evaluate success (20078) 5.3.3.2 Complete/finalize financial management activities (20079) 5.3.3.3 Confirm delivery according to contract terms (20080) 5.3.3.4 Release resources (20081) 5.3.3.5 Manage service delivery completion (20082) 5.3.3.6 Harvest knowledge (20083) 5.3.3.7 Archive records and

Screenshot

## Digital Capabilities

Digital capabilities are often independent from the use case, the organization and even the industry. Therefore, we describe here digital capabilities required for sustainability use cases, but they certainly can support also business use cases without a (direct) link to sustainability goals the organization has.

The Digital Sustainability Maturity Model calls out those digital capabilities already. In this chapter we are looking at each of those capabilities in more detail.

## PLM

A Product Life Cycle Management system manages data along the life cycle of a product the company manufactures.

While PLM applications are focused on the design of a product, we encourage companies to think about PLM as a capability that can include multiple applications. One topic related to PLM are Digital Product Passports.

## ERP

Enterprise Resource Planning are well established and mature and ERP applications/platforms are available that cover all functionality of an ERP capability in one product or a suite for products from the same vendor.

## CRM

Customer Relationship Management systems are well established, and mature and CRM applications/platforms are available that cover all functionality of an CRM capability on product or a suite of products from the same vendor.

## MES

Manufacturing Execution Systems are usually a software product but can also be defined as a capability with workflows, data and applications.

## EAM

Enterprise Asset Management systems as a capability are very well defined in ISO 55000 set of standards, managed by the Institute of Asset Management. In the software products available asset most of the time refer to machines and physical assets, while ISO 55000 has a broader view on the meaning of the term asset.

## SCM

Supply Chain Management is a capability and if you are looking for an industry standard in this area, you can consider the SCOR framework. SCM applications are often tightly integrated with MES and ERP systems to plan and manufacture physical products.

## Data Spaces

Data Spaces is a concept that allows the standardized and secure exchange of data, where the data is not stored on a central platform and where the data owners are in full control, who has access to their data, for how long and for what purpose.

GAIA-X of the EU and IDSA provide the architectural and technical foundation for this federated data exchange pattern. Widespread implementation has started in the Platform Industrie 4.0 through initiatives like Catena-X, Chem-X and Aerospace-X.

## Digital Product Passports

Digital Product Passports (DPP) are emerging based on EU regulation that requires specific physical products to have a Digital Product Passport, with information describing the product. Data in the DPP get added in the life cycle of a product and while some data is required, product vendors have the opportunity to add their own data for their product. The first product category that requires a DPP are batteries in 2027.

## Digital Twins

Digital Twins is a term defined by different organizations in ways that fit with their (software) product, consulting service or existing software application portfolio. The Digital Consortium provides not only a definition of the term, but also a table of Digital Twin Capabilities. From a software perspective whole set of different applications and platforms is needed to create Digital Twin. Hence our recommendation to first define what a Digital Twin is for your organization.

## Agentic AI

AI agents are also an emerging technology, able to autonomously or together with humans work on specified tasks or have the capabilities of a specific role in the organization.

## Copilots

Copilots are a specific form of Agentic AI, where usually humans interact with an AI to perform some tasks together. In software development this is becoming now industry standard, as software development is something based on a defined language and mathematical algorithms.

## IaaS

Infrastructure as a Services provides computing capabilities as a service, think Google Cloud Services, AWS or Microsoft Azure.

## PaaS

Platform as a Services builds on IaaS and adds additional capabilities, like databases, messaging or mail.

## Monitoring

Monitoring provides insides in the complete digital landscape of an organization, including application, platforms and infrastructure.

## CS (Control Systems)

Control Systems, like PLCs or SCADA system monitor and control machines and other production systems. They are deeply integrated with the machines and often still proprietary in nature.

## Digital Sustainability Roadmap

Having the Digital Sustainability Maturity Model and Sustainability Use Cases defined, as well as a map of the Business and Digital Capabilities, a Strategic Digital Sustainability Roadmap can be created, which maps the use cases to the maturity levels. As for the implementation of the use cases, business and digital capabilities are required, they need to go on the roadmap as well.

The example below is in table form to keep it easy to read. In the real world a suitable visualization tool like Mural or Miro, is probably the better choice.

Maturity Level	Use Cases	Business Capabilities	Digital Capabilities
Transparency	Sustainability Reporting Supply Chain Due Diligence Check Track & Trace Supply Chain Incident Management	Supplier Management, Customer Service, Compliance & Risk Management Manufacturing	ERP CRM SCM Digital Twins Data Spaces Digital Product Passports Agentic AI MES PAS
Acceleration	Solution Development Accelerators	IT Supplier Management Solution Development Enterprise Architecture	Copilots
Process Optimization	Energy Management Waste Reduction Predictive Maintenance Warehouse Automation Manufacturing Safety	Manufacturing Logistics Facilities Management Asset Management Supplier Management	ERP CRM SCM EAM PLM MES PAS Digital Twins
Product Optimization	Digital Product Passport Circular Economy	Product Management Customer Service	Digital Product Passport Digital Twins

	Digital Product Services	Sales Supplier Management	Data Spaces
Digital Technology Optimization	Green DC/Cloud Services Green Software Development On Demand Computing	IT Operations Solution Development Application Lifecycle Management Supplier Management	IaaS PaaS Monitoring

## Strategy Execution

This chapter talks about how the Digital Sustainability Roadmap is executed, based on a defined Digital Sustainability Strategy.

There are a couple of core components to enable the successful execution of a strategy:

- A Center of Excellence (CoE) managing the roadmap implementation, from a portfolio, program and project perspective.
- Alignment with existing strategies in the organization.
- Integration in the existing enterprise-wide portfolio and investment processes.
- Integration with the enterprise program management and enterprise architecture management.
- Integration in the enterprise performance, risk and compliance management.

As with all chapters in this play book we encourage you to use a genAI tool to learn more details and explore more examples, just make sure you check the sources ☺

### Center of Excellence

If you introduce a new topic into an organization, creating a Center of Excellence (CoE) could be considered to be a best practice. You have one point of contact to create and distribute knowledge, run experiments and learn. Important is to have participants from different parts of the organization, so the digital side as well as the business side.

One of the key tasks for the CoE is the creation of a change program, focusing on creating understanding, showing the value for the individual (role) and building knowledge, POCs and managing pilot projects.

The budget for building and operating the CoE should be shared across the organization, e.g. be considered an innovation funding. As laid out below, initiatives that go operational need to be funded differently.

### Strategic Alignment

Every organization has a lot of different strategies and unfortunately, they are not always aligned. Digital Sustainability has an impact across the company, so it is especially

critical to consider what the different parts of the organization plan for the next couple of years. You do not want to create an organizational silo

The Strategic Alignment is, like the Strategy, certainly something for the CoE to create and manage.

## Portfolio and Investment Processes

It is more than unlikely that there will be a Digital Sustainability budget or project organization. Digital Sustainability needed to be built into the regular portfolio and investment process of the organization. This ensures the part of the organization that are impacted by digital sustainability use cases are involve and have skin in the game.

## Business Process Management and Enterprise Architecture

Digital Sustainability use cases are changing processes and the digital architecture of the organization, so if the organization has a business process management and/or enterprise architecture capability/function, Digital Sustainability needs to be baked into their operational mandate. As those functions not always have a strategy, they are mentioned here explicitly, because of the operational impact they have on the company.

## Enterprise Performance, Risk and Compliance Management

We talked a lot about business value and performance, risk and compliance has of course a direct link to business value, with performance being reduced by risk and compliance management, but stop ..... maybe risk and compliance management can be considered an enabler for business value and when we talked about business value we already introduced that Business Value Score Card as a performance measurement instrument. This again shows to holistic and integrative nature of Digital Sustainability in the organization, so truly earns the reputation to be transformational.