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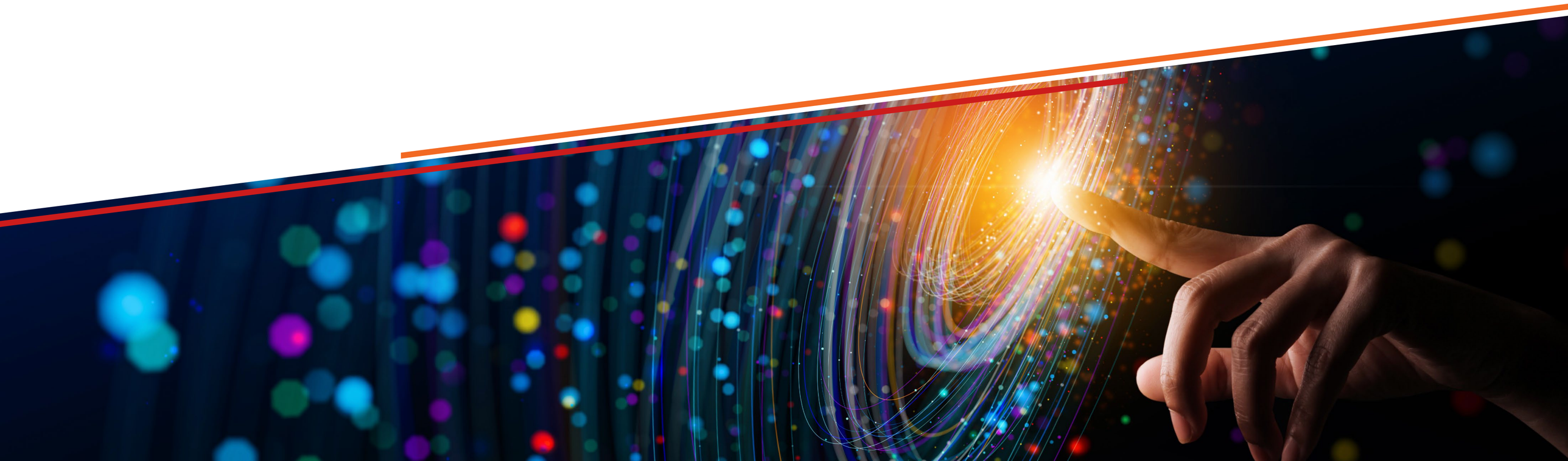
REIMAGINE YOUR POSSIBILITIES

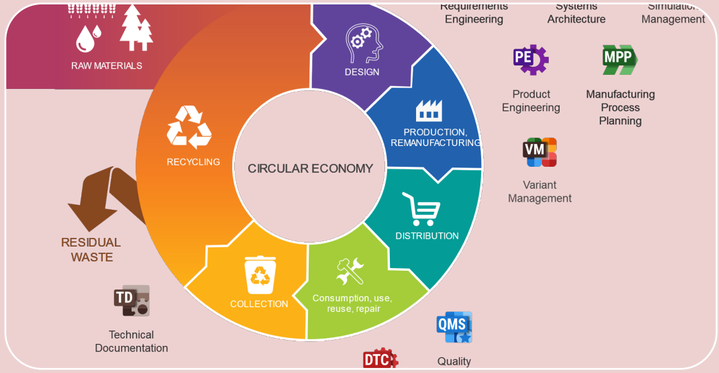
Supporting Environmental, Social and Governance (ESG) Initiatives with Aras Innovator

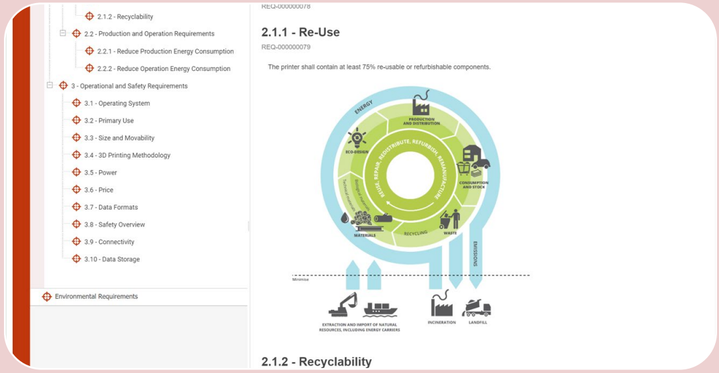
Alan Mendel, Patrick Willemsen, Tim Keer

May 2023



Agenda





Sustainability

1

Green PLM

2

Demonstration

3

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Sustainability

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REIMAGINE YOUR POSSIBILITIES

What is Sustainability?

Four Pillars

- **Social:** preserve social capital by investing and creating services that constitute the framework of our society (communities, cultures, globalization). Preserve future generations and acknowledge what we do has an impact on others and on the world.
- **Human:** maintain and improve the human capital in society. Investments in the health and education systems, access to services, nutrition, knowledge and skills are all programs.
- **Economic:** improve the standard of living, efficient use of assets to maintain profitability over time.
- **Environmental:** Improve human welfare through the protection of human capital (land, air, water, minerals). Needs of population met without the risk of compromising the needs of future generations.

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Sustainable Development Goals

17 United Nations Goals

PLM biggest impact

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Regulations will come ..

Reporting, Tax, Transitions, …

- https://www.aras.com/en/resources/all/wbr-de-20221025-sustainable-future - Jos Voskuil Webinar

GHG reporting

Investments

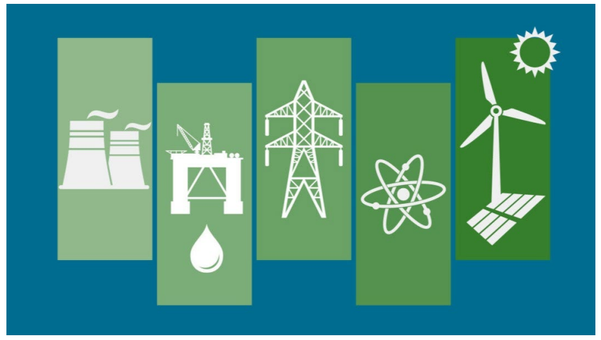
Carbon tax

J4CE
JAPAN PARTNERSHIP FOR CIRCULAR ECONOMY

TCFD Consortium

Task Force on Climate-related Financial Disclosure

Opportunities



Energy transition

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PLM and the Green Context

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REIMAGINE YOUR POSSIBILITIES

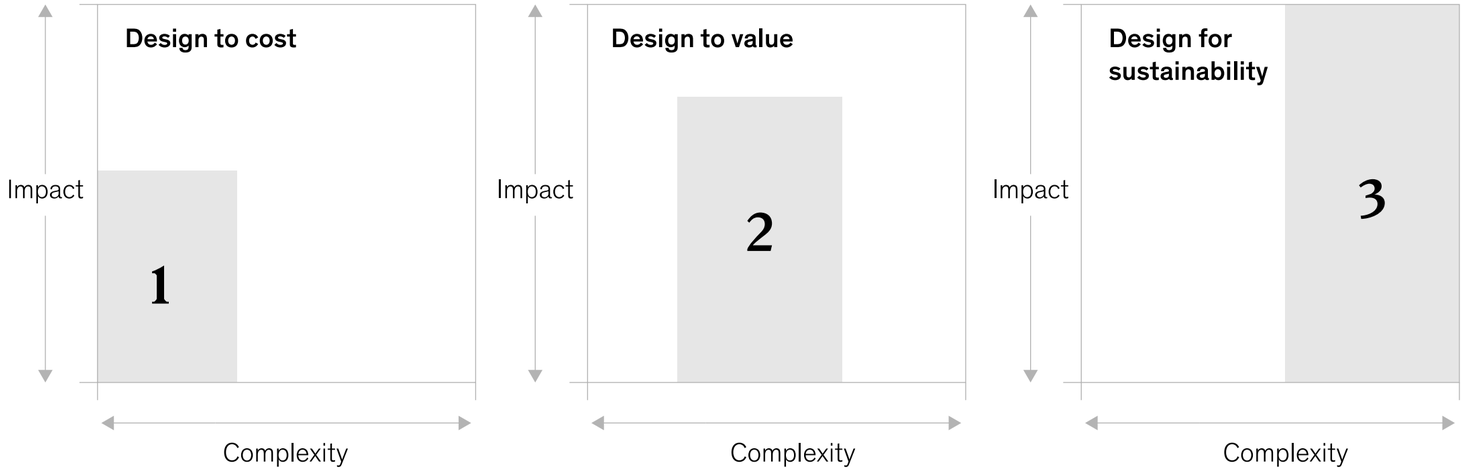
PLM and the **Green** Context

Design Methodologies: Design-to-Cost → Design-to-Value → Design-for-Sustainability

- DfS requires more data and systems thinking, ergo more PLM

Design for sustainability builds on the principles of design to cost and design to value.

Impact of optimization



Reduce manufacturing cost

Increase margin
- Increasing sales price through higher customer value
- Reducing manufacturing cost

Combine margin/sustainability
- Reduce consumed energy and resources in process and product life cycle—shrinking carbon footprint
- Rethink delivering value by designing for new forms of consumption, eg, sharing, reusing, and repairing

McKinsey & Company

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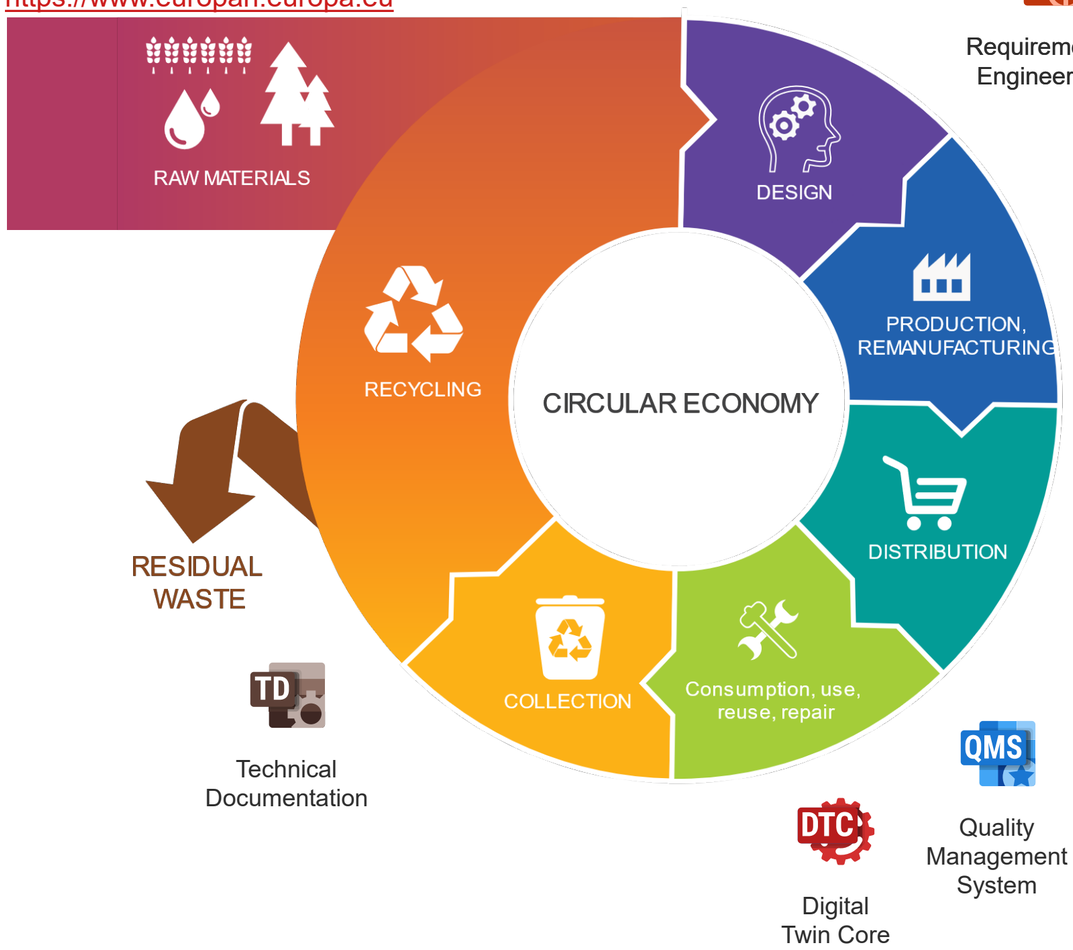
PLM and the **Green** Context

***Circular Economy* starts with making the right decisions early**

https://www.europarl.europa.eu



The PLM Connection:

- (Raw) Materials selection criteria must be part of the conceptual design phase
- Changing materials / components may have a severe impact on existing products

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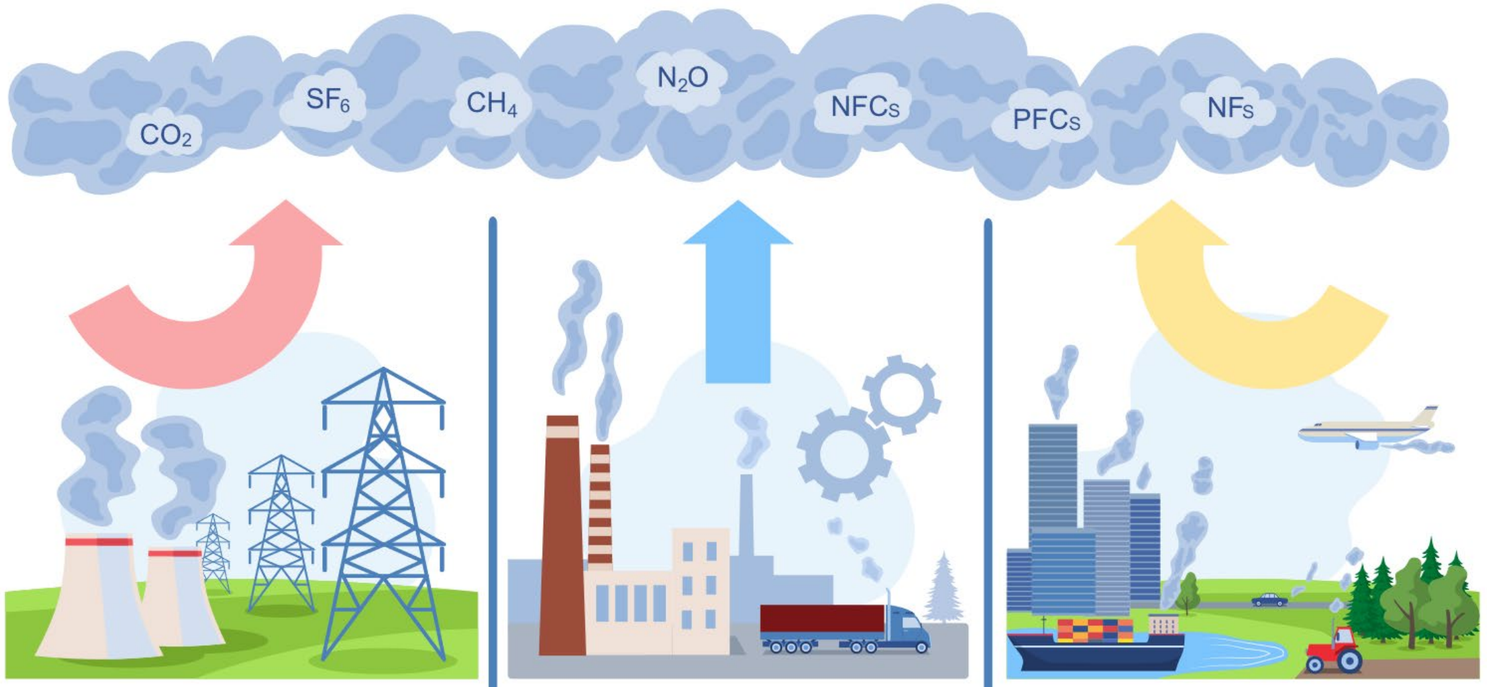
PLM and the **Green** Context

Scopes of Emissions: Scope 1 – 3



Scope 2
indirect
Emissions from energy / utilities

Scope 1
direct
Emissions from sources (on site)

Scope 3
indirect
Emissions of the supply chain or services

Scope 1 emissions
Scope 1 covers emissions from sources that an organization owns or controls **directly** – for example from burning fuel in their fleet of vehicles (if they're not electrically-powered).

Scope 2 emissions
Scope 2 are emissions that a company causes indirectly when the energy it purchases and uses is produced. For example, for an electric fleet of vehicles and machines the emissions from the generation of the electricity they're powered by would fall into this category.

Scope 3 emissions
Scope 3 encompasses emissions that are not produced by the company itself, and not the result of activities from assets owned or controlled by them, but by those that it's indirectly responsible for, up and down its value chain. An example of this is when companies buy, use and dispose of products from suppliers. Scope 3 emissions include all sources not within the scope 1 and 2 boundaries.

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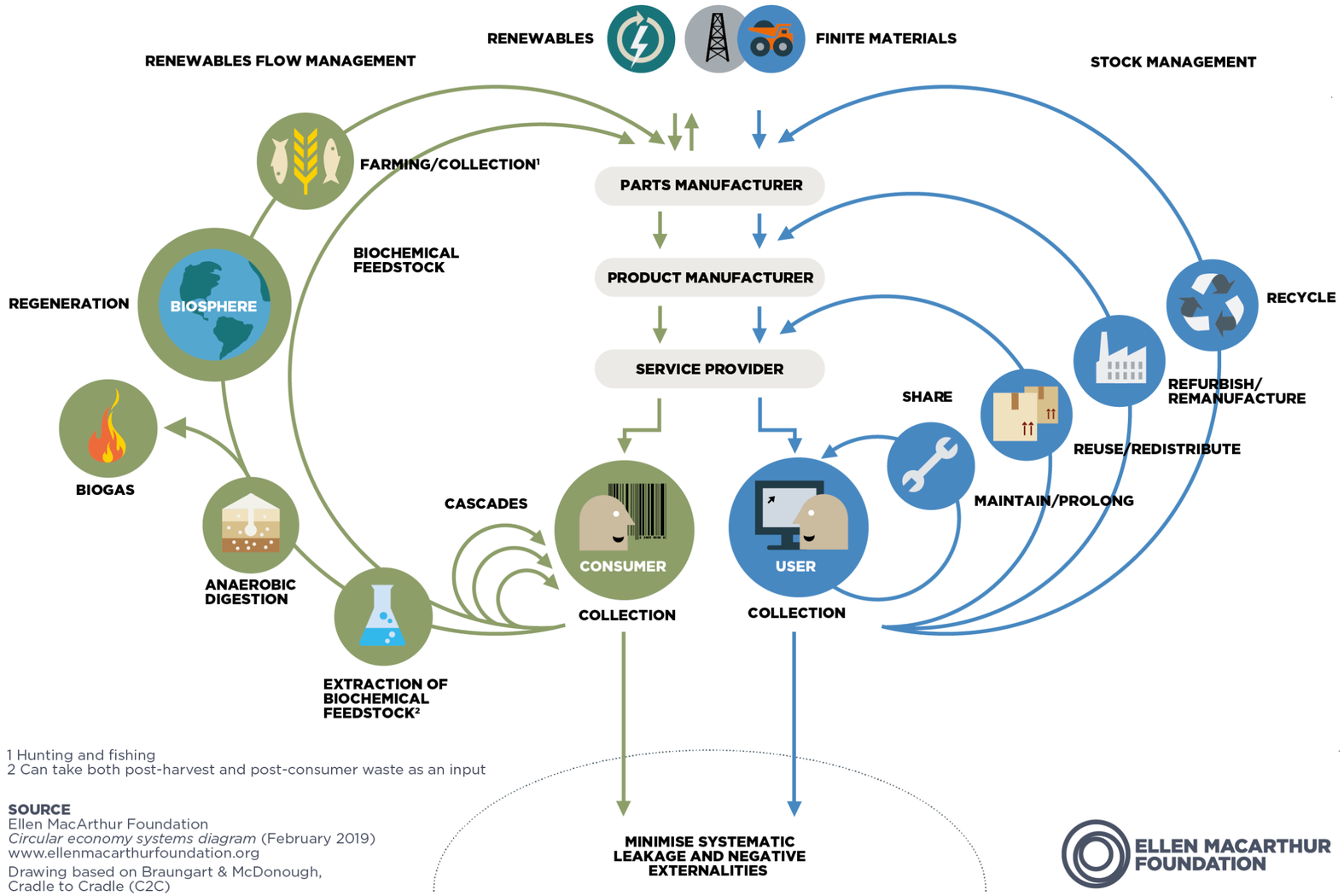
PLM and the **Green** Context

Circular Economy: Technical cycle and Biological cycle



1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input

SOURCE
Ellen MacArthur Foundation
Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough, Cradle to Cradle (C2C)

ELLEN MACARTHUR FOUNDATION

- Technical cycle → Materials that do **not** biodegrade (metals, plastics) and are in need for recovering
- Biological cycle → Materials that **do** biodegrade (wood, cotton, food, …)

https://www.europarl.europa.eu

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PLM and the **Green** Context

Vision

Our ECO system: we need help from our friends

- Several external / cloud data sources will need to enrich and complement the internal data – *Data-as-a-Service*

certivity

Ansys
Minerva

ecovadis

IHS Markit®

AVEVA

RE Requirements Engineering

SA Systems Architecture

PM Program Management

SM Simulation Management

VM Variant Management

PE Product Engineering

CE Component Engineering

TD Technical Documentation

MPP Manufacturing Process Planning

QMS Quality Management System

DTC Digital Twin Core

chemSHERPA by JAMP

ECHA
EUROPEAN CHEMICALS AGENCY

METI
Ministry of Economy, Trade and Industry
METI - Chemical Substances Control Law

EPA United States Environmental Protection Agency

Ansys
Granta Material Intelligence
Restricted Substances Solution

SCIP

CAS Common Chemistry

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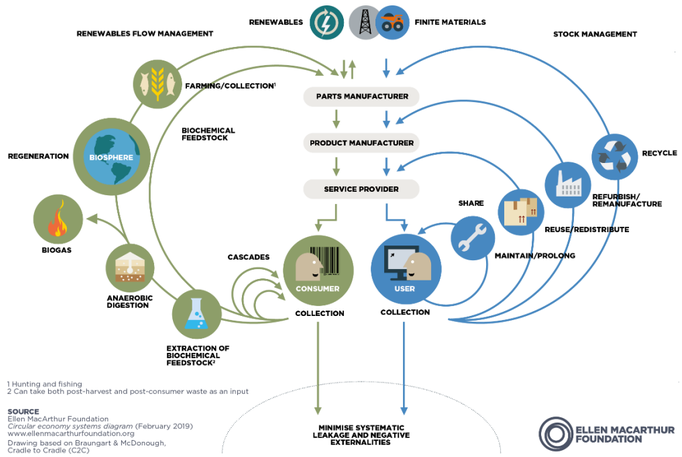
PLM and the **Green** Context

Data Centric Product Development → Navigate the Digital Thread and Leave Documents Behind

Function
Goal
CAD
FAI
Operational Event
Replacement
implemented by
inspected by
Share
replaced by
consists of
implemented by
designed by
Collection
System
Logical Element
Part
planned
Physical Part
Process Plan
executed for
satisfied by
Requirement
Solution
made of
uses
manufactured by
Raw Material
Operation
Machine
External Sources
Manufacturer
consists of
Substance



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Demonstration Examples

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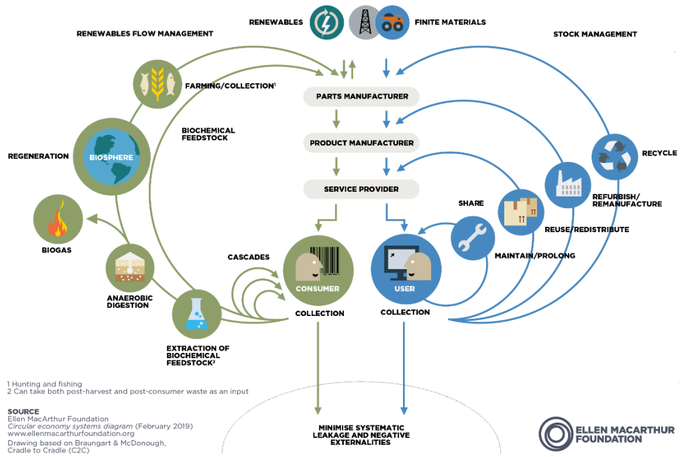
REIMAGINE YOUR POSSIBILITIES

PLM and the **Green** Context

Data Centric Product Development → Navigate the Digital Thread and Leave Documents Behind

Function
Goal
CAD
FAI
Operational Event
Replacement
implemented by
inspected by
Share
replaced by
consists of
implemented by
designed by
Collection
System
Logical Element
Part
planned
Physical Part
Process Plan
executed for
satisfied by
Requirement
Solution
made of
uses
manufactured by
Raw Material
Operation
Machine
External Sources
Manufacturer
consists of
Substance



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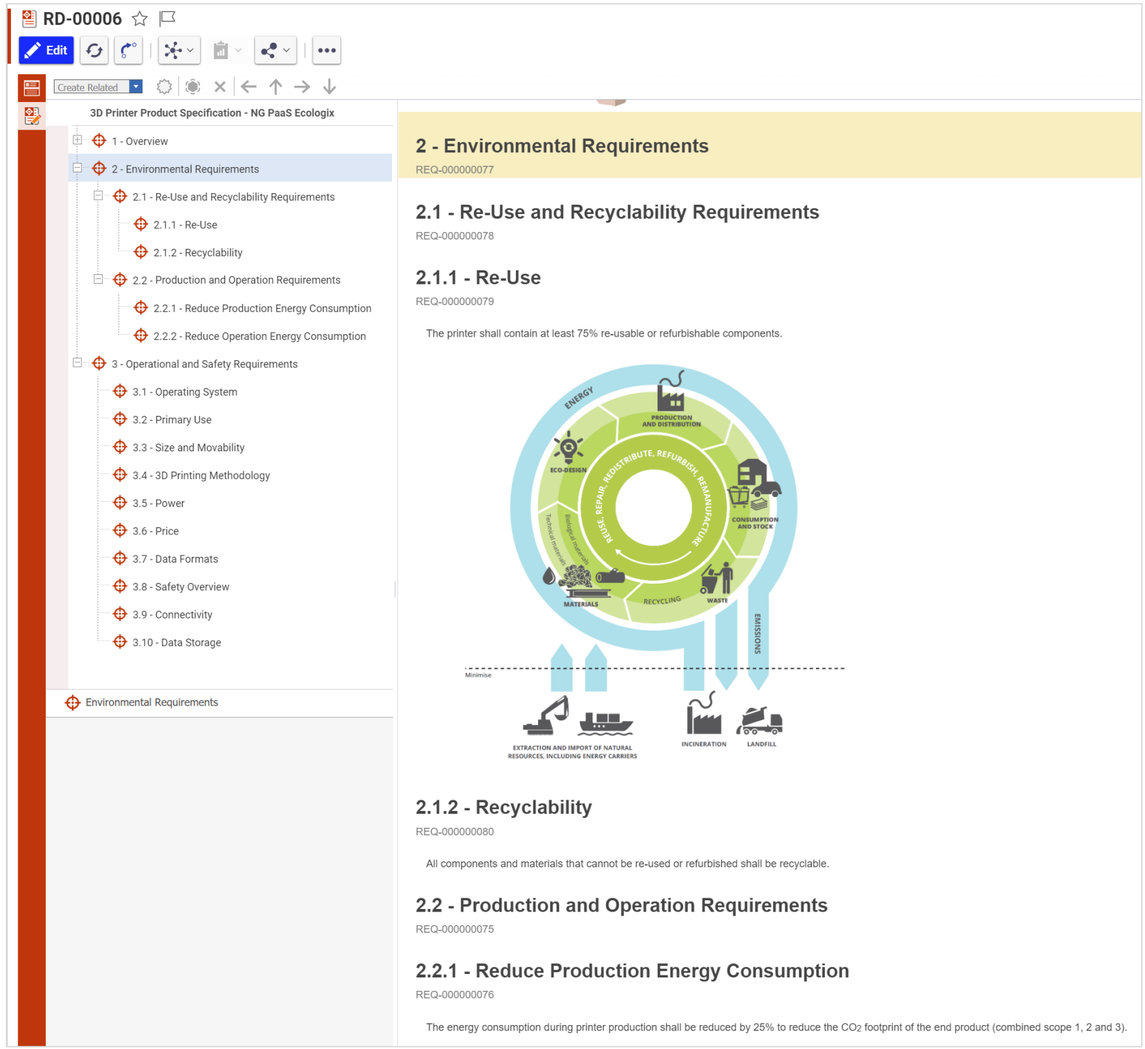
Story Line

Requirements Engineering

- Requirements Document



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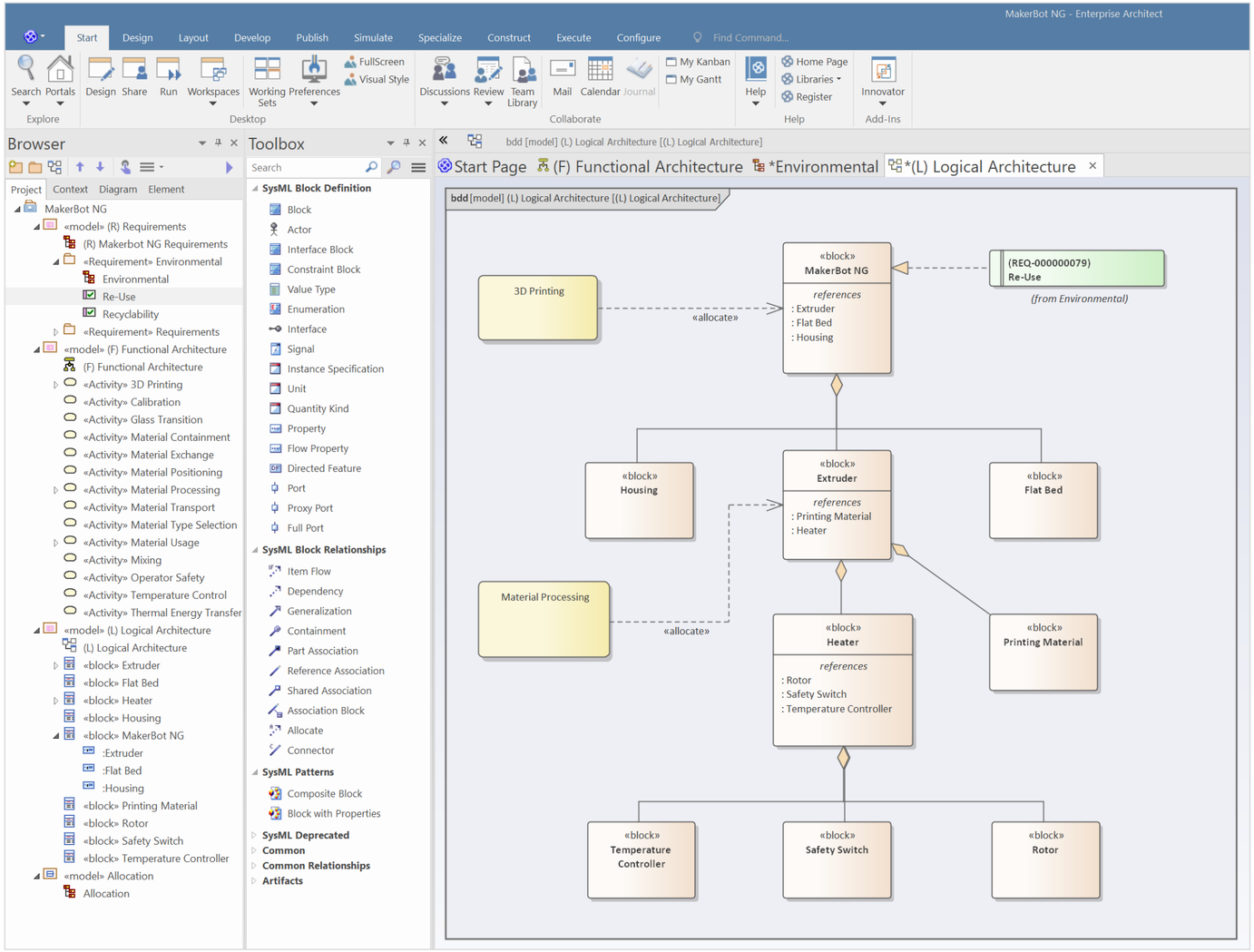
Story Line

Systems Architecture

- MBSE



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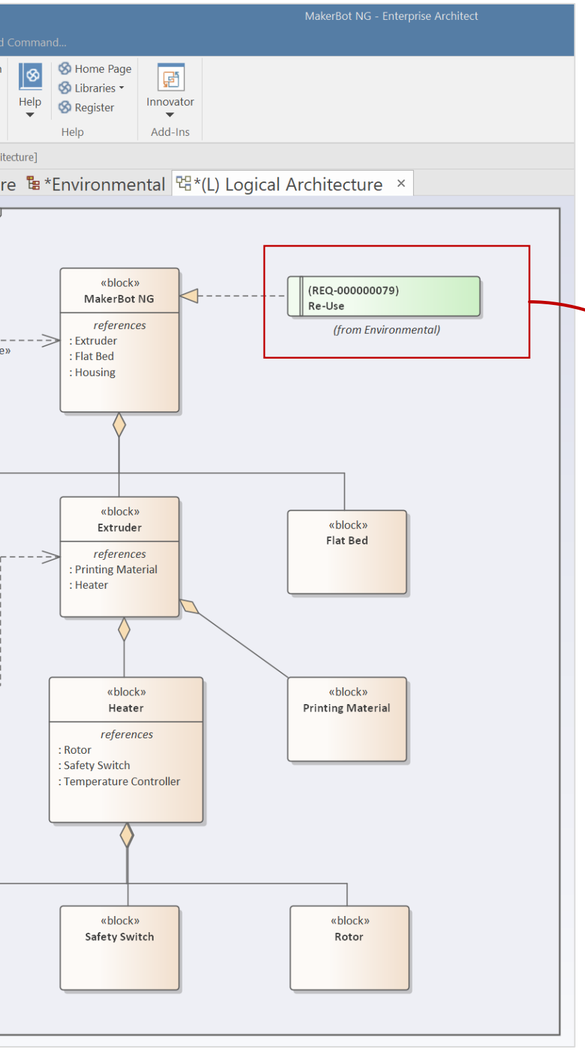
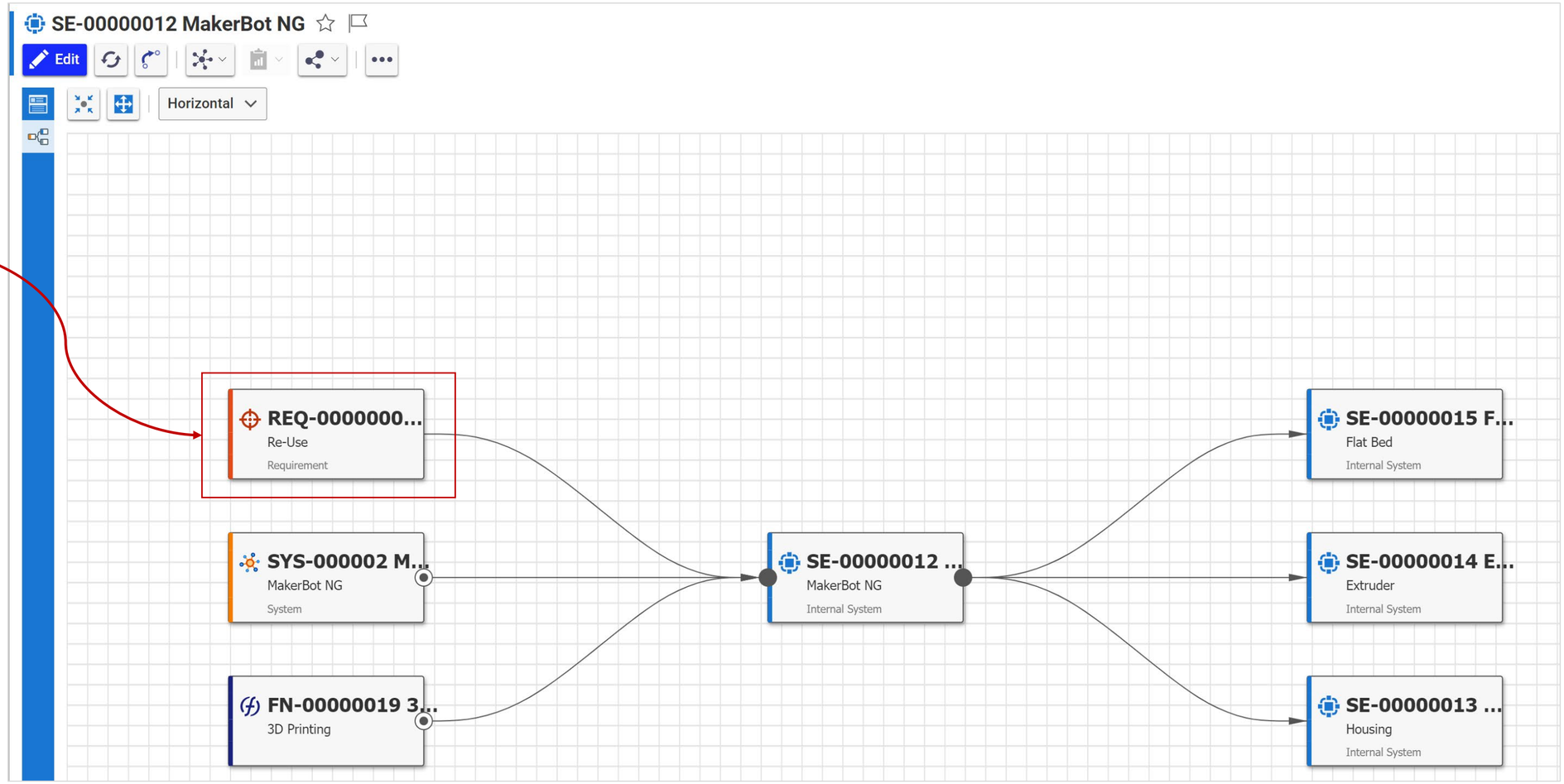
Story Line

Systems Architecture

- MBSE





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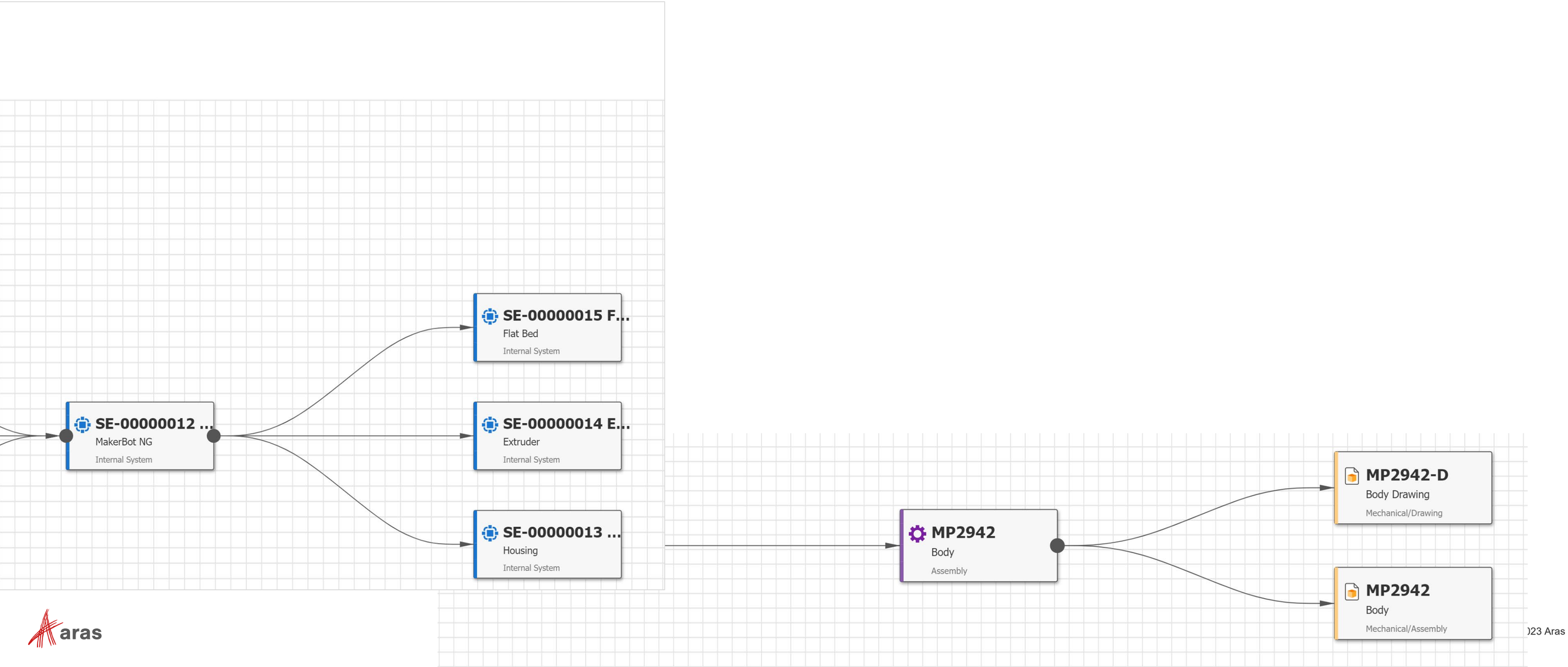
Story Line

Systems Architecture

- MBSE



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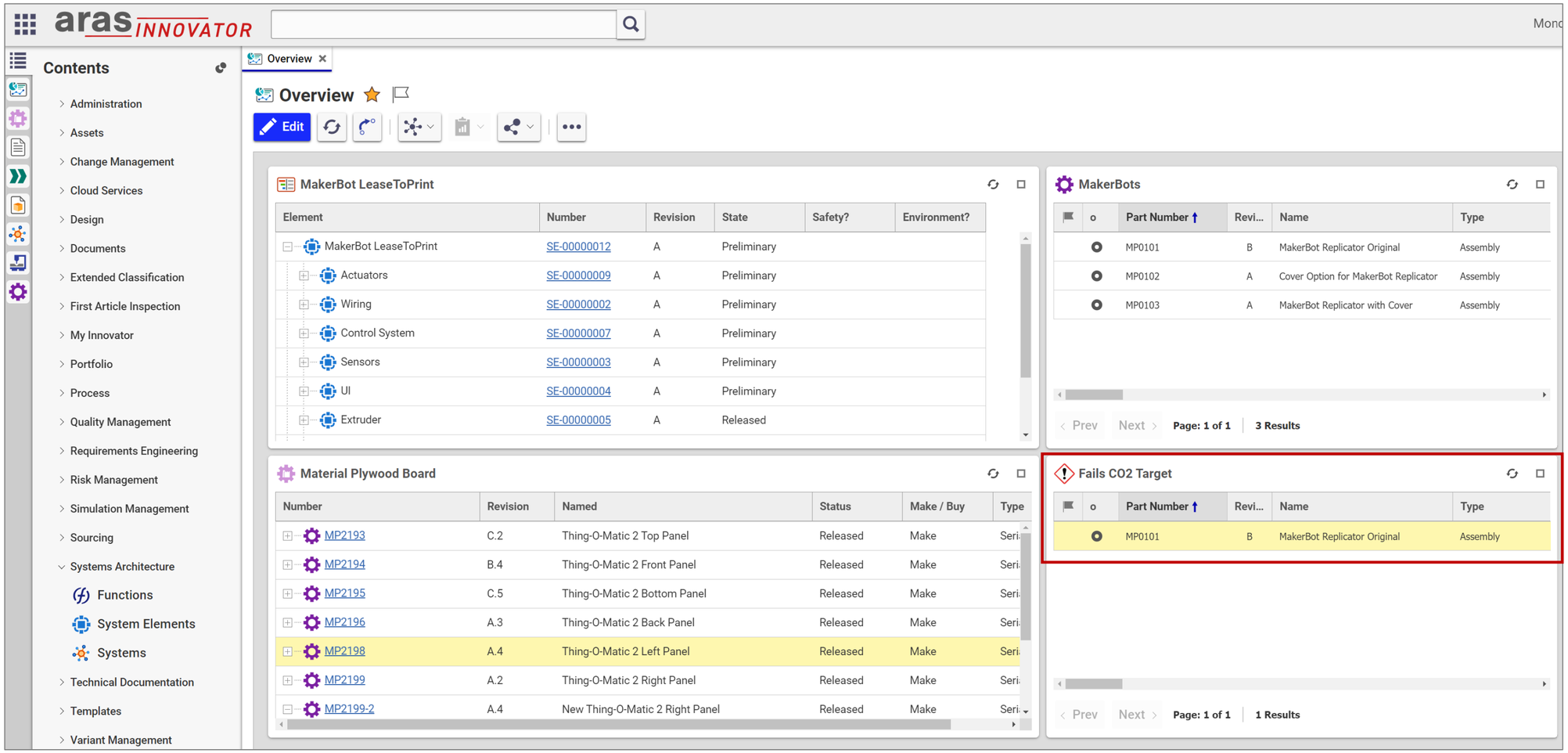
Story Line

Dashboard

- CO_2 Target



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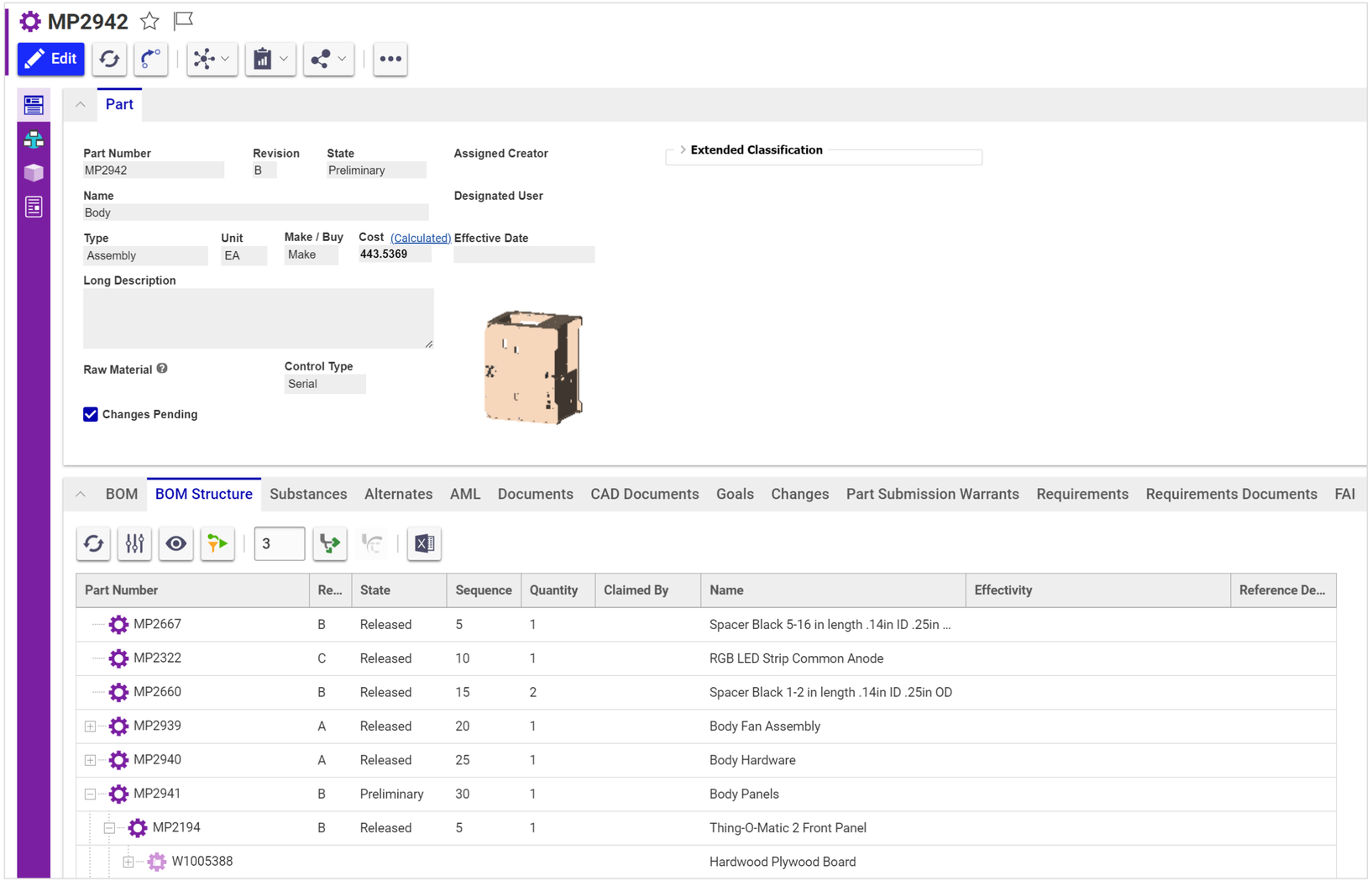
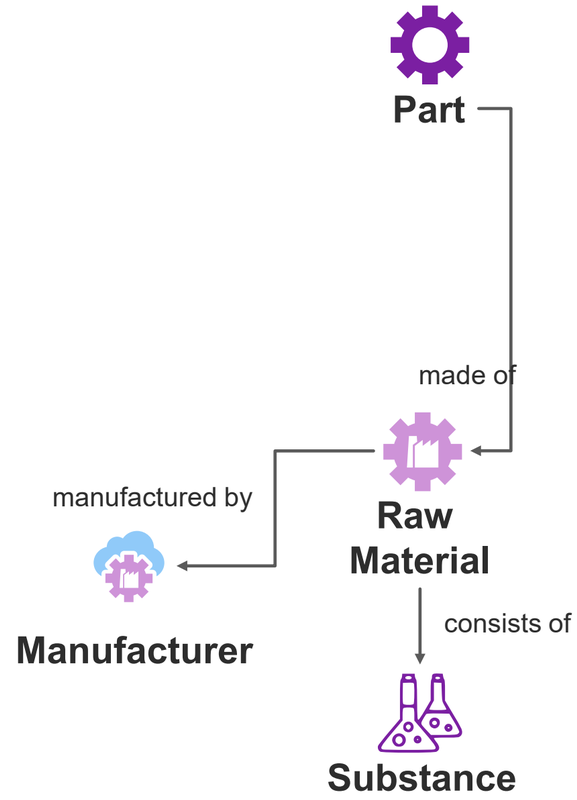
Story Line

Product Engineering

- Part





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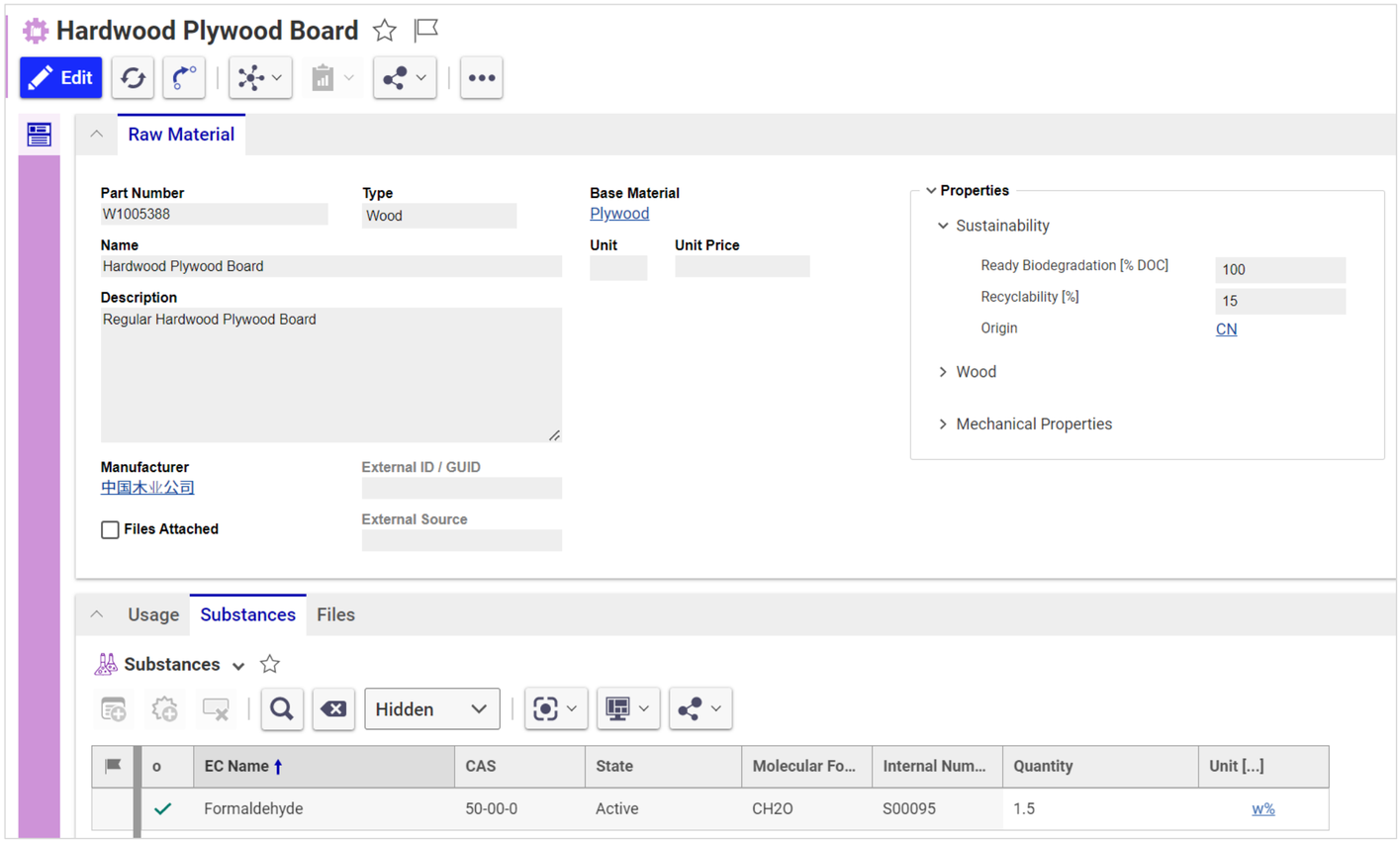
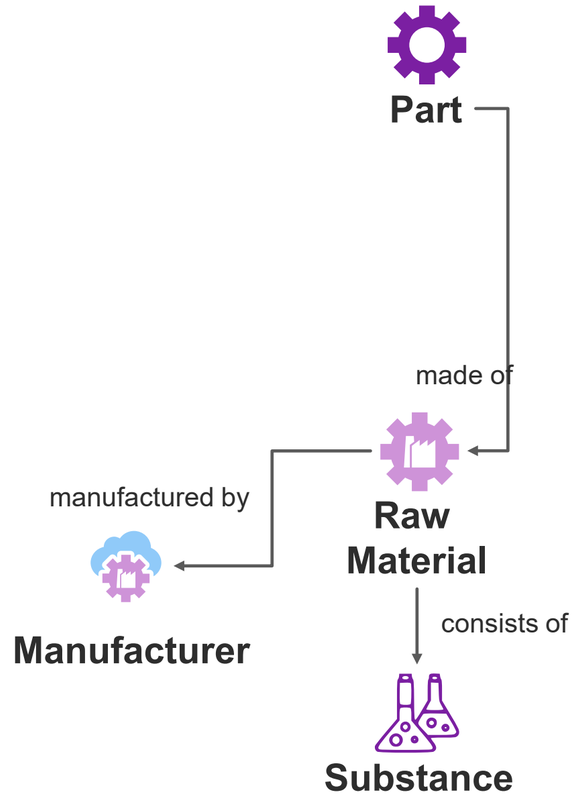
Story Line

Product Engineering

- Materials / Substances





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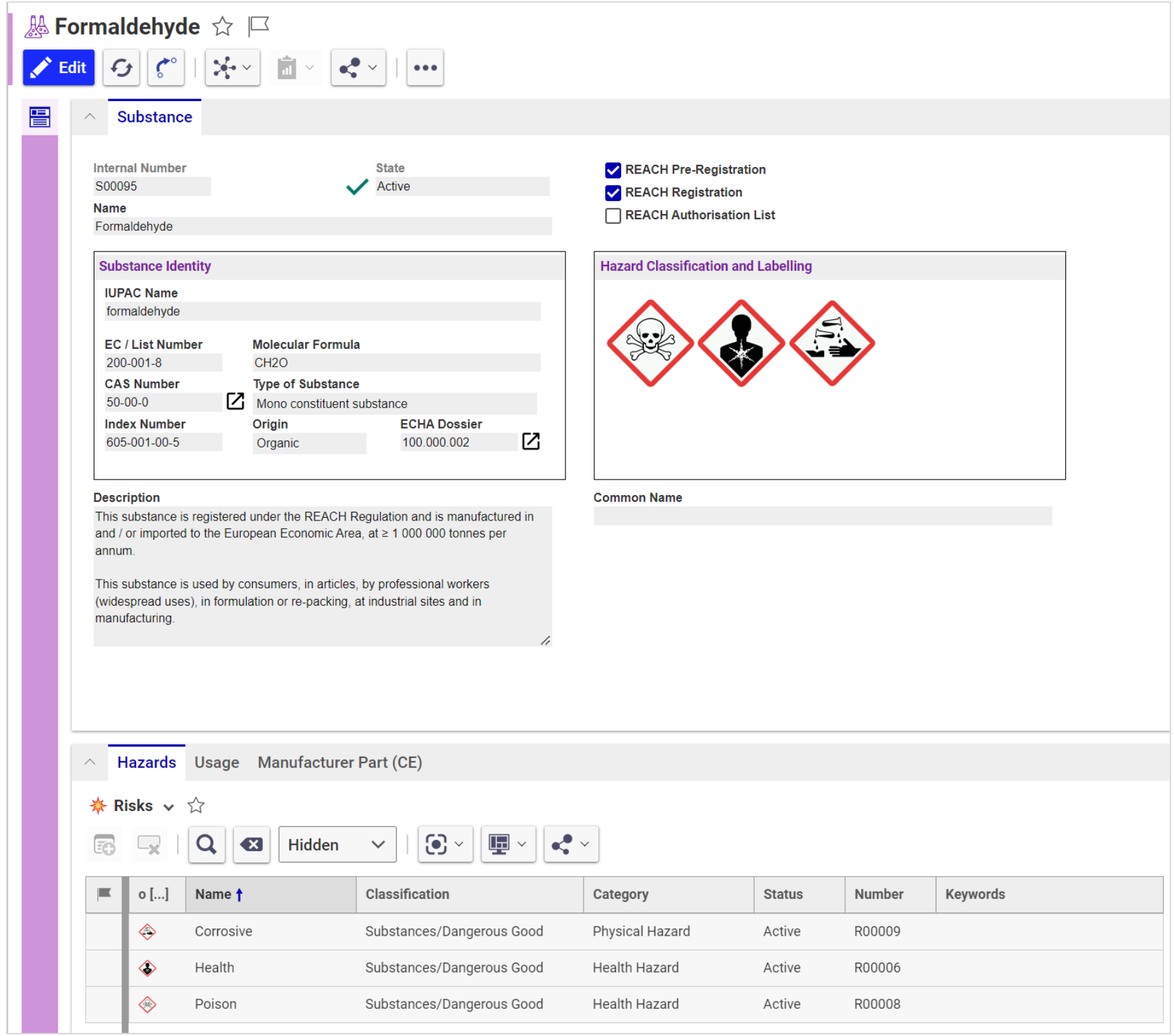
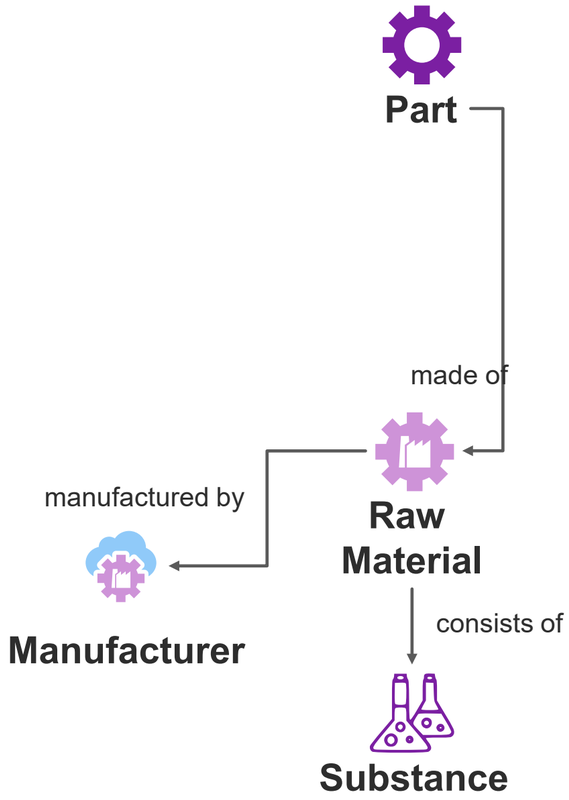
Story Line

Product Engineering

- Materials / Substances
  - Hazards
  - Risks





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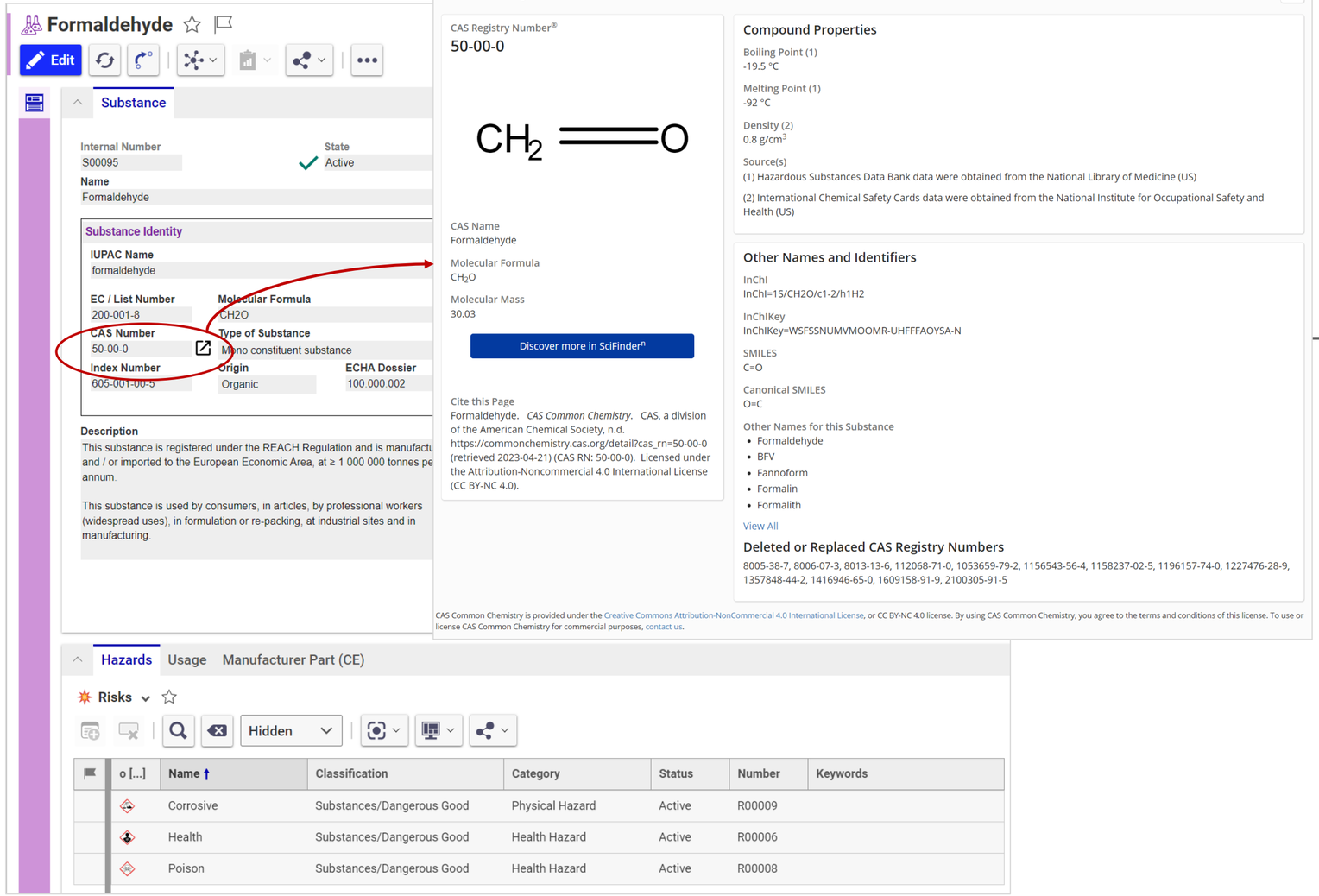
Story Line

Product Engineering

- Materials / Substances
  - External links



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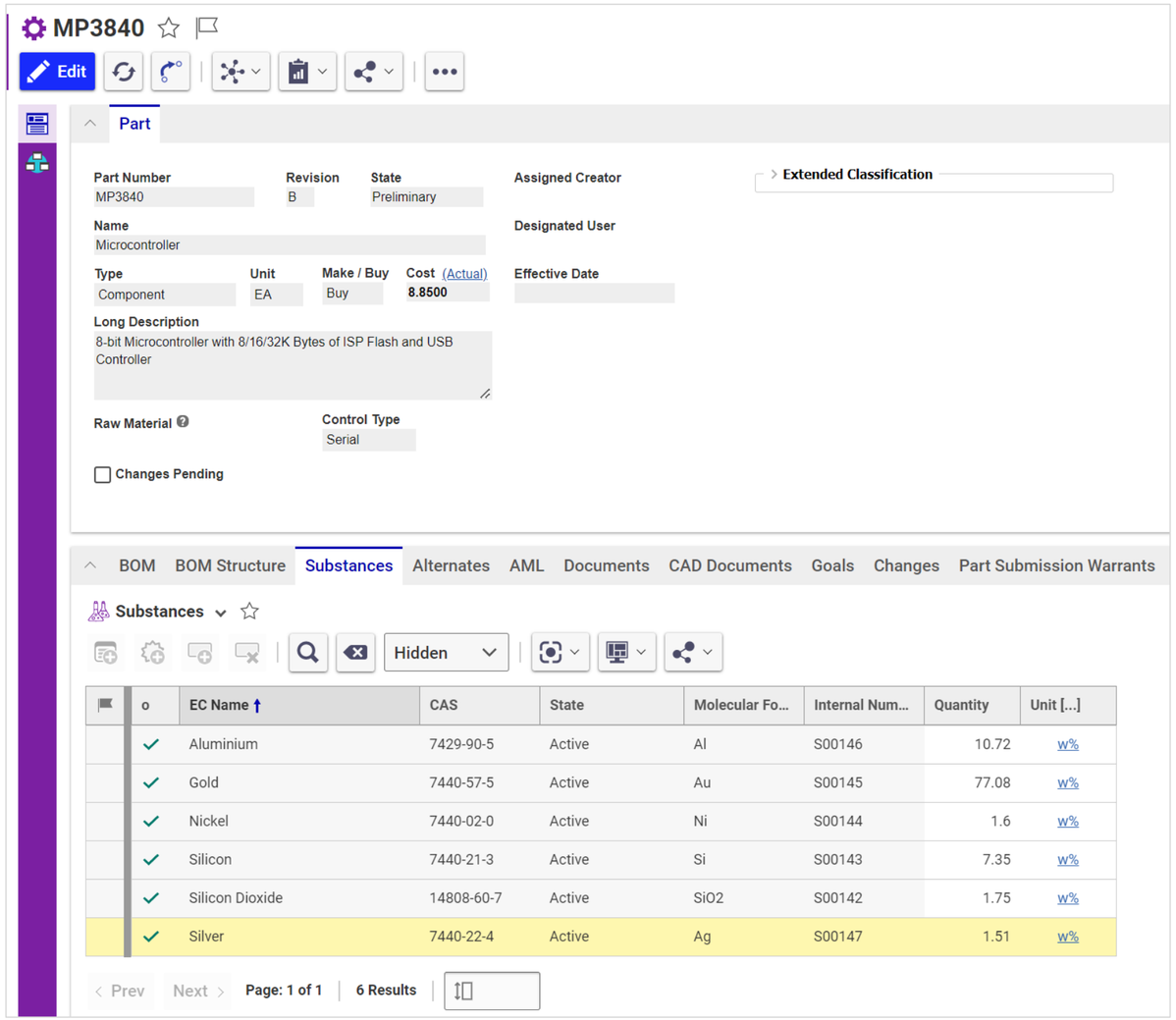
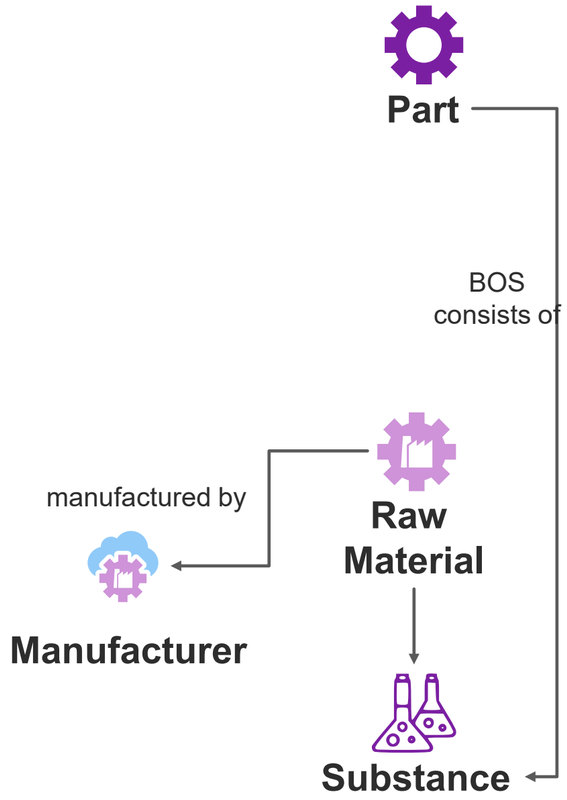
Story Line

Product Engineering

- Materials / Substances





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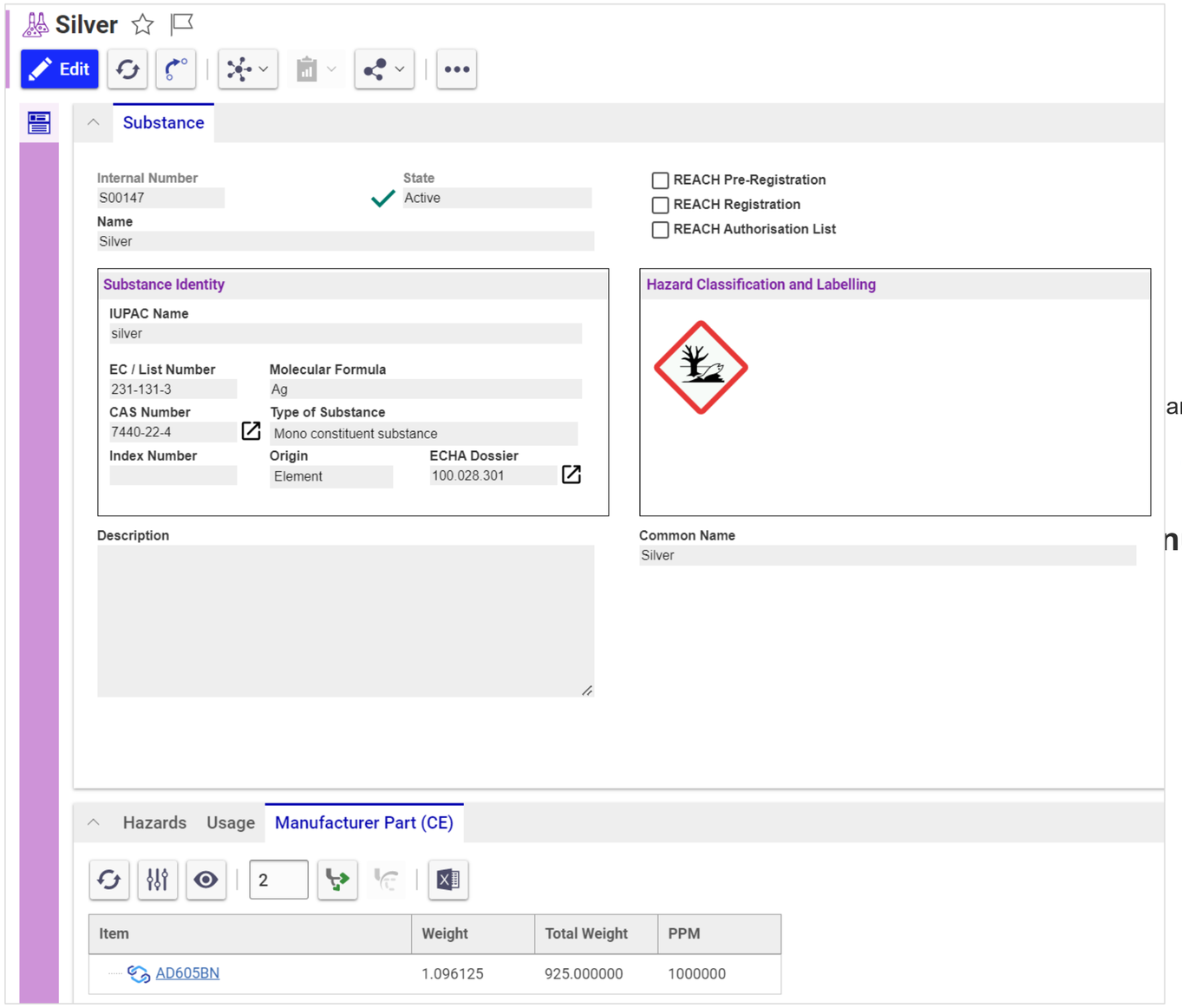
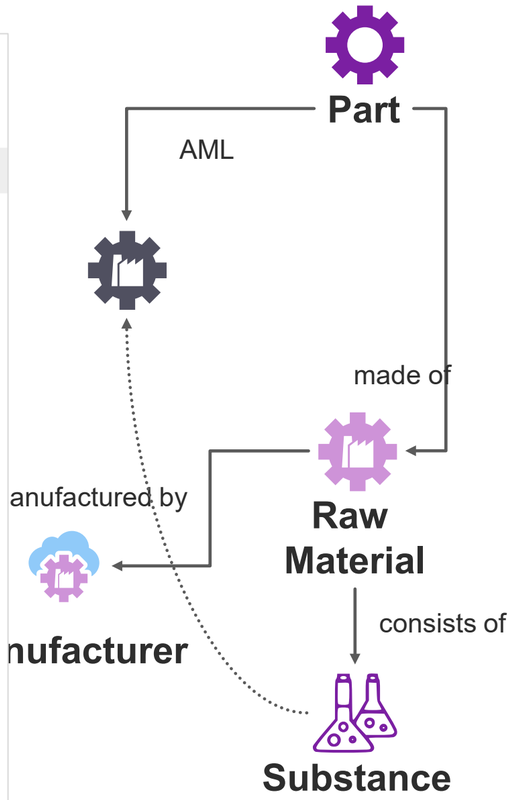
Story Line

Component Engineering

- Materials / Substances





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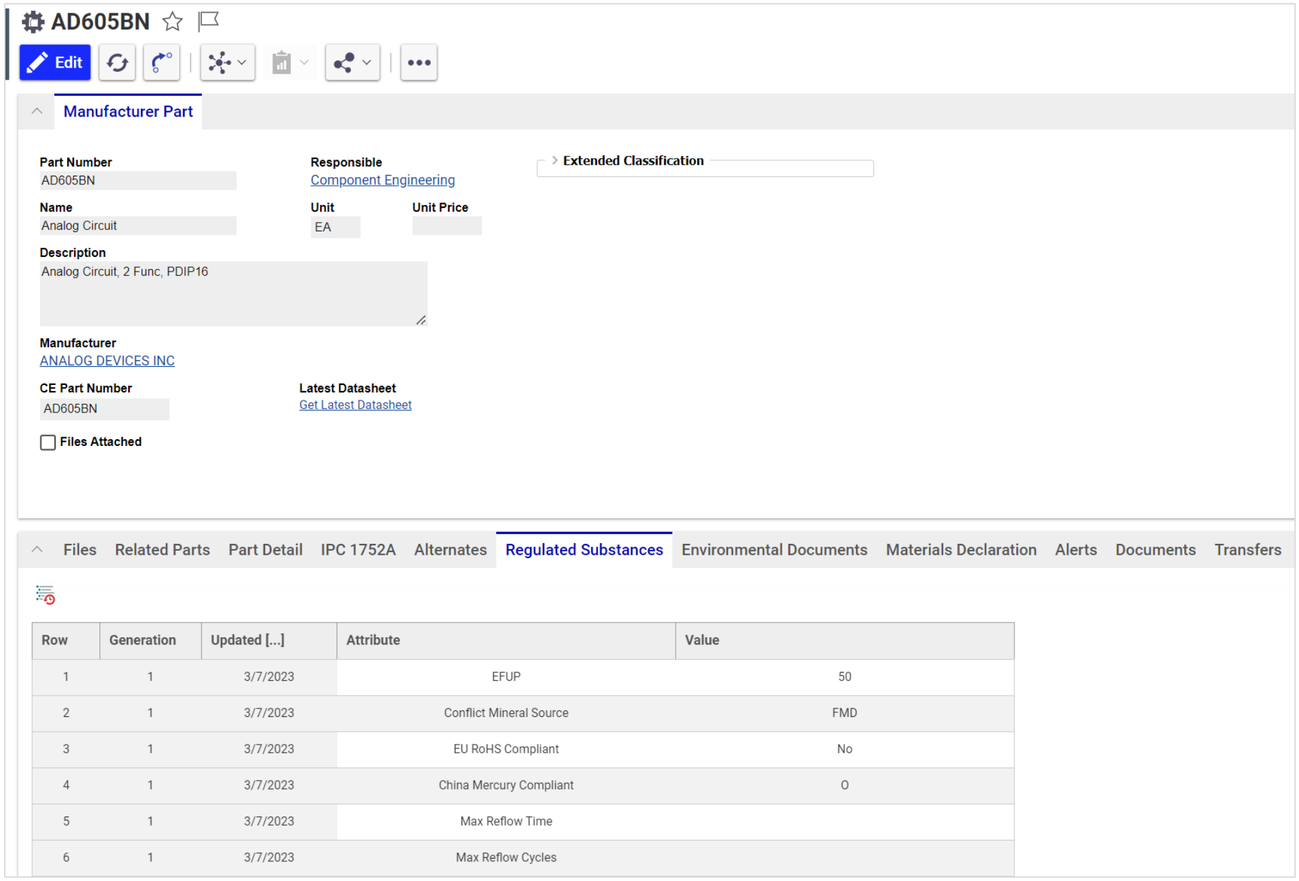
Story Line

Component Engineering

- Regulated Substances



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3	1	3/7/2023	EU RoHS Compliant	No
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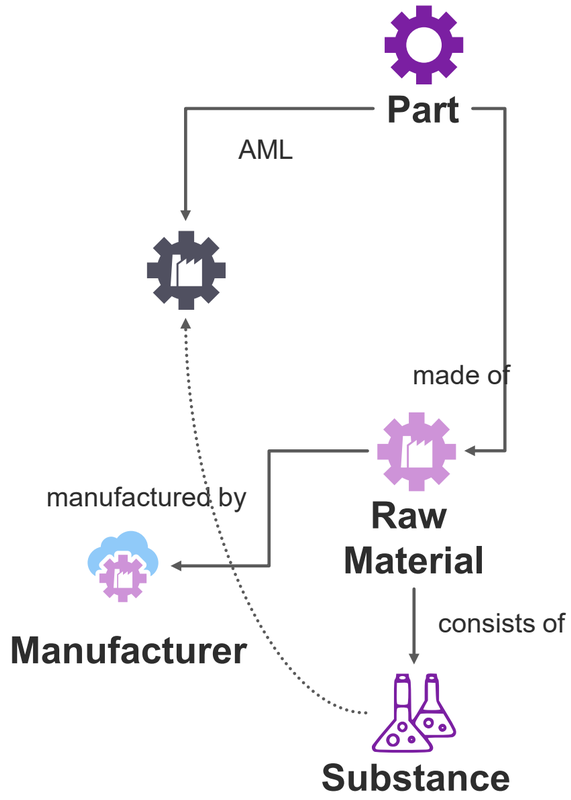
5	1	3/7/2023	Max Reflow Time	
6	1	3/7/2023	Max Reflow Cycles	



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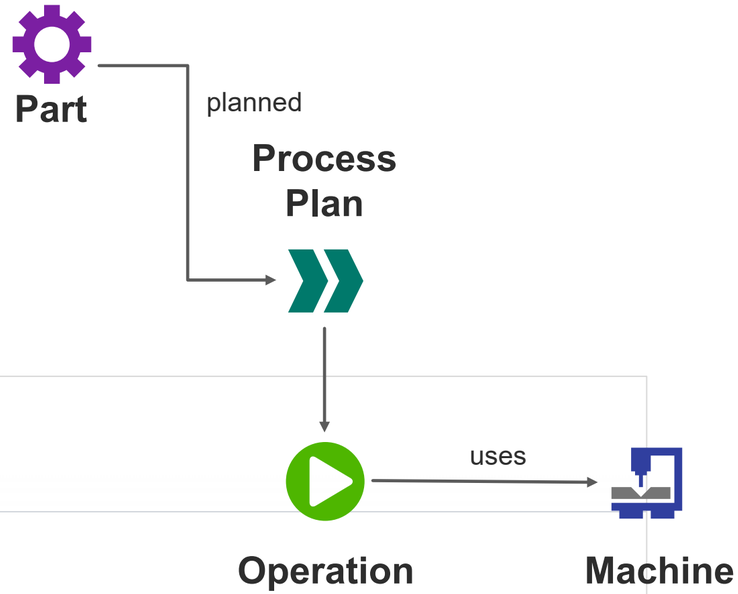
Story Line

Manufacturing Process Planning

- Power consumption



PP001

Edit

Location: Detroit Language: English

- Extruder Assembly → MP2954
  - 10 : Assemble Fan
  - 20 : Assemble Heat Sink
  - 30 : Assemble Mount Assembly
    - 1 : Take the fan assembly and put the bolts throug...
    - 2 : Tighten the bolts down
    - 3 : Place in bin
    - P23124
    - 1731
    - H1234
  - 40 : Assemble Filament
  - 50 : Assemble Drive Block

Operation 30 : Assemble Mount Assembly

Step 1 : Take the fan assembly and put the bolts throught the moutn bar

After cleaning the work surface place the mount plate in front of you with the double notch to your left.

- Place the bar on top of the mount plate
- Thermal Barrier should be in the center

Step 2 : Tighten the bolts down

Step 3 : Place in bin

Part Number	Part Name	Type	Quantity	Alternates	Substitutes
P23124	Mount Assembly	Phantom	1		

Resource Number	Name		Type	Class	Power [kW]
1731	Wrench		Tool	Power Tool	0.1
H1234	Cutting Machine		Machine	Metal Forming	2.5

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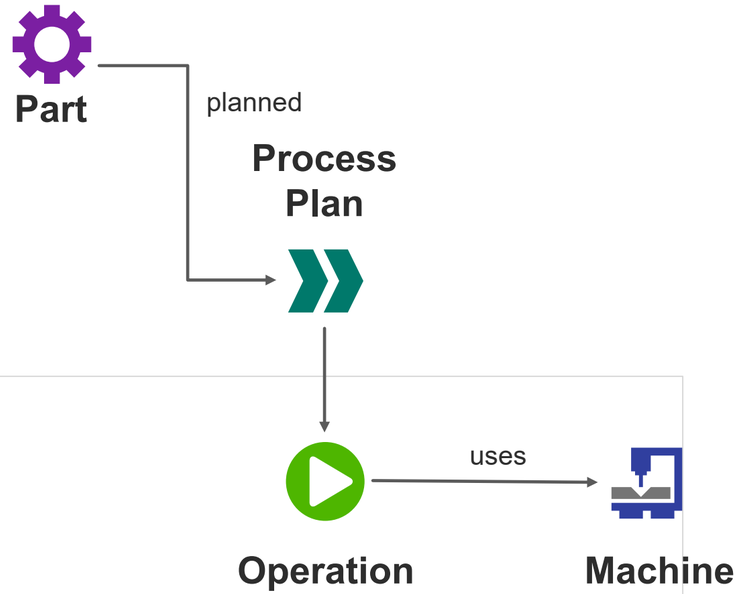
Story Line

Manufacturing Process Planning

- Power consumption



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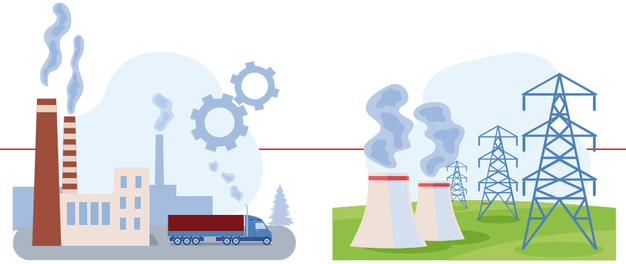
Story Line



Manufacturing Process Planning

Power Consumption – Scope 1 / Scope 2

- Machine / equipment power consumption

PP001

Edit

Location: Detroit Language: Eng

Extruder Assembly → MP2954
- 10 : Assemble Fan
- 20 : Assemble Heat Sink
- 30 : Assemble Mount Assembly
  - 1 : Take the fan assembly and
  - 2 : Tighten the bolts down
  - 3 : Place in bin
  - P23124
  - 1731
  - H1234
- 40 : Assemble Filament
- 50 : Assemble Drive Block

Operation Number: 30
Name: Assemble Mount Assembly
Description: Assemble Mount with power tools
Setup Time: 10
Cycle Time: 20

Operation 30 : Assemble Mount Assemb

Step 1 : Take the fan assembly and put the bol

After cleaning the work surface place the mount plate in front of you with the double notch to your left.
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Part Number	Part Name	Type	Quantity	Alternates	Substitutes
P23124	Mount Assembly	Phantom	1		

Resource Number	Name		Type	Class	Power [kW]
1731	Wrench		Tool	Power Tool	0.1
H1234	Cutting Machine		Machine	Metal Forming	2.5

Workbench

Machines Search

Machine Number	Name
H1234	Cutting Machine
D8123	Lathe

H1234 Cutting Machine

Edit

Machine

Machine Number: H1234
Location: Toulouse
State: In Operation
Name: Cutting Machine
Type: Metal Forming
Description: The V320 is a CNC pass-through plate processing machine built to automate part handling. The machine is equipped with both plasma and oxy-fuel cutting technology as well as a drill.

Properties
Cutting
Power [kW]: 2.5

Thumbnail

Converts to CO_2e

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Questions

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