



Flagship - Towards a NetZero Plastics Industry

A Project Overview

Coffee Lectures

Production Management at ITEM-HSG

05th March 2024

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*“From insight
to impact”* 

We are part of the Institute of Technology Management at the University of St.Gallen

Introduction HSG



University of St.Gallen (HSG)

- Founded in 1898 as business academy in the heyday of the embroidery industry
- Ranked 1st in the German speaking area in the Handelsblatt ranking for business management research, Ranked 4th in FT Ranking European Business Schools
- 42 institutes and 6 schools (Management, Economics and Political Science, Finance, Law, Humanities and Social Sciences)
- 9,291 students (25% international students), 624 research associates, 107 professors

Institute of Technology Management (ITEM-HSG)

- 4 professors for Production Management, Innovation Management, Operations Management and Entrepreneurship with 40+ research associates
- Biggest Institute at the University of St.Gallen

Production Management (ITEM-PM)

- Led by Prof Dr. Thomas Friedli with currently 1 project leaders, 14 research associates
- Competence Centers: Global Production Networks, Operational Excellence, and Smart Manufacturing & Services
- High industry focus with 20+ industry-, 4+ benchmarking- and 4+ industry related research projects per year

Four divisions cover a wide range of topics with a strong emphasis on industry-relevant research

The Institute of Technology Management (ITEM-HSG)

Production Management



Prof. Dr. T. Friedli

Division Deputy
Dr. Lukas Budde

Global Production
J. Kaiser

Smart Manufacturing & Services
D. Wörner

Operational Excellence/Pharma
M. Bernasconi

INOS
Dr. Lukas Budde

Operations Management



Prof. Dr. E. Fleisch

Bits-to-Energy Lab
Prof. Dr. V. Tiefenbeck
Prof. Dr. T. Staake

Center for Digital Health Intervention
Asst.-Prof. Dr. T. Kowatsch
Prof. Dr. F. Wortmann
Dr. F. Barata

Innovation Management



Prof. Dr. O. Gassmann

Energy Innovation Lab
Asst.-Prof. Dr. M. Palmié

Emerging Technologies & BMI
Asst. Prof. Dr. N. Häfner

Bosch IoT Lab
Prof. Dr. F. Wortmann

Global Center for Entrepreneurship & Innovation
Prof. Dr. C. Sirén, Prof. Dr. J. Wincent, Prof. Dr. V. Souitaris

Entrepreneurship



Prof. Dr. D. Grichnik

Decision Making Research Lab
R. Schreiber

Startup@HSG Lab
D. Probst

Startup Navigator Lab
Asst.-Prof. Dr. M. Hess

FoodTech Lab
M. L. Fuchs
R. Schreiber

Transfer Center for Technology Management – TECTEM

Prof. Dr. T. Friedli

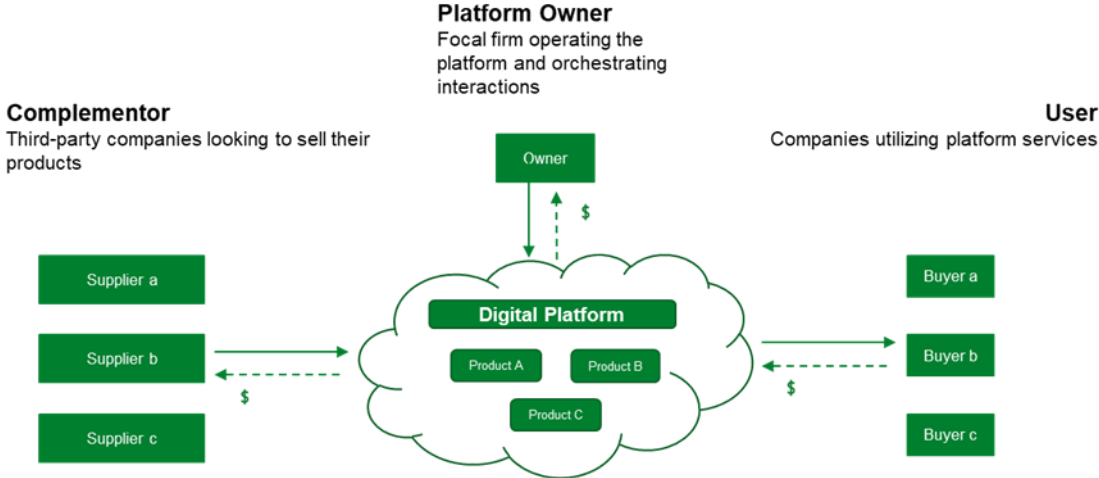
Challenges in Plastics

- **Plastics** represent a global stock of **2.7 Gt CO₂e**.
- **Only a few closed-loop polymer cycles** have been achieved in Switzerland (PET).
- The plastics value chain is directly linked with the global carbon cycle.
- **Significant potential to increase recovery** of other technical polymers (consumer goods/industrial products/mixed plastics), which are generated as waste in large quantities.

Vision of the Flagship Project

The creation of **an innovation space: a digital platform** for companies that produce, process or recycle plastic products to continuously reduce CO2 end to end (*assessment services, learning modules, collaboration tools*).

Novel materials and processes



ECO-design tool

New business models

New collaboration models

A great consortium for the flagship project

18 companies and 5 research institutions, 3 associations

Over 50 participants.... ... from multiple leading organizations... ... and many different roles



Companies

MERAXIS medmix INTERROLL

HUNTSMAN vonRoll mythentec

SULZER PILATUS

bixs Jellypipe Resilux SOREC

worn again UpBoards #tide

COMPOSITESBUSCH Composite Recycling FLUIDSOLIDS

Research Institutes

EPFL OST ETH zürich

SUPSI Universität St.Gallen

Associations

+KUNSTSTOFF .SWISS its CU COMPOSITES UNITED SWITZERLAND inos



CEO, Managing Director, Head of Institute, Head of Technology, Head of R&D, Project Manager, Engineers, Sustainability Intelligence, Researcher, etc.

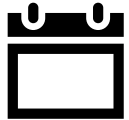
Key facts of our Flagship project

Disruptive solutions for the transition towards a net zero world



Total project cost

CHF 8'072'476,95



Duration

48 months



Flagship Call 2023

1 of only 8 Flagship projects granted

Innosuisse Funding

CHF 4'057'256.55



Setup

12 interlinked project streams



Consortium

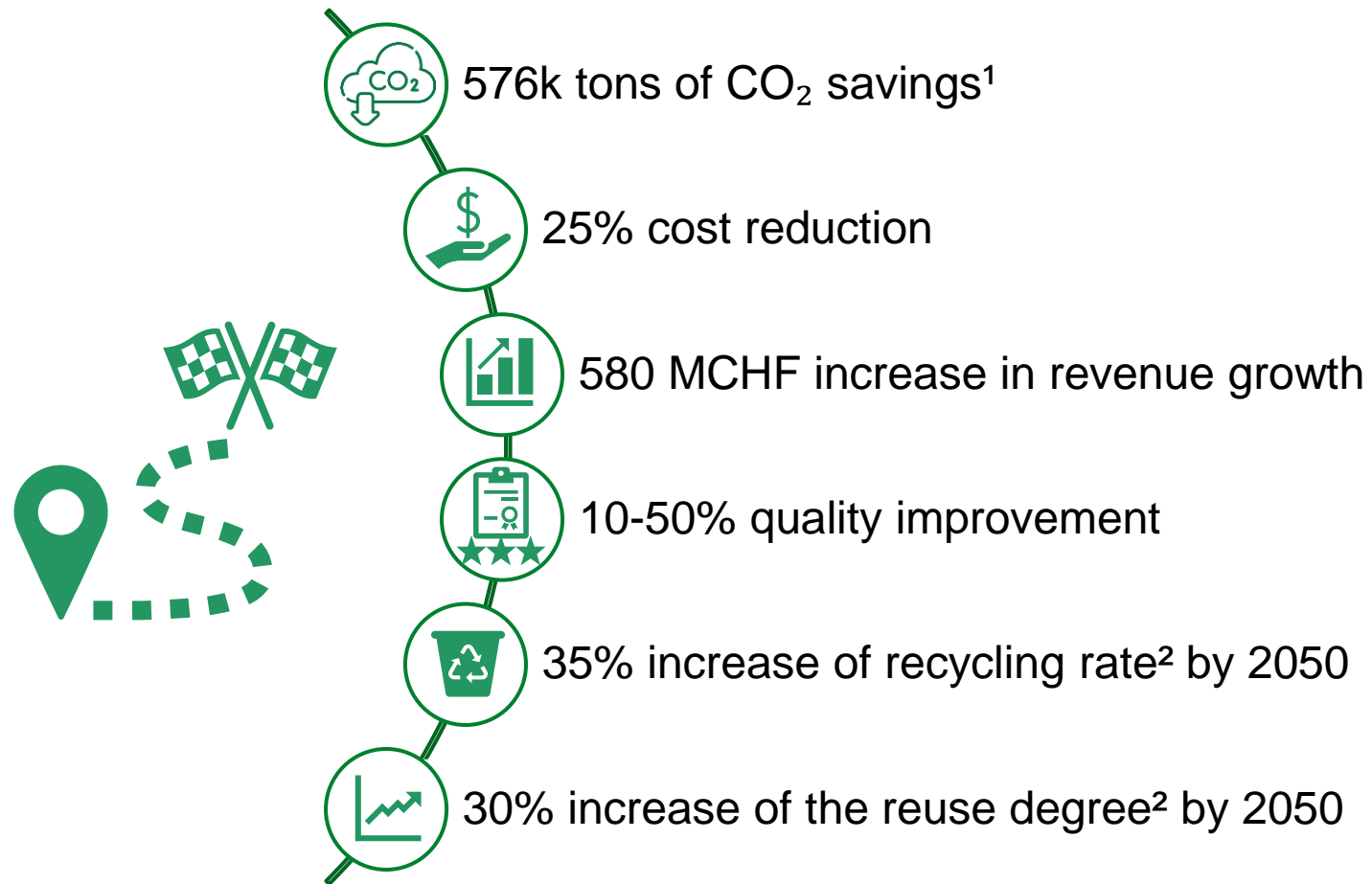
A highly interdisciplinary and broad consortium of experts



**Towards
a NetZero
Plastics Industry**

We have very ambitious goals and initiatives that we aim to achieve through the flagship

Selection of Overall Project Goals



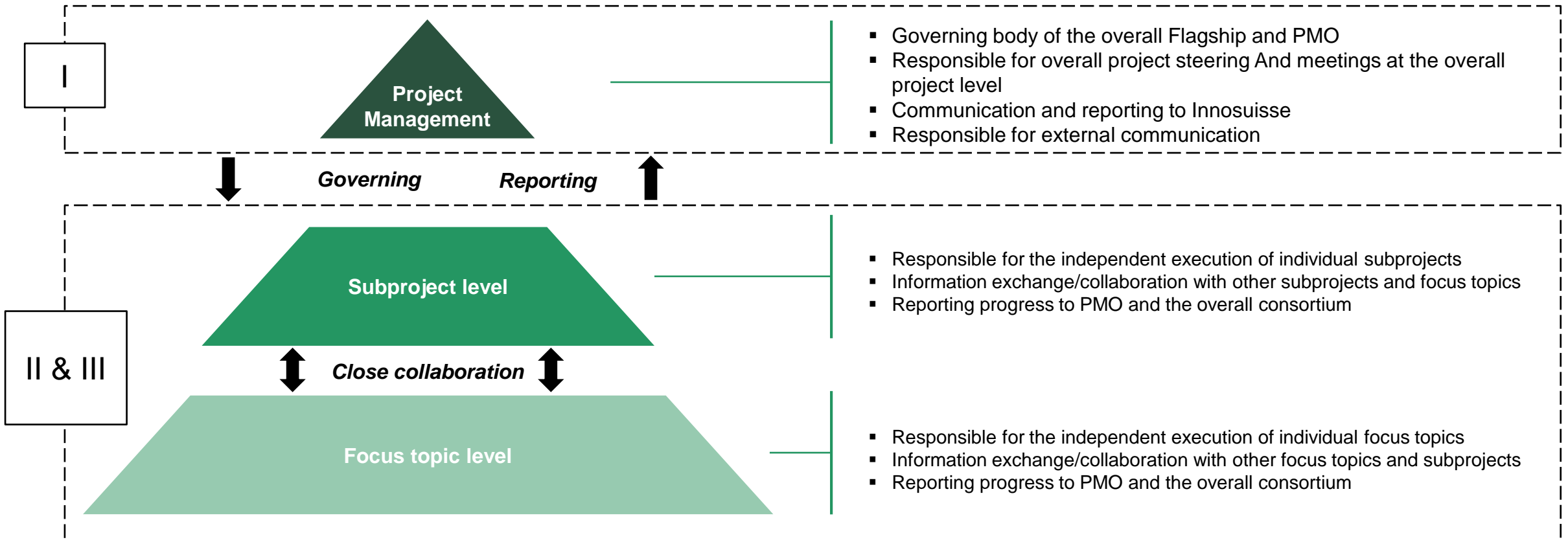
¹: Value creation subprojects 2-6 by 2035 (without multi-sided platform); ²: Expected improvements of Swiss Plastic Industry by 2050

The overall project consists of two interconnected working levels and a control level

Project structure

For better flexibility and efficiency...

...the project is structured on three levels



Overview about Sub Projects and leading Institutes

1 Sub-project 01: Multi-sided Platform

Ecosystem triggers innovation through orchestration by core products & services (Foundation)

Overview deliverables:

- 1) Business model for the multi-sided platform
- 2) Governance model for the platform (degree of freedom to create innovations)
- 3) Definitions of service blueprints (learning nuggets, collaboration tools, assessment)
- 4) MVP (Minimum Viable Product)
- 5) Go-Live MVP with first service
- 6) Add further platform services



3 Sub-project 03: Best carbon footprint materials

Disruptive approaches to reduce the CO_{2e} foot-print in raw materials and increasing circularity

Overview deliverables:

- 1) Scenarios and roadmaps developed towards a Net-Zero 2050 Swiss composite industry
- 2) Aerospace and automotive application case studies: design for circularity and assessment of scope 1, 2, & 3 emissions
- 3) Proof of concept for candidate resins in part manufacturing and re-use of constituents at end-of-life

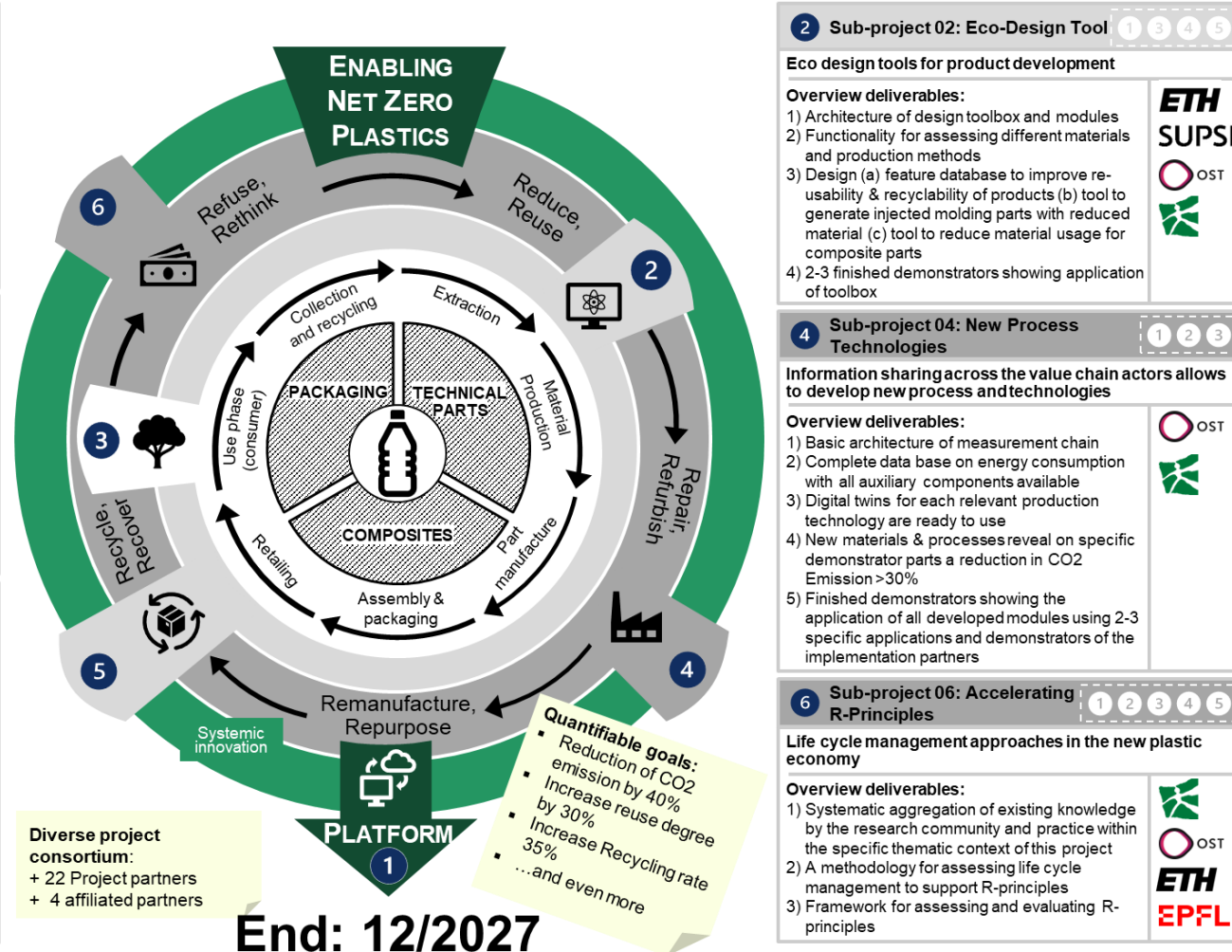


5 Sub-project 05: Re-wiring Value Chains

End-to-end involvement of companies & customers to re-wire supply chains & design more sustainable business practices

Overview deliverables:

- 1) Shortlist of suitable traceability technologies created & evaluated; Data types that shall be tracked are selected
- 2) Tagging strategies of physical parts evaluated; First prototype of digital process chain implemented and tested
- 3) Implications regarding value chain & business models evaluated; Necessary adaptations for conventional polymer processing described
- 4) Digital process chain adapted for conventional polymer processing



2 Sub-project 02: Eco-Design Tool

Eco design tools for product development

Overview deliverables:

- 1) Architecture of design toolbox and modules
- 2) Functionality for assessing different materials and production methods
- 3) Design (a) feature database to improve re-usability & recyclability of products (b) tool to generate injected molding parts with reduced material (c) tool to reduce material usage for composite parts
- 4) 2-3 finished demonstrators showing application of toolbox



4 Sub-project 04: New Process Technologies

Information sharing across the value chain actors allows to develop new process and technologies

Overview deliverables:

- 1) Basic architecture of measurement chain
- 2) Complete data base on energy consumption with all auxiliary components available
- 3) Digital twins for each relevant production technology are ready to use
- 4) New materials & processes reveal on specific demonstrator parts a reduction in CO₂ Emission > 30%
- 5) Finished demonstrators showing the application of all developed modules using 2-3 specific applications and demonstrators of the implementation partners



6 Sub-project 06: Accelerating R-Principles

Life cycle management approaches in the new plastic economy

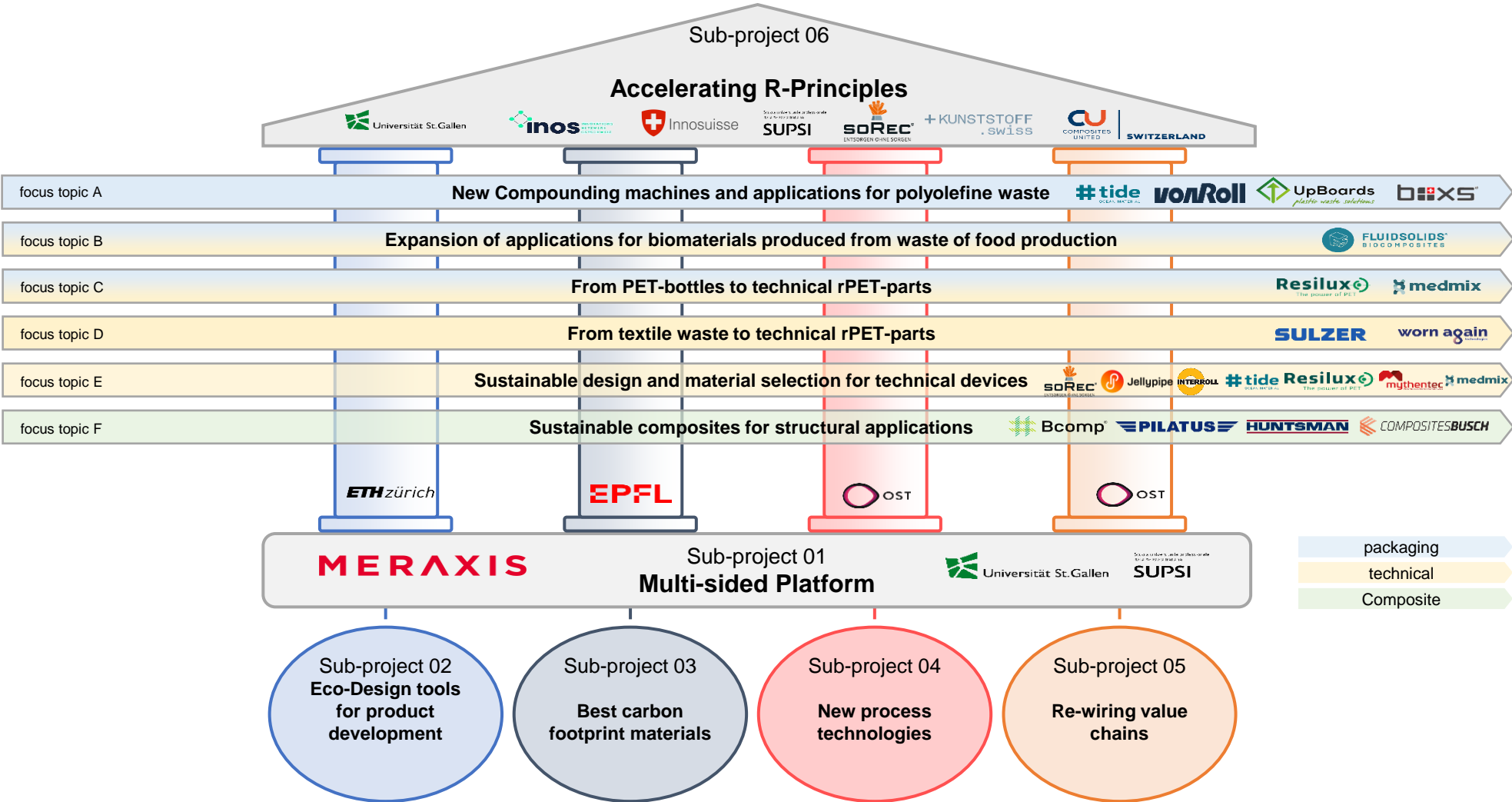
Overview deliverables:

- 1) Systematic aggregation of existing knowledge by the research community and practice within the specific thematic context of this project
- 2) A methodology for assessing life cycle management to support R-principles
- 3) Framework for assessing and evaluating R-principles



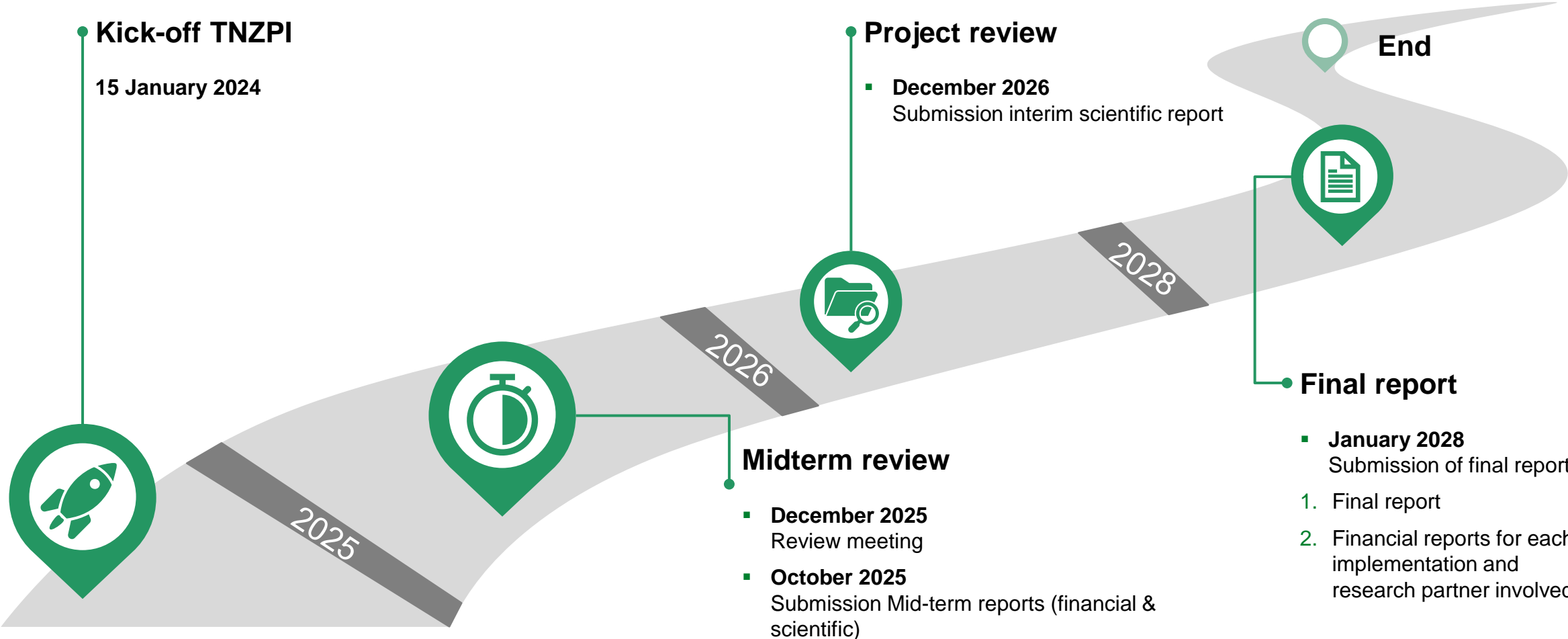
The individual subprojects and focus topics are intricately linked and strongly interdependent

Structure

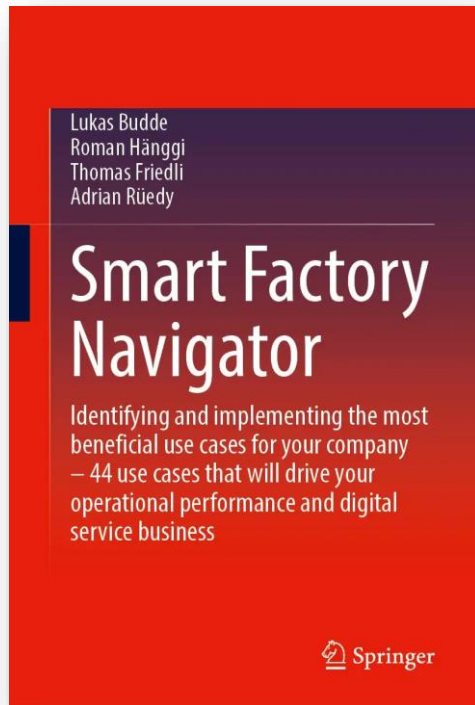


Our Flagship Project Roadmap

Timeline Reporting



Get in Touch!



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Lukas Budde

Scientist | Entrepreneur | Innovations | Smart
Factory | Digitalization | Platforms



Source: *Smart Factory Navigator: Identifying and Implementing the Most Beneficial Use Cases for Your Company—44 Use Cases That Will Drive Your Operational Performance and Digital Service Business Hardcover, Lukas Budde, Roman Hänggi, Thomas Friedli, Adrian Rüedy, Springer (2023) ISBN 978-3031172533