ESTEP 2025 Annual Event
28-30 October 2025
Udine (ITALY)

How decarbonisation, digitisation and circular solutions forge the sustainable European steel future?

Dr. Eric Chiquito
Luleå University of Technology
Postdoctoral Researcher

THE UNIVERSAL ENVIRONMENTAL DATA MODEL - THE PRISMA PROJECT

ESTEP · DIGIMET · DANIELI AUTOMATION · UNIVERSITÀ DEGLI STUDI DI UDINE HIC SUNT FUTURA

PRISMA project

PRISMA is supported by RFCS-2024-CSP GA-101193563

PRISMA project partners

LULEÅ UNIVERSITY OF TECHNOLOGY

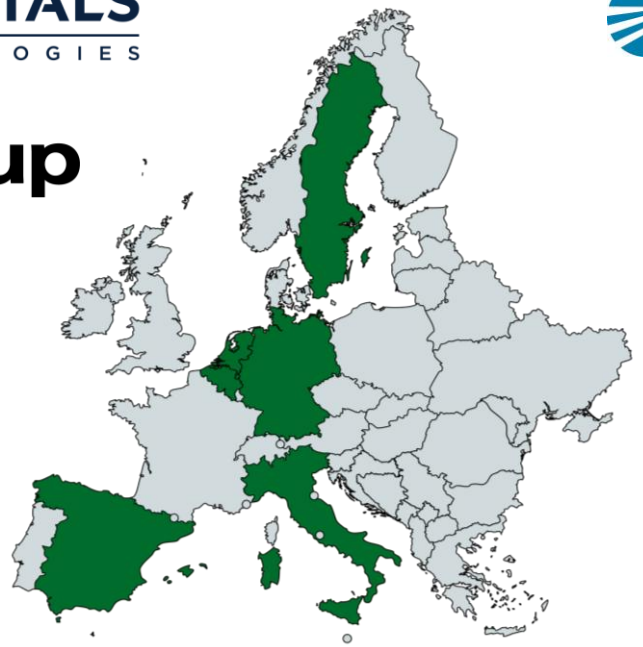
PRIMETALS TECHNOLOGIES

DANIELI AUTOMATION

SMS group

tenova

TATA STEEL



ABS ACCIAIERIE BERTOLI SAFAU
ABSOLUTE STEEL QUALITY

ESTEP
European Steel Technology Platform

RINA

celsa | Transforming today. Strengthening tomorrow.

ORMARTIN®

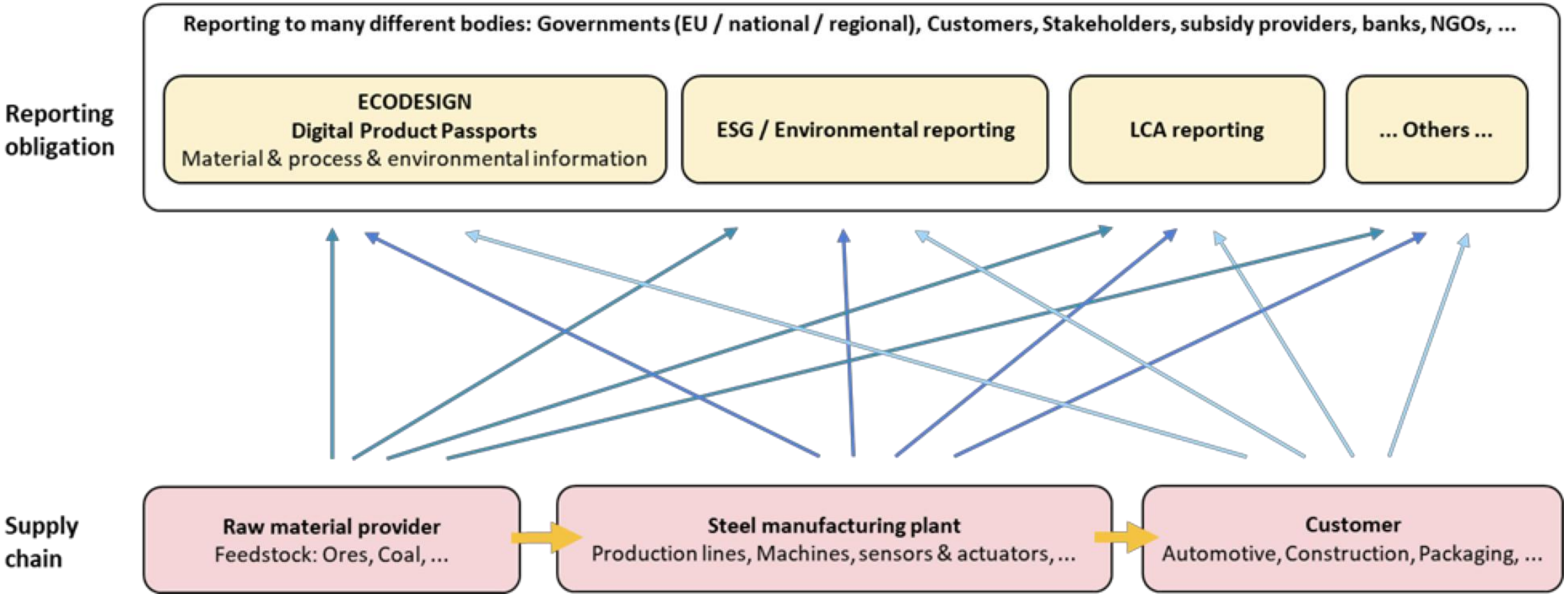
AQUILES SOLUTIONS

polytec | BM GROUP

PRISMA vision

The vision of the PRISMA project is that the steel industry has access to Evolutionary Framework, Data models and Tools for Environmental Reporting along Steel Value Networks and Lifecycles.

Environmental data reporting challenges



Environmental data reporting challenges

1) Fragmented Reporting Landscape:
   - Reporting must be exchanged among multiple organizations, each following different standards, definitions, rules, and formats.
   - This is valid also for standards regarding applications such as LCA/LCCA and the incoming DPP that is still not based on a cogent definition of Green Steel resulting in an inconsistent standardization scenario.
2) Increasing and Evolving Reporting Burden:
   - Reporting burden is rapidly increasing to stay in market and competitive (for example between steelmakers and customers, due to ESPR and future standards).
   - Current environmental reporting regulations and standards are foreseen to change rather frequently asking for re-occurring updates of content and obligations.
3) Labor-Intensive Data Collection:
   - Reporting and data collection are still largely *manual processes,* with information often consolidated from legacy or siloed systems.
4) Static and Low Resolution Data:
   - Figures in reports are “static,” and averaged over large periods (years), no standardized use of dynamic LCA despite its ability to facilitate manufacturing efficiency, transparency and monitoring.
   - Figures are “coarse”, i.e. not grade specific and not production-route specific. Difficult data driven decision making and compliance.

Environmental data reporting challenges

1)Fragmented Reporting Landscape

2)Increasing and Evolving Reporting Burden

3)Labor-Intensive Data Collection

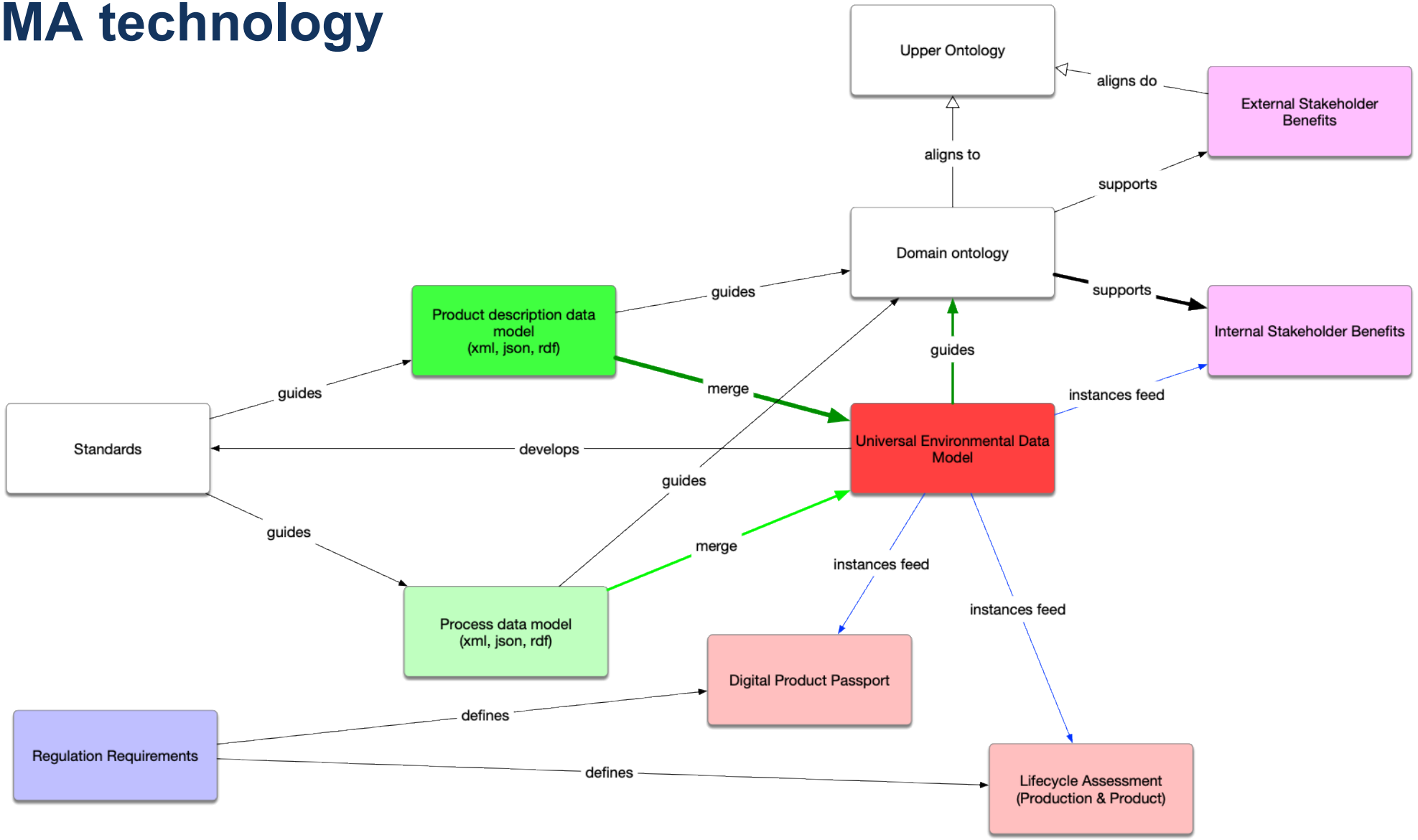
4)Static and Low Resolution Data

- While digitalization could address many of these challenges, by enabling automation and higher data granularity, its adoption remains limited.
- Progress is slowed by non-interoperable legacy systems, unclear and slowly evolving guidance on the deployment of digital technologies, and the significant investment required to achieve compliance with advanced industrial architectures such as Industry 4.0 and 5.0.

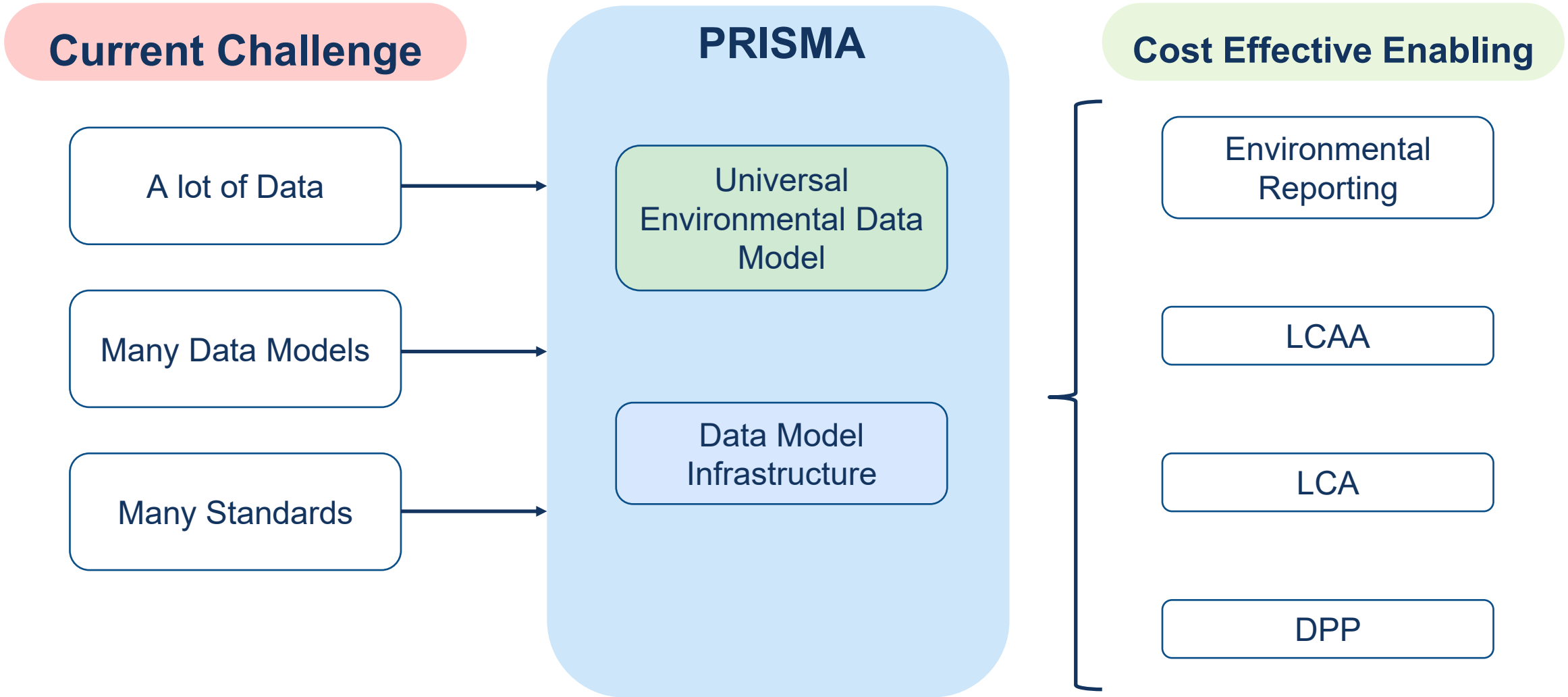
Strategic objective

Provide a Unified Environmental Data Model and Digital Infrastructure to be integrated into the ICT landscape of manufacturing facilities for accelerating the de-carbonization of the steel sector.

PRISMA technology



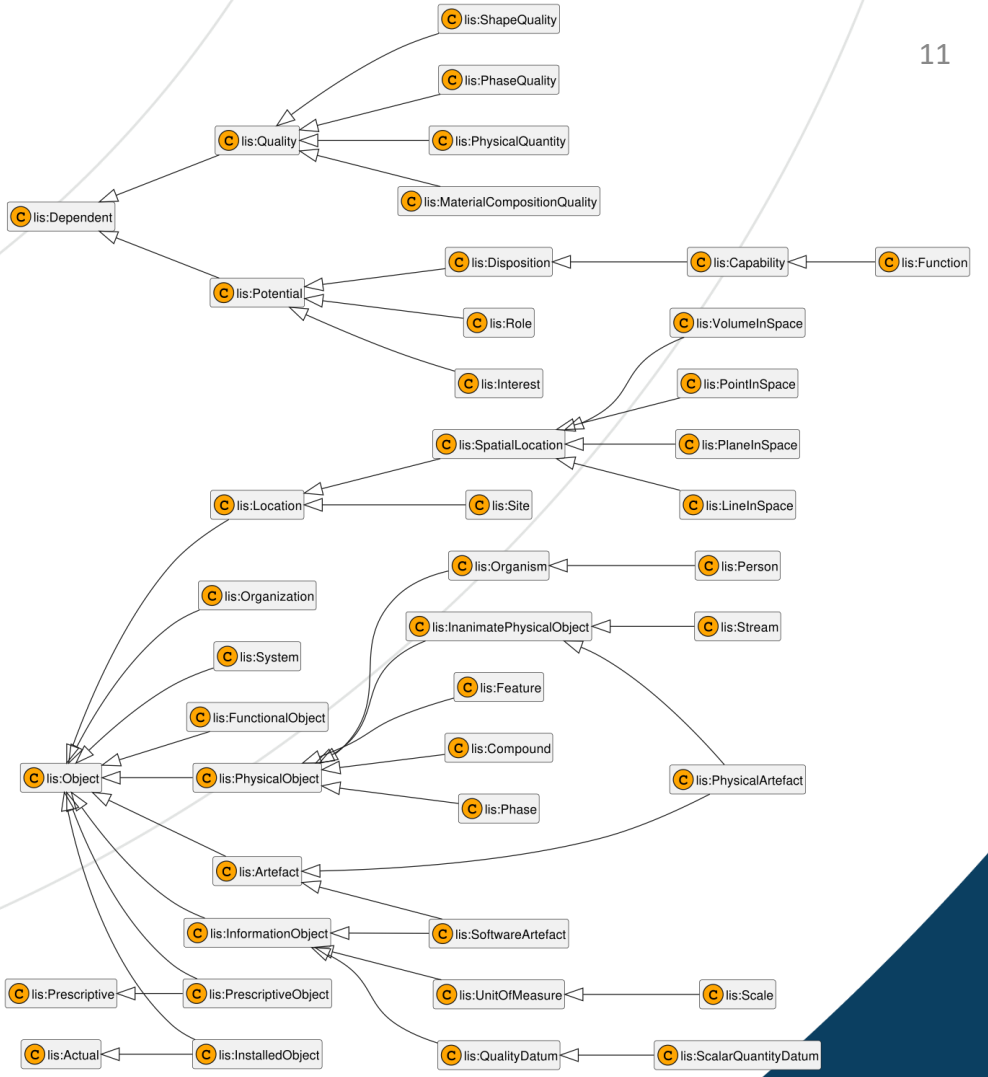
Universal Environmental Data Model



Data integration/translation - based on Chips-JU project results

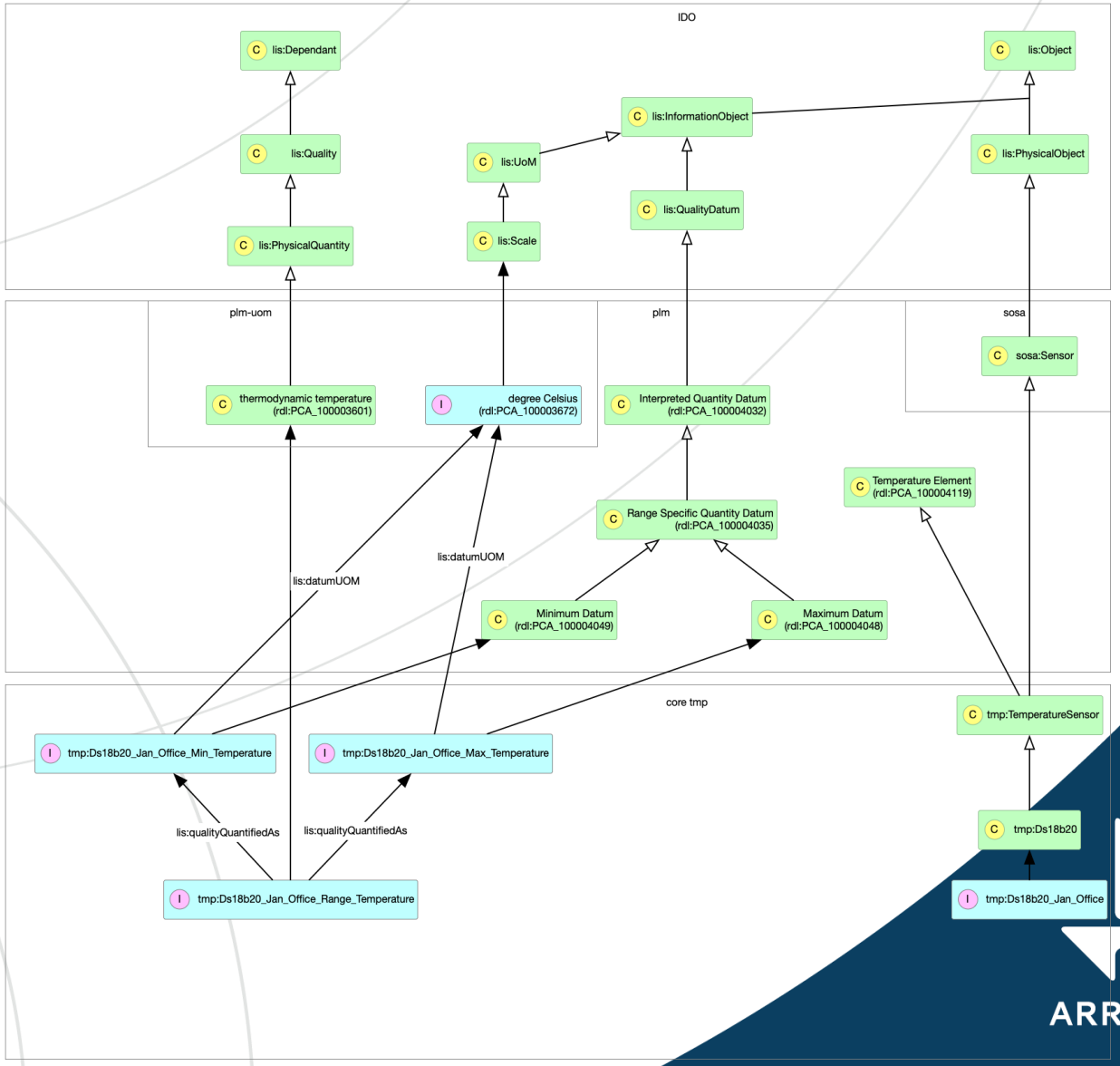
Results from the Arrowhead fPVN project

- Usage of upper ontologies
  - Industrial Data Ontology - IDO Standardised as - ISO 23726-3



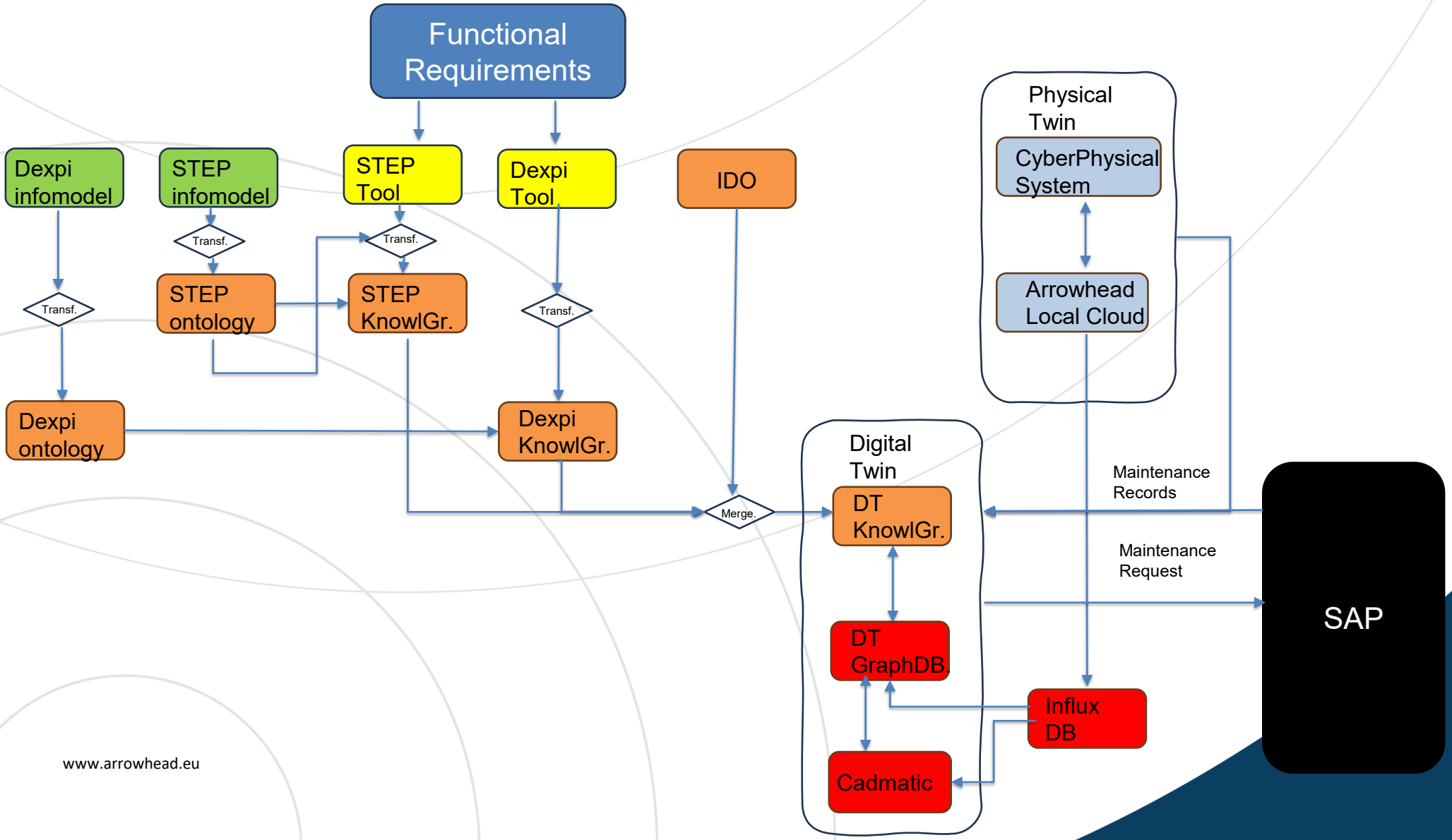
Ontology based data model integration approach

- Integration of ontologies based on an upper ontology enabling
  - Semantic interoperability between standardised data models
    - ISO15926, ISO10303, ISO81346, ,,,
- Reduced engineering cost for
  - Environmental data reporting
  - LCA and LCCA
  - DPP



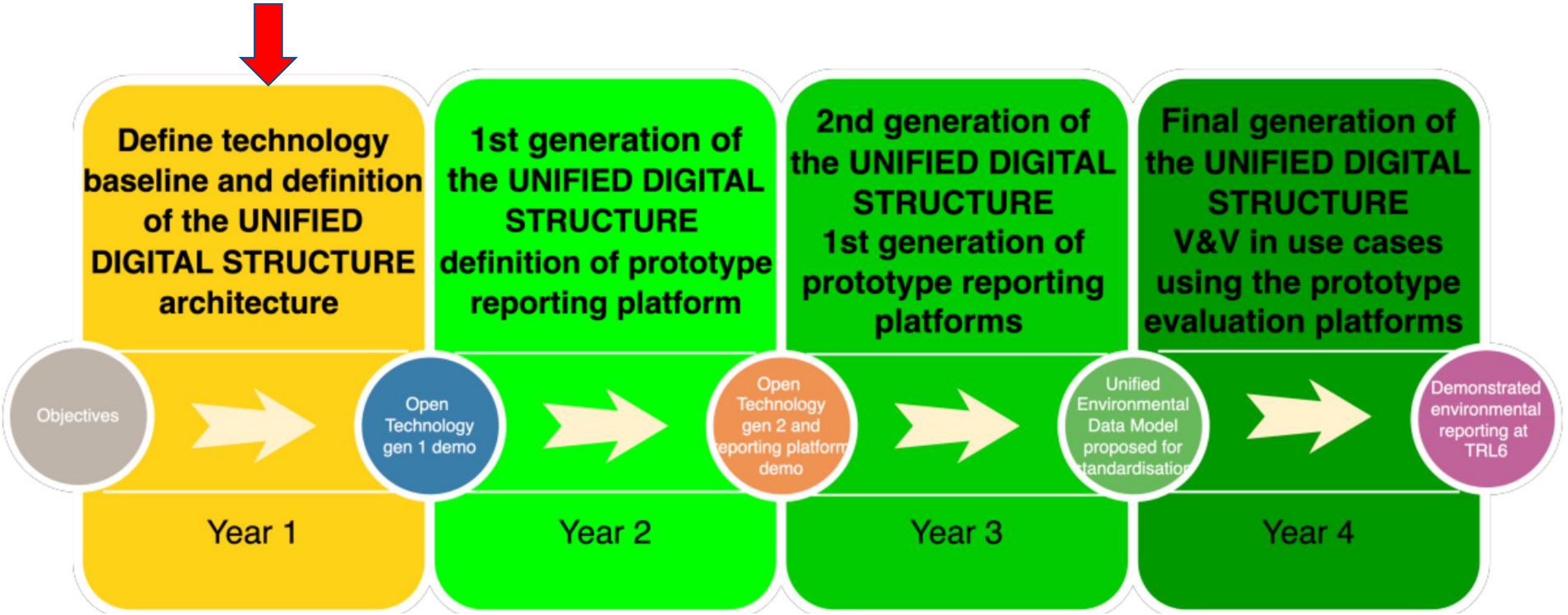
ARROWHEAD fPVN

Evaluation in Paper & Pulp industry

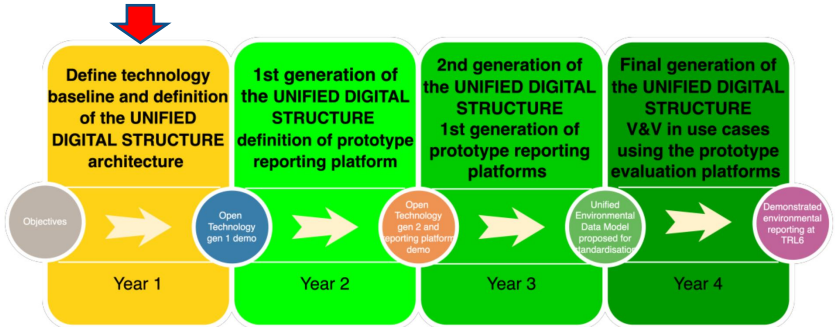


ARROWHEAD fPVN

The PRISMA plan



The PRISMA plan – Advancement so far



- During the first 6+ months, PRISMA has focused primarily on collecting data models and standards in use, along as requirements for the usage of the UEDM from stakeholders across the steel value chain.
- This foundational phase aims to establish a common understanding of the technological principles behind the UEDM and its practical implementation. Key activities have included:
  - Identifying existing data models and structures used to represent different stages of the steelmaking process.
  - Understand the needs of the different use cases for use of the UEDM and potential outputs.
  - Exploring the use of semantic technologies to represent, connect, and operationalize the UEDM for future interoperability and automation.
- Following this phase, the work of WP2 will consist in structuring the collected requirements into the UEDM, followed by deeper exploration of semantic technologies and their integration with digital infrastructures to be developed by WP3.

eric.chiquito@ltu.se
jerker.delsing@ltu.se
par-erik.martinsson@ltu.se

on behalf of the PRISMA consortia

PRISMA is supported by RFCS-2024-CSP GA-101193563