BIORING
High-performance Biocoatings

BIORING project at a glance

Nicole Dölker, The Spanish National Research Council (CSIC), Institute of Catalysis and Petrochemistry (ICP), BIORING project manager

Open Innovation Workshop

Anticipatory LCA to promote informed decision-making in bio-based product development

4 December 2024, online, 11:00 – 13.00 CET

THE PROJECT IS SUPPORTED BY THE CIRCULAR BIO-BASED EUROPE JOINT UNDERTAKING AND ITS MEMBERS.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CBE JU. Neither the European Union nor the CBE JU can be held responsible for them.

Circular Bio-based Europe Joint Undertaking
Bio-based Industries Consortium
Co-funded by the European Union

BIORING

Engineering high performance biocoatings from renewable reactive building blocks

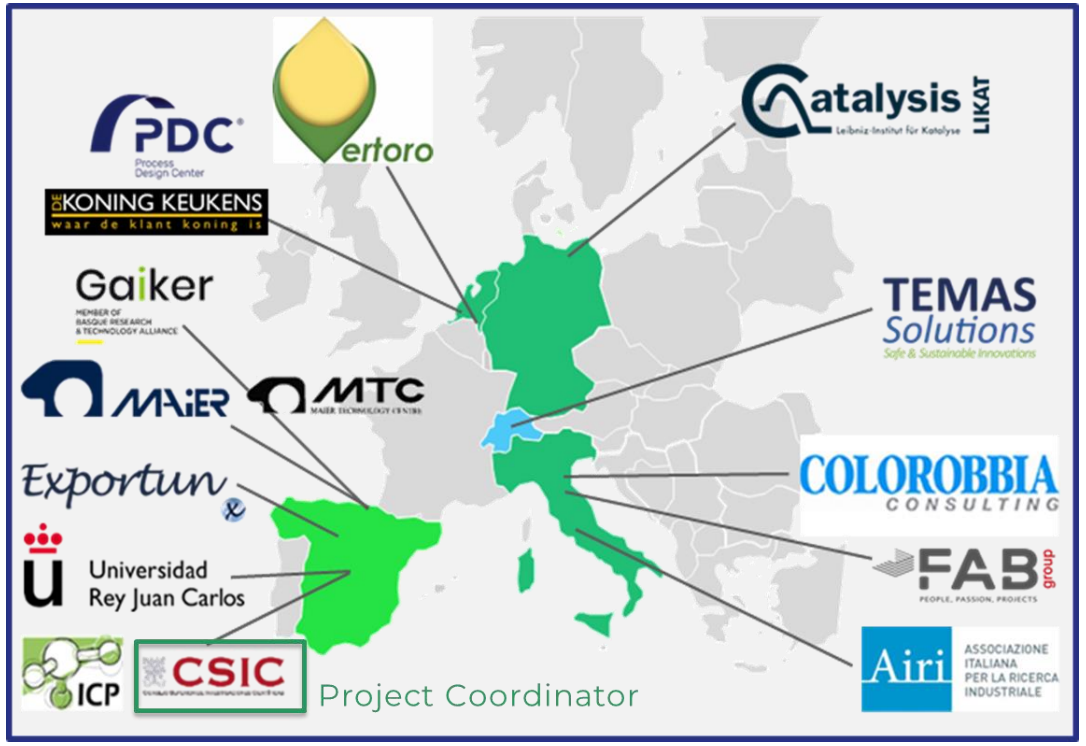
- **Call Identifier**: HORIZON-JU-CBE-2022
- **Project Type**: Research and Innovation Action
- **TRL range**: 3-5
- **CBE JU contribution**: € 4 083 971.25 million
- **Duration**: June 2023 – May 2026
- **Feedstock:** Various types of biomass-derived feedstocks
- **Main products:** UV curable coatings for construction, automotive sectors

BIORING develops a novel portfolio of renewable (up to 95% biobased) formulations for UV curable biocoatings from biomass-derived platform molecules.
Highly protective UV coatings with enhanced thermo-mechanical properties are applied as an effective, sustainable, and safe solution for the furniture, construction and automotive sectors, and beyond.

The BIORING consortium

12 partners from **5 countries**:

- **3 Large companies (LE)** (MAIER SCOOP, FAB, Colorobbia Consulting)
- **4 SMEs** (Process Design Center, TEMAS Solutions, Export Blue Market, VERTORO)
- **3 RTDs** (The Spanish National Research Council, Gaiker Foundation, Leibniz Institute for Catalysis)
- **1 University** (Rey Juan Carlos University)
- **1 Industrial association** (Italian Association for Industrial Research)
- *2 Affiliated partners:* K&K (SME), MAIER Technology Center S. Coop (RTD)



Project coordination:
The Spanish National Research Council (CSIC)

BIORING - context

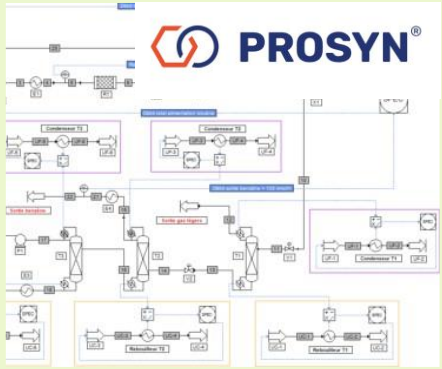
- Biobased coatings currently constitute a small niche market (5% of the coatings market)
- Existing high-performance polyurethane (PU) coatings that exceed a biomass content >35-50% compromise the functional properties of the coating or the techno-economic viability of the production
- Increasing societal and industrial demand for highly functional biocoatings

BIORING Objectives and Impact

Platform of **renewable building blocks** and oligomers from biomass as suitable constituents of tailor-made high-performance biobased UV curing coatings

2 novel
95% biobased formulations

Sustainability assessment and early LCA to guarantee a safer and more sustainable product with improved performance, health, safety profile and EoL



Process modelling framework that aligns the decisions to be taken in the process design and predict of the coating properties based on their formulation

Proofs of concept for **automotive, construction & furniture**

Identify broader market applications

BIORING
High-performance Biocoatings

BIORING Platform

BIORING Novel high performance biobased UV curable coatings

Novelty: processes and technologies for biobased products

Requirements

Unlocking sustainable and biobased Feedstock

Multifunctional component + Biobased reagent / Lignin-based reagent + Biobased end-capping photoreactive molecule + Initiator / Biobased cross linkers

Biobased building blocks: Commercial | Developed in **BIORING**

Outputs

- TRL 5+, biobased UV curing coatings with **enhanced thermomechanical performance**, as alternatives to fossil-based UV curable polyurethane
- **Chemical platform** of renewable building blocks and oligomers, up to 95% biobased feedstocks
- **Material and process design modelling framework**, to predict properties and unlock market applications
- Safety and sustainability early assessment & perspective LCA best practices (EC SSbD framework), leading to **safer processing and reducing environmental impact**

Impact: new biobased value chains & markets

Automotive

EoL recyclability

Assessment of potential cycles for reuse in injection moulding

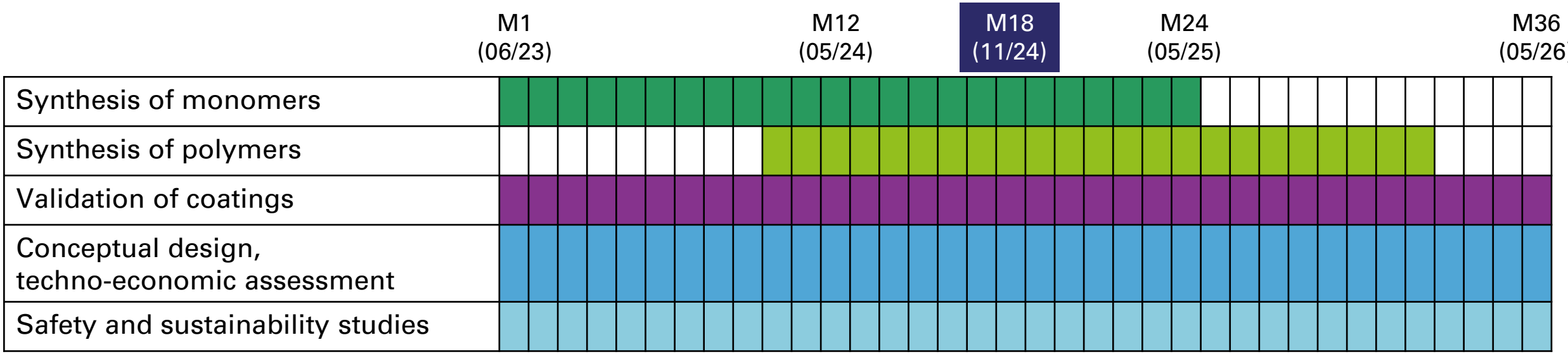
Construction & forniture

EoL biodegradability

Biodegradability in composting conditions, soil & sea water preservation, Coating leachate test

BIORING High-performance Biocoatings

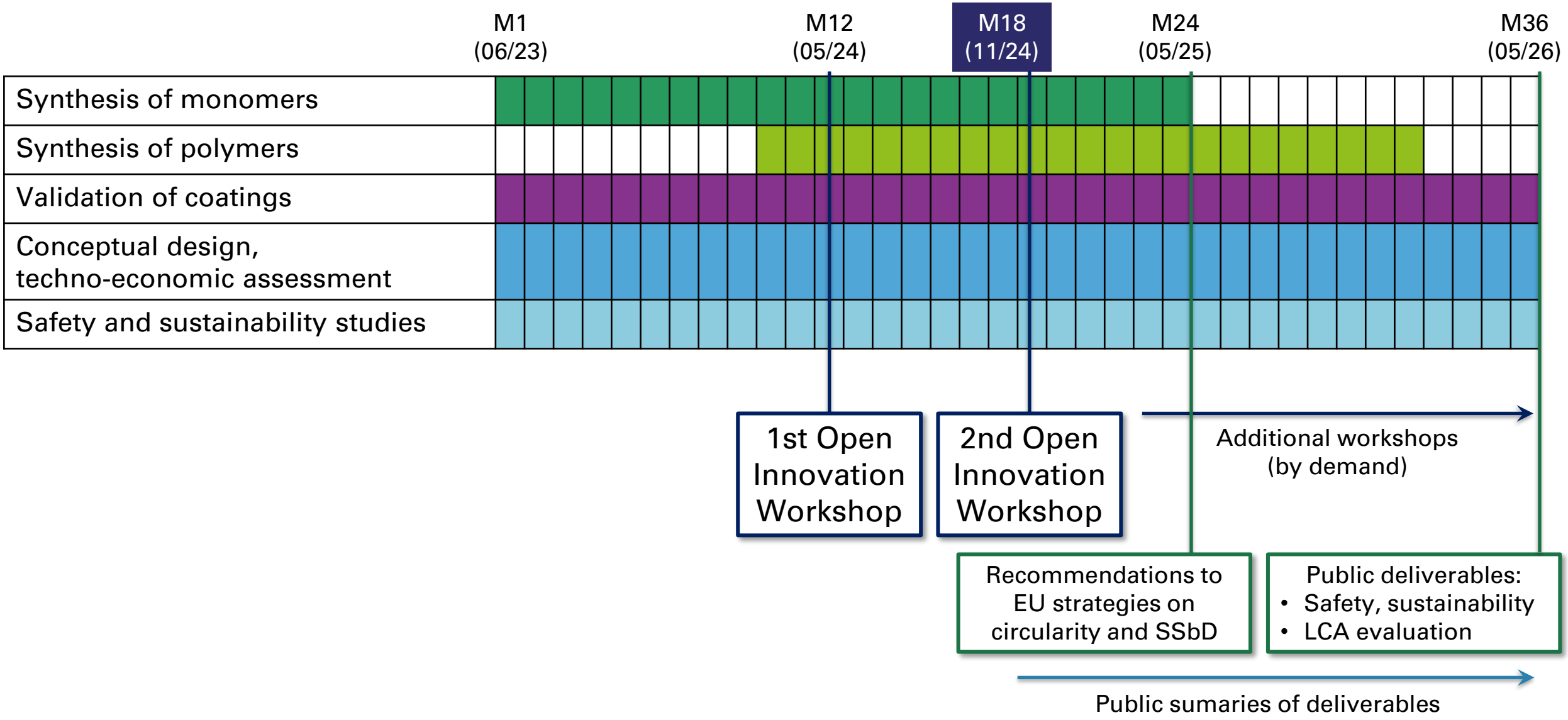
BIORING structure & schedule



All monomers synthesised Samples for polymerisation provided	Optimisation, scale-up Purification
First polymerisation samples achieved	Increase biobased content Optimise formulation
Initial model of all BIORING processes Bottlenecks identified	Optimise economic sustainability
Prospective LCA SSbD: critical substances identified	Full LCA based on project data Policy recommendations

BIORING
High-performance Biocoatings

BIORING structure & schedule



BIORING
High-performance Biocoatings