



A green extraction process to recover phenolic components from coffee side-streams

PROLIFIC Final Dissemination Event

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Celabor



Bio-based Industries
Consortium



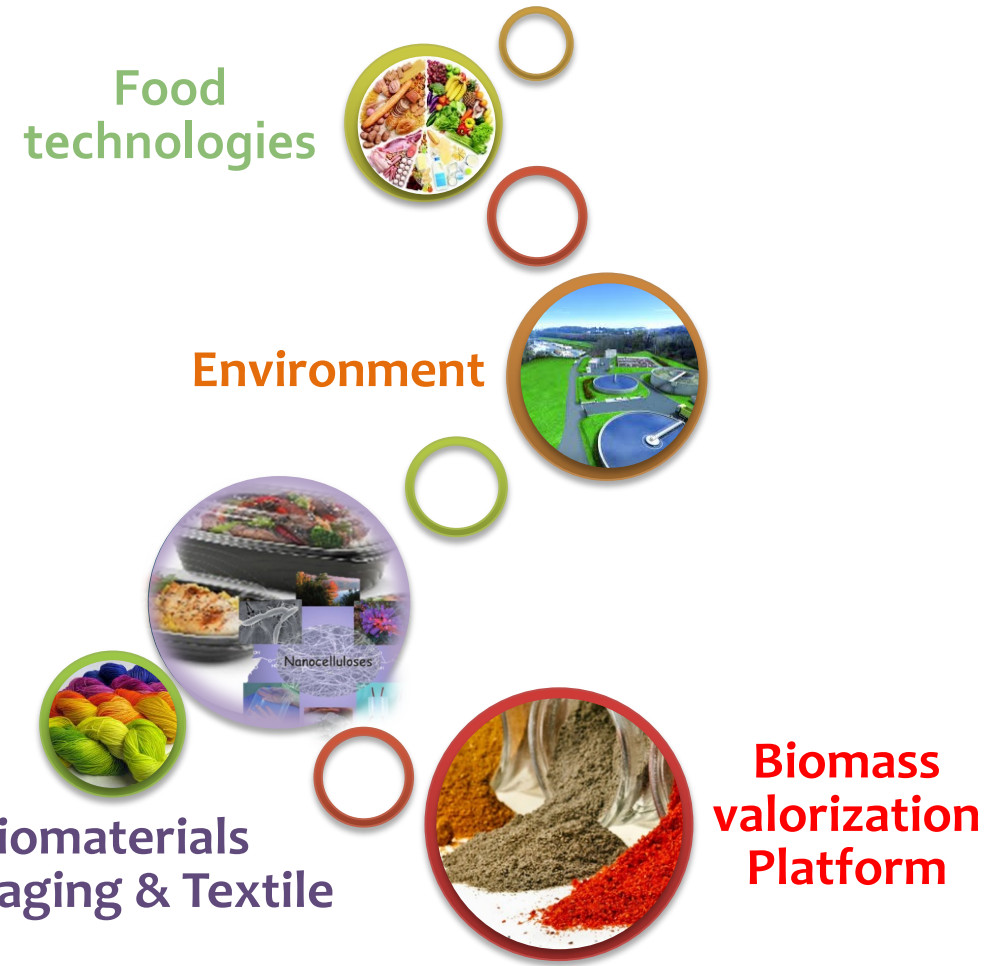
Horizon 2020
European Union Funding
for Research & Innovation

CELABOR scrI

Is a Belgian scientific and technical center accredited by the Walloon region. CELABOR is offering scientific and technical support to companies involved in all sectors of the **circular-economy** and **bioeconomy** including agri-food, green processes, packaging, textile and environment.



Four departments in the heart of the bioeconomy sectors



The "Extraction" department is equipped with a **technological platform** (350 m²) unique in Wallonia boasting an **ATEX zone**, a test hall constituted of laboratory and pilot extraction machinery.



Three pilot plants **Supercritical Fluid Extractors**
SFE-CO₂ - 2x 6L/batch + 1 lab-scale equipment

Pilot-scale **Subcritical Water Extraction** -6L/batch

Conventional **solvent extraction** – 60-350L 

Ultrasonics & Microwave Assisted Extraction -
25-50L UAE, 2-5L MAE

Pilot-scale **Pulsed Electric Field** - liquid 350 L/h &
solid 0,5L/batch

Lab and pilot-scale **membrane separation** – Ultra-,
Nano-filtration

Pilot-scale post-treatment equipment - Freeze-
dryer, Spray-dryer, Evaporator, Centrifuge, 135L-High
Pressure processing for debacterisation

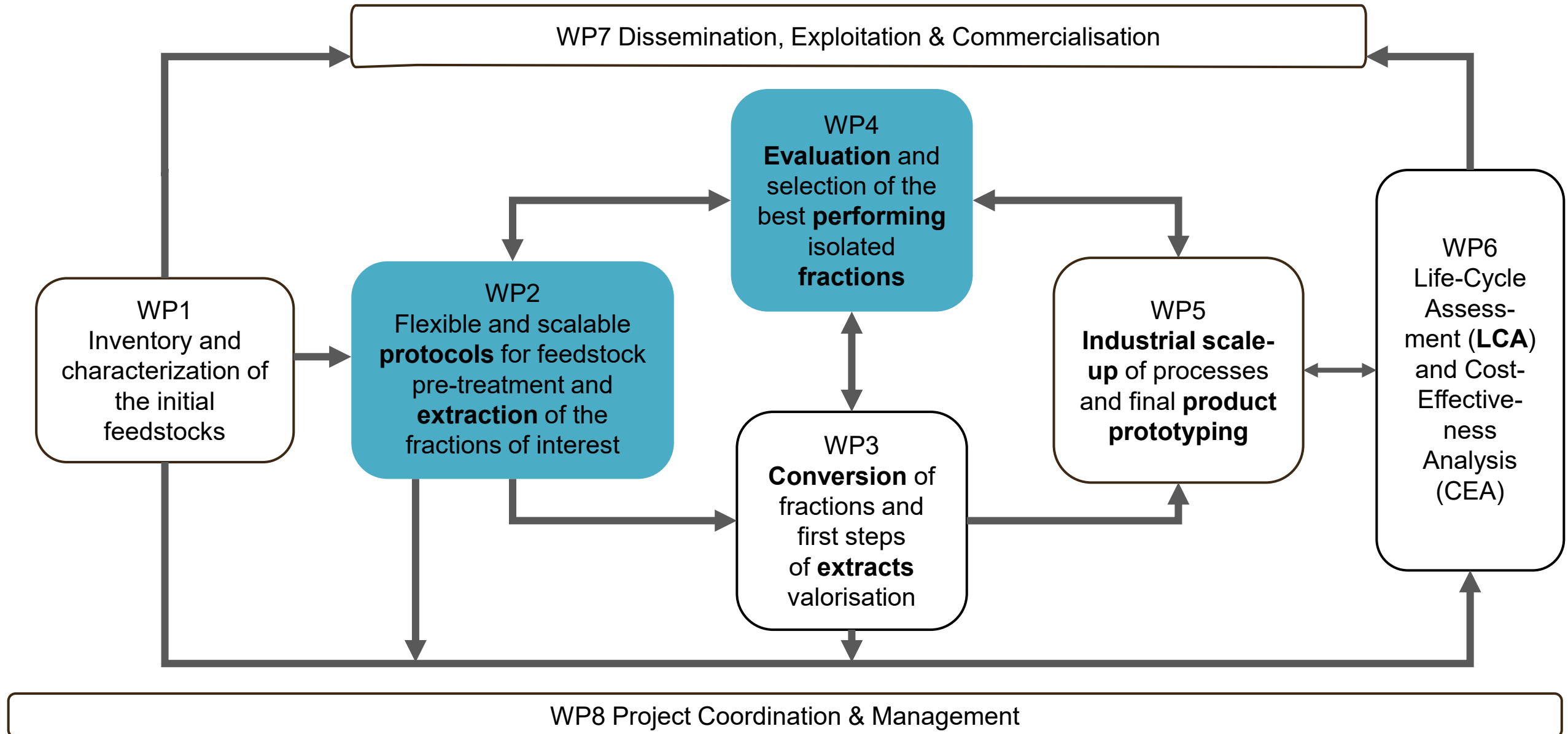
Purification platform - Centrifugal partition
Chromatography CPC, MPLC, Prep-HPLC

Advanced **analytical lab** - UPLC-MS, GC-MS, ICP-MS,
HPLC-DAD-ELSD

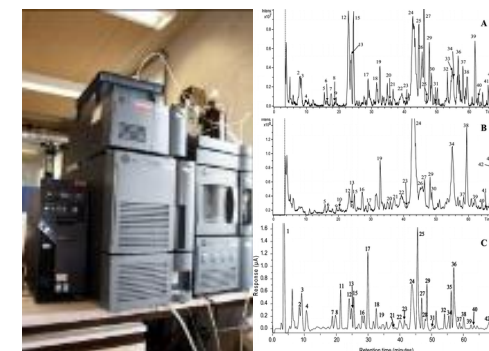
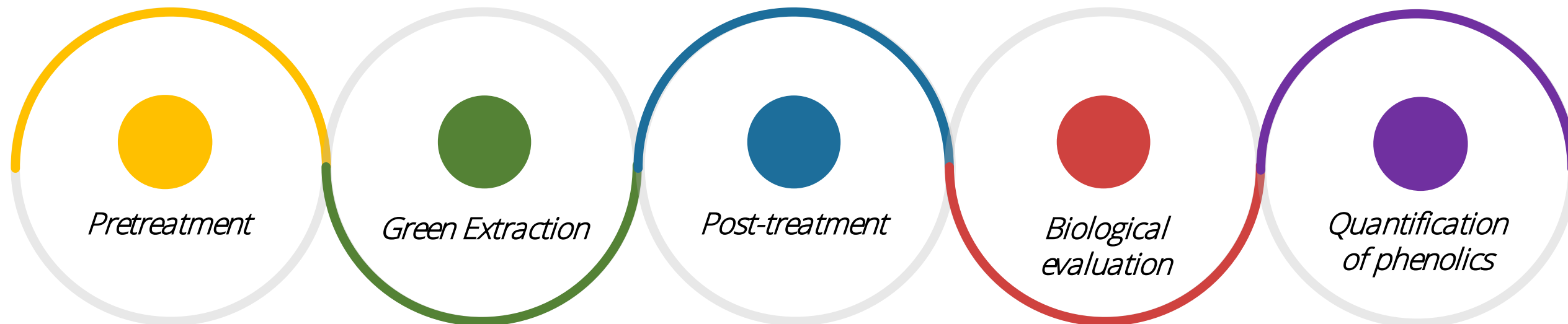
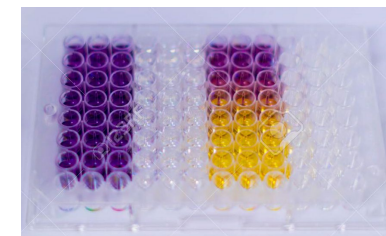
More than 20 years of experience



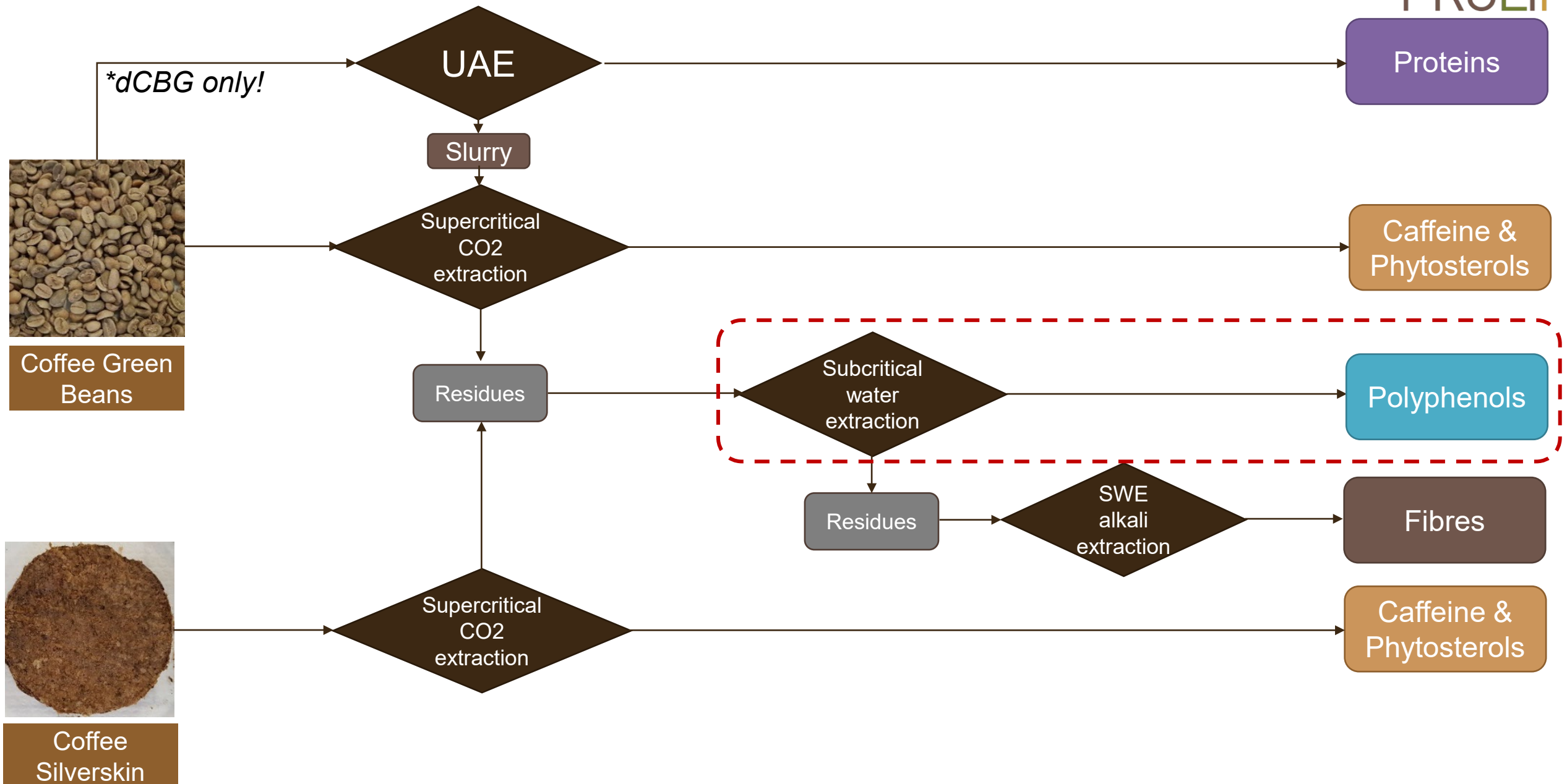
Overview of the WPs



Global approach



Cascade approach of coffee samples



Coffee by products : lab scale & initial scale-up



Sub-critical Water Extraction

- High temperature
- High pressure
- Water in liquid state
- But with lower polarity
- And High solubility of phenolics
- Short extraction time

Optimisation

- Duration
- Temperature
- S/L ratio
- Pressure

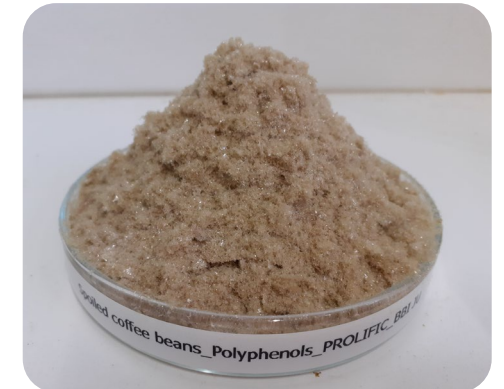


Lab-scale

Initial scale-up



Optimised method



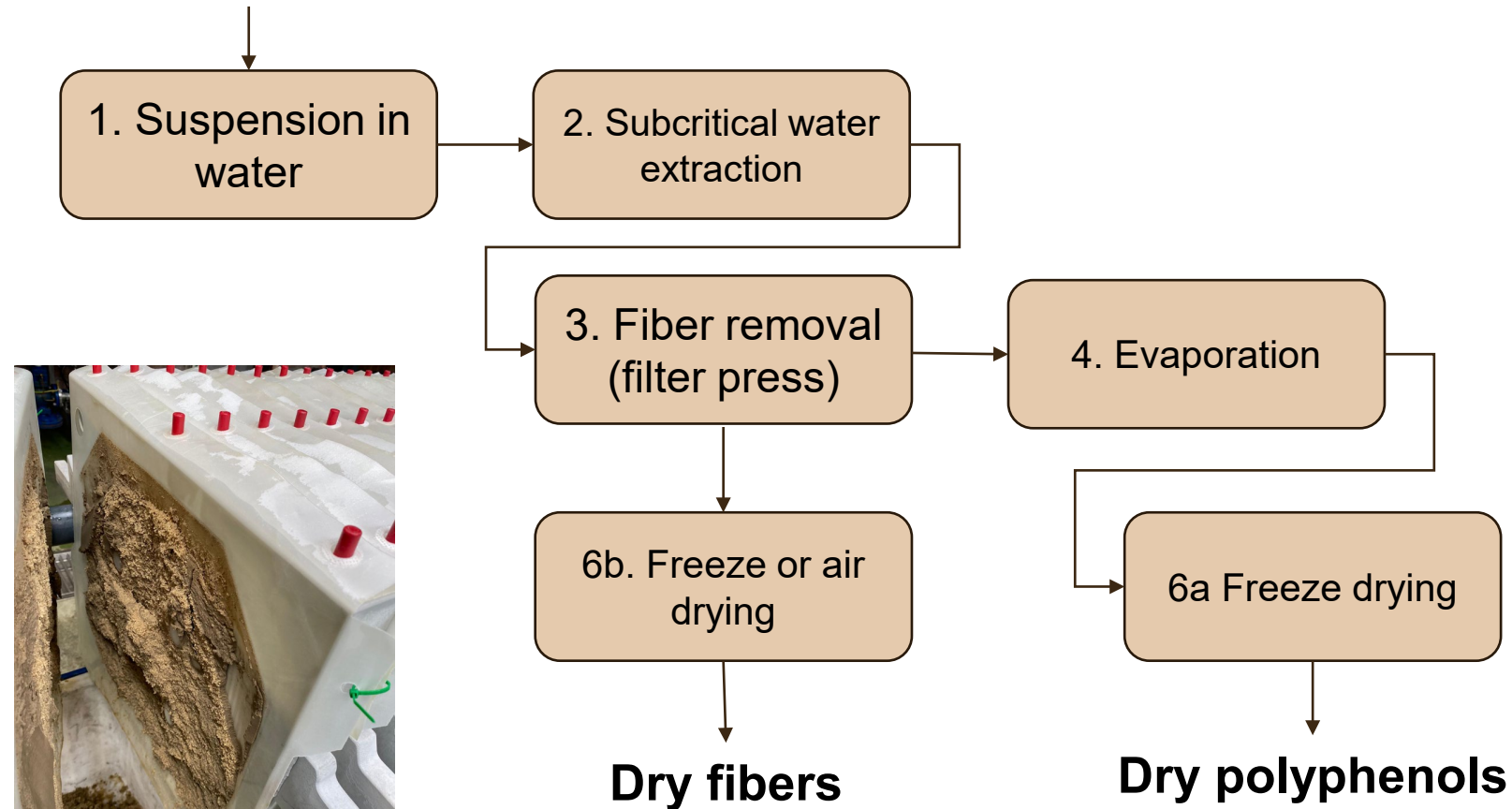
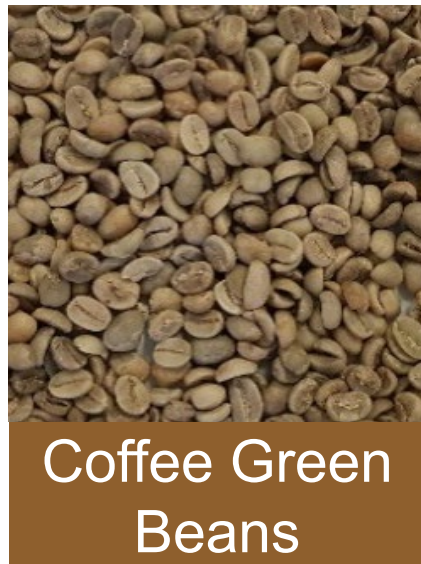
- ✓ **Folin** >> High TPC
- ✓ **LC-MS** >> Concentrated phenolics
- ✓ **FRAP** >> Highly anti-oxidant
- ✓ **DPPH** >> Highly anti-oxidant

Spray-dried vs Freeze-dried



Coffee polyphenols and SWE fibers upscaled extraction

Dry defatted coffee green beans



Conclusions



1

- A green extraction approach applied

2

- Yielding to highly concentrated added-value extracts

3

- Flexible and industrially scalable



Thank you for your attention

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www.prolific-project.eu



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