



VALORPLUS:
VALORISING
BIOREFINERY
BY-PRODUCTS

FP7 EC KBBE-CALL 7- Project No.
613802





VALORPLUS: VALORISING BIOREFINERY BY-PRODUCTS

Valorisation of biorefinery by-products leading to closed loop systems with improved economic and environmental performance

Objective:

- Develop new knowledge, technologies and products that will enable the valorisation of important biorefinery by-products.
- Sustainable and economically viable integrated closed loop biorefineries – with improved economic and environmental benefits.

With funding from the EU FP7 programme, the Valor Plus project consists of a strong consortium of 14 partners, including SMEs, research centres, universities and one large enterprise. The Valor Plus project is focused on the following key areas:

- ❖ **Pre-treatment and fractionation:** development of a novel methodology for the controlled breakdown, release and fractionation of the biomass by-products.
- ❖ **Hemicellulose, Lignin and Valorisation:** engineering of new enzymes and microorganisms, and combined chemo-enzymatic and chemo-microbial processes for the controlled hydrolysis and transformation of hemicellulose and lignin feedstocks to value product streams.
- ❖ **Glycerol Valorisation:** engineering of new microorganisms suitable for the fermentation of crude glycerol to higher value product streams.
- ❖ **Demonstration of the technological and economic potential:** demonstrating component technologies, roadmaps for technology and product stream integration, case studies and a full life cycle assessment.

<http://www.valorplus.eu>



The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 613802



Partners of ValorPlus

- Pan-European consortium spanning the complete biorefinery value chain; kick-off: 12/2013; end-date: 12/2017
- Involved countries:
 - UK
 - Germany
 - Spain
 - Austria
 - Italy
 - France



1 Large enterprise

ABENGOA RESEARCH

2 Research centres



8 Small and medium enterprises



3 Universities

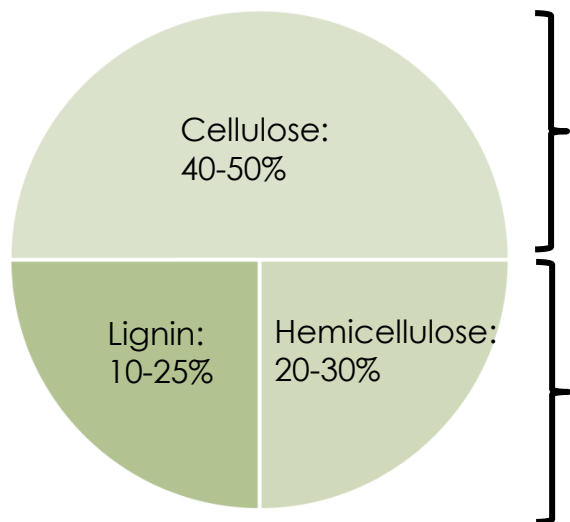


POLITECNICO DI MILANO



What is our goal?

Composition of lignocellulosic biomass



Valorisation already possible → Biofuels

Valorisation
not sufficient

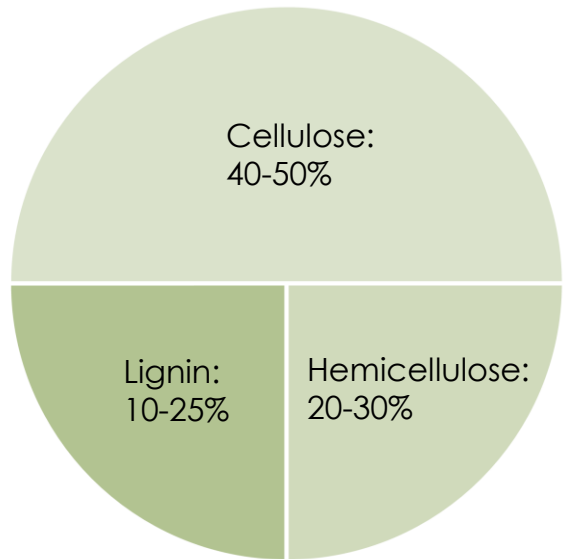


Valor^{plus}
Preventing and valorising bio-waste in biorefineries



What is our goal?

Composition of lignocellulosic biomass

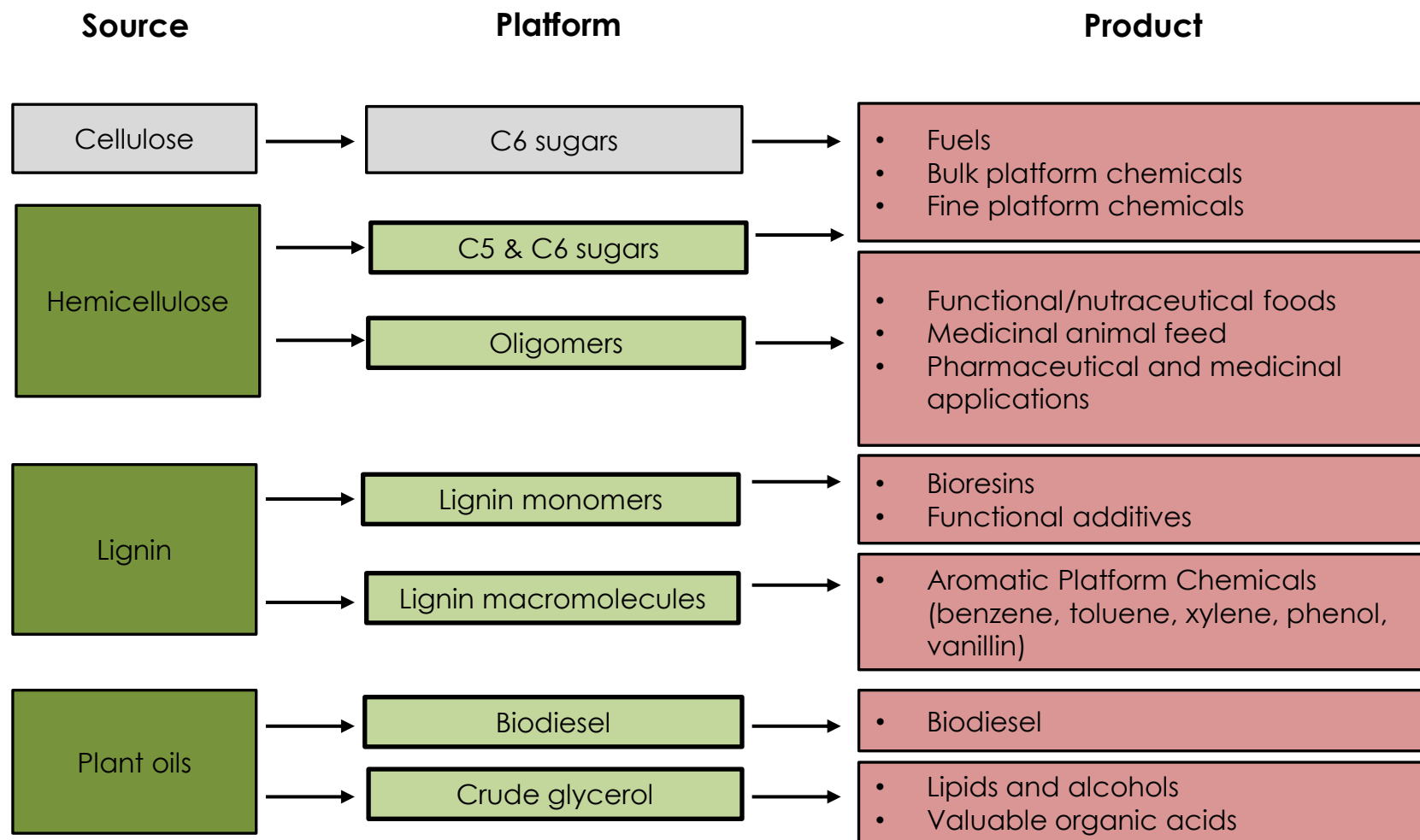


- Pre-treatment and fractionation
- Hemicellulose and lignin valorisation
- Glycerol valorisation
- Demonstration of the technological and economic potential

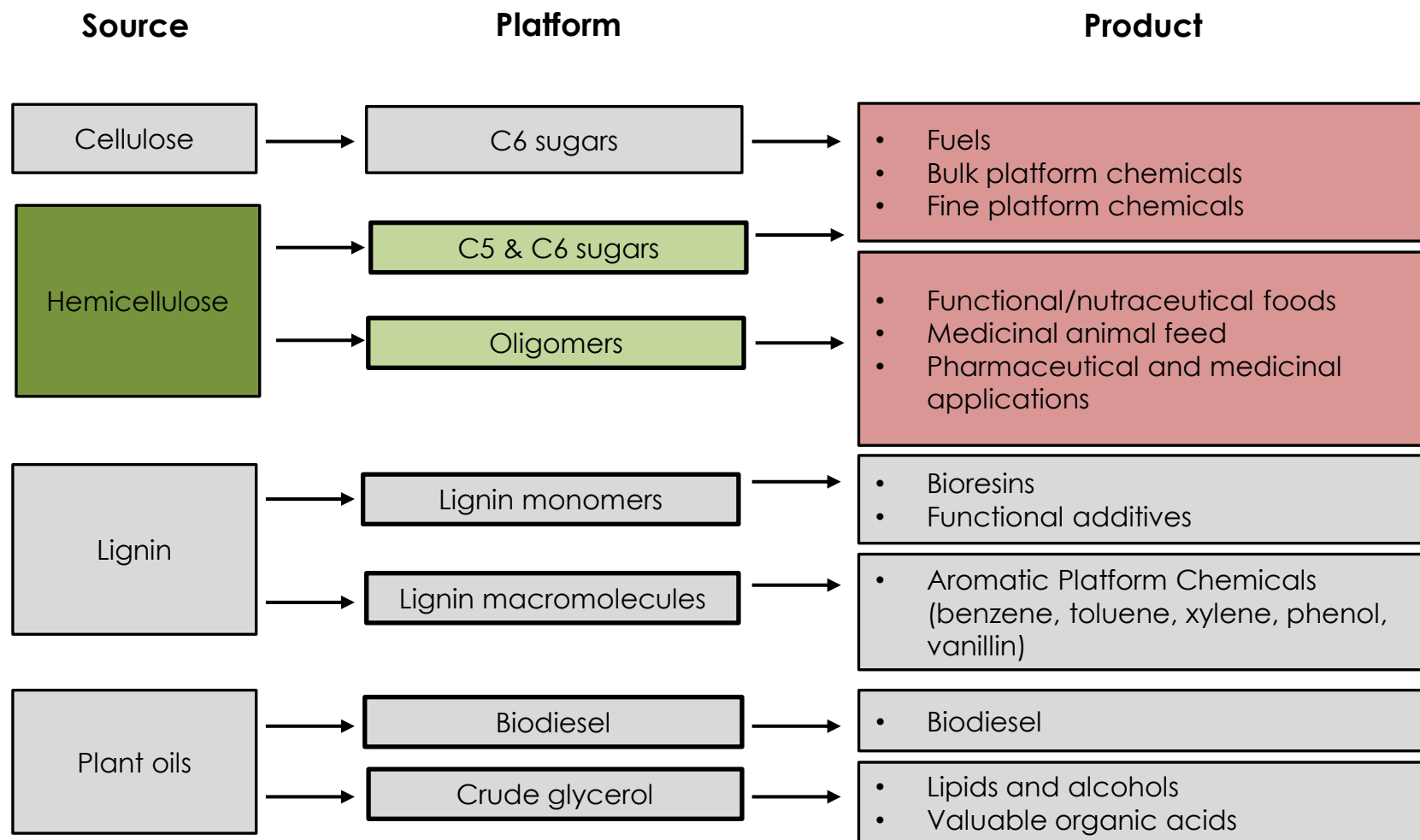
**Closed
loop
biorefinery**



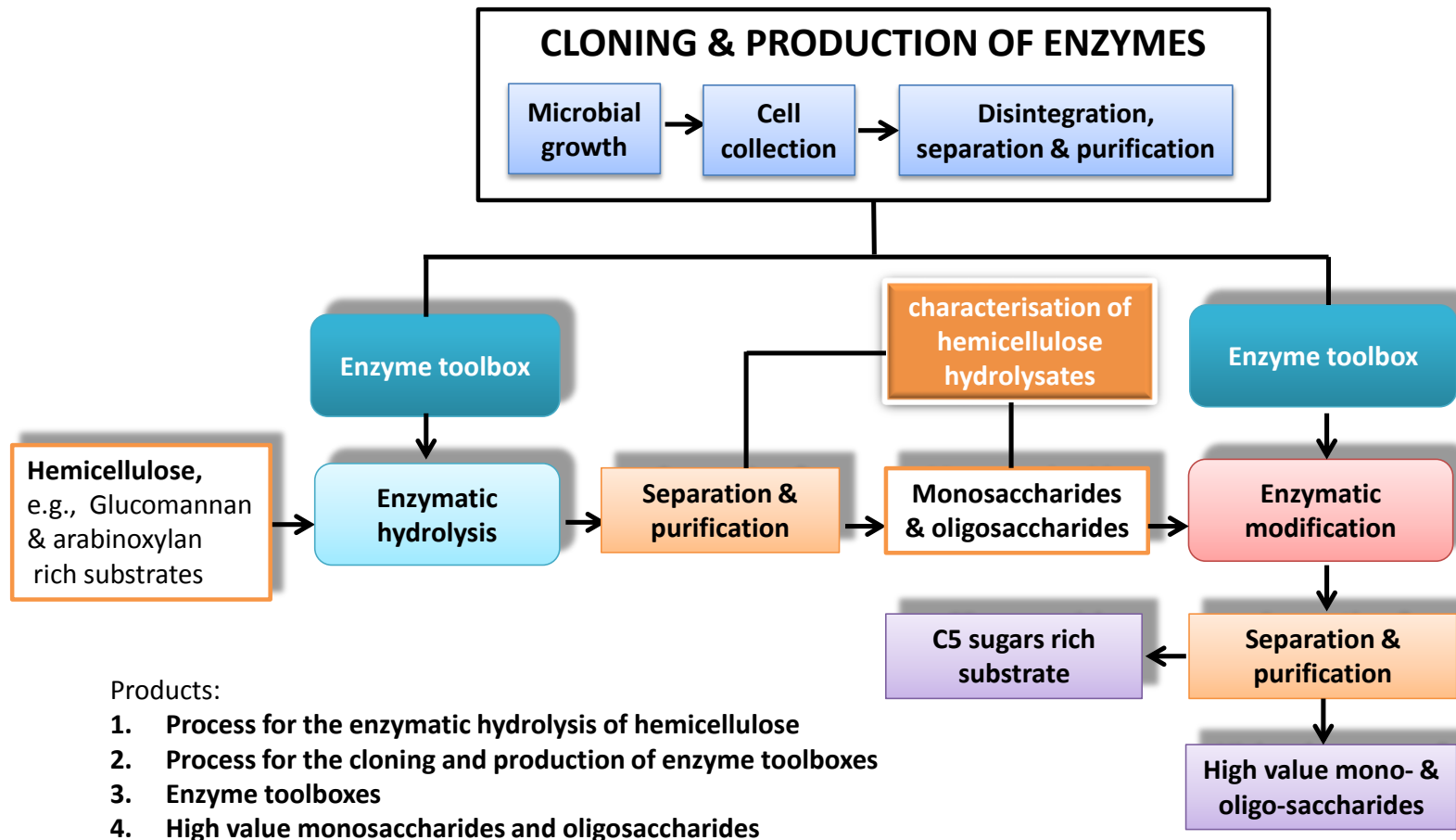
The project idea: Road map for future products



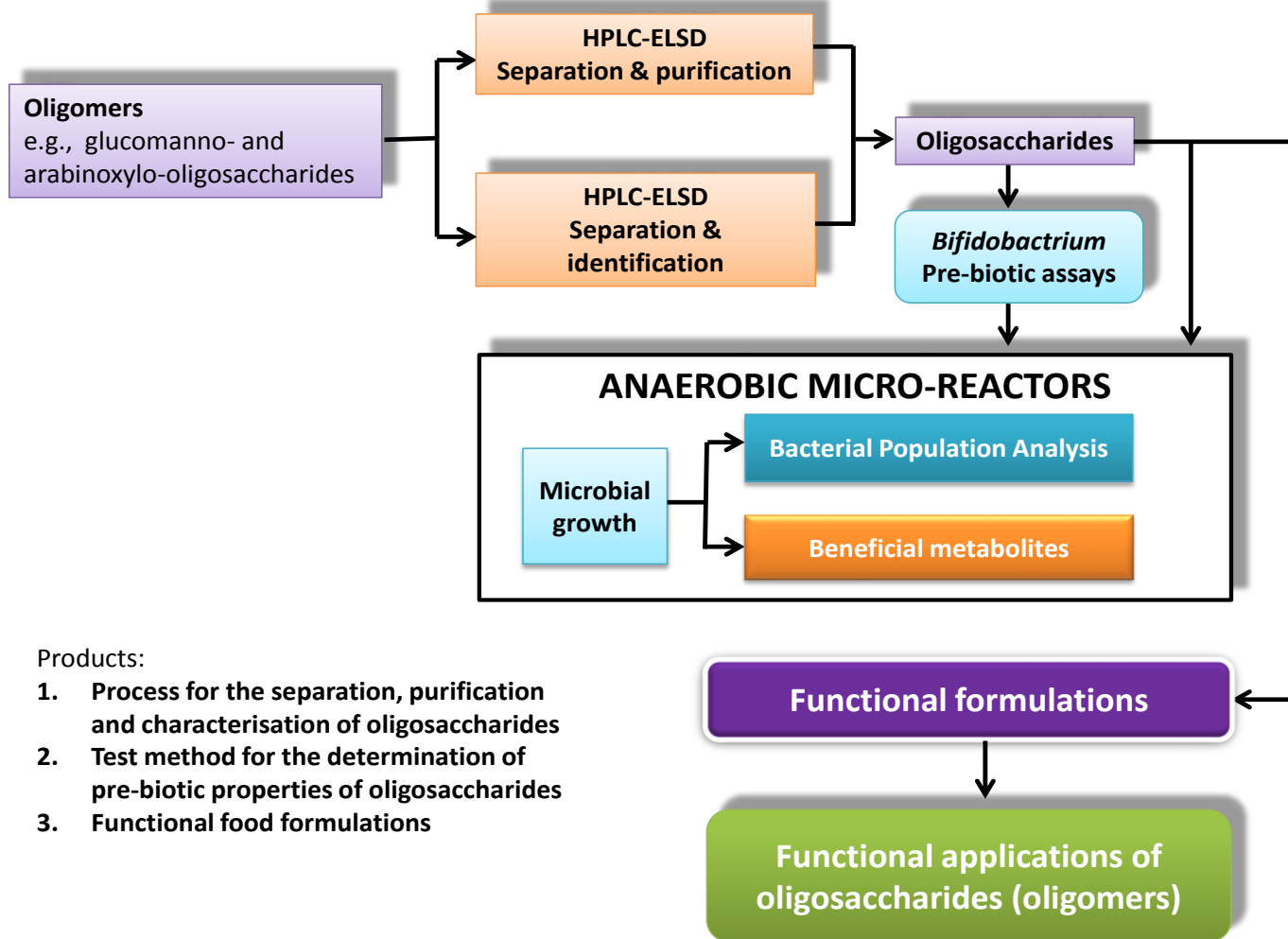
The project idea: Road map for future products



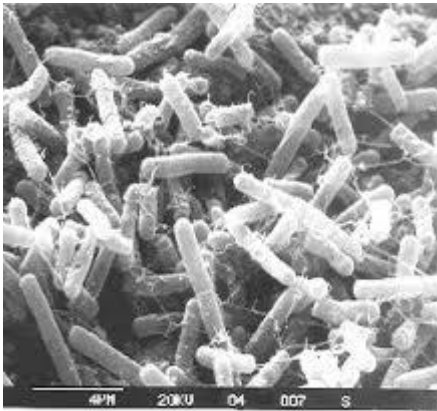
Utilisation paths of hemicellulose hydrolysates from lignocellulosic biomass



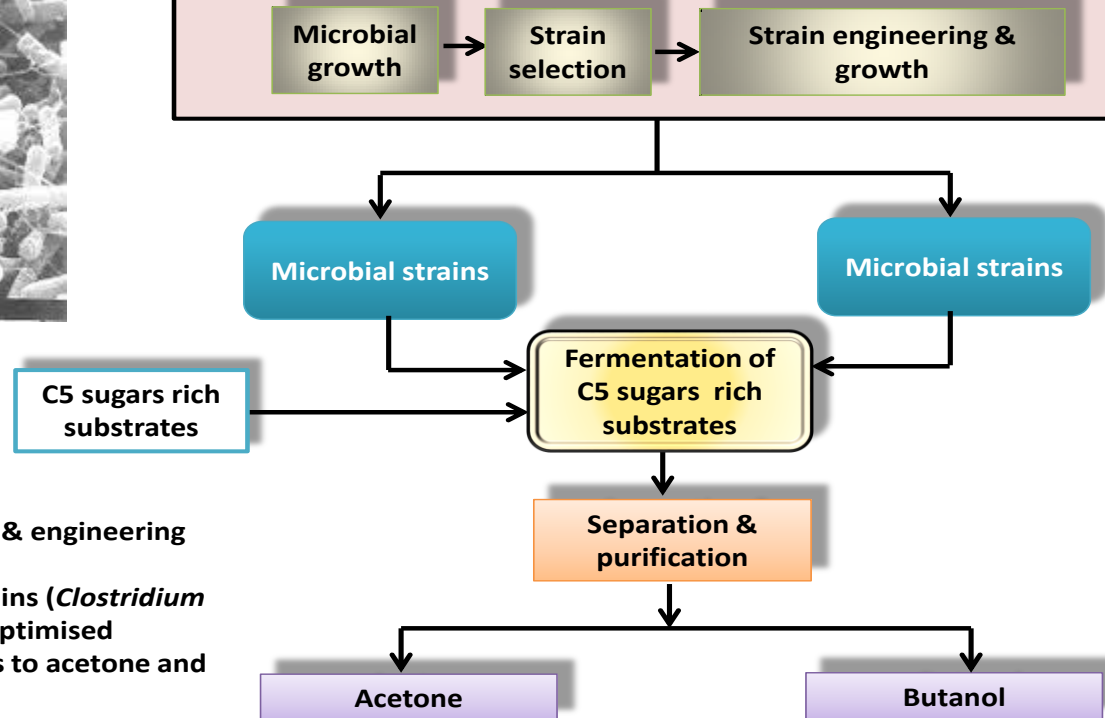
Paths for utilisation of high value hemicellulose oligomers



Utilisation paths of C5 sugars and C5 sugars rich substrates by engineered *Clostridium acetobutylicum*



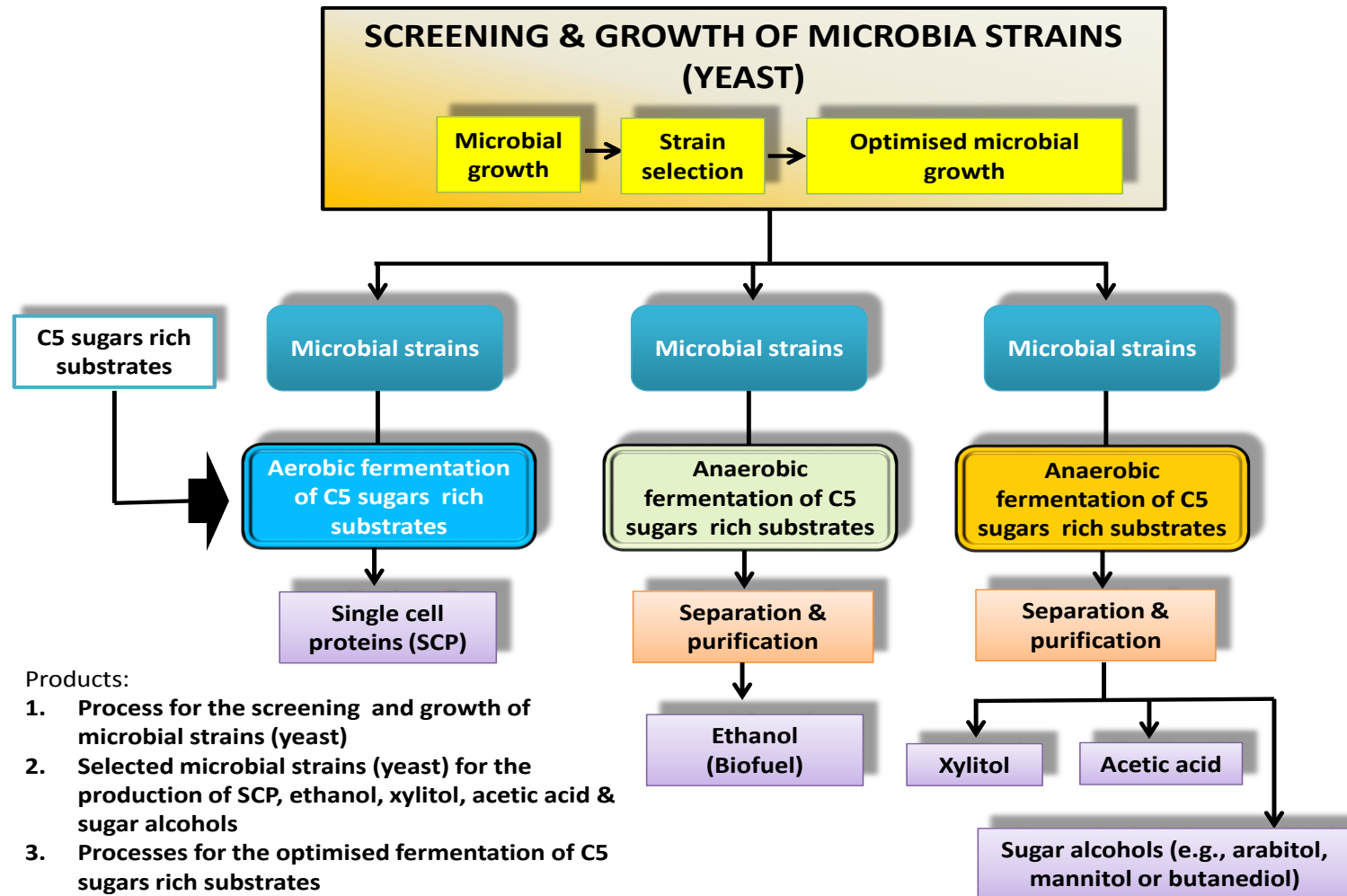
GENETIC ENGINEERING & GROWTH OF MICROBIAL STRAINS (*Clostridium acetobutylicum*)



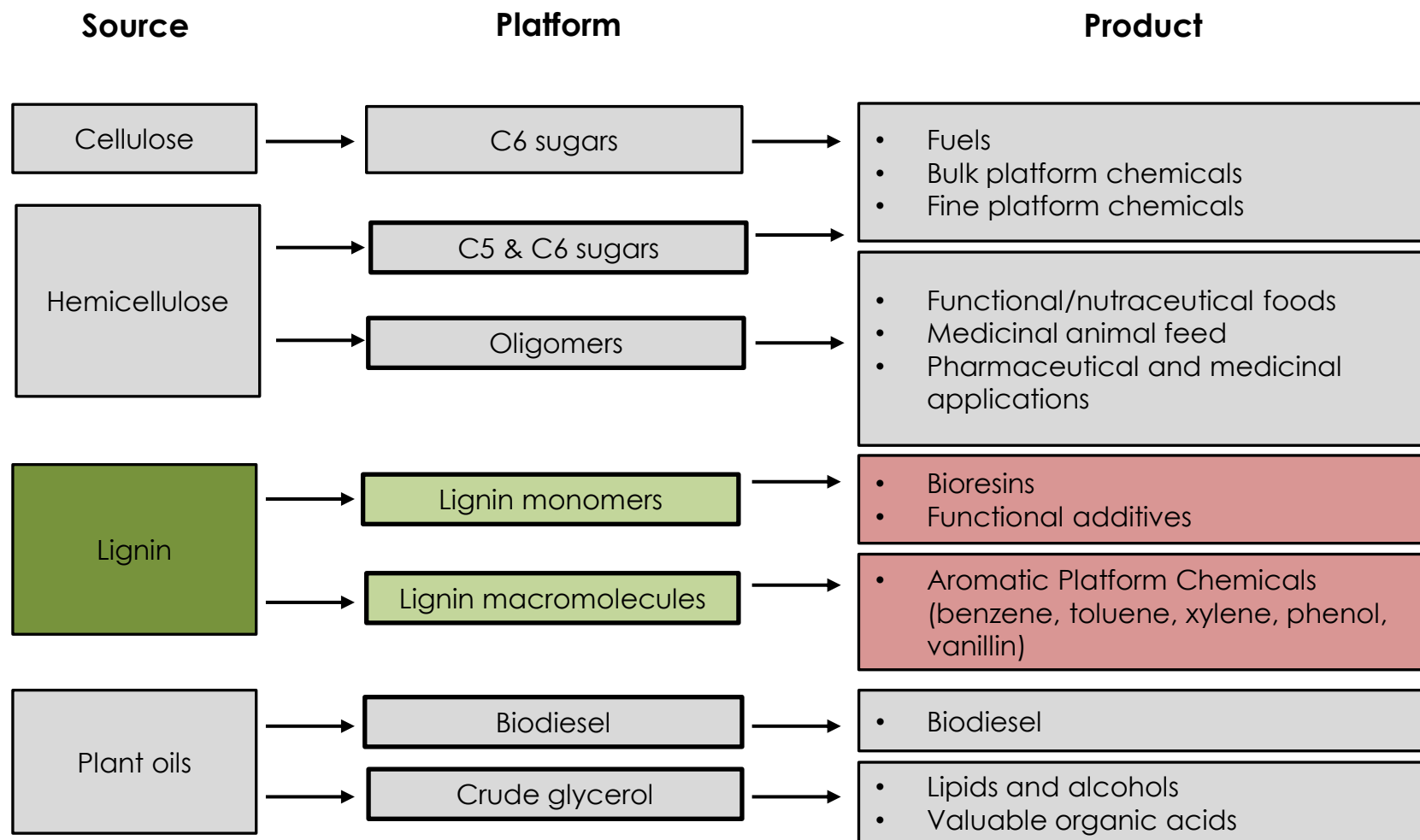
Products:

1. Process for the screening & engineering of microbial strains
2. Engineered microbial strains (*Clostridium acetobutylicum*) for the optimised fermentation of C5 sugars to acetone and butanol
3. Processes for the optimised fermentation of C5 sugars rich substrates to acetone and butanol
4. Acetone and butanol

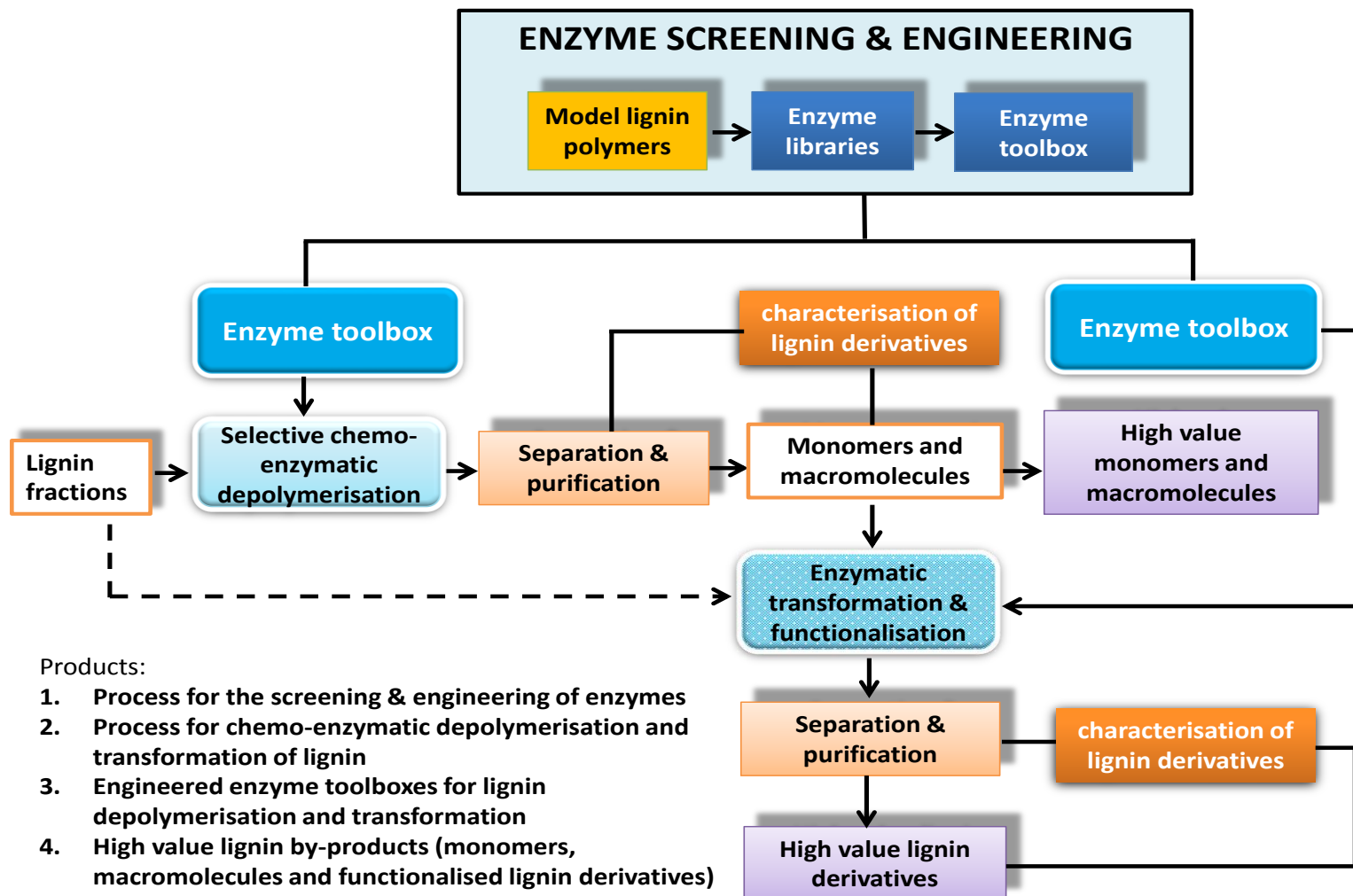
Utilisation paths of C5 sugars and C5 sugars rich substrates by yeast strains



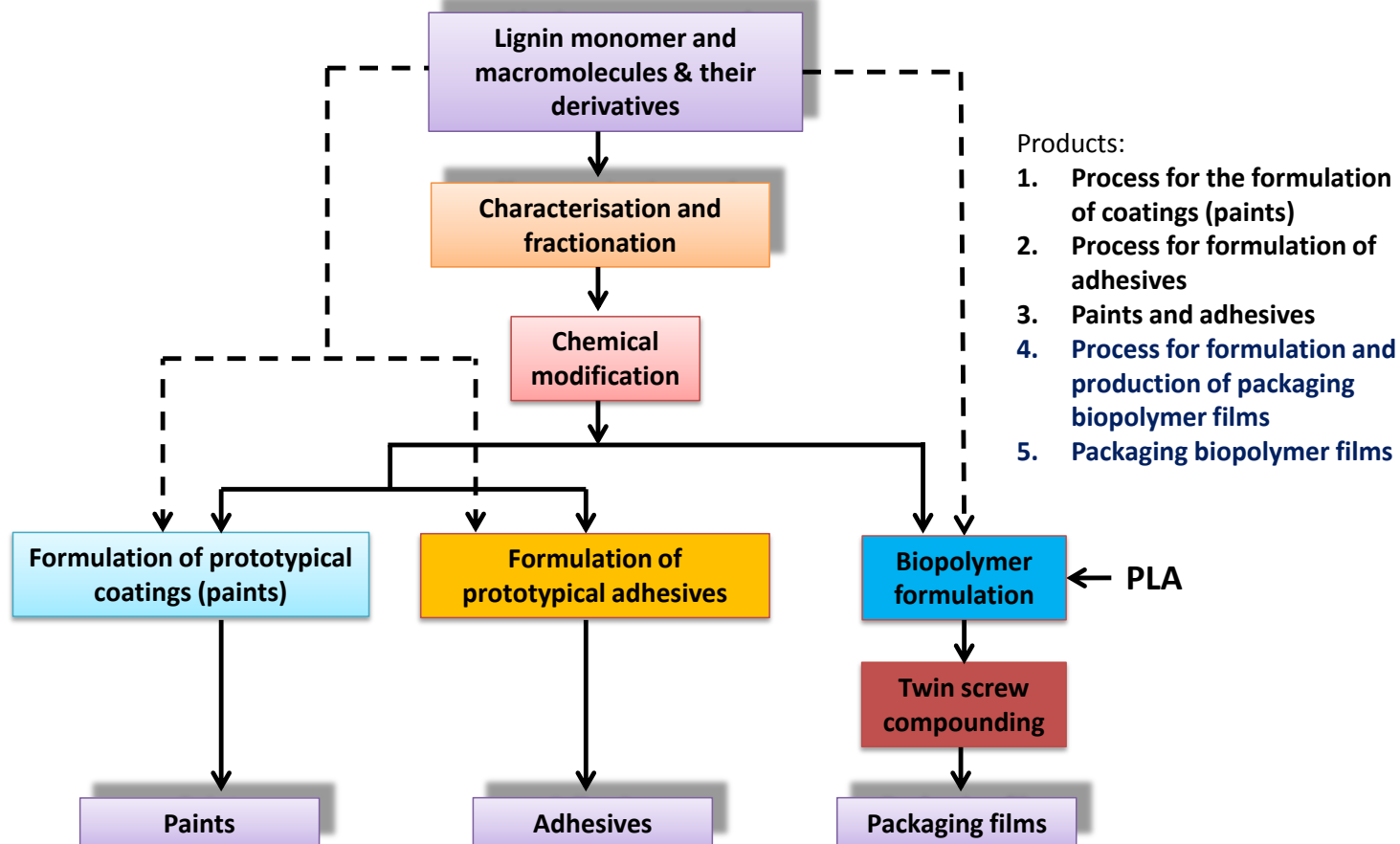
The project idea: Road map for future products



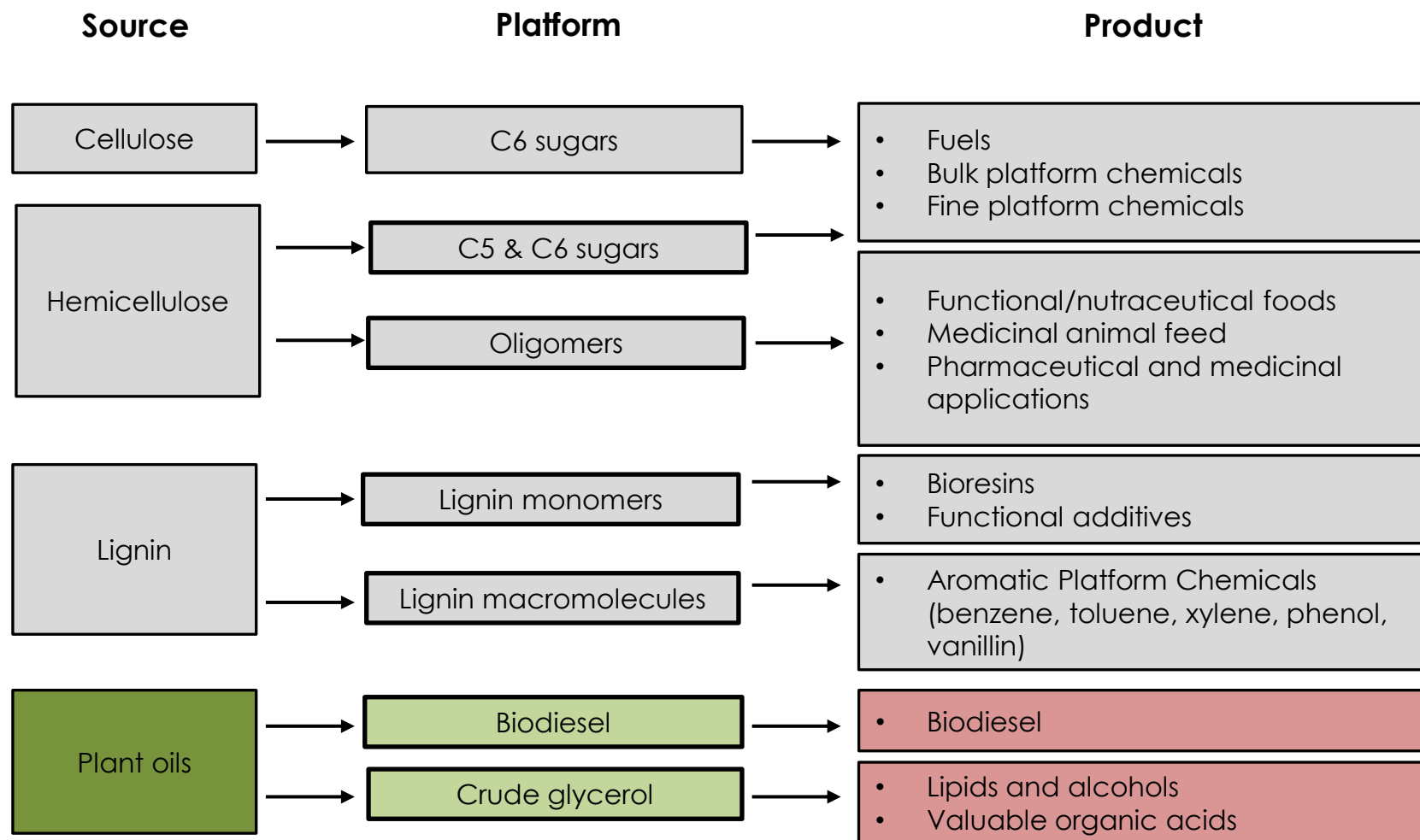
Lignin valorization



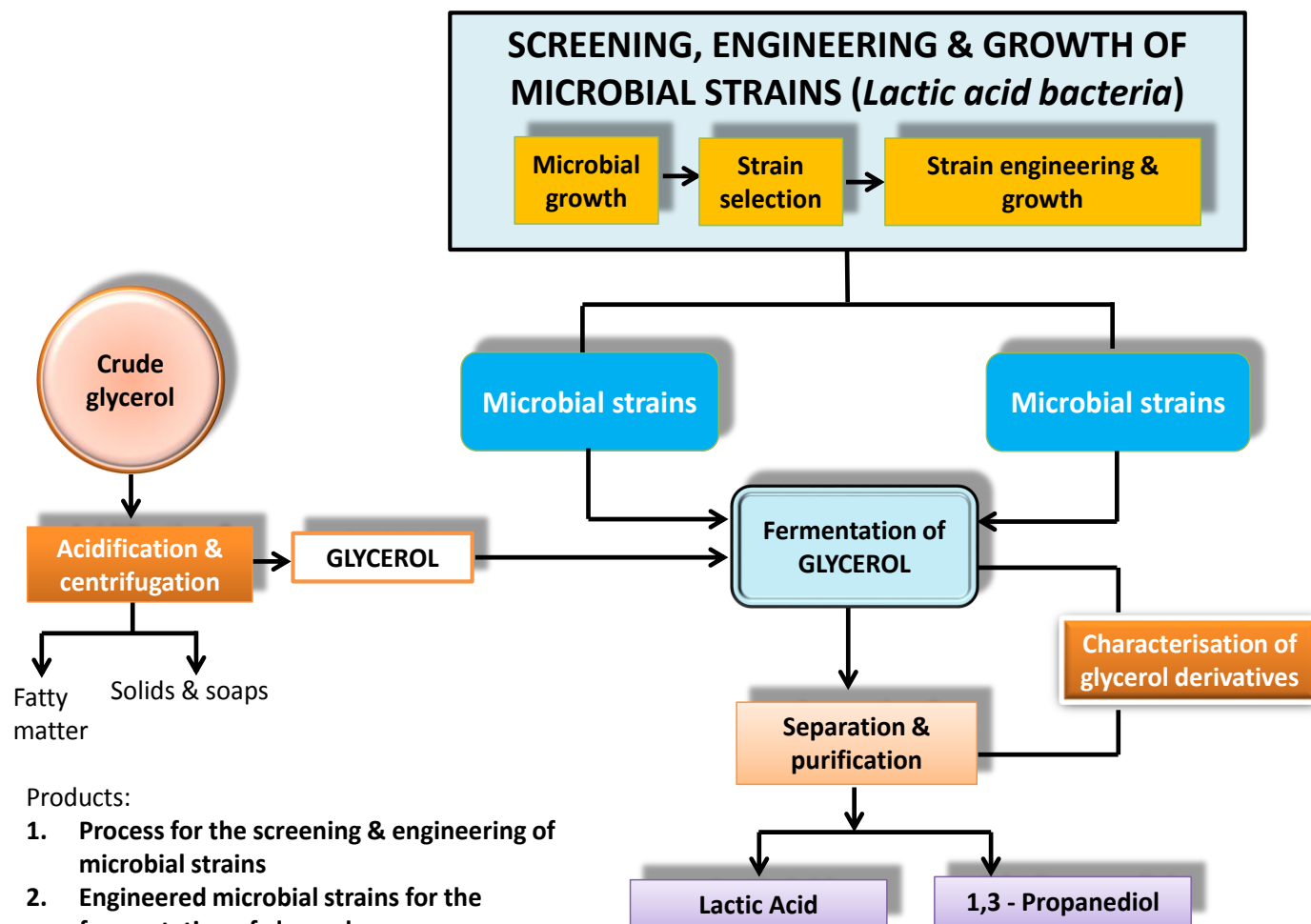
Paths for utilisation of lignin and its derivatives



The project idea: Road map for future products



Glycerol valorization



Products:

1. Process for the screening & engineering of microbial strains
2. Engineered microbial strains for the fermentation of glycerol
3. High value glycerol by-products (lactic acid & 1,3- Propanediol)

A close-up photograph of laboratory glassware containing a vibrant green liquid. In the background, a graduated cylinder and a beaker are visible, both filled with the same green substance. The lighting is bright, highlighting the clarity and color of the liquid.

Summary

- **Goal:** Valorisation of the underused parts of plant biomass:
lignin, hemicellulose, glycerol
 - There should be no waste streams: closed-loop biorefinery!
 - Let's produce more than just biofuels!
- **Next Steps:**
 - **Demonstration:** Linking the achievements & optimizing of process flows
 - **Calculation for the rentability:** Upscaling, LCA ...

Do we have what it takes to change the art of biorefinery?





CONTACT

Dr. Oliver Schorsch, **Valor Plus Project Manager**

- T: +49 421 2246-626
- E: oliver.schorsch@ifam.fraunhofer.de

Klaus Rischka, **Technical Project Coordinator**

- T: +49 761 2036122
- E: klaus.rischka@ifam.fraunhofer.de

Beatriz Palomo, **Exploitation and Dissemination Manager**

- T: +34 91 210 93 74 Ext. 3
- E: bpalomo@asebio.com / pcaro@asebio.com

www.valorplus.eu