DECISION SUPPORT TOOL FOR ASSESSING VALUE CHAINS OF NANO-REINFORCED BIO-POLYMERS

Thayana Rigo[1], Dr. Marinella Tsakalova[2], Dr. Ioanna Deligkiozi[1], Maria Voumvoulaki[1], Dionisis Koutsantonis[3], Konstantinos Koutsantonis[3]

[1] AXIA Innovation, Munich Germany, [2] EXELISIS, Athens, Greece, [3] RDC Informatics, Athens, Greece,

BIOMAC, European Sustainable **BIO**-based nano**MA**terials **C**ommunity, is a Horizon2020 project that will establish an Open Innovation Test Bed (OITB), a true collaborative ecosystem where technologies and solutions utilizing nano-enabled bio-based materials (NBMs) will be upscaled and prepared for market applications.
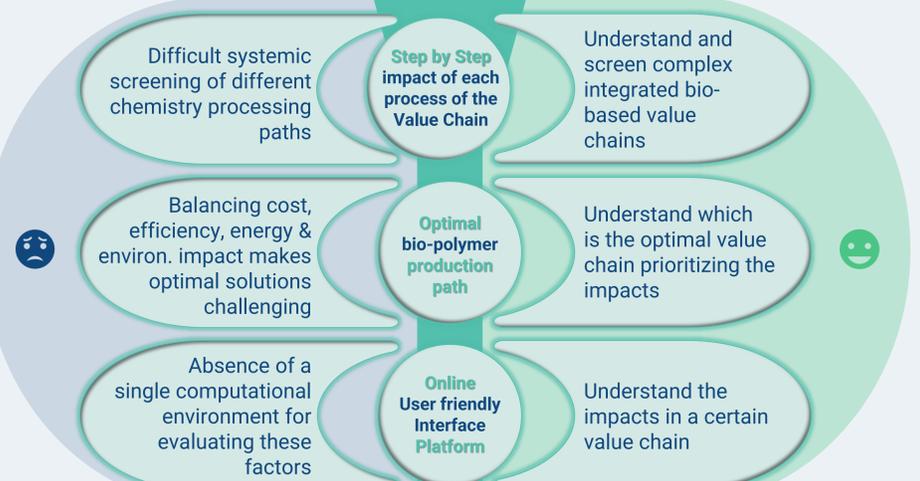
INTRODUCTION

In this complex landscape of biobased industry combined with nanotechnology, the key challenge is finding the best value chain path, balancing economic and environmental factors.

To address this challenge, the BIOMAC project has developed the **Decision Support Tool (DST)** to provide assistance.

This intuitive web-based platform tool will strategically assess sustainability and feasibility across various value chains to guide users effectively.
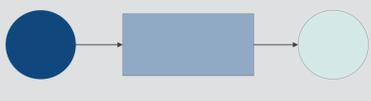
Web-based platform

VALUE PROPOSITION

|	Step by Step impact of each process of the Value Chain	
Difficult systemic screening of different chemistry processing paths		Understand and screen complex integrated bio-based value chains
Balancing cost, efficiency, energy & environ. impact makes optimal solutions challenging	Optimal bio-polymer production path	Understand which is the optimal value chain prioritizing the impacts
Absence of a single computational environment for evaluating these factors	Online User friendly Interface Platform	Understand the impacts in a certain value chain

METHODOLOGY

1 Modular Unit of Analysis

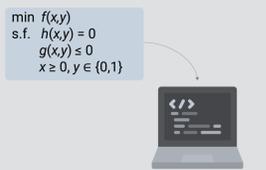Define the boundaries around the individual pilot lines (MODUs)

2 Superstructure
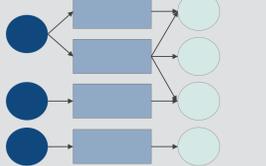
Integrate the MODUs of the different Test Cases in a network
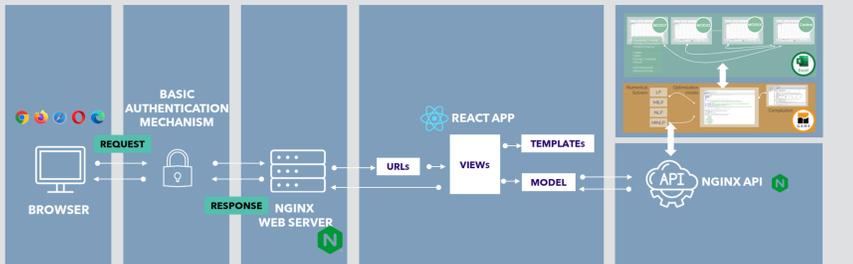
3 Data Repository
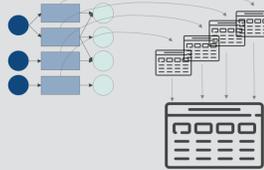
Extract and consolidate environmental and economical information

4 Optimisation Model

$$\min \; f(x,y)$$
$$\text{s.f.} \; h(x,y) = 0$$
$$g(x,y) \le 0$$
$$x \ge 0, \; y \in \{0,1\}$$

Formulate mathematical model and code for optimizing the processes

5 Front-End Web Application Development

BASIC AUTHENTICATION MECHANISM

BROWSER — REQUEST — RESPONSE — NGINX WEB SERVER — URLs — VIEWS — TEMPLATES — MODEL — API — NGINX API

REACT APP

RESULTS

CONCLUSIONS

This Decision Support Tool serves as a valuable resource for users seeking deeper insights into the environmental and economic aspects in the nano-reinforced bio-polymer process. Through its advanced functionality, it empowers decision-makers to navigate complex scenarios and make informed choices that align with sustainability goals while maximizing profitability.

Polymers 2024 Conference
Polymers for a Safe and Sustainable Future
28–31 May 2024 | Athens, Greece

Contact: Thayana Rigo,
Email: thayana.rigo@axia-innovation.com
Phone: +49 (0) 8924588469
Website: www.axia-innovation.com