

28.06.2019 ROYAL FLEMISH ACADEMY OF BELGIUM FOR SCIENCE AND THE ARTS

WORKSHOP ON THE BIOLOGICAL TRANSFORMATION OF THE EUROPEAN MANUFACTURING INDUSTRY

09:00	REGISTRATION AND COFFEE
09:30	Welcome (<i>ManuFUTURE, Maurizio Gattiglio</i>)
09:35	tour de table with short position statements
10:00	Welcome and Introduction to the ManuFUTURE Vision 2030 »ManuFUTURE Vision 2030 and Strategic Research and Innovation Agenda« (<i>Maurizio Gattiglio, co-chair ManuFUTURE High Level Group and EVP Prima Electro</i>)
10:15	Setting the scene »Horizon Europe, Strategic Planning and Industrial Production« (<i>Jürgen Tiedje, Head of Unit »Sustainable Industry Systems«, EC DG RTD</i>)
10:30	Keynote »Horizon Europe, Strategic Planning and Bioeconomy« (<i>Waldemar Kütt, Head of Unit »Bioeconomy and Food Systems«, EC DG RTD</i>)
10:45	»BIO BREAK«
11:00	Keynote »Biological Transformation – a task for Europe« (<i>Thomas Bauernhansl, Director Fraunhofer IPA and Markus Wolperdinger, Director Fraunhofer IGB</i>)
11:30	Scenario building from contributions (break-out groups)
12:45	LUNCH BREAK
13:30	Scenario analysis (break-out groups): Challenges for a Bio-intelligent European Industry
14:30	Prioritisation of analysis results (plenum), identification of tasks for companies, research, education and policy makers
15:30	Discussion and final remarks
16:00	END OF THE WORKSHOP



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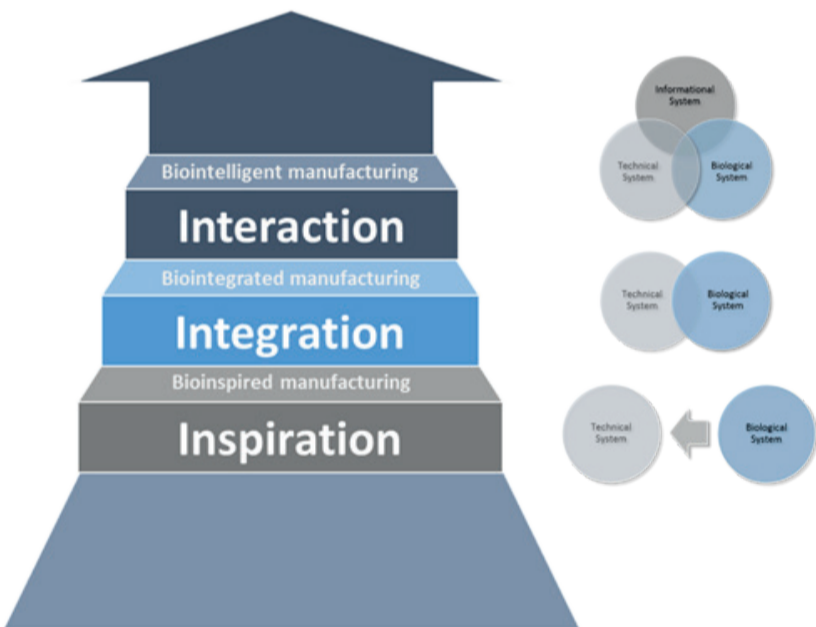
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BIOLOGICAL TRANSFORMATION OF PRODUCTS, PROCESSES AND VALUE CREATION

Biointelligence – the future of sustainable value creation systems

A more efficient use of natural resources is a main task for our modern society, whose fulfilment would both relieve our ecosystem and counteract societal challenges such as emerging resource conflicts. In order to keep our wealth and well-being, new forms of value creation are needed. These will arise with the biological transformation of value creation.

For the process of biological transformation three stages of development can be distinguished, which finally lead to an absolute fusion of the technosphere with the biosphere. First of all, a bionic-inspired approach allows in the stage of inspiration to transfer evolutionary biological phenomena into value-added systems. In a further stage the knowledge of biology in the form of an actual integration of biological systems contributes to the improvement of value-added processes. The comprehensive interaction between technical, informational and biological systems has, as a third stage, the disruptive potential to fundamentally restructure existing production technologies and structures and transfers them to a so-called bio-intelligent value-added. Biointelligence is the convergence of the digital transformation with the biological transformation.



How is this new kind of biointelligent value creation realised?

The basic disciplines biotechnology, engineering and information technology provide the necessary tools for this process. Methods of adaptive data processing (self-learning algorithms) are just as important as additive manufacturing or biotechnological production processes. Their combination and intelligent networking, including biological components and



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principles for their optimization, is the key to a bio-intelligent economy that enables prosperity and healthy and sustainable (qualitative rather than quantitative) growth.

How far ahead is the biological transformation?

The foundations of the biological transformation are already laid. Bionic principles are studied and utilised since decades. The digitalisation of the industry gives way to distributed, parallel computing and artificial intelligence. First elements of biointegrated manufacturing are realised and tested both in research labs and in start-up companies, like sensors with living neuron cells.

How does the world change through biological transformation?

The pipeline economy and the principle of linear supply chains are transforming into decentralised platform economies with intelligently controlled value-added cycles. Biointelligent value-adding cells, which no longer remain exclusively as delimited entities (factories, buildings), are able to adapt their architecture autonomously to the optimal solution of a production order and to organise themselves as regional socio-technical cells. These cells have all the necessary information to exchange resources and to use them intelligently, adapt to environmental conditions and spontaneously and autonomously network and communicate with each other.

The type of consumption and the materials used will change fundamentally. Decentralised, highly flexible

and adaptive so called "Smart Biomanufacturing Devices" (SBMD) are revolutionizing the majority of consumer products. These production units are coupled with self-learning algorithms to process regionally available, inhomogeneous bio-based materials (e.g. bioreactors, biorefineries) or to process directly according to the principle of additive manufacturing. Household and agricultural waste, highly efficient urban gardening plants, horizontal gardens or microalgae reactors on building facades, as well as obsolete, disused products serve as sources of raw materials and energy. Industrial companies provide SBMD technologies and local manufacturing hubs for more complex products, and develop digital blueprints for the products in close and direct exchanges with consumers.

New manufacturing technologies, production processes and manufacturing systems engineering will reinforce the European capability to design, manufacture and provide globally the best production equipment and systems. More specific fields of engineering such as product design engineering, mechanical engineering, mechatronics, and electrical and electronic engineering will also contribute to better European products and factories, as well as to better services provided by European manufacturing industries.

Workshop on 28 June 2019

In the workshop we discuss the relevance of the emerging bio-integration for different application fields in manufacturing value networks and identify recommendations for actions on European level from the related stakeholders in industry, research, innovation, education and regulation / policy makers.