



“Biological transformation in practice”

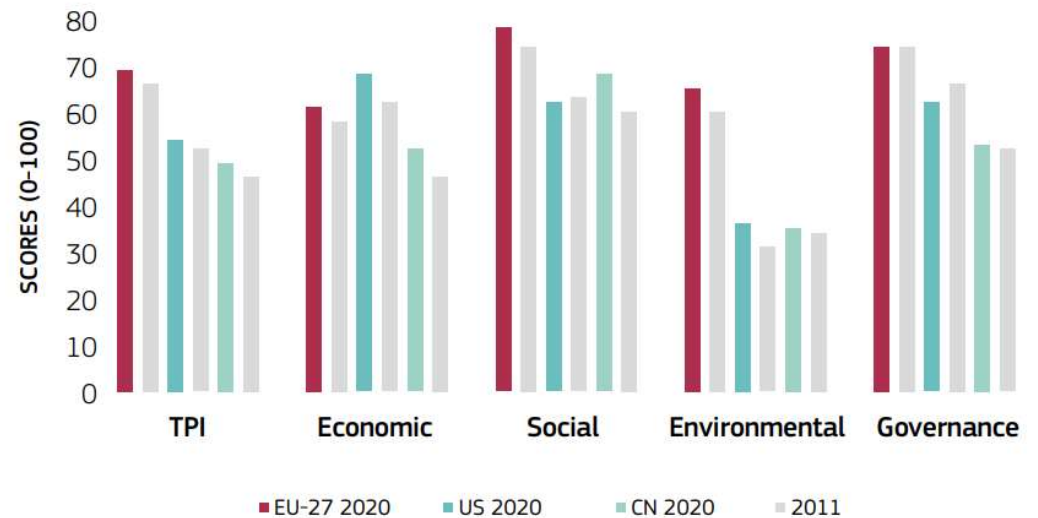
Fraunhofer - European Research Area

Brussels, 1 December 2022

Peter Dröll

Director Prosperity, DG Research and Innovation

Why: Transitions towards sustainability



Source: RTD 2022

« Regenerative » as purpose

“The vision for ‘Industry 5.0’ we propose moves past a narrow and traditional focus on technology-or economic enabled growth of the existing extractive, production and consumption driven economic model to a more transformative view of growth that is focused on human progress and well-being based on reducing and shifting consumption to new forms of sustainable, circular and **regenerative** economic value creation and equitable prosperity. Rather than representing a technological leap forward, Industry 5.0 actually nests the Industry 4.0 approach in a broader context, providing regenerative purpose and directionality to the technological transformation of industrial production for people-planet-prosperity rather than simply value extraction to benefit shareholders”

Source: ESIR 2022



The deep tech wave – EU Innovation Agenda



EUROPE CAN LEAD THE NEW WAVE OF DEEP-TECH INNOVATION:

-  EU's leadership in science – 20% of all top-quality publications in the world
-  Europe's strong industrial base and vibrant startup ecosystem
-  Ambitious framework conditions supporting innovation in a large internal market
-  Europe's talent base - 17.5 million students in higher education, over 1 million researchers
-  Europe's democratic societies and stable institutions

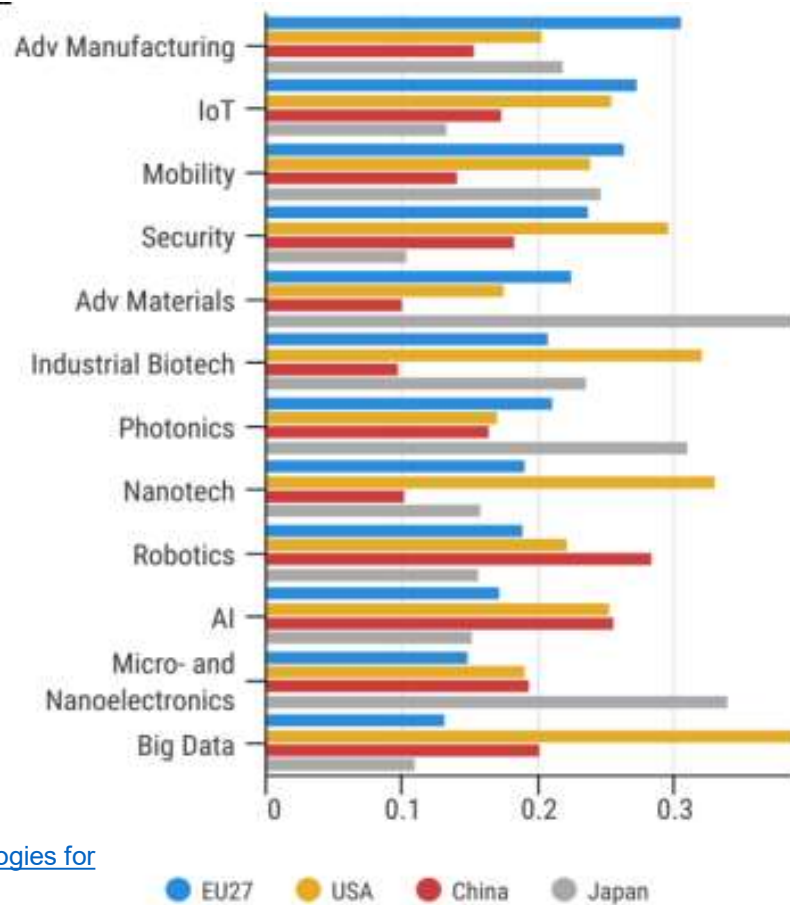
A NEW EUROPEAN INNOVATION AGENDA WILL:

- 1 improve access to finance for European start-ups and scale-ups, for example, by mobilising untapped sources of private capital and simplifying listing rules
- 2 improve the rules to allow innovators to experiment with new ideas
- 3 help create “regional innovation valleys” that will strengthen and better connect our innovation players through Europe, including in regions lagging behind
- 4 attract and retain talent in Europe, for example by training 1 million deep tech talents, increasing support for women innovators and innovating with start-up employees' stock options;
- 5 improve innovation policy-making through clearer terminology, indicators and data sets, as well as policy support to Member States

[#EUInnovationAgenda](#) [#HorizonEU](#)

Source: COM (2022) 332 final

EU performance in key technologies



Source: Commission
SWD(2021) 352

[Technology definitions](#) | [Advanced Technologies for Industry \(europa.eu\)](#)

EU performance in key technologies (ctnd)

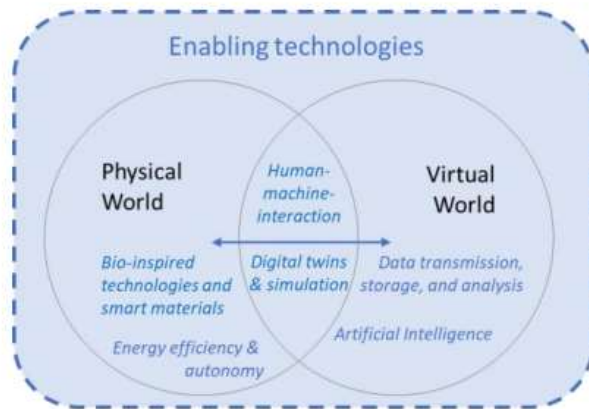
Relative European position vs leading or second-best region on a range of metrics, multiple¹

Europe trailing <0.8 ● 0.8-1.2 ● >1.2 Europe leading

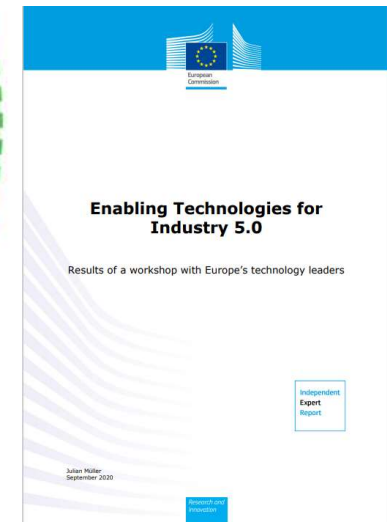
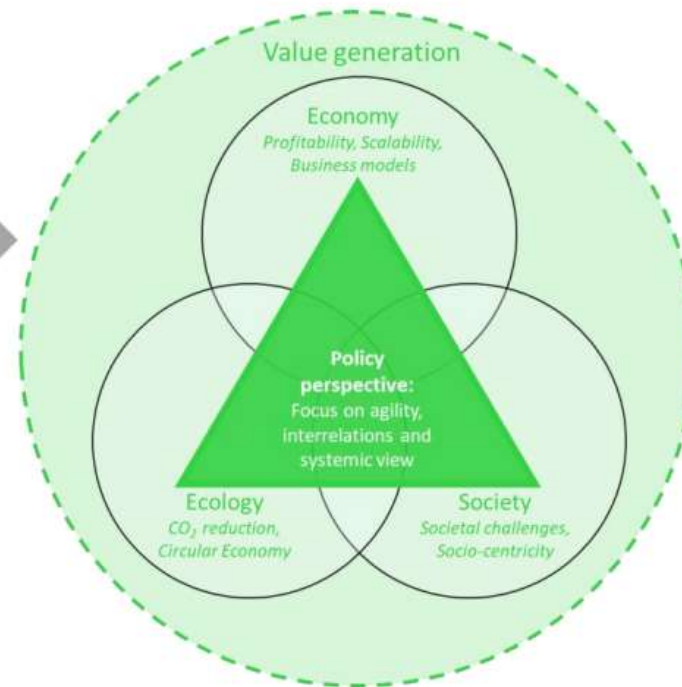


Source: MCKinsey
Global Institute 2022

Bio-inspired as (one of) the next big thing(s)



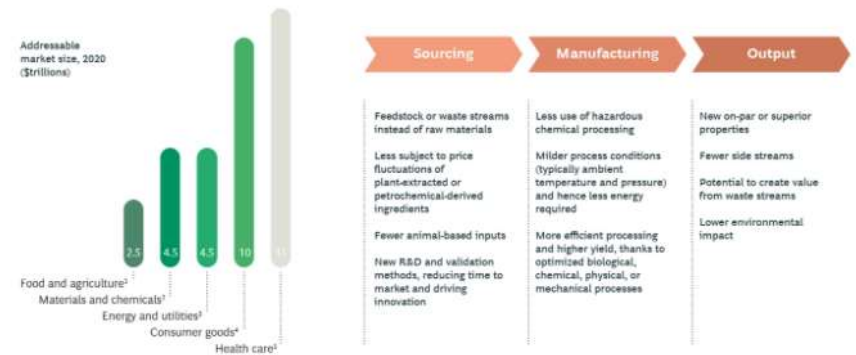
- Challenges**
- Social heterogeneity in terms of values and acceptance while addressing and balancing current challenges of society and ecology
 - Measurement of environmental and social value generation
 - Integration from customers across entire value chains to SMEs, that require skills and lack industry 4.0 technologies' implementation
 - Interdisciplinarity of research disciplines and system complexity
 - Ecosystem-oriented innovation policy with agile, outcome-orientation
 - Productivity is still required, while large investments are needed



Source: RTD, 2020

Future market - Estimates

- equivalent of 40% of current global GDP will be affected over the next 30 years
- disruption could lead to annual business opportunities worth \$10 trillion and create 395 million jobs by 2030 (WEF)
- disruption likely to be greater than that of digital technologies for pharmaceuticals, chemicals, agriculture and food supply, advanced materials and manufacturing



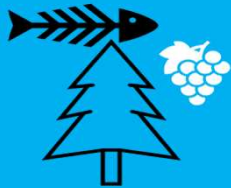
Source: Boston Global Consulting, Looking to nature for the next industrial revolution, 2021

Horizon Europe: Circular Biobased Economy

GO 1 accelerate the innovation process and development of bio-based innovative solutions



SO1.1 increase the intensity of cross-disciplinary research and innovation activities to reap the benefits of the advancement in life sciences and in other scientific disciplines for the development and demonstration of sustainable bio-based solutions



SO1.2 increase and integrate the research and innovation capacity of stakeholders across the Union to exploit the local bioeconomy potential, **including in regions with underdeveloped capacity**

SO1.3 increase the research and innovation capacity for addressing environmental challenges and development of more sustainable bio-based innovations by ensuring that sustainability issues and environmental performance are integrated throughout the whole innovation chain and in future innovative solutions

GO 2 accelerate market deployment of the existing mature and innovative bio-based solutions



SO2.1 reinforce the integration of bio-based research and innovation in the Union biobased industry and increase the **involvement of R&I actors** including **feedstock providers** in the bio-based value chains;

SO2.2 reduce the risk for research and innovation investment in bio-based companies and projects

GO3 ensure a high level of environmental performance of bio-based industrial systems

SO3.1 ensure that circularity and environmental considerations, including contributions to **climate neutrality and zero pollution** objectives, are taken into account in the development and implementation of research and innovation bio-based projects and facilitate **societal acceptance**

Source: CBE

Horizon Europe: bio-based industries

- Innovative processes and industrial symbiosis approaches in the bio-based industrial value chains, enabling local security of supply chains and the maximum valorisation of biological resources while minimizing the use of hazardous substances and waste streams;
- Monitoring systems of the industrial symbiosis in the bio-based industrial value chains.

Source: [Horizon Europe work programmes \(europa.eu\)](https://europa.eu)

Horizon Europe opportunities: cities

- Transition towards a sustainable, **regenerative**, inclusive and just circular economy across regions of Europe
- Significantly increased circularity, reduced GHG emissions, ... valorisation of local resources in cities, regions or their groupings.
- Creation of business opportunities and jobs / Citizen participation in the circular economy
- Knowledge transfer between the cities, regions or their groupings
- Scalability and visibility of circular systemic solutions

Source: [Horizon Europe work programmes \(europa.eu\)](https://europea.eu)

Horizon Europe opportunities: textiles

- Sustainable textiles thanks to a bioinspired and biomimetic advanced materials;
- Low-cost, low-resource, and low environment-impact high performance durable fibres and textiles from renewable sources;
- Smart functions or functionalities of textiles;
- Designed circularity for renewable and recyclable materials.

Source: [Horizon Europe work programmes \(europa.eu\)](https://europa.eu)

Horizon Europe opportunities: agriculture

- Alternative agrochemicals and/or bio-based materials following the safe and sustainable by design;
- Reduced use of pesticides and fertilizers thanks to alternative Advanced (nano)materials and/or bio-based materials;
- Support the goals of the Missions 'A Soil Deal for Europe' and 'Restore our Ocean and Waters'.

Source: [Horizon Europe work programmes \(europa.eu\)](https://europa.eu)

Horizon Europe opportunities: manufacturing

- Access to bio-intelligent production technologies and architecture;
- Technological advances and improvements in sustainability arising from the integration of bio-intelligent principles, functions, structures and technologies in manufacturing;
- Substitution of raw materials by bio-based materials, or implementation of bio-based or bio-intelligent manufacturing operations, and business models leading to **regenerative** production.

Source: [Horizon Europe work programmes \(europa.eu\)](https://europa.eu)