



# Technological challenges

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## SHARED CHALLENGES

1. To develop more sustainable and efficient production and management of biological resources and raw materials, based on the capture and digitalization of data from the production process, not the use of sensorization architectures to capture parameters, on the integration of multimodal information. , to analyze two different types of information and or development of support tools for decision making
2. Promote health care, quality of life and sustainability of the welfare state, in a context marked by the progressive growth of population, through multimodal analysis of intersectoral data (animal health, environmental factors, social and health data, etc. )
3. Mitigate the effects of climate change and adapt to them, optimizing processes and systems to reduce the environmental impact
4. Effective implementation of circular economy criteria in all value chains
5. Creation of new products based on sectorial raw materials and / or sub-products derived from production processes
6. Promote or entrepreneurship in particular based on business models that value information and find solutions to the challenges posed
7. Efficient integration of enabling technologies to optimize value chains from a technical, economic, social and environmental point of view
8. To guarantee the technological viability of two processes and / or innovative products developed based on an analysis of commercial potential, a validation of the industrial and intellectual property, and or of interruption.
9. Creation of new techniques and learning processes that facilitate the adoption of enabling technologies, as well as the acquisition of digital skills a more motivating and positive success for the end-user

## AGRI-SEA-FOOD

**Mission:** To achieve a sustainable, healthy and more productive agro-sea-food sector through the optimized management of resources to improve control, quality and safety

**Challenges:**

1. Ensure a supply of food that is respectful with the environment, safe and of quality throughout the entire value chain
2. Improvement in the traceability of products through the development of traceability tools that include all links in the value chain, facilitating the identification of origin and denomination, as well as the early discovery of anomalies

3. Incorporation of AI technologies and data analytics to improve detection, management and elimination strategies for contaminants or risks that may affect food production

4. Improvement in the decision-making processes for the implementation of sustainable practices that minimize the environmental impact, influencing among others:

- 4.1. Prediction and reduction of phytosanitary treatments
- 4.2. Valorization of by-products generated in the sector obtaining new marketable products
- 4.3. Reduction of diffuse emissions
- 4.4. Life Cycle Analysis
- 4.5. Biodiversity
- 4.6. Water footprint
- 4.7. Water pollution

5. Development of minimally processed products applying emerging conservation technologies

6. Optimized, efficient and comprehensive management of the production of primary resources (crops, livestock, aquaculture, fishing) through the collection and analysis of data

7. **SEA-INDUSTRY:**

7.1. Improvement of the management of fishery resources, including both the fishing and aquaculture processes, through the collection of information and data related to environmental parameters, levels of contamination in water, food and its composition, daily exploitation levels, etc.

7.2. Generating predictions of the captures of a campaign

7.3. Increase in the quality and food safety of fishing species by incorporating operational information to the parameters referring to the quality of the product and its conservation in the different stages of the process

7.4. Increase the capacities for prevention, control and action on feeding, diseases, growth and other parameters of interest in the cultivation of aquaculture species from a biological and environmental point of view

7.5. Improvement in the design of cold storage chambers, including their energy efficiency and management

7.6. Real-time monitoring of the status of stored fish products

7.7. Promote the production and use of alternative fuels in the marine / maritime sector

7.8. Development of cultivation techniques for new products of interest (algae, microalgae, etc.)

7.9. Assessment of existing genetic resources, both in wild and aquaculture populations, to define management and sustainability guidelines

7.10. Tracking markers and genetic traceability as a fundamental tool for the identification and tracking of stocks for their sustainable management

7.11. Incorporation of AI technologies and data analytics in aquaculture to improve production, in particular, to influence disease prevention, improvement of diets, the quality of the final product and the efficiency and sustainability of production

## BIOTECHNOLOGY

**Mission:** Consolidate and digitize the biotechnology sector in Galicia, improving the positioning and competitiveness of key user sectors globally.

**Challenges:**

1. Valorization and optimization of by-products and waste from other industries using biotechnology to enhance the Bioeconomy and the creation of new innovative products with high added value in the Circular Economy
2. Modernization of the Galician primary sectors towards sustainable improvement through the generation of biotechnological products and services with high added value.
3. Use of AI and data analytics applied to genomics, proteomics, as well as the generation of new application technologies in the field of medicine and personalized nutrition
4. Use of AI and data analytics for the manufacturing and production of drugs and biotech components
5. Development of proven and self-sustaining models, based on cost-efficient technologies, from the earliest stages of incubation of drug discovery, development and production programs
6. Chemical and functional characterization of extracts, microorganisms and ingredients with biofunctionality, developing studies of digestibility and absorption of nutrients ex vivo that derive in statistical and predictive models using said information
7. Increase in sectoral hybridization through the use of biotechnology and other Essential Facilitating Technologies (Nanotechnologies, Advanced Materials, environmental technologies, genetics ...) with special emphasis on the development of ingredients and / or foods that promote healthy aging
8. Design, development and commercialization of new biomaterials for use in biomedicine and other areas

9. Improving animal health and welfare to increase food security and economic growth through biotechnological innovation
10. Generation of data sharing systems and development of systems for the recovery, processing and analysis of chemoinformatic information, analytical data and chemical data for the design of innovative products in all fields of application of biotechnology
11. Improvement and advances in consumer knowledge and behavior towards new trends in biotechnology through the use of digital technologies
12. Increase in the digitization of biotechnology through the increase and improvement in the evaluation, diagnosis and remote treatment of patients around the world during monitoring and research processes, having data platforms capable of managing the digital identity of patients with accessibility by stakeholders, paying special attention to cybersecurity, biometrics and artificial intelligence
13. Design and implementation of a digitalization plan for the sector, in which emerging technologies are considered and how they will impact the different sectors in the future

## FORESTRY

**Mission:** Industrialize and digitize the sector, promoting the development, manufacture and use of high added value products based on wood, thus promoting the circular economy and fighting against climate change

**Challenges:**

1. Sensorization and digitization of production processes that allow data to be available in real-time and provide speed and flexibility in decision-making
2. Digitization of information flows in the wood chain that facilitate effective and efficient collaboration
3. Implementation of technologies, such as blockchain, in the wood supply chain that provide trust and traceability to all the intervening agents
4. Planning and enhancement of natural carbon sinks in forestry
5. Modeling of fires (probability of risk, behavior, etc.)
6. Generation of data on the state of forest resources, to improve their management and decision-making in the sector
7. Implementation of systems for the digital management of forest resources (plantation, forestry, logistics, prevention and defense plans against forest fires, pest control, etc.), generating advanced predictive models to estimate, for example, the production of biomass or growth of forest species

8. Genetic improvement of forest species with monitoring and traceability of their evolution, which serves as a support for reforestation decisions, necessary qualities according to use, etc.
9. Develop new options for processing and finishing wood as a key renewable resource to promote the circular economy
10. Develop new wood-based products or those derived from the forest industry as substitutes for unsustainable materials that favor the development of a circular economy (bioresins, bioplastics, fertilizers, etc.)
11. Digital simulation of wood, with access to complex information, such as that generated inside the trees, with the development of algorithms that simulate its behavior and allow its properties to be modeled to optimize subsequent industrial processes
12. Cartography of technological properties of wood of interest to the industry (Modulus of elasticity, Basic density, resin bags, etc.) from modeling
13. Development of patterns for wood screening according to its properties (fiber, extracts content, pulp quality, etc.)
14. Development of Digital Tools for the design and construction of wood. Digital twins, so that the customer can see and perceive a digital product that is a true reflection of later reality. Precast building processes, design, planning, construction and digital management using BIM
15. Reduction of the environmental impact of housing through energy rehabilitation of buildings using prefabricated wooden construction systems

## HEALTH

**Mission:** Digitization of the Silver Economy to empower citizens in the areas of health, food, healthy active aging and leisure, helping to establish population in rural areas, creating quality employment and sustainable development

**Challenges:**

1. Promote active and healthy aging considering:
  - 1.1. Food: Bioaccessibility and bioavailability studies of innovative foods, their relationship with the microbiota and application towards the massive use of omic technologies towards personalized nutrition
  - 1.2. Promotion of exercise, including mental
  - 1.3. Rehabilitation
2. Change of care model: Digital transformation of the social and healthcare sector, person-centered care processes and residential models
  - 2.1. Social and healthcare integration
  - 2.2. Personalized and precision medicine
  - 2.3. Management of chronicity / frailty: Remote monitoring of patients for therapeutic follow-up and in rehabilitation processes

- 2.4. Advanced telecare
- 2.5. Improved access to personalized and higher quality treatments, without compromising public budgets
- 2.6. Reduction of the health cost per capita (especially in chronic patients), especially in those areas where Big Data, Machine Learning and / or High Performance Computing technologies can be applied
- 2.7. Savings in the management of large volumes of data and improvement of the capacities for its processing
- 2.8. Patient empowerment
- 3. Biomedical research
  - 3.1. Development of clinical decision support systems that provide relevant information at the right time to healthcare professionals
  - 3.2. Development of new diagnostic processes based on multimodal information associated with physiological signals
  - 3.3. Studies on intestinal microbiota, metabolic diseases and methodologies for incorporating probiotic microorganisms that use mathematical tools and data analytics in their development
  - 3.4. Data analysis of diets and their relationship with various diseases
- 4. ResidenciaSS 4.0: Extend the concept of a health center, beyond the physical building, reinforce the role of the Home as a place of preference for the provision of long-term social and health care. Improve care coordination between the health and social health sectors
- 5. Healthy tourist destination
  - 5.1. Senior-friendly destinations: Monitoring of environmental pollutants and development of systems to mitigate risks to people's health (Hospitality post-COVID)
  - 5.2. Rehabilitation therapies
  - 5.3. Energy efficiency
  - 5.4. Clean energy sources, clean mobility



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