Chapter 3.5
Agri-food and Natural Resources

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Aeneas

EPoSS. European Association on Smart Systems Integration

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Scope

- **Climate change** has serious repercussions on food security, health, and shortage of fresh and affordable water for human consumption.
- **Strict bi-directional relationship and impact between climate change and agriculture** effective practices must be adopted to mitigate risks to human health and agriculture production.
- **Many other challenges are confronting agriculture** increasing global demand and competition for resources require a rethink of food production and consumption in a way that appropriately connects agriculture, energy, water usage, and food security.
- **Contemporary economic and ecological challenges** mean that the food production must support a new balance between quantity of production and quality of production by moving towards a more sustainable and inclusive food system from farm to fork as well as the use of natural resources.
- **Opportunities for the ECS community to contribute to the disruption of the agrifood sector.** Innovation and digitalization of agriculture are becoming more and more relevant due to the need for building a new level of agri-food system resilience, capable of having a more productive, decarbonised, and sustainable agriculture globally.

Key trends

- **Reducing food loss and waste, adopting dietary changes, and adapting the ways we use arable land.**
  - They help industry meet global food needs while safeguarding farmers' livelihoods and contributing to decarbonization and stabilizing climate change.
  - The need to speed up innovation and the adoption of digital technology in agriculture.
- **Smart Internet of Things (IoT) systems** have become very important for sustainable production and consumption of safe and healthy food, as well as for sustainable practices in agriculture, livestock, aquaculture, fisheries and forestry.
- **Accelerate the deployment of smart systems in agriculture, food production, natural resources and ecosystems to ensure sustainability and limit climate change impact through :**
  - Increase electrification and use of agrivoltaics solutions
  - Increase the development of agroforestry
  - Introduce IoT solutions based on AI.
  - Provide education and agriculture-based services.
  - …

Major challenges

1: Food Security: Economic and social security of availability of food supplies including intelligent and adaptative food production, re-designing farming systems (horticulture/greenhouses, agrovoltaics, etc.).

2: Food Safety: health and hygiene including crop quality and health (pest management, agro-ecology, plant precision breeding and plan phenotyping), livestock welfare and health, food chain.

3: Environmental protection and sustainable production: Preservation of landscapes, biodiversity, and environmental protection including soil health, healthy air and skies (reduction of GHG emission, smart waste management and remediation.

4: Water Resource Management: Access to clean water (healthy water, reduction and conservation of water, water distribution), resource management (irrigation, flood water treatments fostering circular use.

5: Biodiversity restoration for ecosystems resilience, conservation, and preservation: This includes the following ecosystems: agriculture, aquaculture, fisheries, forestry and agro-forestry.

R&I focus areas

- New materials
- Manufacturing technologies
- Innovative sensing solutions
- Information, and communication technology (ICT)
- Artificial Intelligence (AI)
- Robotics
- Energy management
- Harvesting and transfer
- Electronics and photonics
- Other technologies