The event “Make it work! “Bridging digital and green transformation: from policy to practice” was the second in a series of 10 events organised within the Advanced Technologies for Industry (ATI) project (https://ati.ec.europa.eu) commissioned by EASME and DG GROW. This event has been held within the framework of the European Week of Regions and Cities and focused on “Bridging digital and green transformation: from policy to practice”.

The aim of the Make it Work events is to properly inform public and private intermediaries from different regions on latest project activities and findings while triggering participants to brainstorm on new ideas and viewpoints to translate their regional smart specialisation priorities into potential collaborative high-quality projects and smart investments.

This second event offered an overview of a range of recent policy initiatives that aim at coupling digital with green. The workshop has also presented how value chains are being transformed to become more responsible with the help of digital technologies.

Digital and green transformation policies and practices have also been discussed in a regional perspective. Furthermore, representatives from EU regions shared their experience in integrating digital technologies in various value chain segments of the agri-food industry.

Part 1: Exploring Advanced Technologies for Industry

- **Introduction to the Advanced Technology for Industries project** - Marta Batalla-Masana, DG GROW, European Commission

The 4th industrial revolution is driven by digital and advanced technological developments that will radically transform industrial value chains, business models, production facilities, and the entire society. Digitalisation has both positive and negative consequences for the environment and the climate. On the one hand, advanced technologies can lead to more efficient and flexible production processes with increased resource efficiency. On the other hand, digital industrial ecosystems create demand for energy and critical raw materials and the significant carbon emissions can actually offset the positive impacts if not addressed properly and on time. The European Green Deal calls for measures to maximise the impact of policies to deal with climate change through artificial intelligence, 5G, cloud and edge computing, and the Internet of Things. Innovative systems are highly needed, and...
technologies have a clear role to play to enable and ensure the transition to sustainable resource consumption across various value chains. The Commission introduced the meeting by presenting the European Commission priorities (2019-2024) with a particular focus on the European Green Deal and “Europe fit for the digital age”. Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, Europe needs a new growth strategy that will transform the Union into a modern, resource-efficient and competitive economy. The EU’s digital strategy aims to make this transformation work for people and businesses, while helping to achieve its target of a climate-neutral Europe by 2050. The Commission is determined to make this Europe’s “Digital Decade”. Europe must now strengthen its digital sovereignty and set standards, rather than following those of others – with a clear focus on data, technology, and infrastructure.

• Coupling digital with green: some insights from the Advanced Technologies for Industry project (Moderator: Giorgio Micheletti, Speakers: Kincső Izsak and Els Van de Velde)

The objective of the Policy Brief report on “Responsible digital transformation – the bridge between digital and circular economy policies” is to revisit the question of how to create responsible digital transformation models by:

• reviewing some of the most recent national Industry 4.0, digital and circular economy policies and instruments in the EU from an environmental/digital perspective and
• bringing examples of policy initiatives where advanced and digital technologies are promoted to deliver solutions to pressing environmental problems and the climate crisis and promote good practices.

• Responsible digital transformation – the bridge between digital and circular economy policies (Kincső Izsak, Technopolis Group)

Advanced (digital) technologies radically transform industrial value chains, business models, production facilities and society. In fact, Advanced digital technologies can lead to more efficient and flexible products, which replace less resource-efficient technologies and circular economy processes (optimising resource sharing, circulation, and longevity). But, if not properly implemented, the positive effects can be offset by negative side effects such as the drastic increase of energy consumption.

Positive impacts

Efficiency improvements: Smart energy infrastructure based on the Internet of Things can optimise energy consumption and help avoid unplanned downtime.

Monitoring energy consumption and material flows: Digitalisation enables remote monitoring of air and water pollution, deforestation, energy and material consumption.

Enhanced decision-making: Artificial Intelligence can strengthen climate predictions, enable smarter decision-making for decarbonising industries from buildings to transport, work out how to allocate renewable energy.

Negative impacts

Energy need: Data storage, data processing and AI algorithms consume immense energy. Data infrastructure, as the key building block of the digitalised world, accounts for approximately 2% of global electricity consumption (IEA, 2018)

Demand for critical raw materials: The need for critical raw materials in digital products is significant.

E-waste: The growing waste of discarded electrical and electronic equipment represents a hazard for the environment but also to health.
Coupling Digital with Green

- **Sustainability** considerations have been **integrated only to a limited extent** into digital transformation policies and Industry 4.0 initiatives so far.
- Circular economy and digital policies go in parallel rather than being explicitly connected although there are interesting initiatives and a growing understanding of the interlinkages between them.

**Figure 1 Policy Measures**

There are a very limited number of policy measures that aim explicitly at fostering the use of digital technologies to solve climate or environment-related challenges.

- The most common policy initiatives target energy, resource efficiency and mobility.
- Digital solutions to environmental problems have been supported through various R&D and innovation programmes. Several countries also use the concept of smart cities, clusters and local ecosystems to trigger positive linkages.

It is not yet a standard practice to commission studies on the impact of digital measures on the environment and climate, accounting how the rebound effects can be offset.

- **Sensors for Agri-food** – Els Van de Velde, Senior Expert Competitiveness & Innovation, IDEA Consult (ref. [ATI Product Watch “Soil, water, temperature, sensor for agricultural application”](#))

Industry 4.0 is radically changing the way of farming in Europe. However, most farmers do not yet adopt digital technologies or only invest in proven technologies. Many farmers remain sceptical about the benefits of digital technologies due to a lack of proof of concepts that demonstrate the benefits of these technologies. In addition, customised approaches are often needed to address the specific context of various regions.
The increased use of IoT and sensors on farms, allows farmers to make informed decisions on crops or livestock. The objective of this AT Product Watch report is to:
• Map key players in sensors for farm management of livestock value chain
• Identify strengths and weaknesses

**Figure 2 Sensors for farm management of livestock value chain**

**Figure 3 SWOT analysis**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading in precision livestock farming</td>
<td>Market size in the United States of America versus Europe</td>
</tr>
<tr>
<td>Improved decision making</td>
<td>Cost aversion and implementing cost for the farmer</td>
</tr>
<tr>
<td>Product quality and traceability</td>
<td>Framework conditions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production efficiency</td>
<td>Robustness and quality of sensors</td>
</tr>
<tr>
<td>Acceptance of livestock farming</td>
<td>Data sharing</td>
</tr>
<tr>
<td>Improved earnings for farmers</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion and relation to COVID-19**
- Sensors are increasingly becoming more important
- Early detection has a major role in outbreak management
- Increased animal welfare, environment and product quality
- Distance management is possible: improved biosecurity
Part 2: Interactive session

Sharing perspectives: interactive session on digital and green transformation

Moderator: Giorgio Micheletti

Panel participants:
- Kincső Izsak, Principal Researcher, Technopolis
- Els Van de Velde, Senior Expert Competitiveness & Innovation, IDEA Consult
- Maria Goulaptsi (Head of Innovation Support Department, Region of Central Macedonia, Greece)
- Leda Bologni (Head of Infrastructures Unit, ART-ER, Emilia Romagna, Italy)

The second part of the event was very interactive since participants were encouraged to discuss actively about specific questions related to the relevance of impact and opportunities on digitalisation and environment. Thanks to the use of Mural\(^1\), the participants were able to include their feedback following the design thinking method.

The discussion, guided by the moderator, followed two sprints of questions: for each of them a topic was discussed in a collective brainstorming.

Below the main topics and questions addressed and the main feedback collected by the audience.

**Sprint 1. Digitalisation and environment – impact and opportunities (12 minutes)**

- Question 1: What are in your opinion the positive and negative impacts of digital transformation and digital technologies on the environment and the climate? Any concrete example that you can think of in general and/or in your country or region?
- Question 2: Which digital technologies do you think will play a central role in the green transformation? (3 replies); and why?

\(^{1}\) The interactive whiteboard used was developed in Mural
Sprint 2. Understanding the regional perspective – state of the art and challenges (12 minutes)

- Question 3: Is your region developing/has already developed policies/initiatives coupling digital and green priorities?

Regional Speakers contribution

- Maria Goulapsi (Head of Innovation Support Department, Region of Central Macedonia, Greece)

The region of Central Macedonia has developed several initiatives funded by the regional operational programme, such as:

- Development of an integrated system for risk management through the fusion of Earth observation data, focusing on the adaptation and climate change
- Regional plan for climate change with the use of digital tools
- Development of tools and systems for the upgrading of technology and communication services

Other relevant initiatives coupling digital and green transformation include:

- Interreg projects (creation of Digital Innovation Hubs, regional action plan for circular economy and for low carbon mobility)
- Cooperation with other EER regions in Europe in relation to Industry 4.0, agri-food and other areas in order to develop common projects and policies
• **Leda Bologni (Head of Infrastructures Unit, ART-ER, Emilia Romagna, Italy)**

Emilia Romagna region (Italy) is also developing different policy initiatives and tools aiming at bridging green and digital transition. Among them:

- **Policy initiatives**
  - Regional strategy on (good) job and climate (“good” means that this strategy aims not only at reducing the unemployment rate but also to enlarge the level of skills for workers)
  - Smart Specialization Strategy (now in the phase of defining the programme for the next 7 years; digitalization and green represent a core topic especially for industry)
  - Digital infrastructures: HPC, networks and research
  - Skills and Re-skills
- **Technology focus:** Big Data, Artificial Intelligence and High-Performance Computing
- **Policy execution:** digital for Public Administration, rules, laws and digital sovereignty.

Some examples of initiatives Regione Emilia Romagna is working on in relation to the application of digitalisation and green approach to the agri-food sector are shown below:

- Application of traceability methods and Big Data (Co-Leading with Andalucia); 20 regions involved; this initiative encourages the creation of an ecosystem to support innovation and digitisation of the agri-food sector in Europe
- Nutritional Ingredients (Regular Member)
- High Tech Farming (Regular Member); 26 regions involved; the initiative focuses on innovation and adoption of new technologies in the agricultural sector.
Concluding remarks

Bridging digital and green transformation is not a straightforward exercise as digitalisation presents both clear advantages for sustainability-oriented actions and potential harmful effects for the environment and the climate. Among the former, the event has highlighted the efficiency improvements brought about by smart energy infrastructures that can optimise energy consumption as well as enhanced ways of monitoring air and water pollution while keeping in check other phenomena such as deforestation and material consumption. Digital technologies can also greatly improve decision-making so that key actions based on weather and climate predictions and renewable energy reallocation can be taken more accurately and with shorter delays. On the other end, if not properly steered, digital transformation can considerably increase energy needs, deplete the stock of rare raw materials and produce more hazardous waste. The need for a responsible digital transformation as a result, policy design and execution need to be carefully tailored around green goals and requirements.

Take Away messages

The speakers’ presentations, and the following interactive debate, have highlighted how the number of policies in Europe that explicitly aim at fostering the use of digital technologies to solve climate or environment-related challenges is still relatively low. Yes, energy and resource efficiency and better mobility solutions are becoming increasingly part of new policy initiatives and several R&D innovation programmes are now supporting the use of digital solutions to tackle environmental problems. However, a proper and systematic integration of environmental concerns into digital policy actions is not common standard across many EU Member States and regions. There is no direct shortage of successful digital policies with beneficial “green” effects. Industry 4.0, for instance, is radically changing the way farming is organised and conducted in Europe with positive effects not only on the farming industry itself but on the environment as a whole. Yet, cultural resistance and a lack of understanding of these positive effects is still high – an extra effort to embed green concerns in digital policies and to raise awareness on the benefits thereof is therefore needed at European, national and regional level.