Advanced Technologies for Industry

Shaping European Manufacturing: The Role of Advanced Technologies

12th May 2021 - 10.00 -12.30 CEST Zoom Webinar

Organised on behalf of:
European Commission DG GROW
European Innovation Council and Small and Medium sized Enterprises Executive Agency (EISMEA)
By IDC

The event "Shaping European Manufacturing: The Role of Advanced Technologies" was the third in a series of three events organised within the Advanced Technologies for Industry (ATI) project (https://ati.ec.europa.eu/) commissioned by EISMEA and DG GROW. The aim of these workshops is to properly inform relevant stakeholders (policy makers, cluster organisations, national and regional authorities, SMEs) on latest project findings on specific advanced technologies and boost the discussion on related adoption barriers and opportunities.

This last workshop focused on the role of advanced technologies in the manufacturing industry. The manufacturing industry is a strong asset of the European economy, accounting for 2 million enterprises and 33 million jobs. Europe's competitiveness is highly dependent on the ability of this sector to deliver high-quality innovative products using the latest advances in ICT. Certain technologies, such as Industrial Internet of Things, Artificial Intelligence, Robotics and Cloud Computing, have a great impact on manufacturing. The adoption of these new technological possibilities will have consequences for the production process, by lowering the cost of production, improving the speed of operations and minimising errors. The factories of the future need to deal with competitive pressures and incorporate new technologies, applications and services and in this context policymakers and other influential actors play a fundamental role in the establishment of frameworks that provide some degree of certainty to companies in designing their investment strategy.

The event was structured in two main sessions:
- In the first session, we set the scene giving an overview of the main trends and adoptions of advanced technologies (focus on Industrial Internet of Things - IIoT, Artificial Intelligence - AI, Robotics and Cloud) in the manufacturing sector and informing about the current policies that are being implemented in the field at the EU level.
- The second session aimed at gathering different viewpoints and experiences about how to plan and implement the digital transformation of manufacturing SMEs. The discussion included contributions both from the EU level and the local level to provide participants with a full picture of the topic and to encourage them to share their views and formulate requests to policy makers.

Welcome and introduction

Introduction to the ATI project – Evangelos Meles, DG GROW, European Commission

Evangelos Meles introduced the ATI project firstly by presenting the policy context around it:
- **Industrial Strategy for Europe -** aims to ensure that European industry can transform European industry, support small and medium-sized enterprises (SMEs) and keep Europe sustainable and competitive.
- **Updated Industrial Strategy 2021 –** advanced technologies in the scope of identifying strategic dependencies and capacities.
- **Shaping Europe's Digital Future -** vision for how Europe can retain its technological and digital sovereignty and be the global digital leader.
- **European Green Deal -** advanced technologies and industrial value chains play a key role in this strategy by accelerating the transition towards clean technology solutions.

In this context, ATI project has as main goal assessing the uptake and the level of adoption of advanced technologies in Europe. The project identifies 16 advanced technologies (both key enabling and digital technologies). The work performed within the ATI project resulted in several tools, such as the Data dashboard and the Technology Centers mapping (offering a list of Technology centres, public or private organisations carrying out applied research and close-to-market innovation in Advanced Technologies for Industry). The project has further produced analytical reports on technological trends, sectoral insights, promising products and policy measures and tools.

Setting the scene

Capturing technological uptake in manufacturing: The Case of AI, IoT, Cloud and Robotics – Giorgio Micheletti, Consulting Director IDC4EU, IDC

Giorgio Micheletti gave an overview of the uptake of advanced technologies in the different industries, with a specific focus on Cloud, IoT, AI and Robotics, representing relevant technologies for the manufacturing industry (shown in the figure below).
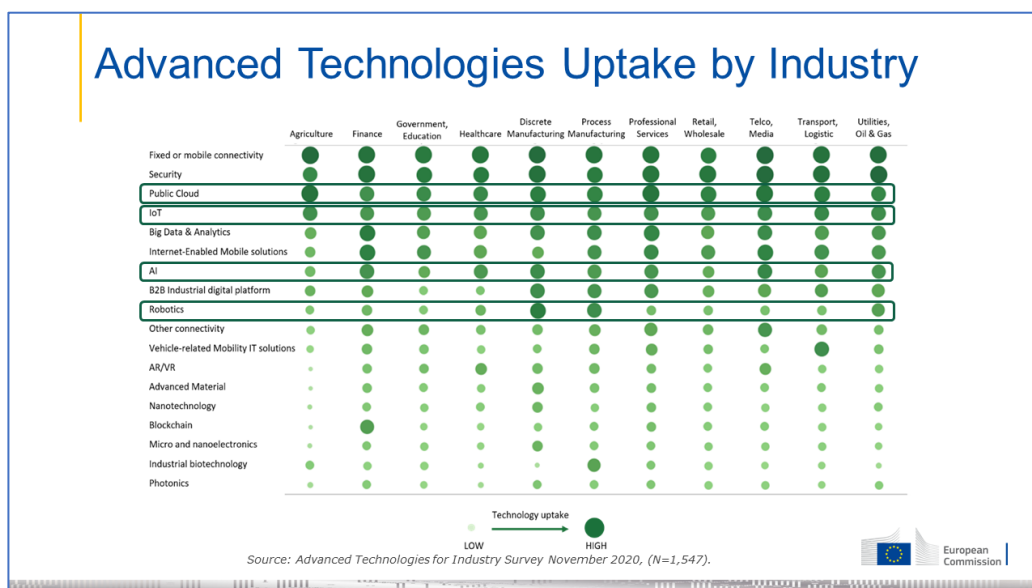
The visualisation highlights how a distinct group of technologies features a marked horizontal diffusion across all industries (general purpose technologies Connectivity, Security, Public Cloud, Mobile solutions, Big Data & Analytics, Internet of Things (IoT) and Industrial Digital Platform): they represent the technology portfolio necessary (but not sufficient) for digital transformation. In fact, COVID-19 impact on trade caught many firms unprepared, with negative consequences on supply chains. Covid-19 drastically changed the focus from a low-cost country sourcing mantra to a more resilient and simple network. Implementing new technologies is turning supply chain processes and activities towards less uncertainty and complexity. Technologies like Robotics, AI, IoT, Blockchain and Edge Computing are the key drivers to achieve these goals, together with efficiency benefits and zero-touch production (ZTP) processes. Mr. Micheletti explained how the AT watch reports focus on the market, business and socioeconomic trends driven by technology innovation for industry from the point of view of enterprises. He continued focusing on technologies which are relevant for the manufacturing sector, namely AI, IoT, Cloud and Robotics and giving more details on the main uses cases. More information can be found visiting the ATI website: https://ati.ec.europa.eu/reports/Technology-Watch.

Sustainable Manufacturing with IT – Maggie Slowik, Research Manager, IDC

Maggie Slowik focused her presentation on the importance of sustainability within the manufacturing sector, highlighting the main challenges, drivers and opportunities.

An important element to take into consideration when discussing about this topic is that manufacturers used to design products based on cost and performance as a key selling factor; going forward it will be sustainability and recyclability[1]. Tackling sustainability is very difficult, because the industry is dealing with very heavy assets which are also polluting. The industry is also dealing with lack of end-to-end transparency (due to complex supply chains). COVID-19 had a disruptive impact on the whole European economy. Ms Slowik pointed out how the 46% of European manufacturers wake up to the importance of sustainability, whereas 30% still see it as mandatory. Sustainability is a key factor for adapting the post-pandemic 'next normal'. When it comes to investments in sustainable products & services manufacturers are ahead of the industry standard, as shown in the figure below.


---
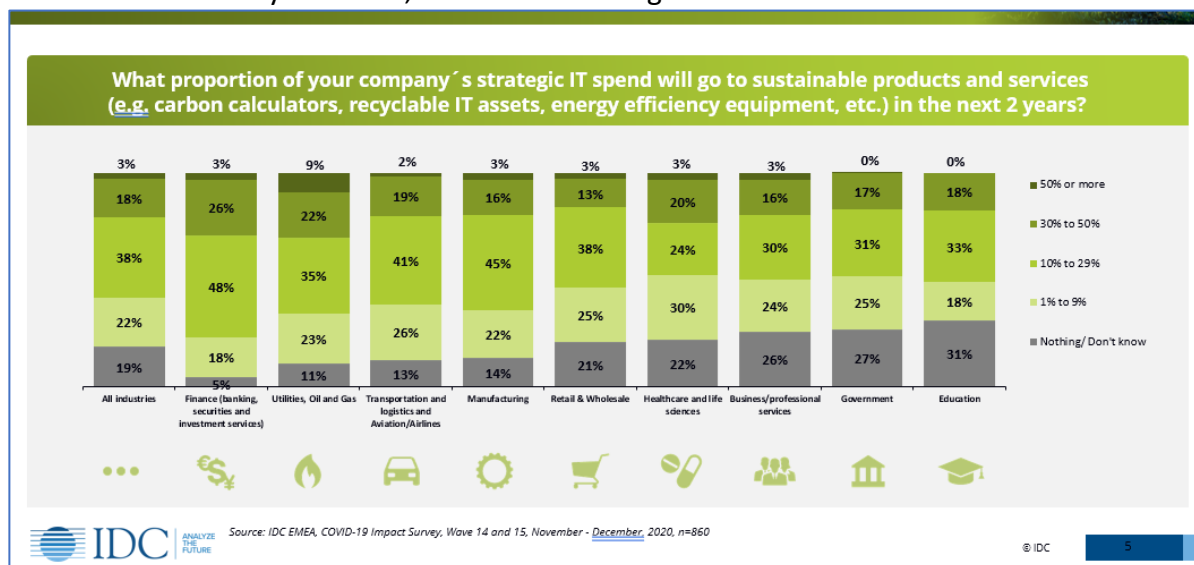
[1] Source: IDC Manufacturing Insights Customer

The key technologies are already here and the future role of IT will be to help manufacturing to be more efficient and to produce less waste. On the other side, manufacturing companies should see the moment and start rethinking the value proposition than can really strive the development of a sustainable future.

Digitising European Industry governance - Yves Paindaveine, Head of Sector, DG CNECT

In his contribution, Yves Paindaveine explained how the increasing wealth of data requires data spaces for trustworthy data sharing and reuse. During the crisis, there has been an acceleration in the adoption of digital technologies. All the digital technologies which we currently see taking ground are converging towards a data economy. In addition, more and more operations which were pushed on the cloud are now pushed to the edge, so data is processed at the point where it is produced.

In this context, the European Commission wants to support data sharing among manufacturing companies and with (service) providers by the facilitation of Manufacturing Data Spaces, which will serve as a model to show how sharing industrial data improves company operations, enhances business opportunities and supports the transition towards a circular economy.
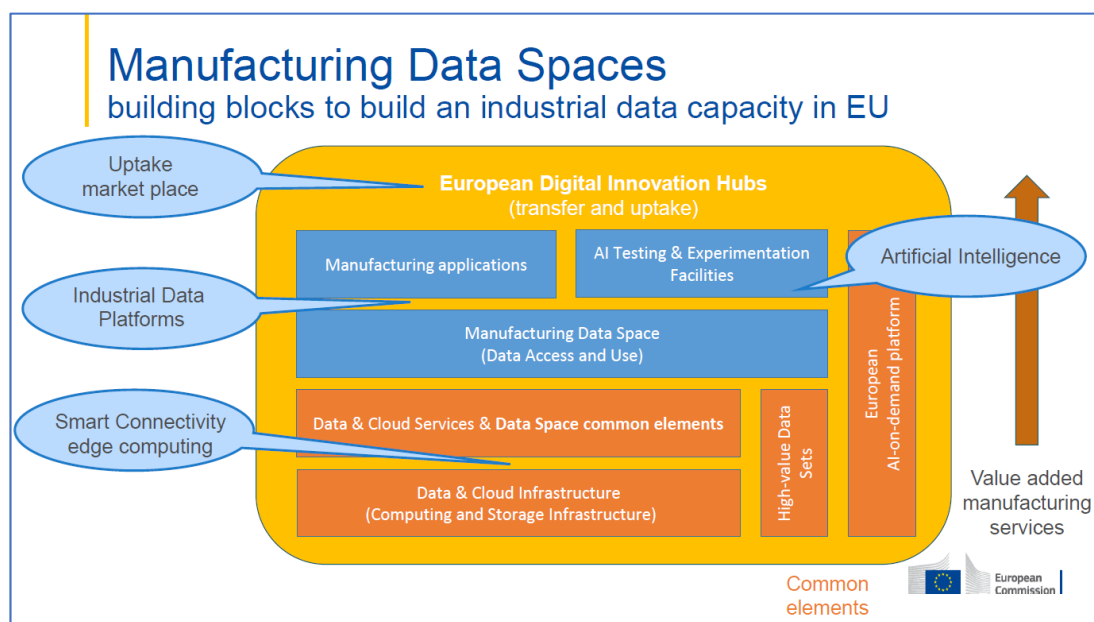
Through Horizon Europe and Digital Europe, the European Commission aims at supporting innovation in European companies throughout the whole lifecycle. In particular:

- Horizon Europe supports the early stages of the innovation chain and funds research and innovation (R&I) activities, including preliminary testing, proof of concept and pilot projects.
- Digital Europe enables the technological deployment and funds large scale pilots in real conditions, taking over successful research results using them for new deployments.

From shareholder to stakeholder value: Industry 5.0 - Martin Huemer, Policy officer, DG RTD

Martin Huemer explained how Industry 5.0 complements the existing Industry 4.0 paradigm by highlighting research and innovation as drivers for a transition to a sustainable, human-centric and resilient European industry. It moves focus from shareholder to stakeholder value, with benefits for all concerned. Industry 5.0 recognises the power of industry in achieving societal goals beyond jobs and growth to become a resilient provider of prosperity, by making production respect the resource boundaries and placing the wellbeing of the industry worker at the centre of the production process.

In this context, the role of skills is crucial. By 2025, 75% of the workforce will be millennials. 75% of millennials would take a pay-cut to work for a socially responsible company. 40% of millennials said they have taken one job offer over another because of the company's sustainability policy. Nearly half of Generation-Z says they would prioritise a job offer that gives them mobility, freedom and flexibility.

Sustainability also plays a central role in industrial innovation, that should aim at reaching Sustainable Development Goals (SDGs) such as "Industry, Innovation and Infrastructure" (#9) and "Responsible Consumption and Production" (#12).

So, how to make Industry 5.0 happen? In the figure below, some actions needed are listed.

Game changing technologies and their impact on production processes and work - Eleonora Peruffo, Research Officer, Eurofound

Eleonora Peruffo presented the work done within the Future of Manufacturing in Europe project, in particular highlighting the analysis performed on some game changing technologies (AI, IIoT, Industrial Biotechnology, Additive manufacturing, Electric Vehicles and Advanced Industrial Robotics) and their impact on manufacturing. The adoption of new technological possibilities will not only have consequences for the production process, but also for the working conditions of those employed on the process and on employment demands at company level. The analysis considers both the replacement of tasks (complete, partial or no replacement) and the effect on jobs (whether they are lost, become higher-value or lower-value or change to involve different tasks). The figure below offers an overview.

Tasks and occupations

		Potential job creation	Potential job losses
Manufacturing	Advanced robotics	ICT skilled professionals, mechatronics engineers, data scientists, and apart from the specialised skills.	Low skilled routine jobs in manufacturing
	Industrial Internet of Things	ICT skilled professionals, data scientists, software engineers and other profiles which sit at the interface between machinery and data.	White and blue-collar jobs which can be performed online
	Additive manufacturing	ICT skilled professional expert in Additive manufacturing – engineering and new material experts	Reduction of pre-processing manual tasks but possible raise of post-production tasks.

Eurofound

Regarding the prospects for working conditions in advanced manufacturing, the case studies draw attention to the diminution of some traditional industrial risks – a potentially positive impact – but also to new and emerging risks. These tend to depend on the specific game changing technology.

Q&A

Does ATI Project consider skills needs to be included as part of its reports?
Answered by ATI consortium: Yes, the ATI project also covers skills analysis and there are dedicated sections in the sectoral reports with an in depth LinkedIn analysis. More info is available on the ATI project website https://ati.ec.europa.eu/reports/Sectoral-Watch

Where is positioned Gaia-X and European Open Science Cloud (EOSC) in the very interesting scheme "Manufacturing Data Spaces"? How do you see the articulation?
Answered by Yves Paindaveine: The development of the manufacturing data spaces starts from embryonic industrial data platforms. In this context, GAIA-X, but also IDSA, IDTA, SCSN, DAWEX, … are initiatives on which to build. We recently had a workshop on how the different initiatives converge. Presentations, recording of the event will be soon available on https://digital-strategy.ec.europa.eu/en/policies/workshop-manufacturing-data-spaces

I am wondering in addition to Digital Innovation Hubs (DIHs) as innovation facilitators, does the Commission plan some further initiatives in the field of manufacturing like tests beds and regulatory sandboxes or they are left for the Member States to decide on?
Answered by Yves Paindaveine: Funding deployment of Testing and Experimentation Facilities (TEFs) are part of Digital Europe programme. They will support industry to test AI solutions in a manufacturing environment, either as user of these solutions, or as supplier. This is a joint cofunding effort of EU and Member States, and the relevance of the TEFs will be decided in an independent evaluation. Regulatory sandboxes for AI will also be a possibility, I want to refer you here to the AI package recently adopted by the Commission on an AI coordinated plan, and trustworthy and ethical AI proposed regulation, which outline the framework for regulatory sandboxes.

What do you understand by millennials, in the slide about skills?
Answered by Martin Huemer: Millenials are people born between 1985 and 1995.

What is the impact factor of the game change technology to digital aging, older workers and the success of retirees?
Answered by Eleonora Peruffo: In terms of older workers, the introduction of Advance robotics can help to increase their participation in the workforce especially for tasks/ jobs where physical effort was required. The availability of professional continuous development programmes can also foster a smooth transition to higher skills jobs and help to retrain occupations at risk. Again, in some cases, collective bargaining can help to shape work organisation (for example port of Rotterdam - check it out on the Eurofound working paper: https://www.eurofound.europa.eu/sites/default/files/wpef19002.pdf
In relation to your question on the success of retirees, we do not cover this in our project.

Roundtable Discussion

Moderated by Giorgio Micheletti
Panelists:
- **Davide Dalle Carbonare**, Senior Researcher, Engineering, Lead of Manufacturing Task Force subgroup in BDVA
- **Sergio Gusmeroli**, Research Coordinator, POLIMI
- **Heike Fischer**, Head of Department, Steinbeis 2i GmbH, coordinator of KET4CP project
- **Maxime Vermeulen and Annabelle Sion**, Polymeris competitiveness cluster and DIH
- **Valentin Charreton**, R&D Mechanical Engineer, Georges Pernoud

Big Data Challenges in Smart Manufacturing - Davide Dalle Carbonare, Senior Researcher, Engineering, Lead of Manufacturing Task Force subgroup in BDVA

Question from moderator: The mission of the BDVA is to develop the Innovation Ecosystem that will enable the data and AI-driven digital transformation in Europe delivering maximum economic and societal benefit, and, achieving and sustaining Europe's leadership on Big Data Value creation and Artificial Intelligence. Davide can you tell us more about the work BDVA is doing within the manufacturing Task Force?
Davide Dalle Carbonare introduced the work implemented by the Big Data Value Association (BDVA) with specific focus on the manufacturing sector. The Smart Manufacturing Industry group has the objective of exchanging views and learn from each other's experiences, on what activities are running in EU and within the different countries. The group also focuses on identifying present and future challenges to be addressed and to provide input for policy-makers at EU and Member States level. The discussion and analysis on the
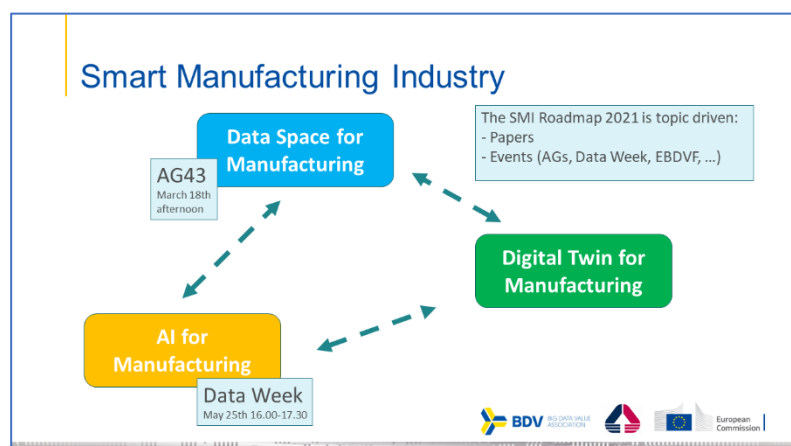
impact of big data in manufacturing has been translated in a Discussion Paper on Big Data challenges for BDVA and EFFRA Research & Innovation roadmaps alignment (2018) and a Whitepaper on Digital Europe Big Data Challenges for Smart Manufacturing Industry (2020).

The 6Ps methodology for SMEs Digital Transformation governance - Sergio Gusmeroli, Research Coordinator, POLIMI

Question from moderator: Digital transformation in SMEs can be fostered through raising awareness of the level of digital maturity the company has reached and identifying the desired level of digital maturity to reach, building up a digital transformation roadmap. Sergio, can you tell us more about POLIMI and AI REGIO project experience in this sense?
Sergio Gusmeroli explained that within the AI REGIO project, but also in other initiatives such as I4MS, the objective is to try to answer some questions: Are our manufacturing SMEs ready for digital transformation? Are they prepared? To assess SMEs readiness, these initiatives propose a three-level assessment, as shown in the figure below.
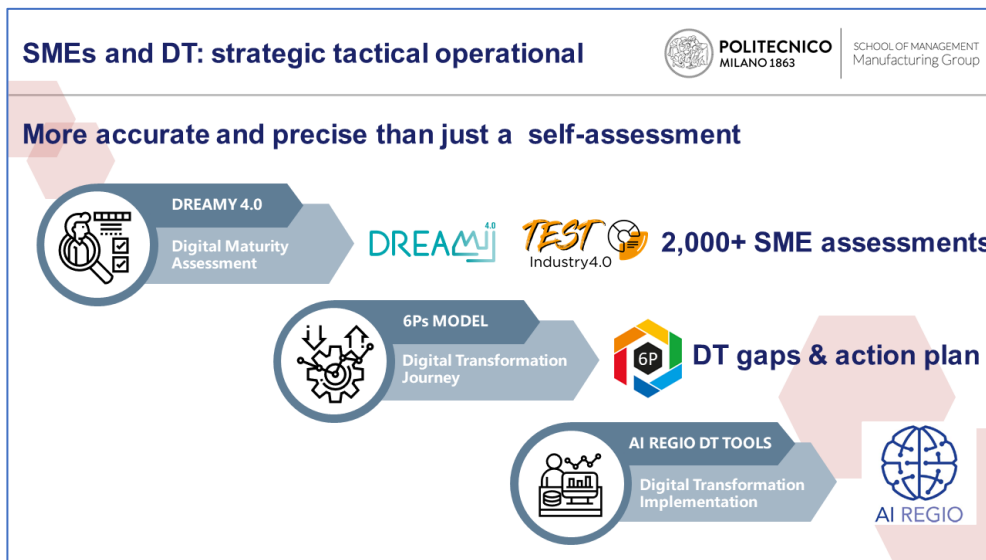
The central level of this approach is represented by the 6P method. The 6P Migration Model is the tool to support Manufacturing Enterprises to identify and assess the impact of a Digital Transformation project. The model adopts a holistic enterprise perspective and addresses both socio-business (people, partnership, performance) and technical aspects (product, process, platform).

KET4CleanProduction: Liaising SMEs with Key Enabling Technology Centres across Europe – Heike Fischer, Head of Department, Steinbeis 2i GmbH, coordinator of KET4CP project

Question from moderator: To remain competitive, manufacturing small and medium sized enterprises (SMEs) in Europe need to reinforce their innovation capacities through the integration and usage of key enabling technologies (KETs). Within this context, clean production processes are seen as a key part of a new industrial revolution and as a crucial competitive factor: It is expected that factories of the future will use highly energy- and material- efficient processes, employ renewable and recycled materials, and increasingly adopt sustainable business models bringing together different components of the value chain

to optimise production processes. Heike, your project seems to go into this direction: can you explain us what KET4CP is about?

The ambition of the project is to establish a growing open innovation ecosystem by interconnecting three main stakeholder groups to develop innovative solutions for cleaner production processes across Europe:

- Manufacturing Small and Medium sized Enterprises (SMEs)
- KET Technology Centres (KET TCs)
- Enterprise Europe Network (EEN) partners

The project offers the following services:

- Informing about opportunities for transnational collaboration of SMEs with service providers for KETs across Europe.
- Offering a platform for SME to submit technology requests to find a KET TC matching their needs.
- Serving as a matching tool linking manufacturing SMEs with key enabling technology experts.
- Awarding SMEs across Europe with €50 000 to kick start their collaboration with international KET TCs.


POLYMERIS: Competitiveness Cluster on Rubbers, Plastics and Composites - Maxime Vermeulen, Polymeris competitiveness cluster and DIH

Question from moderator: Polymeris is a competitiveness cluster and a DIH dedicated to rubber, plastics and composites. Maxime, can you share your experience in supporting the growth of companies in the sector and address the digital transformation challenges?

Polymeris is a competitiveness cluster born in 2005. Its 500 partners include 380 active members, 280 companies, 300 achieved or ongoing projects for €600 m, 40 European projects. The main pillars of Polymeris technology are:

- Materials technologies (polymers, composites…)
- Functionalised products (marketing, safety, data management…)
- Sustainability & ecodesign (environmental footprint, recycling…)
- Advanced manufacturing technologies (3D printing, automation…)

Polymeris technology roadmap focuses on digital and green transitions and its services covers three main areas, namely opportunity path, performance path and growth path, as shown in the figure below.
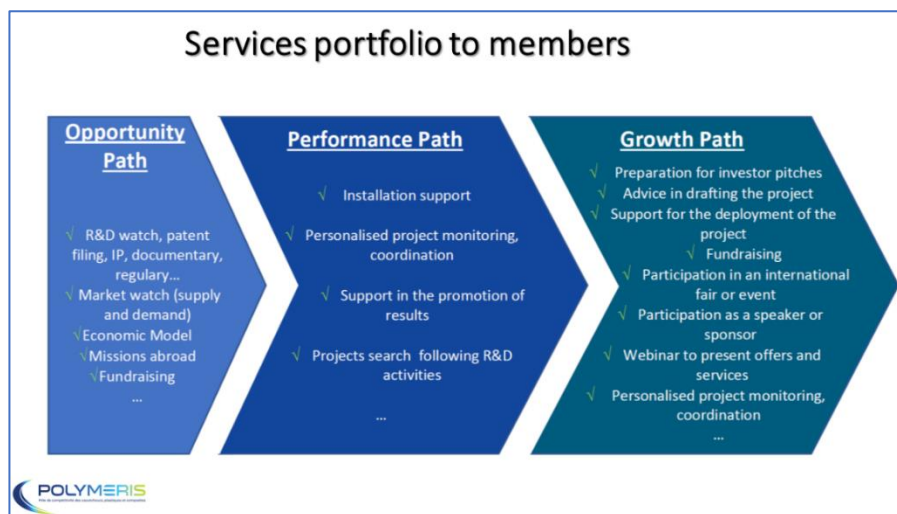

According to Maxime Vermeulen, partnerships with industrial hubs, international projects and connections at regional level are very important to develop common roadmaps, organise joint events and promote resources and services to industry.

Polymeris has also built up a Digital Innovation Hub, Politronic, focusing on the integration of functions and added-value products combining electronic, light and/or sensing features into polymeric components.

GEORGES PERNOUD SAS, a mold maker experience - Valentin Charreton, R&D Mechanical Engineer, Georges Pernoud

Question from moderator: Pernoud is a French manufacturer of injection moulding tools for plastics and composite materials. Mr. Charreton, tell us a bit more about your company and how are you coping with digital transformation challenges and opportunities.

Valentin Charreton illustrated how advanced technologies have been adopted in the company since its creation, as shown by the figure below.
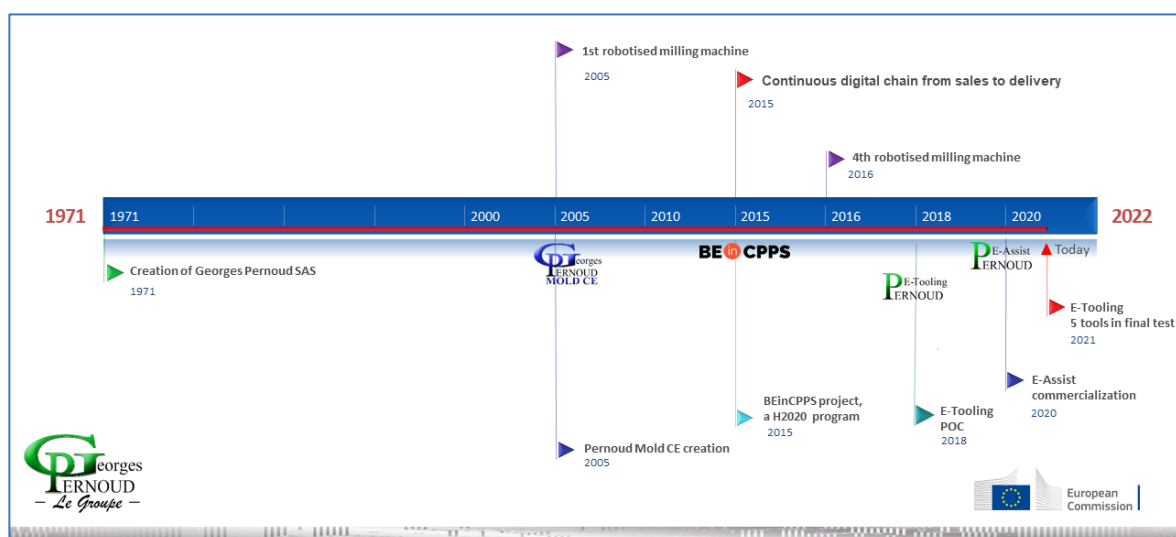
Through the digital transition, Pernoud Group is able to provide an expertise that is:
- Responsive ('just in one click' services)
- Immediate and able to reach any location
- Looking to the future, through a valuable application of Industry 4.0 principles.

Panel questions

The moderator launched some questions addressed to the panellists but also involving he audience through live polls.

Which of the following do you think are the most important areas on which manufacturing companies should focus?
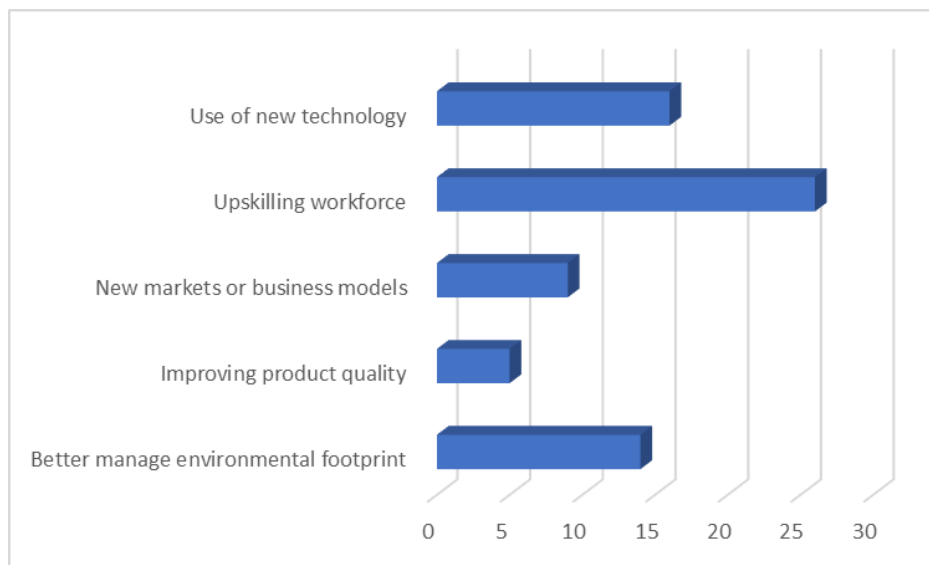

Comment by Davide Dalle Carbonare (BDVA): In my opinion, the use of technology should go hand in hand with upskilling. We need to go for a convergence because different technologies are pieces of the same picture and skills are the central factor for their effective use.

Where do you expect digital transformation having the biggest impact on manufacturing businesses?
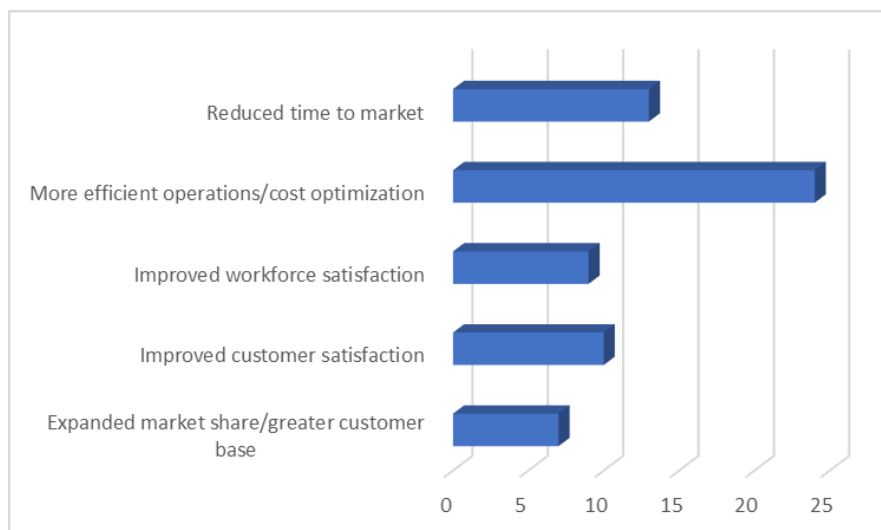
Comment by Maggie Slowik (IDC): I'm not surprised to see such a result. Productivity improvements and cost reduction are key benefits of digital transformation.

The role of national policies is crucial to increase productivity and competitiveness and improve the high-tech skills of their workforce. What do you think should be the main objective of these policies?
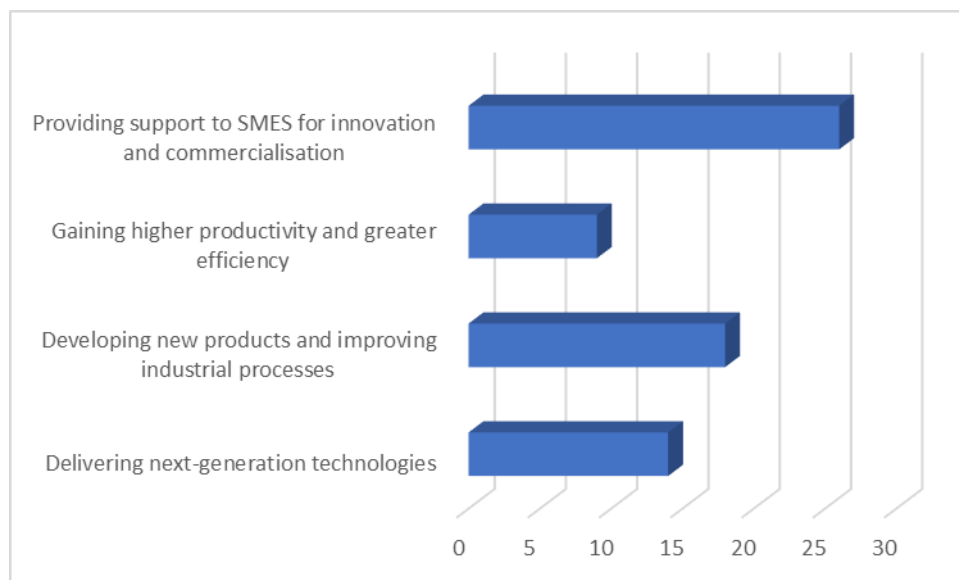
Comment by Evangelos Meles (EC): The result of this poll is the clear demonstration of why it is also important for the European Commission to bring together and connect the different tools, initiatives and policies at European level. The knowledge and the expertise are there: it is a matter of keeping on creating connections and improving cross-fertilisation.

Comment by Sergio Gusmeroli (POLIMI): National policies play a crucial role, because not everything can be managed at the EU level. As an example, in Italy, the launch of fiscal incentives has been a great move, fiscality/money/economic account the solid base of SMEs. Thanks to the incentives, many SMEs were able to refurbish their equipment. In addition to this, the country has also launched DIHs and 9 competence centres, each one specialised in a certain sector (i.e., MADE focuses on advanced manufacturing). Synergies are fundamental between EU and national level.