

CHAIN REACTIONS

THEMATIC BRIEF

Advanced Manufacturing

What's next for advanced manufacturing?

MARCH 2022





ABOUT INNOVATION BRIEFS

CHAIN REACTIONS addresses the challenge for industrial regions to increase regional capacity to absorb new knowledge and turn it into competitiveness edge and business value. There is a strong need to help SMEs to overcome capacity shortages for innovation and integration into transnational value chains.

The project aims at empowering regional ecosystems with the knowledge and tools to help businesses overcome those barriers and generate sustained growth through value chain innovation.

CHAIN REACTIONS focuses thereby on modern approaches considering value chains and their complex developments rather than linear technology transfer approaches. The framework of value chain innovation builds on Porter's 5 forces framework (new entrants, substitutes, customers, suppliers and rivalry) and transversal innovation drivers: key enabling technologies, resource efficiency, digital transformation and service innovation.

During the project lifetime CHAIN REACTIONS published about every third month an INNOVATION BRIEF presenting the rationale behind specific innovation drivers and illustrate them with practical examples.

This thematic brief focuses on the pilot activities performed by the project partners in the area of Advanced Manufacturing

Transnational pilot - Advanced Manufacturing

Executive summary

What is advanced manufacturing?

Advanced manufacturing is the use of knowledge and innovative technology to produce complex products such as aeroplanes and medical devices and improve processes to lower waste, pollution, material consumption and energy use.

Robotics, 3D and 4D printing, artificial intelligence and high-performance computing for modelling are also important elements in advanced manufacturing.

Advanced manufacturing faces 2 important challenges

1. digitisation
2. the shift towards more environmentally sustainable production

Use of innovative technologies to create existing products and the creation of new products. Advanced manufacturing can include production activities that depend on information, automation, computation, software, sensing, and networking.

Advanced manufacturing is the use of innovative technologies and methodologies for improved competitiveness in the manufacturing sectors.



The aim of advanced manufacturing is to

- Enhance output
- Increase:
 - added value
 - quality
 - responsiveness to market
 - flexibility
- Reduce:
 - time to market
 - unit quantities
 - material content
 - material inventory
 - underutilised capital plant

Transnational pilot - Advanced Manufacturing - PBN, Hungary

Executive summary

PBN has over a decade of experience in developing competitiveness of businesses and transforming them into policy inputs. Over 250 SMEs received innovation benchmarking and mentoring services in the previous funding period. More than 50 international partnership projects contributed to the gathering of high-end international know-how and connections that were translated for the benefit of the companies. Key industrial focus areas are mechatronics, wood and furniture and logistics.

For over 3 years by now, Industry4.0 and digitization are the core areas. Numerous partnership projects including collaborations for knowhow sharing, specialization in the field of smart factories in the Central European area and in the Danube Region.

PBN has strong co-operational network in mechatronics, which is a decisive sector in Western Hungary. The relevant cluster management and educational institutions have a strategic working relationship with PBN.

Wood and furniture sector are important, as the forestry coverage is significant and the only university with forestry specialization is located in Western Hungary. The nationally accredited cluster management has ten years of working relationship with PBN. Logistics and warehousing are dependent on the strong manufacturing industry. It represents important part of the employment, and Hungarian SMEs are well represented.

am-LAB partnership hub has a broad access to regional and national SMEs. PBN has over a decade of experience with SME innovation management and benchmarking. The pool of partners exceeds 250, covering all strategic sectors of the Western Hungarian economy. Additionally, PBN is the partner of the High Growth Companies development program, including 300 manufacturing companies. It is the exclusive access to the highest potential family-owned companies in Hungary. There are ongoing activities related to the SMEs at PBN. It also supports a living, innovation-oriented partnership pool, which is a solid platform for the am-LAB hub.



Local innovation technology transfer network has strong organically developed relations. Members of the hub are local university – ELTE Multidisciplinary Science Network -, local manufacturing company, cluster of mechatronic manufacturing SMEs. Regional government is supporting and closely following the progress.

The sectoral topics for PBN during the Chain Reactions were Advanced manufacturing (D.T.3.2.5) and Health (D.T.3.2.3). In the Health, our co-partner is PP3 (CCIA Padova, GAPR) and in the Advanced manufacturing sector PP 5 (RDA Pilsen). PBN planned to work out a joint pilot action, where we could successfully combine the advanced manufacturing sector with our knowledge from the health sector.

Based on the conclusions and lessons learned during the Chain Reactions project, and of course due to the problems, which we have experienced due to the COVID-19 crisis, it became a clear vision, that the economy of our city, Szombathely need new inputs. The economy of Szombathely (and mainly the Western part of Hungary) is dominated by the automotive industry and the multinational companies.

The main motivating idea behind the idea of the so called “smart-senior-test-room” for elderly generation was the fact, which came out due to the COVID-19 situation. It became clear, that this generation is very vulnerable, especially in the case if they can’t get help from their family or their care giver. PBN would like to offer a solution with monitoring their health system and showing them different options (e.g. robots or apps) where they can not only ask for help, but can be used for entertainment functions as well.

Digitalization is transforming the international value chain, and with the novelty in the powertrain these tendencies have significant impact on the production arena.

We experienced problems in the health sector, and we were committed to offer possible solutions with the help of the modern technology. It is a firm commitment from PBN, with the support of the digital innovation hub am-LAB, the municipality of Szombathely, to accelerate economic transition towards diversification. **The goal is to have healthcare industry present in Szombathely.** To enable the process, new knowledge and skills have to be created and augmented. The physical infrastructure will be extended and customized with the cooperation of the city and the am-LAB, while the new knowledge will focus on artificial intelligence. In the domain of artificial intelligence external knowledge will be integrated from the University of Bologna and Bi-rex from Emilia Romagna.

Regional Digitalization Program – elaborated by PBN – creates the strategic framework of the implementation. It includes actions related to setting up a new competence center, focusing on AI. Thematic orientation is on one hand manufacturing, but increasingly on healthcare. The long run mission is the establish an institute, which will serve as a knowledge background institution for the new economy.

Activities implemented

It has been seen on many international (mostly online) study visits, we have seen many good practices from the well-developed regions of Western-Europe. PBN is a project partner in the INTENCIVE Interreg Europe program, which made it available to learn from Finnish partners and have their feedback as well.

IGA members are involved in the pilot project as local policy makers like Szombathely City and Vas County are officially part of this initiatives and University level will be also involved in order to transfer knowledge to local citizens, too.

PBN could successfully involve local actors, such as Pálos Károly Social Service Center and local doctors in order to develop a room, which is fitting to the current trends and needs of the complex target group. Online



CHAIN REACTIONS

questionnaires were advertised, which led us to involve 174 senior persons and their relatives as well.

PBN held National multiplier conferences in February 2022, where we could successfully present the Chain Reactions project and our pilot actions to big companies, such as Nestlé Hungary, Vodafone, FALCO Wood industry, MAM Hungary and other huge multinational companies. They were very interested and we hope to continue our development with them in the near future.

The opening ceremony of the Smart Senior Test room successfully involved 238 participants, from different fields of the target groups: we had universities to visit us, the municipality of Szombathely (the mayor of Szombathely held a welcome speech as well), and the local high schools, local companies also seemed interested in the smart senior room development and also in future cooperation regarding the health and digitalization sectoral trends.

Transnational cooperation was also successfully involved, as we had expertise duo partners, such as GAPR,CCIA Padova (both in health sector) and RDA Pilsen (in advanced manufacturing). On the transnational innovation and transnational industrial workshops, we actively worked on the future cooperation and future projects together in the mentioned sectors.

Key results





Transnational pilot - Advanced Manufacturing, RDA Pilsen

Executive summary

The scope of the RDA pilot action was the development of Virtual demonstration centre for flexible manufacturing processes; thus, the priority sector was naturally the advanced manufacturing. The main idea behind this virtual democentre was to create a showcase platform with examples of good practices and technology implementation, which would motivate the companies toward digitisation activities.

The main objectives of the pilot action were to ensure access for small and medium-sized enterprises to information on new technologies, to assist companies in dealing with the coronavirus crisis with the aid of new technologies and finally to fulfil the planned activities of the regional RIS3 strategy.

Specific project partners who have the relevant knowledge for optimal operation of such type of activities according to their experience in similar type of infrastructure in science and technology parks, hubs etc. have been selected for assistance in this pilot. The PBN partner was involved as an evaluating partner but also their experience with running the am-Lab DIH was crucial. The WTP and R-Tech were the other partners that brought relevant information and examples to be used as examples to demonstrate best practice of adoption of new digital technologies. On the regional level, the IGA partners have been involved, especially the University of West Bohemia, Mechatronics cluster and COMTES research centre.

The selected partners also aided with the development of knowledge portfolio, which resulted in educational platform (for several specific technologies like 3D printing, collaborative robotics or virtual reality). New



technology trends were presented in friendly and in interactive form of education. The PR and promotion of the outputs were disseminated by means of several workshops or seminars.

Activities implemented

The main activity was the development of a new virtual demonstrator. The final version of the demonstrator was placed on the webpage of the regional digital innovation hub called DIH HIVE (<https://www.dih-hive.cz/en/virtual-democenter/>). The originally intended technological sections (Virtual prototyping, Additive technologies, Robotics and automation, Virtual and augmented reality) have been extended by Objects digitisation and Digital twin sections. During the pilot phase more demonstrators have been collected with big contribution from the project partners and put online. Beside the demonstrators, we also focused on the preparation of educational materials. The materials for additive manufacturing, collaborative robotics, VR and AR and 3D scanning have been prepared and are already in downloadable pdf form presented on the VDC.

Our pilot course focused also on different innovation methods. A new course curriculum was developed within the pilot where several innovation methods from the innovation toolbox document were used. The course was structured to 7 lectures, each dedicated to specific topic/innovation method, plus 2 more sessions for presentation of students' innovation projects. Online collaboration on the projects was performed with the aid of Miro online collaboration tool. After the course, feedback regarding the course structure and benefits was collected.

Key results

The key results achieved within the pilot activity involve above mentioned working platform available on <https://www.dih-hive.cz/en/virtual-democenter/>. This platform motivated the IGA members and other partner within the region establish consortium DIH HIVE in October 2021 and focus better its activities related to services for SMEs to support their digital transformation. At the same time educational materials for additive manufacturing, collaborative robotics, VR and AR and 3D scanning were processed to enrich the portfolio of training methods for training of companies' staff withing the University of West Bohemia. Piloted course focused on innovation methods was developed as well.

We must say, that the virtual demonstration centre platform was quite well accepted among relevant stakeholders (companies and public agencies). Thus, we are planning to develop this platform further in the future by adding new showcases. As this activity goes hand in hand with our second innovation action, which is the development of our digital innovation hub (DIH) the new activities are close.



Virtual democenter

The creation of this **Virtual Demonstration Centre** was initialised within the CHAIN REACTIONS project from the Interreg Central Europe project which aims to increase the innovation capacity of industrial companies. The main idea is to absorb new knowledge and turn it into competitive edge and business value, growth and profits. The project focuses on a few key sectors based on their embedding in regional smart specialisation strategies. The Regional Development Agency of Pilsen region is responsible for Advanced manufacturing sector. In this sector we are realising together with other partners the **Virtual Demonstration Centre** pilot activity, which is a place where innovative technologies or methods are displayed, with the aim to enable potential users (e.g. SMEs) to get familiar with them and evaluate a potential implementation in their productions. The content of the virtual democenter is divided into several technological sections, which are: **Additive technologies, Automation and robotisation, Objects digitisation, Digital twins, Virtual and augmented reality and Virtual prototyping.**

Všechny →

Virtual prototyping (1) →

Virtual and augmented reality (3) →

Object digitisation (3) →

Digital twin (2) →

Automation and robotisation (4) →

Additive technology (3) →



Digital twin in your pocket

Digital twin

Twino is an exact 3D Live Digital Twin of your facility. Whether your home, office, factory or even a whole city. It enables you to have your 3D model on your smartphone, tablet, PC or MAC and gives you access...



Digitisation of hospital complex

Digital twin **Object digitisation**

The main goal of this project was to create a digital twin of a 25ha hospital complex in Prešov, Slovakia. The photogrammetry technique was used for the digitisation. Photogrammetry is a method of creating a 3D model from 2D photographs....



Digitisation of archaeological dig site

Object digitisation

Virtual and augmented reality

The main goal of this project was a digitisation of archaeological dig site in order to capture and preserve the discovery. Many of the archaeological excavations that are discovered in the field survey cannot be protected from destruction by other...