

WP T3

D.T3.2.9

Joint implementation report for the pilot in the bioeconomy sector

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Authors:	PP7 – Wrocław Technology Park PP9 – Bioeconomy Cluster
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1 EXECUTIVE SUMMARY

1.1. PP7 Wroclaw Technology Park

The pilot action of WTP was focused on the creation of a platform in the form of a show room of constant dialogue between companies in the food industry including dairy processing and entities offering advanced technological solutions. The platform was designed to identify entities in the food industry as a part of the bioeconomy that are looking for innovative solutions in Industry 4.0 and the digitization of production, management and sales processes. In addition, the platform identified and presented technological solutions that meet the needs of the food industry. The idea of the pilot action was to initiate a dialogue of food industry companies of various sizes with representatives of technology business and science in order to jointly search for appropriate innovative solutions.

WTP is a member of the consortium creating the Digital Innovation Hub in Wroclaw. The purpose of DIH is to conduct educational, demonstration, consulting and implementation activities in the field of digital Industry 4.0 solutions for businesses of any size. WTP created synergies between the activities of DIH Wroclaw and the pilot action.

Operation of the pilot will fit into the smart specialization strategy of the Lower Silesia region. One of the key smart specializations of the region is high quality food. It includes activities to improve food quality, support organic production, R&D for food production and transfer of digital technologies for the industry.

The platform will also function after the end of the project. WTP will take measures to make the platform active, attractive to users and presenting practical, up-to-date solutions.

Throughout the implementation of its pilot, WTP involved the following actors:

- PP9 BEC: Value chain analysis in the dairy and food industries, identification of potential partners for pilot action, evaluation of the pilot.
- PP6 BWCON: Training, consulting and implementation of tools for analysing value chains and business models.
- Local partners - IGA members (Wroclaw Agglomeration Development Agency - Public owned agency, Wroclaw Centre for Technology Transfer - Science, Lower Silesian Chamber of Commerce - Business association, Wroclaw Technology Park - Public owned company, members of DIH Wroclaw consortium): mapping and involving SMEs, start-ups and mature companies, science, experts, the public sector and NGOs in the pilot activities (e. g. Balluff Company).
- Other stakeholders: Endress and Hauser, Solid Solutions (technology providers); NUTRIBIOMED cluster (currently, the cluster has over 100 companies and institutions, of which over 70 are SMEs. The coordinator-track of the Cluster is the Wroclaw Technology Park).

During the pilot implementation, WTP organized 3 hybrid meetings with members of the NUTRIBIOMED cluster, during which representatives of technology companies presented solutions for the food industry and agencies and created preconditions for the support of the implementation of digital technologies and Industry 4.0. Training on the ecosystem, models and methodology (ADMA) of the implementation of Industry 4.0 technologies and digital solutions was conducted by a representative of the Future Industry Platform Foundation - a government agency established to coordinate the implementation of digital transformation in Poland.

WTP organized series of study visits, including online webinars. The guest and co-organizer of the ventures was Balluff, a member of the DIH Wroclaw consortium. As part of the training, participants



learned about the practical production possibilities of Industry 4.0 technology. The presentations and webinars were conducted in a virtual and real production line demonstrator - Smart Factory at the headquarters of Balluff sp.z o.o. in Wrocław. In addition, during meetings with representatives of Endress + Hauser, technologies and solutions in the field of Advanced manufacturing, IIoT and Cloud Computing were presented.

As part of the Internet platform, on the website of the NUTRIBIOMED Cluster - <https://www.nutribio-med.pl/projekty/dzialania-pilotazowe-pilot-action/>, a projects tab was created, where reports from the events of Chain Reactions and examples of digital technologies and Industry 4.0 can be found. These are intended for the food industry.

Moreover, WTP supported international cooperation by participating in the pilot project of PP5 RDA. WTP's goal was to identify companies in Poland, that would like to show individual projects but with strong focus on the real problem and also solution and publish these solutions on virtual demonstration centre. WTP identified several companies from which two companies were selected (Balluff and Pagero) and published on the partner's website (<https://pilsen-dih.org/index.php#chain>).

1.2. PP9 Bioeconomy Cluster

The second pilot activity within bioeconomy sector implemented by the Bioeconomy Cluster in the framework of CHAIN REACTIONS project was aimed at setting up of a virtual innovation observatory, which will provide innovation support services to SMEs in agri-food and bio-based sectors through a multi-partner cooperation. In this respect, BEC managed to conduct several innovation audits of Slovak SMEs and mapped their needs in terms of innovations, which will help to provide tailored advisory services. To further support the uptake of innovations, BEC's pilot grant scheme was launched and will support the implementation of innovative ideas of selected SMEs. Another priority within the pilot was given to creating cross-sectoral synergies between bioeconomy and digitalization. In this respect, on-line and on-site study visits were organized to selected partners to learn about their digital business models and running of DIHs, as BEC is in the phase of establishing a DIH in agri-food in Slovakia.

During the implementation of its pilot, BEC established cooperation mainly with the following partners / groups of stakeholders:

- SMEs from the region – SMEs acting in the agri-food and bio-based sectors, who are innovative and are aiming for better management of innovation processes, which might be linked also to the adoption of new/revised business models.
- IGA members – these involve universities and research centres, who are equipped with necessary infrastructure and resources to support the innovation processes, as well as digital transition of agri-food SMEs.
- Other Chain Reactions' project partners – partners active in digitalization, who have good knowledge on running Digital Innovation Hubs and providing digitalization services to SMEs and other interested entities. Cooperation established in the framework of this pilot has resulted in strengthening transnational collaboration and cross-sectoral links between bioeconomy and digitalization.

As a follow-up of this pilot, BEC is planning to continue in the implementation of a grant scheme as well as in the identification of the needs of SMEs in the agri-food and bio-based sectors. In this respect, innovation audit tool will be used as a main instrument to discover the challenges SMEs are facing in terms of innovation processes. Based on this, BEC will provide tailored innovation support services to



regional SMEs. Moreover, BEC will dedicate efforts to the establishment of DIH in agri-food in Slovakia, which will be linked to further activities of BEC.

In addition, the cooperation between duo partners was very positive. From the beginning of the pilot action, both partners had many two-way talks. Additionally, on 30th November 2021 partners organized mutual event, where "Innovative solutions for the industry and agriculture" were presented, based on SmartFactory (Balluff company). Moreover, WTP supports Bioeconomy Cluster in the process of designing of DIH in cooperation at EDIH Wroclaw.



2 REPORT ON ACTIVITIES IMPLEMENTED

Table 1.1: Activities performed – PP7 WTP

Nr	Date	Location ¹	Type of activity ²	Target group involvement*						
				LRPA	SA	HE&R	SME	BSO	IGA	Other PP
1	28.09.2020	Wroclaw Poland	Value Chain analysis workshop and IGA meeting	-	-	-	1	-	2	-
2	02.10.2020 23.10.2020	Online	Entrepreneurial Discovery Process for the Healthy food and environment as well as 4.0 Industry	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	02.11.2020	Online	Training on business models	-	-	-	-	-	-	1
4	10.12.2020	Online	Participation in the training: Industry 4.0 for business, within Project Digital Innovation HUB	1	-	1	6	-	-	1
5	21.01.2021 19.03.2021	Online	Bilateral meeting with Balluff company, readiness to participate in meetings with SMEs from the dairy industry, during which 4.0 solutions will be presented using tools developed under Chain Reactions.	-	-	-	1	-	-	-
6	18.02.2021	Online	Training on business models	-	-	-	-	-	-	1
7	03.03.2021	Wroclaw Poland	Bilateral meeting with partner of project DIH (Digital Innovation HUB) about synergy.	-	-	1	-	-	-	-
8	11.03.2021	Online	Participation in the training "Industrial RFID systems" as part of Industry 4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	07.04.2021	Online	Industrial innovation workshop for the bio-economy in the region of Dolnośląskie, Poland. WPT4 D.T4.1.17	2	-	-	2	-	2	-

¹ City, country / online

² Type of activity: workshop, conference, training, bilateral meeting, other (please, name the activity)



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10	28.04.2021	Online	Transnational industrial innovation roadmap WS for the bioeconomy sector. Workshop WPT4, D.T4.1.6	-	-	-	1	-	3	-
11	12.05.2021	Online	Participation in "Industry 4.0 Information Meeting" organized by PARP	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	14.05.2021	Online	Meeting with the Wrocław Agglomeration Development Agency S.A. (IGA) as part of pilot action implementation.	-	-	-	-	-	1	-
13	19.05.2021	Online	Participation in "How to support food production in the era of Industry 4.0 challenges?"	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	19.05.2021	Wrocław Poland	Meeting with Wrocław Technology Transfer Centre (IGA members)	-	-	-	-	-	1	-
15	07.06.2021	Online	Meeting with Coventry University	-	-	1	-	-	-	-
16	09.06.2021	Wrocław Poland/ online	NUTRIBIOMED Cluster meeting. (Balluff presentation "Industry 4.0 in the food sector")	-	-	6	20	-	-	-
17	15.09.2021	Wrocław, Poland/ online	NUTRIBIOMED Cluster meeting. Industry 4.0 solutions and the digitization of enterprises was presented by representative of the Fundacja Platforma Przemysłu Przyszłości.	-	-	6	25	2	1	-
18	17.09.2021	Wrocław, Poland	Visit at demonstration line (Smart Factory) was organized. The SmartFactory visit was dedicated to entities from the food technology sector.	-	-	4	1	6	-	1
19	24.09.2021	Online	Online visit at demonstration line (SmartFactory) was organized.	-	-	1	2	1	-	-
20	22-23.10.2021	Puławy, Poland	Cluster workshops – Industry 4.0 - „Metody i narzędzia	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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			podnoszenia konkurencyjności polskich klastrów,, was organized by Fundacja Platforma Przemysłu Przyszłości							
21	21.10.2021	Online	Industry 4.0 - trends - challenges - perspectives. Conference organized by AHK Polish - German Chamber of Commerce and Industry	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22	06.12.2021	Online	NUTRIBIOMED Cluster meeting. Workshop – „Przemysł 4.0 i technologie cyfrowe – praktyczne zastosowanie w branży LifeScience” was organized.	-	-	6	20	-	-	-
23	26.11.2021	Wroclaw, Poland	WTP's partnership in „Consortium 4.0” in subject of digital transformation – Transnational innovation agenda workshop 1.	-	-	1	-	2	1	-
24	28.10.2021	Wroclaw, Poland	WTP representatives participated in Industry conference – Nowy wymiar sprzedaży – Marketing 4.0 i modele biznesowe dla branży rolno (Dolnośląska Zielona Dolina Sp. z o.o. was organizer)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
25	30.11.2021	Online	Transnational innovation agenda workshop no. 2 was organized	-	1	2	7	-	-	1
26	08.12.2021	Online	WTP representatives participated in training – „Zarządzanie 4.0: Jak transferować biznes?” organized by Fundacja Platforma Przemysłu Przyszłości	N/A	N/A	N/A	N/A	N/A	N/A	N/A
27	08.12.2021	Online	WTP representatives participated in training – „Technologie 4.0: Jak organizować procesy?” organized by Fundacja	N/A	N/A	N/A	N/A	N/A	N/A	N/A



			Platforma Przemysłu Przyszłości							
28	09.12.2021	Online	WTP representatives participated in training – „Proces transformacji cyfrowej przedsiębiorstwa.” organized by Fundacja Platforma Przemysłu Przyszłości.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 1.2: Activities performed – PP9 BEC

Nr	Date	Location	Type of activity	Target group involvement*						
				LRPA	SA	HE&R	SME	BSO	IGA	Other PP
1	28.09.2020	Nitra, Slovakia	Value chain analysis workshop and IGA meeting	1	-	1	1	-	-	-
2	02.10.2020 23.10.2020	Online	Entrepreneurial Discovery Process for the RIS3 domain Healthy food and environment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	02.11.2020	Online	Training on business models	-	-	-	-	-	-	1
4	04.11.2020	Online	BEC annual meeting	2	1	4	11	-	3/18	-
5	03. – 04.03.2021	Online	Design Thinking workshop	-	-	-	-	-	-	1
6	05.03.2021	Online	Bilateral discussion with duo partner WTP	-	-	-	-	-	-	1
7	07.04.2021	Online	Online meeting with Funding Box to discuss the voucher scheme	-	-	-	-	1	-	-
8	22.04.2021	Online	Bilateral discussion with duo partner WTP	-	-	-	-	-	-	1
9	04.05.2021	Nitra, Slovakia	Meeting with IGA for Nitra region	1	-	3	-	1	5/5	-
10	24.06.2021	Online	Bilateral discussion with duo partner WTP	-	-	-	-	-	-	1
11	24. – 25.06.2021	Szombathely, Hungary	Study visit to PBN	-	-	-	-	-	-	1
12	19.10.2021	Online	Meeting with representatives of STP to prepare knowledge exchange workshop	-	-	-	-	-	-	1



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13	5.11.2021	Online	Mentoring session on business models' innovations	-	-	-	-	-	-	-
14	18.11.2021	Online	Knowledge exchange workshop with STP	-	-	-	-	-	-	1
15	30.11.2021	Online	Transnational innovation agenda workshop no. 2	-	1	1	7	-	2/10	1
16	January 2021 – December 2021	Various locations in Slovakia	Innovation audits of Slovak companies: Hornonitrianske bane MAX Sport Emilove Sady Reconvel M-HOUSE TARUN Farma Babindol Biomila Pierre Baguette SLOV - ITAL	-	-	-	10	-	-	-

*** Target group involvement – number of involved:**

LRPA – Local / regional public authority

SA – Sectoral agency

HE&R – Higher education and research

SME – Small and medium sized enterprises

BSO – Business support organisation

IGA – Innovation and Growth Alliance

Other PP – other project partners

Project partner implementing the pilot	PP7 – Wrocław Technology Park
CHAIN REACTIONS' sector	Bioeconomy
Description of pilot work plan	<p>The pilot action was focused on the creation of a platform in the form of a show room of constant dialogue between companies in the food processing industry and entities offering advanced technological solutions.</p> <p>The platform was designed to identify entities in the food industry that are looking for innovative solutions in Industry 4.0 and the digitization of production, management and sales processes. The idea of the pilot action was to initiate a dialogue of food industry companies of various sizes with representatives of technology business and science in order to jointly search for appropriate innovative solutions.</p> <p>The dialogue platform will be continued by presenting Industry 4.0 solutions at meetings of the NUTRIBIOMED cluster members (where there are over 100 entities from the food industry).</p> <p>WTP is a member of the consortium creating the Digital Innovation Hub in Wrocław. Thus, WTP created synergies between the activities of DIH Wrocław and the pilot action.</p>
Detailed description of activities performed	<p>1. Activities from 09.2020 to 12.2020</p> <p>In September several meetings were organized concerning the establishment of IGA. Also, WTP organized several bilateral discussions with partners from the region, especially with those grouped within DIH project.</p> <p>At this stage, WTP involved the following local partners: IGA members and the members of DIH Wrocław consortium. Mapping and involving SMEs, start-ups and mature companies, science, experts, the public sector and NGOs in the pilot's activities were organized to discuss innovation needs in agri-food/dairy sector.</p> <p>WTP also managed to organize IGA meeting as part of WP3. The purpose of the meeting was to familiarize IGA partners with the assumptions and activities planned to be implemented as part of the pilot action. The partners confirmed their interest in active participation in the pilot's activities. The discussion concerned the possibility of reaching potential target groups of services offered as part of the pilot as well as the tools developed in the Chain Reactions project as widely as possible.</p> <p>The participants of the meeting recommended contacting the newly established institution by the Polish government: Platform Industry of the Future. The platform's task is to promote digital technologies and their implementation in business.</p>

2. Activities from 01.21 to 07.21

During a 6-month period of realizing the pilot program Wrocław Technology Park made contact with potential partners. The companies engaged in the pilot program, Balluff & Solid Solution, have provided knowledge and support in terms of innovation tools.

WTP organised a meeting with regional IGA members to inform them about concrete activities within the pilot and expected results. The meeting took place on 07.04.2021. The partners confirmed their interest in active participation in the pilot's activities. IGA members took part in the WP4 workshop.

In addition, WTP formed a closer contact with Wrocław Agglomeration Development Agency S.A. The aim of the meeting was to find the possibility of reaching the potential target groups of the services offered under the pilot program developed in the Chain Reactions project as widely as possible. As a result of the talks, a presentation on the Chain Reactions project and the possibilities offered by the implementation of modern solutions was sent to local government officials. The result of these activities was the response of companies focused on cooperation.

In order to increase the level of synergy, WTP participated in several meetings with partners of the project "Level 4.0 Digital Innovation Hub Wrocław".

WTP participated in the training:

- "Industrial RFID systems" as part of Industry 4.0,
- "How to support food production in the era of Industry 4.0 challenges?",
- "Industry 4.0 Information Meeting" organized by PARP (Polish Agency for Entrepreneurship Development).

On June 9, 2021, the NUTRIBIOMED cluster meeting was held, during which the Chain Reactions project was presented to the cluster members. During the meeting, a show room for NUTRIBIOMED cluster members was created with innovative solutions in the Industry 4.0 field dedicated to the food industries. Balluff's presenter, cooperating in realization of the pilot program, presented the opportunities provided by Industry 4.0 in the food industry, using the dairy industry as an example. The lecturer pointed out that the situation in the food industry is dynamically changing. Producers must react to market trends more quickly and effectively than ever before. Often diet changes, trends for healthy food and globalized food chains must all be taken into account. As a result of the constant changes and pressure, the industry needs more modern production lines and elastic procedures of the global situation related to the COVID19 pandemic has caused a series of issues with production continuity. This is currently one of the main challenges of the food industry. The Balluff's lecturer presented a demo production line, which pictures the usage of Industry 4.0 under realistic conditions.



3. Activities from 07.21 to 09.21

Visits to SmartFactory were focused on raising awareness on Industry 4.0 solutions. Demonstration production line (SmartFactory) is a result of the Digital Innovation Hub Wrocław project (where WTP is one of the partners). The SmartFactory presents possibilities of manufacturing products in the shortest time, taking into account the maximum value of OEE and zero downtime. The line is equipped with technologies such as RFID, Machine Vision, IIoT and Machine Learning. On September 17, a stationary visit to SmartFactory took place. An online visit took place a week later (24.09.2021). The model line SmartFactory presents in a practical way the mechanism and possibilities of Industry 4.0 solutions. It is a completely new dimension of experiencing technology. Its goal is to achieve the shortest production of finished products while maintaining the highest OEE value. Smart Factory presents the following technologies:

- Machine Learning - ensures that devices are maintained by sending data to a strategic unit, which analyzes them using appropriate algorithms. Automatically reported data, which would indicate the occurrence of a potential failure, allow for an early response and the chance to avoid a crisis situation.
- Machine Vision - vision systems that enable computer image analysis of various physical properties of the tested object, e. g. the assessment of dimensions, color or its geometry. Their aim is to support the production process, ensuring that it goes smoothly.
- RFID systems - help in the flow of information in a modern enterprise. They allow to automatically identify and track objects on which an RFID data carrier is placed.
- Balluff Condition Monitoring (BCM) - a technology that enables early detection of changes or anomalies. Thanks to this, you can easily control the quality of work, avoid breakdowns and crisis situations, and thus increase the efficiency of the production line. The BCM sensor used in the Smart Factory collects data and analyzes the following parameters: vibration level in three axes, contact temperature measurement, and additionally, one version of the sensor allows the measurement of ambient pressure and relative humidity.

On 15th September a meeting of the NUTRIBIOMED cluster took place. As part of the pilot action, during the meeting of the cluster members, a representative of the foundation Platforma Przemysłu Przyszłości presented the benefits of implementing Industry 4.0 solutions and the digitization of enterprises. At the next meeting of the NUTRIBIOMED cluster, which took place on December 5, as part of the pilot action, the following topic was presented: "Industry 4.0 and digital technologies - practical applications in the Life Science industry." The speaker was Endress + Hauser Polska.



	<p>4. Activities from 09.21 to 01.22</p> <p>In this period, WTP participated in series of conferences devoted to digital transformation devoted to food industry companies, and it also took part in a two-day training course organized by the Future Industry Platform Foundation (a government agency dealing with the coordination of the digital transformation process in Poland) on the use of digital technologies for more effective cluster management. WTP used this knowledge during the cooperation and involvement of the NUTRIBIO-MED cluster in the implementation of the pilot action.</p> <p>On 6.12.2021, there was a meeting of the NUTRIBIOMED cluster Council, where the representatives of WTP participated in. During the meeting, a representative of Endress and Hauser presented the possibilities resulting from the implementation of Cloud Computing and Advance Manufacturing technologies. The meeting was attended by representatives of 26 SMEs, universities and research centres as well as BSO related to the food and Life Science sector.</p>
Use of value chain innovation models and instruments	<p>Wroclaw Technology Park took part in a meeting where business models and the stage of development of the pilot program were discussed. Individual trainings involved passing knowledge regarding models and instruments of innovation in the value chain. The training was led by Alexandra Rudl from BWCON.</p> <p>Additionally, WTP took part in the event entitled "A new dimension of sales - marketing 4.0 and business models for the agri-food industry". The conference took place in Wroclaw, and it was organized by Dolnośląska Zielona Dolina Sp. z o. o. During the event, a workshop was organised on effective business models, e. g. using Business Model Canvas. During the conference, WTP had the opportunity to exchange knowledge on the use of business models and instruments for setting-up innovation value chains.</p>
Involved actors	<p>Repeatedly, WTP met regional IGA members to inform them about concrete activities within the pilot. Additionally, IGA members were involved in "Industrial Innovation workshop for the bioeconomy in the region of Dolnośląskie, Poland (D.T4.1.6), and "Transnational industrial innovation roadmap WS for the bioeconomy sector" (D.T4.1.17), where the support for the implementation of innovations in the bioeconomy sector, in our case the dairy industry was discussed. During the meeting, focus was given on inter-sectoral relationships, i. e. the bioeconomy sector (dairy industry) and the ICT sector, as well as Industry 4.0. IGA members took part in Transnational innovation agenda workshop no 1.</p> <p>To ensure the cross-sector nature of this pilot, WTP engaged NUTRIBIOMED cluster members and partners of Digital Innovation Hub Wroclaw. NUTRIBIOMED cluster members are small, medium and large enterprises and business units as well as universities. In order to in-</p>



	<p>crease the level of synergy, WTP invited cluster members to visit SmartFactory. The demo line at SmartFactory is a result of the Digital Innovation Hub Wroclaw project (in which WTP is a partner).</p> <p>The goal of WTP is to keep life science companies informed about technological innovations related to Industry 4.0. Therefore, during the meetings with members of the NUTRIBIOMED cluster, WTP invited companies that present the latest industrial solutions in the field of 4.0 for the food industry. WTP invited foundation Future Industry Platform to the meeting of the members of the NUTRIBIOMED cluster. The foundation Future Industry Platform is a government program whose task is to build an appropriate environment around Industry 4.0, based on cooperation and trust. The Foundation will cooperate, coordinate and standardize digital innovation centres in Poland (DIH). The company Endress + Hauser Polska was also invited to the meeting of the cluster members, where they presented how to implemented their technology especially IoT and Cloud Computing to the food industry and life science sector. WTP also invited Balluff Sp. z o.o., a partner in the DIH project. Balluff's presenter, cooperating in realization of the pilot program, presented the opportunities provided by Industry 4.0 in the food industry, using the dairy industry as an example.</p> <p>Finally, numerous virtual meetings were organized with duo partner Bioeconomy Cluster. The discussions contributed to the transfer of knowledge related to digital opportunities for the agri-food sector, e. g. Balluff Sp. z o.o. was invited to the meeting of members of the Bioeconomy Cluster, where the Industry 4.0 solutions were presented, based on SmartFactory.</p>
<p>Monitoring of performance indicators</p>	<p>1. Number of study visits and trainings for pilot action partners: Training on business models (02.11.2020), Training on business models (18.02.2021), WTP & Bioeconomy Cluster held a meeting, where Balluff presented SmartFactory (3.11.2021). Target value: 3; Achieved: 3</p> <p>2. Number of webinars, training sessions and presentations carried out on the online platform: 2 workshops on presenting pilot action and the Chain Reactions project (D.T4.1.17, D.t.4.1.6); 3 NUTRIBIOMED cluster meetings and presentations of Industry 4.0 potential in the food industry (09.06.2021, 15.09.2021, 6.12.2021); Visit to the demonstration line (SmartFactory) (17.09.2021); Online visit at demonstration line (SmartFactory) (24.09.2021). Target value: 4; Achieved: 7</p> <p>3. Number of identified food industry entities and technology providers: Identification of industry entities/technology providers within NUTRIBIOMED cluster network (NUTRIBIOMED has more than 100 members). Additionally, WTP identified suppliers of various technologies (Solid Solutions, Balluff, Endress+Hauser Polska, Future Industry Platform). Target value: 8; Achieved: 8</p> <p>4. Number of identified technological solutions for Industry 4.0:</p>



	<p>RFID (RFID systems - help in the flow of information in a modern enterprise. They allow to automatically identify and track objects on which an RFID data carrier is placed);</p> <p>IIoT and Machine Learning (ensures that devices are maintained by sending data to a strategic unit, which analyzes them using appropriate algorithms. Automatically reported data, which would indicate the occurrence of a potential failure, allow for an early response and the chance to avoid a crisis situation;</p> <p>Cloud Computing (a data processing model that is based on the use of the services provided by the service provider).</p> <p>Target value: 3; Achieved: 3</p>
Key results	<ul style="list-style-type: none"> • Training in business models was completed and the acquired knowledge will be passed on to regional stakeholders, • Numerous stakeholders were involved in pilot actions (Solid Solutions, Balluff, Future Industry Platform, Endress and Hauser), • Numerous meetings were organized, to which food industry entities and technology suppliers from Industry 4.0 were invited, • Constant contact with companies that presented their technological solutions for Industry 4.0 was established, e. g.: Balluff, Endress + Hauser Polska, Future Industry Platform, • Permanent and periodic activities in the field of promoting and supporting the implementation of innovations in the field of Industry 4.0 and digital technologies among the members of the NUTRIBIOMED cluster was introduced and coordinated by WTP, • Thanks to participation in the project, WTP employees gained new competences in the promotion and implementation of digital technologies and Industry 4.0, • Enterprises residing in the Wrocław Technology Park had the opportunity to raise their awareness and knowledge related to the benefits and methods of implementing digital technologies and Industry 4.0.
Follow-up	<p>Next meetings with food industry SMEs are planned, e. g. associated with NUTRIBIOMED cluster to present Industry 4.0 and digital technology solutions. WTP will continue cooperation and maintain constant contact with project partners e. g. Bioeconomy Cluster.</p> <p>The experience gained so far resulting from the implementation of the project and the pilot demonstrates the legitimacy of continuing the partnership and cooperation with partners (e. g. BEC) in other digitalization initiatives, for example European Digital Innovation Hub (EDIH). Wrocław Technology Park is a leader of EDIH proposal for Lower Silesia region in Poland.</p>
Delays, problems	<p>The main problem was the coronavirus, which blocked direct contact with stakeholders. Additionally, many companies were overloaded with the amount of free virtual workshops / trainings, which made it difficult to convince people to participate in the meetings organized by WTP.</p>



Project partner implementing the pilot	PP9 – Bioeconomy Cluster
CHAIN REACTIONS' sector	Bioeconomy
Description of pilot work plan	<p>The main objective of pilot activity of BEC is to set up a virtual innovation observatory, which will provide innovation support services to target groups in bioeconomy through a multi-partner cooperation. Innovations were introduced to adopt new efficient business models and to avoid value chain disruptions in the agri-food sector. The specific sub-objectives are: (i) to identify the needs of agri-food (dairy) sector and particular SMEs in respect to innovative business practices, (ii) to stimulate the exchange of knowledge between project partners and between SMEs and R&D actors, (iii) to turn new ideas into practice by using the models and tools developed within CHAIN REACTIONS.</p> <p>To ensure transnational and cross-sectoral character of its pilot, BEC involved other project partners in concrete work plan activities. The aim was to exchange information on practical application of innovative business models in other regions and to identify future collaboration opportunities.</p> <p>The activities of this pilot include: (i) training on business models, (ii) organization of two study visits to project partners (physical or online), (iii) identification of SMEs' needs via innovation audits, (iv) testing of business models through preparation of joint projects, (v) creation of voucher scheme to support the uptake of innovations.</p> <p>During the implementation of pilot, stronger emphasis was placed to the digital transition and to the establishment of Digital Innovation Hub in agri-food sector in the Nitra region. In this respect, several activities were implemented, aimed at transfer of knowledge on the successful operation of DIHs in other partner countries.</p>
Detailed description of activities performed	<p>The activities implemented within the pilot of BEC in the period from September 2020 until December 2021 include:</p> <p>Activity 1: Training on business models</p> <p>To deepen the knowledge on value chain innovation processes, representatives of BEC participated in individual training on models and instruments for business models and value chain innovations. It was organized online with expert from the University of Pforzheim in Germany and BWCON facilitated this training. Originally, it was planned to organize the training as a physical meeting in Germany. However, due to coronavirus pandemic, it was organized online, involving two representatives of BEC.</p> <p>Following the training, BEC studied the materials provided by the trainer and briefly presented the approach to its members and other partners during the annual meeting on 4th November 2020. The aim was to transfer the knowledge on models and instruments gained throughout the implementation of Chain Reactions project to stake-</p>



holders at regional/national level and to support the innovation ecosystem in bioeconomy, which is still a new topic to many stakeholders and companies in Slovakia.

In addition, BEC took part in a mentoring session organized in close cooperation with BWCON, where the participants (employees of BEC) were trained on the business models' innovations and different methods and tools in this respect. It was organized on 05.11.2021 and 5 employees of BEC participated in this mentoring.

Activity 2: Organisation of study visits

On 24th and 25th June 2021, BEC organized an on-site study visit to Hungary, where the representatives of BEC learned about digital business models implemented by project partner PBN and about future possibilities of cooperation on projects, DIH, etc. Representatives of BEC visited the premises of PBN and its am-LAB, which is a DIH and a specialized facility focused on digitalization support.

In addition, multiple meetings have been organized with duo partner WTP to discuss the organization of workshops within WP T4, which constituted an important input also for the pilot activity of BEC, as these workshops served to formulate the proposed actions for the future development of bioeconomy.

Organization of transnational knowledge exchange workshop with the representatives of STP was another activity strengthening transnational and cross-sectoral collaboration. The aim was to discuss the setting up of STP's DIH Smart Solutions, their positioning, offer of services, practical lessons learned and suggestions for the potential future DIH in agri-food in Slovakia, which is to be established by BEC in cooperation with other regional partners (including some of the IGA members). The workshop was organized as online event on 18th November 2021.

In addition, within Transnational innovation agenda workshop no. 2 organized on 30.11.2021 together with WTP, BEC and its members had the opportunity to discuss with DIH from Wroclaw "Level4.0" their experience from running a DIH. Potential cooperation opportunities were explored within the workshop as well.

Activity 3: Identification of needs

As part of the process of identification of relevant SMEs and their needs, BEC mapped the regional environment for the potential synergies at strategical and decision-making level. In this respect, BEC participated in the Entrepreneurial Discovery Process for the RIS3 update in the domain "Healthy food and environment" organized by the Ministry of Investments, Regional Development and Informatisation of the Slovak Republic. During the discussions, BEC collected several project ideas from SMEs and other actors and identified needs of the agri-food sector in respect to uptake of innovations. Synergies of the pilot with the regional smart specialisation is essential to enhance the competitiveness of SMEs and the transition to the new models of production.



One of these models for agri-food companies is represented by bioeconomy since it can be used as new approach in production, distribution, marketing, consumption, etc. Bioeconomy is integrated also in the priority areas of the Healthy food domain in Slovak RIS3. Another possibility is linked to the application of digitisation and smart solutions in agri-food/dairy industry. Bioeconomy and digitisation are the two main approaches considered in this pilot.

In addition, the innovation needs of Slovak SMEs were identified in the course of 10 innovation audits, which were conducted within the pilot. Following this in-depth analysis of innovation management knowledge and skills, BEC will be able to provide tailored advisory services to farmers through certified advisors in the near future, as well as to broaden its portfolio of members and partners in different bio-based sectors. In addition, this activity contributes to the involvement of primary producers into the creation of added-value through bioeconomy.

Activity 4: Testing of business models

BEC supported farmers in submitting proposals for the establishment of operational groups within the European Innovation Partnership in Agricultural Productivity and Sustainability (EIP-AGRI). The proposals are focused on digital aspects in production as well as on exploiting the potential of bioeconomy in traditional sectors of production, while producing products with higher added value.

Although the proposals were submitted in the first half of 2021, BEC is still waiting for the approval of submitted applications of operational groups within Slovak RDP. If the operational groups will be approved, the proposed innovations will be tested under real conditions and will contribute to the adoption of new business-models by farmers (linking agri-food/bioeconomy with digitalization).

Activity 5: Creation of mini voucher scheme

As part of continuous efforts of BEC in supporting innovations in agri-food and bioeconomy, BEC launched its pilot grant call focused on innovative solutions in bioeconomy and cooperation of SMEs with R&D and academia. It was launched on 15.10.2021 with the deadline of 15.11.2021. BEC received 22 applications from different stakeholders and bio-based sectors. The selection of “winners” and subsequent implementation of successful projects will go beyond the implementation of Chain Reactions as this is a cross-cutting activity within other projects of BEC. However, this activity contributed to the extension of portfolio of activities and services of BEC and BEC will search for further resources that could be used to finance similar efforts.

All these activities have resulted in the creation of virtual innovation observatory, which will provide innovation support services to target groups through a multi-partner cooperation and will support the adop-

	<p>tion of new efficient business models and strategies. It will be an integral part of future DIH in agri-food in Slovakia, thus providing services also in the area of digital transformation of SMEs.</p>
Use of value chain innovation models and instruments	<p>The key instruments that were used are innovation audits. These use the compiled methodology from different international projects and thus, BEC has its own structure and form of innovation audit, which will be used also in its future communication with new partners and potential members. The methodology used by BEC was provided also to other partners and interested stakeholders as part of the inventory of existing approaches to support value chain innovation that was developed within the project.</p> <p>Other tools and methods that were studied and used within Chain Reactions are design thinking method, business model canvas, business model patterns. Representatives of BEC were trained on the use of these methods during the mentoring and training sessions organized within the project and will incorporate them into its day-to-day operations and working with members and partners.</p>
Involved actors	<p>In total, BEC involved 4 project partners to the implementation of its pilot, which is fully in line with pilot work plan. The interactions with these partners were ensured either via the organization of online events or through physical meetings. The discussions contributed to the transfer of knowledge on innovative (digital) business models (PBN, STP), on the methods and tools for value chain innovations (BWCON), as well as on possible digital solutions for the agri-food and bio-based industries (WTP).</p> <p>Moreover, BEC involved regional SMEs mainly through: events organized within the pilot, innovation audits, its own grant scheme, in which SMEs from bio-based sectors were eligible applicants. Overall, more than 30 SMEs were involved through these activities.</p> <p>IGA members were also involved, as they will act as partners in the future DIH in agri-food in Slovakia. They were involved in online meetings and BEC is continuously discussing with them the cooperation opportunities within already running activities (National platform AgroBio-Food Nitra, EIT Food Hub), within future Horizon Europe projects, etc.</p>
Monitoring of performance indicators	<p>The following section describes the performance indicators set within the pilot work plan and the level of their fulfilment:</p> <ul style="list-style-type: none"> ▪ Number of exchanges with relevant project partners – this includes online training facilitated by BWCON on models and instruments for value chain innovations (02.11.2020); on-site study visit to PBN and its am-LAB (24.06.2021); online knowledge exchange workshop with STP on the functioning of their DIH (18.11.2021); online transnational innovation agenda workshop with representatives of duo partner WTP and DIH Wroclaw (30.11.2021) <p>Target value: 3; Achieved: 4</p>

	<ul style="list-style-type: none"> ▪ Number of innovation audits conducted – innovation audits of Slovak agri-food SMEs were conducted to identify the innovation needs, challenges and strengths in the area of innovation. Target value: 2; Achieved: 10 ▪ Pilot testing of business models – two proposals for EIP-AGRI operational groups have been prepared and submitted within a call launched by the Ministry of Agriculture. The evaluation results are not yet available, but the implementation of ideas has already started. Target value: 2; Achieved: 2 ▪ Number of tools developed – own mini grant scheme to support innovations in bioeconomy was developed and launched. Target value: 1; Achieved: 1 <p>As it can be seen, all performance indicators were fulfilled and some were even exceeded. BEC is planning to continue in some of the above activities and thus, it is expected that even better results will be achieved.</p>
Key results	<p>The key results and impacts of this pilot activity include:</p> <ul style="list-style-type: none"> ▪ Fostering of transnational cooperation and exchange of knowledge, ▪ Improving the knowledge on the innovation environment in the region, ▪ Supporting the innovation actors in the region, ▪ Taking the first steps towards the establishment of DIH in agri-food in Slovakia. <p>The main impacts on BEC can be seen in strengthening its capacity in working with SMEs and in responding to their needs as well as in enhancing transnational cooperation with partners with the same sectoral focus. The cross-sectoral linkages created within the project opened further cooperation opportunities with partners, who are not directly focused on bioeconomy.</p>
Follow-up	<p>All of the activities within BEC's pilot were planned in a way to be sustainable since they represent the developments BEC would like to achieve in a medium- to long-term.</p> <p>BEC will continue performing innovation audits as it was adopted as the main method to assess the innovation capacity of potential new members and partners as well as to assess their expertise in different areas, also in respect to their contribution to cluster's activities.</p> <p>BEC will also maintain contact with international partners for the preparation of future projects focused on agri-food, bioeconomy and potentially also on digitalization. The continuous exchange of knowledge and information is envisaged whenever needed by these partners, as this will be rooted also in the memorandum of agreement signed within WP T4.</p>

	<p>The pilot grant scheme has not yet been finalized and the selected projects will be implemented in the period after the Chain Reactions lifetime. Therefore, BEC will continue in the implementation of this scheme and if other financial sources will be identified in the future, BEC is planning to integrate this scheme into the future activities of virtual innovation observatory as well as DIH.</p>
Delays, problems	<p>No significant delays or problems were encountered during the implementation of the pilot.</p> <p>In general, the implementation of pilot was running smoothly. Only the events and meetings had to be moved to online space since the pandemic measures were still in place and travelling abroad was not recommended. For the type of activities that were implemented within BEC's pilot, this was not a problem, although the communication is always more fruitful and brings more tangible results when meeting physically.</p>



3 CONCLUSIONS AND LESSONS LEARNED

During the implementation of the pilot on bioeconomy, the following conclusions were reached in close cooperation of WTP with BEC and other involved project partners:

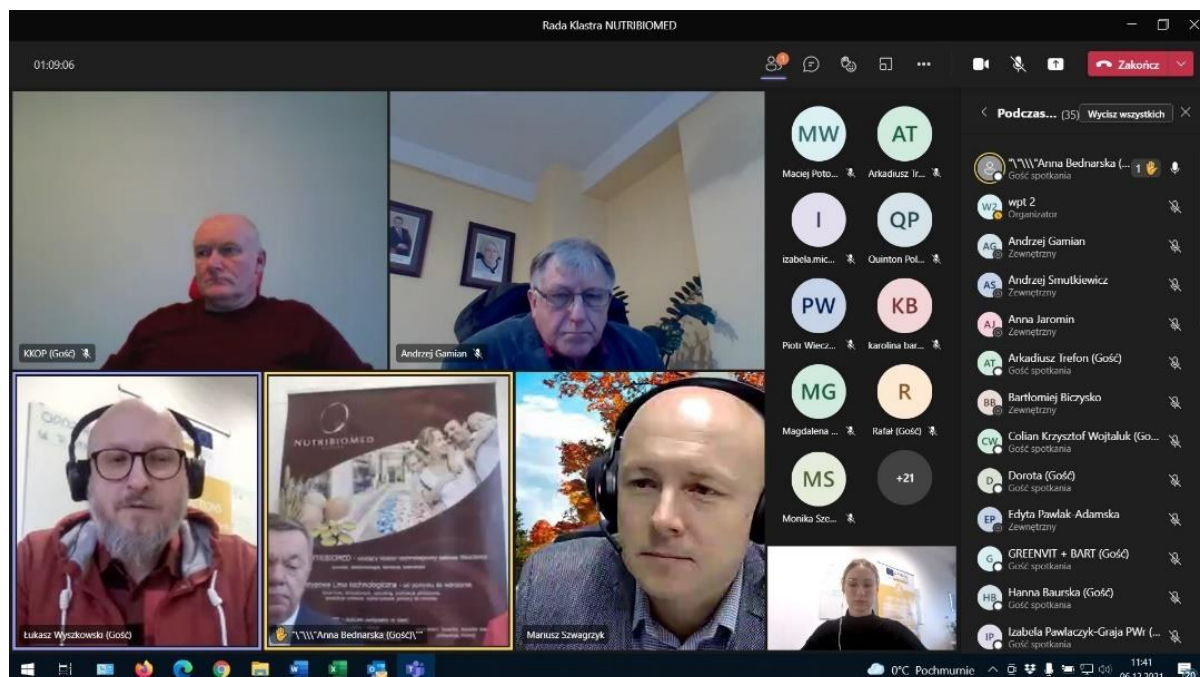
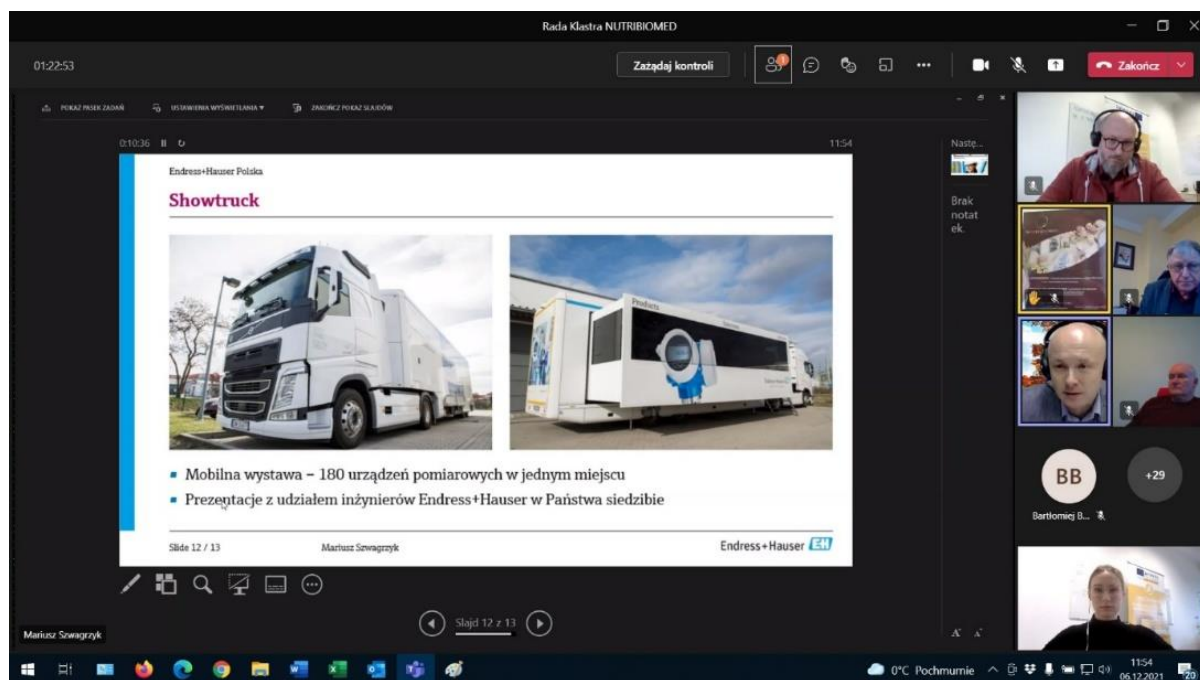
1. One of the main conclusions is that the agri-food industry requires continuous implementation of innovative solutions, especially from the scope of Industry 4.0 and robotics. During Covid-19 pandemic, it could be seen how important it is to ensure smooth production and maintain value chains. Additionally, the continuous growth of the population forces us to increase efficiency of production (it will be necessary to introduce digitization and robotization in agri-food companies).
2. The agri-food market is a consumer market that requires continuous improvement of the quality of products and raw materials. The best way to improve quality is to digitize the industry and to follow the modern trends to maintain the competitiveness.
3. The agri-food sector requires considerable financial outlays and a large group of competent specialists to carry out an efficient and purposeful digital transformation.
4. Digital transformation and implementation of innovations require constant cooperation and coordination along the whole value chains.
5. There is a significant difference in terms of awareness and implementation potential between medium-sized and micro-entities from the food sector. Especially small producers of food and regional products are at risk of being excluded from the transformation process or to a spontaneous and uncontrolled transformation of the so-called "wild transformation".

Following these conclusions, WTP decided to introduce permanent and periodic activities in the field of promoting and supporting the implementation of innovations in the field of Industry 4.0 and digital technologies among the members of the NUTRIBIOMED cluster. At the same time, BEC will dedicate efforts to continuous support of innovations in agri-food companies and will create conditions for efficient transfer of knowledge and technologies from R&D to practice.

In addition, WTP together with BEC decided to mutually support activities in the field of digital transformation, including WTP's help to BEC in establishing DIH in agri-food in Slovakia, as well as BEC's involvement in the implementation of EDIH Wroclaw, the leader of which is WTP. This includes mutual exchange of knowledge and involvement in relevant activities that will be identified along the way after the lifetime of Chain Reactions.



ANNEXES



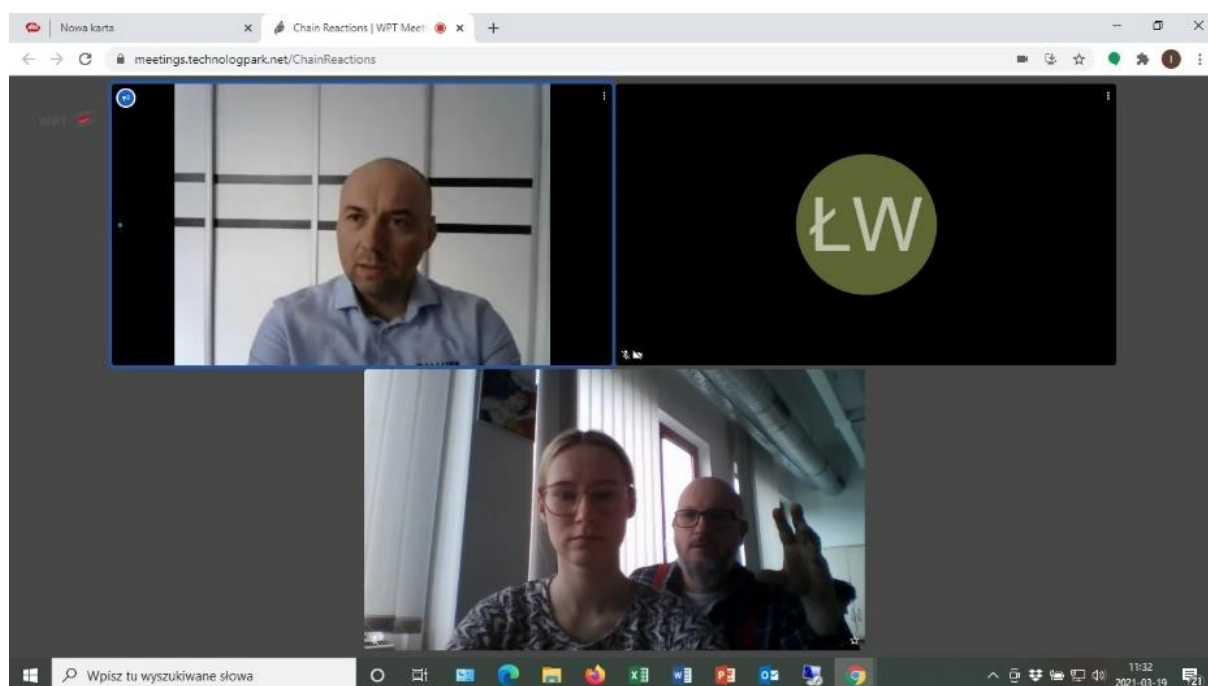
Cluster meeting, 06.12.2021, presented: "Industry 4.0 and digital technologies - practical applications in the Life Science industry". Speaker: Endress + Hauser Polska.



Cluster meeting, 15.09.2021, presented: benefits of implementing Industry 4.0 solutions and the digitization of enterprises.



Cluster meeting, 09.06.2021



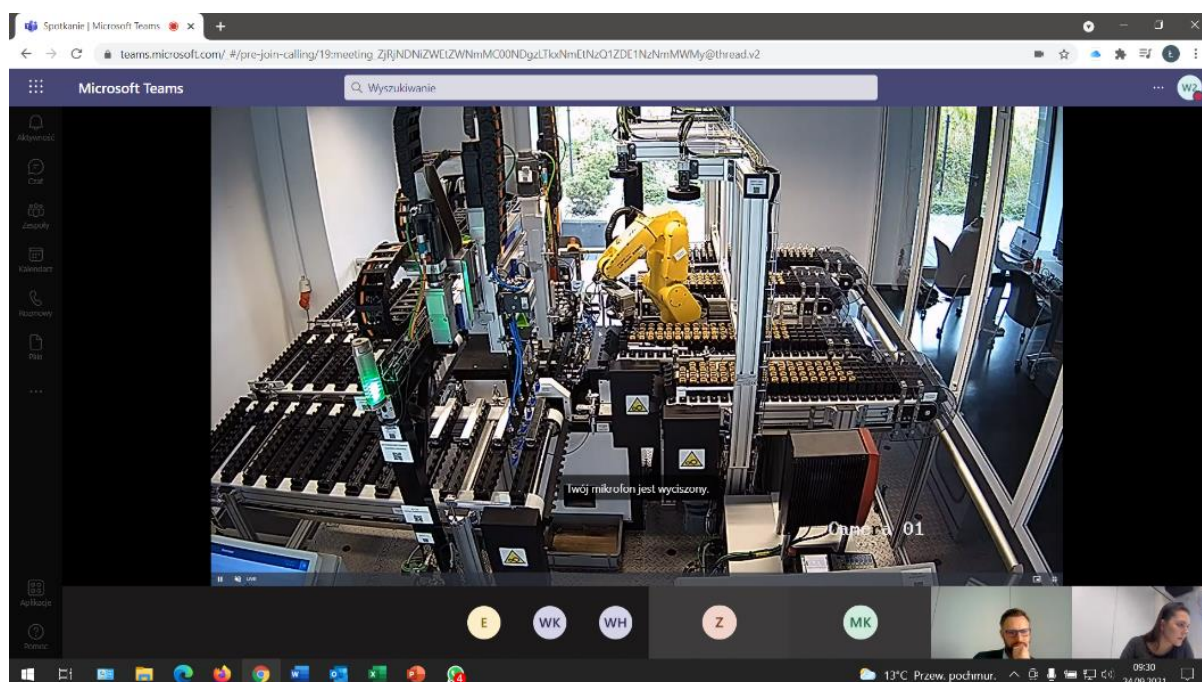
Meeting with Balluff company about pilot action



Workshop: Transnational industrial innovation roadmap WS for the bioeconomy sector.



Visit in SmartFactory, 17.09.2021



Online visit in SmartFactory, 24.09.2021



WTP representatives participated in Industry conference - Marketing 4.0 and business models for the agri-food industry, Dolnośląska Zielona Dolina, 28.10.2021



Value chain analysis workshop and IGA meeting, 28.09.2020

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "Testing Business Ideas - An Introduction" from "The E-School". The slide features a circular diagram with "BUSINESS DESIGN" in the center, surrounded by stages: "Business Prototype", "Ideate", "Assess", "Decide", and "Hypothesize". To the right of the diagram is a list of contact information for several individuals, including Dr. Frank Pawlitschek, Dr. Nicolai Bohn, Maximilian Hense, and Annalena Lorson. Below the contact list is a section titled "EVENTS" with dates and descriptions. The Zoom interface also shows a list of participants on the right: Katarina Bliclingova BEC (Me), Luc Schmerber (Host), Bernhard Kölmel, and Daniel Acs SK. The bottom of the screen shows the Windows taskbar with various open applications.

Training on business models, 02.11.2020



PILOTNÁ AKTIVITA

- Tréning v oblasti inovácií business modelov
- Študijné návštevy PBN (HU) a STP (SLO) s cieľom učiť sa novým (digitálnym) business modelom
- Identifikácia potrieb MSP (členov BEC) v oblasti inovácií / možností prechodu na nové business modely (inovačné audity, business model canvas)
- Podpora inovácií - nastavenie pravidiel fungovania vlastnej vouchrovej schémy

TAKING COOPERATION FORWARD

Participants (16)

- NPPC - Dana Pešková
- Peter Fatul - Pewas
- Repiska
- Slovakia Jan Durec

Zoom Group Chat

Pozdravujem všetkých. Dakujem za informácie. Za dve minúty mi začína ďalšie stretnutie, ktorého sa musím zúčastniť. Prajem všetko dobré.

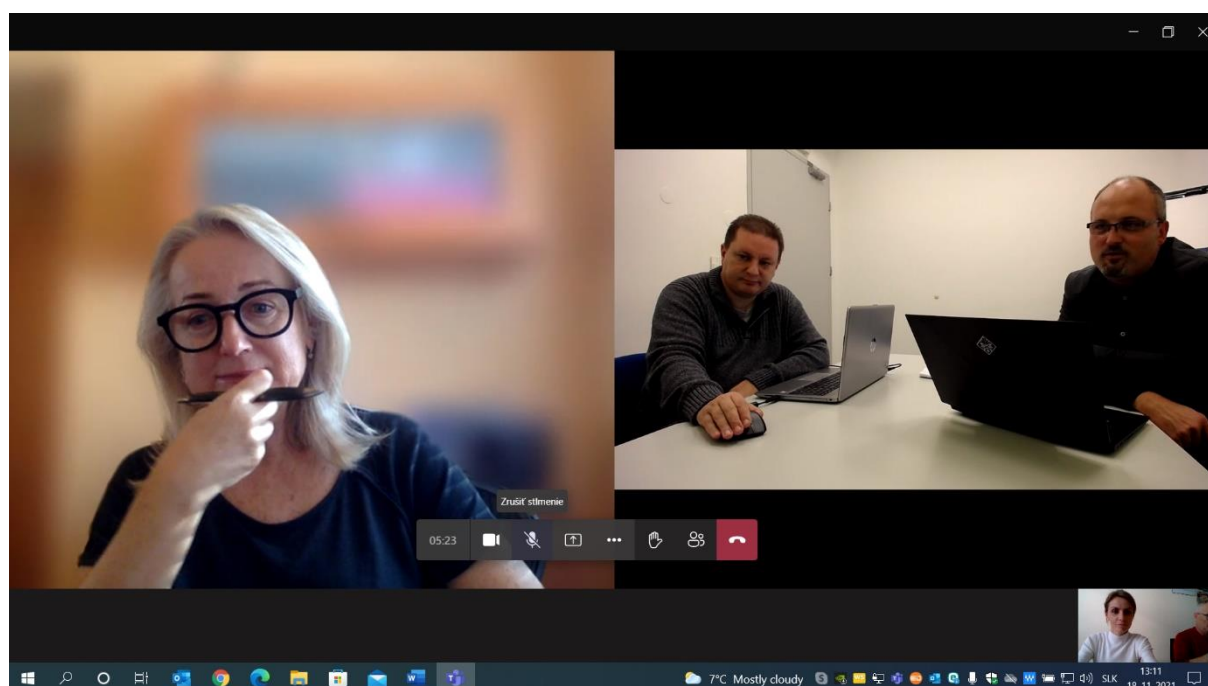
From Me to Everyone:
Dakujeme pán Miškuf, tešíme sa na spoluprácu

BEC annual meeting, 04.11.2020

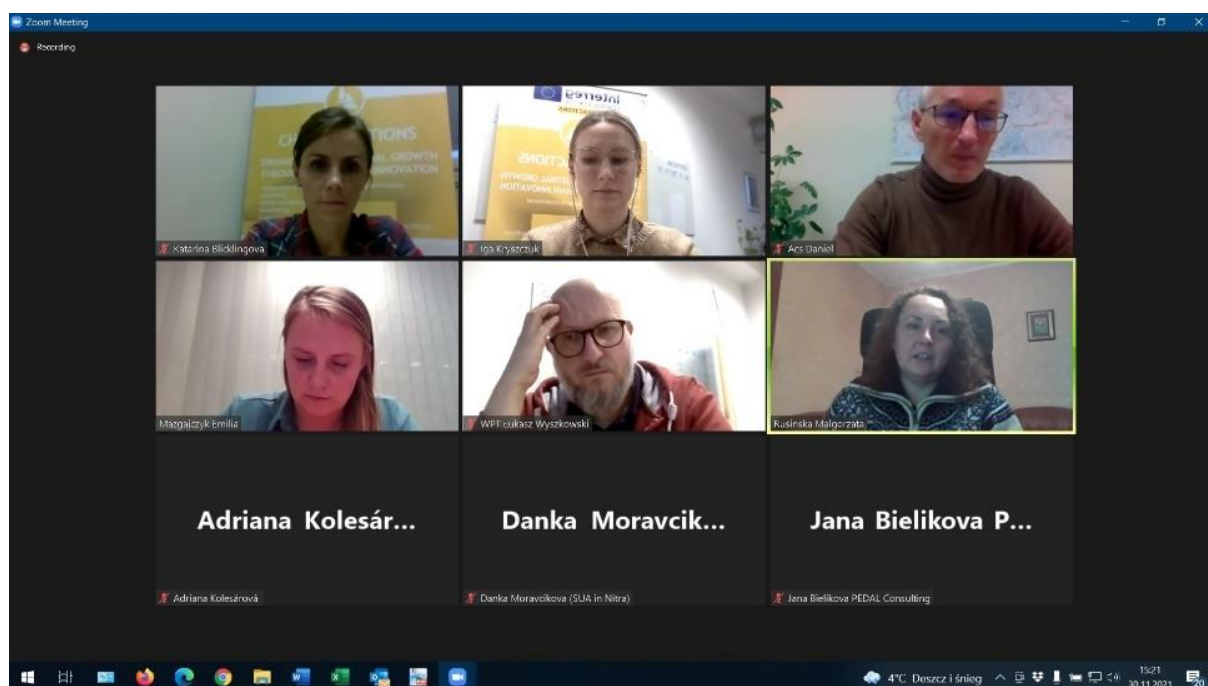
Design Thinking workshop

Participants: Alexandra Ruoi, Katarina Blichingova BEC, Alexandra Machova, Dominika Bancakova, Xenia Szarkova, Lucia Jamrichova, Acs Daniel, Silvia Ilkova, Majerčíková Paula

Design Thinking workshop, 03. – 04.03.2021



Knowledge exchange workshop with STP, 18.11.2021



Transnational innovation agenda workshop, 30.11.2021