**Project Title:**

THE FOF-DESIGNER:
DIGITAL DESIGN SKILLS FOR FACTORIES OF THE FUTURE

**Project Acronym:**
**DigiFoF**

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D.5.2. Report on academia-industry[1]

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ULBS

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EMSE, UNIBG, UNIOULU, UNIBIAL, BOC,
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| V2 | December 2020 | Month 1-24 | 01/01/2019 | 36 Months |

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[1] "Any communication or publication related to the action, made by the beneficiaries jointly or individually in any form and using any means, shall indicate that it reflects only the author's view and that the Agency and the Commission are not responsible for any use that may be made of the information it contains."

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# 1 Introduction

This report details the actions carried out by DigiFoF partners from joint academia-industry point of view in the first year of DigiFoF project. The evaluated actions were proposed and described in detailed in the D5.1 deliverable (Action plan on joint academia-industry initiatives).
DIGIFoF partners carried out all planned actions proposed in the action plan. Information about these activities taken in the period 01.2019-12.2020 (24 month) are given in details in the next section of the report. It contains a separated section for each national note of academic/industrial partnerships, with actions that was taken in the covered period regarding collaborations between academy and industry in the DigiFoF project.

# 2 EMSE&CLEXTRAL: List of joint academia-industry actions

## *2.1 Online and face-to-face trainings and Webinar*

### 2.1.1 Actions provided by EMSE

EMSE contributes to the following two webinars in 2019. The second webinar on 12.02.2020 is realize in collaboration with CIRIDD.

**Table 2.1. EMSE online and face-to-face trainings and Webinar**

| Training/webinar topic | Presenter | Date | Qualitative results |
|---|---|---|---|
| DigiFoF webinar #2 - Introduction and research interest of each Laboratory | Xavier Boucher, EMSE | 07.10.2019 | Information available on the web. |
| DigiFoF webinar #9: Circular Economy approach in servitization | Coralie Neyrand, CIRRID<br>Nadine Dubruc, EMSE | 12.02.2020 | Information available on the web, and reusable for teaching purposes. |
| French DigiFoF Webinar Industrie du futur: comment associer la personnalisation de masse et l'agilité des systèmes de production ? | Khaled Medini EMSE<br>Xavier Delorme EMSE<br>Arnaud Bocquillon CIMES | 12.06.2020 | Material and video reusable for industrial training, available on the web via French partners (CIMES and other websites) |
| DigiFoF Webinar #15 Convergence between mass-customisation and industrial agility | Xavier Boucher EMSE<br>Khaled Medini EMSE<br>Xavier Delorme EMSE<br>Arnaud Bocquillon CIMES | 08.09.2020 | Information available on the web, and reusable for teaching purposes. |

## *2.2 Lectures (series) in academia and industry*

### 2.2.1 Actions provided by EMSE

Ecole Nationale Supérieure des Mines de Saint Etienne (EMSE) provides the following lectures in academia. These lectures target engineering students from different disciplines to make them familiar with various aspect of FOF.

**Table 2.2. EMSE lectures (series) in academia and industry**

| Lectures topic | Lecturer / Participant | Date | Participants | Qualitative results |
|---|---|---|---|---|
| Security and health management for Digital FoF | Nadine Dubruc | April 2019 | 6 | Awareness of occupational health and safety as part of organizational change |
| NEMO 2019 | Xavier Boucher | July 2019 | 50 | Knowledge transfer re-used by PhD students; practical exercices re-used for other teaching purposes |
| Industry 4.0 in master MIT | Elaine Mosconi | October 2019 | 10 | Development of industrial & academic international collaborations on industry 4.0 |
| Business process management using OMiLAB | Xavier Boucher | October 2019 | 28 | Teachings programmed yearly. Internships on BPR proposed to students. |
| PSS design in industrial transition | Xavier Boucher | November 2019 | 13 | Teachings programmed yearly. Proposal of specific industry 4.0 projects to students. |

| Lectures topic | Lecturer / Participant | Date | Participants | Qualitative results |
|---|---|---|---|---|
| Life-cycle integration and management | Xavier Boucher | November 2019 | 6 | Teachings programmed yearly. |
| Enterprise modelling and design using OMiLAB | Xavier Boucher | December 2019 | 4 | Teachings programmed yearly. Later use of OMILAB by students in research activities. |
| Operationalizing Circular Economy by means of Product-Service System (PSS) | Elaheh Maleki | February 2020 | 15 | This program made engineering students familiar with circular servitization in industry. Canceled because of covid 19 |
| Business process management using OMiLAB | Xavier Boucher | November 2020 | 43 | Teachings programmed yearly (ICM – GPL Students). Internships on BPR proposed to students. |
| PSS design in industrial transition | Xavier Boucher | October 2020 | 16 | Teachings programmed yearly (ICM – LMRI Students). Proposal of specific industry 4.0 projects to students. |
| Life-cycle integration and management | Xavier Boucher | December 202 | 7 | Teachings programmed yearly (Master MTI). |
| Enterprise modelling and design using OMiLAB and ADOXX | Khaled Medini | December 2020 | 4 | Teachings programmed yearly. Later use of OMILAB by students in research activities. |

### 2.2.2 Actions provided by Clextral

Clextral is actively in collaboration with EMSE in realizing knowledge exchange between industry-academia. In 2019 and 2020, Clextral gave the following lectures in EMSE.

**Table 2.3. Clextral lectures (series) in academia**

| Lectures topic | Lecturer / Participant | Date | Participants | Qualitative results |
|---|---|---|---|---|
| International Management | Gilles Maller | April 2019 | 24 | Transfer of industrial expertise towards engineering students- Yearly teaching. |
| International Strategy | Gilles Maller | May 2019 | 24 | Transfer of industrial expertise towards engineering students Yearly teaching. |
| International Management | Gilles Maller | April 2020 | 24 | Transfer of industrial expertise towards engineering students- Yearly teaching. |
| International Strategy | Gilles Maller | May 2020 | 24 | Transfer of industrial expertise towards engineering students- Yearly teaching. |

## *2.3 Invited talks both in academic and industrial settings*

### 2.3.1 Actions provided by EMSE

EMSE continuously invites professionals from different research institute and industrial companies to discuss on various subjects. However the year 2020 was quite impacted by the COVID situation, with cancellation of several events. The following talks are organized.

**Table 2.4. Invited talks both in academic and industrial settings**

| Topic | Presenter | Date | Participants | Qualitative results |
|---|---|---|---|---|
| Digital transformation and circular Economy | PRIMETAL, Y.Fontaine | May 2019 | 50 | Mutual exchanges between academic and industrial, on digital orientations for industry of the future |
| Digital transformation and circular Economy | EPE, C. Tutenuit | May 2019 | 50 | Mutual exchanges between academic and industrial, on digital innovation for circular economy |
| Industry 4.0 | Sherbrooke university (CAN) | October 2019 | 10 | International Exchange of expertise on industry of the future |
| PSS and sustainability | ECOBEL, JP.Bosles | October 2019 | 25 | Transfer of industrial expertise towards engineering students |
| Management of Product-Services Strategies | BIELIEFELD University (DE) | February 2020 | 8 | International exchange of expertise on industry of the future. Professional training for students. |
| Sustainability and Service-oriented Strategies | ECOBEL, JP.Bosles | October 2020 | 17 | Transfer of industrial expertise towards engineering students |

## *2.4 Internships (e.g. Erasmus+ / student internships)*

### 2.4.1 Actions provided by EMSE

EMSE supports student internship and provides trainings for Erasmus+. In the context of Erasmus+, EMSE organize courses focusing on different aspects of Product-Service System (PSS)

**Table 2.5. Internships provided by EMSE – Erasmus+**

| Erasmus+ | | | | | | |
|---|---|---|---|---|---|---|
| **Teacher Name** | **Specialization** | **Year study** | **Start date** | **Organising Company** | **Participants** | **Qualitative results** |
| Xavier Boucher | PSS design | PhD | July 2019 | University of Vienna | 50 | Transfer of expertise on PSS Design |
| Thomas Suesse | PSS management | Final year of Master | February 2020 | EMSE | 15 | Transfer of expertise on PSS management |
| Thomas Suesse | PSS management | Final year of Master | January 2021 | EMSE | 8 | Transfer of expertise on PSS management |
| Xavier Boucher | Environmental assessment of PSS | Master I | January 2021 | EMSE | 1 | Erasmus+ Semestrial Exchange |

**Table 2.6. Internships provided by EMSE for students**

| Student internships | | | | | |
|---|---|---|---|---|---|
| **Student Name** | **Specialization** | **Year study** | **Start date** | **Organising Company** | **Qualitative results** |
| Roua Allaoui | Data analysis for industrial and commercial strategy | Final year of Master | May 2019 | Clextral | Report on the status and history of different machines. |
| Thibault Gourdon | Studying the market of second hand extrusion machine | Final year of Master | October 2019 | Clextral | Report on the status and history of second-hand machines. |
| Elisabetta Arboscelli | Smart PSS design | Master I | January 2021 | Elm Leblanc | Contribution to a design method |
| Abir Belcaid | PSS project management | Master I | October 2019 | CETIM | Audit for PSS innovation projects |
| Abir Belcaid | PSS project management | Master I | February 2019 | ERE 43 | Economic model for PSS assessment method |
| Bruno Mokbel | Servitisation of manufacturing Systems | Master I | February 2019 | EMSE | Method for production system reconfiguration |
| Constantin ROUSSEAU | Digitalisation of manufacturing Systems | Master I | February 2019 | EMSE | Method for production system reconfiguration |
| Jean Philippe Vouhé | Reconfigurability of manufacturing Systems | Master I | February 2020 | EMSE | FRAMEWORK FOR RECONFIGURABLE MANUFACTURING SYSTEMS DECISION-MAKING |

| | | | | | |
|---|---|---|---|---|---|
| Marghrita DIB | Management of Circular Economy for industry of the future | Master I | October 2020 | Clextral | Industrial management of product renovation processes |
| Julien BECOT | Commercial offers for second-hand Machinery | Master I | October 2020 | Clextral | Innovation and marketing strategy for product renovation |
| Mouhammad Fawaz | Human resources and empowerment | Master | November 2020 | EMSE | Report on HR tools encouraging empowerment |

### 2.4.2 Actions provided by Clextral

Clextral collaborates with EMSE to support master students during their internship. During 2019, Clextral worked with students from EMSE on 2 subjects to take primary steps to adopt a new business in the context of FOF.

**Table 2.7. Internships provided by Clextral**

| Item | Student Name | Specialization | Year study | Start date | Organising Company | Qualitative results |
|---|---|---|---|---|---|---|
| 1 | Roua Allaoui | Data analysis for industrial and commercial strategy | Final year of Master | May 2019 | Clextral | Report on the status and history of different machines. |
| 2 | Thibault Gourdon | Studying the market of second hand extrusion machine | Final year of Master | October 2019 | Clextral | Report on the status and history of second-hand machines. |
| 3 | Marghrita DIB | Management of Circular Economy for industry of the future | Master I | October 2020 | Clextral | Industrial management of product renovation processes |
| 4 | Julien BECOT | Commercial offers for second-hand Machinery | Master I | October 2020 | Clextral | Innovation and marketing strategy for product renovation |

## *2.5 Bachelor, Master, PhD thesis project*

### 2.5.1 Actions provided by EMSE

Currently, EMSE supervises the following two PhD thesis projects in collaboration with industrial partners. These thesis focus on PSS value chain and customization as the new business in the context of FOF.

**Table 2.8. Bachelor, Master, PhD thesis project coordinated by EMSE**

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 1 | PhD | Andres-Camilo MURILLO-COBA | Design of PSS value chains for thermic systems | 2019 | ElmLeblanc |
| 2 | PhD | Omar-Ahmed-Mostafa EZZAT | Modularity for PSS customization | 2019 | Academic |

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 3 | Master | Safae Diouri | Impact of digitalisation on manufacturing management | 2019 | WAVESTONE |
| 4 | Master | Bruno Mokbel | Validation of information system development in a digital context. | 2019 | Ernst & Young |
| 5 | Master | Mariam Lazrek | Management of innovation project portfolio | 2019 | NOVEANE |
| 6 | Master | Ralph Pierrot | Management of Digital transformations | 2019 | SIA PARTNERS |
| 7 | Master | Eva Baguet | Impact of industry of the future on logistic management | 2020 | Manhattan Associates |
| 8 | Master | Violette Favret | | | |
| 9 | Master | Vinicios Mees | Supply Chain Management | 2020 | KELLOGG'S |
| 10 | Master | Salma Bouraoua | Industrial Innovation for product Developement | 2020 | SAFRAN |
| 11 | Master | nicolas Van der laan | Losgitic management | 2020 | Progress Managemen t |
| 12 | Master | Pauline Goldery | Indicator Systems for Resilient industry | 2020 | Cranfield Univ. |

## *2.6 Excursions (lab visits, industrial visits etc.)*

### 2.6.1 Actions provided by EMSE

EMSE organizes visits for the French academia-industry network to make all partners familiar with the competencies and capabilities of each other. In the context of factory of the Future, EMSE organized the following visits.

**Table 2.9. Excursions provided by EMSE**

| Item | Excursion Name / Excursion topic | Company(ies) visit | Date | Participants | Qualitative results |
|---|---|---|---|---|---|
| 1 | EMSE PSS research team | Clextral | June 2019 | 6 | Presentation on the company equipment and competencies |
| 2 | French partners of DigiFoF | ITM Factory | April 2019 | 6 | Presentation on Fayol Institute, ITM Factory, objectives of ITM Factory, and Visiting the equipment of ITM Factory |

# 3 ULBS joint academy-industry action

In follow we will present actions carried out by ULBS partner in period 01.2019-12.2020 in the DigiFoF project. This report completes the actions undertaken by ULBS in 2019 with actions that were realized in 2020.

## *3.1 Online and face-to-face trainings and Webinar*

Members from ULBS contributed at four webinars in the two years of DigiFoF project, as was in proposed plan. Also, it took place (face-to-face until COVID-19 introduced restrictions – in March 2020 and online after that) a lot of vocational and professional trainings:

1. In 06.19.2019 webinar #1 with name "*Introduction to DigiFoF*" where Adrian Florea presented the actions that need to be carried out in the project and next steps in the project.
2. In 07.10.2019 webinar #2 with name "*Introduction and research interest of each Laboratory*" where colleague Ion Mironescu presented the general idea that will be integrated and develop in the white paper for this project.
3. In 23.04.2020 webinar #11, "*Computer Vision for Manufacturing Industry Application*" where our colleague prof. Remus Brad presented the idea of using modelling system in developing particular manufacturing system.
4. In 09.06.2020 webinar #13: "*Design and control of manufacturing processes in confectionery industry using ADOxx tools*" presented by Ion Mironescu.
5. In 22.01.2020 9 participants completed an academic training organised by ULBS entitled "*Workplace safety – Employees emotion recognition*", trainer Eng. MSc. Valentin Fleacă.
6. In period 10.04.2019 – 12.04.2019 at ULBS was organised an academic training "*Sibiu – Smart city modelling (ADOxx)*", trainer Eng. Victor Dobrilă.
7. In period 15.06.2020 – 26.06.2020 at ULBS was organized a vocational training for Continental Sibiu employees, entitled "*Workplace safety – Employees emotion recognition*" where 7 participants finished.
8. In 30.07.2020 other 28 participants completed a vocational training organized by ULBS for Continental Sibiu employees, entitled "*Workplace safety – Employees emotion recognition*", trainer Eng. MSc. Valentin Fleacă.
9. In period 5.10.2020 – 23.11.2020 was organised a vocational training entitled "*Workplace safety – Employees emotion recognition*" where 23 participants finished.

## *3.2 Lectures (series) in academia and industry*

In 2019 ULBS have 2 students participating at NEMO 2019 in period 15-27.06.2019 – MUNTEAN Maria and BALTES Octavian Isaia and 1 participant (Victor DOBRILĂ-member of ULBS team in DigiFoF) at the training course at Vienna "Introduction to ADOxx" that took place in period 10-12.04.2019. Due to COVID-19 restrictions in 2020 the NEMO summer school was cancelled, and the mobilities of the people were limited.

## 3.3 Invited talks both in academic and industrial settings

In 17.05.2019 in the context of "Hardware and Software Engendering" event organised by Engineering Faculty from ULBS took place the presentation "Research problems at CONTINENTAL Sibiu" exposed by Langa Remus from Continental Automotive System. (http://csac.ulbsibiu.ro/hse.php)

In 22.05.2019 in the event of "Marquardt Schaltsystems" organised at Engineering Faculty ULBS, Anda Antonescu have a presentation called "The R&D expansion plan of Marquardt Sibiu: Intelligence Opens Doors to New Possibilities". Detailed about the event http://inginerie.ulbsibiu.ro/fara-categorie/marquardt-schaltsysteme-s-c-s-university-event-22-05-2019/

In period 4-15.11.2019 took place the event "Continental alături de tine în Facultate" where was organized a lot of workshops by employers of Continental for the students and professors from Engineering Faculty

- "Assisted driving Autosar playground",
- "Network devices and seat control",
- "Electrical engineering for safety",
- "Finite element analysis high performance computing",
- "U.R. - from zero to hero!",
- "Cybersecurity live - penetration testing".

The detailed program is on http://inginerie.ulbsibiu.ro/wp-content/uploads/2019/10/Promovare_Conti-Attractive-ULBS.pdf

In 26-27 November 2020 will took place at the "Lucian Blaga" University of Sibiu the event "Sibiu Innovation Days" where is organised a lot of workshops by employers of European Commission and different companies from Sibiu, Cluj Napoca, Timisoara and Bucharest. The panels and presentations related to DigiFoF project are presented in the next table:

| Lecture name | Speakers | Company |
|---|---|---|
| **A user story, in the context of Industry 4.0** | Valean Ioan | WEBfactory GmbH |
| **Digitalization / Industry 4.0 in the context of cloud and distributed systems** | Sebastian Negomireanu | WEBfactory GmbH |
| **Industry 4.0: Cobots & AGVs impact in industry** | Alexandru Bian | Continental Automotive Systems |
| **SAP HANA as the architecture for fast data processing** | Mark Hollaender | BearingPoint Software Solutions GmbH, Germany |
| **Reporting evolution from a physical signed paper towards granular data accessibility** | George Bontas | BearingPoint Software Solutions SRL |
| **Research and innovation for Europe´s digital decade** | Ana Luísa Correia | European Commission |
| **Survival of the fittest through disruptive changes** | Klaus-Georg Schmidt | Alfa-Horizont GmbH, Germany |

| | | |
|---|---|---|
| **Future of work - the human connection** | Daniel Reisenauer | Visma Software S.R.L |
| **The future of work: humans and machines** | Iris Diaconescu | Continental Automotive Systems |
| **Workforce skills and jobs of the future** | Lukas Borunsky | European Commission |
| **From Business Continuity to Business Resiliency** | Sergiu-Valentin Dilimot | Visma Software S.R.L |
| **Why Agile in home office works – challenges and solutions** | Cristi Cimpineanu | IT Perspectives |

The detailed program is on https://events.ulbsibiu.ro/innovationdays/

## *3.4 Internships (e.g. Erasmus+ / student internships)*

In the partnership between ULBS and companies around Sibiu some of the students go into companies to make practice in the internship period (in July). In the Table 1_ULBS is presented a list with these students that made practice in the DigiFoF domain.

**Table 3.1. List of ULBS students who made practiced in Continental Automotive System Sibiu**

| Item | Student Name | Specialization | Year study | Start date |
|---|---|---|---|---|
| 1 | Anghel Adrian | Electromechanics | III | 08.07.2019-26.07.2019 |
| 2 | Badiu Bogdan Vasile | Multimedia Systems Engineering | II | 08.07.2019-26.07.2019 |
| 3 | Bardasu Maria Roxana | Multimedia Systems Engineering | III | 08.07.2019-26.07.2019 |
| 4 | Berbecel Adina | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 5 | Bianca Mosor | Computer science and Computer Engineering | III | 08.07.2019-26.07.2019 |
| 6 | Bratu Mioara | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 7 | Diac Rares Dumitru | Multimedia Systems Engineering | III | 08.07.2019-26.07.2019 |
| 8 | Dobre Elvis Marin | Applied Electronics | III | 08.07.2019-26.07.2019 |
| 9 | Draghici Gabriel Constantin | Applied Electronics | II | 08.07.2019-26.07.2019 |
| 10 | Dragomir Darian | Multimedia Systems Engineering | II | 08.07.2019-26.07.2019 |
| 11 | Dragut Roxana Diana | Applied Electronics | III | 08.07.2019-26.07.2019 |
| 12 | Drumar Radu | Applied Electronics | II | 08.07.2019-26.07.2019 |
| 13 | Filip Cristian | Applied Electronics | II | 08.07.2019-26.07.2019 |
| 14 | Fratila Ionut | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 15 | Gurau Florin Adrian | Information Technology | II | 22.07.2019-9.08.2019 |

| Item | Student Name | Specialization | Year study | Start date |
|---|---|---|---|---|
| 16 | Hertoiu Bogdan George | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 17 | Lica Anamaria | Multimedia Systems Engineering | II | 08.07.2019-26.07.2019 |
| 18 | Linte Irina | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 19 | Lupu Andreea | Computer science and Computer Engineering | III | 08.07.2019-26.07.2019 |
| 20 | Muresan Mihai | Information Technology | II | 08.07.2019-26.07.2019 |
| 21 | Nanu Paul | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 22 | Neacsu Maria Madalina | Applied Electronics | II | 08.07.2019-26.07.2019 |
| 23 | Popa Nicolae Catalin | Applied Electronics | III | 08.07.2019-26.07.2019 |
| 24 | Pridie Ceridian Atanasie | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 25 | Statescu Andrei | Information Technology | II | 08.07.2019-26.07.2019 |
| 26 | Totoroga Madalina | Information Technology | II | 08.07.2019-26.07.2019 |
| 27 | Tudoroiu Ilie Valentin | Applied Electronics | III | 08.07.2019-26.07.2019 |
| 28 | Turbureanu Aida Maria | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |
| 29 | Udrescu Claudiu | Electromechanics | III | 08.07.2019-26.07.2019 |
| 30 | Vasilas Iulia | Computer science and Computer Engineering | II | 08.07.2019-26.07.2019 |

Students that made the internship at COMPA SA Sibiu (consortium with PRELMET partner) in the period 09.07.2019-27.07.2019.

**Table 3.2. List of ULBS students who made practiced at COMPA SA Sibiu (PRELMET partner)**

| Item | Student Name | Specialization | Year study | Start date |
|---|---|---|---|---|
| 1 | Argesanu Marin-Daniel | Machines Manufacturing Technologies | II | 09.07.2019-27.07.2019 |
| 2 | Catana Narcis-Constantin | Machine-Tools and Production Systems | III | 09.07.2019-27.07.2019 |
| 3 | Contiu Elena | Mechatronics | II | 09.07.2019-27.07.2019 |
| 4 | Crisca Raul-Sorin | Machines Manufacturing Technologies | II | 09.07.2019-27.07.2019 |
| 5 | Cristian Bogdan Andrei | Machine-Tools and Production Systems | II | 09.07.2019-27.07.2019 |
| 6 | Cucu Ovidiu-Gabriel | Machines Manufacturing Technologies | II | 09.07.2019-27.07.2019 |
| 7 | Gindila Ana-Maria | Economic Engineering in Mechanical field | II | 09.07.2019-27.07.2019 |
| 8 | Gherasim Alexandru-Victor | Mechatronics | II | 09.07.2019-27.07.2019 |
| 9 | Gligor Emanuel-Ioan | Mechatronics | II | 09.07.2019-27.07.2019 |
| 10 | Haiduc Alexandra-Elena | Engineering and Environmental Protection in Industry | III | 09.07.2019-27.07.2019 |
| 11 | Magureanu Iulian-Florin | Economic Engineering in Mechanical field | II | 09.07.2019-27.07.2019 |
| 12 | Manole Paul-Andrei | Mechatronics | II | 09.07.2019-27.07.2019 |
| 13 | Popa Claudiu-Andrei | Machines Manufacturing Technologies | III | 09.07.2019-27.07.2019 |
| 14 | Stoisor Miruna-Maria | Economic Engineering in Mechanical field | III | 09.07.2019-27.07.2019 |
| 15 | Tiplea Maria-Iuliana | Economic Engineering in Mechanical field | II | 09.07.2019-27.07.2019 |
| 16 | Vadean Catalina-Ioana | Engineering and Environmental Protection in Industry | III | 09.07.2019-27.07.2019 |
| 17 | Viloiu Irina | Machines Manufacturing Technologies | III | 09.07.2019-27.07.2019 |
| 18 | Visa Andreea-Ecaterina | Machine-Tools and Production Systems | III | 09.07.2019-27.07.2019 |
| 19 | Vlad Nicolae-Madalin | Machines Manufacturing Technologies | III | 09.07.2019-27.07.2019 |

## 3.5 Bachelor, Master, PhD thesis project

Companies around Sibiu in the collaboration with the "Lucian Blaga" University of Sibiu proposed in each year a list of bachelor and master issues that can be develop by students from university in collaboration with companies. In the Table 2 are provided a list with the name of the students and the project title that was coordinate by professor from ULBS that are involved in the DigiFoF project: Daniel Volovici, Remus Brad, Adrian Florea, Daniel Morariu.

**Table 3.3. ULBS List with students that develop projects for companies**

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 1 | Master | FLEACĂ Valentin | Face Emotion Recognition | 2019 | Continental System Sibiu |
| 2 | Master | IAMANDI Laura Diana | System for picking and estimating the number of objects in a warehouse | 2019 | Continental System Sibiu |
| 3 | Master | STANCIU Sergiu Gabriel | Small scale autonomous guided vehicle | 2019 | Continental System Sibiu |
| 4 | Master | MODRÂNGĂ Cristina Maria | A Study of Hematoma Detection from Medical Images | 2019 | Sibiu County Clinical Hospital |
| 5 | Master | TALPOȘ Elena Mădălina | A Study of Pedestrian Detection from Infrared Images | 2019 | Continental System Sibiu |
| 6 | Master | STOIA Paul Claudiu | Automatic Measurements of Foetal Head Circumference in Ultrasound Images | 2019 | Sibiu County Clinical Hospital |
| 7 | Bachelor | Durdun Abel Emanuel | Development of a hardware-software application for air quality monitoring | 2019 | Environmental Protection Agency Sibiu |
| 8 | Bachelor | Dușleag Alin Dumitru | Smart buffer | 2019 | Continental System Sibiu |
| 9 | Bachelor | Opriș D-I. Karina-Mihaela | Driver Assistance application by obstacles detection | 2019 | Continental System Sibiu |
| 10 | Bachelor | Lică I. Adelina Teodora | Position and braking lights detection at motor vehicles from image sequences | 2019 | Continental System Sibiu |
| 11 | Bachelor | Boștină V. Cătălina-Maria | Pedestrian detection from image sequences | 2019 | Continental System Sibiu |
| 12 | Bachelor | Mesea V. Ionica-Cristina | Defect detection on the road surfaces | 2019 | Continental System Sibiu |
| 13 | Bachelor | Ciucă A. Mihai Marius | Behaviour autonomous car prediction in the event of a pedestrian collision | 2019 | Continental System Sibiu |
| 14 | Bachelor | Danciu L. Daniel-Ionuț | Application for controlling the specific parameters to a robotic arm. Analysis the cobot problems | 2019 | Marquardt GmbH Sibiu |
| 15 | Bachelor | Oancea Ș. Andrei Ștefan | Development an interlocking system applied to manual processes in production. | 2019 | IFM efector /prover SRL |

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 16 | Bachelor | Ciuclea G. Victor-Ștefan | Stack consumption analysis in the context of embedded systems applications. | 2019 | Continental System Sibiu |
| 17 | Bachelor | Olariu I. Diana Ioana | Air quality information and monitoring platform using IoT devices. | 2019 | Sibiu City Hall, Environmental Protection Agency Sibiu |

Students from Bachelor and Master that Develop Thesis on the Project Fields in 2020:

| Item | Thesis Type | Student Name | Project Title | Year | Target Companies |
|---|---|---|---|---|---|
| 1 | Bachelor | Muntean I. Maria | Parking of a M-BOT with help of modelling language | 2020 | DigiFoF Project |
| 2 | Bachelor | Budiu C.N. Cristiana-Roxana | Classification of sounds from vehicles | 2020 | Continental System Sibiu |
| 3 | Bachelor | Dobrin D Flavius-Daniel | Hardware and software system for detecting the correct position of the spine | 2020 | Sibiu County Clinical Hospital |
| 4 | Bachelor | Balteș I. Octavian-Isaia | Automation of assembly lines with help of the robotic arm and an M-BOT. | 2020 | DigiFoF Project |
| 5 | Bachelor | Purece D. Ana-Maria | Development of a dedicate air quality monitoring system | 2020 | Environmental Protection Agency Sibiu |
| 6 | Bachelor | Mondoc N. Anca Claudia | Remotely controlled mobile robot (with real-time playing images) | 2020 | Marquardt Schaltsysteme Sibiu |
| 7 | Bachelor | Bîrsan S. Cristina Andreea | Detection of brain tumours with imaging processing | 2020 | Sibiu County Clinical Hospital |
| 8 | Bachelor | Milașcon I. Lidia | Detection and counting of vehicles for a video source | 2020 | Continental System Sibiu |
| 9 | Master | Carjan G. Diana-Florinela | Pneumothorax detection and segmentation in chest x-ray images | 2020 | Sibiu County Clinical Hospital |
| 10 | Master | Vasilaş C. Teodora | Automatic design space explorer for VLIW architecture | 2020 | Continental System Sibiu |
| 11 | Master | Rădulescu M. Marius-Constantin | Image processing for smart parking lot | 2020 | Continental System Sibiu |
| 12 | Master | Hagiu(Radulescu) M. Maria Elena | Image processing for fog detection | 2020 | Continental System Sibiu |
| 13 | Master | Filimon I. Raul - Constantin | Artificial Intelligence application for traffic management systems | 2020 | Visma Software S.R.L. |
| 14 | Master | Moraru N. Diana-Ionela | Storage manager using AGVs for manufacturing in the context of industry 4.0 | 2020 | Continental System Sibiu |
| 15 | Master | Dragoe M.F Gina-Irina | A method for face detection using Viola-Jones algorithm | 2020 | Continental System Sibiu |
| 16 | Master | Popa G.Carmen | Localization and mapping with autonomous robot, based on Lidar sensors | 2020 | Continental System Sibiu |

| Item | Thesis Type | Student Name | Project Title | Year | Target Companies |
|---|---|---|---|---|---|
| 17 | Master | Aflat Horea Ovidiu | Walking bag | 2020 | |
| 18 | Master | Marcu D. Simona-Daniela | Innovative solution for parking-sharing of private institutions | 2020 | Continental System Sibiu |
| 19 | Master | Ciorîcă I. Florentin Cătălin | Autonomous self-driving museum assistant | 2020 | Continental System Sibiu |

## *3.6 Excursions (lab visits, industrial visits etc.)*

In period 9-16.12.2019 took place the excursion "Fascinatia industriei auto (The fascination of the auto industry)" with the following main objectives that were visited:

- BMW company and museum;
- Audi company and museum;
- Technical museum Munich.

The list with all 45 students who participated at this excursion is submitted in the document "D5.2-List of participants_ULBS".

# 4 UNIBG joint academy-industry action

In follow we will present actions carried out by UNIBG partner in period 01.2019-12.2020 in the DigiFoF project. Some of actions was planned and described already in the deliverable D5.1 because the deliverable D5.1 was prepared at the end of the year, according to the planning, and already some of the actions were being carried out.

## *4.1 Online and face-to-face trainings and Webinar*

Members from UNIBG contribute at one webinar in the 2019 year, as was in proposed plan:

1. In 07.10.2019 webinar #2 with name "Introduction and research interest of each Laboratory" where Fabiana Pirola presented the general idea that will be integrated and develop in the white paper for this project.
2. In 11.03.2020 webinar #10 with name "Omilab use case: IoT platform as enabler of new Product-Service" where Fabiana Pirola presented an Omilab use case in the field of PSS.

## *4.2 Lectures (series) in academia and industry*

| Lectures topic | Lecturer / Participant | Date | Participants | Qualitative results |
|---|---|---|---|---|
| NEMO 2019 | Sergio Cavalieri | July 2019 | 50 | Knowledge transfer re-used by PhD students; practical exercices re-used for other teaching purposes |
| Operations management | Sergio Cavalieri/ Fabiana Pirola | September 2020 | 50 | Teachings programmed yearly to transfer knowledge to master students. Proposal of BPM projects to students. |
| Supply and service chain management | Giuditta Pezzotta | May 2019 | 50 | Teachings programmed yearly to transfer knowledge to master students. |
| Operations management for FoF | Fabiana Pirola | May 2020 | 15 | Knowledge transfer to professionals, with particular focus on operations management 4.0 and BPM (modelling and simulation) |
| Service management for FoF | Giuditta Pezzotta | November 2020 | 15 | Knowledge transfer to professionals focused on the transition towards servitization |
| Long life training in service management | Giuditta Pezzotta | November 2020 | 15 | Knowledge transfer to professionals focused on the transition towards servitization |
| BPM in textile industry | Fabiana Pirola | July 2020 | 12 | Knowledge transfer to professionals with particular focus on BPM and BPMN 2.0 |

## *4.3 Invited talks both in academic and industrial settings*

On 06.11.2019 the visiting researcher Antonio Maffei provided a talk on "Business Models and challenge-driven research: a perspective from production research".

On 21.10.2020 dr. Claudio Turconi, CIO of Ratti Spa provided a speech on "Production monitoring with product tracking and product/process integration".

On 02.12.2020 dr. Julo Galati and Daniele Nisoli provided a speech on "The adoption of Lean 4.0 in industry"

## *4.4 Internships (e.g. Erasmus+ / student internships)*

In the partnership between UNIBG and companies around Bergamo some of the students go into companies to make practice in the internship period.

**Table 4.1. UNIBG students who made internships**

| Item | Student Name | Specialization | Year study | Start date | Organising Company |
|---|---|---|---|---|---|
| 1 | Bonaldi Francesco | Management engineering | 2 | 13.02.2019 | Balance systems |
| 2 | Cavaliere Concetta | Engineering and Technology for health | 3 | 11.09.2019 | Synlab |
| 3 | Luca Doneda | Management engineering | 2 | 01.11.2019 | Ratti SpA |
| 4 | Facheris Valentina | Management engineering | 2 | 20.01.2020 | SMI SpA |
| 5 | Erika Milesi | Management engineering | 2 | 20.01.2020 | SMI SpA |
| 6 | Marco Venuta | Management engineering | 2 | 20.01.2020 | SMI SpA |
| 7 | Alessandro Manzoni | Management engineering | 2 | 20.01.2020 | SMI SpA |
| 8 | Sonia Amigoni | Management engineering | 2 | 01.02.2020 | Aesys |
| 9 | Sara Somaini | Management engineering | 2 | 15.11.2020 | Fedabo |
| 10 | Francesco Cazzaniga | Management engineering | 2 | 15.11.2020 | Fedabo |
| 11 | Ilaria Bianchini | Management engineering | 2 | 05.10.2020 | Ratti SpA |
| 12 | Aharon Gentili | Management engineering | 2 | 01.12.2020 | Tenaris SpA |

## *4.5 Bachelor, Master, PhD thesis project*

Companies around Bergamo in the collaboration with the University of Bergamo proposed in each year a list of bachelor and master issues that can be develop by students from university also in collaboration with companies. In the Table 2 are provided a list with the name of the students and the project title that was coordinate by professor from UNIBG that are involved in the DigiFoF project: Fabiana Pirola, Giuditta Pezzotta, Sergio Cavalieri, Roberto Pinto. Other theses have been developed on the topic related to the factory of the future.

**Table 4.2. UNIBG list with students that develop projects on the FoF topics**

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 1 | PhD | Roberto Sala | Design and assessment of a decision-making process for data-driven maintenance provision in Product-Service System | 2020 | Balance Systems SMI Spa |
| 2 | PhD | Chiara Cimini | A roadmap for the integration of human workers and technology in the next generation manufacturing systems: a socio-technical perspective | 2019 | Brembo |
| 3 | PhD | Michela Zambetti | A data-driven approach to PSS engineering: explore the potential of data availability and its impact on PSS ecosystem | 2020 | ABB |
| 4 | Bachelor | Piantoni Mattia | Analysis of the production and organizational processes of an engineering company with a view to continuous improvement | 2019 | |
| 5 | Bachelor | Trapletti Andrea | Analysis of the production and organizational processes of an engineering company with a view to continuous improvement | 2019 | |
| 6 | Bachelor | Piazzalunga Marco | Industry 4.0 applications in the agro-food sector | 2019 | MioOrto |
| 7 | Bachelor | Barzani Claudia | Big Data in Operations Management | 2019 | |
| 8 | Bachelor | Brambilla Chiara Maria | Big Data in Operations Management | 2019 | |
| 9 | Bachelor | Rachdaoui Badr | Cyber-Physical Systems in the context of product-service systems: analysis of literature and services offered | 2019 | |
| 10 | Master | Amato Hernandez Paolo Andres | Decision making in field service scheduling | 2019 | AtlasCoop |
| 11 | Master | Bendotti Michele | Digital Transformation as a challenge for the new era of SCM: measuring the digital maturity level of the Supply Chain through Readiness Assessment tools | 2019 | |
| 12 | Master | Locatelli Andrea | Digital Transformation as a challenge for the new era of SCM: measuring the digital maturity level of the Supply Chain through Readiness Assessment tools | 2019 | |
| 13 | Master | Lombardoni Barbara | Engineering and assessment of product-service solutions in manufacturing realities: the BFT case | 2019 | BFT |
| 14 | Master | Maltagliati Miranda Silvia | Engineering and assessment of product-service solutions in | 2019 | BFT |

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| | | | manufacturing realities: the BFT case | | |
| 15 | Bachelor | Rigamonti Alessandra | Internet of Things in the 4th range production chain. | 2019 | |
| 16 | Master | Ferrari Giorgia | The re-engineering of the production planning process in the context of Industria 4.0: the Ratti S.p.A. case. | 2019 | Ratti |
| 17 | Master | Bertoletti Sara | The re-engineering of the production planning process in the context of Industria 4.0: the Ratti S.p.A. case. | 2019 | Ratti |
| 18 | Bachelor | Persico Matteo | Discrete event simulation of production systems: comparison between two simulators in a real-life case | 2019 | |
| 19 | Bachelor | Previtali Francesca | Discrete event simulation of production systems: comparison between two simulators in a real-life case | 2019 | |
| 20 | Bachelor | Belotti Riccardo | Logistics 4.0: analysis of the new technologies to support the operator | 2019 | |
| 21 | Bachelor | Carrara Simone | Maintenance 4.0: principles, strategies, technologies and application cases. | 2019 | |
| 22 | Bachelor | Salvatoni Alberto | Maintenance 4.0: principles, strategies, technologies and application cases. | 2019 | |
| 23 | Bachelor | Lombardi Nicola | Re-engineering of production processes for a company working on a single order: the Innse-Berardi S.p.A case | 2019 | Innse-Berardi |
| 24 | Bachelor | Rota Luca | Sustainable Product-Service System Design from a strategic sustainable development perspective | 2019 | |
| 25 | Bachelor | Guazzi Marta | 5G Technologies in the Manufacturing Industry: state of the art, potential and future developments | 2019 | |
| 26 | Bachelor | Limonta Andrea | The evolution of business models in the clothing industry in context of Industry 4.0 | 2019 | |
| 27 | Bachelor | AHBAR DOUNIA | Simulation models developed for the spread of infectious diseases | 2020 | |
| 28 | Bachelor | ALBORGHETTI FEDERICA | Development of a use case in the healthcare field within OMiLAB - laboratory for research and experimentation of modelling methods | 2020 | |

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 29 | Bachelor | LUCCHINI ALICE | Simulation models and prediction techniques for the spread of infectious diseases | 2020 | |
| 30 | Bachelor | MAGNI MARTINA | Pipette controllers and spare parts management: San Raffaele Hospital Case | 2020 | |
| 31 | Bachelor | ARRIGONI DANIELE | Sizing and design of automated warehouses | 2020 | |
| 32 | Bachelor | BESTETTI LUCA | Analysis and optimization of material flows within a production department: the Brembo S.p.A. case. | 2020 | Brembo S.p.A. |
| 33 | Bachelor | MORSTABILINI ANDREA | Application of artificial intelligence in service delivery in manufacturing companies | 2020 | |
| 34 | Bachelor | TASCA MARCO | Setting up a Performance Measurement Dashboard for Maintenance | 2020 | |
| 35 | Bachelor | AGUSTONI STEFANO | Reorganization and optimization of warehouse layout: the My Cooking Box case | 2020 | My Cooking Box |
| 36 | Bachelor | FERRARI ZOE | Reorganization and optimization of warehouse layout: the My Cooking Box case | 2020 | My Cooking Box |
| 37 | Bachelor | AMIGONI SONIA | Application of Lean Thinking tools for the optimization of assembly processes: the Aesys SPA case | 2020 | Aesys SPA |
| 38 | Bachelor | QUADRIO UMBERTO | A stochastic model of Total Landed Cost to support decision making in a manufacturing supply chain | 2020 | |
| 39 | Bachelor | NORIS SIMONE | Redesigning cooking center maintenance plans: the Dussmann Service case | 2020 | Dussmann Service |
| 40 | Master | JOY ALBY | An overview of Decision Support System in maintenance from Industry 4.0 perspective | 2020 | |
| 41 | Master | MANSURI ALI NUREDDIN ALI | Application of Blockchain Technology in the Oil and Gas industry | 2020 | |
| 42 | Master | FACHERIS VALENTINA | Business processes reengineering within an IoT platform implementation project: the Smi case study | 2020 | SMI Spa |
| 43 | Master | ABBATTISTA ALESSIO | L'adozione della tecnologia 5G nei sistemi di produzione: uno studio esplorativo | 2020 | |
| 44 | Master | MILESI ERIKA | Business processes reengineering within an IoT platform implementation project: the Smi case study | 2020 | SMI Spa |

| Item | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 45 | Master | BALDI LORENZO | Logistics processes optimization in a factory open yard | 2020 | |
| 46 | Master | MANZONI ALESSANDRO | IoT platform for the dynamic monitoring of key-performance indicators: the SMI case study | 2020 | SMI Spa |
| 47 | Master | VENUTA MARCO | IoT platform for the dynamic monitoring of key-performance indicators: the SMI case study | 2020 | SMI Spa |
| 48 | Master | CORONA MATTEO | The machine learning algorithm selection framework: test with multiple datasets | 2020 | |
| 49 | Master | ARDITI ANTONIO | Supply Chain Sustainability: A Multi-objective Closed-loop Cycle Model for the WEEE Industry | 2020 | |
| 50 | Master | BOSCHINI GABRIELE | The adoption of 5G technology in manufacturing systems: an exploratory study | 2020 | |

## *4.6 Excursions (lab visits, industrial visits etc.)*

In 2019, took place the following three excursions:

- 28.10.2019: visit to the SMILE (Smart Manufacturing Innovation Lab) with 10 participants;
- 28.11.2019: Industry 4.0 in action at ABB Italy with 55 participants;
- 20.11.2019: Lean 4.0 in action at Vinservice with 50 participants.

The list of participants is reported in the document “D5.2-List of participants_UNIBG”.

Due to COVID pandemic we would not be able to organize excursions in 2020.

# 5 UNIBIAL joint academy-industry action

## *5.1 Online and face-to-face trainings and Webinar*

**Table 5.1. UNIBIAL webinars**

| Item | Webinar topic | Presenter | Date |
|---|---|---|---|
| 1 | Introduction and research interest of each Laboratory | Arkadiusz Jurczuk | 07.10.2019 |
| 2 | Gaps in digital competencies of the employees of the Factory of the Future | Julia Siderska | 16.01.2020 |

In the webinar "Introduction to DigiFoF" main areas of scientific research carried out by UNIBIAL team were presented. Furthermore, capabilities of UNIBIAL Laboratory and its potential input into the DIGIFoF project were introduced.
Webinar "Gaps in digital competencies of the employees of the Factory of the Future" aimed at presenting general results from "Report on needs and demands for FoF-design: Findings and recommendations" and recommendations on the scope of potential trainings for students and employees.

Furthermore, DIGIFoF project deliverables were presented by Arkadiusz Jurczuk, Alicja Gudanowska on 04.12.2019 during the workshop "Management challenges" organised by *The Scientific Society of Organization and Management, Branch in Bialystok* and *Polish Association for Production Management, Branch in Bialystok*. They gave a talk about demands and needs in the scope of digital competencies of the employees of the Factory of the Future.
Detailed about the event are submitted on the websites:

**Bialystok University of Technology, Faculty of Engineering Management**
https://wiz.pb.edu.pl/2019/11/21/kolejne-seminarium-warsztatowe-pt-wyzwania-zarzadzania-5-0/

**The Scientific Society of Organization *and Management***
http://www.tnoik.org/index.php?option=com_content&view=article&id=176:seminaria-warsztatowe-pt-wyzwania-zarzdzania-50-2019&catid=40:aktualnoci&Itemid=18

## 5.2 Lectures (series) in academia and industry

In the reported period three lectures and workshops have been provided. They were given for students of Bialystok University of Technology (UNIBIAL) and international students, among others in the scope of Erasmus+ Programme (see Table 2).

**Table 5.2. UNIBIAL lectures in academia**

| Item | Topic | Lecturer | Period | Number of participants |
|---|---|---|---|---|
| 1 | Business process management | Arkadiusz Jurczuk | October 2019/ January 2020 | 52 |
| 2 | Process management (Erasmus+ Programme) | Arkadiusz Jurczuk | October 2019/ January 2020 | 4 |
| 3 | Designing of business models for services | Arkadiusz Jurczuk | November 2019/ January 2020 | 17 |
| 4 | Modern management methods and tools in logistics (Robotic Process Automation) | Julia Siderska | October 2020/January 2021 | 30 |
| 5 | Contemporary methods of management and smart IT tools (Robotic Process Automation – workshop) | Julia Siderska | October 2020/January 2021 | 10 |
| 6 | Business Model Canvas in service engineering (workshop) | Alicja Gudanowska | March and May 2020 | 20 |
| 7 | Creating a roadmap for selected technological innovation (workshop) (Erasmus+ Programme) | Alicja Gudanowska | December 2019 | 4 |
| 8 | Creating a roadmap for selected technological innovation (workshop) (Erasmus+ Programme) | Alicja Gudanowska | May - June 2020 | 6 |
| 9 | Business process management | Arkadiusz Jurczuk | October 2020/January 2021 | 68 |
| 10 | Process management (Erasmus+ Programme) | Arkadiusz Jurczuk | October 2020/January 2021 | 2 |
| 11 | Designing business models for service activities | Arkadiusz Jurczuk | October 2020/January 2021 | 13 |

## 5.3 Invited talks both in academic and industrial settings

In the reported period UNIBIAL team took a part in three meetings organised by Innovation and Development Promotion Centre (IDPC).

**Table 5.3.** UNIBIAL **invited talks provided in the reported period**

| Item | Presented topic | Presenter | Date | Company |
|---|---|---|---|---|
| 1 | Role and functionality of OMILABFoF | Arkadiusz Jurczuk | 17.12.2019 | Metal Processing Cluster (MPC) General Meeting of Shareholders |
| 2 | Idea of OMILABFoF laboratory | Arkadiusz Jurczuk | 15.01.2020 | Metal Processing Cluster (MPC) GZW Lobbing |
| 3 | Needs and demands of the employees of the Factory of the Future – selected aspects | Alicja Gudanowska | 25.02.2020 | TOCK-AUTOMATYKA |
| 4 | Business process automation with the use of Robotic Process Automation technology | Julia Siderska | 13.11.2020 | The Future Industry Platform |
| 5 | Application of intelligent automation technology at various supply chains | Damian Kędziora (Guest lecturer, Norian) | 18.12.2020 | Norian/ Bialystok University of Technology |

Two invited talks were devoted to a role of OMILABFoF laboratory in digital competency development. Presentation was addressed to potential beneficiaries of DIGIFoF project - members of Metal Processing Cluster (MPC). The presentation given by Alicja Gudanowska considered areas of potential trainings for students and pupils of technical and vocational-technical schools as well.

The guest lecture “Application of intelligent automation technology at various supply chains” presented by dr. Damian Kedziora from Norian was addressed to master and bachelor students of Bialystok University of Technology (Faculty of Engineering Management). The lecture focused on business process digitalization aspects including: Robotics Process Automation in service industry, Blockchain, Artifial Inteligence.

## 5.4 Internships (e.g. Erasmus+ / student internships)

Internships in the DigiFoF domain were organised in cooperation with Innovation and Development Promotion Centre (IDPC) and Metal Processing Cluster (MPC). Details about this cooperation are given in the section 9.

## 5.5 Bachelor, Master, PhD thesis project

As part of the didactic activity and cooperation with business, thesis on selected aspects of FoF is conducted. In the reporting period, one thesis using the OMILABFoF methodology (process modelling, Scene2model-storytelling), coordinated by Arkadiusz Jurczuk was finished. Also, one work related to the process automation undertaken in logistics companies was finished (the concept of the application for controlling the automatic lift trucks), coordinated by Alicja Gudanowska.

**Table 5.4. UNIBIAL thesis for companies in the scope of chosen FoF aspects**

| **Item** | Thesis Type | Student Name | Project title | Year | Target companies |
|---|---|---|---|---|---|
| 1 | Bachelor | Patryk Żbikowski | Concept for digitizing the process of daily data exchange of the rail freight of Barter Inc. | 2020 | Barter Inc. |
| 2 | Engineering | Krystian Siemieńczuk | Project of automation of selected processes as an element of improvement of operational activity of logistic companies | 2020 | |

# 6 UNIOULU joint academy-industry action

In follow actions carried out by UNIOULU partner in period 01.2019-12.2020 in the DigiFoF project are presented. Activities in the reported period referred to two groups of project tasks - webinars and lectures in academia.

## *6.1 Online and face-to-face trainings and Webinar*

Members from UNIOULU contribute at one webinar in the 2019 year, as was in proposed plan:

1. In 07.10.2019 webinar #2 with name "Introduction and research interest of each Laboratory" where Juha Röning and Xiaowen Wang presented the general idea that will be integrated and develop in the white paper for this project.
2. In 13.05.2020 webinar #12 "Using conceptual modelling for automatisation in chemistry laboratory".

## *6.2 Lectures (series) in academia and industry*

In 2019 UNIOULU has 1 lecturer that participated at NEMO 2019 on the 17.07.2019 giving a lecture on "Collaborative and well-behaved outdoor robots in harsh environment".

## *6.3 Invited talks both in academic and industrial settings*

On 13.03. Biomimetic and intelligent systems group of Oulu university hosted AI & ROBOTICS BUSINESS EVENT for companies developing or utilising autonomous technology, AI and robotics. Speaks given in the event included:

| Lecture name | Speakers | Company |
|---|---|---|
| Opening | Juha Röning | University of Oulu |
| Open Infra BIM integrated Autonomous Excavator | Rauno Heikkilä | University of Oulu |
| GOF U-space project, Urban Air Mobility" | Jonas Stjernberg | |
| Robotics in the future rural transportation system | Rune Storvold Research | Director at NORCE " |
| Digital platform for U-space, opportunity for Drone business to grow | Pasi Nikama | SPV Marketing & customer relations |
| UAVs and Next Generation mobile networks | Richard Wiren | Ericsson |
| The challenges for autonomous and unmanned aircraft in the high north | Kim Lynge | UBIQ Aerospace |

On 10.11-12.11. University of Oulu hosted CriM 2020 Cyber Security Seminar and Workshops. Due to the COVID epidemic situation, the event was held online with speakers, delegates and students participating in the event remotely. The international

Crisis Management workshop CriM gathers the teachers, researchers, experts and students of cybersecurity annually to study pressing issues of security and privacy of our digital systems. Respected international and Finnish lecturers combined with practical workshops each day bring the important insights of the current world to students interested in cybersecurity. 2020 CriM focused on the NEXT GENERATION INTERNET and its challenges. Speakers talked about cybersecurity issues and legislative problems but also projects around the world tackling these issues. In addition to lectures, students also got to test their skills in practical workshops organized each day. The students were also awarded 5 ECTS for participating and completing all the assigned tasks for each of the lectures and workshops. Lectures given during event included:

| Lecture name | Speakers |
|---|---|
| Start lecture | Juha Röning |
| Digital forensic in enterprises | Ludwig Englbrecht |
| Cybersecurity in light of legislation | Gerald Quirchmayr |
| The challenge for managing security requirements for Ot environments | Markku Tyynelä |
| Cybersecurity presentation | Kimmo Halunen |
| The cost of Cybersecurity breached | Steven Funell |
| Cybersecurity presentation | Gabriela Limonta |
| Trusted computing | Ian Oliver |
| Secure critical infrastructures | König Sandra |
| Running infosec tools securely using containers and cincan | Rauli Kaksonen |

Workshops organised during CrimM 2020 were about cyberrange, trusted computing and cyber forensic.

## *6.4 Bachelor, Master, PhD thesis project*

University of Oulus Biomimetics and Intelligent Systems groups Robotics group studies and develops methods, theories, sensors and platforms for creating mobile robots that are adaptive and capable of performing purposeful tasks in cooperation with humans. Robotics research activity at BISG includes collaboration with processing industry. Projects done in cooperation with industry don't always lead directly to thesis but value is generated in knowledge gained during projects. Some projects developed in collabration with industries during 2019 and 2020 include:

- **EAKR - Labrobot** – Developing food industry with robotics in collaboration with Luonnonvarakeskus Luke, Probot Oy, Mekitec Oy, Maustaja Oy, Kinnusen Mylly, Yaskawa Finland and Oy Katri Antell Oy

- **HYFLIERS** – Oil refinery pipe inspection with flying drones in collaboration with University of, University of Seville (Spain), Chevron Oronite (France), Total (France), Consorzio di Ricerca per l'Energia e le Tecnologie dell'Elettromagnetismo C.R.E.A.T.E. (Italy), Advanced Center for Aerospace Technologies FADA-CATEC (Spain), General Electric Inspection Robotics (Switzerland) and, DASEL sistemas (Spain)
- **EAKR Garbot** – Utilizing robotics and AI for material recycling with Suomen ympristökeskus, Oulun energia, Vimelco and Kiertokaari.,
- **EAKR Geobot** – Utilizing robotics for geopolymer manufacturing in collaboration with Oulu University of Applied Sciences, Saint-Gobain S.A. Keliber Oy and Boliden AB.

# 7 BOC joint academy-industry action

In follow we will present actions carried out by BOC partner in period 01.2019-12.2019 in the DigiFoF project. Some of actions was planned and described already in the deliverable D5.1 because the deliverable D5.1 was prepared at the end of the year, according to the planning, and already some of the actions were being carried out.

## *7.1 Online and face-to-face trainings and Webinar*

BOC coordinated the development of webinars done by other consortium members as well as created two webinars, as it was in proposed in the action plan:

1. On 18.09.2019 – a webinar #4 with name "DigiFoF webinar 4 - FoF design with ADOxx" in which Zbigniew Misiak explained how ADOxx platform can be used to design FoF
2. On 16.10.2019 – a webinar #5 with name "DigiFoF webinar 5 - How to set up Olive based portal and brokerage" in which Zbigniew Misiak explained presented the current development of Olive platform, including instruction on how to properly setup this platform.
3. On 13.11.2019 – a webinar #6 with name "Design thinking with Scene2Models" presented by Michael Walch, in which explain how Science2Model can be used to design FoF.

# 8 OMiLAB joint academy-industry action

In this chapter, the actions carried out in the DigiFoF project by OMiLAB NPO in the period from January 2019 until December 2019 are presented.

## *8.1 Online and face-to-face trainings and Webinar*

In 2019, OMiLAB NPO contributed the following webinars:

1. The webinar #3 “Introduction and requirements for OMiLAB” was presented by Wilfrid Utz on the 04/09/2019. In this webinar, the OMiLAB Laboratory was introduced and the physical as well as the technical requirements for setting up an OMiLAB were explained.
2. The webinar #7 “Flowchart and Petri net steering with BeeUp” was presented by Wilfrid Utz on the 11/12/2019 explaining the modelling languages flowchart and Petri net using the BeeUp software tool.

## *8.2 Lectures (series) in academia and industry*

On the 19/07/2019, during NEMO summer school, Wilfrid Utz presented this EU project DigiFoF to the participants of the summer school. The presentation covered the motivation for the project, the purpose of the project, including the concept, the objectives as well as project facts and figures and concluded with an outlook.

# 9 IDPC joint academy-industry action

Activities carried out by IDPC in the reported period refer to two groups of project tasks - invited talks and internships. All actions have been described in the action plan (deliverable D5.1).

## *9.1 Invited talks both in academic and industrial settings*

IDPC Poland provides the three actions in the scope of this set of project tasks. They aimed at presentation of fundamental aspects of Industry 4.0.

**Table 9.1. IDPC invited talks in the reported period**

| Item | Presenter | Topic | Event and Date | Company |
|---|---|---|---|---|
| 1 | Sebastian Rynkiewicz | On the Way to Industry 4.0 | November 2019 | University of Bialystok / Faculty of Mechanical Engineering |
| 2 | Sebastian Rynkiewicz | Competent success factors of the industry of the future | April 2019<br>Congress of Leaders of Change | The University of Finance and Management |
| 3 | Sebastian Rynkiewicz | EU funds after 2020 - possibilities, needs, potential effects. Education and new competencies. Universities versus soft regional projects | September 2019<br>6th Eastern Economic Congress | Bialystok<br>6th Eastern Economic Congress |

## *9.2 Internships (e.g. Erasmus+ / student internships)*

Internships coordinated by IDPC were addressed mainly to UNIBIAL students and teachers. In the reported IDPC provides the following actions.

**Table 9.2. Internships cooordinated by IDPC**

| Item | Student Name | Specialization | Year study | Start date | Organising Company |
|---|---|---|---|---|---|
| 1 | Karolina Ślinko | Biomedical engineering | Final year of engineer | VIII – IX 2019 | Rotational internships in companies :<br>FERROX Ltd.<br>Samasz Ltd.<br>ChM Ltd<br>Metalfach Ltd. |
| 2 | Adrian Lotkowski | Electronic and telecommunications | | VIII – IX 2019 | |
| 3 | Rafał Tarasaewicz | Mechatronics | | VIII – IX 2019 | |
| 4 | Kamil Żukowski | Management engineering | | VIII – IX 2019 | |
| 5 | Karol Rzemieniecki | Mechatronics | | VIII – IX 2019 | |
| 6 | Adrian Kaczmarek | Mechanics | | VIII – IX 2019 | |
| 7 | Sandra Romaniuk | Mechanics | | VIII – IX 2019 | |
| 8 | Paulina Nikołajuk | Biomedical engineering | | VIII – IX 2019 | |
| 9 | Barbara Chojnowska | Mechanics | | VIII – IX 2019 | |

# 10 CONTI joint academy-industry action

In follow we will present actions carried out by CONTI partner in period covered by this report in the DigiFoF project.

## *10.1 Online and face-to-face trainings and Webinar*

1. In 28.10.2020 webinar #16: "Cobots - Rapid implementation of Cobots in industrial environment" was presented by Cosmin Moga and Cristian Mihutoiu from the CONTI Company.
2. In 18.11.2020 webinar #17:"AGV for modern Logistics in industrial companies" was presented by Cosmin Moga and Cristian Mihutoiu from CONTI.

# 11 Summary of academia-industry initiatives

DIGIFoF partners in the reported period organized 17 webinars on project and some trainings for professionals, students and teachers as well. Furthermore, project members contributed and gave more than 35 lectures and talks for academics, representatives of enterprises, training institutions and local/regional authorities. Thanks to the strong cooperation in DIGIFoF academia-industry network including HEIs and manufacturing sector it was possible to organize 70 internships in fist year and only 19 in the second year but because of restrictions due to COVID-19 period. Also, the excursions start very well in the first year and stop in the second year. Project partners coordinated 46 Bachelor, Master and PhD thesis project related to fundamental aspects of Factory of the Future in first year and 58 in the second year. This confirms the high utilitarian potential of the diploma thesis and the ability of the HEI-industry to work together efficiently in the field of FoF.

Synthesis of all activities carried out by DIGIFoF partners in the reported period (separate for each year) are given in the table below.

**Table 11.1. Summary of academia-industry initiatives**

| Type of activity | Achieved result 2019 | Achieved result 2020 |
|---|---|---|
| Online and face-to-face trainings and Webinar | **9** | **13** |
| Lectures (series) in academia and industry | **17** | **19** |
| Invited talks both in academic and industrial settings | **11** | **38** |
| Internships (e.g. Erasmus+ student internships) | **70** | **19** |
| Bachelor, Master, PhD thesis project | **46** | **58** |
| Excursions (lab visits, industrial visits etc.) | **6** | **0** |