

Role of the leaders of intellectual Outputs (IOs). Plan and status of each IO +distribution of tasks)

Transnational Project Meeting – UPB -day 1 -
31st of August 2022

Associate Prof.dr.eng. Razvan Pacurar

Department of Manufacturing Engineering

Faculty of Industrial Engineering, Robotics and Production Management

Technical University of Cluj-Napoca, Romania

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Content

- 1. Main objectives of the EMERALD project. General presentations of the Intellectual Outputs. Most important KPIs of the EMERALD project.**
- 2. Role of the leaders of Intellectual Outputs. Important aspects that must be considered (as the Agency is specifically requiring it).**
- 3. Validation of the distribution of tasks - each partner will present the plan and status for each activity they have ownership**
- 4. Q&A with EMERALD partners - comments and discussions**

1. Main objectives of the EMERALD project.

Quick overview of the Intellectual Outputs.

Most important KPIs of the EMERALD project

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Main objectives of the EMERALD project

Providing **teaching resources and methods for professors** coming from the Higher Education institutions that are interested to find ways in **providing their students** relevant knowledge, skills and competences in **conceiving, developing and realizing of different biomimetic mechatronic systems by 3D printing methods for people with special needs (amputated arms)**, such as:

- EMERALD **support e-courses** related to the objective (based on one curriculum defined by the EMERALD consortium)
- EMERALD **e-toolkit manual** for digital learning (correlated with the support courses)
- EMERALD **e-learning virtual laboratory** platform for developing, producing and testing of biomimetic mechatronic systems made by 3D printing (in correlation with the support e-courses and the e-toolkit manual)
- EMERALD **e-case studies** for project based learning method used in developing, testing and manufacturing of new types of biomimetic mechatronic systems made by 3D printing technologies for people with special needs (amputated arms)

The advantages of the EMERALD methods will be that the **professors and students will gain knowledge and competences related to the developing, designing, producing of biomimetic mechatronic systems by 3D printing methods and testing of developed systems that are aimed to support people with special needs (amputated arms) in the end.**

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Quick overview of the Intellectual outputs related to the EMERALD project

I01 - EMERALD e-book for developing of biomimetic mechatronic systems

Start Date : 15 Feb 2022

End Date : 31 Jul 2022

Responsible: Technical University of Cluj-Napoca

The main aim of the I01 is to provide the proposed CURRICULUM for increasing the application of research results in regenerative medicine, human-machine interfaces, advanced robotics, new paradigms in biomimetic mechatronic systems, etc. The curriculum comprise **8 MODULES**.

Languages : English

Open
access
on the
platform?

Content?

Template?

Report?

MODULES	RESPONSIBLES
1. Computer Aided Design (CAD)	PUT
2. Computer Aided Engineering (CAE)	TUCN
3. Computer Programming	UiA
4. Virtual Reality / Augmented Reality	PUT & BIZZCOM
5. Sensors and Electronics	UPB
6. Bio-Mechatronics	UiA
7. 3D printing and Rapid Tooling methods	TUCN
8. Intelligent (smart) materials	UPB

Starting:
15.02.2022

Deadline:
31.07.2022

For each module according to the skills and competences of the EMERALD partners consortium, from the **Technical team there will be nominated 1-2 responsible persons** which will be in charge with one module and will need to provide course support for the particular module courses necessary for **producing biomechatronic / biomimetic systems**.

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Quick overview of the Intellectual outputs related to the EMERALD project

102 - EMERALD e-toolkit manual for digital learning in producing biomimetic mechatronic systems

Start Date : 01 Aug 2022 End Date : 31 Jan 2023

Responsible: University of Agder

The aims of the 102 : > to provide e-toolkit for teaching purposes

- > to provide the basics knowledge about the realizing of biomimetic mechatronic systems by 3D printing.
- > to provide the other preliminary and post processing steps that are required to be followed in terms of CAD modeling
- > diploma project themes

		RESPONSIBLES	
Open access on the platform?	Conceiving the concepts of biomimetic mechatronic systems / bio-mechatronic domain	UiA	Starting: 01.08.2022
	Providing details related to the designing solutions used for conceiving the biomimetic mechatronic systems	PUT & TUCN	
	Validation of the biomimetic mechatronic systems (solutions designed by CAD systems based on CAE analyses)	TUCN	
Content?	Solutions related to the materials to be used for the realizing of the new developed biomimetic mechatronic systems	UPB	Deadline: 31.01.2023
	3D printing and rapid tooling methods for the components to be realized for the new biomimetic mechatronic	TUCN & UPB & PUT	
Template?	Description of assembling and programming of the systems	UiA	
Report?	Aspects related to the set-up/functionality of the presented solutions/repeatability of the process /troubleshoot and control; inputs regarding the methods of testing of these new biomimetic mechatronic systems by AR / VR	BIZZCOM	
	- solutions of conceiving, realizing and materializing of different scenarios in AR/VR where the biomimetic mechatronic systems will be connected and used for therapeutically purposes by the persons with special needs		

For each module according to the skills and competences of the EMERALD partners consortium, from the Technical team there will be nominated 1-2 responsible persons which will be in charge with the module and will need to provide the module for the e-toolkit manual.

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Quick overview of the Intellectual outputs related to the EMERALD project

I03 - EMERALD e-learning VR / AR platform for programming and using biomimetic mechatronic systems

Start Date : 01 Feb 2023 End Date : 31 Jul 2023

Responsible: BIZZCOM company

The aims of the I03 : ➤ the realization of a Virtual laboratory (e-learning) platform, that integrates VR / AR applications which can be accessed by professors and students

- Programming and realizing of different scenarios in VR / AR / Mixed Reality, conceiving of different applications that can be connected with AR / VR (applications that can be downloaded at home)
- Applications developed by professors and students will be uploaded on the EMERALD platform

		RESPONSIBLES	
Open access on the platform?	Designing of different scenarios, the programming of the biomimetic mechatronic systems	BIZZCOM Company	Starting: 01.02.2023
	Preparing the e-library of the developed e-learning platform & aspects that are required to be followed by professors & students Hints & tips about regulations in modeling, selecting of the adequate materials, manufacturing solutions & assembling of such biomimetic mechatronic systems	TUCN & PUT & UPB	
Content?	The project themes that are required for people with special needs & particularities of these types of topics	UiA / all partners	Deadline: 31.07.2023
	Logistics in terms of materials selecting, CAD, CAE, manufacturing & assembling of the new developed systems	TUCN & PUT & UPB	
	Potential stakeholders that are interested by the solutions developed by the EMERALD consortium	BIZZCOM	
Report?	Feedbacks and recommendations	BIZZCOM/ all partners	

For each room according to the skills and competences of the EMERALD partners consortium, from the **Technical team there will be nominated 1-2 responsible persons** which will be in charge with the virtual room and will need to provide the informations for the virtual room of the virtual laboratory.

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Quick overview of the Intellectual outputs related to the EMERALD project

I04 - EMERALD e-case studies for project based learning method used in developing, testing and manufacturing of new biomimetic mechatronic systems by 3D printing technologies
 Start Date : 15 Feb 2022 End Date : 29 Sep 2023
 Responsible: Poznan University of Technology

The main aim of the I04 : ➤ the implementation of the communication and dissemination strategy for increasing awareness, understanding and engagement with users and target groups
 ➤ **4 CASE STUDIES** of biomimetic mechatronic systems made by 3D printing for people with special needs.

		RESPONSIBLES	
Open access on the platform?	Designating of one person from each technical team of the EMERALD consortium as MENTOR for the students which will work on these topics.	UiA & TUCN & UPB& PUT	Starting: 15.02.2022
	Selection of the 4 case studies	PUT / all partners	
	3 different TEAMS comprising 5-7 students from different countries of the consortium will start to work on the topic, starting from the CAD & CAE methods	all partners	
Content?	Validation of the solutions proposed by the students	all partners	Deadline: 29.09.2023
	Selection of the material and 3D printing process by the students	UPB & TUCN & PUT	
Template?	Programming tests & procedures	UiA & BIZZCOM	
	Final feedback	UiA	

Report? For each case study according to the skills and competences of the EMERALD partners consortium, from the **Technical team there will be nominated 1-2 responsible** persons. **3 different teams comprising 5-7 students** from different countries of the consortium will start to work on the topic. Validation of the solutions proposed by the students will be made with the help of their mentor (responsible professor of the EMERALD consortium) .


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KPI
(Key Performance Indicators)



Delante



104 - EMERALD e-case studies for project based learning method used in developing, testing and manufacturing of new biomimetic mechatronic systems by 3D printing technologies

RESULTS (KPIs):

- ✓ 4 case study reports
- ✓ 1 open access book
- ✓ 1 open access toolkit manual
- ✓ 4 academic / scientific papers (ISI with Impact factor) are expected to be delivered at the end and shared via a-platform of EMERALD project as good practice use for dissemination
- ✓ e-learning platform conceived by the EMERALD consortium is intended to be used finally as one powerful tool for attracting the major stakeholders in the field of bio-mechatronics /3D printing domains) to scale up the solutions to build one active and representative network for 3D printing of biomimetic mechatronic systems in Europe (EMERALD network)

DISSEMINATION:

1. **Chapters that might be used by students for BSc projects / reports** that emphasize the case studies and use of EMERALD resources in developing, producing or testing new types of biomimetic mechatronic systems by 3D printing (reports will be shared via the e-learning platform of EMERALD project in open-access mode in order to emphasize how EMERALD resources were used in sorting out real issues in close correlation with the persons with special needs I adapted for these case studies);
2. **Case studies developed, tested and made at this level** will provide important feedbacks regarding the EMERALD resources and regarding the new biomimetic mechatronic systems developed for people with special needs.
3. Since topic of the EMERALD project and content is in the interest of SMEs and Medical Institutions, **transfer of know-how from the universities engaged in the EMERALD consortium to stakeholders**, as well as building strategic partnerships and **applying for new EU projects** is highly foreseen to be reached at dissemination level in the future as well.
4. **patenting process of the solutions developed by the EMERALD consortium** (patent submitting application)
5. **Advertising is not for dissemination**, but is needed for promoting of the consortium and events (logo of the project, advertising, web page, newspapers) etc.

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2. Role of the leaders of Intellectual Outputs. Important aspects that must be considered (as the Agency is specifically requiring it)

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Role of the leaders of Intellectual Outputs. Important aspects that must be considered (as the Agency is specifically requiring it)

DISSEMINATION PLAN



Dissemination (disseminating) plan – this is urgently needed In the frame of IO4 (coordinated by Filip Gorski – PUT Poznan)

This disseminating plan must be done in concordance to the expected KPIs in the frame of the EMERALD project

Actions / terms (deadlines) / responsibilities will have to be attributed on behalf of Filip Gorski to all of us!!!

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Role of the leaders of Intellectual Outputs. Important aspects that must be considered (as the Agency is specifically requiring it)

Input
needed
on behalf
of UPB

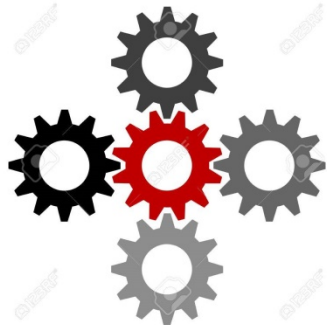


Input
needed
on behalf
of UPB

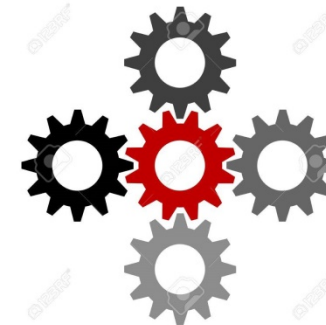
ARM NEUROPROSTHESIS EQUIPED WITH ARTIFICIAL SKIN AND SENSORIAL FEEDBACK - ARMIN

Partners: UPB, National Institute of Microtechnology, Clinical Hospital of Floreasca, Medical Science Academy, Areus Technology, University of South-Eastern Norway, budget approx. 1.510.000 euro

The main objective of the project was to design and fabricate the command and control system of a neuroprosthesis that integrates the motion algorithms with the command and sensory signals. The sensorial feedback system is re-establishing the sensorial function of amputated arms and is able to achieve high precision movements when handling objects with the neuroprosthesis. To design and fabricate a set of regenerative neural bio-interfaces for selecting and stimulating (from ulnar and median nerves), the sensory axons considered being in charge with the transmission of tactile sensations from palm and fingers, before amputation has been developed. These bio-interfaces allow the tactile signals from the fingers and palms of the neuroprosthesis to be transmitted through these sensory axons. In this way the patient actually feels tactile feedback sensations when handling objects with neuroprosthesis. To mount a fully functional neuroprosthesis on the patient stump, it was needed to be connected to the peripheral nervous system of the patient. For delivering the arm neuroprosthesis prototype (implanted in the patient stump and WiFi connected to the prosthesis hand), most of lost arm and hand functions were achieved by 3D printing.



SYNERGY



SYNERGY

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3. Validation of the distribution of tasks – Each partner will present the plan and status for each activity they have ownership

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Role of the leaders of intellectual outputs

IO1	EMERALD e-book for developing of biomimetic mechatronic systems	TUCN
IO2	EMERALD e-toolkit manual for digital learning in producing biomimetic mechatronic systems	<i>University of Agder</i>
IO3	EMERALD e-learning VR / AR platform for programming and using biomimetic mechatronic systems	<i>Bizzcom</i>
IO4	EMERALD e-case studies for project based learning method used in developing, testing and manufacturing of new biomimetic mechatronic systems by 3Dprinting technologies	<i>Poznan University of Technology</i>

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I01 - EMERALD e-book for developing of biomimetic mechatronic systems

Start Date : 15 Feb 2022

End Date : 31 Jul 2022

Responsible: Technical University of Cluj-Napoca

The main aim of the I01 is to provide the proposed **CURRICULUM** for increasing the application of research results in regenerative medicine, human-machine interfaces, advanced robotics, new paradigms in biomimetic mechatronic systems, etc. The curriculum comprise **8 MODULES**.

Languages : English

Open
access
on the
platform?

Content?

Template?

Report?

MODULES	RESPONSIBLES
1. Computer Aided Design (CAD)	PUT
2. Computer Aided Engineering (CAE)	TUCN
3. Computer Programming	UiA
4. Virtual Reality / Augmented Reality	PUT & BIZZCOM
5. Sensors and Electronics	UPB
6. Bio-Mechatronics	UiA
7. 3D printing and Rapid Tooling methods	TUCN
8. Intelligent (smart) materials	UPB

Starting:
15.02.2022

Deadline:
31.07.2022

For each module according to the skills and competences of the EMERALD partners consortium, from the **Technical team there will be nominated 1-2 responsible persons** which will be in charge with one module and will need to provide course support for the particular module courses necessary for **producing biomechatronic / biomimetic systems**.

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EMERALD

The Education, Scholarships, Apprenticeships and Youth
Entrepreneurship

EUROPEAN NETWORK FOR 3D PRINTING OF BIOMIMETIC

MECHATRONIC SYSTEMS

MODULE *number*

Name of Module

Project Title	European network for 3D printing of biomimetic mechatronic systems 21-COP-0019
Output	IOI - EMERALD e-book for developing of biomimetic mechatronic systems
Module	Module *number* *Name of Module*
Date of Delivery	July 2022
Authors	
Version	FINAL VARIANT, *date*

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4.2	Subchapter	7
4.2.1	Subsection	7
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5	Chapter	8

Title of the presentation

Academic title or role in the company, Name and Surname,
Department,
Faculty / University / Company, country of origin



1

Template is ready in the first draft

8 course modules comprising 30-40 pages each
are needed to be delivered (deadline was
31.07.2022)

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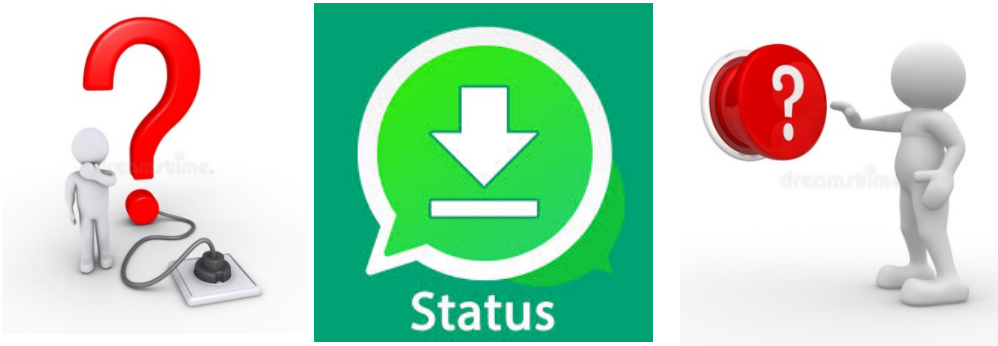
MODULES	RESPONSIBLES
1. Computer Aided Design (CAD)	PUT
2. Computer Aided Engineering (CAE)	TUCN
3. Computer Programming	UiA
4. Virtual Reality / Augmented Reality	PUT & BIZZCOM
5. Sensors and Electronics	UPB
6. Bio-Mechatronics	UiA
7. 3D printing and Rapid Tooling methods	TUCN
8. Intelligent (smart) materials	UPB

8 course modules comprising 30-40 pages each are needed to be shared and delivered (together with the Powerpoint presentations) at the International Summer School in Norway (September 2022)

This is the main aim of this edition of summer school organized in the frame of the EMERALD project

8 course modules comprising 30-40 pages each were supposed to be shared and distributed at this edition of ME organized on 2nd September 2022 in Bucharest

This is the main aim of the ME organized in the frame of the EMERALD project in Bucharest



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Validation of the distribution of tasks – Each partner will present the plan and status for each activity they have ownership

I02 - EMERALD e-toolkit manual for digital learning in producing biomimetic mechatronic systems

Start Date : 01 Aug 2022

End Date : 31 Jan 2023

Responsible: University of Agder

The aims of the I02 : > to provide e-toolkit for teaching purposes

> to provide the basics knowledge about the realizing of biomimetic mechatronic systems by 3D printing.

> to provide the other preliminary and post processing steps that are required to be followed in terms of CAD modeling

> diploma project themes

		RESPONSIBLES	
Open access on the platform?	Conceiving the concepts of biomimetic mechatronic systems / bio-mechatronic domain	UiA	Starting: 01.08.2022
	Providing details related to the designing solutions used for conceiving the biomimetic mechatronic systems	PUT & TUCN	
	Validation of the biomimetic mechatronic systems (solutions designed by CAD systems based on CAE analyses)	TUCN	
Content?	Solutions related to the materials to be used for the realizing of the new developed biomimetic mechatronic systems	UPB	Deadline: 31.01.2023
	3D printing and rapid tooling methods for the components to be realized for the new biomimetic mechatronic	TUCN & UPB & PUT	
Template?	Description of assembling and programming of the systems	UiA	
Report?	Aspects related to the set-up/functionality of the presented solutions/repeatability of the process /troubleshoot and control; inputs regarding the methods of testing of these new biomimetic mechatronic systems by AR / VR - solutions of conceiving, realizing and materializing of different scenarios in AR/VR where the biomimetic mechatronic systems will be connected and used for therapeutically purposes by the persons with special needs	BIZZCOM	

For each module according to the skills and competences of the EMERALD partners consortium, from the Technical team there will be nominated 1-2 responsible persons which will be in charge with the module and will need to provide the module for the e-toolkit manual.

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Validation of the distribution of tasks – Each partner will present the plan and status for each activity they have ownership

I03 - EMERALD e-learning VR / AR platform for programming and using biomimetic mechatronic systems

Start Date : 01 Feb 2023 End Date : 31 Jul 2023

Responsible: BIZZCOM company

The aims of the I03 : > the realization of a Virtual laboratory (e-learning) platform, that integrates VR / AR applications which can be accessed by professors and students

- > **Programming and realizing** of different scenarios in VR / AR / Mixed Reality, conceiving of different applications that can be connected with AR / VR (applications that can be downloaded at home)
- > **Applications developed by professors and students will be uploaded on the EMERALD platform**

		RESPONSIBLES	
Open access on the platform?	Designing of different scenarios, the programming of the biomimetic mechatronic systems	BIZZCOM Company	Starting: 01.02.2023
	Preparing the e-library of the developed e-learning platform & aspects that are required to be followed by professors & students Hints & tips about regulations in modeling, selecting of the adequate materials, manufacturing solutions & assembling of such biomimetic mechatronic systems	TUCN & PUT & UPB	
Content?	The project themes that are required for people with special needs & particularities of these types of topics	UiA / all partners	Deadline: 31.07.2023
	Logistics in terms of materials selecting, CAD, CAE, manufacturing & assembling of the new developed systems	TUCN & PUT & UPB	
Report?	Potential stakeholders that are interested by the solutions developed by the EMERALD consortium	BIZZCOM	
	Feedbacks and recommendations	BIZZCOM/ all partners	

For each room according to the skills and competences of the EMERALD partners consortium, from the **Technical team there will be nominated 1-2 responsible persons** which will be in charge with the virtual room and will need to provide the informations for the virtual room of the virtual laboratory.

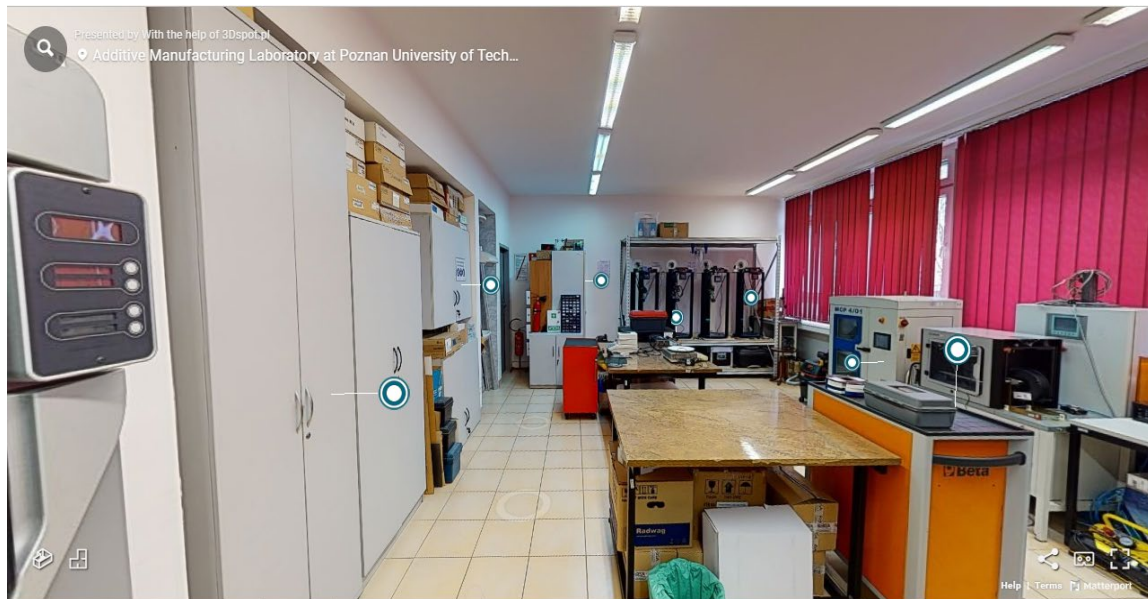
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**Validation of the distribution of tasks –
Each partner will present the plan and status for each activity they have ownership**

**Virtual platform (in progress on a similar project) –
rooms will be focused on 360 degrees presentations of each institution with AR/ VR elements integrated in it**



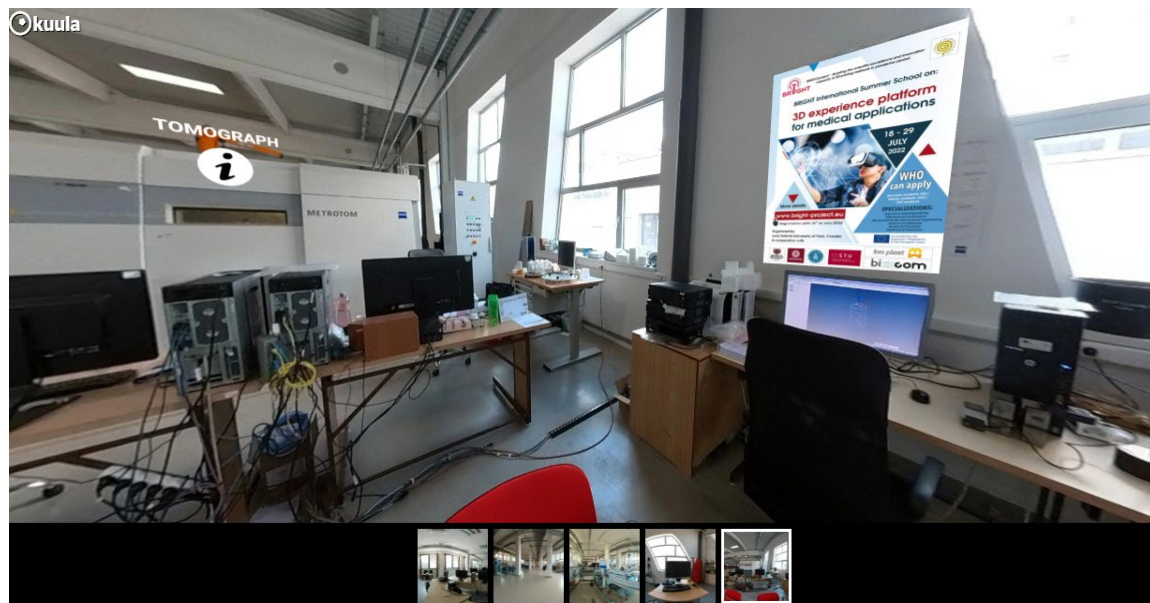
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**Virtual platform (in progress on a similar project) –
rooms will be focused on 360 degrees presentations of each institution with AR/ VR elements integrated in it**



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Validation of the distribution of tasks – Each partner will present the plan and status for each activity they have ownership

I04 - EMERALD e-case studies for project based learning method used in developing, testing and manufacturing of new biomimetic mechatronic systems by 3D printing technologies
 Start Date : 15 Feb 2022 End Date : 29 Sep 2023
 Responsible: Poznan University of Technology

The main aim of the I04 : ➤ the implementation of the communication and dissemination strategy for increasing awareness, understanding and engagement with users and target groups
 ➤ 4 CASE STUDIES of biomimetic mechatronic systems made by 3D printing for people with special needs.

		RESPONSIBLES	
Open access on the platform?	Designating of one person from each technical team of the EMERALD consortium as MENTOR for the students which will work on these topics.	UiA & TUCN & UPB& PUT	Starting: 15.02.2022
	Selection of the 4 case studies	PUT / all partners	
	3 different TEAMS comprising 5-7 students from different countries of the consortium will start to work on the topic, starting from the CAD & CAE methods	all partners	
Content?	Validation of the solutions proposed by the students	all partners	Deadline: 29.09.2023
	Selection of the material and 3D printing process by the students	UPB & TUCN & PUT	
Template?	Programming tests & procedures	UiA & BIZZCOM	
	Final feedback	UiA	

Report? For each case study according to the skills and competences of the EMERALD partners consortium, from the Technical team there will be nominated 1-2 responsible persons. 3 different teams comprising 5-7 students from different countries of the consortium will start to work on the topic. Validation of the solutions proposed by the students will be made with the help of their mentor (responsible professor of the EMERALD consortium) .

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**Q&A with partners comments and discussions.
Concluding of the first TPM day organized in Bucharest
31st of August 2022**

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