Co-funded by the Erasmus+ Programme of the European Union

BRIGHT

Erasmus+ strategic partnership for Higher Education

BOOSTING THE SCIENTIFIC EXCELLENCE AND INNOVATION CAPACITY OF 3D PRINTING METHODS IN PANDEMIC PERIOD

BRIGHT Dissemination report

Project Title	**Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period 2020-1-RO01-KA226-HE-095517**
Output	**Dissemination report**
Date of Delivery	**2023**
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Version	**FINAL VERSION**

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Content

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1. Introduction

The most important aspect that is foreseen in the disseminating process of BRIGHT project was related to the main target groups of the project (professors & students outside the BRIGHT project consortium, SMEs representative, hospital institutions, broader public, etc.), who can benefit from the BRIGHT project's achievements, but also have been interested in receiving relevant information throughout the implementation process of BRIGHT project. This approach had the main aim to maximize the impact of the BRIGHT project by keeping stakeholders informed about progress, achievements and results that have been reached in the BRIGHT project. Academic partners of BRIGHT consortium have been very active not just in realizing of teaching resources of BRIGHT project, but also through other types of activities, such as workshops, meetings, and conferences on which they have attended, utilizing these opportunities to include the perspectives of the BRIGHT project in discussions. The BRIGHT project activities have been carried out with a long-term strategic view, emphasizing continuity, complementarity, and capitalization of results that have been achieved in the BRIGHT project. When referring to the main results or resources of the BRIGHT project, these results are comprising the BRIGHT e-course modules that support the curriculum which was defined by the BRIGHT consortium in the frame of O1, the e-toolkit laboratory modules of the manual realized based on the activities that have been developed in the frame of O2, the BRIGHT e-virtual platform that has been conceived in the frame of O3 like a modern resource for digital learning especially in time of pandemic, e-webinars that have been realized by the BRIGHT consortium in the frame of O4, and last, but not least the e-cases that have been defined by the medical sector for developing, producing and testing new products for the medical sector to be realized by professors and students of BRIGHT consortium with support of the SMEs in the time of pandemic. Each partner of the BRIGHT consortium has been actively contributing to the promoting of the results reached in the BRIGHT project through several methods: promoting on their home institution websites, promoting through social media or articles published in the press, promoting through several publications (articles, books, etc.) or presentations that were realized through several events (like workshops, conferences, etc.) as well as through the events that have been organized in the BRIGHT project (like summer school events, multiplier events, etc.), all results in terms of dissemination being published on the BRIGHT project website on a dedicated link (see: https://bright-project.eu/?cat=17).

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2. Dissemination strategy of the BRIGHT project

The responsibility for the dissemination of the BRIGHT project results have been taken seriously by all partner institutions that have been involved in the BRIGHT project. In order to have an efficient dissemination of the results reached in the BRIGHT project, it has been considered as being essential to have a well-planned dissemination strategy in place to ensure that the BRIGHT project's outcomes and achievements will be disseminated effectively in the implementation phase of the BRIGHT project. In this context, one dissemination plan has been conceived with clear KPIs, deadlines, and responsibilities allocated to all partners involved in the BRIGHT project, so each partner would be engaged in all the activities (see Figure 1).

Project activity	Target	Result	Degree of fulfilment	Responsible	Deadline	Narative description
Project management	**30 SMEs** representatives engaged in the project					
	5 Universities taking part in the project;					
	30 professors participants engaged in the project					
Project promotion	Project & Erasmus + Program promoted to **>20K people** at European level through online channels: partners' websites, Facebook & LinkedIn pages, websites, info graphic, slide share presentations, multiplier events' minutes.					
	Project & Erasmus+ Program promoted **>100 small, medium and large company's representatives** from Serbia, Romania, Slovakia, Croatia and Poland through face-to-face meetings, participation in networking event.					
Dissemination	Project results disseminated to **>20K people** at European level through online channels: partners' websites, Facebook & LinkedIn pages.					
	Project results disseminated to **>100 small, medium and large company's representatives** from Serbia, Romania, Slovakia, Croatia and Poland through face-to-face meetings, participation in networking events.					
	Project results disseminated to **students** and teachers from Serbia, Romania, Slovakia and Poland online channels: partners' websites, Facebook & LinkedIn pages, websites, info graphic, slide share presentations, etc.					
Transnational meetings	**4 meetings**					
	120 evaluation questionnaires filled in by participants at organized BRIGHT project events					

Project activity	Task	Organiser / Owner	Status
Project management	Signing the contracts between partners and transfer the first payment	UTCN	
	Prepare shared project management procedures & tools	UTCN	
	Establish the Executive, Financial, Technical, Communication team members	TUCN	
	Organise one meeting to evaluate the progress of the project	Management (Executive team)	
Project promotion	Create a logo of the project	Univ. of PU	
	Create website / facebook page	Univ. of PU	
	Promote M1 on the facebook page - pictures and info	Univ. of PU	
	Promote the project on social media	All partners	
Monitoring	Organise monthly skype meetings, according to the monitoring plan	TUCN	
	Create measuring instruments, measuring points, expected outputs and reports and quality indicators (both quantitative and qualitative).	TUCN	
	Create a model of agenda and minute	TUCN	
Project evaluation	Create evaluation tools and share them with the partners	Univ. of NIS	
	Create the feedback evaluation form for **M1**	Univ. of NIS	
	Centralize the results from the feedback forms and realize a report for **M1**	Univ. of NIS	
	Create evaluation tools and share them with the partners	Univ. of POZ	
	Create the feedback evaluation form for **M2**	Univ. of POZ	
	Centralize the results from the feedback forms and realize a report for **M2**	Univ. of POZ	

Figure.1 Targets and tasks defined and assigned in the dissemination plan of BRIGHT project

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The KPIs included deadlines for specific dissemination activities, such as publication of project-related articles in academic journals, publishing of books, along with specific responsibilities that have been assigned to all partners of the BRIGHT consortium. To ensure that the dissemination plan is implemented effectively, a responsible partner has been assigned to oversee and monitor the dissemination activities (like shown in Figure 2).

Monitoring activity*	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
Monthly Ms Teams meetings																								
Centralize documents monthly																								
Management Commitee - Observation Form																								
Self evaluation questionnaire fiiled in by the Management Commitee																								
Monitor the progress of each project activity - Check list																								
Activities implemented according to the Gantt chart																								
Accomplishment of the project objectives																								
Quality interim report																								
Quality final report																								
Monitoring report for IO 1																								
Monitoring report for IO 2																								
Monitoring report for IO 3																								
Monitoring report for IO 4																								
Monitoring report for IO 5																								
Monitoring report for M1 Serbia																								
Monitoring report for M2 Poland																								
Monitoring report for M3 Croatia																								
Monitoring report for C1 Romania																								
Monitoring report for C2 Slovakia																								
Monitoring report for C3 Croatia																								
Monitoring report for E 1 Serbia																								
Monitoring report for E 2 Poland																								
Monitoring report for E 3 Croatia																								

Figure 2. Monitoring of the BRIGHT project activities based on the Gantt diagram

This partner has been responsible in coordinating the dissemination activities, ensuring that they are aligned with the BRIGHT project's objectives and timelines, being responsible in monitoring the progress of all BRIGHT project's dissemination activities. In order to have double-check of the dissemination activities and reports uploaded on the BRIGHT project website (https://bright-project.eu/), periodic monitoring and discussions (monthly) have been held between the responsible allocated partner for this task (Juraj Dobrila University (Croatia) and project leading partner (Technical University of Cluj-Napoca).

3. BRIGHT visualisation and ID

3.1. The project Erasmus webpage

One way of realizing the disseminating of the BRIGHT results has been made through the ERASMUS project platform, through which the results that have been made available through the EPALE EU platform, information published in “open access” mode reaching to anyone interested about the topic of BRIGHT project worldwide. The link related to the BRIGHT project on ERASMUS webpage (see Figure 3) can be accessed on the following link:

https://erasmus-plus.ec.europa.eu/projects/search/details/2020-1-RO01-KA226-HE-095517

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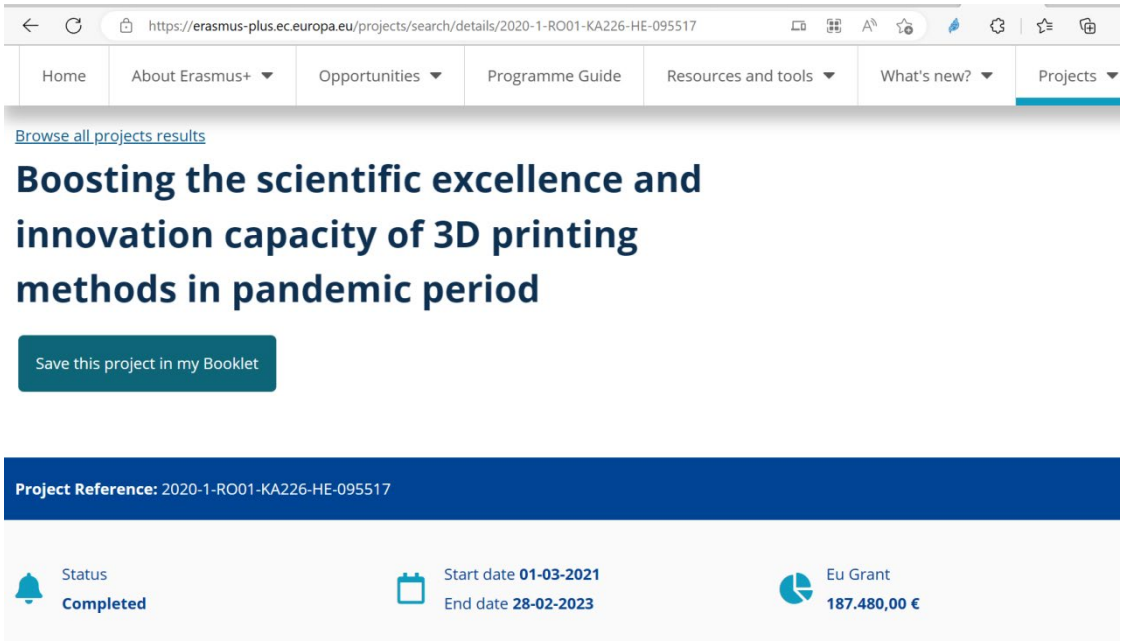

Figure 3. BRIGHT project details on the ERASMUS webpage – one powerful tool for dissemination

3.2. BRIGHT logo

The logo of the BRIGHT project (shown in Figure 4) has been used by one professional designer (Ms. Lea Guric from Croatia), being provided with specific identity manual and used as one powerful tool, contributing significantly to the impact of the BRIGHT project that was made through different activities and materials that have been realized for promoting and disseminating the BRIGHT project (for more details about the ID manual of BRIGHT logo - see: https://bright-project.eu/?cat=17).

Figure 4. Logo of the BRIGHT project conceived by professional designer

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As one may notice in Figure 4, the BRIGHT logo contains one group of symbols and letters suggesting the key words and objectives of the BRIGHT project that are related: innovation, medical applications and 3D printing. Taking into consideration the main title of the BRIGHT project "Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period", as one may notice the project title and the logo are very suggestive and well correlated. The bulb from the logo is suggesting the innovative idea of the BRIGHT project that have applicability both in engineering and medical field, by bringing one "bright light" in the hard time of pandemic.

3.3. BRIGHT project website

One other important disseminating resource is given by the BRIGHT project official website that can be found on the following link (see Figure 5): https://bright-project.eu

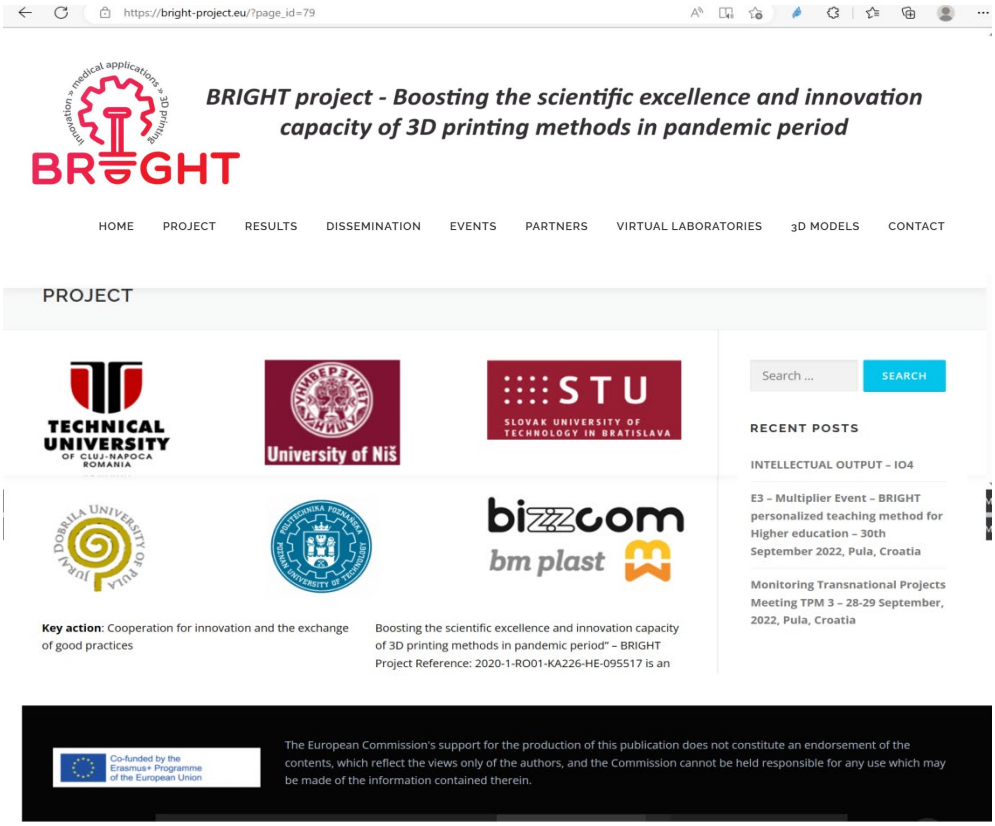

Figure 5. BRIGHT project website with ERASMUS + disclaimer included

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The website of the BRIGHT project is structured on several sections, comprising details about the project aims and objectives, partners that are involved in the project, period of implementation, intellectual output description, results (this section being permanently updated as soon as one intellectual output was finished), events organized in the BRIGHT project, like TPM, Multiplier Events, Learning Teaching and Training Activities, virtual e-learning laboratory platform (which is presented briefly in section 4), e-library of 3D models, contact section and one special section dedicated to dissemination (see Figure 6)

Figure 6. Dissemination section on the BRIGHT project marked in the image

On this special section of Dissemination are provided in detail most of the materials that have been used and mentioned in this dissemination report (details about published articles or books realized with the support of the BRIGHT project resources, press release articles, reports of different events through which the BRIGHT project results have been disseminated, etc.)

3.4. BRIGHT press releases

Important communication especially in the case when events (summer schools or Multiplier Events) have been organized by the BRIGHT project consortium partners has been made using the BRIGHT project website in the form of official press releases. An example of press release communicates realized in the case of organizing the Multiplier Event in Nis is presented in Figure 7. For each type of disseminating event, the BRIGHT press releases were accompanied by relevant image, short description, agenda of the event and one post-report event, as one may notice in Figure 8. In order to check all BRIGHT press releases that were made on the BRIGHT project website, sections “EVENTS” and “DISSEMINATION” can be checked for more details, by accessing the following links on the BRIGHT project website: https://bright-project.eu/?cat=14 and https://bright-project.eu/?cat=17 .

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Co-funded by the Erasmus+ Programme of the European Union
ERASMUS+ Programme 2020 – KA2 High Education
Project nº: 2020-1-RO01-KA226-HE-095517 Document name: Second press release

BRIGHT project - Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period

September, 16th 2021
Press Release

University of Niš organized 1st Transnational Project Meeting as part of educational project BRIGHT funded by European program Erasmus +

The main objective of the BRIGHT project is to provide teaching resources & methods for professors coming from Higher Education institutions that are interested to find ways in providing their students relevant knowledge, skills & competences in the field of 3D printing methods used for producing medical parts , by providing e-courses that sustains the BRIGHT project curriculum, e-toolkit manuals for digital learning which are the required steps to follow starting from CAD, CAE & continuing with 3D printing & testing.

The project has been endowed with a total budget of 209,823.00 € and it ends on 28th of Febryary 2023. The consortium consists of seven partners: Technical University Cluj-Napoca (Coordinator) (UTCN) - Romania, Slovak University of Technology in Bratislava (STU), Bizzcom s.r.o. - Slovakia, Poznan University of Technology - Poland, Juraj Dobrila University of Pula - Croatia, BM Plast - Croatia and University of Nis (UNI) – Serbia.

The First Transnational Project Meeting of the BRIGHT project organized by the Serbian partner UNI was held from 15th to 16th of Septemer 2021 at Faculty of Mechanical Engineering, Niš to summarize all realized tasks related to intellectual output IO1 and to plan further activities especially related to intellectual output IO2.

The event was on-site attended by representatives of the 5 partners: Technical University of Cluj-Napoca (UTCN) - Romania, University of Nis (UNI) – Serbia, Sveuciliste Jurja Dobrile u Puli (UNIPU) – Croatia, BM Plast doo – Croatia and Bizzcom s.r.o. – Slovakia. Due to Covid 19 restrictions for business traveling, two partners were virtually attended the meeting - Slovak University of Technology in Bratislava (STU) – Slovakia and Politechnika Poznanska (PUT) – Poland.

NOTES TO EDITORS:

For more information about the project, contact with: razvan.pacurar@mdm.utcluj.ro

Co-funded by the Erasmus+ Programme of the European Union
ERASMUS+ Programme 2020 – KA2 High Education
Project nº: 2020-1-RO01-KA226-HE-095517 Document name: Third press release

BRIGHT project - Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period

September, 17th 2021
Press Release

University of Niš organized multiplier event as part of educational project BRIGHT funded by European program Erasmus +

The main objective of the BRIGHT project is to provide teaching resources & methods for professors coming from Higher Education institutions that are interested to find ways in providing their students relevant knowledge, skills & competences in the field of 3D printing methods used for producing medical parts , by providing e-courses that sustains the BRIGHT project curriculum, e-toolkit manuals for digital learning which are the required steps to follow starting from CAD, CAE & continuing with 3D printing & testing.

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The Multiplier Event E1 of the BRIGHT project organized by the Serbian partner UNI was held on 17th Septemer 2021 at Science Technological Park, NIš to present the results of the intellectual output IO1 of BRIGHT project to an invited audience composed of industry experts affiliated mainly to regional companies and higher educational institutions.

The Multiplier event was planned to have six main presentations which were held by the TUCN, UNI and 4 business representatives. The presentations were focused on BRIGHT Project objectives explanations, learning experience of BRIGHT summer school held in Cluj-Napoca during the summer and the first results obtained during this project.

The focus in presentations was also on implementation of some topics directly in business community.

There were over sixty participants from nearly 30 different institutions and companies.

NOTES TO EDITORS:

For more information about the project, contact with: razvan.pacurar@mdm.utcluj.ro

Figure 7. Press release communicate regarding the events organized within the BRIGHT project

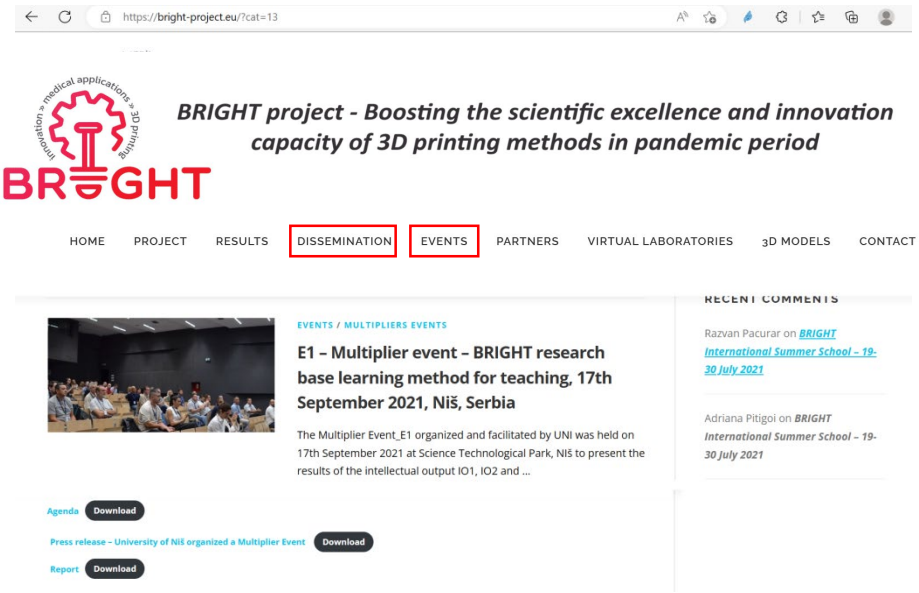

Figure 8. Press releases accompanied by description of the event, agenda and report of the organized events in the BRIGHT project

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3.5. BRIGHT feedbacks, questionnaires and data collected

BRIGHT project website has been used as powerful tool of communication in time of pandemic, being also one useful tool through which participants were able to register or send feedbacks through the BRIGHT website, like images given in Figures 9 and 10 are suggesting:

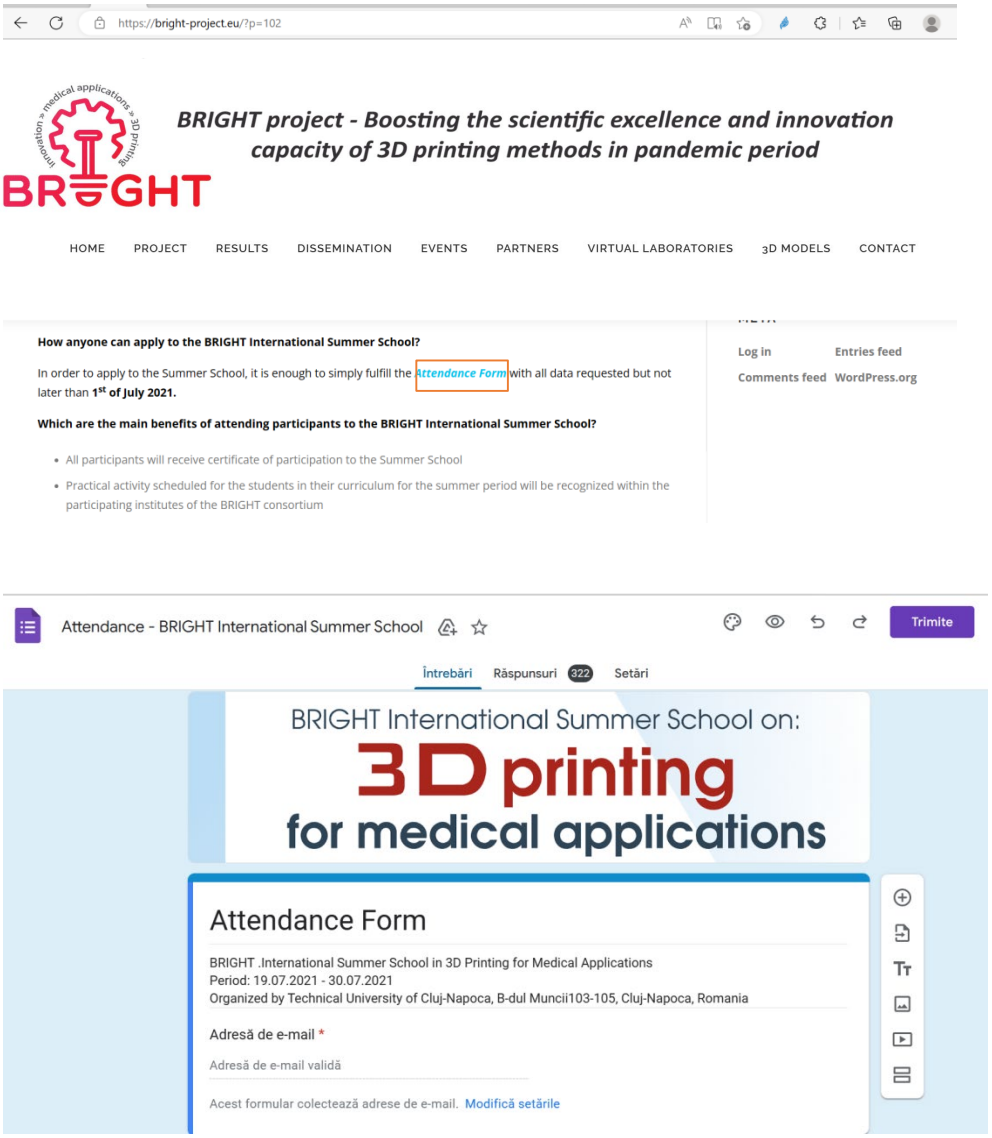

Figure 9. Attending form to the BRIGHT Summer School event fulfilled through the BRIGHT project website

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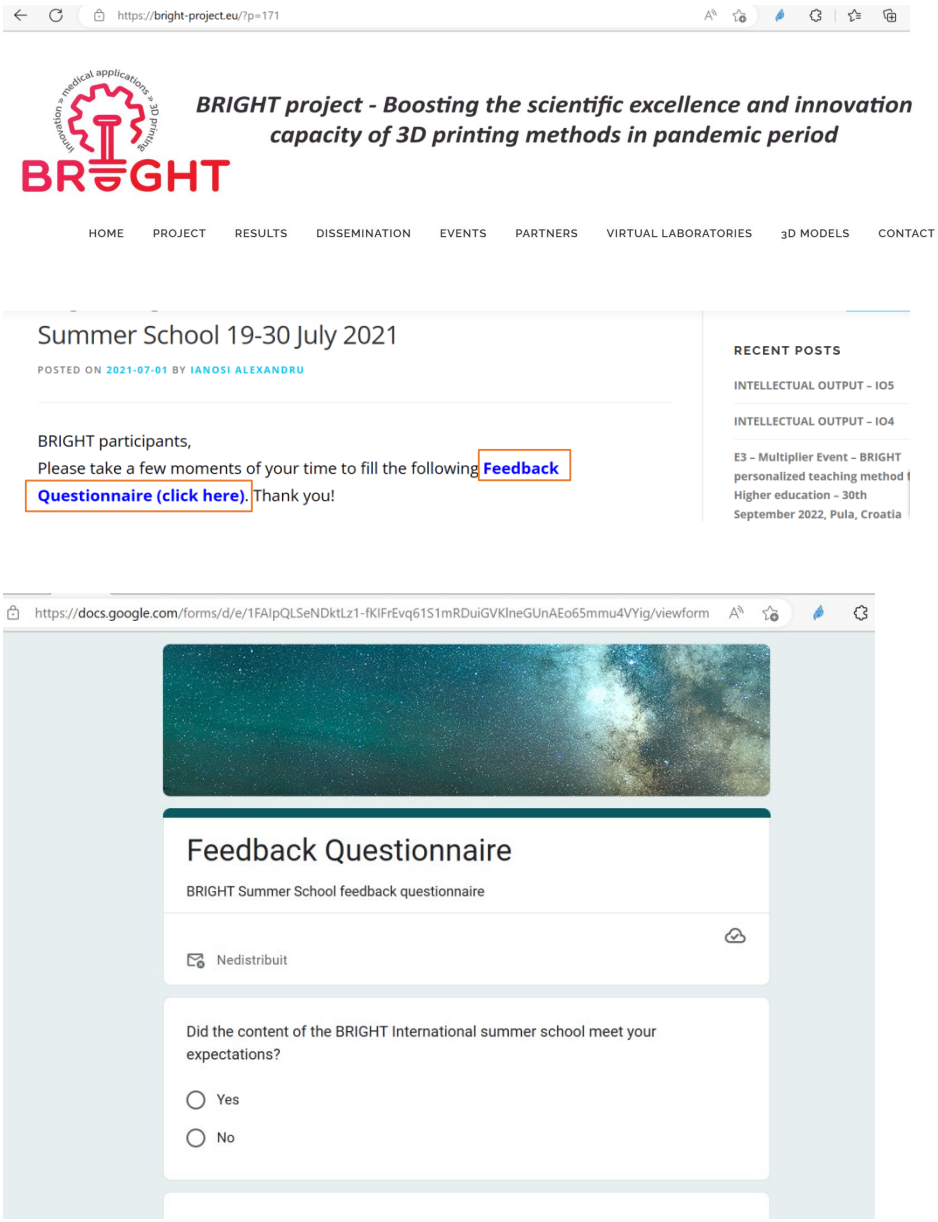

Figure 10. Questionnaires collected through the BRIGHT project website post-events

Using this approach has proved to be very important tool on the level or BRIGHT project in implementing of the activities. On the one hand it was possible to realize one strong database comprised by the specific stakeholders and target groups that have invited to join the events and support the activities of the BRIGHT project (professors and students outside the BRIGHT consortium, SMEs specialists, Medical institutions representatives, etc.). All attendees to the event have fulfilled

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their contact details (emails, phone number, etc.), data was stored with GDPR consent of the ones who provided these data (more than 300 participants, like Figure 11 is suggesting), all attendees being informed afterwards about the next coming events organized in the BRIGHT project to which they have been invited to attend to, results (teaching resources, etc.) and progress of the BRIGHT project, etc. In this way besides the statistics and feedbacks which have been very important as they have been received from the attendees, this powerful and simple tool has been used to disseminate the results of the BRIGHT project very fast, very easy and very efficient in time of pandemic.

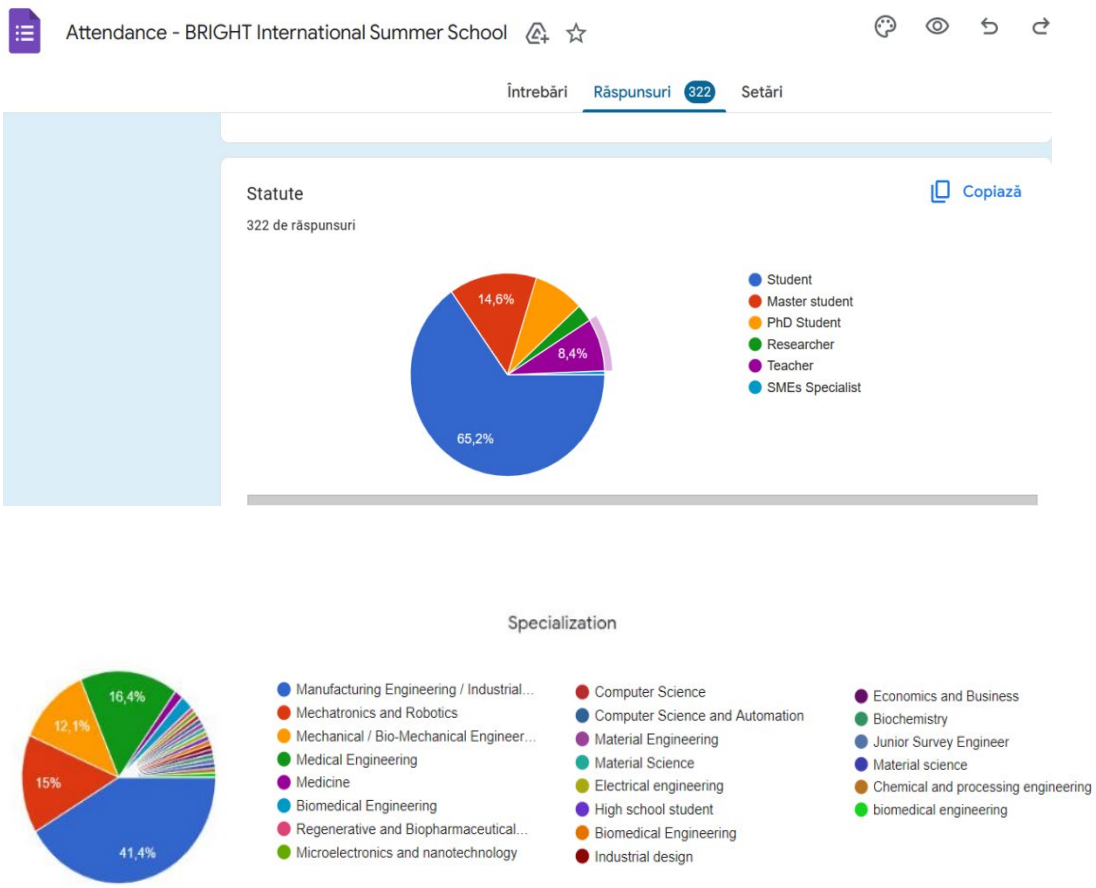

Figure 11. Important data and feedbacks collected through the BRIGHT project website regarding the activities and events organized in the BRIGHT project

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3.6. BRIGHT official communicates on the institutions

BRIGHT consortium institutions have also brought their contribution in promoting of the BRIGHT project and activities of the BRIGHT project on their official websites of the institutions.

In Figure 12 is provided one print screen capture undertaken from an official communicate that has been posted on the Technical University of Cluj-Napoca regarding the BRIGHT project aims, objectives, partnership, etc.

BIROUL de IMAGINE & COMUNICARE

MINISTERUL EDUCAȚIEI
UNIVERSITATEA TEHNICĂ
DIN CLUJ-NAPOCA

Școala Internațională de vară desfășurată în cadrul proiectului ERASMUS KA226 – BRIGHT, coordonat de Universitatea Tehnică din Cluj-Napoca, un nou eveniment de succes

Un grup de 12 profesori și studenți ai Facultății de Inginerie Industrială, Robotică și Managementul Producției, respectiv ai Facultății de Autovehicule Rutiere, Mecatronică și Mecanică din cadrul Universității Tehnice din Cluj-Napoca a participat la Școala Internațională de vară ce a fost organizată de către Universitatea "Juraj Dobrila" din Istria (Croația) în perioada 18-29 iulie 2022. Tematica tratată a fost în domeniul tehnologiilor de imprimare 3D cu aplicabilitate în domeniul medical, în cadrul proiectului internațional ERASMUS KA226 – BRIGHT, coordonat de Universitatea Tehnică din Cluj-Napoca (UTCN).

Figure 12. Official communicate on the Technical University of Cluj-Napoca website related to the BRIGHT project

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Communicate shown in Figure 12 can be accessed from the following link: https://www.utcluj.ro/media/documents/2022/Universitatea_Tehnica_din_Cluj-Napoca_Scoala_Bright_2022_ok_1_3.pdf

Beside this official communicate there are several others that can be accessed on the website of the Technical University of Cluj-Napoca about the events organized on the BRIGHT project (e.g. BRIGHT International summer school – press release communicates and reports). Links can be found below:

- https://www.utcluj.ro/media/documents/2021/Proiectul_ERASMUS_BRIGHT__3wi4Vgs.pdf
- https://www.utcluj.ro/media/documents/2022/Bright_final.pdf
- https://www.utcluj.ro/media/documents/2021/Scoala_de_vara_pt_stiri.pdf
- https://www.utcluj.ro/media/documents/2021/Universitatea_Tehnica_din_Cluj-Napoca_a_organizat_Scoala_Bright_3.pdf

Beside the communicates that have been posted on the official website of the Technical University of Cluj-Napoca, similar posting were made also on the other institutions involved in the BRIGHT project, like University of Nis (Serbia) – see: https://www.ni.ac.rs/saradnja/medjunarodni-projekti/erasmus-plus or University Juraj Dobrila of Pula (Croatia) – see: https://www.unipu.hr/en/international-cooperation/projects/bright/news . University Juraj Dobrila (Croatia) has made one dedicated page specifically for the ERASMUS KA 226 BRIGHT project on their institutional webpage like shown in Figure 13.

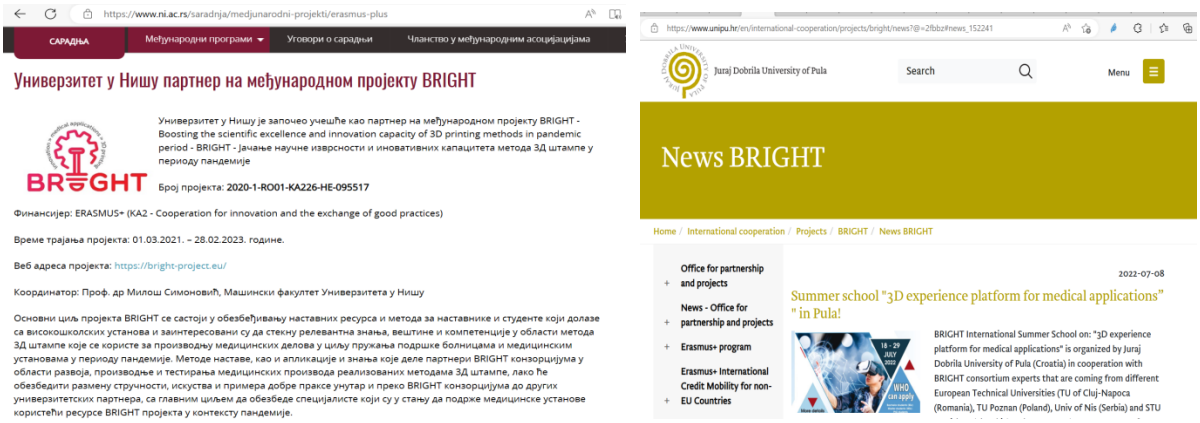

Figure 13. BRIGHT project information data found on the other institutions of BRIGHT consortium

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Links where information can be found in the case of other BRIGHT institutions can be found by accessing the following links:

- https://www.mtf.stuba.sk/sk/diani-na-mtf/aktuality/medzinarodna-letna-skola-bright-19.-30.-jula-2021.html?page_id=15454
- https://www.mtf.stuba.sk/sk/diani-na-mtf/aktuality/mtf-stu-hostilo-skolenie-k-projektu-bright.html?page_id=15885
- https://filip.gorski.employee.put.poznan.pl/projects.html
- https://www.put.poznan.pl/en/node/3505
- https://www.unipu.hr/en/international-cooperation/projects/bright/news?@=2f7df

Also the SMEs companies who are part of the BRIGHT project (like BIZZCOM Slovakia) did one very professional promotion and dissemination activity through their official website, like shown in Figure 14 (see: https://bizzcom.sk/en/research/).

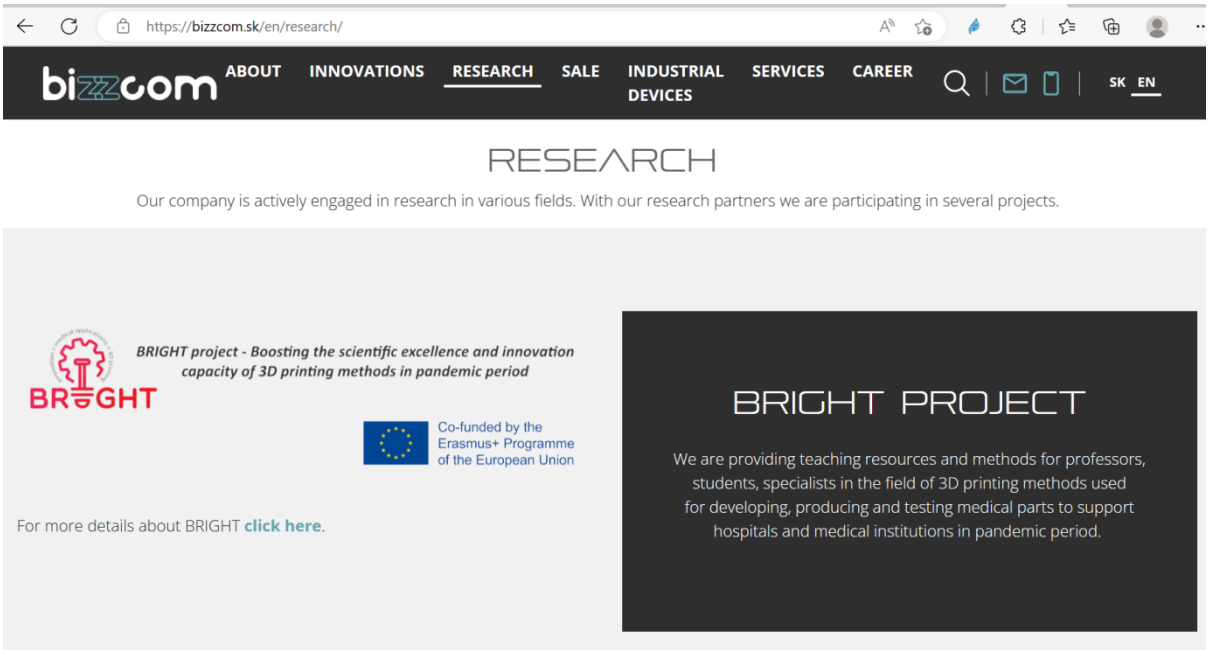

Figure 14. Promoting of the results reached in the BRIGHT project through the website of BIZZCOM partner

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One big plus has been represented by the fact that through the organized events realized by the BRIGHT project consortium partners (like BRIGHT International Summer School 2021 event) there were universities from outside the BRIGHT project consortium, who have undertaken information related to the BRIGHT project and who have made posting on their official website institutions about BRIGHT (see for example the announcement that has been posted about BRIGHT summer school at Technical University of Moldavian Republic - https://utm.md/blog/2021/06/23/bright-international-summer-school-3d-printing-for-medical-applications-organized-by-the-technical-university-of-cluj-napoca/ and the one shown in Figure 15 undertaken from the Faculty of Biomedical Engineering at the National Technical University of Ukraine – Polytechnic Institute of Kiev - https://fbmi.kpi.ua/en/about/all-news/717-bright-international-summer-school and also). One important group of Ukrainian students have attended the BRIGHT International Summer School in 2021 in online mode, during pandemic. They have found about this opportunity through the partners coming from Poznan University of Technology (Poland) who shared and have disseminated information about BRIGHT project with them in the pandemic.

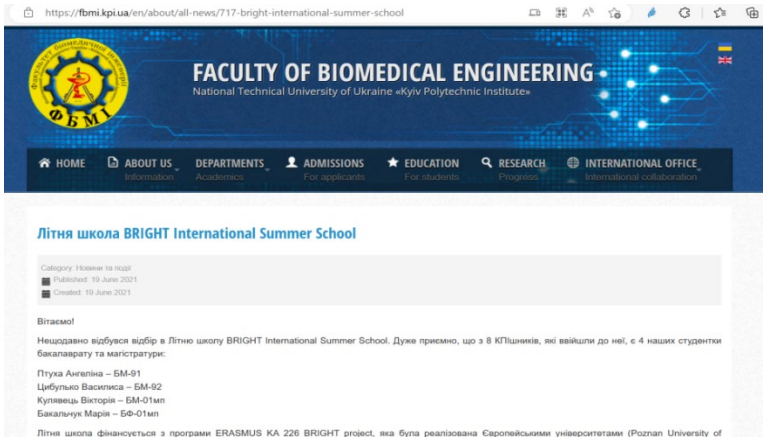

Figure 15. BRIGHT project events disseminated on other institutional websites outside the BRIGHT consortium (e.g. National Technical University of Ukraine)

4. BRIGHT e-learning virtual laboratory platform

One way of disseminating the BRIGHT project results has been consistent in time of pandemic through the BRIGHT e-learning virtual laboratory platform that has been conceived by the BRIGHT consortium partners, being used by the professors coming from the BRIGHT consortium, but also professor coming from outside the BRIGHT consortium in teaching activities with the students.

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BRIGHT virtual laboratory platform can be accessed easily and free of charge by any user directly from the BRIGHT project website by accessing the following link: https://bright-project.eu/?page_id=320 , like shown in Figure 16 presented below. Selecting the link opens the interface of the BRIGHT platform which contains map of Europe, with pins representing laboratories of project consortium partners. BRIGHT platform it is divided into two sections – one for HEIs and the other for companies engaged in the project

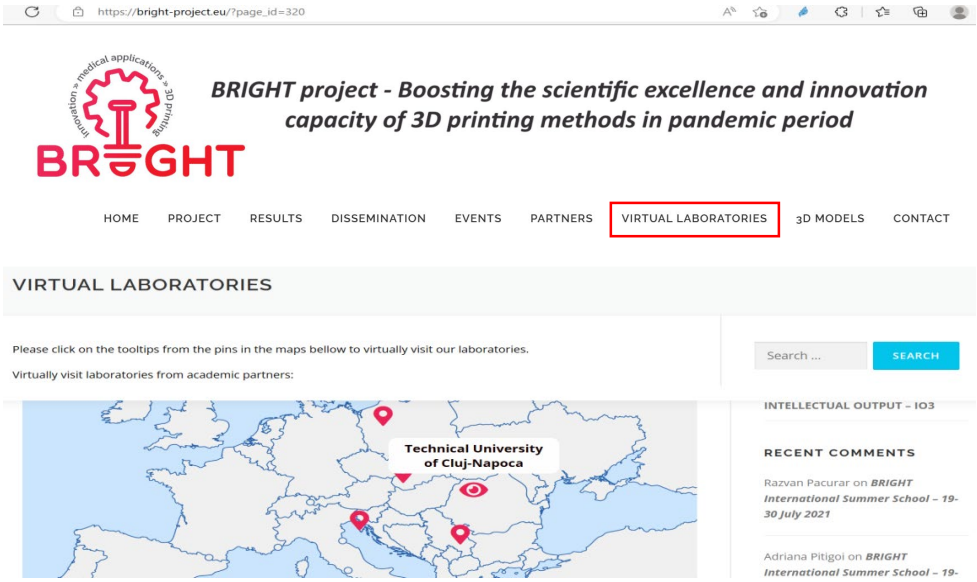

Figure 16. BRIGHT virtual laboratory platform accessed through the BRIGHT project website

The Virtual Laboratory platform is a solution containing high amount of interactive educational content, addressed to everyone who is involved in teaching process of 3D printing of medical parts, taking into account the whole process (starting from design, through various simulations, manufacturing, post processing, testing and actual use). The platform is thought to be a knowledge hub, containing most of educational results created over the scope of BRIGHT project, in an interesting, involving, interactive manner. The platform was also thought as an useful tool during the COVID-19 pandemics, as it allowed students to visit the specialized laboratories virtually, without physically getting into the universities in the period when they were closed. This greatly helped realization of remote learning and continues to be used even after pandemics, allowing students to take a peek into laboratories anytime, before or after actual classes. The Virtual Laboratories were also used during the BRIGHT project events, such as second summer school realized in Juraj Dobrila University of Pula, as well as during the Multiplier Event, held in the same location.

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Within the BRIGHT Virtual laboratory platform there are provided mixed information/ thematic instructions that are specific to each institution, information that are linked with the chain of developing of new medical products to be realized by 3D printing processes, starting from the CAD step and following with the CAE, manufacturing process itself (using several 3D printing methods and equipment items that are available on the laboratories of BRIGHT consortium) and finalizing with the testing process right in the end. Since each institution has many laboratories (more than one per each of the 7 institutions of the BRIGHT project) additionally there have been added important instructions on the BRIGHT project website before the users are accessing the platform, so they can choose to simply walk through laboratories and see the facilities in every room at the level of BRIGHT institutions / virtual laboratory platform or they can choose to search information found in the virtual laboratories according to the thematic interesting rooms, organized in 4 main directions (CAD, CAE, 3D printing and testing) as developing of a new medical product is assuming to (see Figure 17). For each of these directions, there has been assigned one main room at the level of BRIGHT consortium partners + there have been considered also supporting capabilities around that specific topic (CAD, CAE, 3D printing and testing) that exists at the level of other BRIGHT institutions.

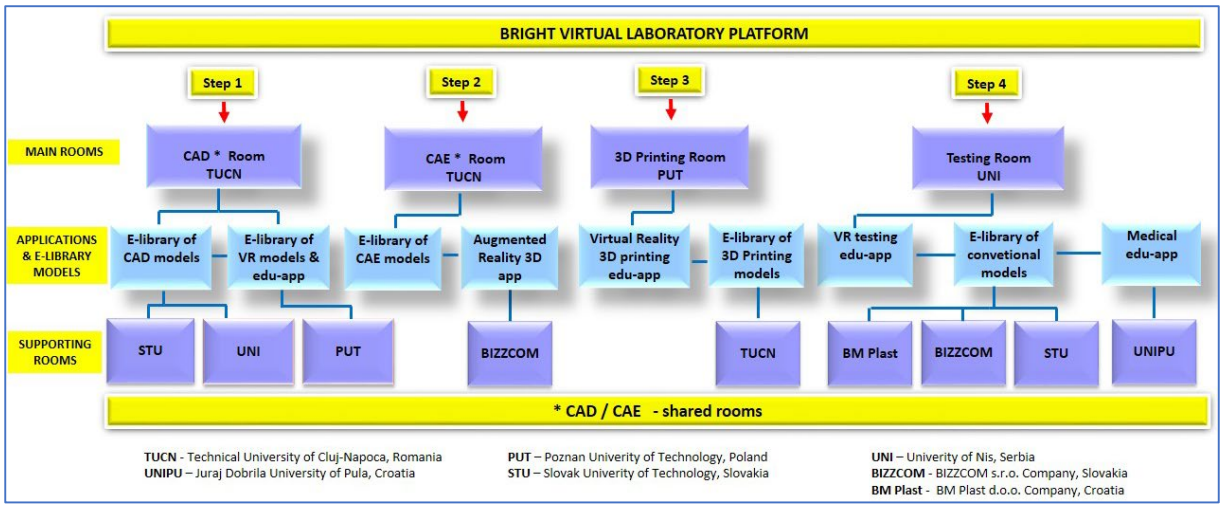

Figure 17. Concept of the Virtual Laboratory in the BRIGHT project on thematic rooms

The thematic "rooms" shown in Figure 19 were mapped as following:

1. **CAD**: main room at TUCN + supporting capabilities in UNI and STU rooms
2. **CAE**: main room at TUCN + supporting capabilities in BIZZCOM

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3. **3D Printing** (Rapid Manufacturing): main room at PUT + supporting capabilities in TUCN and BM Plast
4. **Testing**: main room at UNI + supporting capabilities in STU, PUT, UNIPU, BIZZCOM and BM Plast

For a better understanding of mixture in between institutional rooms, it has been created the following table (Table 1) which is helping the ones who are accessing the Virtual platform to be oriented while they are walking from one room to another what they can expect to find in the rooms.

Table 1. Final concept of Bright Virtual Laboratories

No.	VL – Institution	Functions of VL	Extra applications
1.	Technical University of Cluj-Napoca (TUCN)	CAD/CAE/3D Printing	e-library of CAD / CAE/ VR models
2.	Poznan University of Technology (PUT)	3D Printing / post processing / testing	Orthosis design and 3D printing in Virtual Reality
3.	Slovak University of Technology (STU)	flexible manufacturing / post processing / testing / CAD	e-library of CAD models / e-library of conventional models
4.	University of Nis (UNI)	testing / CAD	Strength testing in Virtual Reality / e-library of VR models
5.	Juraj Dobrila University of Pula (UNIPU)	medical testing	Medical educational application
6.	BIZZCOM	testing in augmented reality / CAE	Augmented Reality medical product presentations / e-library of conventional models
7.	BM Plast	Rapid Tooling / post processing / testing	e-library of conventional models

The BRIGHT Virtual Laboratory as a whole has been conceived as a web-based platform, accessible by WWW browser. It contains a number of basic modules at the level of each institution – virtual rooms, accessible from a main, web-based interface. Each room is a virtual, digital image of a real laboratory or laboratories of one of partners, captured by a 360 degree camera, containing e-learning information about the equipment contained in a given room and procedures possible to realize in it. In Figure 18 is given one example with the view of the virtual laboratory of Poznan University of Technology - Poland (laboratories of the other partners being realized in the same manner), taken with 360 camera, through the laboratory being included as one may notice, several pins which are very intuitive and useful for the students in terms of teaching while they are walking virtually through the laboratory and they are discovering things.

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Figure 18. Virtual Laboratory of Rapid Manufacturing at Poznan University of Technology

Virtual laboratory is in this way a central interactive hub of knowledge, containing the results of the main effects of Intellectual Outputs of the BRIGHT project (toolkits, modules, instructions, webinars realized within the BRIGHT project). In each of the rooms, visitors are able to find teaching resources reached within the BRIGHT project, in form of documents, instructions or videos, aimed mostly for teaching or self-learning by the BRIGHT students who were restricted to visit laboratories in time of pandemic (see Figure 19). Access to the teaching resources in the BRIGHT platform are not restricted, are free of charge and all resources can be downloaded by anyone who is accessing the platform (professors and students from inside / outside the BRIGHT consortium as well).

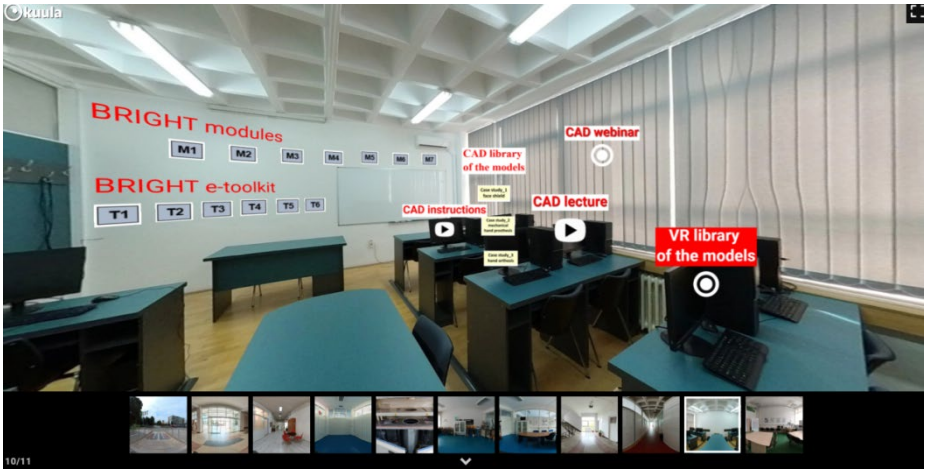

Figure 19. Main content of the resources provided within CAD Virtual room of TUCN

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In selected rooms it is possible also to access library of 3D models realized by the BRIGHT consortium (see Figure 20), as well as to download or launch dedicated external applications, with use of Virtual Reality or Augmented Reality technology as shown in the examples given in Figure 21.

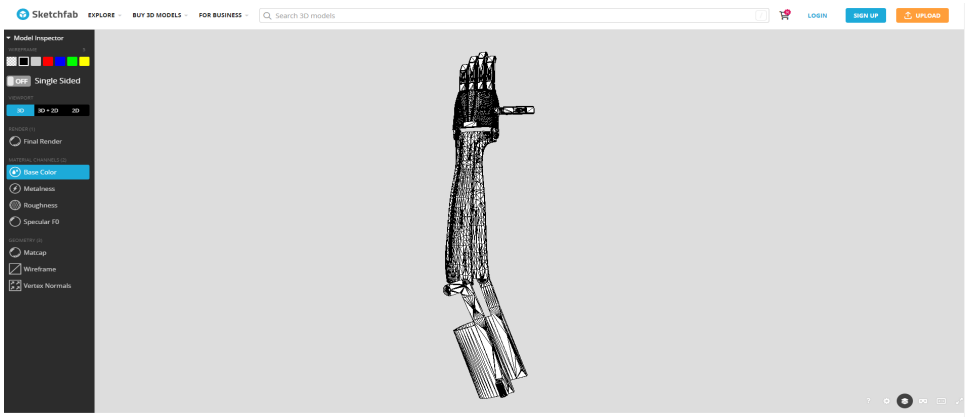

Figure 20. 3D model of a prosthesis opened in SketchFab platform

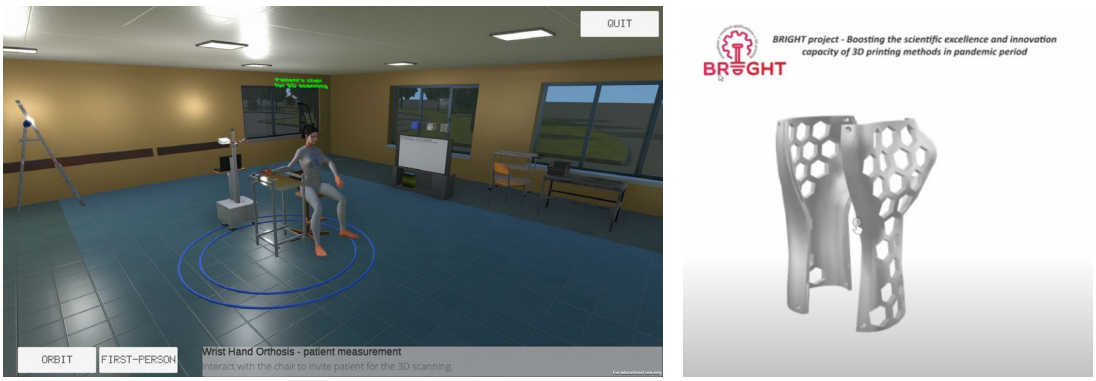

Figure 21. VR and AR applications integrated within the BRIGHT virtual learning laboratory platform

The BRIGHT platform's content, although finished considering the BRIGHT project assumptions and requirements, is not completely closed. The educational content can and will still be added, even after ending of BRIGHT project, adding or updating materials, expanding it with results of student diploma theses for further reference etc. (e-virtual laboratory platform will remain open and freely accessible even after the BRIGHT project will be ending). The BRIGHT virtual laboratory platform is intended also to be developed in continuing other EU funded projects (ERASMUS strategic partnerships) that will be realized together by the consortium members and its use as a teaching tool will be in this way continued.

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Promoting materials regarding the events organized within the BRIGHT project have been integrated into the BRIGHT laboratory platform as well as shown in Figure 22.

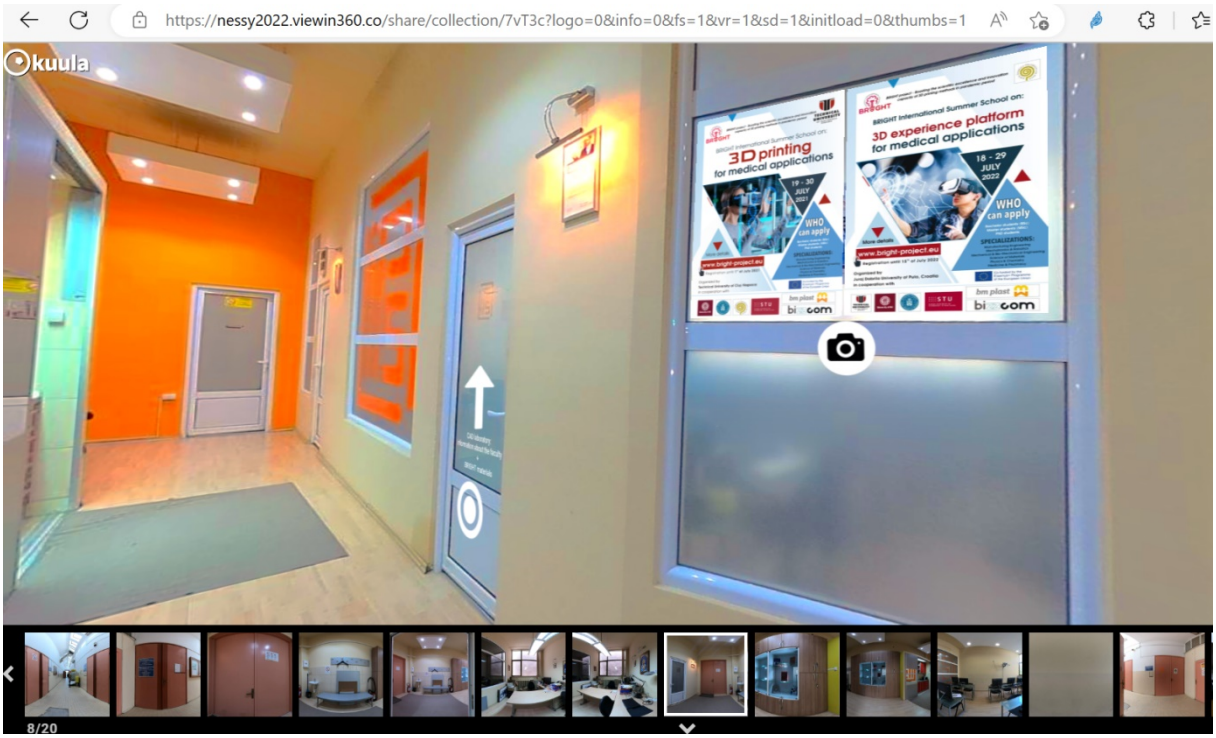

Figure 22. Promoting materials regarding the events organized in the frame of BRIGHT project

5. BRIGHT disseminating events

Within the BRIGHT project there have been organized different events (three Multiplier events) through which the results reached regarding several intellectual outputs of the BRIGHT project (e-course modules realized in the frame of O1, e-toolkit laboratory modules realized in the frame of O2 and e-virtual laboratory platform realized in the frame of O3) have been disseminated outside the BRIGHT consortium, to professors, students and all the other stakeholders that have expressed their interest in the field (SMEs, hospital institutes, etc.) regarding the development, producing and testing of medical parts by 3D printing technologies to support hospitals in the time of pandemic. Same objective has been to be reached through the Learning Teaching and Training activities, like BRIGHT International Summer School, invitations of attending being addressed to anyone who was interested to attend the event “free of charge” and in “open-access” mode.

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5.1. Multiplier event – BRIGHT research base learning method for teaching, September 2021, Niš, Serbia

The Multiplier Event (E1) organised and facilitated by UNI was held on 17th September 2021 at Science Technological Park, NIš (Serbia) to present the results of the intellectual output IO1 of BRIGHT project, related to the course modules developed to sustain the BRIGHT curriculum to an invited audience composed of academic institutions representatives and industry experts affiliated mainly to regional companies (see Figure 23).

Figure 23. Multiplier event - BRIGHT research base learning method for teaching –Nis (Serbia) 2021

The target groups of the Multiplier event were colleagues involved in teaching 3D printing/ CAD / CAE / Materials Science and Strength of Materials / Flexible manufacturing systems/ Process optimization and software control / Medical Engineering, including teaching staff, students as well as other people involved in teaching 3D printing in Higher education in their respective organizations. The 1st Multiplier event has also been opened to business partners that are interested about developing, producing, and testing of parts by 3D printing methods (not just medical institutes, clusters, City Hall institutions) in order to ensure a maximum audience.

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For inviting participants, UNI and Chamber of Commerce sent e-mails directly to regional companies and regional Higher Educational Institutions who could be interested in the BRIGHT project and for academic staff and students, a press release was published on the UNI - FEM website.

There have been many Higher Educational institutions and companies who have registered and have participated to the Multiplier Event organized in Nis (Serbia) in time of pandemic, like: Faculty of Technical Science Novi Sad, Institute Mihajlo Pupin Belgrade, Visoka tehnicka skola, Nis Technical University of Bremen, Germany, Technical University of Berlin, Germany, but also important companies like: Mikrotehnika doo, Nis, COMING Computer Engineering, Belgrade, LMB Soft, Germany – Nis, Neomedica, Nis, etc.. More details about the Multiplier Event organized in Nis (including the Agenda of the event, press release about the organized event and report of the event) can be found on the BRIGHT project website on the following link: https://bright-project.eu/?p=221

5.2. E2 - Multiplier Event BRIGHT personalized teaching methods for Higher education, February 2022, Poznan, Poland

The Multiplier Event_E2 organized by the Poznan University of Technology (Poland) was held on 25th February 2022 in very hard time of pandemic, to present and share the results reached in The intellectual output 2, related to the toolkit manual. The toolkit manual was realized by the BRIGHT consortium in order to emphasize how several types of 3D printing and Rapid Tooling methods (such as FDM, SLS, SLM, SLA (DLP), Vacuum casting, etc.) can be used for producing different types of parts that are destined to the medical sector. In the context of the pandemic the event was organized online, using TEAMS and the BRIGHT project website (see Figure 24).

Figure 24. Prof. Filip Gorski sharing the results reached in the BRIGHT project at Multiplier Event

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The focus of the presentations was oriented also on implementation of some topics directly in business community. There were approximate 30 participants coming from different institutions outside the consortium, including representatives of important companies that are activating in the 3D printing domain in developing and realizing medical products, such as: Omni 3D, Poland, Stratasys company, B3D Poland, etc. who also shared their solutions and trends in the 3D printing companies and common solutions have been identified finally in using different types of materials and technological variants for producing medical parts to support hospitals in time of pandemic (see Figure 25).

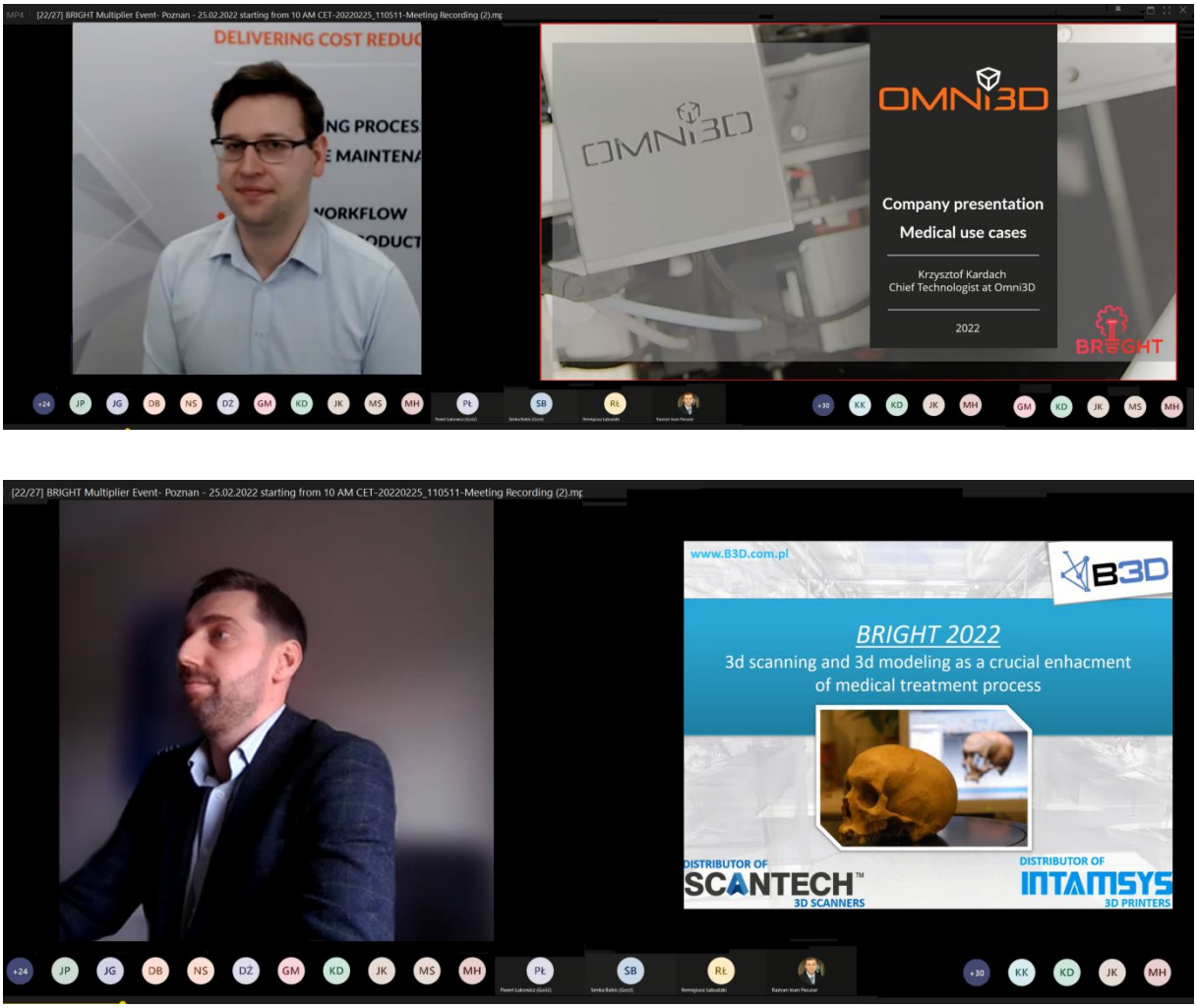

Figure 25. Common solutions to support medical institutions identified through the presentations and discussions being held with SMEs representatives within Multiplier Event organized in Poznan

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For inviting participants, PUT sent e-mails directly to regional companies and regional Institutions who was interested in the BRIGHT project and for academic staff and students, a press release was published on the PUT website as well. More details about the Multiplier Event organized in Nis (including the Agenda of the event, press release about the organized event and report of the event) can be found on the BRIGHT project website on the following link: https://bright-project.eu/?p=240

5.3. E3 - Multiplier Event BRIGHT Personalized teaching method for Higher education, September 2022, Pula, Croatia

The Multiplier Event E3 organized by the University Juraj Dobrila of Pula (Croatia) was held physically at the Medical school in Pula (Croatia) on 30th September 2022 to present and share the results reached in IO 3, related to the e-learning virtual laboratory platform which was built by the BRIGHT consortium. The number of attendees was 110, more than expected, but this was one effect of the summer school that was organized in the same city in the summer (see Figure 26).

Figure 26. BRIGHT Multiplier event organized at Medical school in Pula (Croatia) in September 2022

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Interest on the BRIGHT virtual platform was of high on behalf of the pupils of Medical School in Pula. They were the main target group of this Multiplier event. Pupils were really enthusiasts about the resources that they have found on the BRIGHT virtual laboratory platform & especially about VR & AR applications that were integrated within the BRIGHT platform (see Figure 27).

Figure 27. Prof. Magdalena Zukowska (PUT) showing AR applications to one group of pupils during the Multiplier Event organized by Juraj Dobrila University of Pula in September 2022

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Besides the pupils of Medical School, at multiplier event organized have attended also professors & colleagues from BRIGHT consortium & Juraj Dobrila university, colleagues that are mainly involved in teaching 3D printing/ CAD / CAE / Materials Science & Strength of Materials / Flexible manufacturing systems/ Process optimization & software control / Medical Engineering topics. More details about the Multiplier Event organized in Nis (including the Agenda of the event, press release about the organized event and report of the event) can be found on the BRIGHT project website on the following link: https://bright-project.eu/?p=354

5.4. BRIGHT International Summer School 2021 event

One of the biggest successes in the frame of BRIGHT Project organized events has been represented by the BRIGHT International Summer School 2021 edition that has been organized by Technical University of Cluj-Napoca together with its partners from the BRIGHT project consortium in the period19th - 30th July 2021. This was a very tough period caused by the pandemic & due to this reason & hard restrictions imposed by local authorities the event has been organized online exclusively. The topic of the BRIGHT International Summer school entitled „3D printing for medical applications" attracted an impressive number of participants (more than 300 attendees) from more than 20 countries, providing one very strong connection with long-term positive impact not only between students & teachers but also between the universities & well-known European companies involved in the field of 3D printing, national & European development agencies, as well as public institutions.

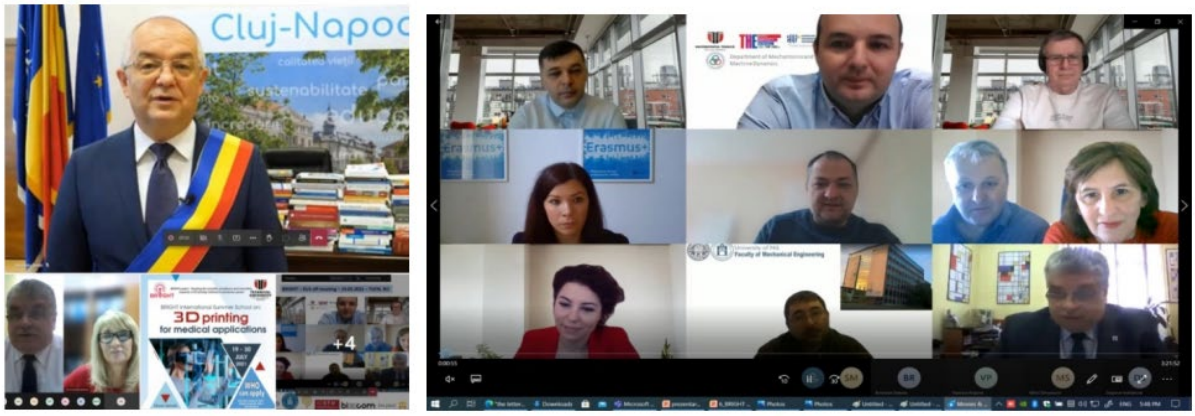

Figure 28. Message addressed by the Mayor of Cluj-Napoca at BRIGHT International summer school

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The message addressed by Mr. Emil Boc (mayor of Cluj-Napoca) to the participants (se Figure 28) emphasized that "young people are characterized by an inexhaustible creativity which enables them to face any challenge of the labour market" provided a great motivation to the attendees to the event who decided to share their knowledge and expertise in the frame of the BRIGHT International summer school online edition organized by the Technical University of Cluj-Napoca. By having the Mayor of Cluj-Napoca present at the event, the information about BRIGHT project and summer school event has been powerfully disseminated into the media (local press). Results reached about course modules that have been prepared in the frame of Intellectual output 1 by the BRIGHT consortium partners have been disseminated in this way to a wider audience (see Figure 29).

Figure 29. BRIGHT course modules prepared in the frame of O1 disseminated at BRIGHT International summer school 2021 event organized by the Technical University of Cluj-Napoca

Many other professors from T.U. Cluj-Napoca as well as from other Romanian and foreign partner universities gave lectures to the students enrolled in the summer school, providing valuable information and resources to the attendees regarding the designing, validating, producing and testing of medical products realized by 3D printing technologies (see Figure 30).

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Figure 30. Additional lectures that have been presented during BRIGHT International Summer School organized at the Technical University of Cluj-Napoca in 2021

Students were able to work on real medical case studies being guided by the professors that have made presentations during BRIGHT International summer school event as shown in Figure 31.

Figure 31. Medical parts realized by students during the BRIGHT International Summer School event

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There were many important 3D printing producing companies (see Figure 32) who attended the BRIGHT International Summer School, who did presentations about the latest trends in the 3D printing domain for medical products, many common topics of interests being identified during this event. Few companies have expressed their interest in supporting the BRIGHT project activities in continuing, by attending the Multiplier Events organized in the BRIGHT project, but also by supporting professors and students in the process of developing and producing new products for the medical sector in the frame of the BRIGHT project.

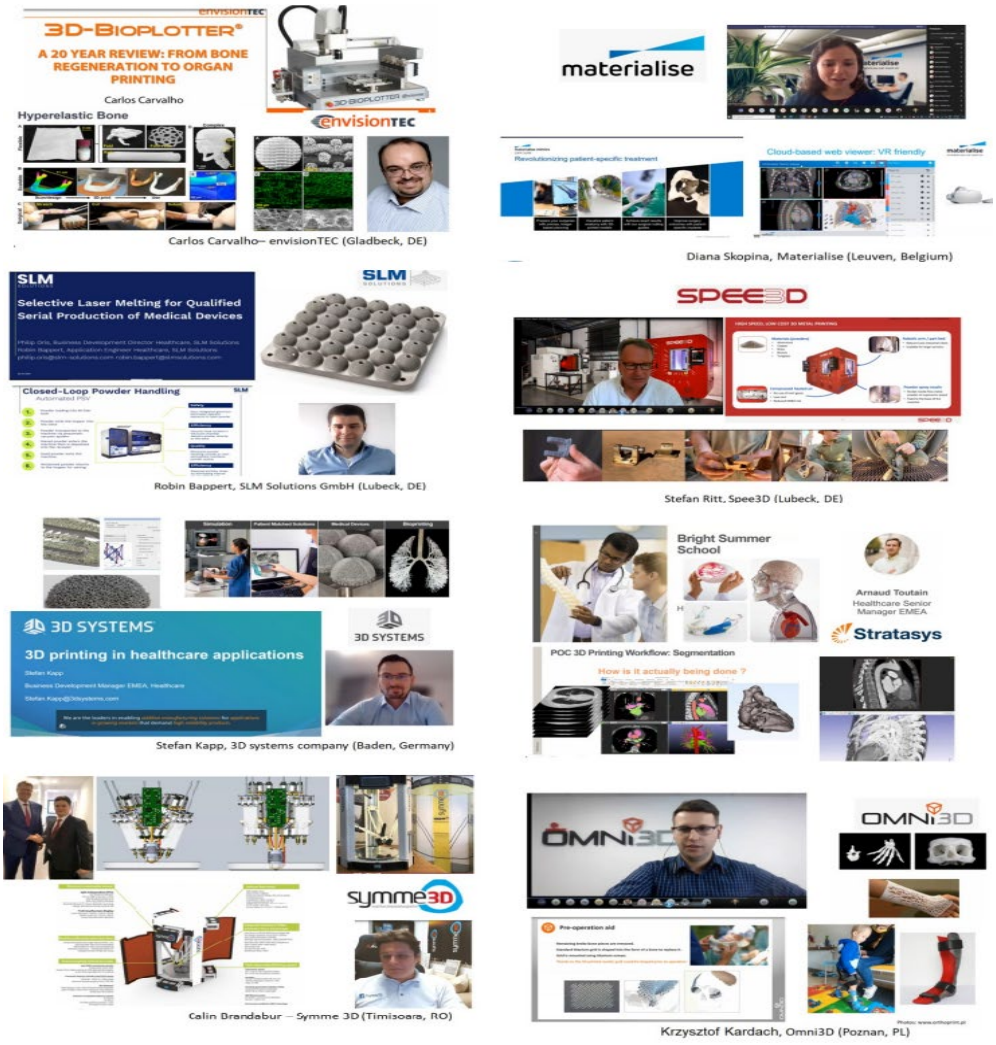

Figure 32. Important 3D printing companies who realized presentations and expressed their support for the BRIGHT project

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Students have provided important feedbacks for the professors regarding the quality of their lectures, but also they defended one final test, as they also did presentations and have received feedbacks from all the participants (including SMEs) regarding the quality of their work (see Figure 33) along with certificates with ERASMUS + label as results of their participation to the event).

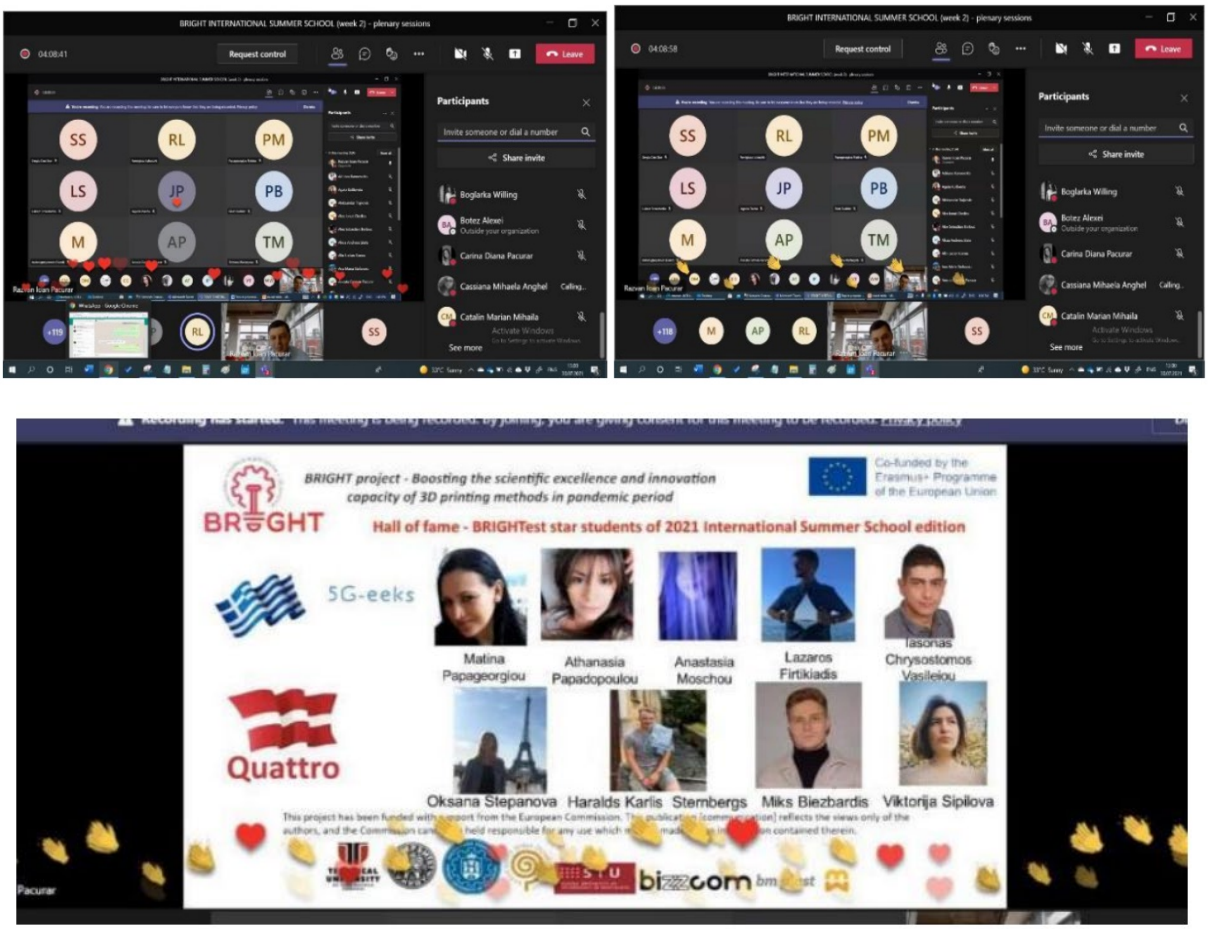

Figure 33. BRIGHT feedbacks on behalf of the other attendees on BRIGHT summer school

In conclusion, by being the first event organized within the BRIGHT project, this has been proved to be one with a very high impact in terms of dissemination activities. One database containing information contact of more than 300 attendees have been realized on this event, many of this attendees (including SMEs / stakeholders) being involved in future activities organized in the frame of the BRIGHT project and being informed permanently about the results and progress in the implementation process of BRIGHT project. For more comprehensive overview of the BRIGHT

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summer school 2021 organized event, information can be found on the BRIGHT project website on the following links:

- https://bright-project.eu/?p=72 – Final overview, flyer and reports
- https://bright-project.eu/wp-content/uploads/2021/08/BRIGHT-extended-version.pdf; - final report (extended view)
- https://bright-project.eu/wp-content/uploads/2021/08/PRESENTATION_BRIGHT_30_07_2021_2.pdf - retrospective view of the organized activities (Powerpoint presentation)
- https://bright-project.eu/?p=171 – Agenda of the event
- https://bright-project.eu/?p=102 – Initial announcement, invitation and registration

5.5. BRIGHT International Summer School 2022 event

Based on the experience gained by the consortium in organizing events, like summer schools, the second edition of BRIGHT International Summer School which was organized physically by the University of Pula (Croatia) in the period 18th - 29th of July 2022) aimed to familiarize the attendees through the all organized activities with the personalized & project based teaching methods used in Higher education & the efficiency of these methods in using the BRIGHT project resources, especially on BRIGHT virtual laboratory platform for getting knowledge & practical skills in developing, producing & testing of medical parts made by 3D printing technologies. A total number of 60 participants coming from 10 European countries from inside and outside BRIGHT consortium institutions have registered to this event that was organized with the main aim of testing and experiencing the 3D virtual platform for medical applications which has been conceived by the BRIGHT consortium in 2022. The event was hosted by Istrian Development Agency (IDA d.o.o) - https://ida.hr/en/ , where course and workshops were held with the professors and students that attended to this event. Each day has been actively organized by students and professors coming from a specific institution of the BRIGHT consortium. Pictures were taken at the end of the day with specific flags of the organizing BRIGHT Higher Educational institutional teams (Croatian, Polish, Romanian, Slovak and Serbian) – see Figure 34.

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Figure 34. BRIGHT International summer school 2022 edition held in Croatia

Professors coming from the BRIGHT consortium have shared their knowledge with the students, which had the possibility to follow the whole chain that it is needed when a medical product is required to be realized, starting from Computer Aided Design, continuing with Computer Aided Engineering, 3D printing and testing of the realized products (mechanical testing, quality control, etc) working on specific medical case studies of real patients, like the ones presented in Figure 35.

Figure 35. Specific medical case studies on which they students had the occasion of working during the BRIGHT International Summer School that was hold in Croatia in 2022

Also during the BRIGHT International summer school, all participants had the chance to visit the METRIS institute, where in one afternoon. Professors and students had also the possibility to experience the Mechanical testing procedures of medical products, but also material testing characterization that is done using specific equipment items (including several types of microscopes, like SEM or Optical Microscopes, etc) (see Figure 36).

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Figure 36. METRIS institute visit during BRIGHT Summer School in Croatia

Visiting of a Medical Hospital in Pula (Croatia) was also very important in the BRIGHT International summer school, by the sharing experience point of view between engineers and surgeons (medical doctors) (see Figure 37). The participants to the summer school had the chance to better understand which the main challenges of doctors in the pandemic were and how engineers can come with important solutions to support hospitals in this context. Also during the realized visits there have been identified lot of common opportunities in collaborating and work each other in developing, producing and testing of medical parts made of 3D printing technologies.

BRIGHT resources have been disseminated and shared with representatives of medical hospital who have provided evaluating feedbacks regarding the BRIGHT virtual laboratory platform that has been constituted by the BRIGHT consortium, as well as they had the chance to provide support in defining the case studies that have been defined in the frame of O5, cases that were needed to support hospitals in time of pandemic.

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Figure 37. Visiting of Medical Hospital in Pula (Croatia) during BRIGHT International Summer school

During this edition of BRIGHT International summer school, students had the chance to work on real case studies that have been finally realized by 3D printing technologies, they had the chance to do testing and measurements from the dimensional (accuracy) point of view afterwards, as they had also the chance to go through VR / AR programming and experiencing of such modern environments that are used mainly for training and teaching using Unity software and VR googles (see Figure 38).

Figure 38. 3D printing and VR experience during BRIGHT International summer school 2022

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Most of the realized applications realized within the BRIGHT International summer school in Croatia with students related to VR / AR have been integrated into the BRIGHT virtual laboratory platform that was realized in the frame of O3 and was finalized in this period. Finally students had the chance to defend final tests, realize presentations and be awarded with certificates with ERASMUS label on it (see Figure 39), receiving in the meantime valuable feedbacks on behalf of all participants to the BRIGHT International Summer School, SMEs representatives and Medical institutions, like Medical Hospital and Medical School of Pula (Croatia).

Figure 39. Students being awarded with certificates on BRIGHT International Summer school 2022

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For more comprehensive overview of the BRIGHT summer school 2022 organized event, information (like the agenda of the event, final report presentation and review of all activities that have been organized during this event can be found on the BRIGHT project website on the following links:

- https://bright-project.eu/?p=370 – Final overview, flyer and reports
- https://bright-project.eu/wp-content/uploads/2022/08/BRIGHT-summer-school-2022-activity-report.pdf - final report (extended view)
- https://bright-project.eu/wp-content/uploads/2022/08/BRIGHT_final_presentation_29_07_2022.pdf - retrospective view of the organized activities (Powerpoint presentation)
- https://bright-project.eu/wp-content/uploads/2022/06/BRIGHT-summer-school-2022_program_ok.pdf – Agenda of the event
- https://bright-project.eu/?p=370 – Initial announcement, invitation and registration

6. BRIGHT case studies, theses, publications and presentations to the events

6.1. BRIGHT case studies and theses

In the BRIGHT project, professors & students have collaborated with stakeholders and hospitals to define case studies linked with the pandemic needs. Using resources developed by BRIGHT project consortium within O1-O4, such as e-courses, e-toolkits, e-virtual laboratory platform and e-webinars (starting from the existing resources) it was able to develop, produce and test innovative medical parts that were needed to be 3D printed in concordance with hospital needs in time of pandemic. These medical parts were created as case studies to demonstrate the gained knowledge and skills in developing medical parts using 3D printing technology. 5 case studies were defined in the frame of O5, through which students and professors of BRIGHT consortium were able to get involve and use all BRIGHT resources for developing and producing medical parts for real patients in the time of pandemic like shown in Figure 40.

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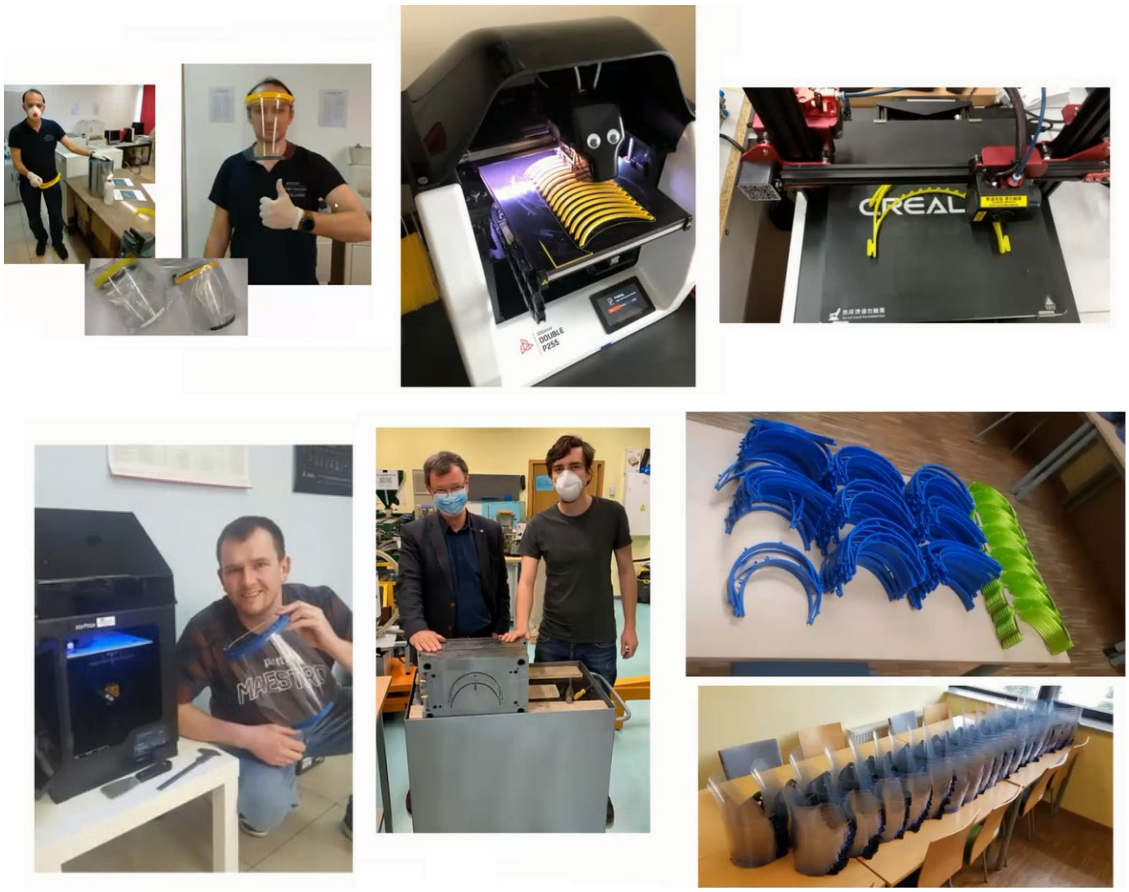

Figure 40. Case studies defined in the frame of O5 to support hospitals in time of pandemic

Students have been working in inter and trans-national teams under supervision / co-supervision regime of BRIGHT professors. Existing infrastructure and logistic of the BRIGHT consortium has been used in this sense along with the virtual laboratory rooms and resources conceived and developed within the BRIGHT project. As direct result in terms of disseminating the results reached within these case studies, directly linked with the realized case studies are to be mentioned chapters with results reached in the BRIGHT project using the BRIGHT project resources were integrated by students within their BSc projects at level of each BRIGHT consortium higher educational institutions. One list of BSc project themes / chapters related to the case studies that have been defined and integrated within BSc diploma project can be found on the following link on the BRIGHT project website: https://bright-project.eu/?cat=17

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6.2. BRIGHT publications (articles and books)

In terms of results of disseminating of the results that are linked with the case studied that have been realized within the BRIGHT project, there can be mentioned in the following one list of publications (academic/scientific articles) that have been published in ISI journals with impact factor and in articles that have been indexed in important international databases like Scopus, as well as a series of books (handbook, toolkit manual, project guidebook, etc.) that have been realized based on the resources of BRIGHT project, all these resources being realized and published in common, with authors coming from different BRIGHT consortium higher educational institutions (on all these materials special acknowledgments referring to BRIGHT project has been included / referenced at the end of these publications – see Figure 41). In this way dissemination has been done through the published articles, anyone being aware about the name of the project, acronym, title of the project as source of supporting the results that have been reached directly linked with the BRIGHT project.

The publishing of this project book has been financially supported by the ERASMUS KA226 project entitled "Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period", the implementation of the project being supervised by the National Agency for Community Programmes in the Fields of Education and Vocational Training (project reference: 2020-1-RO01-KA226-HE-095517).

ACKNOWLEDGMENT

This research was supported by the ERASMUS+ Strategic partnership program for Digital Education (KA226) – "Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period – BRIGHT" - contract no. 2020-1-RO01-KA226-HE-095517

Funding: This research was supported by the ERASMUS+ Strategic partnership program for Digital Education (KA226)—"Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period—BRIGHT"—Contract No. 2020-1-RO01-KA226-HE-095517.

Figure 41. Acknowledgments mentioned at the end of the scientific articles and books that have been published based on the results reached within the BRIGHT project

In terms of **scientific articles** that have been published **with "open access" in ISI journals with impact factor**, are to be mentioned the following ones:

1. Păcurar Răzvan, Petru Berce, Anna Petrilak, Ovidiu Nemeş, Cristina Ştefana Miron Borzan, Marta Harničárová, and Ancuţa Păcurar. 2021. "Selective Laser Sintering of PA 2200 for Hip Implant Applications: Finite Element Analysis, Process Optimization, Morphological and Mechanical Characterization" Materials 14, no. 15: 4240. https://doi.org/10.3390/ma14154240; Impact factor: 3.748 (Q1)

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

2. Păcurar Răzvan, Petru Berce, Ovidiu Nemeş, Diana-Irinel Băilă, Dan Sergiu Stan, Alexandru Oarcea, Florin Popişter, Cristina Miron Borzan, Sven Maricic, Stanislaw Legutko, and Ancuţa Păcurar. 2021. "Cast Iron Parts Obtained in Ceramic Molds Produced by Binder Jetting 3D Printing—Morphological and Mechanical Characterization" Materials 14, no. 16: 4502. https://doi.org/10.3390/ma14164502; Impact factor: 3.748 (Q1)
3. Băilă Diana-Irinel, Cătălin Vițelaru, Roxana Trușcă, Lidia Ruxandra Constantin, Ancuța Păcurar, Constantina Anca Parau, and Răzvan Păcurar. 2021. "Thin Films Deposition of Ta2O5 and ZnO by E-Gun Technology on Co-Cr Alloy Manufactured by Direct Metal Laser Sintering" Materials 14, no. 13: 3666. https://doi.org/10.3390/ma14133666; Impact factor: 3.748 (Q1)
4. Popișter Florin, Daniela Popescu, Ancuţa Păcurar, and Răzvan Păcurar. 2021. "Mathematical Approach in Complex Surfaces Toolpaths" Mathematics 9, no. 12: 1360. https://doi.org/10.3390/math9121360; Impact factor: 2.592 (Q1)
5. Filip Górski, Olga Komorowska, Przemysław Zawadzki, Wiesław Kuczko, Magdalena Żukowska, Remigiusz Łabudzki and Razvan Pacurar, Automation of design of modular upper limb prostheses, Facta Universitatis, Series: Mechanical Engineering, 2023 (accepted for publication), DOI: 10.22190/FUME230228072G; Impact factor: 4.622 (Q1). http://casopisi.junis.ni.ac.rs/index.php/FUMechEng
6. Ancuţa Păcurar, Andreea Tomşea, Cristian Vilău, Eugen Guţiu, Răzvan Păcurar, Designing and manufacturing of an ankle orthosis using 3d printing technology, Acta Technica Napocensis-Series: Applied Mathematics, Mechanics and Engineering, Vol. 64, Issue 4, 2021, WOS:000731519800006, ISI Impact factor: 0.07 (Q4), https://atna-mam.utcluj.ro/index.php/Acta/article/view/1667/1346
7. Sven Maricic, Iva Mrsa, Răzvan Păcurar, Zoran Mrsa, „The 3D Printed Astronautical Probe Simulation Analyzing the Free-fall, Acta Technica Napocensis-Series: Applied Mathematics, Mechanics and Engineering, Vol. 65, Issue 2, 2022, WOS:000838236300006, ISI Impact factor: 0.07 (Q4), https://atna-mam.utcluj.ro/index.php/Acta/article/view/1802/1450

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Beside these articles, the following articles have been published **in ISI proceedings of scientific conferences**, with articles being **indexed in ISI Web of Science scientific database**:

1. Răzvan Păcurar, Bogdan Danci, Ancuţa Păcurar, Research on optimal scaling of parts made from stainless steel material by Selective Laser Melting, 2021 9th International Conference on Modern Power Systems (MPS), IEEE Xplore, 16-17 June 2021, Cluj-Napoca, Romania, 2021, DOI: 10.1109/MPS52805.2021.9492672; https://ieeexplore.ieee.org/document/9492672
2. Nikola Vitkovic, Miroslav Trajanovic, Miodrag Manic, Nikola Korunovic, Ljiljana Radovic, Răzvan Păcurar, Procedure for the Creation of Complex Free-Form Human Bones Surfaces for Manufacturing of Personalized Implants, IFIP Advances in Information and Communication Technology, Vol. 640, IFIP, pp. 14 – 24, 2022, DOI: 10.1007/978-3-030-94399-8_2; https://link.springer.com/chapter/10.1007/978-3-030-94399-8_2

Last, but not least, the following **articles have been published in proceedings of scientific international conferences**, with articles being **indexed in International scientific databases**, like SCOPUS:

1. Răzvan Păcurar, Sergiu Pascu, Ancuţa Păcurar, Dan Sergiu Stan, Emil Teuţan, Diana Irinel Băilă, Arik Sadeh, „Designing of an original extruding system for 3D printing of parts made of plastic material in powder-state form", IOP Conference Series: Materials Science and Engineering, Vol. 1009 (2021), 012043, https://iopscience.iop.org/article/10.1088/1757-899X/1009/1/012043
2. Diana Irinel Băilă, Răzvan Păcurar, Ancuţa Păcurar, Thin-Film Protective Coatings on Samples Manufactured by Direct Metal Laser Sintering Technology Used in Dentistry, Lecture Notes in Mechanical Engineering, Manufacturing 2022, pp. 59–68; https://link.springer.com/chapter/10.1007/978-3-030-99769-4_5
3. Diana Irinel Băilă, Răzvan Păcurar, Ancuţa Păcurar, Sintered Compacts of Co-Cr Powders Doped with HAp and ZrO2 Used in Implantology, Lecture Notes in Mechanical Engineering, Springer, 2022, pp. 69–78; https://link.springer.com/chapter/10.1007/978-3-030-99769-4_6

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4. Nikola Vitković, Miroslav Trajanović, Jovan Aranđelović, Răzvan Păcurar, Cristina Borzan, Contact Surface Model Parameterization of the Extra-Articular Distal Humerus Plate, Lecture Notes in Mechanical Engineering, Manufacturing 2022, pp. 79–92; https://link.springer.com/chapter/10.1007/978-3-030-99769-4_7
5. Mark Kovacs, Răzvan Pacurar, Sorin Grozav, Numan Durakbasa, Osman Bodur, Jan Rehor, Tomas Marik, Research on Mechanical Characteristics of parts made of 316L Stainless Steel (material) by using Selective Laser Melting Technology, The International Symposium for Production Research ISPR 2022: Towards Industry 5.0, Springer, pp.176-187, https://link.springer.com/chapter/10.1007/978-3-031-24457-5_15;
6. Nikola Vitković, Miroslav Trajanović, Miloš Stojković, Răzvan Păcurar, Sergiu-Dan Stan, Filip Górski, The Reverse Engineering of Human Organs Based on the Application of Method of Anatomical Features, Nordic-Baltic Conference on Biomedical Engineering and Medical Physics, NBC 2023, https://nbc2023.lmifb.lv/ (in course of publication).

Regarding **books** that have been published by the BRIGHT consortium based on results and with support reached from the BRIGHT project the following ones are to be mentioned:

1. Sven Maričić, Răzvan Păcurar, Milos Simonovic, Peter Kostal, Remigiusz Łabudzki, Branislav Rabara, Mate Babic, Computer Aided Engineering – Additive Manufacturing Approach (e-book), Rispoprint Publishing House, Cluj-Napoca, 2023, ISBN: ISBN: 978-973-53-3027-9, https://www.risoprint.ro/detaliicarte.php?id=2452
2. Răzvan Păcurar, Cristina Borzan, Eugen Guţiu, Cătălin Moldovan, Cristian Vilău, Sorin Comşa, Cosmin Cosma, Petru Berce, Nicolae Bâlc, Miloš Simonovic, Aleksandar Miltenovic, Milan Banic, Nikola Vitkovic, Remigiuzs Labudski, Filip Gorski, Magdalena Zukowska, Filip Sarbinovski, Sven Maricic, Mate Babic, Branislav Rabara, Peter Kostal, Erika Hruskova, BRIGHT e-toolkit manual for digital learning in producing medical parts by 3D printing methods in the context of the pandemic (e-toolkit), Rispoprint Publishing House, Cluj-Napoca, 2023, ISBN: 978-973-53-3028-6, https://www.risoprint.ro/detaliicarte.php?id=2455
3. Răzvan Păcurar, Nicolae Bâlc, NON-CONVENTIONAL TECHNOLOGIES - Project Guidebook, Rispoprint Publishing House, Cluj-Napoca, 2023, ISBN: 978-973-53-2707-1.

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There have been published also **books** in which BRIGHT partners of the consortium have been involved **as editors / co-editors,** like the following ones:

1. Filip Gorski, Michal Rychlik, Răzvan Păcurar, „Advances in Manufacturing III, vol. 5 – Biomedical Engineering: Research and Technology Innovations, Industry 4.0", Lectures Notes in Mechanical Engineering, Springer, 2022, ISBN 978-3-030-99768-7; https://link.springer.com/book/10.1007/978-3-030-99769-4
2. Răzvan Păcurar, „Trends and Opportunities of Rapid Prototyping Technologies", Open- access book, IN-Tech Publishing House, Rijeka, Croatia, 2022, DOI: 10.5772/intechopen.102781, https://www.intechopen.com/books/11171
3. Răzvan Păcurar, Filip Gorski, Special Issue "Smart Materials, Intelligent Structures and Innovative Applications of 3D Printing and Bio-Printing Methods", MDPI Materials journal, ISSN 1996-1944, (in course of publishing in 2023), https://www.mdpi.com/journal/materials/special_issues/XA56C5IU0T

6.3.BRIGHT project presentations to the events

Disseminating of the BRIGHT project and BRIGHT project results have been made also through several presentations that have been made by the BRIGHT consortium partners during scientific conferences that have been organized by other higher educational institutions or organized by the home institutions, events on which the BRIGHT consortium members were present, along with presentations that have been made with the occasion of other events on which attendees from outside BRIGHT consortium have participated, like workshops, summer schools that have been organized in the frame of other European programs, like CEEPUS, etc.

Regarding dissemination that was been made during the international and national **conferences,** it is about to be mentioned the MANUFACTURING 2022 conference that was organized by Poznan University of Technology - PUT (Poland) physically in the period 16-19.05.2022 in Poznan, Poland (see: https://manufacturing.put.poznan.pl/) , conference in which professor Filip Gorski (PUT-Poland) and Răzvan Păcurar (Technical University of Cluj-Napoca, Romania) have been involved in chairing sections, working together as co-editors of a book that has been published by Springerlink Publishing house, etc. (see Figure 42). As it is specified on the website of the conference, more than 150 international participants attended the event.

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Figure 42. Disseminating activities realized by the BRIGHT consortium at Manufacturing 2022 conference organized in Poznan (Poland)

Another occasion to realize dissemination of the BRIGHT project results reached by the BRIGHT consortium was on the IMANEE 2021 conference that was organized by the "Gheorghe Asachi" University of Iaşi (Romania) in hybrid mode in the period 21-23rd of October (see: http://www.2021.imane.ro/), event in which prof. Răzvan Păcurar from Technical University of Cluj-Napoca (Romania) has been invited as keynote speaker to realize one presentation in the plenary session of this conference, like shown in Figure 43. As one may notice in this figure title of the made presentation was identically with the one of the BRIGHT project, this being the main focus of this presentation that was held with more than 100 attendees coming from more than 10 EU countries which have been participating to the event.

Figure 43. Disseminating the BRIGHT project as keynote speaker at the IMANEE 2021 conference

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In terms of conferences, one last event on which BRIGHT project results realized by the BRIGHT consortium partners have been disseminated was realized by prof. Răzvan Păcurar (Technical University of Cluj-Napoca, Romania) on the Research Conference of Technical University of Cluj-Napoca (see: https://research.utcluj.ro/index.php/conferinta-cercetarii-in-utcn-2021.html) that was organized online by the Technical University of Cluj-Napoca, October 20-22, 2021 on which more than 70 participants (most of them coming from Technical University of Cluj-Napoca) have been participated. The title of the presentation was linked on the title of the BRIGHT project also in this case as one may notice in Figure 44 or by accessing the next following link that has been posted on the website of the organized event, from which the made presentation can be downloaded for free: https://research.utcluj.ro/tl_files/research/Pro%20Invent%202021/Advanced%20Technology/Prezentare_Conferinta%20Cercetarii_Razvan_Pacurar_21_10_2021.pdf

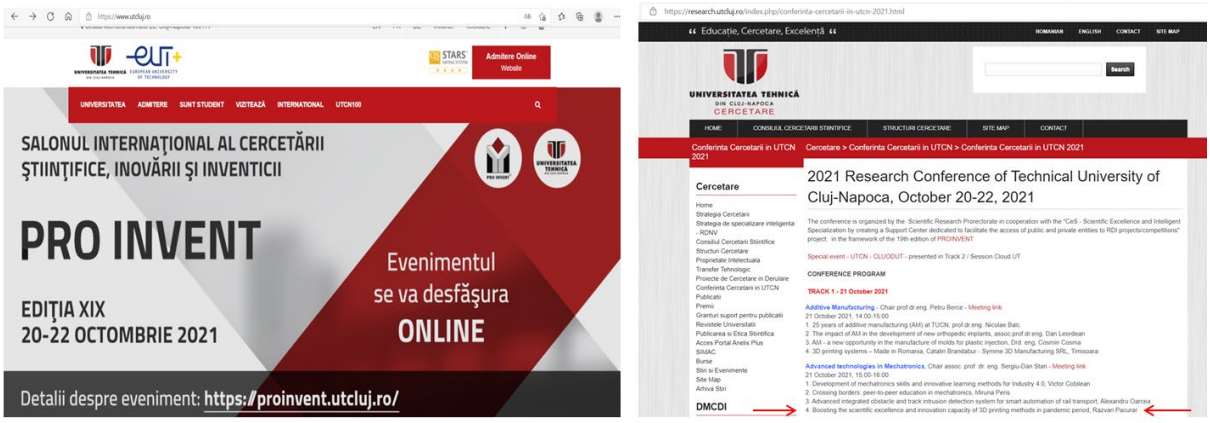

Figure 44. Disseminating the BRIGHT project on the Research Conference of TUCN, October 2021

Disseminating of BRIGHT project activities and reached results has been realized also in continuing through different **workshops, seminars,** or **other similar events** that have been organized with attendees coming from outside the BRIGHT project consortium.

In this sense, it is to be mentioned on the beginning, as shown in Figure 45 the workshop that has been organized by the ERASMUS + Office of the Technical University of Cluj-Napoca (see: http://bri.utcluj.ro/en/eplus.php) on 9th of April 2021, on which prof. Răzvan Păcurar has been asked to realize one online presentation about the BRIGHT project (more than 50 colleagues attended the event) through which he was invited also to provide valuable hints in writing of one proposal and also

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about the ERASMUS strategic partnership program benefits and opportunities in general. Details related to the Agenda of this event can be found by accessing the following link: https://www.utcluj.ro/media/notices/2021/Anunt_9_aprilie_ora_12.30.pdf.

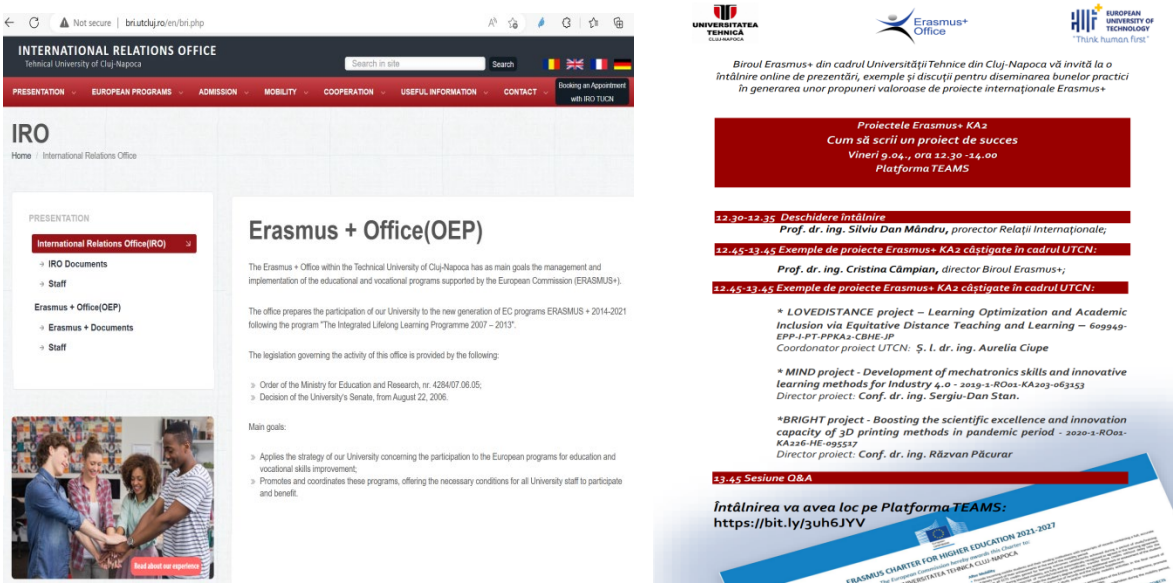

Figure 45. Disseminating of BRIGHT project within the workshop organized by the ERASMUS + office

In terms of **seminars and other similar events** or exchange cooperation (summer schools organized in the frame of other EU programs, like CEEPUS – see: https://www.ceepus.info/, dissemination of BRIGHT project has been realized by prof. Peter Kostal (STU Trnava) and prof. Răzvan Păcurar (TUCN) during the summer school edition entitled ""Internet of Things – Challenges, Applications, Trends" (see Figure 46), event that has been organized online by the Technical University of Kielce (Poland) in the period 17-28 May 2021 (see: https://weaii.tu.kielce.pl/80433-2/)

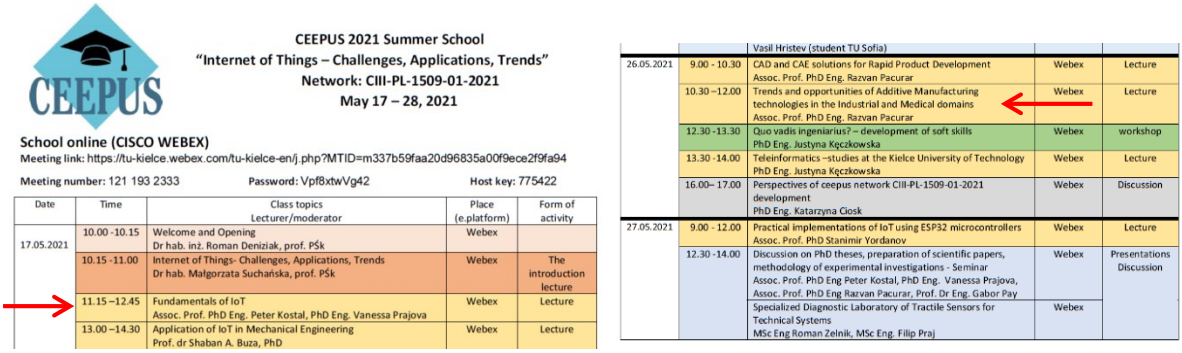

Figure 46. Dissemination of BRIGHT project done during Summer School organized by TU Kielce

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Important discussions have been held during this event about possibilities of cooperating together in supporting students with their activities they are developing in the field of 3D printing for their BSc and MSc theses, students and professors attending to the event being invited by prof. Peter Kostal and prof. Răzvan Păcurar to be continued and to be realized with support of the BRIGHT project resources. In continuing of this event, STU partner of the BRIGHT project has organized one seminar with the students coming from STU Trnava (Slovakia), in which they have been invited to go further on in being involved in comprising the opportunities that the BRIGHT project are offering in terms of designing and realizing of medical case studies by using 3D printing technologies. Students had the chance to work during the organized workshop under local coordinator of BRIGHT project, prof. Peter Kostal (STU Trnava) on designing of medical products to be done by 3D printing, to test one of the basic technologies of 3D printing like Fused Deposition Modelling in producing medical parts. Event was organized in March 2022 at STU Trnava (Slovakia) physically after all restrictions caused by pandemic have been raised up in Slovakia by public authorities (see Figure 47).

Figure 47. BRIGHT workshop organized by STU in Trnava in March 2022 with the students

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One important opportunity for disseminating the results of the BRIGHT project was constituted by the existing cooperation that exists with other Higher Educational institutions of Europe in the frame of European University of Technology - EuT+ project (see: https://univ-tech.eu/). Aim and mission of the EuT+ project is focused on the pivotal role that technology plays in forging an inclusive and sustainable future. Fundamentally new approach to technology and the training of people to foster it requires a new model of university that is relying on radically human-centered model of technology, as Figure 48 is suggesting.

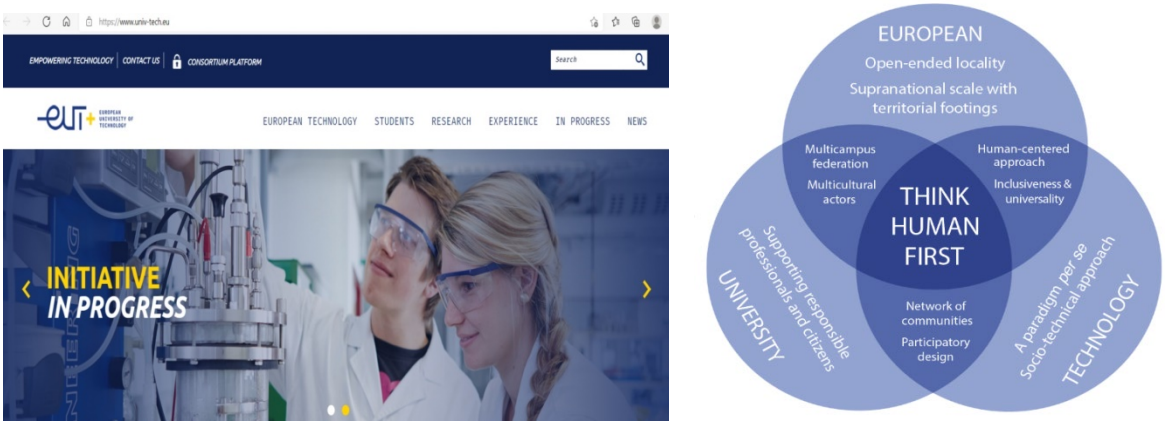

Figure 48. European University of Technology – EUT+ - main aims, mission and vision

Consortium of EuT+ comprises 8 Higher Educational institutes, namely University of technology in Troyes (France), University of Applied Sciences of Darmstadt (Germany), Technical University of Riga (Latvia), Technological University Dublin (Ireland), Technical University of Sofia (Bulgaria), Cyprus University of Technology (Cyprus), Polytechnic University of Cartagena (Spain) and Technical University of Cluj-Napoca (Romania). Prof. Răzvan Păcurar (TUCN) is activating also in this important European network of Universities and in this way, through the activities organized also within this project and also through the actions of visiting institutions or receiving of other professors and students from the EuT+ network at the Department of Manufacturing Engineering / Faculty of Industrial Engineering, Robotics and Production Management at the Technical University of Cluj-Napoca, many opportunities have been arising on the horizon to disseminate also the BRIGHT project and BRIGHT results through this Network. Recently one group of professors from the Polytechnic University of Cartagena (Spain) have paid one visit at Technical University of Cluj-Napoca for attending one event, through which BRIGHT results and resources were shared (see Figure 49).

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Figure 49. One group of professors from Polytechnic University of Cartagena (Spain) visiting TUCN

This visit came as one response to one of the visits that has been realized by prof. Răzvan Păciurar (TUCN) at Polytechnic University of Cartagena (Spain), who has been invited as honorary guest professor to realize one plenary presentation to a group of medical doctors with the occasion of inaugurating of one Laboratory of Research and Innovation in the field of Biomedical Engineering (Laboratorio de Investigación, Desarrollo e innovación de Tecnologías Biomédicas" (LIDiTeB) – in Spanish language) at Polytechnic University of Cartagena (Spain) – see Figure 50.

Figure 50. Plenary presentation realized at Polytechnic University of Cartagena (Spain)

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The event has been held physically in Spain on the date of 7th of October 2022 at Santa Lucia Hospital of Cartagena (see: https://www.upct.es/sait/es/Noticias/jornada-presentacion-laboratorio-liditeb/) with more than 100 attendees (medical doctors) who have participated and were eager to find which opportunities there are for the medical hospitals given by the 3D printing technologies, many of the solutions achieved in the BRIGHT project being disseminated in this way on this event. The event has also being transmitted online and one recording of video presentation that was made at LIDITEB 2022 event is available and can be visualized for free on the next following link: https://www.youtube.com/watch?v=W4ocdudm_IA

In terms of SMEs companies and presentations they have made regarding BRIGHT project results and achievements, to be mentioned is the one that Director of BIZZCOM company, Branislav Rabara did concerning their platform they have created for Research projects (see: https://bizzcom.sk/en/research/) in front of an international delegation from Taiwan in the presence of Pei-Zen Chang, Executive Vice President of the Industrial Technology Research Institute, Alex Hao-Chih Liao, Director General of the Department of International Cooperation of the Ministry of Foreign Affairs of Taiwan and Karol Galek, State Secretary of the Ministry of Economy of the Slovak Republic in 28 March 2022 in Bratislava, Slovakia (see Figure 51).

Figure 51. Presentation realized by BIZZCOM company regarding BRIGHT project

The subject of the meeting was to try to settle new possibilities of strategic cooperation between Europe and Taiwan, investment possibilities, partnerships in the field of research and development and business activity. In addition, Taiwan declared its interest in supporting European designers through several training programs.

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7. BRIGHT in the media

One other important source and tool that has been used for disseminating the BRIGHT project results and activities has been represented by the promoting materials that has been prepared in one very professional manner by a group of professional designers of one Publishing house in Cluj-Napoca, who have prepared different promotional materials like rollups, flyers, banners etc. regarding the activities of the project. Social media was also one important channel through which information has been rapidly shared among students. Last but not least it was the press who have brought important contribution in promoting, sharing and distributing the information about all results that have been achieved in the BRIGHT project.

7.1. BRIGHT promo materials

As it has been mentioned in the introduction of this chapter, having one team of professional designers in constituting the promoting materials regarding BRIGHT project and BRIGHT project activities has proved to be very important in relation with the impact that this promoting material had from the visualizing point of view in attracting people (professors, students, stakeholders, etc.) to be part of the events (see Figure 52).

Figure 52. Examples of promoting materials that have been prepared for the BRIGHT events

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Promotional materials like the ones presented in Figure 52 have been posted on the BRIGHT project website (e.g. see the following links: https://bright-project.eu/?p=171; https://bright-project.eu/?p=370) being used in continuing in media (newspapers, social media, etc.) or in other communicating materials (like press releases) which have been posted on official websites of Higher Educational institutions of BRIGHT consortium partners (see for example the next following links:

- https://www.utcluj.ro/media/documents/2021/Scoala_de_vara_pt_stiri.pdf
- https://www.utcluj.ro/media/documents/2022/Bright_final.pdf
- https://www.unipu.hr/_news/93709/flyer%20Summer%20School%20BRIGHT.pdf
- https://www.unipu.hr/medunarodna-suradnja/projekti/bright/obavijesti?@=2f78h#news_152242
- https://www.unipu.hr/medunarodna-suradnja/projekti/bright/obavijesti?@=2fbbx#news_152242
- https://www.unipu.hr/medunarodna-suradnja/projekti/bright/obavijesti?@=2fbiv#news_152242

Rollups and banners have been used to promote the BRIGHT project on all types of events that have been organized by the BRIGHT consortium partners, images undertaken during the organized events being included on all the reports that have been produced for the BRIGHT project (see Figure 53). As one may notice in this Figure also t-shirts with BRIGHT events have been realized for the students that have been participating to the events.

Figure 53. Photo image undertaken during the BRIGHT International Summer school 2022 edition

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Not just t-shirts with BRIGHT events have been produced and realized by the BRIGHT consortium partners during the organized events, but also logos of the BRIGHT project (3D models) which have been realized by 3D printing technologies and have been distributed during the organized events (see Figure 54).

Figure 54. Bright 3D printed logos shared and distributed during organized events

Banners related to the BRIGHT project have been produced by the SMEs companies, like B.M. Plast as shown in Figure 55. This banner has been realized and used during the visit that has been realized in July 2022 by the professors and students that have attended the BRIGHT Summer school 2022 event at BM Plast Factory.

Figure 55. Banner about BRIGHT project realized and exposed at BM Plast company

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This banner is visible and is used also to promote the BRIGHT project not just for the occasion of visiting that was realized by professors and students at the B. M. Plast factory in 2022 (see Figure 56), but also with the occasion of other visits that are being performed by SMEs representatives that are visiting B.M. Plast.

Figure 56. Banner of BRIGHT project being exposed on the BM Plast company during realized visits

Last, but not least rollups have been realized by the BRIGHT project on several events (like scientific conferences – e.g. Manufacturing conference - https://manufacturing.put.poznan.pl/ that was organized by Poznan University of Technology in 2022) for disseminating purposes of BRIGHT project results among the participants who have been attending the event (see Figure 57).

Figure 57. Rollup about BRIGHT project prepared for Manufacturing 2022 conference organized by PUT

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7.2. BRIGHT in the social media

One important tool for disseminating the BRIGHT project, BRIGHT project results and BRIGHT project activities has been constituted by the BRIGHT social media (BRIGHT Facebook page (Figure 58) which can be accessed on the following link: https://www.facebook.com/bright3Dprinting .

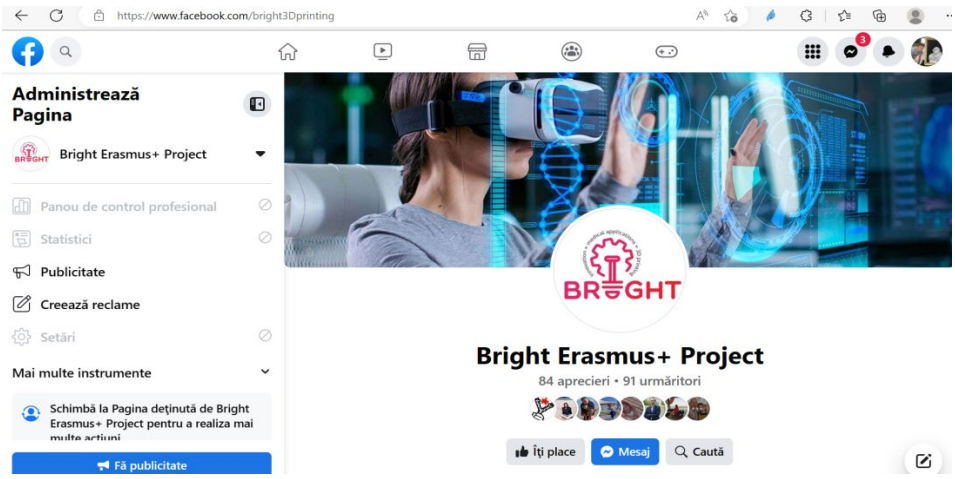

Figure 58. BRIGHT Facebook page

Communications of the results, reports, actions and activities of the BRIGHT project have been done during the implementation phase of the BRIGHT project through this Facebook page, but also through the social media pages (Facebook pages) of the BRIGHT Higher Educational institutions as one may notice exemplified in Figure 59. There are many links that can be provided about the postings that have been made through the official social media pages of BRIGHT institutions (especially in the case of Poznan University of Technology partner), but due to the length of this report only few (more representative) have been selected like the following ones:

- https://www.facebook.com/utcluj.ro -
- https://www.facebook.com/unipu.hr/posts/3122516191395460
- https://www.facebook.com/watch/?v=172417648028107
- https://www.facebook.com/permalink.php?story_fbid=pfbid0Zg9Us7L3Yfh3uA8Q3KbTBK8Kbd2mNeBu9Pd6zpFguK1CG7hjwnaAjYdxMdusXMh7l&id=461196793897843
- https://www.facebook.com/permalink.php?story_fbid=pfbid0NR558PesjaThqvBFsQct7ic11LxdAjitquXDhHaaHDKL1tiRDQRDBuJZNcmLdQfNl&id=461196793897843

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- https://www.facebook.com/permalink.php?story_fbid=pfbid0UwNhAS4BcAmch1qCR7hozMYpod57TV5LJxRf3NysQrC2Rxu7UJtVmQRpX72YsNMDl&id=461196793897843
- https://www.facebook.com/permalink.php?story_fbid=pfbid02TNBb3yxCzCLce3mj46PJZgvWyAB3FpRLfmKbgdcaH1A9ivdNE9ay7miYyJVB1P2jl&id=461196793897843
- https://www.facebook.com/permalink.php?story_fbid=pfbid024tejtwSFy9avwdcdgZYGaCay4UC6g85NAwQziDd8kdY2NEi8yGEug4egqY4jYpcdl&id=100057177441812

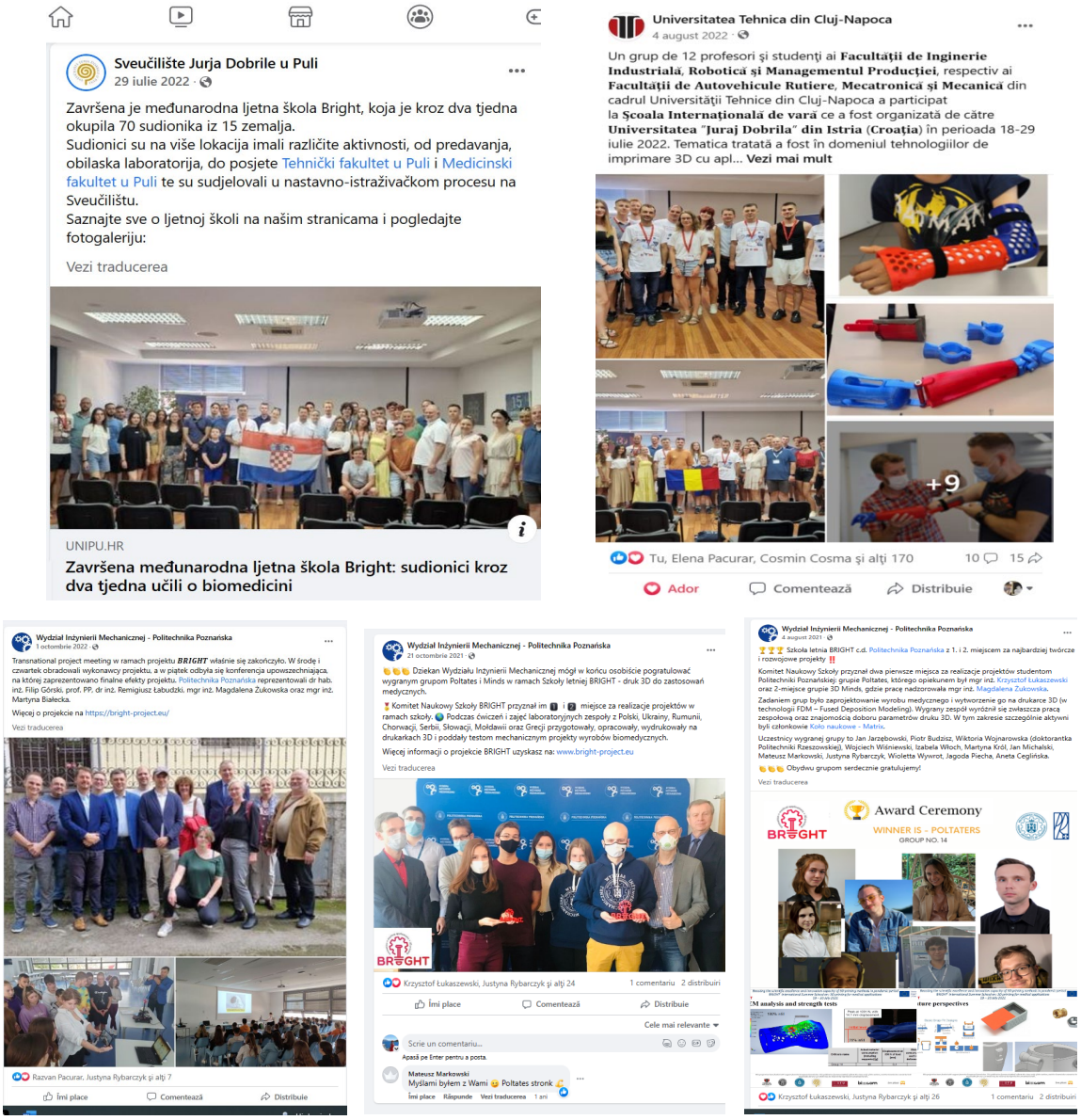

Figure 59. Posts made on the official social media pages of BRIGHT institutions

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7.3. BRIGHT YouTube channel

One YouTube page was created for the BRIGHT project, since it was necessary for hosting the webinars that have been produced in the frame of O4 (see Figure 60).

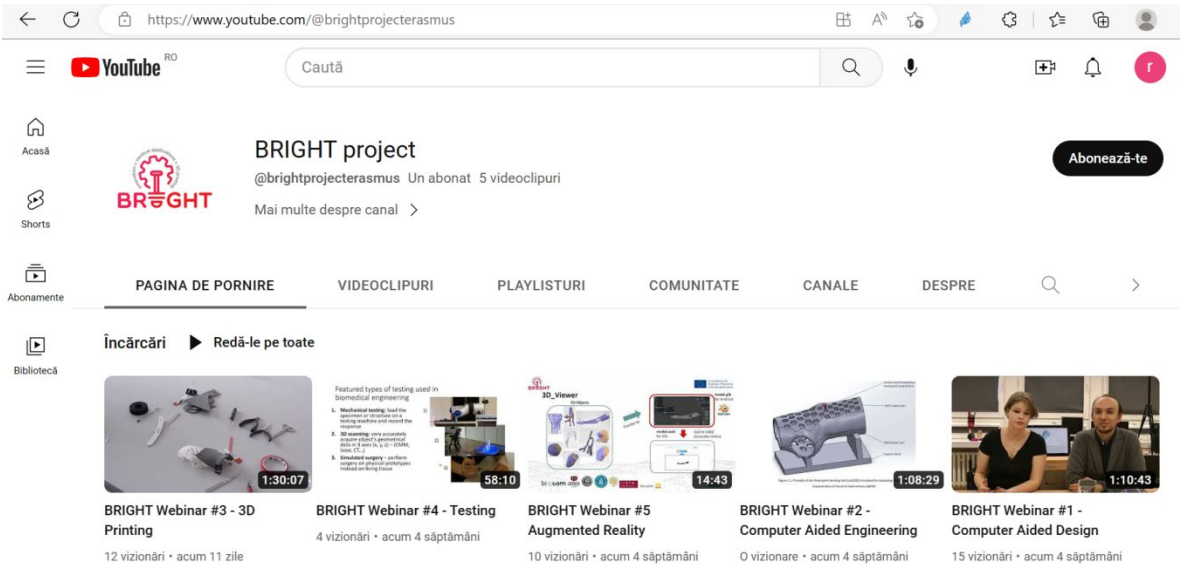

Figure 60. YouTube channel of the BRIGHT project

BRIGHT YouTube page can be accessed on the following link on which all BRIGHT webinars that have been produced in the frame of the BRIGHT project can be accessed for free: https://www.youtube.com/@brightprojecterasmus

7.4. BRIGHT in the press

One important source for disseminating the BRIGHT project activities and results have been realized also with the help of the mass-media, who have undertaken information that have been posted on press-releases of BRIGHT project website and Higher Educational institutions that have been released such type of communicates (press releases) (see for example the next following links):

- https://www.utcluj.ro/media/documents/2021/Proiectul_ERASMUS_BRIGHT__3wi4Vgs.pdf
- https://www.utcluj.ro/media/documents/2021/Scoala_de_vara_pt_stiri.pdf
- https://www.utcluj.ro/media/documents/2022/Bright_final.pdf

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By having the Mayor of the City present at the BRIGHT International Summer School 2021 event that has been organized by the Technical University of Cluj-Napoca, impact in terms of promoting and disseminating was high on the local level, since most of newspapers have taken the news and information related to BRIGHT project aims, objectives and events have reached easily to a wider audience (see Figure 61). Also since Technical University of Cluj-Napoca is very well linked with the digital platform of education community EduManager (see: https://www.edumanager.ro/) – which is leader in terms of information provided related to the educational domain in Romania, information related to BRIGHT project, results and events organized within BRIGHT project have been disseminated also by using this dedicated platform.

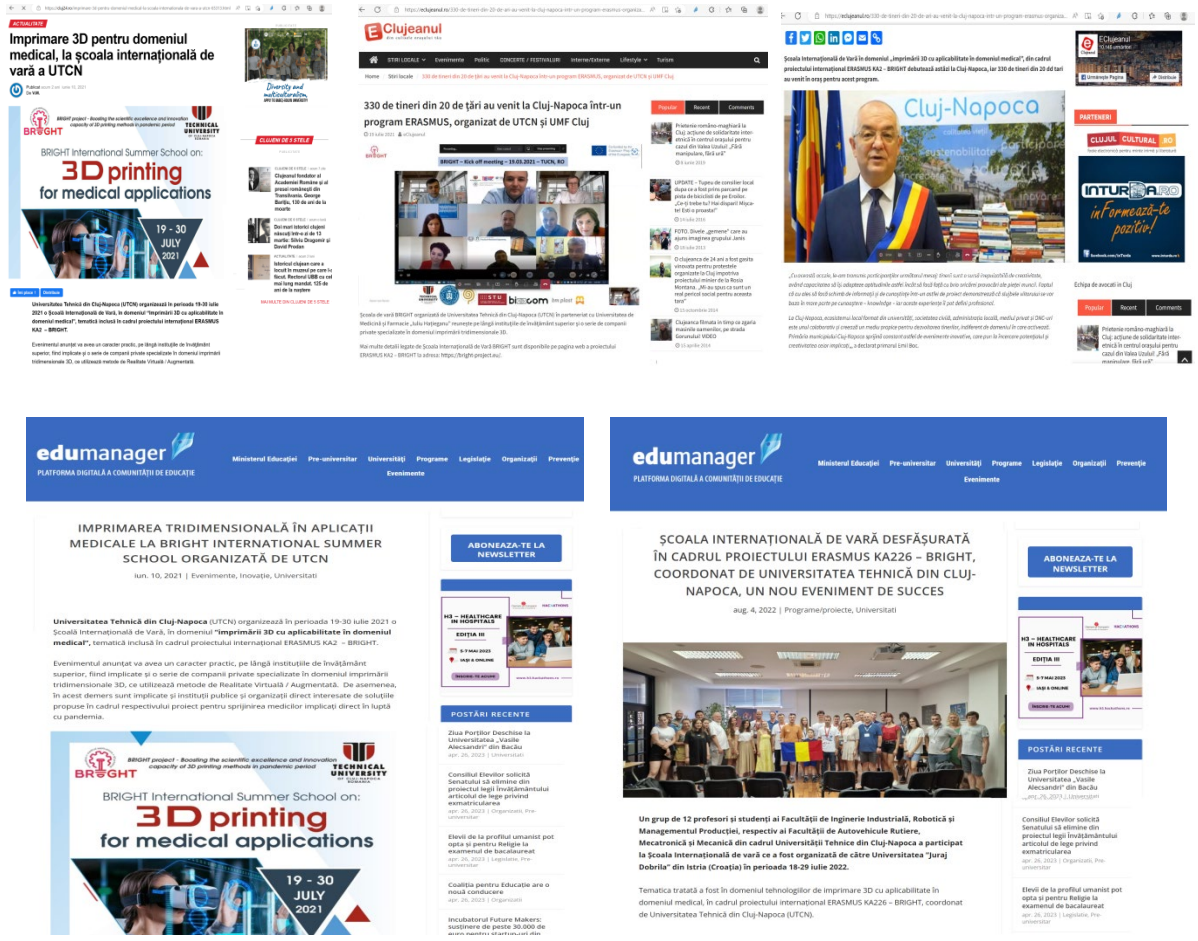

Figure 61. News in mass-media related to BRIGHT International Summer School organized in Cluj-Napoca

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One full list of sources through which BRIGHT project, results and events have been promoted and disseminated on EduManager digital platform and in the media on local level (in Cluj-Napoca) and on the National level in Romania can be found by accessing the following links:

- https://www.edumanager.ro/imprimarea-tridimensionala-in-aplicatii-medicale-la-bright-international-summer-school-organizata-de-utcn/
- https://www.edumanager.ro/scoala-internationala-de-vara-desfasurata-in-cadrul-proiectului-erasmus-ka226-bright-coordonat-de-universitatea-tehnica-din-cluj-napoca-un-nou-eveniment-de-succes/
- https://foaiatransilvana.ro/un-nou-proiect-inovativ-care-va-revolutia-industria-medicinei-va-fi-realizat-la-cluj-a-castigat-o-finantare-de-200-000-euro/
- https://cluj24.ro/imprimare-3d-pentru-domeniul-medical-la-scoala-internationala-de-vara-a-utcn-65313.html
- https://eclujeanul.ro/330-de-tineri-din-20-de-ari-au-venit-la-cluj-napoca-intr-un-program-erasmus-organizat-de-utcn-i-umf-cluj/
- https://www.viata-medicala.ro/reuniuni/scoala-de-vara-despre-imprimarea-3d-a-dispozitivelor-medicale-21868

Also positive news has been released in the same manner in Croatia related to the BRIGHT events that have been realized by Juraj Dobrila University of Pula (Croatia). News articles have been produced by local newspapers, who have been actively involved not just in providing articles related to the events (Summer School and Multiplier Event) that have been organized in Croatia in the summer and autumn of 2022, but also they have been involved in taking interviews and actively promoting the aims and results of the BRIGHT project also in this way. Promoting of BRIGHT International Summer School and BRIGHT project has been realized also through radio interviews like the one that was taken on the Radio Maestral of Istria. Important promotion and dissemination activity has been realized also on the platform of Istrian Development Agency of Pula (Croatia). Istrian Development Agency (IDA d.o.o) - https://ida.hr/en/ has been supporting Juraj Dobrila University of Pula (Croatia) by hosting professors and students that have attended to BRIGHT International Summer School in July 2022. Relevant images regarding promoting and disseminating of BRIGHT project and activities organized in Croatia in 2022 can be seen in Figure 62.

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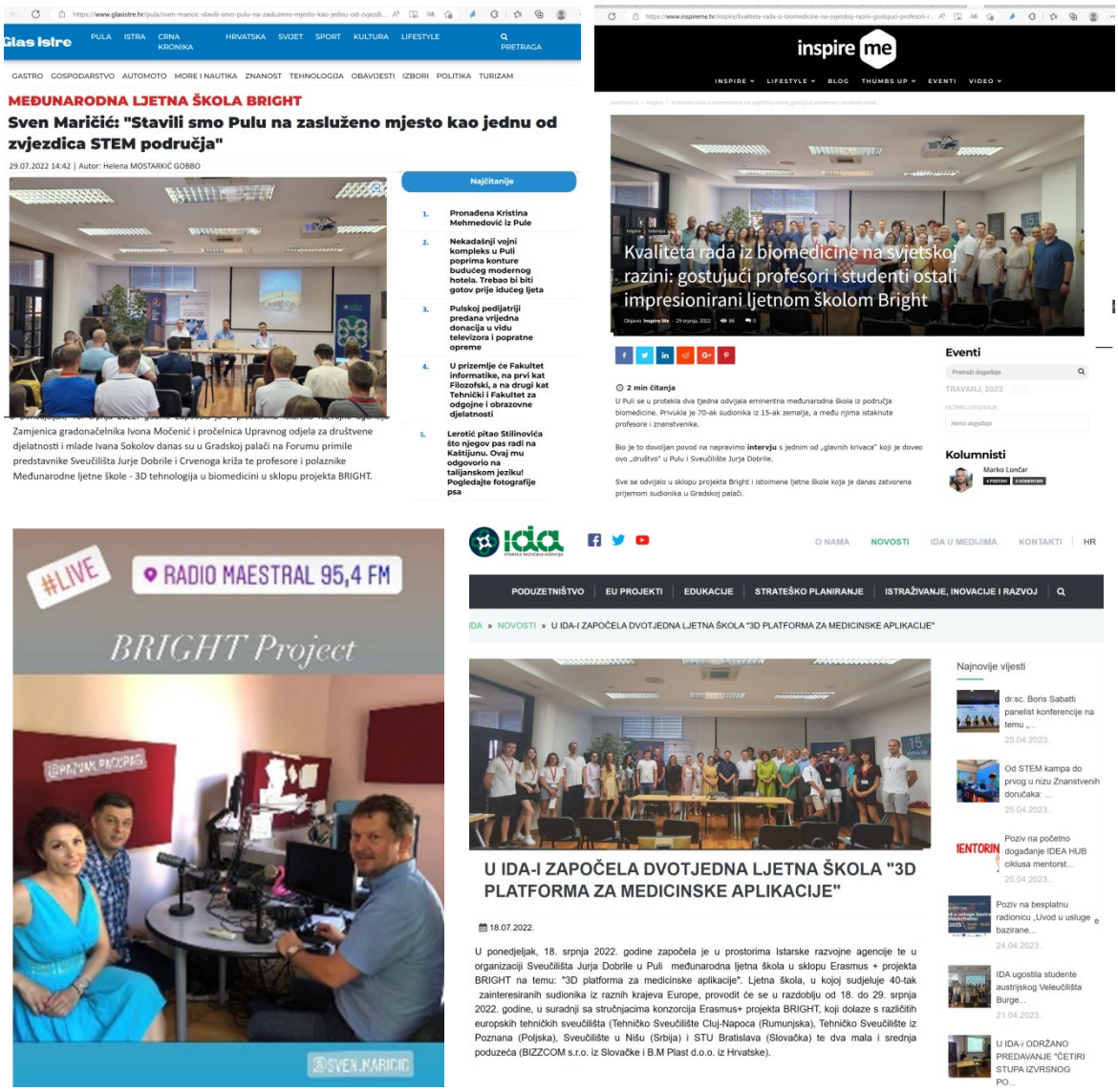

Figure 62.News in mass-media related to BRIGHT International Summer School organized in Pula (Croatia)

One list regarding sources through which the activities of the BRIGHT project, results and events organized in Pula (Croatia) in 2022 can be found on the next following links:

- https://www.glasistre.hr/pula/u-puli-pocela-ljetna-skola-o-koristenju-novih-tehnologija-u-biomedicini-sudjeluje-60-studenata-iz-10-zemalja-a-dio-predavanja-bit-ce-na-fratarskom-otoku-808423
- https://www.inspireme.hr/inspire/kvaliteta-rada-iz-biomedicine-na-svjetskoj-razini-gostujuci-profesori-i-studenti-ostali-impresionirani-ljetnom-skolom-bright/

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- https://www.glasistre.hr/pula/sven-maricic-stavili-smo-pulu-na-zasluzeno-mjesto-kao-jednu-od-zvjezdica-stem-podrucja-810263
- https://istrain.hr/index.php/istrain-arhiva/35257-u-pulskoj-komunalnoj-palaci-odrzana-zavrsna-svecanost-medunarodne-ljetne-skole-bright
- https://www.iv.hr/prezentiran-projekt-hatch-na-medunarodnoj-ljetnoj-skoli-bright-2022/
- https://ida.hr/hr/tn/novosti-481/detail/2583/u-ida-i-zapocela-dvotjedna-ljetna-skola-3d-platforma-za-medicinske-aplikacije/

8. BRIGHT strategic partnerships and new projects

One important results related to the realized disseminating activities, which was also one important objective of the BRIGHT project meantime have consisted in the attracting of potential stakeholders, like SMEs who are interested about the topic of the BRIGHT project and the potential of using the BRIGHT resources in developing and realizing of medical products by 3D printing technologies to support hospitals in time of pandemic. Through the organized events like Multiplier Events, Summer Schools, etc. as well as through knowledge exchange and sharing information in between BRIGHT institutions and SMEs who have attended the organizing events, BRIGHT consortium has managed to establish the frame for new partnership agreements which have been signed with SMEs, as well as to strengthening of the cooperation by getting involved in other EU strategic partnership projects or cooperating projects like EEA grants, new created consortium being constituted by some of the partners of the BRIGHT project, but also with new partners coming from higher educational institutions and SMEs coming from outside the BRIGHT consortium.

8.1.BRIGHT cooperation with companies and partnership agreements

As it was mentioned in the introduction section of this chapter, during the events that have been organized in the frame of the BRIGHT project like Multiplier Events, Summer Schools, etc., there have been many companies that have been participating and have expressed their interest in collaborating in the frame of the BRIGHT project, such as High leaders in the field of 3D printing equipment producers on the market, such as: Materialise, 3Dsystems, SLM Solutions, Stratasys, Viscotec, envisonTEC, but also local producers or distributors in the field of 3D printing, such as: Omni 3D, B3D, CD3D, Syntplant, from Poland or NU Technologies, Admasys, Leykom, CADWorks and Symme 3D from Romania (see Figure 63).

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Figure 63. Important institutions who were involved in attending and supporting the BRIGHT project

Most of these companies (especially the local ones coming from Poland and Romania (Omni 3D (https://omni3d.com/pl/), B3D (https://b3d.com.pl/), CD3D (https://centrumdruku3d.pl/), Syntplant (https://cyberbone.eu/en/) from Poland and NU Technologies (https://www.nutechnologies.ro/en), Leykom (https://leykom.ro/), Admasys (https://admasys.ro/) , CADWorks (https://cadworks.ro/) have been actively involved in supporting professors and students in producing developing and producing medical parts by using 3D printing technologies to support hospitals in time of pandemic, which were linked with the case studies (results) that have been obtained with support of these SMEs in the frame of intellectual output O5 of the BRIGHT project. Most of activities that have been realized in the frame of the BRIGHT project with support of the SMEs were realized based on new agreement partnerships that have been signed between the BRIGHT institutions and the SMEs.

8.2. BRIGHT new strategic partnership projects

Based on the existing cooperation in between the BRIGHT consortium institutions and based on the new established and signed agreements as direct results of disseminating the results during the organized activities in the BRIGHT project and share knowledge exchange in between SMEs and

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higher educational institutions, there have been established new partnership consortium formed by partners that are coming from BRIGHT consortium and outside the BRIGHT consortium, with whom there have been prepared and have been submitted new project proposals at the EU level (ERASMUS KA2 strategic partnerships, EEA grants, etc)

In this sense it is to be mentioned the new project entitled "European network for 3D printing of biomimetic mechatronic systems (21-COP-0019) – EMERALD (see: https://project-emerald.eu/), which is part of the Education, Scholarships, Apprenticeships and Youth Entrepreneurship Programme – EEA Grants 2014-2021 that has been funded within the key action "2021 Cooperation Projects in Higher Education Area", this project being in the period of implementation under the coordination of Technical University of Cluj-Napoca (see Figure 64).

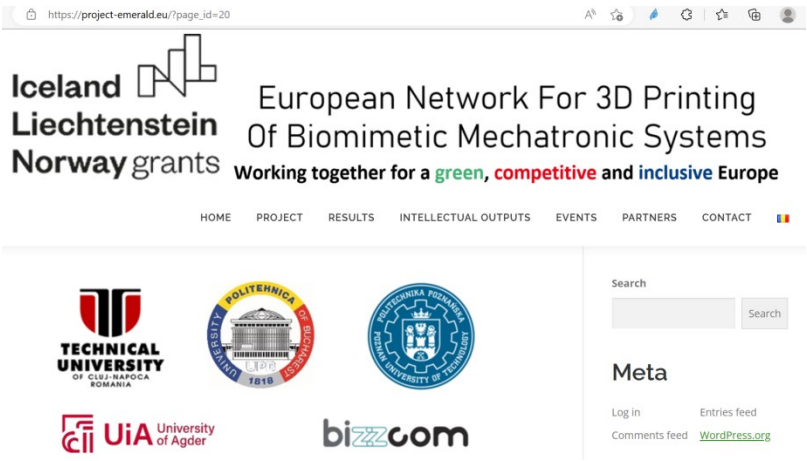

Figure 64. The new EMERALD project which was financed by Norwegian EEA grants

As one may notice in Figure 64 a total number of 3 partners (out of 5) are common with the ones in the BRIGHT project: Technical University of Cluj-Napoca (coordinator of the EMERALD project), Poznan University of Technology (Poland) and BIzzcom company of Slovakia, the rest of 2 partners being completed by other important Higher Educational institutions, like University of Agder (Norway) and Politehnica University of Bucharest (Romania).

The EMERALD project has received the highest score in the evaluating process (see Figure 65), continuing and confirming in this way the good practices results that were reached in terms of strategic partnership of the BRIGHT project in between the BRIGHT partner consortium and new partners coming from Higher Educational institutions (outside of the BRIGHT consortium).

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https://www.eea4edu.ro/rez-coop/

Iceland Liechtenstein Norway grants

HOME | INFORMAȚII GENERALE | CINE POATE CANDIDA | ȘTIRI | GALERIE DE PROIECTE | APLIC EN JM RO

Rezultate selecţie – Proiecte de cooperare în învăţământul universitar

Runda 2021 – APROBATE

Nr. crt.	Număr de referinţă	Titlul proiectului	Promotorul de proiect	Localitate	Partener din ţările donatoare	Punctaj final	Buget solicitat (EUR)	Buget aprobat (EUR)
1	21-COP-0019	European network for 3D printing of biomimetic mechatronic systems systems	Universitatea Tehnica din Cluj-Napoca	Cluj-Napoca	University of Agder, NO	115	199.950	198.810
2	21-COP-0004	Bringing Real Life into Virtual Classrooms	Universitatea de Vest din Timisoara	Timisoara	Norwegian University of Science and Technology, NO	110	94.237	89.353
3	21-COP-0016	Using the Open Source Collaborative Model for the Development, Delivery and Curation of Digital	Universitatea Politehnica Bucuresti	Bucuresti	University of Iceland, IS	92	198.412	158.444

Figure 65. Highest score reached (1st place) in the selecting / evaluating process of EMERALD project

The EMERALD project is complementary to the BRIGHT project, in sense that in the case of the EMERALD project the main objective is (like in case of BRIGHT project) the realizing of the necessary framework in providing teaching resources and methods that are destined for professors and students that are coming from the Higher Education institutions which are interested in getting relevant knowledge, skills and competences in the field of 3D printing methods, with applicability in the bio-mechatronics sector, case studies developed in the EMERALD project being exclusively destined for supporting people with special needs (like amputated arms), in this sense EMERALD project being little bit different oriented as compared to the BRIGHT project. EMERALD project is going one step further (as compared to the BRIGHT project) in programming of the realized prostheses made by 3D printing technologies, sensorizing of the realized prostheses, is approaching aspects focused and oriented exclusively on the bio-mechatronic sector and so on in concordance with the objectives that were stated by the consortium within the EMERALD project. For more details about the new EMERALD project that has been funded during the implementing period of BRIGHT

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project, confirming the good practice result in terms of cooperating in between partners that were involved in the BRIGHT project consortium can be found on the next following links:

- https://eeagrants.org/archive/2014-2021/projects/RO-EDUCATION-0167
- https://www.eea4edu.ro/rez-coop/
- https://www.utcluj.ro/media/documents/2022/proiect_EMERALD__YHdtBS6.pdf

One second project to be mentioned in terms of good cooperation in between partners of BRIGHT consortium and as a result of this good cooperation it is the ERASMUS KA 220 project (see: https://www.erasmusplus.ro/library/Superior/2022/Rezultate_selectie_KA220-HED_20222_250k.pdf), project entitled "Collaborative e-platform for innovation and educational enhancement in medical engineering" – CALLME (reference code: 2022-1-RO01-KA220-HED-000087703) which has also been financed in 2022, as shown in Figure 66 .

anpcdefp

Erasmus+

Rezultate selecție
Acțiunea Cheie 2 - Parteneriate de cooperare în domeniul universitar (KA220-HED) - Buget 250 000 euro
Apelul 2022 - runda 23 martie 2022

Nr. crt.	Număr referință proiect	Organizația	Localitatea	Județ	Titlul proiectului	Punctaj	Grant solicitat (EUR)	Grant aprobat (EUR)	Decizie / Observații
1	2022-1-RO01-KA220-HED-000085385	UNIVERSITATEA DIN CRAIOVA	CRAIOVA	DOLJ	Development of New Skills for Medical Students in Pandemic Context	76	250,000.00	250,000.00	Aprobat
2	2022-1-RO01-KA220-HED-000087365	UNIVERSITATEA BABES BOLYAI	CLUJ NAPOCA	CLUJ	Business Negotiation Competencies in Online World	74	250,000.00	250,000.00	Aprobat
3	2022-1-RO01-KA220-HED-000088958	UNIVERSITATEA DE MEDICINA SI FARMACIE VICTOR BABES TIMISOARA	TIMISOARA	TIMIS	Cooperation to implement innovative methods for the assessment of medicinal plants with central roles in pharmaceutics, agriculture and nutrition	73	250,000.00	250,000.00	Aprobat
4	2022-1-RO01-KA220-HED-000085618	UNIVERSITATEA POLITEHNICA DIN BUCURESTI	BUCURESTI	BUCURESTI	Cooperation partnership for innovation and development of green skills & knowledge enabling transformation and change for greening jobs and enterprises	72	250,000.00	250,000.00	Aprobat
5	2022-1-RO01-KA220-HED-000089017	UNIVERSITATEA DE MEDICINA SI FARMACIE GRIGORE T POPA DIN IASI	IASI	IASI	Digital transformation of Histology and Histopathology by Virtual Microscopy (VM) for an innovative medical school curriculum	70	250,000.00	250,000.00	Aprobat
6	2022-1-RO01-KA220-HED-000087703	UNIVERSITATEA TEHNICA CLUJ-NAPOCA	CLUJ NAPOCA	CLUJ	Collaborative e-platform for innovation and educational enhancement in medical engineering	69	250,000.00	250,000.00	Aprobat
7	2022-1-RO01-KA220-HED-000087012	UNIVERSITATEA DUNAREA DE JOS DIN GALATI	GALATI	GALATI	Start a civil society organization at European level	65	250,000.00	250,000.00	Aprobat
8	2022-1-RO01-KA220-HED-000086460	UNIVERSITATEA LUCIAN BLAGA DIN SIBIU	SIBIU	SIBIU	Developing Green Skills via Augmented Reality in Preschool Education Programs	63	250,000.00	250,000.00	Rezerva
9	2022-1-RO01-KA220-HED-000087310	UNIVERSITATEA AUREL VLAICU DIN ARAD	ARAD	ARAD	University Clubs As Accelerators for Civic Engagement and Inclusion of Students and Academy	62	250,000.00	0.00	Respins - fonduri insuficiente
10	2022-1-RO01-KA220-HED-000086310	UNIVERSITATEA DUNAREA DE JOS DIN GALATI	GALATI	GALATI	Challenges of Cross-Cultural Communication in the European Union - Innovation Partnership of Higher Education Institutions	61	250,000.00	0.00	Respins - fonduri insuficiente
11	2022-1-RO01-KA220-HED-000087210	UNIVERSITATEA DE STIINTE AGRONOMICE SI MEDICINA VETERINARA DIN BUCURESTI	BUCURESTI	BUCURESTI	Fostering Innovative Learning for Developing Smart and Sustainable Competences in Green Environmental Bioengineering	61	250,000.00	0.00	Respins - fonduri insuficiente
12	2022-1-RO01-KA220-HED-000089340	UNIVERSITATEA DE VEST DIN TIMISOARA	TIMISOARA	TIMIS	Higher Education Actions and Responsibility	60	250,000.00	0.00	Respins - fonduri insuficiente

Figure 66. New ERASMUS KA 220 - CALLME financed in 2022 competition

The aim of the ERASMUS KA 220 CALLME project is to implement a novel educational methodology (NEM) and STEM (Science, Technology, Engineering and Math) based on molecular (atomic) learning into the existing educational (learning) processes in medical engineering.

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Several curriculums and courses will be affected by this methodology (which will be shown as project outputs). Besides NEM, another important output will be open e-platform (E-COOL) for collaboration and knowledge exchange, which will enable application of NEM, molecular network structure of knowledge triangle elements (business, innovation, HEI), enhancement of existing HEI curriculums and creation of new applicable. The ERASMUS KA 220 CALLME (https://project-callme.eu/), coordinated by Technical University of Cluj-Napoca (Romania), comprises in the consortium the following partners that are coming from Higher Educational Institutions – University of Nis (Serbia) which was also involved in the BRIGHT project consortium, University of Kraguevac (Serbia), Techncal University of Riga (Latvia), Dublin City University (Ireland) and one company institution - G.M Eurocy Innovations Ltd from Cyprus. For more details about the CALLME project can be found on the following links:

- https://www.masfak.ni.ac.rs/images/CALLME_Project_Information.pdf
- https://bini.rtu.lv/erasmus-2/

BRIGHT consortium has been very active also on starting of 2023 and one new ERASMUS KA 220 proposal has been prepared and submitted on 2023 round 1 competition like shown in Figure 67 (https://www.erasmusplus.ro/library/Superior/2023/Parteneriate_de_cooperare_%C3%AEn_domeniul_%C3%AEnv%C4%83%C8%9B%C4%83m%C3%A2ntului_superior.pdf)

anpcdefp

F-C-04/02.2016

Erasmus+

Propuneri de proiecte primite la termenul limită 22 martie (prelungit pana la 24 martie) 2023
Acțiunea Cheie 2 - Parteneriate de cooperare în domeniul învățământului superior

Nr.	Număr referință proiect	Organizația	Localitatea	Județ	Titlul proiectului	Submission ID
21	2023-1-RO01-KA220-HED-000157369	UNIVERSITATEA DIN BUCURESTI	BUCURESTI	BUCURESTI	Project mAnagement Skills for ICT Students	1436508
22	2023-1-RO01-KA220-HED-000157494	UNIVERSITATEA MARITIMA DIN CONSTANTA	CONSTANTA	CONSTANTA	Sustainable Maritime Tourism Specialist in Higher Education	1436683
23	2023-1-RO01-KA220-HED-000157962	UNIVERSITATEA TEHNICA GHEORGHE ASACHI DIN IASI	IASI	IASI	AI4TEX	1437313
24	2023-1-RO01-KA220-HED-000158031	UNIVERSITATEA DIN CRAIOVA	CRAIOVA	DOLJ	Academic Network for Green and Innovative Europe	1437391
25	2023-1-RO01-KA220-HED-000158360	UNIVERSITATEA DE VEST DIN TIMISOARA	TIMISOARA	TIMIS	Boosting Graduate Employability to Grow SME Competitiveness	1437833
26	2023-1-RO01-KA220-HED-000158740	UNIVERSITATEA POLITEHNICA DIN BUCURESTI	BUCURESTI	BUCURESTI	aCademia and industrY Cooperation on digitaL cIrcular eConomy	1438361
27	2023-1-RO01-KA220-HED-000159116	UNIVERSITATEA ROMANO AMERICANA ASOCIATIE	BUCURESTI	BUCURESTI	Green competences to boost sustainable businesses in rural area	1438937
28	2023-1-RO01-KA220-HED-000160511	UNIVERSITATEA DUNAREA DE JOS DIN GALATI	GALATI	GALATI	Advancing the Integration of Soft Skills in Higher Education for Water	1440849
29	2023-1-RO01-KA220-HED-000159127	UNIVERSITATEA TEHNICA CLUJ-NAPOCA	CLUJ-NAPOCA	CLUJ	The University teaching methodology for the education of the future	1441350
30	2023-1-RO01-KA220-HED-000160843	UNIVERSITATEA TEHNICA CLUJ-NAPOCA	CLUJ-NAPOCA	CLUJ	Biomedical Innovations through Digital Transformation of Additive Technologies and Knowledge Exchange	1441356
31	2023-1-RO01-KA220-HED-000161051	UNIVERSITATEA STEFAN CEL MARE DIN SUCEAVA	SUCEAVA	SUCEAVA	Overcoming Stereotypes – Barriers to European Mobility	1441592
32	2023-1-RO01-KA220-HED-000159648	UNIVERSITATEA DIN BUCURESTI	BUCURESTI	BUCURESTI	Developing green co-curricula for students in teacher education programs	1441660
33	2023-1-RO01-KA220-HED-000159985	UNIVERSITATEA TRANSILVANIA DIN BRASOV	BRASOV	BRASOV	Smart Healthcare Engineering	1442977
34	2023-1-RO01-KA220-HED-000161905	UNIVERSITATEA CRESTINA PARTIUM	ORADEA	BIHOR	Early-Poly-Universe	1443220

Figure 67. New ERASMUS KA 220 proposal realized and submitted in the round 1 of 2023 competition

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The new ERASMUS KA 220 project entitled "Biomedical Innovations through Digital Transformation of Additive Technologies and Knowledge Exchange – BIOMEDIX (reference code: 2023-1-RO01-KA220-HED-000160843) is also complementary to BRIGHT project, aiming to provide one set of responses to the demand of specialists caused by the introduction of disruptive technologies in medical device manufacturing by incorporating Industry 4.0 (AR/VR, 3D Bioprinting, AI) in Biomedical Engineering curricula and by adopting new digital teaching methods for transnational knowledge-exchange in the frame of one digital platform that is going to be realized within BIOMEDIX project. Consortium of the new proposed ERASMUS KA 220 project BIOMEDIX is comprised by 3 partners that have been also involved in the BRIGHT project: Technical University of Cluj-Napoca (coordinator), Poznan University of Technology (Poland) and University of Nis (Serbia), consortium of new proposed project being completed with two other partners (that are part of the European University of Technology - EuT+ network (https://univ-tech.eu/) coming from the Higher Educational sector - Polytechnic University of Cartagena (Spain) and Technical University of Riga (Latvia) and with two other partners that are coming from company institutions – Materialise NV (Belgium) - https://www.materialise.com/en and ViscoTec Pumpen und Dosiertechnik GmbH (Germany) - https://www.viscotec.de/en/, company that is activating in the bio-printing 3D sector.

9. Conclusions

In conclusion, even if hard time of pandemic has been facing worldwide in the last two years, BRIGHT project consortium has been actively involved in implementing all the results that have been aimed to be realized in the frame of the BRIGHT project, being also actively involved in disseminating the achieved results in terms of teaching resources not just with people coming from the academic sector (professors and students from BRIGHT consortium and outside the BRIGHT consortium), but also to stakeholders (SMEs, hospital institutions, City Hall institutions, etc.) that are interested in developing, producing and testing of medical parts by using 3D printing technologies, to support hospitals in time of pandemic. The results reached in the frame of BRIGHT project have been consistent, being quantified not just in the teaching resources that have been produced (course and laboratory modules, virtual platform, scientific articles, books, diploma theses, etc.), but also in several events that were realized with high impact in time of pandemic, leading to new strategic partnerships or projects that have been realized in collaboration with companies and medical institutions that have been attracted through the organized events and have provided all their support in implementing and reaching all the results of the BRIGHT project in the end.

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