

# D.2.4.2. REPORT ON 1<sup>st</sup> BTS

InnovaMare project

Blue technology - Developing innovative technologies for sustainability of Adriatic Sea

WP2 – Communication activities

## Project References

**Call for proposal 2019 Strategic – InnovaMare**

**Project number:** 10248782

**Work package:** WP2 Communication activities

**Activity title:** A4 Public events

**Deliverable title:** D.2.4.2. Report on 1<sup>st</sup> BTS

**Expected date:** M5

**Deliverable description:** D.2.4.2. Report on international interdisciplinary field workshop of maritime robotics and applications where all the leading experts will be present to share and upgrade their knowledge in this specific field that shall contain all the gathered information and conclusion from this event

**Partner responsible for the deliverable:** FER

**Dissemination level:** CO - Confidential

**Status:** Final

**Version:** V1

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## INTRODUCTION



The **Breaking the Surface** 2020 was held from 27th September until 4th October in Biograd na Moru, Croatia and more than 85 people participated (on-site and online). BTS 2020 was held in a hybrid format with a small set of lectures held virtually and part of the lectures streamed online. The programme was divided in three programme tracks: lectures, PhD presentations and one roundtable. In five days, ten lectures, ten PhD presentations, one roundtable, four demonstrations and six tutorials were presented.

**Dates:** 27th September – 4th October 2020

**Location:** Biograd na Moru, Croatia

**Website:** <http://bts.fer.hr/>

## GENERAL INFORMATION OF THE EVENT

Breaking the Surface - BtS International Interdisciplinary Field Workshop of Maritime Robotics and Applications has been organized by UNIZG FER LABUST for the last 12 years – first three years as a part of FP7-REGPOT CURE project, while in the following years with Office of Naval Research Global and EU funded projects. This year's BTS was financed and supported by Interreg Italy-Croatia InnovaMare project, H2020 EUMarine Robots – Marine Robotics Research Infrastructure Network, H2020 AeRoTwin – Twinning Coordination Action for Spreading Excellence in Aerial Robotics, IMPACT Erasmus+, and IEEE Oceanic Engineering Society. During the years, BtS served as a meeting place of experts and students of marine robotics and the marine robotics application areas such as marine biology, marine archaeology, marine security, oceanography, marine geology, and oceanology. This is the world's first successful, multi-year field training programme that combines academic topics in marine robotics and robotics application areas and hands-on working experience in the sea, doing remote sensing and sampling for various ocean sciences. The workshop took place from 29th September to 4th October in Biograd na Moru, Croatia.

The programme is organised in the form of plenary talks, hands-on tutorials and demonstrations of marine technologies. Over the years, the programme has been growing and has been modified with novel elements. This year, for the first time, PhD presentations were held. In addition, a roundtable organized in the framework of the Interreg Italy-Croatia InnovaMare project took place on 29th September. In addition, three talks from the AeRoTwin project were held in partnership with the Laboratory for Robotics and Intelligent Control Systems (LARICS) from the University of Zagreb.

Ever since 2009, BtS has served as a meeting place for international experts, university professors, scientists, industry representatives and students. Given the pandemic restrictions, the target of BtS 2020 was mostly the student community although professors and industry representatives attended as well. The goals for this year edition were:

- To disseminate knowledge of the state of the art in marine robotics and related applications,
- To present and discuss several EU-funded projects such as EU Marine Robots, InnovaMare and AeRoTwin,
- To provide high-quality hands-on tutorials and demos on topics of interest for the student community,
- To share with all attendees the current UNIZG FER PhD students work,
- To test and demonstrate current projects in which UNIZG FER LABUST is involved.

The expected results include better awareness of the current work being developed by the UNIZG FER PhD students, cross-domain fertilization with LARICS laboratory, dissemination of the EU funded projects, in particular, the recently started InnovaMare project, advancement in the state of LABUST projects through trials and demonstrations and knowledge transfer from experienced researchers to students.

The methodology used to reach the above-mentioned goals was multi-fold. First of all, high-level and experienced lecturers were invited for both on-site and online talks. Similarly, very practical topics with extreme relevance and usefulness were chosen for the tutorials and experts in those topics were invited as presenters. These lectures and tutorials were complemented by short talks by all the participating PhD students from UNIZG FER, a novelty in the programme. Another novelty was the InnovaMare roundtable regarding the blue future, blue sustainability and innovation ecosystems. Finally, a well programmed set of demos and trials was planned by LABUST to maximize exposure to other participants and at the same time advance the status of current projects.

## BTS 2020 IN NUMBERS



6

COUNTRIES



50

ATTENDEES  
(IRL)



10

LECTURES



10

PHD PRESENTATIONS



6

VEHICLES



1

SOCIAL EVENT

## ORGANIZERS

Breaking the Surface is organized under the European Union's Horizon 2020 project EUMarineRobots – Marine Robotics Research Infrastructure Network (GA: 731103), Interreg Italy-Croatia InnovaMare project (ID: 10248782), H2020 AeRoTwin – Twinning Coordination Action for Spreading Excellence in Aerial Robotics (GA: 810321), IMPACT Erasmus+ (No: 2018-1-DE01-KA201-004259), and IEEE Oceanic Engineering Society. The main organizers are University of Zagreb Faculty of Electrical Engineering and Computing, Laboratory for Underwater Systems and Technologies and Centre for Underwater Systems and Technologies with the support from LARICS laboratory University of Zagreb Faculty of Electrical Engineering and Computing.



**FER**

University of Zagreb Faculty of  
Electrical Engineering and  
Computing



LABUST

Laboratory for Underwater  
Systems and Technologies



CUST

Centre for Underwater Systems  
and Technologies

## IN PARTNERSHIP WITH

**AMOS**

AMOS – Centre for Autonomous  
Marine Operations and Systems

**IFT** TÉCNICO  
LISBOA

Associação do Instituto Superior  
Técnico para a Investigação e  
Desenvolvimento

**DLTM**  
DISTRETTO LIGURE  
DELLE TECNOLOGIE MARINE

Distretto Ligure delle Tecnologie  
Marine





Herriot Watt University



Institut Français de Recherche pour l'exploitation de la Mer



Integrated Systems for Marine Environment



King's College London



Marine Institute Foras na Mara



Norwegian University of Science and Technology (NTNU)



NATO S&T Centre for Maritime Research and Experimentation



Natural Environment Research Council



The Oceanic Platform of the Canary Islands



The Association of Instituto Superior Técnico for Research and Development



Universidade de Lisboa (ULisboa)



University of Girona (UdG)



University of Limerick (UL)



University of Porto

## BREAKING THE SURFACE ORGANIZATION STRUCTURE

### Committees Chairs



**Prof. Zoran Vukić, PhD**  
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University of Zagreb  
Faculty of Electrical  
Engineering and  
Computing,  
Laboratory for  
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**Prof. Nikola Mišković, PhD**  
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### Programme Committee



**Prof. Ralf Bachmayer,  
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**Prof. Bridget Buxton,  
PhD**

University of Rhode Island,  
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**Joao Sousa**

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**Bill Kirkwood**

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**Massimo Caccia**

Italian National Research  
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**Fausto Ferreira, PhD**

NATO STO Centre for  
Maritime Research and  
Experimentation



**Asst. Prof. Irena  
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University of Zadar,  
Department of  
Archaeology

## Organizing Committee



**Ana Golec**

UNIZG FER LABUST

## Technical Committee



**Anja Babić, mag. ing.**

UNIZG FER LABUST



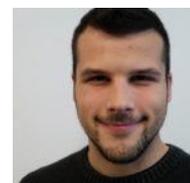
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**Nikica Kokir**

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**Ivan Lončar, mag. ing.**

UNIZG FER LABUST



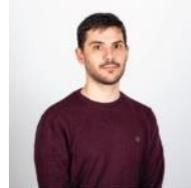
**Ivan Lončar,**  
mag. ing.

UNIZG FER LABUST



**Đula Nađ, PhD**

UNIZG FER LABUST



**Frane Rogić, mag.**  
ing.

UNIZG FER LABUST

## REPORT ON THE OUTCOMES

Given the global pandemic situation, the outcome of BtS 2020 edition can be considered a great success. Although the attendance diminished with respect to previous years due to substantial travel restrictions, UNIZG FER, other InnovaMare partners, Croatian companies and international lecturers led to an overall attendance of 50 people on-site which is a good number considering the constraints. Moreover, a maximum of 35 daily on-line attendees was reached during a time of proliferation of online events.

While the networking between professors, students, industry representatives and other professionals from different areas was reduced, a smaller community allowed for longer and expectably more fruitful and deeper interactions among the attendees. At the same time, tutorials and especially demos did not suffer from over attendance and more time could be devoted to individual questions and doubts.

The targeted group of students could promote their work to a wider community which may be hard to do at an early stage of their career. Thus, BtS acted as a platform to showcase the best of FER PhD students. With a smaller crowd, the same students could more easily discuss their research topics with more experienced researchers during breaks, which recalls BtS as an educational event.

Finally, the LABUST team had the time and opportunity to demonstrate its projects not only to the attendees but also to a local school and focus on new developments.

### INNOVAMARE ROUNDTABLE

On the second day of the Breaking the Surface - an international interdisciplinary field workshop of maritime robotics and applications – round table about project InnovaMare has been held. The round table has gathered different experts and stakeholders. The round table discussion organized within INNOVAMARE

Project – Interreg Italy Croatia has covered these topics: Blue future – underwater robotics and sensors; Blue sustainability – sea pollution and Economic value – innovation ecosystems.

The round table speakers have been Fantina Madricardo (ISMAR-CNR Venice), Ivana Palunko (University of Dubrovnik, Croatia), Gregory Yovanof (Athens Information Technology), Massimo Caccia (CNR-INM, Italy), Nikola Mišković (University of Zagreb, Croatia). The session has been moderated by InnovaMare project manager Mateo Ivanac (Croatian Chamber of Economy, Croatia).

The thematic of this roundtable was tackling the project overall objective that is enhanced framework conditions for innovation on cross-border level by setting up strategical and operational level capacity that consist of mix of policy instruments and innovation players as a frame for development of innovative technologies for sustainability of Adriatic Sea. Through the project implementation, the performance of the Programme area in the field of innovation, will improved by establishing and developing mechanisms as jointly developed and implemented cross-border model of innovation ecosystem in area of underwater robotics and sensors. Cross-border DIH in underwater robotics and sensors (MAiROS) will be central point for boosting innovation in monitoring and surveillance sector which contributes to a better exploitation of the existing potential and strengthen innovation relationships between SMEs and research centres operating in Programme area. InnovaMare project aims to enhance collaboration on technology transfer by creation of innovative network for underwater robotics and sensors based on request and offers from private and scientific research stakeholders.

After the discussion, important conclusions have been made. Cooperation between science, government institutions and companies are key to the development of a good innovation ecosystem. We now have excellent conditions and incentives to develop such a system as part of InnovaMare project and it could lead to concrete results. The implementation of the InnovaMare project is a chance to take concrete steps together because the technology is evolving rapidly and gives us opportunities to work cheaper and more modular robots that can help preserve the ecosystem. It was pointed out that Croatia and Italy are ready for that shift.

It has also been emphasized that we must determine our strengths and advantages of the national and European level and then focus on their development. In Croatia, the economy should be encouraged to use and apply scientific research in practice, in which we need to invest as much as possible. Software, hardware and sensors are becoming more advanced and with interdisciplinary cooperation, they will develop even faster. This cooperation is a model from the academic community to the market itself, where innovations are commercialized. Triple helix model is the right way to connect all the stakeholders.

Participants have concluded that the technology is already available, but it is expensive, so cooperation with the economy is needed in order to develop systems that will be commercially viable for implementation. Stakeholders should join us and take their place in this value chain. It is also important to emphasize that InnovaMare provides opportunities to use sophisticated technology to reduce costs and improve the results of marine ecosystem research.

## EVENT MATERIALS

Complete information regarding the agenda, talks, participants and communication materials follows below.

### Agenda and speakers

The complete schedule is summarized in the following table and is available on the website together with abstracts and biographies of all speakers.



MONDAY, 28.09.		TUESDAY, 29.09.		WEDNESDAY, 30.09.		THURSDAY, 01.10.				FRIDAY, 02.10.			
09:00-09:15	OPENING SESSION	09:00-09:45	Lecture: D2 - a vehicle for diver-robot collaboration (Đ. Nađ)	09:00-09:45	Lecture: Data Acquisition Service for ENCORE Architecture (S. Bogdan)	09:00-11:00 Tutorial The Basics of a Monitoring Mission (Babić, Lončar, Križmančić) subCULTron							
09:15-10:00	Lecture: Marine robotics at CMRE: from competitions regulation (F. Ferreira)	09:45-10:30	Lecture: Structurized Ecological Cultivation with Autonomous Robots in Indoor Agriculture (M. Orsag)	09:45-10:05	PHD Presentation: Sonar-Based Object Detection Methods (I. Kvasić)								
10:00-10:45	Lecture: Hybrid acoustic-optical underwater communication networks for next-generation cooperative systems (R. Petrocchia & A. Pascoal, EUMAR)	10:30-10:50	PHD Presentation: Production, testing and possible usecases of underwater acoustic beacons (V. Slošić)	10:05-10:25	PHD Presentation: Online seabed coverage path planning for an autonomous marine vehicle based on sonar data (N. Kapetanović)	11:00-11:15 BREAK				09:00-13:00 DEMO HECTOR DEMO H2O DEMO CroMarX DEMO InnovaMARE			
10:45-11:00	BREAK	10:50-11:05	BREAK	10:25-10:45	PHD Presentation: Low-power detection of underwater acoustic signals (F. Penić)								
11:00-11:20	PHD Presentation: Underwater Localization (F. Rogić)	11:05-11:25	PHD Presentation: MBZIRC 2020 - Autonomous ground vehicle in wall building scenario - Theoretical background (I. Vatašuk)	11:00-11:45	Lecture: SLAM in complex large-scale GNSS-denied environments (J. Ramiro Martinez-de Dios, AEROTWIN)	11:15-13:00 DEMO HECTOR DEMO H2O DEMO CroMarX DEMO InnovaMARE				13:00-14:30 LUNCH			
11:20-11:40	PHD Presentation: A hyper-heuristic approach to achieving long-term autonomy in a heterogeneous swarm of marine robots (A. Babić)	11:25-11:45	PHD Presentation: MBZIRC 2020 - Autonomous ground vehicle in wall building scenario - Experimental validation and in-field experiment (I. Hrabar)	11:45-12:30	Lecture: Asynchronous event-based vision for UAS perception (A. Gómez Egulluz, AEROTWIN)								
11:40-12:00	PHD Presentation: Consensus-Based Distributed Connectivity Control in Multi-Robot Systems (M. Križmančić)	11:45-13:15 Round table INNOVAMARE project Topics: 1. Blue future - underwater robotics and sensors 2. Blue Sustainability - sea pollution 3. The economic value - innovation ecosystems		12:30-13:15	Lecture: Adaptive Morphology for Aerial-Aquatic Robots (C. Winston, A. Farinha, J. Di Tria, AEROTWIN)	13:00-14:30 LUNCH				13:00-14:30 LUNCH			
12:00-12:20	PHD Presentation: Acoustic localisation of underwater sensors using cooperative unmanned marine vessels (I. Lončar)												
12:20-13:05	Lecture: Adaptive Optimal Control in Cooperative and Decentralized Systems (I. Palunko)	13:15-14:30 LUNCH		13:15-14:30	LUNCH	14:30-18:30 DEMO HECTOR DEMO H2O DEMO CroMarX DEMO InnovaMARE				14:30-18:30 DEMO HECTOR DEMO H2O DEMO CroMarX DEMO InnovaMARE			
13:05-14:30	LUNCH												
14:30-16:00	Lecture: Soft robotic manipulation in selected agrotechnical procedures based on artificial intelligence (M. Polić)	14:30-16:30	Tutorial Slam in complex GNSS-denied environments (J. Paneque, AEROTWIN)	14:30-16:00	Tutorial H2Orologio + H2Observe	16:00-16:15 BREAK				16:15-18:45 Tutorial ROS2 (Đ. Nađ)			
16:00-16:15	BREAK	16:30-16:45	BREAK	16:00-16:15	BREAK								
16:15-18:45	Tutorial ROS2 (Đ. Nađ)	16:45-18:45	Tutorial Blender (M. Orsag)	16:15-18:45	Tutorial LAUV Lupis - deployment, mission planning and analysis (N. Kapetanović)								

The daily programme follows below with the list of talks and speakers and links to the abstracts and biographies.

<b>Monday, 29<sup>th</sup> September</b>		
09:15 – 10:00	<a href="#">MARINE ROBOTICS AT CMRE: FROM COMPETITIONS TO REGULATION</a>	<a href="#">Fausto Ferreira</a>
10:00 – 10:45	<a href="#">HYBRID ACOUSTIC-OPTICAL UNDERWATER COMMUNICATION NETWORKS FOR NEXT- GENERATION COOPERATIVE SYSTEMS</a>	<a href="#">António M. Pascoal</a> , <a href="#">Roberto Petroccia</a>
11:00 – 11:20	<a href="#">PHD PRESENTATION: UNDERWATER LOCALIZATION</a>	<a href="#">Frane Rogić</a>
11:20 – 11:40	<a href="#">PHD PRESENTATION: A HYPER-HEURISTIC APPROACH TO ACHIEVING LONG-TERM AUTONOMY IN A HETEROGENEOUS SWARM OF MARINE ROBOTS</a>	<a href="#">Anja Babić</a>
11:40 – 12:00	<a href="#">PHD PRESENTATION: CONSENSUS-BASED DISTRIBUTED CONNECTIVITY CONTROL IN MULTI- ROBOT SYSTEMS</a>	<a href="#">Marko Križmančić</a>
12:00 – 12:20	<a href="#">PHD PRESENTATION: ACOUSTIC LOCALISATION OF UNDERWATER SENSORS USING COOPERATIVE UNMANNED MARINE VESSELS</a>	<a href="#">Ivan Lončar</a>
12:20 – 13:05	<a href="#">ADAPTIVE OPTIMAL CONTROL IN COOPERATIVE AND DECENTRALIZED SYSTEMS</a>	<a href="#">Ivana Palunko</a>
14:30 – 16:00	<a href="#">SOFT ROBOTIC MANIPULATION IN SELECTED AGROTECHNICAL PROCEDURES BASED ON ARTIFICIAL INTELLIGENCE</a>	<a href="#">Marsela Polić</a>
16:15 -18:45	<a href="#">TUTORIAL: ROBOT OPERATING SYSTEM 2 (ROS2)</a>	<a href="#">Đula Nađ</a>

Tuesday, 30 <sup>th</sup> September		
09:00 – 09:45	<a href="#">D2: A VEHICLE FOR DIVER-ROBOT COLLABORATION</a>	<a href="#">Đula Nađ</a>
09:45 – 10:30	<a href="#">STRUCTURIZED ECOLOGICAL CULTIVATION WITH AUTONOMOUS ROBOTS IN INDOOR AGRICULTURE</a>	<a href="#">Matko Orsag</a>
10:30 – 10:50	<a href="#">PHD PRESENTATION: PRODUCTION, TESTING AND POSSIBLE USECASES OF UNDERWATER ACOUSTIC BEACONS</a>	<a href="#">Vladimir Slošić</a>
11:05 – 11:25	<a href="#">PHD PRESENTATION: LARICS AT MBZIRC 2020 – AUTONOMOUS GROUND VEHICLE IN WALL BUILDING SCENARIO – THEORETICAL BACKGROUND</a>	<a href="#">Ivo VataVuk</a>
11:25 – 11:45	<a href="#">PHD PRESENTATION: LARICS AT MBZIRC 2020 – AUTONOMOUS GROUND VEHICLE IN WALL BUILDING SCENARIO – EXPERIMENTAL VALIDATION AND IN-FIELD EXPERIMENT</a>	<a href="#">Ivan Hrabar</a>
11:45 – 13:15	<a href="#">ROUND TABLE: INNOVAMARE PROJECT</a>	
14:30 – 16:30	<a href="#">TUTORIAL: SLAM IN COMPLEX LARGE-SCALE GNSS-DENIED ENVIRONMENTS</a>	<a href="#">Julio L. Paneque</a>
16:45 – 18:45	<a href="#">BLENDER</a>	<a href="#">Matko Orsag</a>

Wednesday, 31 <sup>st</sup> September		
09:00 – 09:45	<a href="#">DATA ACQUISITION SERVICE FOR ENCORE ARCHITECTURE</a>	<a href="#">Stjepan Bogdan</a>
09:45 – 10:05	<a href="#">PHD PRESENTATION: SONAR-BASED OBJECT DETECTION METHODS</a>	<a href="#">Igor Kvasić</a>
10:05 – 10:25	<a href="#">PHD PRESENTATION: ONLINE SEABED COVERAGE PATH PLANNING FOR AN AUTONOMOUS MARINE VEHICLE BASED ON SONAR DATA</a>	<a href="#">Nadir Kapetanović</a>
10:25 – 10:45	<a href="#">PHD PRESENTATION: LOW-POWER DETECTION OF UNDERWATER ACOUSTIC SIGNALS</a>	<a href="#">Fran Penić</a>
11:00 – 11:45	<a href="#">SLAM IN COMPLEX LARGE-SCALE GNSS-DENIED ENVIRONMENTS</a>	<a href="#">J. Ramiro Martinez-De Dios</a>
11:45 – 12:30	<a href="#">ASYNCHRONOUS EVENT-BASED VISION FOR UAS PERCEPTION</a>	<a href="#">Augusto Gómez Eguíluz</a>

12:30 – 13:15	<a href="#">ADAPTIVE MORPHOLOGY FOR AERIAL-AQUATIC ROBOTS</a>	<a href="#">Julien Di Tria</a> , <a href="#">André Farinha</a> , <a href="#">Crystal Winston</a>
14:30 – 16:00	<a href="#">TUTORIAL: H2O ROBOTICS PRODUCTS FOR UNDERWATER LOCALIZATION AND COMMUNICATION</a>	<a href="#">Kristijan Krčmar</a> , <a href="#">Vladimir Slošić</a>
16:15 – 18:45	<a href="#">TUTORIAL: LAUV LUPIS – DEPLOYMENT, MISSION PLANNING AND ANALYSIS</a>	<a href="#">Nadir Kapetanović</a>

Thursday, 1 <sup>st</sup> October		
09:00 – 11:00	<a href="#">TUTORIAL: THE BASICS OF A MONITORING MISSION</a>	<a href="#">IVAN LONČAR</a> , <a href="#">MARKO KRIŽMANČIĆ</a> , <a href="#">ANJA BABIĆ</a>

## Information on participants

Over 85 attended the event in total. On-site attendance included 50 participants. Given the travel restrictions most of the on-site attendees came from Croatia. Three international participants came from Spain and Italy. Of these, most were PhD students and research assistants from UNIZG FER. Students have been a target group of participants throughout all editions of BtS. Other participants include Professors (Assistant, Associate and Full) from UNIZG and University of Dubrovnik and a few professionals from a tech company.

BtS was partially live streamed (morning sessions) for free. Around 30 participants attended daily with a peak of 35 attendees on Tuesday 29 September.

## Pictures and videos



*Pictures of the opening session, tutorials and demos*



*InnovaMare Roundtable*

All pictures are available on [BtS FB page](#) divided by daily albums. Videos of the presentations that were live streamed are available below.

## Presentations

All the technical talks were streamed and were made available to the public on Youtube. In the following links covering these talks.

### Monday 28<sup>th</sup> September

- [Opening Session and 1st Morning Session](#) (includes F. Ferreira and R. Petroccia & A. Pascoal lectures)
- [2<sup>nd</sup> Morning Session](#) (includes PhD presentations by F. Rogić, A. Babić, M. Križmančić and I. Lončar and lecture by I. Palunko)

### Tuesday 29<sup>th</sup> September

- [1<sup>st</sup> Morning Session](#) (includes Đ. Nađ and M. Orsag lectures and V. Slošić PhD presentation)
- [2<sup>nd</sup> Morning Session](#) (includes I. Vatauvuk and I. Hrabar PhD presentations)
- [INNOVAMARE Round table](#)

### Wednesday 30<sup>th</sup> September

- [1st Morning Session](#) (includes S. Bogdan lecture and I. Kvasić, N. Kapetanović and F. Penić PhD presentations)
- [2nd Morning Session](#) (includes J. Ramiro Martinez-de-Dios, A. Gomes Eguíluz, and C. Winston, A. Farinha and J. Di Tria lectures)

## Promotional materials developed for the event

Due to the circumstances caused by the pandemic (travelling restrictions, limited number of participants), promotional materials were not used in their usual form (printed materials). The dissemination of information for the (virtual) attendees regarding regular update on the development of the situation prior to the event was done via newsletters: Save the Date, Important Notice, Preliminary Programme, and Final Programme.

## News and posts on social media

Several news were published in the website and through the newsletter over the year in preparation for BtS 2020. The initial “Save the Date” was launched on 2 January 2020. Given the COVID-19 situation, an important notice regarding refunds was published on 17 June 2020. The final announcement with the reduced programme was published on 28 August 2020. After the event, a short news announcing the lectures recording on YouTube was published on 11 November 2020.

In parallel, posts on BtS official FB page were published along the year and especially during the event. In particular, several posts with info and pictures of previous years were published in the first half of the year for marketing purposes. The preliminary programme talks were presented throughout August (before updating the programme). On 4 September, the final programme and schedule was announced with a reminder for online attendees on 25 September. Daily posts during the event included photo albums for the lectures, tutorials, and demos. A total reach of 1679 interactions during the event week was achieved according to FB statistics.

## Press office activities

Due to the uncertainty created by the pandemic, the communication focused more on social media (Facebook posts) and newsletters sent by e-mail to the subscribed audience, to ensure quick updates on the development of the situation. Therefore, the press was not included in the dissemination activities as the situation was constantly changing, causing not only last-minute changes in the programme, but also not excluding the option of cancelling the event altogether.

## CONCLUSIONS

BtS 2020 was a special edition in the decade-plus history of BtS. On one side, the current COVID-19 pandemic required to adapt the programme as most of the initial speakers were not able to travel to Croatia. Moreover, travel restrictions significantly diminished the number of international attendees. This led to a refocus of the participant targets and programme in the direction of students and local attendees. On the other side, for the first time, live streaming of technical talks took place and PhD students were given the opportunity to showcase their research not only to their fellow students but also to the more experienced researchers present in Biograd na Moru and online. While there were less opportunities for networking, with a reduced crowd, interactions could last longer, and students had more chances to spend time questioning and discussing with the lecturers.

Nonetheless, BtS 2020 had over 85 attendees and a rich programme. Gathering 50 attendees coming from six different countries on-site for a programme that included 10 lectures, 10 PhD presentations, six tutorials and four demos in a context of extreme uncertainty proves the success of this event and the long-standing positive reputation of the BtS workshop.

