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Innovation and excellence in massive-scale communications and information processing

INCOMING (Project No. 856967)

D4.2: Yearly plan/report of 5G-IT-Hub promotion activities¹

Abstract: This document presents a report on the 2nd year activities of 5G Innovation and Technology Hub established at the ICONIC centre as part of the INCOMING project. The deliverable also provides initial plans for 5G-IT-Hub activities during the second project year.

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INCOMING - 2 - June 30, 2022

Table of Contents

Li	st of Tables	4
Li	st of Figures	5
Li	st of Abbreviations	6
Ех	ecutive Summary	7
1	Introduction	8
2	5G and Beyond 5G Seminar Series	9
	5G and B5G Seminar 4: Prof. Charalambos Constantinou	10
	5G and B5G Seminar 5: Dr Branko Ristic	11
3	Meet the ICT Industry Seminar Series	12
	Meet the ICT Industry Seminar 3: Milan Jevtic (SAGA)	12
	Meet the ICT Industry Seminar 4: Filip Bankovic (Roaming Networks)	13
	Meet the ICT Industry Seminar 5: Nenad Siroki and Aleksandar Pantovic (PANOS)	14
4	Startup Success Stories Seminar Series	16
	Startup Success Stories Seminar 1: Veselin Pizurica (Waylay)	16
	Startup Success Stories Seminar 2: Nenad Bozic (Smart Cat)	17
	Startup Success Stories Seminar 3: Nino Adzibaba & Milan Erdelj (Easy Aerial)	18
5	Summary of 5G-IT-Hub Activities during Year 2	20
6	5G-IT-Hub plans for Year 3	21

INCOMING - 3 - June 30, 2022

List of Tables

INCOMING - 4 - June 30, 2022

List of Figures

- Figure 1: 5G and B5G Seminar Series Lecture 4: Prof. Charamabos Konstantinou
- Figure 2: 5G and B5G Seminar Series Lecture 5: Prof. Branko Ristic
- Figure 3: Meet the ICT Industry Seminar Series Lecture 3: Milan Jevtic
- Figure 4: Meet the ICT Industry Seminar Series Lecture 4: Filip Bankovic
- **Figure 5:** Meet the ICT Industry Seminar Series Lecture 5: Nenad Siroki and Aleksandar Pantovic
- Figure 6: Startup Success Stories Seminar Series Lecture 1: Veselin Pizurica
- Figure 7: Startup Success Stories Seminar Series Lecture 2: Nenad Bozic
- Figure 8: Startup Success Stories Seminar Series Lecture 3: Nino Adzibaba and Milan Erdelj

INCOMING - 5 - June 30, 2022

List of Abbreviations

5G-IT-Hub 5G Innovation and Technology Hub

AAU Aalborg University

CHALMERS Chalmers University of Technology

COVID Corona Virus Disease

DLR German Aerospace Centre

EU European Union

FTN Faculty of Technical Sciences, University of Novi Sad

ICT Information and Communication Technologies

IPR Intellectual Property Rights
 NSF National Science Foundation
 NTN Non-Terrestrial Networks

PAWR Platform for Advanced Wireless Research

UNS University of Novi Sad

INCOMING - 6 - June 30, 2022

Executive Summary

ICONIC centre (Faculty of Technical Sciences, University of Novi Sad) aims to establish itself as a leading research centre in the domain of wireless communications and information processing domains with applications in 5G and beyond 5G technologies in the region. Besides research and development activities, ICONIC aims to be active and visible in education and knowledge sharing on 5G and beyond 5G technologies. As part of H2020 INCOMING, ICONIC establieshed so called 5G Innovation and Technology Hub (5G-IT-Hub) to organise lectures and spread knowledge about exciting developments in the world of wireless communications and mobile cellular systems.

The main goals of 5G-IT-Hub are following:

- The hub provides local and regional stakeholders opportunity to access information, expertise, training, and best practices related to research, development and business opportunities in 5G ecosystem.
- 5G IT hub stimulates knowledge and experience exchange, networking among local and regional academic and industrial community, sharing and exchange of ideas, and stimulating innovation and entrepreneurship in 5G domain.
- The hub creates links between ICONIC and regional ICT-related stakeholders, thus raising ICONIC visibility among wider ICT community.

In this deliverable, we provide details on 5G-IT-Hub activities conducted during the second year of H2020 INCOMING project. For more information about 5G-IT-Hub and its activities, please check the hub's webpage: https://5ghub.ftn.uns.ac.rs/.

INCOMING - 7 - June 30, 2022

1 Introduction

H2020 INCOMING project aims to stimulate innovation and entrepreneurship environment in and around ICONIC centre (http://iconic.ftn.uns.ac.rs/, Faculty of Technical Sciences, University of Novi Sad) in the domain of 5G and beyond 5G technologies. ICONIC centre established 5G Innovation and Technology Hub (5G-IT-Hub) as a virtual entity that supports various educational, promotion and networking activities of the centre. 5G-IT-Hub is established in month 6 (01.06.2020.) of the H2020 INCOMING project.

5G-IT-Hub serves to connect ICONIC researchers with local and regional stakeholders with interest in 5G technologies and applications. The main tasks of 5G-IT-Hub are to:

- promote internal research and development capacity of ICONIC researchers,
- expand knowledge in ICT innovation and entrepreneurship of ICONIC staff members,
- gain experience, knowledge, support from EU partners and access to global stakeholders via their network of contacts,
- connect with local and regional stakeholders and startup community interested in 5G technologies,
- connect with local organizations that promote innovation in ICT.

The major activity of 5G-IT Hub is to organize seminars that will be useful both to ICONIC members as well as to wider community. These include three main seminar series:

- 5G and Beyond 5G Seminar Series
- Meet the ICT Industry Seminar
- Startup Success Stories Seminar.

5G-IT Hub will also organize trainings in the domain of Innovation, IPR and Entrepreneurship in ICT domain.

The second year of the project has been affected by global COVID-19 pandemic. For this reason, the original plans related to 5G-IT-Hubs activities had to be changed. For example, most of the activities done during this period had to be implemented in an online format. Towards the end of 2021, the COVID-19 restrictions are relaxed and organisation of 5G-IT-Hub lectures as physical events became possible. At that stage, many planned events are delayed in order to allow for their physical in-person realisation. For this reason, we include in this deliverable all the hub events that took place until this deliverable is submitted (30th of June 2022).

In this deliverable, we present activities of WP4 planned for the second project year, covering all the events that were organised from the beginning of the second year (01.01.2021.) until the submission of this deliverable (30.06.2022). The description is divided into three seminar series, and for each seminar series, we provide details of all the different events organised. We conclude this deliverable with future plans for the third project year.

INCOMING - 8 - June 30, 2022

2 5G and Beyond 5G Seminar Series

The first and the most important seminar series organized by 5G-IT-Hub is **5G** and **Beyond 5G Seminar Series**. The original goal of this seminar series was to bring leading 5G industry experts to ICONIC centre and Novi Sad, to present their view on 5G technology and applications.

Due to COVID-19 pandemic, travels and physical events were not possible during early 2021, so the seminar was rescheduled to take place as a set of virtual events. Towards late 2021, the situation improved and the prospects of organising physical 5G-IT-Hub events became a reality. The situation created a gap in schedule of 5G-IT-Hub seminars during Autumn 2021 (that was covered by other project activities such as the first project special session at BalkanCom 2021 in Novi Sad in September 2021). Since starting from 2022, most of the COVID restrictions are lifted, a number of seminars postponed in late 2021 are delivered during Spring of 2022, and we include them in this deliverable.

Next, we review seminars held in 5G and Beyond 5G seminar series. The first three seminars took place in online format during the first project year. Thus we continue the description of seminars starting from the fourth seminar in the series.

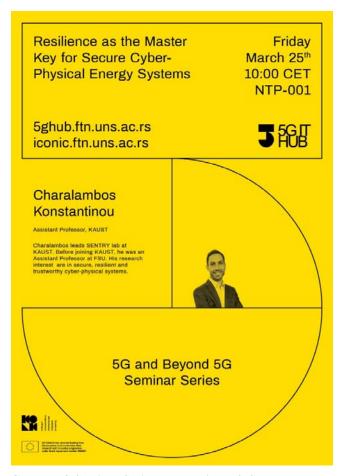


Figure 1: 5G and B5G Seminar Series Lecture 4: Prof. Charamabos Konstantinou

INCOMING - 9 - June 30, 2022

5G and B5G Seminar 4: Prof. Charalambos Constantinou

The fourth lecturer in this seminar series was Dr Charalambos Konstantinou, an assistant professor at King Abdullah University of Science and Technology (KAUST), Saudi Arabia. The information of the presenter at the talk are provided on the following link, including the video lecture provided under the speaker's informed consent:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-charalambos-konstantinou-kaust/

The talk entitled Resilience as a master key for secure cyber-physical energy systems presented the main problems in the domain of cyber-security for critical infrastructures with the focus on Smart Grids. This topic is very relevant for ICONIC research due to the centre's focus on massive IoT communications and large-scale information processing in Smart Grids.

The seminar took place as a physical event on 25th of March 2022 at the NTP building of Faculty of Technical Sciences, lecture hall NTP-001, with about 30-40 students and staff members attending the seminar.

The event poster for the lecture is presented via ICONIC centre and INCOMING project social media (LinkedIn and Twitter) and distributed through various University of Novi Sad, Faculty of Technical Sciences and global communication channels, and is presented in Figure 1.

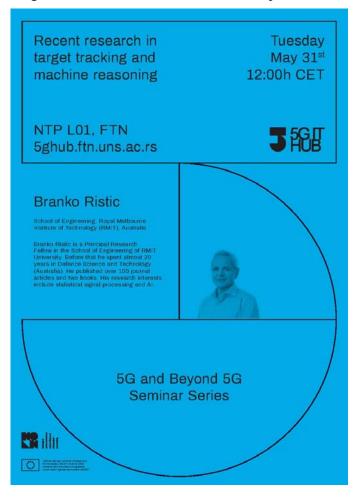


Figure 2: 5G and B5G Seminar Series Lecture 5: Prof. Branko Ristic

INCOMING - 10 - June 30, 2022

5G and B5G Seminar 5: Dr Branko Ristic

ICONIC centre staff are very active in the domain of large scale probabilistic inference methods via probabilistic graphical models. This framework has a lot of applications in various applications such as localisation and tracking. Celebrated Kalman Filter is one instance of application of Belief Propagation algorithms on graphical models. One of the world renowned experts on Bayesian methods for tracking and filtering is Prof. Branko Ristic from Royal Melbourne Institute of Technology (RMIT).

More information about the talk presented by Prof. Branko Ristic is provided on the link below: https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-branko-ristic-rmit/

The seminar entitled Recent research activities in target tracking and machine reasoning took place as a physical event on 31st of May 2022 at the NTP building of Faculty of Technical Sciences, lecture room NTP-L-01, with about 20-30 students and staff members attending the seminar. It attracted attention of other groups from FTN-UNS, e.g., the robotics and mechatronics group.

The event poster presented on ICONIC centre social media (LinkedIn and Twitter) and distributed through various University of Novi Sad, Faculty of Technical Sciences and global communication channels is presented in Figure 2.

Overall, 5 out of 8 planned 5G and Beyond 5G Seminar Series have been organised until this report has been submitted (30th of June 2022). Out of five seminars, 3 have been organised in an online format during the COVID travel restrictions, while the last 2 seminars have been organised as physical events in early 2022, as the travel restrictions have been relaxed and completely lifted.

INCOMING - 11 - June 30, 2022

3 Meet the ICT Industry Seminar Series

The second seminar series organized by 5G-IT-Hub is **Meet the ICT Industry Seminar Series**. The goal of this seminar is to present local/regional ICT companies to students, academic and local/regional ICT community. The original goal of this seminar series was to bring local and regional ICT industry representatives to visit ICONIC centre and Novi Sad and deliver a lecture as a physical event to the interested researchers and students.

Due to COVID-19 pandemic, travels and physical events were not possible during early 2021, so the seminar was rescheduled to take place as a set of virtual events. Towards late 2021, the situation improved and the prospects of organising physical 5G-IT-Hub events became a reality. In particular, for this seminar series that does not assume international travels, organising physical events depended only on Serbian regulation of gathering in indoor spaces during and in later phases of the pandemic.

Next, we review seminars held in Meet the ICT Industry seminar series. The first two seminars took place in online format during the first project year. Thus we continue the description of seminars starting from the third seminar in the series.



Figure 3: Meet the ICT Industry Seminar Series Lecture 3: Milan Jevtic

Meet the ICT Industry Seminar 3: Milan Jevtic (SAGA)

5G-IT-Hub third seminar of Meet the ICT Industry Seminar Series featured Milan Jevtic, Executive Director for Software Solutions of SAGA, from Belgrade, Serbia. SAGA (www.saga.rs)

INCOMING - 12 - June 30, 2022

is one of the leading IT companies in Serbia and SEE region. SAGA is a well known system integrator focusing on modern communications and cloud technologies.

The information of the presenter and the talk are provided in the link below, including the complete video lecture:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-milan-jevtic-saga/

The seminar entitled IoT projects in regional environment: Organisational bottleneck, took place as an online event on 16th of April 2021, with about 20-30 students and staff members attending the online seminar session.

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 3.



Figure 4: Meet the ICT Industry Seminar Series Lecture 4: Filip Bankovic

Meet the ICT Industry Seminar 4: Filip Bankovic (Roaming Networks)

The fourth seminar within the Meet the ICT Industry Seminar Series brought the first opportunity to organise a physical event at the FTN UNS, after the restrictions on indoor gatherings are relaxed. The lecture was presented by Filip Bankovic, CTO of the Roaming Networks, one of the larger system integrators in the domain of mobile wireless cellular networks. Roaming Networks is active in many markets, including the USA, UK, Norway, Germany, and SEE region. They are 5G network integrator for a large number of mobile cellular operators worldwide, including advanced deployments of Open-RAN (O-RAN) based networks.

INCOMING - 13 - June 30, 2022

The detailed information of the presenter and the talk are provided on the following link, including the complete video lecture:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-filip-bankovic-roaming-networks/

The seminar entitled Wherever We May Roam took place as a physical event on 2nd of June 2021 at the large amphiteatre A01 of the Faculty of Technical Sciences, University of Novi Sad. It was attended by about 40-50 students and staff members.

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 4.

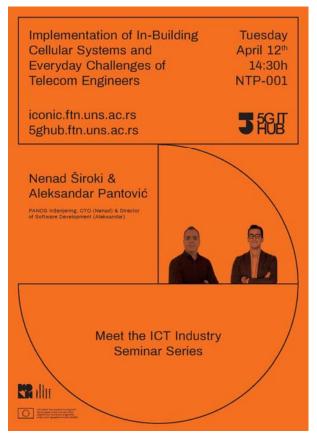


Figure 5: Meet the ICT Industry Seminar Series Lecture 5: Nenad Siroki and Aleksandar Pantovic

Meet the ICT Industry Seminar 5: Nenad Siroki and Aleksandar Pantovic (PANOS)

The fifth seminar within the Meet the ICT Industry Seminar Series introduced PANOS as one of the major provider of integrated active and passive RF solutions for mobile cellular operators in the region. The lecture was presented by Nenad Siroki, CTO, and Aleksandar Pantovic, Director of Software Development. As one of the main system integrators for active and passive RF deployments for public and private mobile networks, the lecture presented a number of real-world deployments and use cases including a number of indoor distributed antenna systems installations in large commercial and industrial objects.

The detailed information of presenters and their talk are provided on the following link, including the complete video lecture:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-nenad-siroki-aleksandar-pantovic-panos/

INCOMING - 14 - June 30, 2022

The seminar entitled Implementation of In-Building Cellular Systems and Everyday challenges of Telecommunication Engineers took place as a physical event on 12th of April 2022 at the lecture room NTP-001 of the NTP building of the Faculty of Technical Sciences. It was attended by about 30 students and staff members.

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 5.

It is worth noting that all of the involved companies that present lectures in Meet the ICT Seminar of 5G-IT-Hub further increase the visibility of ICONIC centre through their social networking activities on LinkedIn network. For example, PANOS team publicly praised the organisation of 5G IT Hub seminars on their posts on LinkedIn, as illustrated below:



Overall, 5 out of 6 planned Meet the ICT Industry Seminar Series events have been organised until this report has been submitted (30th of June 2022). Out of five seminars, 3 have been organised in an online format during the COVID travel restrictions, while the last 2 seminars have been organised as physical events in 2021 and 2022, as the travel restrictions have been relaxed and completely lifted.

INCOMING - 15 - June 30, 2022

4 Startup Success Stories Seminar Series

The goal of this seminar is to establish regular talks and presentations of the most successful ICT entrepreneurs in the region, where they would provide account on the initiation and first steps in development of their startups, the steps that followed to reach the first major success, share their best practices, and engage in discussion with the seminar participants.

This seminar series serves as an introduction to the first set of trainings that will be organized within 5G-IT-Hub, such as the training on Intellectual Property Rights (IPR), Entrepreneurship, and Fundraising.

Startup Success Stories Seminar 1: Veselin Pizurica (Waylay)

The first 5G-IT-Hub seminar of Startup Success Stories Seminar Series invited Veselin Pizurica as a speaker. Veselin is a CTO and Co-Founder of a Ghent-based startup called Waylay (https://www.waylay.io/) focusing on enterprise automation, AI, and IoT technologies. Veselin, who is natively from Novi Sad, Serbia, was an ideal person to present his own experience of building a startup in EU in such a competitive domain of IoT technologies and applications. His experiences and views were valuable input to all the participants coming across ICONIC centre staff members, FTN-UNS students, but also, external researchers that could follow this seminar online via video conferencing platform.



Figure 6: Startup Success Stories Seminar Series Lecture 1: Veselin Pizurica

The information of the presenter and the talk are provided in the link below, including the complete video lecture:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-veselin-pizurica-waylay/

INCOMING - 16 - June 30, 2022

The seminar entitled Waylay: Building a Startup in Industrial IoT Automation, took place as an online event on 30th of March 2021, with about 40 students and staff members attending the online seminar session.

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 5.

Startup Success Stories Seminar 2: Nenad Bozic (Smart Cat)

The second 5G-IT-Hub seminar of Startup Success Stories Seminar Series featured Nenad Bozic as a speaker. Nenad is a CEO and Co-Founder of a Novi Sad-based startup called Smart Cat (https://smartcat.io/) focusing on usage of big data and machine learning/AI technologies in various industries. Nenad presented a wide portfolio of different projects Smart Cat did in recent years and shared his own experience of building a startup in Serbia in emerging domain of ML and AI technologies and services. His experiences and views were positively evaluated and appreciated by the seminar participants that included ICONIC staff members, students, and external followers that connected to the seminar online via video conferencing platform.

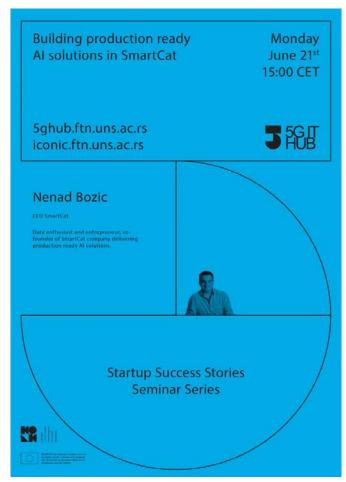


Figure 7: Startup Success Stories Seminar Series Lecture 2: Nenad Bozic

The information of the presenter and the talk are provided in the link below, including the complete video lecture:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-nenad-bozic-smartcat/

INCOMING - 17 - June 30, 2022

The seminar entitled Building Production Ready AI Solutions in SmartCat, took place as an online event on 21st of June 2021, with about 40 students and staff members attending the online seminar session.

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 6.

Startup Success Stories Seminar 3: Nino Adzibaba & Milan Erdelj (Easy Aerial)

The third 5G-IT-Hub seminar of Startup Success Stories Seminar Series introduced Ninoslav Adzibaba, Chief Software Architect, and Milan Erdelj, Director of Communication Technologies, as seminar speakers. They are part of US-based startup called Easy Aerial (https://www.easyaerial.com/) that provides tethered and untethered drones for various applications, ranging from first responders, railway infrastructure inspection, border security, sports and entertainment and many others. The audience was inspired by a number of useful advices on how to evolve as a startup, strategies to succeed but also to fail.

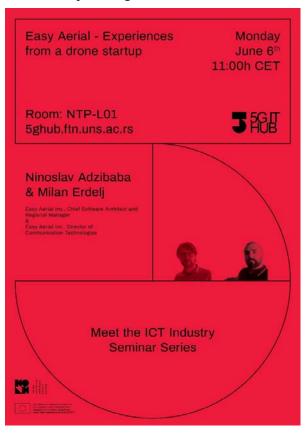


Figure 8: Startup Success Stories Seminar Series Lecture 3: Nino Adzibaba and Milan Erdelj

The information of the presenter and the talk are provided in the link below, including the complete video lecture:

https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-nino-adzibaba-and-milan-erdelj-easy-aerial/

The seminar entitled Easy Aerial – Experiences from a drone startup, took place as a physical event on 06th of June 2022, at the NTP lecture room L01 of Science and Technology (NTP) building of FTN with about 40 students and staff members attending the seminar session.

INCOMING - 18 - June 30, 2022

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 7.

INCOMING - 19 - June 30, 2022

5 Summary of 5G-IT-Hub Activities during Year 2

The second year of the project continued with 5G-IT-Hub activities. The project had to deviate from the original plan that was to organize 5G-IT-Hub activities as physical events. Instead, during the first half of 2021, all activities are organized as online events. However, during the second half of 2021, it became possible to organise events for regional lecturers (coming from Serbia or SEE region) as physical events. Starting from early 2022, the COVID restrictions were mainly removed across EU, so that the physical events with presence of international speakers became possible.

The main line of activities of 5G-IT-Hub are Seminar Series: public lectures that serve to inform the general audience about the 5G technology developments. After three seminars delivered during the first year of the project, additional two 5G and Beyond 5G seminars are organised during 2021 and early 2020, both as physical events. Meet the ICT Industry seminar series also continued its activities through organisation of additional three seminars during 2021 and the first half of 2022. One of the seminars is organised online, while the following two were organised as physical events. Finally, the last seminar series called Startup Success Stories kick-started during the second year of the project. Three lecturers provided inspiring experience with their startup journeys, the first two lectures being delivered online, while the final one delivered as a physical event.

Other training activities within 5G-IT-Hub in the form of IPR, Entrepreneurship, and Fundraising trainings are scheduled to start during second half of 2022. Among other activities, as the research outcomes of INCOMING collaboration become more mature, 5G-IT-Hub will also serve as a platform for regular organization of demo sessions where a number of showcase demos will be presented as a result of INCOMING project activities.

To summarize, 5G-IT-Hub is established in June 2020. and after the first two years and 11 events taking place from October 2020 to June 2022, the activities of 5G-IT-Hub attracted significant attention from IT researchers and specialists in the region. LinkedIn page and home page of ICONIC centre and 5G-IT-Hub gained increased visibility as the events have been announced, and very positive feedback has been received from local and regional ICT community. This trend is likely to continue as more events and world-class speakers are added to 5G-IT-Hub events agenda in the following years.

INCOMING - 20 - June 30, 2022

6 5G-IT-Hub plans for Year 3

5G-IT-Hub will continue its activities during 2022. with organization of various events, as planned by the INCOMING project WP4 description. These activities include:

- Organization of at least 3 additional seminars from 5G and Beyond 5G seminar series;
- Organization of at least 3 seminars from Meet the ICT industry seminar series;
- Organization of at least 3 seminars from Startup Success Story seminar series.

In addition to the seminar series, during 2022. 5G-IT-Hub will start with training events. At least the first training on Intellectual Property Rights will be organized in 2022.

Finally, the activities of showcasing the project results will be initiated during 2022. and planned as a regular and periodical event. Due to removal of COVID-19 restrictions in early 2022, such events will be organised in physical instead of virtual format.

INCOMING - 21 - June 30, 2022