



## EXPERIMENTATION AND VALIDATION OPENNESS FOR LONGTERM EVOLUTION OF VERTICAL INDUSTRIES IN 5G ERA AND BEYOND

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Deliverable D6.3

# Training Material and SMEs and Startup Acceleration Program Activities (Final)

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## GLOSSARY

| <i>Abbreviations/Acronym</i> | <i>Description</i>                                      |
|------------------------------|---|
| <b>3GPP</b>                  | <i>3rd Generation Partnership Project</i>               |
| <b>5G</b>                    | <i>5<sup>th</sup> Generation of Mobile Networks</i>     |
| <b>API</b>                   | <i>Application Programming Interface</i>                |
| <b>CAPIF</b>                 | <i>Common API Framework</i>                             |
| <b>CI/CD</b>                 | <i>Continuous Integration &amp; Continuous Delivery</i> |
| <b>CLI</b>                   | <i>Command Line Interface</i>                           |
| <b>DoA</b>                   | <i>Description of Action</i>                            |
| <b>EU</b>                    | <i>European Union</i>                                   |
| <b>GA</b>                    | <i>Grant Agreement</i>                                  |
| <b>IIoT</b>                  | <i>Industrial Internet of Things</i>                    |
| <b>IoT</b>                   | <i>Internet of Things</i>                               |
| <b>MOOC</b>                  | <i>Massive Open Online Course</i>                       |
| <b>NEF</b>                   | <i>Network Exposure Function</i>                        |
| <b>Network App</b>           | <i>Network Application</i>                              |
| <b>NPN</b>                   | <i>Non-Public Network</i>                               |
| <b>Q&amp;A</b>               | <i>Questions &amp; Answers</i>                          |
| <b>QoS</b>                   | <i>Quality of Service</i>                               |
| <b>RAN</b>                   | <i>Radio Access Network</i>                             |
| <b>SDK</b>                   | <i>Software Development Kit</i>                         |
| <b>SEAL</b>                  | <i>Service Enabler Architecture Layer</i>               |
| <b>SME</b>                   | <i>Small and Medium Enterprise</i>                      |
| <b>ToC</b>                   | <i>Table of Contents</i>                                |
| <b>WP</b>                    | <i>Work Package</i>                                     |



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## EXECUTIVE SUMMARY

This document, namely Deliverable 6.3 “Training Material and SMEs and Startup Acceleration Program Activities (Final)”, represents the final report on the activities performed in Task 6.1 “Developers-oriented Events and Related Training Material” and Task 6.2 “SMEs and Startup Acceleration Program” during second period of report of Work Package 6 (M17-M36) of the H2020 EVOLVED-5G Project. These activities have progressed since the achievement of Milestone Ms5 “Training Material and Startup Acceleration Program fully active” until the end of Work Package 6 at M36.

In this regard, this report encompasses the progress and results of both Task 6.1 and Task 6.2 and their respective associated programs during Period 2: the Technical Training Program addressed to developer, academia and student communities, and the Acceleration Program targeted to SMEs and entrepreneurs. Several training activities have taken place as developer-oriented events, such as workshops or seminars, a series of free on-demand open training courses for developers, related to the EVOLVED-5G vision and technical outcomes have been published as MOOCs on well-known educational platforms. Those activities and courses provided training on EVOLVED-5G technical topics and promoting the engagement of open-source and academic communities towards the embracement of the EVOLVED-5G project and the associated technical achievements developed. Moreover, a Wiki for the developer community has been created and maintained, and technical support regarding EVOLVED-5G artifacts and technical topics is provided in the EVOLVED-5G Forum.

In the scope of the acceleration program, specific activities have been defined for the business acceleration of SMEs and Startups, and several organizations around Europe have been contacted and engaged, with the major goal to foster Community Building among SMEs, entrepreneurs and other stakeholders around the EVOLVED-5G project and its technical developments.

Furthermore, several online resources around EVOLVED-5G vision and technical related topics have been developed in the scope of both programs, which will be active for potential stakeholders and the EVOLVED-5G Community after the lifetime of the project. Those elements compose the Community block of the EVOLVED-5G architecture, and are namely i) a Wiki ii) a Forum iii) a set of Open Online Training Courses with an associated Space and iv) a Library of resources. This action is in line with the overarching goal of WP6: to supply all necessary elements within the Community around EVOLVED-5G vision and technical outcomes to ensure the project's success both during and after its conclusion. This entails securing its continuity, enhancing visibility and awareness, and fostering the continued utilization of EVOLVED-5G's technical accomplishments, not only within the industry sector but also potentially across any other sectors.



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# 1 INTRODUCTION

## 1.1 PURPOSE OF THE DOCUMENT

This deliverable is the final report on “Training Material and SMEs and Startup Acceleration Program Activities” in Work Package 6, to be delivered during Month 36 at the finalization time of the EVOLVED-5G project. In this regard, this document aims to report the activity performed in Task 6.1 “Developers-oriented Events and Related Training Material” and Task 6.2 “SMEs and Startup Acceleration Program” during Period 2.

This report outlines the EVOLVED-5G consortium's strategy for establishing the EVOLVED-5G Community. This Work Package 6 overarching goal aims to unite developers, SMEs, and other relevant parties around the EVOLVED-5G initiative through two key programs:

- **Training Program:** This program concentrates on developing training materials and providing accessible online courses about the project's technical framework and developments. It also includes organizing technical seminars at academic institutions and events geared towards developers.
- **Acceleration Program:** This facet focuses on empowering innovation agencies to drive SME innovation. It features a 5-month Acceleration Program, an online resource-rich Acceleration Library, and a Train the Trainer Program. These elements are designed to enhance SMEs' and entrepreneurs' skills on the business exploitation of the potential of 5G & 5G Network apps.

## 1.2 STRUCTURE OF THE DOCUMENT

This deliverable is structured in the following manner:

- **Section 1. Introduction:** This section describes the Purpose of the Deliverable, the Structure and Target Audience.
- **Section 2. Training Program:** This section describes the progress and outcomes of the EVOLVED-5G Training Program for academia, student, and developer communities, including the Training Events performed, the On-demand Open Training Courses published and their associated Space, the project Wiki created and maintained for developers, the management of Technical Topics at the EVOLVED-5G Forum, and the creation of other training materials.
- **Section 3. Acceleration Program:** This section describes the Acceleration and Community engagement program that is constructed around three pillars: The Acceleration Program directed to SMEs and with focus in Business Models; The Acceleration Library, a set of resources of interest in online format, and The Train the Trainer Program that provides tools to Innovation agencies to upgrade their skills with a “learn by doing” approach.
- **Section 4. Resources for the Community:** This section presents the block of the EVOLVED-5G architecture devoted to attracting and nurturing a growing Community around the technical outcomes and vision of the project, during and after its lifetime. This block is primarily composed of diverse elements provided in the frame of WP6: the EVOLVED-5G Wiki, Forum, Training Course Spaces, and the Accelerator Library.
- **Section 5. Conclusions:** Final summary that recaps the main achievements and outcomes of both programs.



- **Annexes:** A set of appendixes are provided complementing the information provided in the main sections of this deliverable.

### 1.3 TARGET AUDIENCE

The scope of this deliverable is to report the activity and results for both the Training program and the Acceleration program. Its primary objective is to make this information accessible to a diverse range of research individuals and communities.

The target audiences of this document are the following:

- **Project Consortium:** This audience validates the thorough documentation of EVOLVED-5G tools and processes, to disseminate it by producing training materials that third parties can use for accelerating innovation agencies.
- **Industry 4.0 developers and Factories of the Future (FoF) vertical groups:** This group can leverage the information and resources contained in this document to establish a common comprehension of the technologies and design principles that underlie the Certification Process and its implementation. They will gain access to training materials that small and medium-sized enterprises (SMEs) can leverage to harness EVOLVED-5G innovations through the defined tools and processes.
- **Other vertical industries and groups:** This category aims to create an impact on various 5G-enabled vertical industries and groups over the long term. The training material is designed to be versatile and applicable across a wide spectrum of vertical domains.
- **Scientific audience, general public, and the funding EC Organisation:** To document the work performed by the project and justify the effort reported for all relevant activities. The scientific audience will also gain insights into the design approach and underlying components of the EVOLVED-5G framework and the Certification process, and get a hands-on approach by leveraging the training material and the acceleration program defined.

In summary, this deliverable is intended to serve as a comprehensive resource accessible to a broad range of stakeholders, from project consortium members to industry groups, and even the scientific and academic communities, students, young professionals and the general public, with the ultimate goal of facilitating the adoption and understanding of EVOLVED-5G innovations.



## 2 EVOLVED-5G TECHNICAL TRAINING PROGRAM

"Training" refers to the process of imparting skills and knowledge. A comprehensive training plan for a technical project has proven to be crucial to ensure that both members and potential users can effectively deploy and utilize various technical artifacts. From the one hand, internal training within the project facilitates rapid and effective knowledge acquisition, fostering increased awareness and alignment among team members in different technical Work Packages. This collaboration, though diverse in roles and responsibilities, contributes to a more efficient joint technical development and higher-quality outcomes.

From the other hand, from a user perspective, the absence of training material or activities may impede users outside the project boundaries from fully utilizing the software. Training materials are instrumental in helping users acquire the necessary knowledge to leverage software or hardware elements effectively. With absent documentation and training materials, users might struggle to employ the software, potentially leading to abandonment. Success in a software project hinges on factors such as the availability of proper training material and a robust training outreach strategy.

In this regard, EVOLVED-5G has implemented a Technical Training Program that encompasses technical aspects, project developments, vision, framework, and associated procedures, including processes like code verification, validation, and specific developments integral to the project. As well, the EVOLVED-5G project has incorporated a training outreach strategy designed to make potential users aware of the software's benefits and encourage adoption, in addition to provide internal training to project developers. This outreach strategy also aims to foster a community that provides feedback, visibility, and support to the project.

This section presents the activities conducted in the scope of Technical Training within the EVOLVED-5G training framework until the submission of this deliverable in M36. This includes the following main activities:

- The development and publication of on-demand open training courses on EVOLVED-5G technical developments and technical vision on recognized educational platforms.
- Development of training materials that are employed or support other activities in T6.1.
- Training events and training activities.
- Creation and maintenance of a Wiki of the EVOLVED-5G project for developers.
- Management of technical topics and threads in the EVOVED-5G Forum (technical support).

### 2.1 TRAINING AREAS

Built upon the EVOLVED-5G vision and considering the various phases of the Network App lifecycle, along with the diverse environments within the EVOLVED-5G Framework (i.e., workspace, certification, validation, and marketplace), diverse knowledge domains within the EVOLVED-5G scope were pinpointed during the project's initial phase, in which it was identified a need or convenience for technical training.

Those training areas are the following:

- General topics related with EVOLVED-5G
- Concept of Network App
- EVOLVED-5G Architecture



- Development of Network Apps
- Verification of Network Apps
- Validation of Network Apps
- Certification
- Marketplace
- Application of Network Apps in Industry
- Network Apps and developed vertical applications

Tailored materials have been developed for each training area, supporting technical training, and forming the foundation for the creation of publicly accessible training courses in the form of MOOCs (Massive Open Online Courses).

#### 2.1.1 Training Outcomes

EVOLVED-5G training encompasses different types of outcomes as training elements, which are listed below:

- **Training Materials:** documentation and materials for training such as tutorials or cookbooks for the different elements, procedures and software artefacts related to the EVOLVED-5G framework. These materials were developed and consolidated primarily in the first stage of the project. Those materials have served as the basis of the different Training Courses, and most of them have been published in the Wiki [1] and in the Library [2].
- **Training Events:** live events devoted to training on a specific EVOLVED-5G training area, generally targeting academic students and developers, with the potential to extend the invitation to other audiences. There are two primary categories of training sessions within the EVOLVED-5G training program: developer-focused sessions tailored for developers, and seminars designed for an academic audience, including researchers and students. These interactive sessions can occur in various formats, such as online, in-person, or a hybrid model that seamlessly combines both online and physical participation.
- **Training Courses:** freely accessible open online courses in the form of Massive Open Online Courses (MOOCs) [3], designed for a global audience. These modules represent a hybrid outcome, combining comprehensive training materials with the interactive features typically associated with live training events. These courses are announced in spaces created in the frame of T6.1 to facilitate information and access to them (Training Course Space I [4] and II [5]), as well as in the Accelerator Library [2].
- **Wiki and Wiki contents:** Online platform for developers, provisioned by EVOLVED-5G developers, which centralizes the technical documentation related to the EVOLVED-5G project. The Wiki [1] includes training materials.
- **Forum [6]:** This training program ensures the provision of technical support for requests and inquiries regarding Technical Topics posted at the EVOLVED-5G Forum. Technical Work Packages (WP3, WP4 and WP5) are involved in this service.

## 2.2 TRAINING COURSES

### 2.2.1 Training Courses

As a part of EVOLVED-5G technical training program and outreach strategy, EVOLVED-5G project provides a set of free online courses as MOOCs (Massive Open Online Courses)[3] in well-known educational platforms such as UPVx [7] and EDx [8].



The EVOLVED-5G Training Courses<sup>1</sup> [4] [5] cover various specific topics related to Network Apps, such as their concept and the specific vision of EVOLVED-5G regarding them. They also delve into Network App programming processes, functionality verification, certification of compliance with standards and other key aspects, validation on a 5G platform in conjunction with a vertical application or service that utilizes the Network App, and publication on the Marketplace [9]. Moreover, the courses also provide a step-by-step guide for Marketplace users to make use of this online repository for Network Apps, and they also guide on the usage of tools provided by the EVOLVED-5G project for these processes, or introduce such as CAPIF [10] interface specified by 3GPP [11]. Also, courses highlight diverse use cases in industrial environments, leveraging the potential provided by Network Apps.

The objective of this set of courses is to provide technical training internally and externally to the project; they are designed to offer comprehensive educational resources and learning opportunities for individuals interested in gaining knowledge and expertise in the field of Network Apps and the application of 5G technology. Such courses are accessible to any individual or organization interested in the exploitation of 5G Network Core functionality through Network Apps, as well as in the production of new Network Apps, at no cost.

EVOLVED-5G courses intend to empower learners with the necessary skills and understanding to actively contribute to the advancement on the production of Network Apps on any sector, encourage innovation, and support the growth of the emerging Network App ecosystem. These courses facilitates organisations and developers to significantly enhance the performance of applications and services, and make them network-aware through the usage and production of Network Apps.

Information regarding the available set of EVOLVED-5G training courses is published in the Training Course Spaces (I and II) [4] [5], on which the links and registration instructions (Annex 1: Training course registration) are provided to facilitate access to the courses. Moreover, information regarding each individual course is also published in the Accelerator Library<sup>2</sup> [2] as resources of interest for the EVOLVED-5G Community.

Additionally, this set of training courses has been also communicated and disseminated through informative leaflets (

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<sup>1</sup> <https://forum.evolved-5g.eu/c/evolved-5g-training-courses/10>

<sup>2</sup> <https://forum.evolved-5g.eu/c/library/7>

Anex 3: EVOLVED-5G Traning Courses Leaflet), which have been distributed in events such as 6G Submit & EUCNC 2023 Conference, to scientific, academic and developer audiences interested in EVOLVED-5G vision and technical outcomes.

#### 2.2.1.1 List of Training Courses Developed in Period 2

The list of Training Courses developed and published during Period 2 can be seen in the following table.

| Training courses in Period 2               |
|--|
| EVOLVED-5G Network App Verification        |
| EVOLVED-5G Marketplace                     |
| EVOLVED-5G Common API Framework (CAPIF)    |
| EVOLVED-5G Network App Validation          |
| EVOLVED-5G Network App Certification       |
| EVOLVED-5G Service Pack (course extension) |

Table 1 EVOLVED-5G Training Courses developed in Period 2

##### 2.2.1.1.1 Training course on EVOLVED-5G Network App Verification

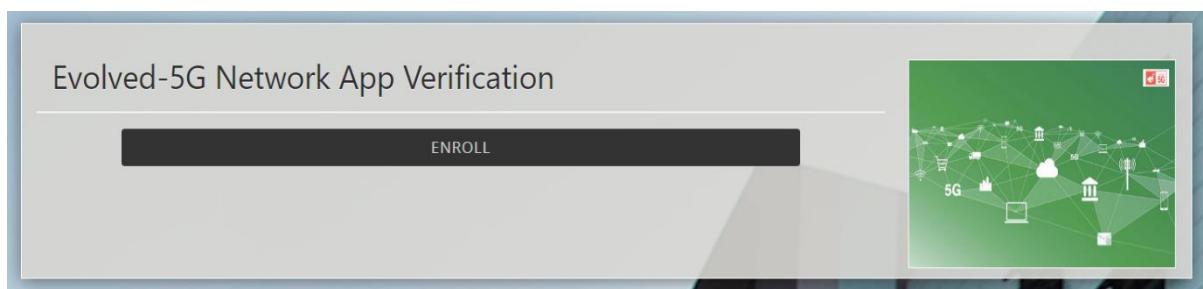


Figure 1. EVOLVED-5G Network App Verification Training Course

##### Title: EVOLVED-5G Network App Verification

**Description:** Training course complementary to the EVOLVED-5G Network App Development, devoted to the software verification process of Network App in a synthetic environment, to check that the programmed Network App performs as expected.

##### Structure & Contents:

|     | Sections   | Description of content  |
|-----|--|---|
| 1   | Welcome to the course on EVOLVED-5G Network App Verification | Presents a short introduction to the course.  |
| 2   | Structure of the course                                      | Presents the module of the course, describing its main sections.  |
| 3   | Introduction   | Presents the overall scope of the course, providing a brief introduction to Network Apps and Software Verification. |
| 3.1 | Introduction: Software Quality of Network Apps               | Provides a concise introduction to the Network App concept and the  |



|     |  |   |
|-----|--|---|
|     |  | software quality aspects involved.  |
| 3.2 | Introduction: Software Verification Process                  | Provides an overview of the Verification Process of Software and its importance.  |
| 4   | Verification Tools & Tests                                   | Presents the different tools and tests employed for the verification of EVOLVED-5G Network Apps.  |
| 4.1 | EVOLVED-5G framework components for Network App Verification | Presents the EVOLVED-5G framework components for Network App Verification.  |
| 4.2 | Network Exposure Tools                                       | Presents specifically the open Network Exposure tools provided by the EVOLVED-5G project, which play a key role for Network App verification. |
| 4.3 | Other aiding tools for Network App verification              | Presents other tools involved in the verification of Network Apps.  |
| 4.4 | Verification Tests   | Presents the different groups of tests and their testing objectives in the process of verification of a Network App.                          |
| 5   | Verification Process Steps                                   | Presents the different phases, steps and actors in the verification process.  |
| 5.1 | Verification Commands – Demonstration of use                 | Presents the instructions and different commands to execute for the verification of a Network App, along with a technical demonstration.      |
| 6   | Conclusions & Outlook  | Presents conclusions on this course.  |

Table 2 Structure of the EVOLVED-5G Network App Verification course

**Lecturers:** Regel G. Usach (UPV), Ricardo Marco (ATOS)

**Course editor:** UPV

**Support slides:** ATOS, UPV

**Tests:** UPV

**Course structure design:** ATOS, TID, INTRA, UPV

**Quality check:** UPV

**Duration:** 1 week

**Learning Objectives:**

- What is the software verification phase, its significance and how to perform this process.

- A set of aiding tools for performing verification testing.
- How to verify the correct performance of your developed Network App.
- How to make use of a set of tools offered by the EVOLVED-5G project for the verification of Network Apps.
- Required steps and commands to execute tests in a CI/CD verification pipeline from the EVOLVED-5G framework.

**Materials:** Videos & Tests

**Resources:** Course Forum

**Link:** <https://www.upvx.es/courses/course-v1:TecnologiasAvanzadasDeComunicaciones+evolved-5g-app-verific+2023-01/about>



Figure 2. Introductory video of the EVOLVED-5G Network App Verification training course

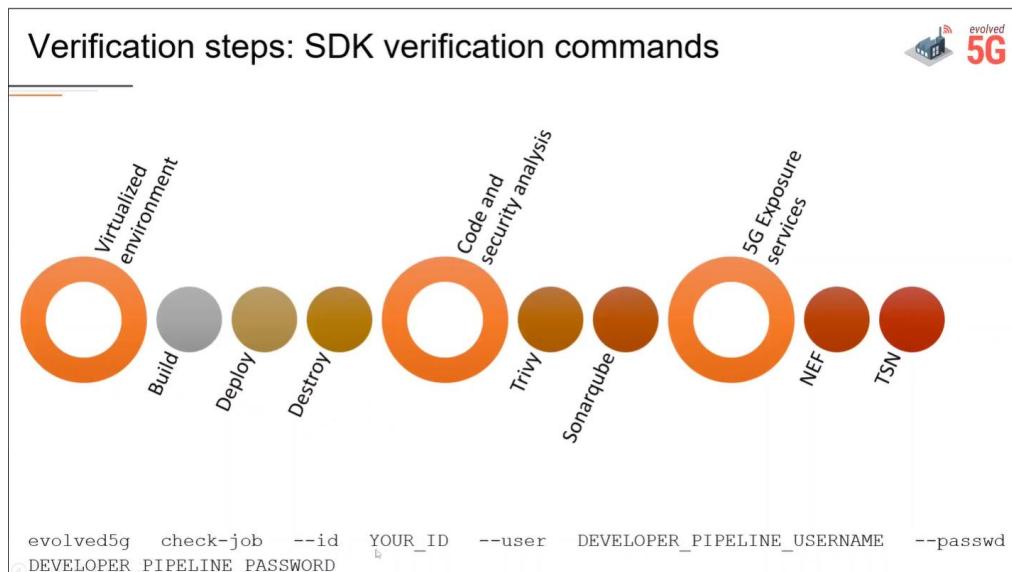


Figure 3. Video sample of EVOLVED-5G Network App Verification training course

## 2.2.1.1.2 Training course on EVOLVED-5G Marketplace

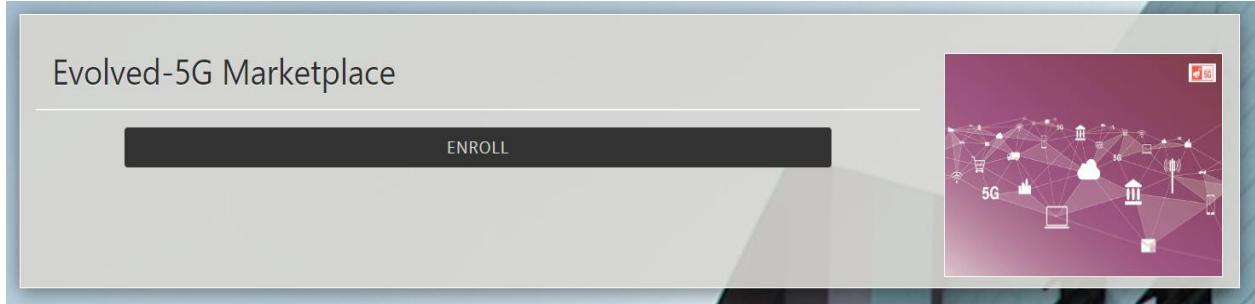


Figure 4. EVOLVED-5G Marketplace Training Course

**Title:** EVOLVED-5G Marketplace**Description:**

This course allows in an easy, descriptive way to make use and benefit from a Network App Marketplace (EVOLVED-5G Marketplace), where Network Apps to exploit the potential of 5G Programmability are available and can be retrieved or published. 5G is an immensely disruptive technology and Network Apps that is transforming our world, and Network Apps allows for exploiting in a profound manner the benefits that 5G can provide.

**Structure & Contents:**

| Sections  | Description of content   |
|---|--|
| 1 Welcome to the EVOLVED-5G Marketplace course  | Presents a short introduction of the course, the related modules and content.  |
| 2 Introduction to 5G Network Apps               | Presents the Advantages from the use of 5G Network Apps.   |
| 3 The EVOLVED-5G Marketplace for Network Apps   | Presents the EVOLVED-5G Marketplace.   |
| 4 Marketplace for Network App Developers        | Presents: <ul style="list-style-type: none"><li>- The onboarding of a Network App in the Marketplace.</li><li>- How network app developers can control the visibility of a network app.</li><li>- How to visualize basic analytics for published Network Apps.</li></ul> |
| 5 Marketplace for Network App Users             | Presents the marketplace from the perspective of the business users that are looking to purchase network Apps.   |
| 6 Example of Network App Use Case: PAL Robotics | Presents marketplace user cases: The PAL Robotics use case, employing a Network App available at the Marketplace.  |
| 7 Conclusions                                   | Presents a short summary of the completed course.  |

Table 3 Structure of the EVOLVED-5G Marketplace training course

**Lecturers:** Alexandros Tzoumas (MAG), Harilaos Koumaras (NCSRDI), Thomas Peyrucain (PAL)**Course editor:** UPV

**Duration:** 1 week

**Learning Objectives:**

- As a Network App developer, how to publish and manage your Network Apps in the EVOLVED-5G Marketplace.
- As a Network App user or consumer, how to search and download Network Apps from the EVOLVED-5G Marketplace to make use of them to create or adapt vertical applications or services to improve your business.

**Materials:** Videos & Tests

**Resources:** Course Forum

**Link:** <https://www.upvx.es/courses/course-v1:TecnologiasAvanzadasDeComunicaciones+evolved-5g-marketplace+2023-01/about>

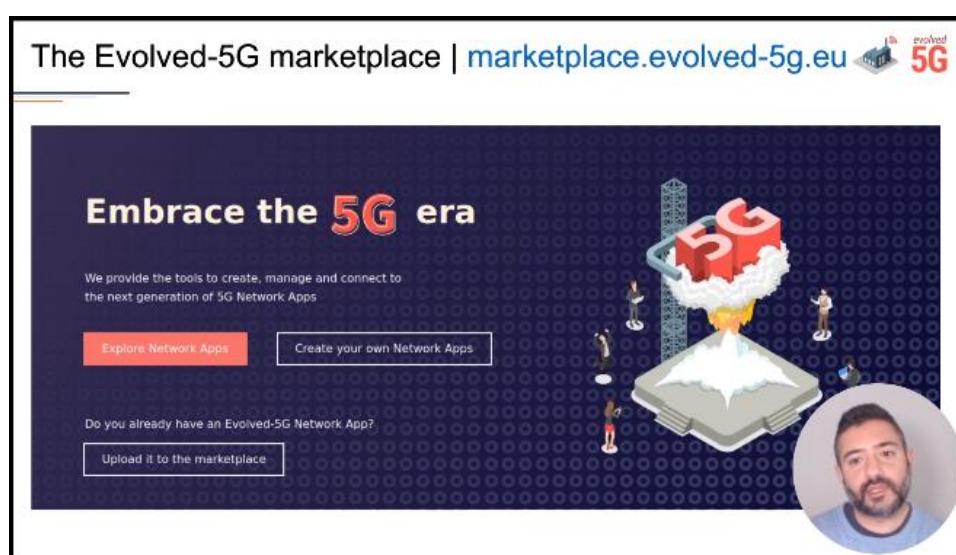


Figure 5. Video lesson of EVOLVED-5G Marketplace training course

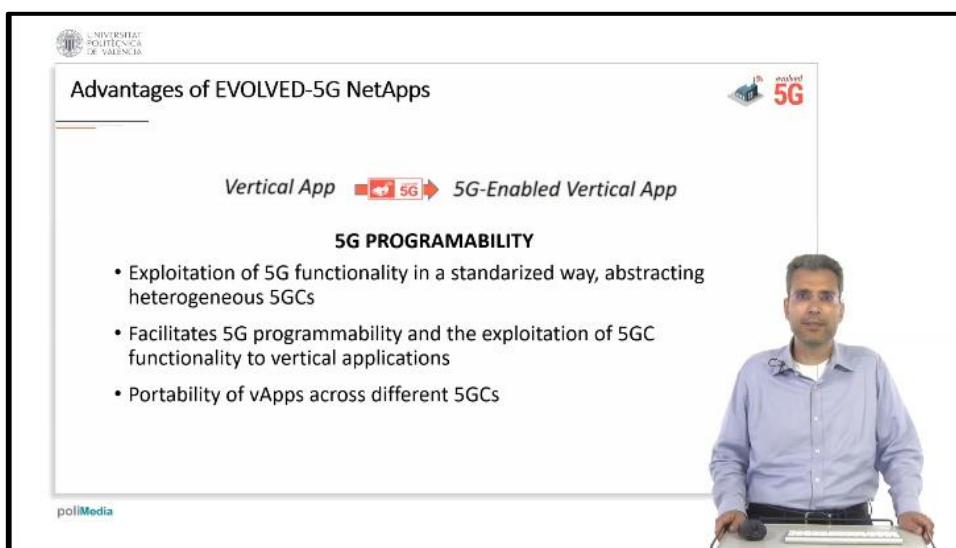


Figure 6. Video lesson of EVOLVED-5G Network App advantages



Figure 7. Video lesson of the Network App use case of robotic teleoperation

#### 2.2.1.1.3 Training course on EVOLVED-5G & CAPIF

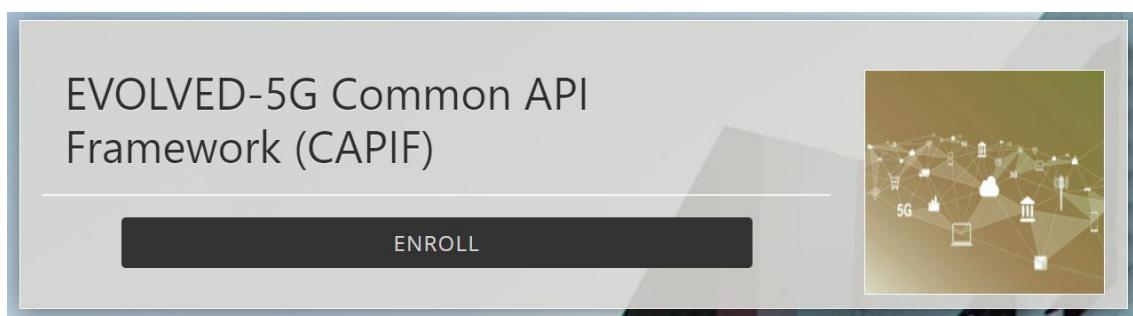
The image shows a screenshot of a training course interface. On the left, the title 'EVOLVED-5G Common API Framework (CAPIF)' is displayed above a large 'ENROLL' button. On the right, there is a graphic illustrating a network ecosystem with various icons like buildings, people, and technology symbols connected by a network of lines, with the word '5G' prominently featured.

Figure 8. EVOLVED-5G CAPIF Training Course

##### Title: EVOLVED-5G Common API Framework (CAPIF)

**Description:** In this course, CAPIF will be examined in the context of the EVOLVED-5G project, which is funded by the European Union's Horizon 2020 program. The project aims to harness 5G infrastructure for innovation, particularly among third-party innovators and SMEs, creating an open ecosystem where network applications can communicate with the 5G core via CAPIF. This communication is crucial for driving the fourth industrial revolution and benefiting various technology and marketing sectors. The course starts by defining CAPIF and exploring its architecture, emphasizing its role as a standardized API management framework developed by 3GPP for programmability in Service-Based Architecture. Subsequently, we will delve into the technical aspects of CAPIF, examining its implementation within the EVOLVED-5G project and how it facilitates interaction between third-party software and 5G networks.

##### Structure & Contents:

The “EVOLVED-5G Common API Framework (CAPIF)” course comprises a single module, designed to introduce fundamental knowledge around 3GPP Common API Framework (CAPIF).



The module is structured in two main sections (2 and 3), touching first CAPIF related specifications (including the description of the CAPIF reference architecture) and implementation aspects (describing the open-source implementation by FOGUS and Telefonica within the EVOLVED-5D project).

|       | Sections                                 | Description of content  |
|-------|--|---|
| 1     | Introduction to the course               | Presents a short introduction to the course.  |
| 1.1   | Structure of the course                  | Presents the module of the course and the two main sections.                                      |
| 2     | Defining CAPIF                           | Presents the definition and the main functionality of CAPIF, as specified by 3GPP.                |
| 2.1   | CAPIF Architecture and Reference points  | Presents CAPIF architecture and its main components.  |
| 2.2   | CAPIF components                         | Presents CAPIF main components.   |
| 2.2.1 | CAPIF Core Function                      | Presents with details CAPIF Core Function and its functionality.                                  |
| 2.2.2 | CAPIF Components: API Invoker            | Presents API Invoker and its functionality.   |
| 2.2.3 | CAPIF Components: API Provider           | Presents API Provider and its functionality.  |
| 2.3   | Summary regarding the CAPIF fundamentals | Presents a summary of fundamental aspects of CAPIF.   |
| 3     | CAPIF Implementation                     | Presents the implementation of CAPIF in the context of EVOLVED-5G project.                        |
| 3.1   | Details of CAPIF Implementation          | Presents the structure, specific services and functionalities of CAPIF.                           |
| 3.2   | CAPIF Security Guarantees                | Presents the security guarantees that CAPIF offers.   |
| 3.3   | Summary regarding CAPIF implementation   | Presents a summary of the CAPIF implementation principles, and the security guarantees it offers. |
| 4     | Conclusions & Outlook                    | Presents a conclusion on this course.   |

Table 4 Structure of the CAPIF training course

**Lecturers:** Katerina Giannopoulou (FOGUS)

**Course editor & quality check:** UPV

**Duration:** 1 week

**Learning Objectives:**

- To define CAPIF as specified by 3GPP and its underlying architecture.
- To explore technical aspects of CAPIF by examining its implementation within the context of EVOLVED-5G project.
- To understand how CAPIF facilitates the interaction between third-party software and 5G networks.

**Materials:** Videos & Tests

**Resources:** Course Forum

**Link:** <https://upvx.es/courses/course-v1:TecnologiasAvanzadasDeComunicaciones+capif+2023-01/about>

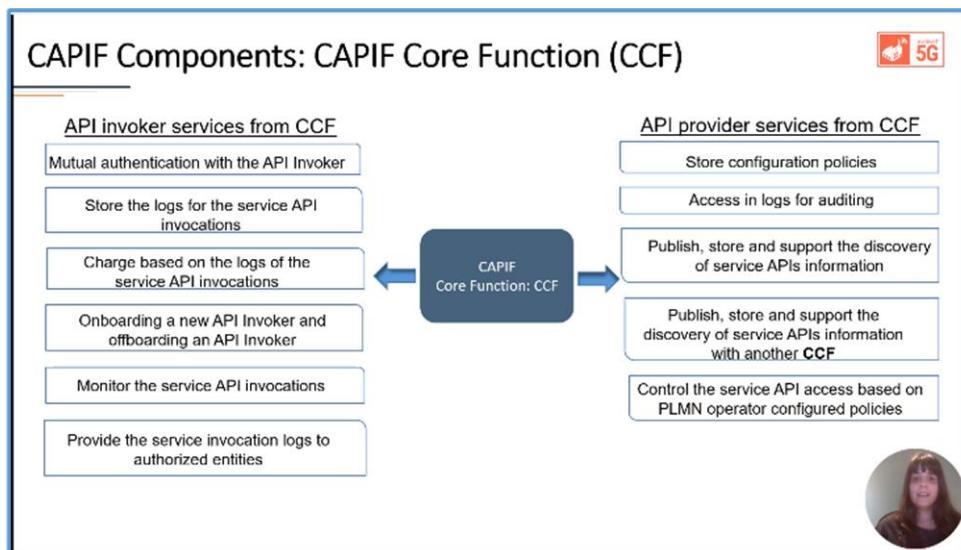


Figure 9. Video lesson of CAPIF training course

#### 2.2.1.1.4 Training course on EVOLVED-5G Network App Validation

**Title:** EVOLVED-5G Network App Validation

**Description:** This course is devoted to the validation process of a Network App, along with an associated vertical app that consumes its APIs. In the course, the Validation environment, process, associated test and tools, and the validation report are described, providing a demonstration of the use of the EVOLVED-5G Validation pipeline.

**Structure & Contents:**

|   | Sections                   | Description of content                                   |
|---|----------------------------|--|
| 1 | Introduction to the course | Presents a short introduction to the course.             |
| 2 | Structure of the course    | Presents the module of the course and its main sections. |



|       |  |  |
|-------|--|--|
| 3     | Introduction                                     | Introduction to the main concepts addressed in the course  |
| 3.1   | Software Validation Concept                      | Explains what is Software Validation and its critical importance.                                  |
| 3.2   | Network App Validation                           | Describes Network App Validation.  |
| 4     | EVOLVED-5G Validation Environment                | Presents the EVOLVED-5G Validation Environment.  |
| 4.1   | 5G Experimental Platforms                        | Presents the EVOLVED-5G Experimental Platforms   |
| 4.1.1 | Athens Platform                                  | Presents Athens Experimental Platform.   |
| 4.1.2 | Malaga Platform                                  | Presents Malaga Experimental Platform.   |
| 4.2   | Network Exposure Tools                           | Presents the different Network Exposure Tools employed in the Validation process of a Network App. |
| 4.3   | Validation Pipeline                              | Presents the Validation Pipeline.  |
| 5     | Validation Methodology                           | Presents the Validation Methodology.   |
| 6     | Demo of the execution of the Validation Pipeline | Demo of the execution of the Validation Pipeline   |
| 6.1   | Validation Report                                | Explains the Validation report.  |
| 7     | Conclusions & Outlook                            | Presents conclusions of this course.   |

**Lecturers:** Jorge Moratinos (TID), Regel G. Usach (UPV), Charles Bailly (IMM)

**Course editor:** UPV

**Duration:** 1 week

**Learning Objectives:**

- Understanding of the process of software Validation and its crucial importance
- Knowledge of the EVOLVED-5G Validation Environment
- Process and test executed for the validation of a Network App and its associated Vertical App
- Usage of the EVOLVED-5G Validation Pipeline

**Materials:** Videos & Tests

**Resources:** Course Forum

\* All materials were delivered to the UPVx platform, and this course is currently in the publication process.



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

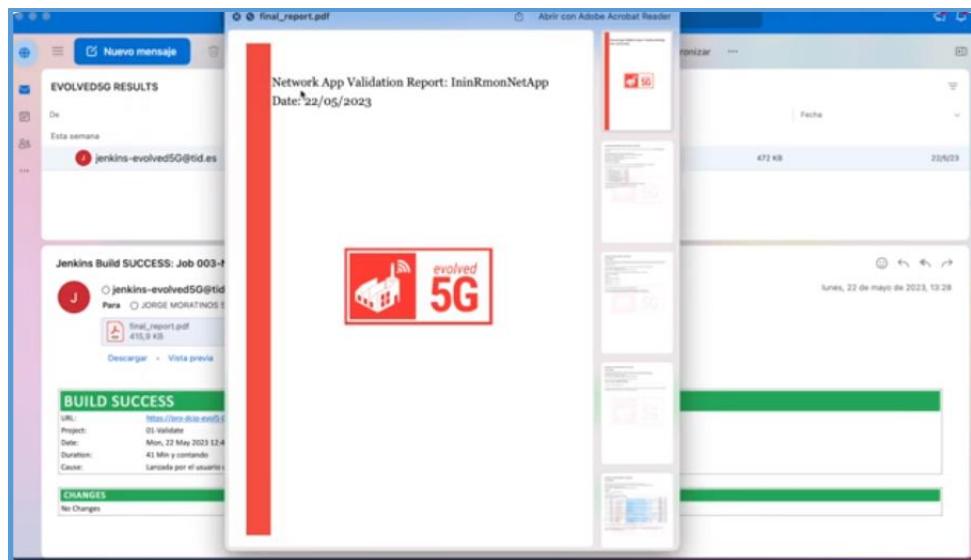


Figure 10. Video lesson on the EVOLVED-5G Validation report generated for a Network Application

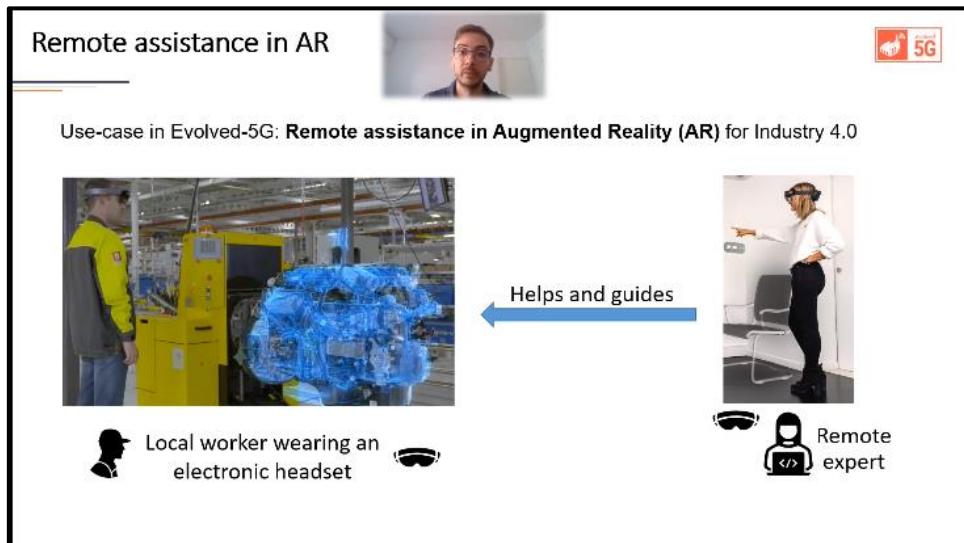


Figure 11. Video lesson on the validated Network App use of Mixed Reality

### 2.2.1.1.5 Training course on EVOLVED-5G Network App Certification

#### Title: EVOLVED-5G Network App Certification

**Description:** Course devoted to the Certification process of a Network App, a novel concept in software, referring to guarantee and certify that a software artifact accomplishes a series of requirements such as, for example, NEF or CAPIF compliance, or key security aspects.

#### Structure & Contents:

|   | Sections                   | Description of content                       |
|---|----------------------------|--|
| 1 | Introduction to the course | Presents a short introduction to the course. |



|     |   |   |
|-----|---|---|
| 2   | Introduction to the concept of Software Certification & Network App |   |
| 3   | Certification on Mobile Communications                              | State of the art of software certification in regard to Mobile Telecommunication environments.                            |
| 4   | Why certification on Network Apps is critically necessary           | This lesson explains the reasons why Network App certification is crucial for the emerging Network App ecosystem          |
| 5   | EVOLVED-5G Network App Certification Framework                      | Description of the framework for Network App certification designed and implemented in the EVOLVED-5G project             |
| 5.1 | Aspects certified (I)   | Compliance with NEF & 5G  |
| 5.2 | Aspects certified (II)  | CAPIF compliance  |
| 5.3 | Aspects certified (III)   | Security  |
| 5.4 | Aspects certified (IV)  | Documentation aspects tested and certified  |
| 6   | EVOLVED-5G Certification Environment                                | Description of the specific Environment devoted to Network App Certification in the EVOLVED-5G Architecture & Framework   |
| 6.1 | 5G Experimental Platforms   | Lesson describing the 5G Experimental Platforms employed for Network App Certification in EVOLVED-5G                      |
| 7   | Certification Process   | Description of the certification process.   |
| 7.1 | Demo of the Certification Pipeline                                  | Demo on the automatic execution of the Network App certification process employing the EVOLVED-5G Certification Pipeline. |
| 7.2 | Network App Certificate (Certification Report)                      | Explanation of the different aspects informed in the Certificate Report of a Network App.                                 |
| 8   | Conclusions & Outlook   | Presents conclusions on this course.  |

**Lecturers:** Fotini Setaki (COS), Jorge Moratinos (TID)

**Course editor:** UPV

**Duration:** 1 week

**Learning Objectives:**



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

- Understanding of the current state of the art of certification on Mobile Communications and the novelty of software certification in this scope.
- Understanding the innovative concept of Network App certification and its critical importance for the emerging Network App ecosystem.
- Understanding of the different aspects that EVOLVED-5G Network App certificates guarantee.
- Understanding of the Certification Environment and Network App Certification process implemented by EVOLVED-5G.
- Usage of the EVOLVED-5G Certification pipeline and understanding of the Certification Report on a Network App.

**Materials:** Videos & Tests

**Resources:** Course Forum

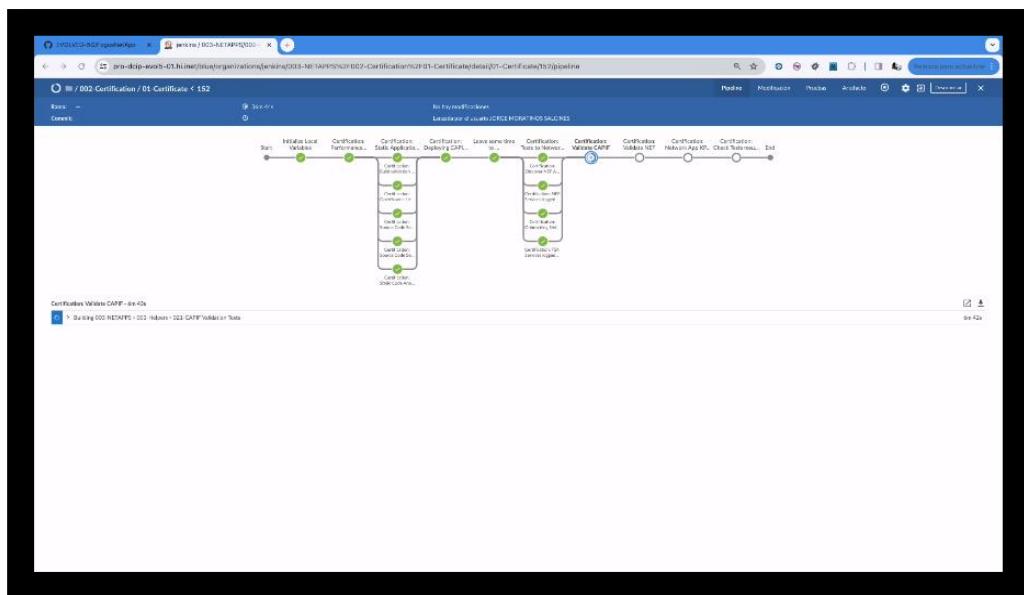


Figure 12. Video lesson demonstrating of the use of the Certification pipeline in the EVOLVED-5G Certification training course

\*All materials have been delivered to UPVx platform. This course is currently under its publication process.

### 2.2.1.1.6 EVOLVED-5G Service Pack

Lessons regarding the EVOLVED-5G Service Pack have been added as an extension of the EVOLVED-5G Network App development course. Additionally, they may constitute an independent course with additional resources in the short future. This extension can be seen as follows, in the structure of the course.

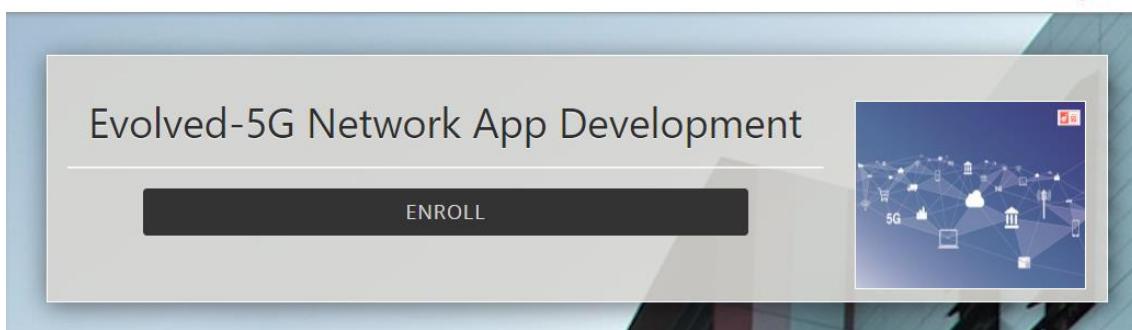


Figure 17. EVOLVED-5G Network App Development Training Course

#### **Extension of EVOLVED-5G NetApp Development Course**

**Description:** Training course for the development of EVOLVED-5G NetApps

**Structure & Contents:** 2 Modules

- Presentation of the Course “EVOLVED-5G Network App Development”

#### **Module 1: Network App Development Process**

- EVOLVED-5G Network Apps
- 5G Programmability & SBA
- CAPIF
- EVOLVED-5G NetApp Vision
- Advantages of EVOLVED-5G Network Apps
- EVOLVED-5G NetApp Vision
- Advantages of the creation & use of EVOLVED-5G Network Apps
- Design of the NetApp
- Steps for NetApp Development
- NetApp Implementation Principles
- Definition of a NetApp API
- Further Steps for Network Apps

#### **Module 2: Software Tools for Network App Development**

- Presentation of the module “Software Tools for Network App Development”
- Contents of the module
- Software tools
- Code Repositories
  - EVOLVED-5G GitHub Code Repository
  - Actions on Code Repositories
- **EVOLVED-5G Service Pack**
  - **Service Pack VM**
  - **Tools of the EVOLVED-5G Service Pack**
    - **SDK**
      - **Network App Template**
      - **SDK Libraries**
    - **Dummy Network App**
    - **NEF emulator**



- **CAPIF API Services Tool**
- **TSN Tool**
- **Installation and deployment of the Service Package**
- SDK
  - What is the EVOLVED-5G SDK?
  - SDK Integrated Tools
    - SDK CLI Tool & NetApp Template
    - SDK Libraries
  - Advantages of the EVOLVED-5G SDK
- Installation of the SDK
  - NetApp Creation with the SDK
    - Use of the SDK library LocationSubscriber
    - Use of the SDK library QoS Awareness
  - NetApp Production Pipeline (Integrated SDK tool)
- Next Steps after Coding your NetApp
- Conclusions

**Duration:** 2 weeks – 2 hours of video

**Lecturers:** Ricardo Marco (ATOS), Dr. Harilaos Koumaras (NSCRD), Nikos Vrionis (INFOLYSIS), Alexandros Tzoumas (Maggioli), Dr. Regel González Usach (UPV).

**Learning Objectives:**

- 5G Programmability concept & advantages
- NetApp vision, innovation potential & main benefits
- Steps and process for NetApp development
- Awareness of the most important assisting software tools for NetApp development
- Use of EVOLVED-5G Code Repository
- **Installation, deployment and use of the EVOLVED-5G Service Package**
- SDK integrated tools
- EVOLVED-5G SDK installation & use
- How to start programming a NetApp from a generic NetApp template
- Use of the EVOLVED-5G SDK library LocationSubscriber
- Use of the EVOLVED-5G SDK library QoS Awareness
- Basic knowledge on NetApp CI/CD pipelines

**Materials:** Videos & Tests

**Resources:** Course Forum

**Link:** <https://upvx.es/courses/course-v1:TecnologiasAvanzadasDeComunicaciones+evolved-5g-netapp-dev+2022-01/about>

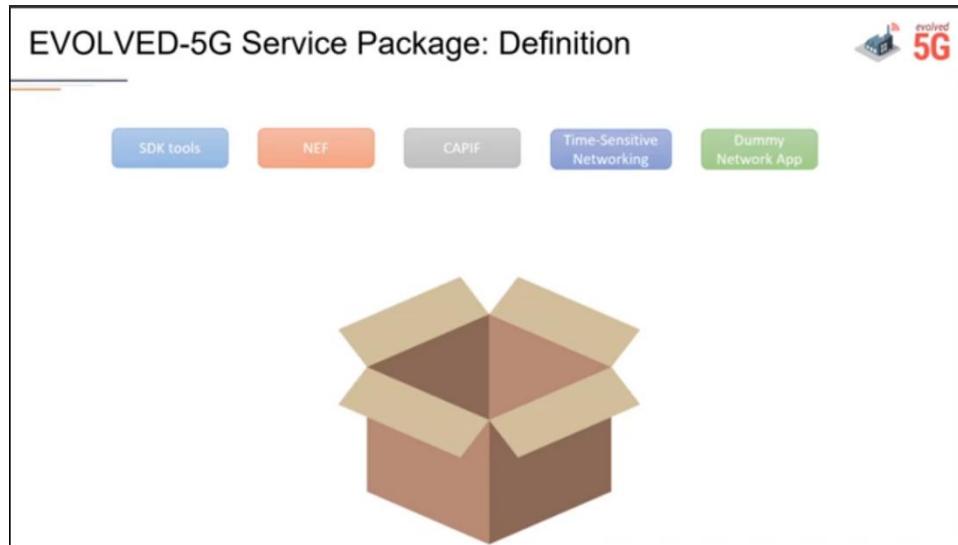


Figure 13. Video lesson on what is the EVOLVED-5G Service Package

A terminal window titled 'Activities' with the command 'evalled5g@EVOLVED-5G ~ %' at the top. The window displays a long list of Docker log entries from various services. Some of the visible service names include mongo, postgres, dockerhub, docker-entrypoint, python3, and various API endpoints like /discover\_, /events\_, /publish\_, /invoker\_, /security\_, /easy-rsa\_, /routing\_info\_, and /api\_invocation\_logs\_. The logs show commands being run such as 'sh register\_prepare...', 'sh prepare\_provider...', 'sh prepare\_invoker...', and 'sh security\_prepare...'. The logs are timestamped with times ranging from 15 minutes ago to 23 minutes ago.

Figure 14. Video lesson on the usage of the EVOLVED-5G Service Package

## 2.3 TRAINING EVENTS & TRAINING ACTIVITIES

Within the framework of EVOLVED-5G training, it has been devised the strategy to provide both internal and external training to maximize engagement with target audiences beyond the project through training activities. This strategy serves as a blueprint for communication and engagement with stakeholders currently uninvolved in the EVOLVED-5G project. This section describes the training outreach strategy aimed at external target audiences through external training events, with the goal of familiarizing them with EVOLVED-5G's technical vision, details, developments, and relevant technical topics, with the focus on cultivating their engagement with the project, its vision, and technical advancements.

EVOLVED-5G technical training activities specifically targets the developer and academic communities as primary audiences, without excluding or limiting the participation of other stakeholders interested in EVOLVED-5G and related technical topics. The primary means of



reaching these audiences involve organizing training events and participating in key existing events within this domain. It is worth noting that open courses for training on educational platforms like UPVx and EDx also serve as avenues to reach these audiences. Additionally, the Community Resources described in Section 4 (Wiki [1], Forum [6], Training Courses Spaces [4][5] and Library[2]), as well as the EVOLVED-5G GitHub repository [12] play a significant role for this external training.

The EVOLVED-5G technical repository serves as a tool for trainees to access the project's software developments, allowing them to download code repositories, build, deploy, utilize various elements, provide feedback, and potentially extend or reuse the code in the future. Conversely, the Forum provides a space for interaction not only with SMEs but also with external developers, researchers, students, and other stakeholders interested in the project's technical topics and developments. In the Forum questions, doubts, and open discussions can be posted and addressed by the EVOLVED-5G consortium or members of the EVOLVED-5G Community.

Various types of training activities, particularly developer-oriented events and seminars, are considered for implementing this external technical training. These activities are well-suited for delivering training on technical topics and attracting the specified target audiences. Regardless of the event's modality—physical, online, or a hybrid approach—training events are always live events. Even if a recording is offered later, the synchronous attendance of participants at a specific date and time is a key feature distinguishing these events from the on-demand lectures in online open courses.

### 2.3.1 Types of training events and activities

The different types of training events are described in this section. Depending on the target audience, they can be categorized into the following two main groups:

- Developer-oriented events to attract developer and open-source communities.
- Seminars for engaging students, academia and researchers.

#### 2.3.1.1 *Developer-oriented events*

A developer-oriented event within the context of EVOLVED-5G training is a live activity with the primary objective of providing training on technical topics either directly related to or associated with the project. These events are specifically tailored for developers and are open to external audiences beyond the project consortium, and they aim to educate developers about the vision, framework, and technical developments of the EVOLVED-5G project, with a particular emphasis on the pivotal role played by Network Apps. Different types of developer-oriented events are the following:

- A training workshop involves experts leading a meeting on a technical topic related to EVOLVED-5G, wherein participants engage in collaborative learning or problem-solving activities. These workshops can be focused on specific technical areas or developments, such as Network App development.
- An hackathon is an intensive collaboration among computer programmers and other participants in software development, such as interface designers or project managers. This event focuses on a software project, such as the development of Network Apps, creation of an SDK library, or programming a specific vertical application using existing EVOLVED-5G Network Apps.
- Developer meetups for training are gatherings of individuals interested in acquiring more knowledge on a particular technical subject related to the EVOLVED-5G project.



These events bring developers and experts together to share information and learn from each other, covering technical skills or new approaches to processes or actions related to development.

- Other events, including webinars (seminars conducted over the Internet), can be considered EVOLVED-5G developer-oriented events if they primarily target developers rather than academia or university audiences. These events must be dedicated to training on EVOLVED-5G technical topics, the project's technical vision, framework, and developments.

#### 2.3.1.2 Seminars

This section describes the different training events as live activities tailored for academia and university student audiences within the context of EVOLVED-5G training.

Seminars are the primary event type in academic settings for conveying the EVOLVED-5G vision, objectives, and technical developments to university students specializing in technical areas. The seminars, focused on technical topics related to EVOLVED-5G, represent dedicated classes at universities not tied to any specific subject. They provide students with an in-depth exploration of a particular topic, covering both theoretical concepts and practical application.

Beyond seminars, other event types are considered, such as webinars (online seminars conducted over the Internet without a physical or hybrid format), university workshops, or lectures within a subject. These events serve to introduce technical topics and elements from EVOLVED-5G to university students, contributing to their knowledge and understanding of the project's objectives and technical advancements.

#### 2.3.2 Conducted training activities

During Period 2 of the EVOLVED-5G project, several training events took place in physical and digital format in the frame of the training activity of Task 6.1, which are listed in the table below and described in more detail in the following subsections.

| EVENT  | DATE & PLACE  | AUDIENCE          |
|--|---|-------------------|
| <b>Seminar on 5G Application</b>                               | Polytechnic University of Valencia<br>Valencia, Spain<br>30 May, 2022 | Academic students |
| --- Lecture on “5G Application”                                |   |                   |
| --- Workshop “5G Programmability”                              |   |                   |
| -----Integrated Training Demo: NEF emulator                    |   |                   |
| --- Workshop “EVOLVED-5G Network Apps”                         |   |                   |
| --- Workshop “EVOLVED-5G framework”                            |   |                   |
| --- Training Demo: INFOLYSIS Network App & Chatbot application |   |                   |
| --- Training Demo: IMMERSION Network App & Mixed Reality       |   |                   |
| <b>Summer School NCSR Demokritos</b>                           | NCSR Demokritos,<br>Athens, Greece<br>12 July, 2022                   | Academic students |
| --- Panel on EVOLVED-5G  |   |                   |
| <b>CAPIF Master Class</b>                                      | University of Malaga,<br>Malaga, Spain                                | Academic students |



|  |  |                                   |
|--|--|-----------------------------------|
| 14 Dec, 2022   |  |                                   |
| ----Lecture on CAPIF and Open APIs                                       |  |                                   |
| <b>Seminar on EVOLVED-5G Network Apps</b>                                | Polytechnic University of Valencia<br>Valencia, Spain<br>31 Jan, 2023  | MsC students                      |
| ----Lecture on EVOLVED-5G Network Apps                                   |  |                                   |
| ----SDK & GitHub exploration   |  |                                   |
| <b>CAPIF Conference</b>  | Polytechnic University of Valencia<br>Valencia, Spain<br>9 March, 2023 | Academic students,<br>researchers |
| ----Lecture on CAPIF   |  |                                   |
| ----Practical demonstration of CAPIF deployment and usage                |  |                                   |
| <b>Network App validation sessions</b>                                   | NCSR Demokritos<br>Athens, Greece<br>14-15 March, 2023                 | Developers                        |
| ----Onboarding, testing and validation of 8BELLS Network App             |  |                                   |
| ----Onboarding, testing and validation of INTERNET INSTITUTE Network App |  |                                   |
| ----Onboarding, testing and validation of IMMERSION Network App          |  |                                   |
| ----Onboarding, testing and validation of INFOLYSIS Network App          |  |                                   |
| ----Onboarding, testing and validation of GMI AERO Network App           |  |                                   |
| ----Onboarding, testing and validation of PAL Robotics Network App       |  |                                   |
| ----Onboarding, testing and validation of INQBIT Network App             |  |                                   |
| ----Onboarding, testing and validation of FOGUS Network App              |  |                                   |
| ----Onboarding, testing and validation of CAFATECH Network App           |  |                                   |
| ----Onboarding, testing and validation of ZORTENET Network App           |  |                                   |
| <b>Seminar on 5G &amp; Digital System Security</b>                       | University of Piraeus<br>Athens, Greece<br>3 July, 2023                | MsC students                      |
| ----Lecture on 5G, 5G Security and Evolved 5G concepts                   |  |                                   |
| <b>Summer School NCRS Demokritos</b>                                     | NCSR Demokritos,<br>Athens, Greece<br>12 July, 2023                    | Academic students                 |
| --- Panel on EVOLVED-5G  |  |                                   |

Table 5. Training Events performed in Period 2

A total of 8 training events have been performed during Period 2. The events performed are composed of:

- 5 seminars
- 3 workshop
- 16 hands-on activities
- 4 practical demos
- 2 EVOLVED-5G Panel presentation in Summer School Events



As well, these training events encompass technical sessions, workshops, training-oriented presentations and technical, providing a total of 27 different training activities performed.

Overall, during the whole WP6 lifetime, 11 training events encompassing a total of 37 training activities have been performed.

### 2.3.2.1 Seminar on 5G Application

**Event:** Seminar “5G Application”

**Date & Place:** 30<sup>th</sup> May, 2021

**Event type:** Seminar (hybrid mode: physical event but with videoconference mode enabled)

**Organisers:** EVOLVED-5G & Computer Science Department of the Metropolitan College of Athens

**Audience:** MsC, BsC and PhD students, PhD researchers & Professionals. Mostly MsC Students.

**Attendance:** 44 attendants

**Duration:** 5h

**Description:** EVOLVED-5G seminar addressing the topics of 5G Application, 5G Programmability, EVOLVED-5G Network Apps and the EVOLVED-5G Framework, and presenting technical demonstrations of EVOLVED-5G Network Apps and their associated vertical applications (i.e., INFOLYSIS Network App & Chatbot and IMMERSION Network App along with an associated Mixed Reality application).

#### Activities:

- Presentation of the seminar by Prof. Carlos Palau (UPV)
- “5G Application” by Dr. Regel G. Usach (UPV)
- “5G Programmability and APIs exposure” by Anastasios Gogos & Dimitris Fragkos
- “EVOLVED-5G Network Apps” by George Makropoulos (NCSRDI)
- “The EVOLVED-5G Framework” by Dr. Harilaos Koumaras (NCSRDI)
- Technical demonstration of INFOLYSIS Network App & Chatbot by Theoni Dounia (INF)
- Technical demonstration of IMMERSION Network App & Mixed Reality by Dr. Charles Bailly (IMM)

**Organiser:** UPV

**Presenters:** Prof. Carlos Palau (UPV), Dr. Regel Gonzalez Usach (UPV), Anastasios Gogos (NCSRDI), George Makropoulos (NCSRDI), Dr. Harilaos Koumaras (NCSRDI), Theoni Dounia (INF), Dr. Charles Bailly (IMM)

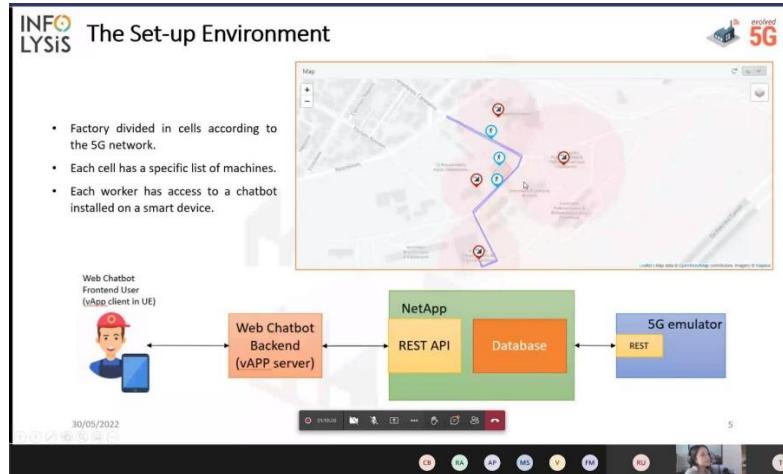


Figure 15. Infolysis demo on Chatbot vApp & Network App

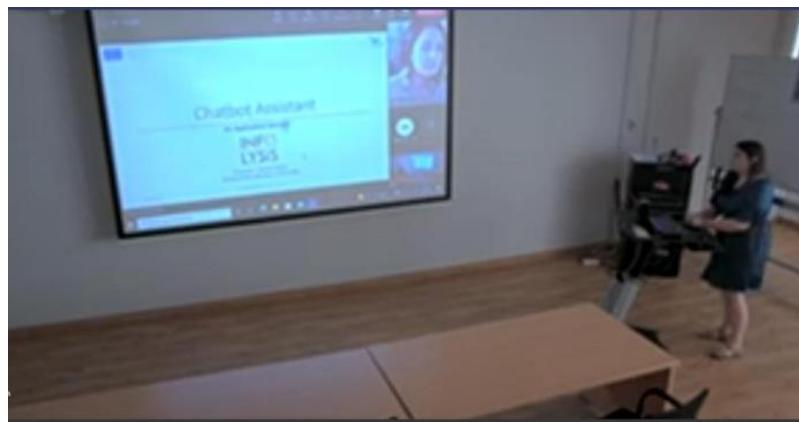


Figure 16. 5G Application Seminar



Figure 17. EVOLVED-5G Framework presentation in 5G Application Seminar

### 2.3.2.2 NCSR Demokritos Summer School 2022

**Event:** NCSR Demokritos Summer School (Panel presentation in the event)

**Date & Place:** 12<sup>th</sup> July 2022 in Athens (Greece)

**Event type:** Panel presentation about EVOLVED-5G

**Organisers:** EVOLVED-5G & Computer Science Department of the Metropolitan College of Athens

**Audience:** M.Sc., B.Sc. and PhD students, graduates of Technological domains in interdisciplinary research

**Attendance:** 200 attendants

**Duration:** 1h

**Description:** Panel presentations about 5G programmability, EVOLVED-5G facility, Network App concept during the Summer School of NCSR Demokritos.

**Organiser:** NCSR D

**Presenter:** Dr Harilaos Koumaras (NCSR D), Dimitrios Fragkos (NCSR D)

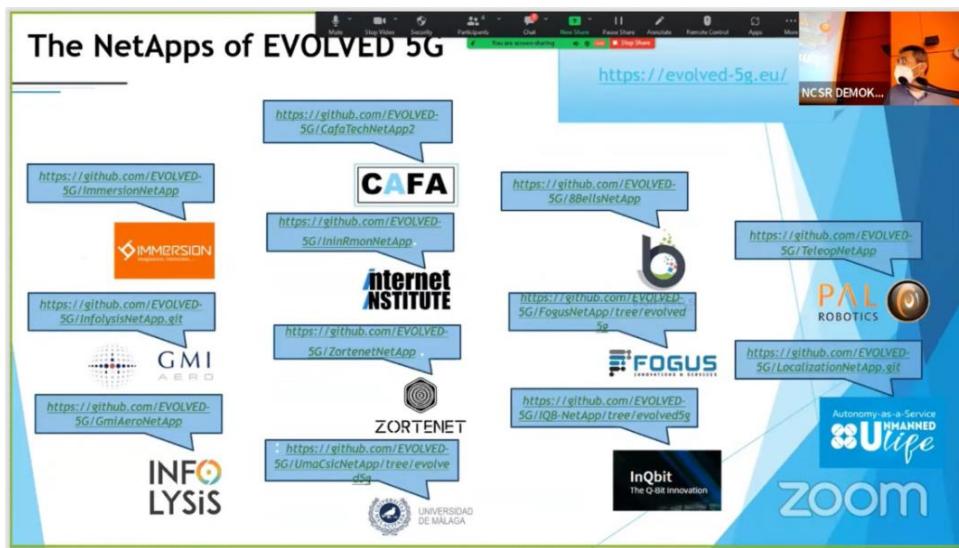


Figure 18. EVOLVED-5G Panel presentation on NCSR D Summer School

### 2.3.2.3 CAPIF Master Class

**Event:** CAPIF Master Class

**Date & Place:** 14<sup>th</sup> December 2022, University of Malaga (Spain)

**Event type:** Master Class (seminar)

**Organisers:** TID, UMA

**Audience:** M.Sc. students

**Attendance:** 32 attendees

**Duration:** 1 h

**Description:** Master class on CAPIF and 5G Open APIs.

**Presenter:** David Artuñedo (TID), Alejandro Molina (TID)

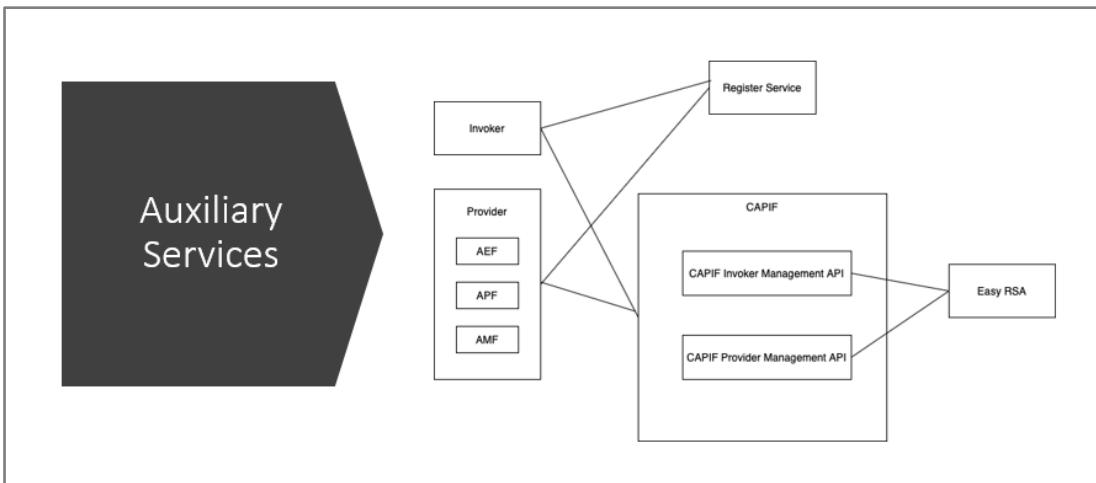


Figure 19. CAPIF Master Class Presentation

#### 2.3.2.4 Seminar on EVOLVED-5G Network Apps

**Event:** Seminar on EVOLVED-5G Network Apps

**Date & Place:** 26<sup>th</sup> January 2023, Polytechnic University of Valencia (Spain)

**Event type:** Master Class (seminar in physical mode)

**Organisers:** UPV

**Audience:** M.Sc. students

**Attendance:** 23

**Duration:** 2 h

**Description:** Seminar on EVOLVED-5G Network Applications

- Lecture on EVOLVED-5G Network Apps
- SDK & GitHub exploration

**Presenter:** Carlos E. Palau (UPV)



Figure 20. Seminar on EVOLVED-5G Applications

### 2.3.2.5 CAPIF Conference

**Event:** CAPIF Conference

**Date & Place:** 9<sup>th</sup> March 2023, Polytechnic University of Valencia in Valencia (Spain)

**Event type:** Conference with integrated hands-on demo (physical event)

**Organisers:** TID, UPV

**Audience:** M.Sc., B.Sc. and PhD students, researchers

**Attendance:** 24

**Duration:** 1 h

**Description:** CAPIF Training Session that integrates both a presentation on CAPIF and CCF implementation as an open tool, and a practical step-to-step demonstration of its deployment and usage. The content structure of this conference integrating technical training was the following:

- What is CAPIF
- CAPIF Components
- CAPIF Architecture
- Work Flow E2E
- Continuous Integration/ Continuous Delivery (CI/CD)

**Presenters:** Jose Ignacio Hernandez Velasco (TID), Arturo Jose Torrealba (TID)



Figure 21. CAPIF Conference

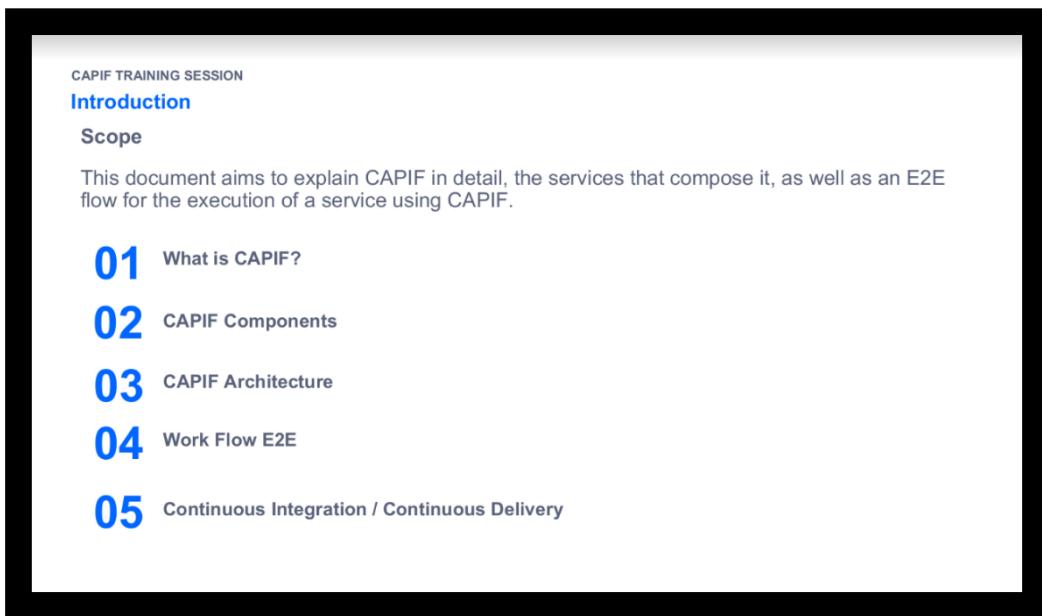


Figure 22. CAPIF Conference Presentation

### 2.3.2.6 Network App Validation Sessions

**Event:** Network App Validation Sessions (Athens)

**Date & Place:** 14<sup>th</sup>-15<sup>th</sup> March, 2023, NCSR Demokritos (Greece)

**Event type:** Developer-oriented event (hands-on validation sessions)

**Organisers:** NCSR Demokritos

**Audience:** EVOLVED-5G Network App developers

**Attendance/Participation:** 22 attendants

**Duration:** 14h (2 days)

**Description:** Training & hands-on sessions for Network App validation in a 5G Experimental Platform assisted by NCSRD and TID. The following activities took place:

- Validation process overview –Technical instructions & specific considerations.
- Onboarding, testing and validation of 8BELLs Network App
- Onboarding, testing and validation of ININ Network App
- Onboarding, testing and validation of IMM Network App
- Onboarding, testing and validation of INF Network App
- Onboarding, testing and validation of GMI AERO Network App
- Onboarding, testing and validation of PAL Network App
- Onboarding, testing and validation of IQBT Network App
- Onboarding, testing and validation of FOGUS Network App
- Onboarding, testing and validation of CAF Network App
- Onboarding, testing and validation of QCOM Network App
- Overview of sessions, lessons learnt & closure

**Participants:**

- George Makropoulos (NCSRDI)
- Dimitris Fragkos (NCSRDI)
- Jorge Moratinos (TID)
- Jesús Macias (TID)
- Illias Politis (IQB)
- Charles Bailly (IMM)
- Tomas Peyrucain (PAL)
- Vasilis Pasios (8BELLS)
- Anastasios-Stavros Charismiadis (FOGUS)
- Katerina Giannopoulou (FOGUS)
- Jaka Cijan (ININ)
- Christos Sakkas (INF)
- Nick Vrionis (INF)
- Konstantinos Fragkos (INF)
- George Kanterakis (GMI)
- Aggelos Christopoulos (GMI)
- Märten Rannu (CAF)
- Bianca Vendris (UML)
- Ivano Manfredonia (UML)
- Andreas Oikonomakis (ZOR)
- George Xylouris (ZOR)
- Alexandros Tzoumas (MAG)

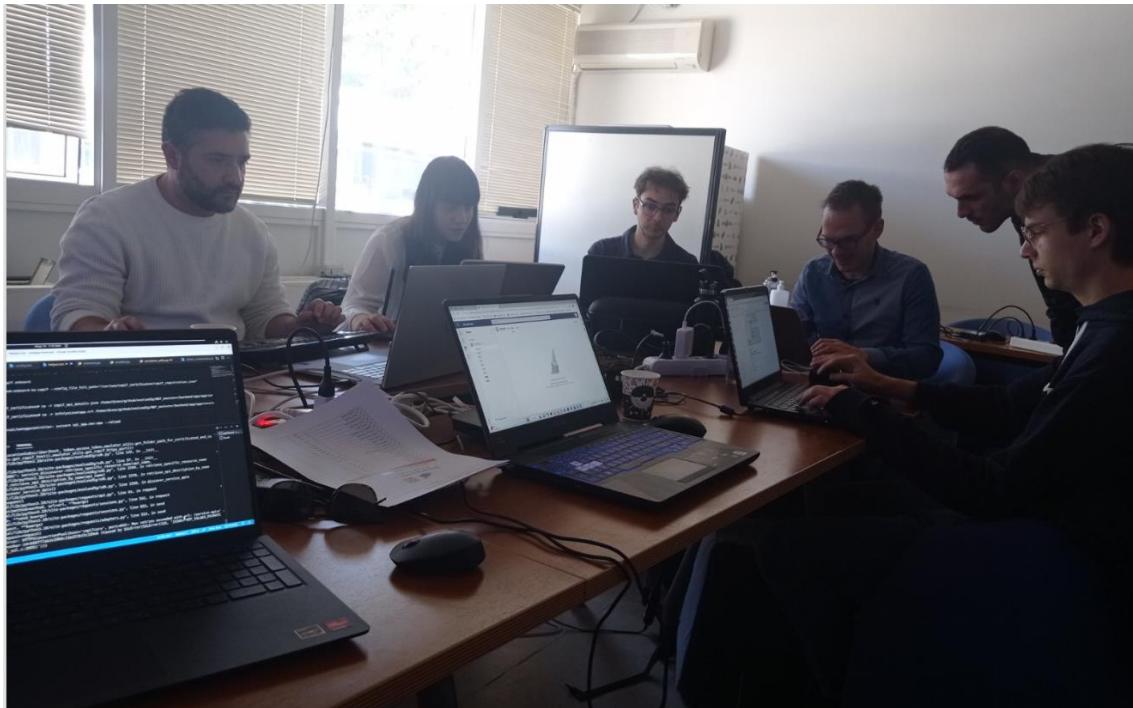


Figure 23. Network App Validation Sessions



Figure 24. First full day of the Network App Validation Sessions

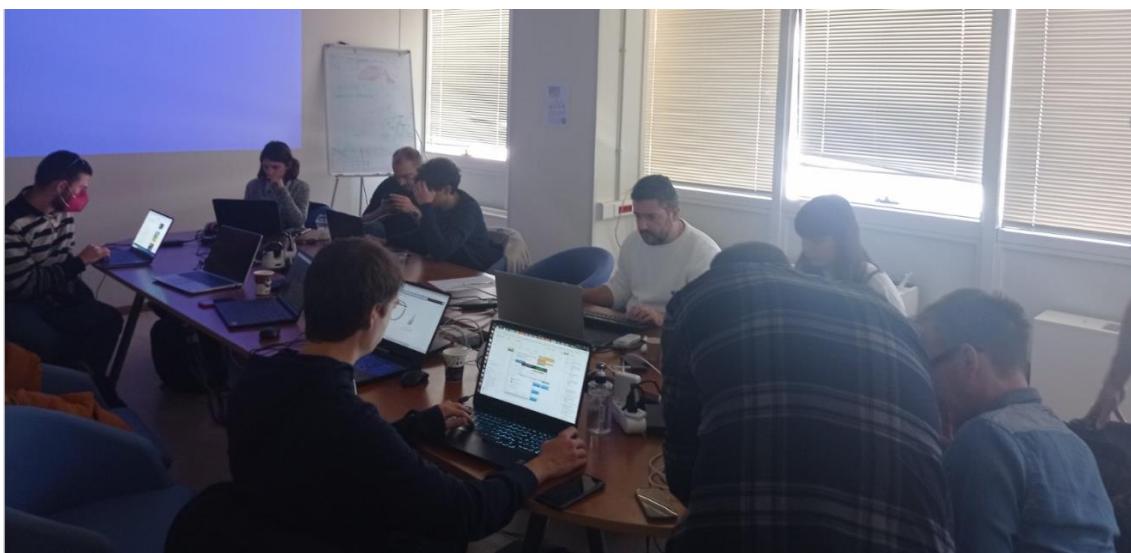


Figure 25. Developers in the Network App Validation Sessions

#### 2.3.2.7 Seminar on 5G & Digital System Security

**Event:** Seminar 5G & Digital System Security

**Date & Place:** 3<sup>th</sup> July, 2022 University of Piraeus Athens, Greece

**Event type:** Seminar (online)

**Organisers:** INQBIT

**Audience:** MsC students

**Attendance:** 28 attendants

**Duration:** 3h



**Description:** Presentation of EVOLVED-5G project vision and technical outcomes addressing the topics of 5G Application, 5G Programmability, EVOLVED-5G Network Apps and the EVOLVED-5G Framework.

**Presenter:** Prof. Christos Xenakis (IQB)

The screenshot shows a video conference interface. At the top, there's a header with various icons and the text 'Συμμετέχοντες' (Participants). Below the header, there's a list of names and profile pictures for nine participants. The main content of the slide is titled 'LTE vs 5G Architecture' and contains two diagrams. The left diagram shows the LTE architecture with components like Home eNB, MME, and SGW. The right diagram shows the 5G architecture with similar components but with more emphasis on the 'Cloud Native' nature of 5G, where functions like User Plane Function (UPF) and Session Management Function (SMF) are shown as clouds, indicating they can be located anywhere.

Figure 26. EVOLVED-5G presentation on 5G & Digital System Security

#### 2.3.2.8 NCSR Demokritos Summer School 2023

**Event:** NCSR Demokritos Summer School (Panel presentation in the event)

**Date & Place:** 11th July 2023 in Athens (Greece)

**Event type:** Panel presentation about EVOLVED-5G (physical event)

**Organisers:** EVOLVED-5G & Computer Science Department of the Metropolitan College of Athens

**Audience:** M.Sc., B.Sc. and PhD students, graduates of Technological domains in interdisciplinary research

**Attendance:** 150 attendees

**Duration:** 2h

**Description:** Panel presentations

**Organiser:** NCSR D

**Presenters:** Dr Harilaos Koumaras (NCSR D), Dimitrios Fragkos (NCSR D)

## 2.4 EVOLVED-5G WIKI

The EVOLVED-5G Wiki<sup>3</sup> [9] is a space for developers created by developers as the official centralized EVOLVED-5G technical documentation repository, i.e., a documentation place unifying all the technical information related to the project.

<sup>3</sup> <https://wiki.evolved-5g.eu/>



Thus, the Wiki represents a dedicated space for developers both within and beyond the project, catering to any external developers and other stakeholders interested in the EVOLVED-5G Network App related developments, as well as the EVOLVED-5G specific vision regarding this type of applications. This element plays a crucial role for technical training and community building as an online centralized platform for sharing technical knowledge and project-related information.

It contains a wide range of resources that include instructional materials for project developers and general public interested in Network Apps, as well as EVOLVED-5G detailed technical insights and advancements, and the different processes associated to the a Network App lifecycle (i.e., development, verification, validation, certification and publication) . Additionally, the Wiki offers essential information pertaining to the project's overarching vision and objectives.

This Wiki centralizes the existing key technical documentation on different areas addressed by the EVOLVED-5G project:

- EVOLVED-5G Vision
  - Network App Vision
  - Network App lifecycle
  - EVOLVED-5G Architecture
- Network Service Exposure
  - NEF
  - CAPIF
  - TSN
- EVOLVED-5G Service Package
- Network App Development
- Network App Verification
- Network App Validation
- Network App Certification
- EVOLVED-5G Marketplace
  - Network App Publication
  - Network App search and retrieval through the Marketplace
- EVOLVED-5G Training courses (It hosts the Training Course Space II [5])

Those areas are tightly related to the NetApp lifecycle phases, from the Network App development to the publication on the Marketplace, as well as to the different EVOLVED-5G framework environments shown in the EVOLVED-5G architecture. The different contents and are structured in different topics and subtopics.

The Wiki is intricately interconnected to other EVOLVED-5G elements, to which links and redirects to, namely the EVOLVED-5G Forum<sup>4</sup> [6] for enabling technical discussion and support, and to the EVOLVED-5G GitHub Organization<sup>5</sup> [12] which provides the source code of Network Apps and several open tools of the EVOLVED-5G project.

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<sup>4</sup> <https://forum.evolved-5g.eu/>

<sup>5</sup> <https://github.com/EVOLVED-5G>



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

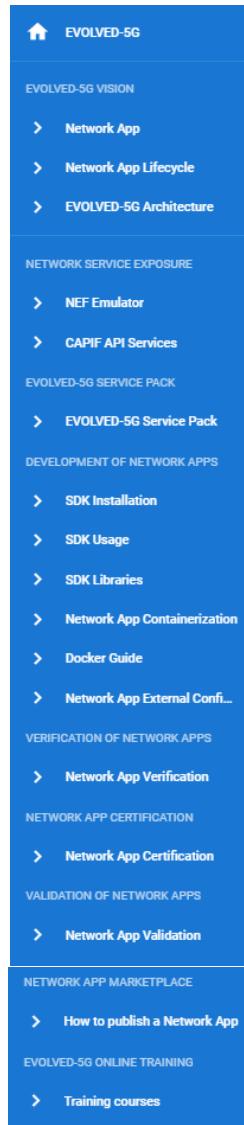


Figure 27. Content Structure of the Wiki - List of topics and subtopics addressed

The screenshot shows a wiki page titled "Network App concept". The left sidebar has a "PAGE CONTENTS" section with links to "Network App concept", "Why the Network App ecosystem is ...", "Network App types", "Architectural remarks", and "Implementation remarks". Below this is a "LAST EDITED BY" section showing "Administrator" on "05/09/2023". The main content area has a heading "Network App" and a sub-section "Network App concept". A diagram at the bottom illustrates the "Vertical Application" architecture, showing layers from "Business APIs" down to "5G Network Core", with the "EVOLVED-5G Network App" layer highlighted in red. A note at the bottom states: "EVOLVED-5G embraces the potential of the emerging Network App ecosystem under a two-fold scope:

Figure 28. Network Application concept



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

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The screenshot shows the homepage of the EVOLVED-5G Wiki. The top navigation bar includes a search bar and user icons. The left sidebar contains a navigation menu with sections like 'EVOLVED-5G VISION', 'NETWORK SERVICE EXPOSURE', 'DEVELOPMENT OF NETWORK APPS', 'VERIFICATION OF NETWORK APPS', 'NETWORK APP CERTIFICATION', 'VALIDATION OF NETWORK APPS', and 'NETWORK APP MARKETPLACE'. The main content area features a 'WELCOME!' section with a message about the official centralized documentation source, the 'evolved 5G' logo, and a photograph of a team. Below this is a section titled 'In this page you will find documentation for the implementation and usage of EVOLVED-5G framework elements and key information regarding the EVOLVED-5G vision, architecture and the concept of Network App.' It also includes a contact note for the forum.

Figure 29. Wiki homepage – Welcome to the EVOLVED-5G Wiki

The screenshot shows a page titled 'Network App lifecycle' under the '1-NETAPP' category. The left sidebar has a similar navigation menu to the homepage. The main content area starts with a brief description of the lifecycle phases: Development, Verification, Validation, Certification, and Publication. It then provides a detailed description of each phase. Below this is a diagram illustrating the five phases: NetApp Development (Pushing code), NetApp Verification (Verify the code, Testing, Report), NetApp Validation (Validation tests, Report), NetApp Certification (Certification tests, Report), and Marketplace (Publication).

Figure 30. Network Application lifecycle



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The diagram illustrates the EVOLVED-5G architecture, which is divided into several functional blocks:

- WORKSPACE ENVIRONMENT:** Contains SDK (Network App Templates, CLI Tools, Libraries), Code Verification, and Interaction with SG Exposure Services.
- CLOUD ENVIRONMENT:** Includes CI/CD SERVICES, OPEN REPOSITORY, and a COMMUNITY block (Forum, Library, Wiki).
- CERTIFICATION ENVIRONMENT:** Handles Marketplace policy compliance, Security Audits, and Software Quality/Functional Suitability (NF, OAPI) compliance.
- VALIDATION ENVIRONMENT:** Features Validation process, Analytics and Results, and Experiment Life Cycle Management.
- EXPOSURE SERVICES:** Provides API services, NEF Services, and SG core.
- 5G-NPN:** Manages Multi-domain Network Management and orchestration, Experiment control, and interacts with Vertical Apps and User Plane via Uu and LPP interfaces.

Interactions are shown through various communication types indicated by icons in the legend, such as API communication, Onboarding and artifact transfer, Transport layer, Community support, CI/CD implementation, and Network Apps.

Figure 31. EVOLVED-5G architecture

Also, the software developed in the project (e.g., SDK, NEF, CAPIF, TSN and the Service Package) is described, as well as the Marketplace implemented as shown in the next Figures.

The screenshot shows the "SDK Installation" page under the "WORKSPACE / SDK" section:

- PAGE CONTENTS:** Includes "SDK Installation", "Prerequisites", and "Installation Steps".
- LAST EDITED BY:** Administrator, 05/08/2023.
- Content:** Describes the Software Development Kit (SDK) for creating 5G Network Apps in Python, available on GitHub under Apache License 2.0.
- Code Snippet:** Shows the command \$ ssh-keygen -t rsa.

Figure 32. EVOLVED-5G SDK



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The screenshot shows the EVOLVED-5G WIKI interface. The left sidebar has sections for EVOLVED-5G VISION (Network App, Network App Lifecycle, EVOLVED-5G Architecture), NETWORK SERVICE EXPOSURE (NEF Emulator, CAPIF API Services), and DEVELOPMENT OF NETWORK APPS (SDK Installation, SDK Usage, SDK Libraries, Network App Containerization). The main content area is titled 'NEF Emulator' and contains a sub-section 'How to install NEF emulator' with steps like 'Try out your setup', 'How to work on a specific tag / ...', and 'NetApp Communication Options'. It also includes a note about the last edit by Administrator on 05/08/2023.

Figure 33. Network Exposure Function (NEF)

The screenshot shows the EVOLVED-5G WIKI interface. The left sidebar has sections for EVOLVED-5G VISION (Network App, Network App Lifecycle, EVOLVED-5G Architecture), NETWORK SERVICE EXPOSURE (NEF Emulator, CAPIF API Services), and DEVELOPMENT OF NETWORK APPS (SDK Installation, SDK Usage, SDK Libraries). The main content area is titled 'CAPIF API Services' and contains a sub-section 'CAPIF: Common API Framework' with links to 'Releases available', 'How to run CAPIF services', and 'How to test CAPIF APIs using the C...'. It also includes a note about the last edit by Administrator on 01/27/2023.

Figure 34. Common API Framework (CAPIF)

The screenshot shows the EVOLVED-5G WIKI interface. The left sidebar has sections for EVOLVED-5G VISION (Network App, Network App Lifecycle, EVOLVED-5G Architecture), NETWORK SERVICE EXPOSURE (NEF Emulator, CAPIF API Services), and DEVELOPMENT OF NETWORK APPS (SDK Installation). The main content area is titled 'EVOLVED-5G MARKETPLACE - Online Publication of Network Apps' and contains a sub-section 'EVOLVED-5G Marketplace' with a note about the last edit by Administrator on 05/08/2023. It also includes a section 'How to publish a Network App in the EVOLVED-5G Marketplace' with a note about the last edit by Administrator on 05/08/2023.

Figure 35. EVOLVED-5G Marketplace



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The screenshot shows the 'EVOLVED-5G WIKI' interface. The left sidebar has a blue header 'EVOLVED-5G' and lists sections like 'EVOLVED-5G VISION', 'EVOLVED-5G SERVICE PACK', and 'DEVELOPMENT OF NETWORK APPS'. The main content area is titled 'EVOLVED-5G Service Pack' and contains a detailed description of its components: CAPIF, NEF, TSN, and SDK. It also mentions the 'Dummy Network App' and its connectivity to other services.

Figure 36. EVOLVED-5G Service Pack

## 2.5 FORUM TECHNICAL TOPICS

Technical support is provided at the EVOLVED-5G Forum<sup>6</sup> [10] in regard to any technical inquiry or request regarding EVOLVED-5G technical topics, posted by any person. T6.1 is responsible for managing and monitoring technical topics, ensuring that any request receives technical support by i) responding directly to those inquiries ii) redirecting them to technical Work Packages to provide technical attention.

This open service is available to anyone: any developer, academic or interested stakeholder that posts an inquiry in the Forum.

The screenshot shows a forum post titled 'CAPIF 3.0 - 401 Client Error: Unauthorized for url – Solved'. A user named 'bianca' asks about obtaining results from the latest versions of CAPIF and NEF. They provide a trace error message. Another user, 'Dimitris\_Fragkos', replies with the correct versions: CAPIF v2.1 - NEF v1.6.2 - SDK v0.8.9. The thread shows standard forum metrics like replies, views, and users.

Figure 37. Example of thread for a technical inquiries receiving technical support

<sup>6</sup> <https://forum.evolved-5g.eu/t/welcome-to-the-evolved-5g-forum/14>



Welcome to the EVOLVED-5G Forum !

The purpose of this Forum is to provide support for SMEs and other interested stakeholders or Network App users in the use of Network Apps, as well in related topics such as the creation of Network Apps or the development of an EVOLVED-5G Network App ecosystem.

You can explore the topics of the forum to understand how you can build a Network App or how to use Network Apps that are already available in the Marketplace, and add questions and inquiries to be answered by the EVOLVED-5G community.

| Topic   | Replies | Views | Activity |
|---|---------|-------|----------|
| About the Network App Development Support category                                | 0       | 347   | May 8    |
| Pip3 install evolved5g installs 1.0.7 instead of latest (1.1.0)                   | 3       | 133   | Sep 26   |
| [Pending] NEF emulator not starting locally                                       | 0       | 61    | Aug 29   |
| [Pending] TSNManager instance creation failure despite correct CAPIF registration | 8       | 172   | Jun 22   |
| SDK Module not found error  | 3       | 110   | Jun 15   |
| CAPIF 3.0 - 401 Client Error: Unauthorized for url - Solved                       | 2       | 227   | Mar 2    |
| CAPIF 409 Conflict when onboarding Network App to CAPIF                           | 2       | 252   | Dec '22  |
| Capif registration failure for Network App  | 1       | 191   | Nov '22  |
| Poetry error with last version of NEF emulator -SOLVED                            | 6       | 629   | Nov '22  |
| Error port 5000 busy - SOLVED   | 9       | 405   | Nov '22  |
| Capif error when running register-and-onboard command                             | 9       | 331   | Nov '22  |
| NEF_emulator_error: network-services-default not found                            | 2       | 382   | Nov '22  |
| NEF_emulator: error in make build: python version                                 | 1       | 202   | Nov '22  |

Figure 38. Forum sample Network App Development topics

### 3 SMEs AND STARTUP ACCELERATION PROGRAM

#### 3.1 ACCELERATION PROGRAM

The aim of the Evolved-5G Accelerator is to provide hands-on methodology based on the principles of lean startup and experiential learning, including business and industry case studies for the adoption and implementation of 5G technology in the participants business. By inviting innovative SMEs across Europe to join the EVOLVED-5G Acceleration program, the aim is to provide the admitted teams with a holistic support on various topics, spanning from business innovation essentials to more technical aspects of their businesses, such as the adoption of 5G technologies and the advancement of their internal or external processes.

Having the above aim in mind, the design of the acceleration program included various workshops on business tools and methodologies to improve or re-define the existing business model, hosting of various speakers with different technical or business background to support the teams in ideation, provide feedback, or improve existing products or services, as well as networking opportunities within the cohort of the selected teams, while also flourishing the ground for synergies between the selected teams and EVOVLED-5G Project's network, while also, Envolve's network of industry experts.

##### 3.1.1 EVOLVED-5G Accelerator Open Call

The selection process of up to twenty-five (25) innovative SMEs was designed and implemented is described below. The goal was to present the opportunities of 5G technology and EVOLVED-5G project to the innovation, startup and SME community.

For this purpose, the following actions were prepared and conducted:

###### 1) Formation of the Call for Expressions of Interest

The open call<sup>7</sup> was published on EVOLVED-5G Website<sup>8</sup> [15] including the scope of the EVOLVED-5G Project, the expected results, the eligibility criteria for participation, the evaluation and selection criteria and the application form. The call for expression of interest was formed mentioning all the relevant information for the scope of the EVOLVED-5G Project, including a hyperlink to the project's official website, the expected results from the Project to the participants, the eligibility criteria for participation, the evaluation and selection criteria as well as the open close and multiple-choice questions of the application form. The application process was carried out with the support and use of a third-party platform, Vestbee. The platform offers the capacity of one building their own application form with various types of questions, spanning from open text to multiple choice questions as well as promotion of the open calls within the members/users of the platform.

The initial deadline for the submission of the applications was set for 30 November 2021, but due to the consortium's needs for wider location distribution of the participating teams, and taking into account the holiday period, in order to provide substantial support, an extension was given for 3 February 2023, to ensure the attraction of more applications spanning from various locations within Europe.

<sup>7</sup> <https://evolved-5g.eu/wp-content/uploads/2022/10/Accelerator-Program.pdf>

<sup>8</sup> <https://evolved-5g.eu/accelerator-program>



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

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### EVOLVED-5G Accelerator Call for Expression of Interest

EVOLVED-5G (<https://evolved-5g.eu/>) consortium is calling for SMEs and Start-ups from Europe to apply for the EVOLVED-5G Acceleration Program, which will help them turn their products/services into scalable businesses by adapting new digital technologies and 5G applications. 20 entrepreneurs and start-ups will be selected to join the 5-month program, starting in January 2023. The EVOLVED-5G consortium through an intensive capacity building program will support its participants, by providing them training and advanced business support, coaching on funding opportunities, technical assistance, and business networking to grow their ventures and expand them across the EU.

Applications are open until Wednesday, November 30<sup>th</sup> 2022.

The EVOLVED-5G Project is funded by the EU under the Horizon 2020 Programme, counting 21 partners from 10 countries.

#### What we offer:

##### Capacity Building & Training on

- Business and technical support tailored to the needs of the ventures.
- Training on investment readiness and funding opportunities
- Access to European market opportunities and support through networking events.
- Access to members of the EVOLVED-5G network of 5G and innovation experts.
- Access to EVOLVED-5G project's network of entrepreneurs, professionals, media, funding companies and international partners.

#### How to Apply

Applications are submitted online via Vestbee's platform for startups: <https://app.vestbee.com/org/evolve>

Application Submission Deadline: Wednesday, 30 November 2022.

#### Who Can Apply?

The call is addressed to start-ups and small and medium size enterprises (SMEs) from all the EU countries. **Commitment from the participants**

A minimum of 1 member per team, expert in their project field, must be committed to participate in the accelerator activities.

#### Need Support?

Arrange an appointment with our team to learn more about the acceleration program and receive support at the following email: [accelerator@evolved-5g.eu](mailto:accelerator@evolved-5g.eu)

#### About the EVOLVED-5G Acceleration Programme:

##### The Program's Timeline & Support Stages

The Program starts in January 2023 and ends in May 2023. Below is the timeline and the description of the different support stages.

- Outreach & Selection: October 17 – December 31, 2022
- Application period: October 17 – November 30, 2022
- Evaluation period: December 1 – December 20, 2022
- Selection of 20 companies
- Information to the applicants: December 20 – January 10, 2023
- Capacity Building Program: January 20 – May 31, 2023
- Pitching Day & Selection of 10 Projects: June 2023
- Incubation Support & Mentoring: June 2023 – July 2023

The selected start-ups will go through a 5-month capacity building Program tailored to support them in developing their business models, access to finance and market strategies.

##### Pitching Day | Selection Of 10 Projects – June 2023

Entrepreneurs will pitch in front of a selected jury from the consortium members and our advisory board that will select 10 projects, which will continue in the next incubation phase.

The pitching teams will be screened based on their value proposition, their innovation, the applicability of their technology, their business model and scalability potential, their implementation capacity, and finally on their pitch effectiveness.

##### Incubation Support: June 2023 – July 2023

The 10 selected companies will benefit from a 2-month incubation support and get in depth technical and business support. The 2-month incubation period will revolve around:

- defining a business growth roadmap for the companies and supporting them in the implementation.
- facilitating linkages with experts, investors, and professionals – giving the teams access to support programs, market and funding opportunities through EVOLVED-5G and its partners' networks.

Figure 39. Open Call Expression of Interest



Figure 40. Open Call announcement

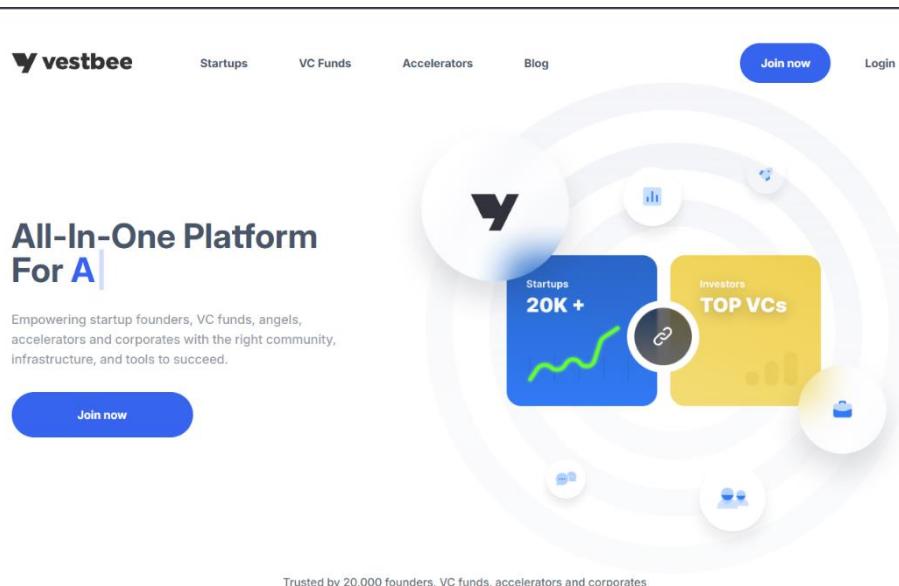


Figure 41. Vestbee platform hosting the online Open Call registration



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**vestbee**

**Companies** **New** **Featured** **Watchlists** **Programs** **Reports** **Showrooms** **Messages** **Discounts** **Settings**

**1. MULTIPLE SELECTION**  Required

Do you have startup or SME?

- Yes
- No

**Add choice**

**2. QUESTION**  Required

What is the name of your company/venture?

**3. QUESTION**  Required

What is your phone number?

**4. SINGLE SELECTION**  Required

Country

**5. MULTIPLE SELECTION**  Required

What is your Gender? (this will only be used for statistical purposes)

- Male
- Female
- Other
- I prefer not to say

**Add choice**

**6. SINGLE SELECTION**  Required

Does your business operate in any of the below sectors of industry 4.0?

- AR/VR
- IoT
- Automotive
- Data Analytics
- Sensors
- AI/Machine Learning
- Cloud Computing
- Other

**Add choice**

**7. QUESTION**  Required

If you selected other or do not operate in the Industry 4.0 sector, please define the sector of your venture.

**8. SINGLE SELECTION**  Required

What is the stage of your venture?

- Idea Phase
- MVP
- Pre-seed
- Seed
- Growth

**Add choice**

**9. QUESTION**  Required

Is your company incorporated? If yes, write which type of incorporation and date of incorporation.

**10. QUESTION**  Required

Please share your company's website link

**12. QUESTION**  Required

Please briefly define your business model and client approach. (e.g. B2B, B2C, B2G, etc.)

**13. ATTACHMENT**  Required

Please attach your Pitch Deck

**14. NUMBER**  Required

How many people are on your team?

**15. QUESTION**  Required

Please add the core team's names and surnames, company roles and respective LinkedIn links.

**16. SINGLE SELECTION**  Required

Have you participated in a startup acceleration programme before?

- Yes
- No

**Add choice**

**17. QUESTION**  Required

If you selected yes, please share us the programmes you have participated in.

**18. SINGLE SELECTION**  Required

What level is your business and startup knowledge?

- No startup knowledge
- I have heard of startups
- I have participated in seminars/workshops about startups
- I work for a startup
- I am a startup enthusiast
- I am a startupper

**Add choice**

**19. SINGLE SELECTION**  Required

What do you know about 5G Technology?

- I have no idea
- Hearsay
- Experimenter
- Expert

**Add choice**

**20. SINGLE SELECTION**  Required

Have you incorporated 5G technology in your venture?

- Yes
- No

**Add choice**

**21. QUESTION**  Required

How will 5G technology support your venture?

**22. QUESTION**  Required

How will you integrate 5G technology in your process/product/service?

**23. MULTIPLE SELECTION**  Required

What kind of support are you looking for?

- Business Support
- Networking Opportunities
- Training on Funding Opportunities
- Industrial IoT & Integration of 5G Applications
- 5G Applications
- Product Development
- Other

**Add choice**

Your Account



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The screenshot shows a registration form on the Vestbee platform. On the left, a sidebar menu includes 'Companies', 'New', 'Featured', 'Watchlists', 'Programs' (which is selected), 'Reports', 'Showrooms', 'Messages', 'Discounts', and 'Settings'. The main area contains the following fields:

- SG Applications**: A dropdown menu with options 'SG Applications', 'Product Development', and 'Other'. An 'Add choice' button is at the bottom.
- 24. QUESTION**: A text input field with placeholder text: "If you selected 'Other', please define what kind of support you are seeking." An 'Required' checkbox is unchecked.
- 25. QUESTION**: A text input field with placeholder text: "Please share your company's Facebook link." An 'Required' checkbox is unchecked.
- 26. QUESTION**: A text input field with placeholder text: "Please share your company's Twitter link." An 'Required' checkbox is unchecked.
- 27. QUESTION**: A text input field with placeholder text: "Please share your company's LinkedIn link." An 'Required' checkbox is unchecked.
- 28. ATTACHMENT**: A text input field with placeholder text: "Please feel free to add any other relevant files/documentation. (Non-obligatory)." An 'Required' checkbox is unchecked.

At the bottom, there are buttons for "Add frequently asked questions", "Add custom question", and a yellow "Save" button.

Figure 42. Open Call registration form

### 2) Promotion of the open call

Vestbee's platform also serves as a database and marketplace for startups and investors to connect and attract investment and acceleration opportunities. The open call was also published and disseminated to Vestbee's database of over 20,000 founders.

The call was, in addition, distributed through the official media channels of the EVOLVED-5G Project, through Envolve's official media channels, as well as the respective websites of the abovementioned parties.



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Figure 43. Open Call promotional banners

To further disseminate the open call and the EVOLVED-5G Acceleration program opportunities for the applicable SMEs, Envolve/IEA hosted an online Info Day for the project and the acceleration program, on November 8<sup>th</sup> 2022 with over 40 participants. The event hosted partners of the consortium sharing the EVOLVED-5G project's goals and results, up to that point, while also communicating to interested parties the benefits of joining the acceleration program and the selection and eligibility criteria for the teams interested to apply.



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The collage consists of several screenshots from the evolved-5G Accelerator website:

- INFO DAY**: Shows speakers including Christina Skoubridou, Javier Garcia Rodrigo, Dr. Harilaos Koumaras, Dr. Dimitris Tsolkas, Maria G. Anagnostopoulos, and Konrad Koncerewicz.
- AGENDA**: Details the schedule from 16:00 to 17:15, including Welcome, Project Inception, Network Applications, Acceleration Programme, Opportunities, and a Q&A session.
- ACCELERATOR**: Key Dates (Deadline: 30 November 2022, Selection of Participants: 20 December 2022, Capacity Building Program: 20 January - 31 May 2023, Pitching Day: June 2023, Incubation Support & Mentorship: June - July 2023).
- ACCELERATOR**: 5-Month Capacity Building & Training details, listing 20 entrepreneurs & startups, minimum of 1 member per team, duration January 2022 - May 2022, and training support.
- ACCELERATOR**: 5-Month Capacity Building & Training details, listing 4 Chapters, 6 Workshops, 1-month coaching, and various modules like Introduction to 5G Networks & Architecture / Business Integration, Entrepreneurship Masterclass, Industry & Case Studies, and Virtual Venture Support & Business Coaching.
- PITCHING DAY**: Jury criteria including Value Proposition & Innovation, Applicability & Implementation Capacity, Business Model & Scalability, and Pitch Effectiveness.
- Open Call**: A 5-month Acceleration Programme for SMEs and Start-ups from Europe, offering support in adapting new digital technologies and 5G applications. It includes a screenshot of a video call and a computer screen showing the Accelerator Info Day presentation.
- ACCELERATOR**: What We Offer, listing Tailored Business and Technical Support, Training on Investment Readiness, Networking & European market opportunities, Access to Members of the EVOLVED-5G Project, and Access to the Project's network of entrepreneurs, professionals, media, funding companies, and international partners. It also includes a video call screenshot.

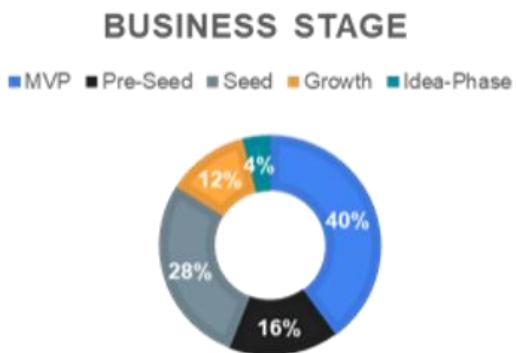
Figure 44. Open Call Info Day



Figure 45. Open Call Info Day presentations

### 3.1.1.1 Selected Projects

The total number of applicants who responded to the call for expression of interest on the Vestbee platform was 76, where 25 were eligible according to the EVOLVED-5G Accelerator. The applicants were 72% Male & 28% Female, operating in 15 different sectors, of which 9 in IoT. The eligible applicants come from 13 countries, Greece, Poland, Tunisia Italy, Estonia, Turkey, Romania, Finland, Latvia, Belgium, Bulgaria, Denmark, United Kingdom. The majority of the applications were at MCP stage (40%) following with seed stage startups (28%).



The criteria for the selection of the SMEs were:

- Effective business model
- Scalability
- 5G deployment potential
- Team capacity and expertise
- Financially sustainable business model

The initial goal was to admit 20 SMEs in the acceleration program while also maintaining a wide spread of teams' location for the cohort. Due to ties in the grades of some of the teams as well as considering the business potential in all of the business ideas submitted, the evaluation committee, in cooperation and mutual agreement with the consortium partners, decided to admit the below 25 teams to the acceleration program, offering the opportunity to even more SMEs to benefit from the accelerator's activities, network, and business and technical support.

The 25 teams that were selected based on the above criteria and their respective evaluation scores, from a scale of 1 to 5, where 1 non-sufficient and 5 high score, follow below.



|    | SME Name                      | Business Model | Scalability | 5G Deployment Potential | Team capacity | Financial projection | Score |
|----|-------------------------------|----------------|-------------|-------------------------|---------------|----------------------|-------|
| 1  | 3D WAVE                       | 3              | 3           | 3                       | 4             | 4                    | 17    |
| 2  | Athleton Plus                 | 4              | 4           | 4                       | 5             | 5                    | 22    |
| 3  | BEIA                          | 3              | 3           | 3                       | 4             | 4                    | 17    |
| 4  | BE-IN-G                       | 4              | 5           | 5                       | 5             | 5                    | 24    |
| 5  | CAMPO s.c.a.                  | 3              | 2           | 4                       | 3             | 3                    | 15    |
| 6  | Cumucore Oy                   | 4              | 5           | 5                       | 5             | 4                    | 23    |
| 7  | Embneusys                     | 3              | 4           | 3                       | 3             | 3                    | 16    |
| 8  | HeadsApp                      | 3              | 4           | 4                       | 3             | 3                    | 17    |
| 9  | IVOLUNTRY                     | 4              | 4           | 3                       | 3             | 3                    | 17    |
| 10 | Knoddo                        | 4              | 4           | 4                       | 3             | 3                    | 18    |
| 11 | Link Robotics                 | 4              | 4           | 4                       | 4             | 4                    | 20    |
| 12 | Quanterall Ltd (AVERATO)      | 4              | 4           | 3                       | 3             | 3                    | 17    |
| 13 | TechNarts                     | 3              | 4           | 4                       | 3             | 3                    | 17    |
| 14 | ViZmerald                     | 4              | 4           | 5                       | 5             | 4                    | 22    |
| 15 | WAN-AI                        | 4              | 5           | 5                       | 5             | 5                    | 24    |
| 16 | DIGIZONE                      | 4              | 4           | 3                       | 3             | 3                    | 17    |
| 17 | ADVANCED INTELLIGENT ROBOTICS | 3              | 3           | 5                       | 4             | 3                    | 18    |
| 18 | Smart Alert                   | 3              | 3           | 5                       | 3             | 2                    | 16    |
| 19 | Astrotectonic                 | 3              | 3           | 4                       | 3             | 3                    | 16    |
| 20 | EmergenCycList                | 3              | 4           | 3                       | 2             | 3                    | 15    |
| 21 | INNOVATI FOODS                | 3              | 3           | 3                       | 3             | 3                    | 15    |
| 22 | LTI CHEMI                     | 3              | 2           | 4                       | 3             | 3                    | 15    |
| 23 | Teligencia                    | 4              | 4           | 5                       | 5             | 4                    | 22    |
| 24 | Tinest                        | 3              | 4           | 5                       | 3             | 3                    | 18    |
| 25 | Val bio déchets composite     | 3              | 3           | 3                       | 3             | 3                    | 15    |

Table 6. Open Call Candidates

### 3.1.1.2 Incubation Support

#### 1.a.2 Accelerator Chapters

Within the application form, there have been questions regarding the business model maturity of the team, the 5G deployment needs and capacity as well as the stage of the product or service development of the teams applying. Having those responses in mind, the design of the acceleration program was formed in four different chapters, each one advancing the teams to the next stage of their business model finalization, their product/service readiness, and the formation of the 5G deployment strategy. The presentations we recorded and provided internally for offline learning, including workshops recordings, presentations and used tools.



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During each workshop, the presentations started with an introduction to the EVOLVED-5G Project, its activities, and partners, promoting the Project to the cohort and guest speakers.



Figure 46. Entrepreneurship Master Class

Those chapters are:

- Entrepreneurship Masterclass
- Introduction to 5G Networks & Network Applications
- Industry & Case Studies
- Virtual Venture Support & Business Coaching

Below are, in detail, the topics covered in each chapter as well as the speakers that facilitated the respective activities.

| Chapter                       | Topic  | Curator  | Type     | Duration  | Date     |
|-------------------------------|--|--|----------|-----------|----------|
| Entrepreneurs hip Masterclass | Innovation & Business Design: Innovation Design, Product Development, Service Design Tools | Maria Anagnostopoulos & Konstantinos Kissas, Envolve | Workshop | 1,5 hours | 3/4/2023 |
|                               | Innovation & Business Design: Business Model Canvas, IP Commercialization Blueprint        | Maria Anagnostopoulos & Konstantinos Kissas, Envolve | Workshop | 1,5 hours | 4/4/2023 |



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|  |   |  |                    |           |           |
|--|---|--|--------------------|-----------|-----------|
|  | Investment Readiness and Funding Opportunities  | Maria Anagnostopoulos & Konstantinos Kissas, Envolve | Workshop           | 1,5 hours | 20/4/2023 |
|  | Pitching to Investors & Pitch deck  | Maria Anagnostopoulos & Konstantinos Kissas, Envolve | Workshop           | 1,5 hours | 21/4/2023 |
| Introduction to 5G Technologies & Network Applications | Remote assistance with Augmented Reality (AI)   | Castet Julien, Immersion                             | Inspiration Speech | 3 hours   | 17/5/2023 |
|  | Infology Chatbot and Network application for Precise Maintenance in 5G-enabled Industry 4.0 | Konstantinos Fragkos, Infology                       | Inspiration Speech |           |           |
|  | The 5G-IANA Project: What's in it for SMEs?   | Eirini Liotou, 5G-IANA                               | Inspiration Speech |           |           |
|  | Industrial Grade 5G Connectivity Network Application  | Jaka Cijan, Internet Institute Ltd                   | Inspiration Speech |           |           |
|  | The EVOLVED-5G Project  | Javier Garcia Dodrigo, Telefonica                    | Inspiration Speech |           |           |
|  | 5G Campus Opportunities & Challenges  | Paschalis Tsiaras, Cosmote                           | Inspiration Speech |           |           |
|  | Athens 5G Open Experimentation Platform   | Harilaos Koumaras, NCSR                              | Inspiration Speech |           |           |
|  | 5G Network Applications and SME Potentials  | Dimitris Tsolkas, Fogus                              | Inspiration Speech |           |           |
|  | Catch up and Workshops Reflection   | Envolve  |                    | 1 hour    | 25/5/2023 |
| Industry & Case Studies                                | Bespot. Case Study  | Leon Gavalas, Bespot                                 | Inspiration Speech | 1,5 hours | 30/5/2023 |

|  |  |  |                    |           |           |
|--|--|--|--------------------|-----------|-----------|
|  | Research & Innovation Funding Opportunities within the SNS Ecosystem | Kostas Trichias, 6G-IA                                       | Workshop           | 2 hours   | 14/6/2023 |
|  | Introduction to European Funding Landscape for SMEs                  | Christina Skoubridou, Envolve                                | Workshop           |           |           |
|  | Business Cases 2023  | Anestis Dalgkitsis, IQUADRAT                                 | Workshop           | 2 hours   | 16/6/2023 |
|  | Intro to Phaistos Fund   | Salvator Levis, Executive Director & Investor at 5G Ventures | Inspiration Speech | 2 hours   | 26/6/2023 |
|  | Team's Pitches   | Knodo, Ivoluntary, WAN-AI                                    | Workshop           | 1,5 hours | 5/7/2023  |
|  | Showcase AI Catalyst   | Paul Sotiriadis, President & Stefanos Kolias, AI Catalyst    | Inspiration Speech | 1,5 hours | 6/7/2023  |
|  | FAQs on Demo Day   | Maria Anagnostopoulos & Konstantinos Kissas, Envolve         | Workshop           | 1,5 hours | 18/9/2023 |
|  | Allancode Case Study   | Kostas Karolemeas, Allancode                                 | Workshop           | 2 hours   | 4/10/2023 |

Table 7 Chapters of the Accelerator Program

Below there is a brief description of the points covered in each session of the table above:

- **Entrepreneurship Masterclass:**
  - **Workshop 1:** In the workshop “Innovation & Business Design: Innovation Design, Product Development, Service Design Tools”, participants learned about the process of transforming their ideas into innovative products and services, the methodology of innovation and service design and how to use useful tools, such as User Persona, Customer Journey Map, and Value Proposition Canvas, as well as how to set an innovation strategy and find identify new business opportunities and how to create a defined journey and measurable impact to share with partners and investors.

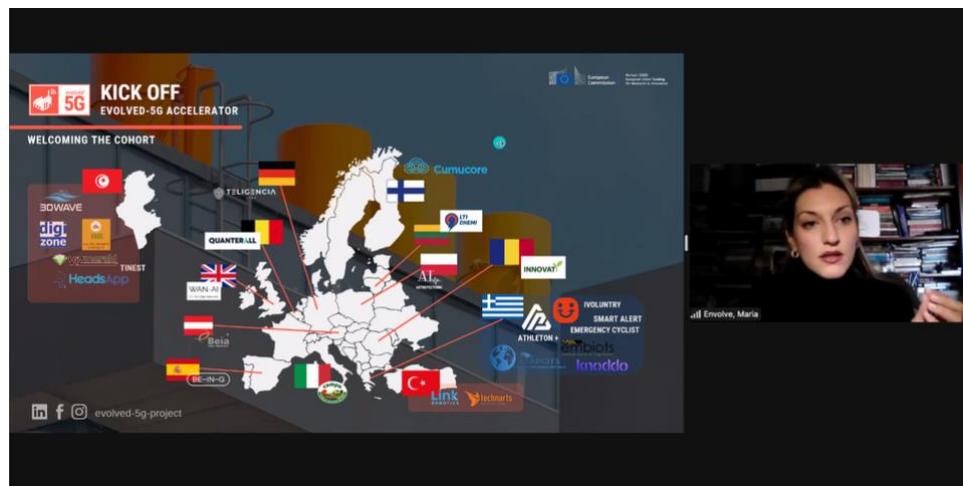


Figure 47. Screenshot 1 of Workshop 1



Figure 48. Screenshot 2 of Workshop 1

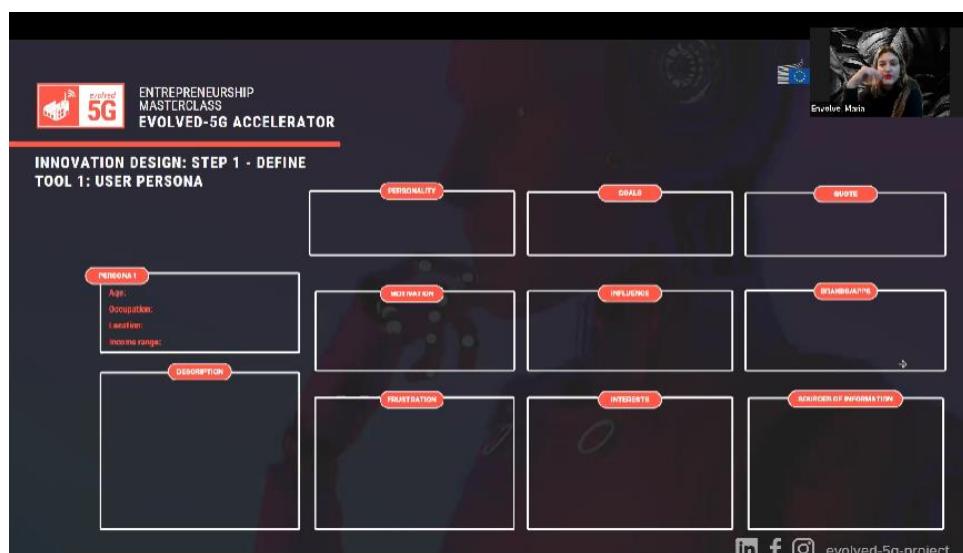


Figure 49. Screenshot 3 of Workshop 1

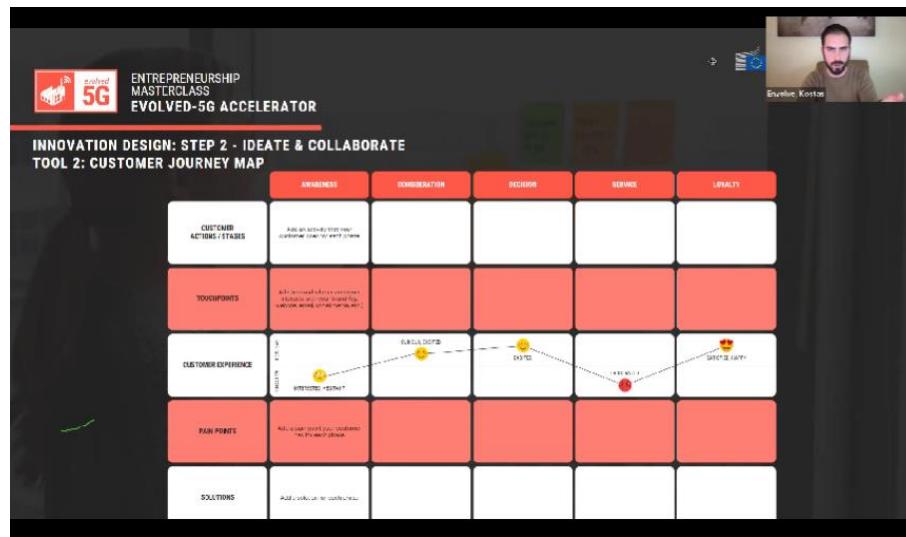


Figure 50. Screenshot 4 of Workshop 1

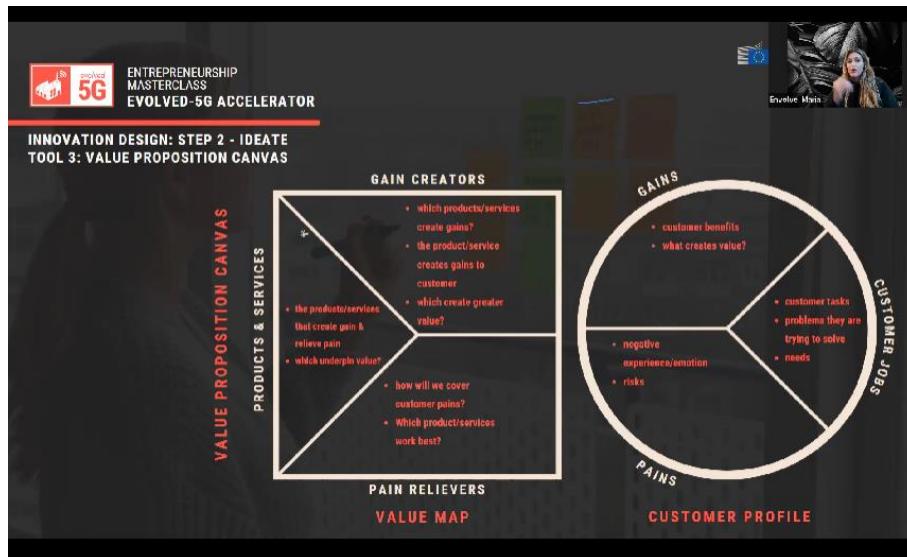


Figure 51. Screenshot 5 of Workshop 1



Figure 52. Screenshot 6 of Workshop 1



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

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- **Workshop 2:** In workshop “Innovation & Business Design: Business Model Canvas, IP Commercialization Blueprint”, participants learned about the validation of the business solutions, how to identify growth potential and how to use the methodology and tool of Business Model Canvas and find their Competitive Advantage with the respective tool. Their progress with these tools, served as a basis for the mentoring sessions with all teams. The teams also experimented with the EVOLVED-5G IP Commercialization Blueprint Tool to effectively design a strong IP commercialization strategy.

**VALIDATE**

Evaluate the solutions you have designed.

- What has potential for your business growth?
- What has potential in the market and creates higher value to your customers & partners?
- Which are more feasible? What resources are needed and what is the cost?
- Start with the **Business Model Canvas (tool 4)** and **Competitive Advantage (Tool 5)**.

Who will carry these evaluations?

- Will you deploy experts? Community members? Which team members understand the challenges & potential value in the market?
- How can we maximize value for the customer and the business? Start with the **Competitive Advantage Tool (tool 3)**

Figure 53. Screenshot 1 of Workshop 2

**INNOVATION DESIGN: STEP 3 - VALIDATE**  
**TOOL 4: BUSINESS MODEL CANVAS**

**Summary of your business plan & serves as a map for your implementation.**

**Start from the value proposition and work towards the outer boxes.**

**Indicative questions in each box to help you fill out the BMC.**

**BUSINESS MODEL CANVAS**

| KEY PARTNERS / STAKEHOLDERS  | KEY ACTIVITIES   | VALUE PROPOSITION   | CUSTOMER RELATIONSHIPS   | CUSTOMER SEGMENTS   |
|--|--|---|--|---|
| Who do you work with to achieve your goals?<br>Who are your key partners/participants?<br>Motivations for partnerships?<br>Which key activities do your partners perform?                                    | What are your business activities?<br>What key activities create your value proposition require?<br><br>KEY RESOURCES<br>What resources do you need in order to produce and deliver your products? | What problems do you solve?<br>How do you solve it?<br>What more value do you deliver to the customer?  | What is your relationship with your customers (B2B/B2C)?<br>Which customer relationships have you already established? How do you handle acquired customers? | How many people want your solution?<br>Who is your most important customer? |
|  |  |   | CHANNELS<br>How will you deliver your product to the market?<br>How will you reach your customers?<br>Which channels work best?                              |   |
|  |  |   |  |   |
| <b>COSTS STRUCTURE</b><br>What are the most important costs inherent to your business model? Which key resources/categories are most expensive?<br><br>Show monthly amounts as percentage for each category. |  | <b>REVENUES STREAMS</b><br>What value are your customers willing to pay? How will you get paid? What is your revenue model? How much does every revenue stream contribute to the overall revenues?<br><br>Show monthly amounts as percentage for each category. |  |   |

Figure 54. Screenshot 2 of Workshop 2



Figure 55. Screenshot 3 of Workshop 2



Figure 56. Screenshot 4 of Workshop 2

- Workshop 3:** In the “Investment Readiness & Funding Opportunities” workshop, participants learned about effective ways to define their capital needs and their investment strategy, how to communicate with investors, design their growth plan and become investment ready. By the end of the workshop, they also learned what metrics and KPIs investors want to know, governance to a potential advisory board and investors, and how to properly generate those for their respective businesses.



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

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evolved 5G

ENTREPRENEURSHIP  
MASTERCLASS  
EVOLVED-5G ACCELERATOR

PART 2 - INVESTMENT READINESS & FUNDING OPPORTUNITIES

THURSDAY & FRIDAY, 20-21 APR 23 | 16:00 - 17:30 CET

evolved-5g.eu

evolved 5G

ENTREPRENEURSHIP  
MASTERCLASS  
EVOLVED-5G ACCELERATOR

GETTING READY FOR INVESTORS - STEP 2

DESIGN YOUR GROWTH PLAN

- What are the next milestones for your product development?
- What are the next milestones for the growth of your business and team?
- What are the required funds for each stage?
- What are the financial projections for each milestone?
- When will you break even? And what will your market share look like?
- How will your business plan look like for the first year of your business (3-5 yrs)
- How are you expecting to repay your investors? What is your exit strategy?

evolved-5g-project

| INVESTMENT READINESS<br>WHAT INVESTORS EXPECT<br>TO REVIEW |   |  |
|--|---|--|
| CATEGORY   | ITEMS TO INCLUDE  | WHAT INVESTORS WANT TO UNDERSTAND  |
| MARKET / CUSTOMERS   | <ul style="list-style-type: none"><li>• Target market size</li><li>• Product/service demand</li><li>• Competitive landscape</li><li>• Strategy to compete</li><li>• Regulatory environment</li><li>• Go-to market strategy</li></ul>              | An understanding of these factors enables the investor to assess whether there is a significant demand for the products and services, and the potential relative performance in the market, both of which drive financial sustainability                                       |
| BUSINESS MODEL   | <ul style="list-style-type: none"><li>• Production processes</li><li>• Product offerings</li><li>• Strategic value chain partnerships</li><li>• Location of operations</li><li>• Customer outreach</li></ul>                                      | By understanding the business model, investors can identify both internal and external risks associated to scaling operations and achieving growth targets   |
| STRUCTURE  | <ul style="list-style-type: none"><li>• Comprehensives of senior management</li><li>• Workforce structure</li><li>• Executive compensation</li><li>• Employee compensation</li><li>• Core team</li><li>• Business &amp; Decision-Making</li></ul> | Knowledge about the team helps investors identify whether the business' employees and management have the experience to deliver on the value propositions pitched and work well together to set well-defined times with clear expectations                                     |
| HISTORICAL PERFORMANCE                                     | <ul style="list-style-type: none"><li>• Sales</li><li>• Revenue streams</li><li>• Gross and net margins</li><li>• Cash flows</li></ul>  | Investors need to understand the drivers of historical financial and operational metrics to understand key growth strengths supporting projections   |
| FINANCIAL PROJECTIONS & GROWTH STRATEGY                    | <ul style="list-style-type: none"><li>• Company vision</li><li>• Growth strategy</li><li>• Detailed business plan for execution</li><li>• Financial projections</li><li>• ROI</li></ul>   | A growth strategy ensures that the business is working towards achieving realistic objectives that will increase profitability and deliver more value to investors. They are looking to see the major milestones of the business growth and how their investment will multiply |
| CAPITAL NEEDS  | <ul style="list-style-type: none"><li>• Capital requirement</li><li>• Investment terms</li><li>• Ability to negotiate investors</li><li>• Prior engagements with investors</li></ul>  | This helps investors understand what the business expects from them and its track record for delivering returns. Investors will want to know what the terms will affect their business and maximize both ends benefits   |
| GOVERNANCE / REPORTING                                     | <ul style="list-style-type: none"><li>• Processes and controls</li><li>• Board of Directors (BOD) / Gap Tables</li><li>• Competencies and role of the BOD</li><li>• Statutory documentation</li><li>• Reporting to investors</li></ul>            | Governance structures influence the implementation of the growth strategy, operations & processes, regulatory compliance, and the efficiency of the due diligence process, reporting, and audit  |
| DATA MANAGEMENT  | <ul style="list-style-type: none"><li>• Number of users/customers</li><li>• KPIs</li><li>• Performance metrics</li><li>• Data collection process</li><li>• Data analysis process</li></ul>  | This will help investors trust your assumptions and predictions based on the data you are tracking early on prior to investing regarding revenue expansion, user activity, etc.  |

Figure 57. Workop 3 Screenshots

- **Workshop 4:** In workshop “Pitching to Investors & Pitchdeck”, participants learned how to properly pitch their businesses verbally, forming an attractive elevator pitch. Additionally, they were taught how to form an attractive pitch

deck, what aspects of their business they should include, and how to avoid forming a first negative impression when approaching a possible investor or partner.

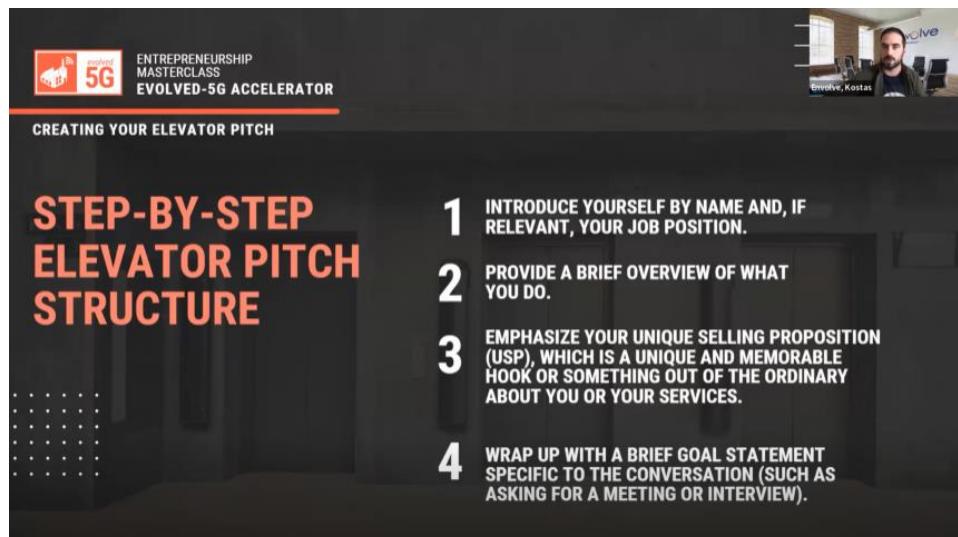


Figure 58. Workshop 4 Screenshots

- Introduction to 5G technologies & Network Applications

- Workshop

1:

In this workshop, participants became acquainted with the case study of Immersion and how they utilize remote assistance with Augmented Reality, the market opportunities and benefits, and more about their use case within the EVOLVED-5G Project with their presentation “Remote assistance with Augmented Reality (AI)”, the case study of Infalysis chatbot and how they use network applications for precise maintenance in 5G-enabled Industry 4.0 with their respective presentation “Infalysis Chatbot and Network application for Precise Maintenance in 5G-enabled Industry 4.0”. They also got to hear about the 5G-IANA project with a presentation titled “The 5G-IANA Project: What’s in it for SMEs?” and how it can benefit them as well as other SMEs in the region, operating in the same industry. This presentation showcased the nApp communication, alternative functions of 5G Technology and informed the

participants of the 5GIANA Open Call. Lastly, they learned about Internet Institute and the application of 5G connectivity in an industrial environment through their workshop as well as their use case in the EVOLVED-5G network application “Industrial Grade 5G Connectivity Network App”.

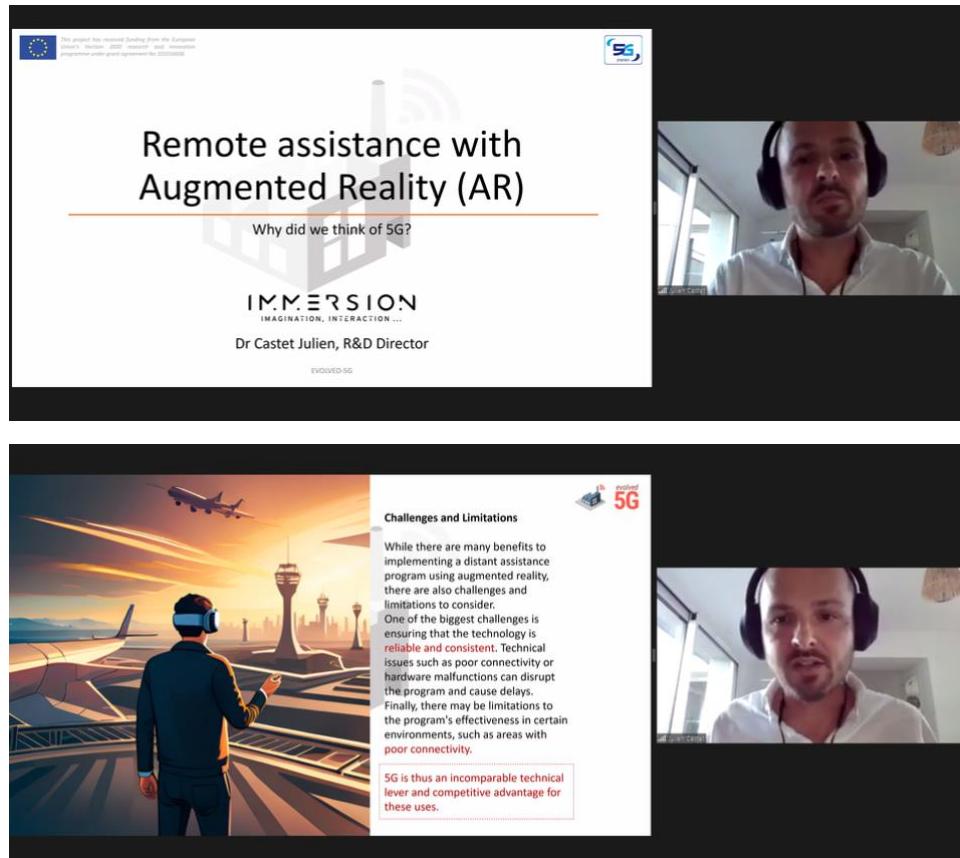
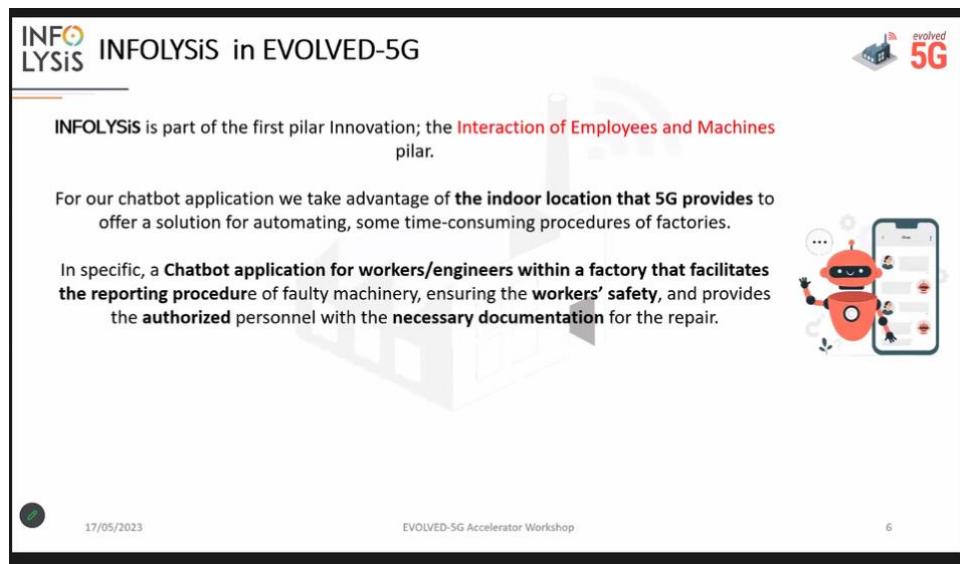


Figure 59. Presentation on Remote Assistance with Augmented Reality

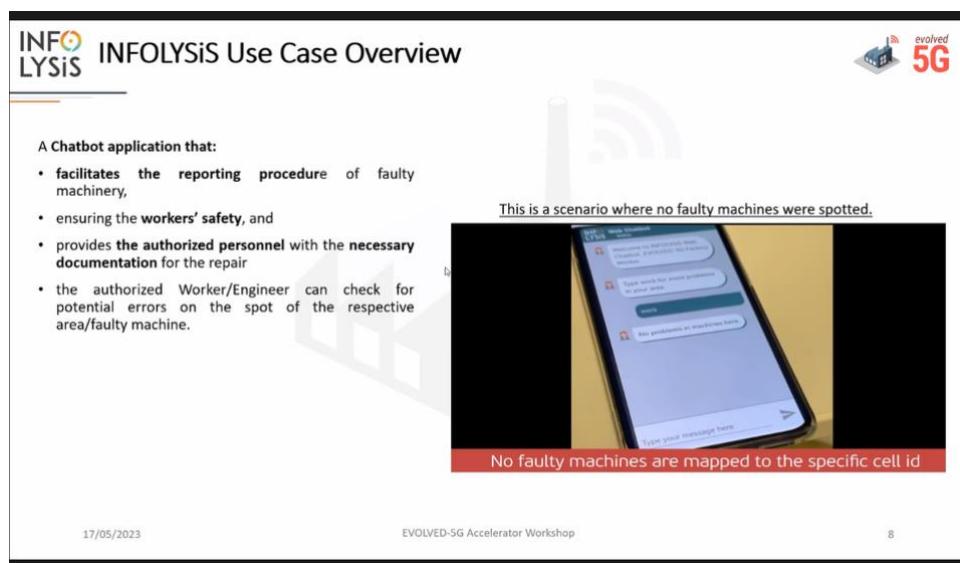
The figure shows a presentation slide for "INFOLYSIS Chatbots". It includes a list of facts about chatbots, a logo for "INFOLYSIS", and four screenshots of the Viber app interface showing various chatbot interactions and promotional banners.

- Chatbots are applications that simulate human conversation, based primarily on conversational flows and occasionally enriched with DL/NLP technologies for more sophisticated use-cases
- INFOLYSIS provides chatbot solutions over various popular messaging apps, like Viber and Messenger, and over web, while its primary business is based on Viber, since INFOLYSIS is "Viber Preferred Business Partner for Chatbots".

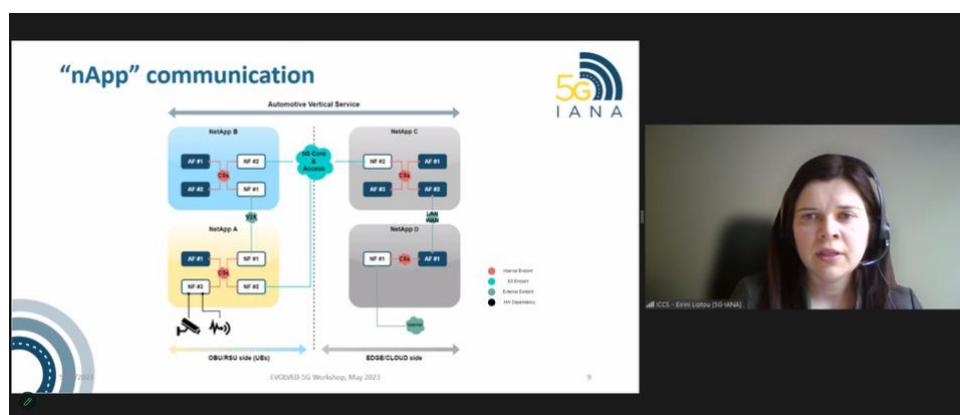
Figure 60. Screenshot 1 of Infolysis Chatbots presentation



*Figure 61. Screenshot 2 of Infolytics Chatbots presentation*



*Figure 62. Screenshot 3 of Infolytics Chatbots presentation*



*Figure 63. Screenshot of 5G IANA presentation*



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The image shows two vertically stacked presentation slides. The top slide is titled '5G Portfolio' and features sections for 'qMON', 'rMON', and 'PPDRONE'. It includes screenshots of monitoring dashboards and hardware components. The bottom slide is titled 'Use Case Overview' and lists 'Goals' and 'Targeted verticals'. Both slides include the 'Internet INSTITUTE' logo and a copyright notice: 'Internet Institute. All Rights Reserved. | Confidential'.

Figure 64. Presentations on Internet Institute M2M platform use case

- **Workshop 2:** In this workshop, participants with four presentations learned about the EVOLVED-5G Project, network applications, and its expected outcomes and results in the long run, as well as how to utilize other available resources from the project to their benefit. They also became familiar with other businesses operating in the telecommunications sector, such as the “5G Campus Opportunities and Challenges” by Cosmote, the “Athens 5G Open Experimentation Platform” by NCSR Demokritos and “5G Network Applications and SMEs Potentials” from Fokus.

This slide is a summary of the EVOLVED-5G project. It features the 'evolved 5G' logo at the top right. To the left are logos for '5G PPP' and 'European Commission'. The main title 'The EVOLVED-5G Project' is centered. Below the title is a photo of Javier Garcia Rodrigo, identified as the 'EVOLVED-5G Project Coordinator'. Logos of various partners and funders are listed on the right side, including T-Mobile, Gruppo Maggiori, Atos, Intrasoft International, Cosmote, Lenovo, envolve, Universidad de Málaga, Universitat Politècnica de València, GMI, Internet INSTITUTE, CAFA, InQbit, FOCUS, INFO LYSIS, PAL Robotics, ZORTENET, IMMERSION, and UL. A small note at the bottom states: 'This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101016608'.

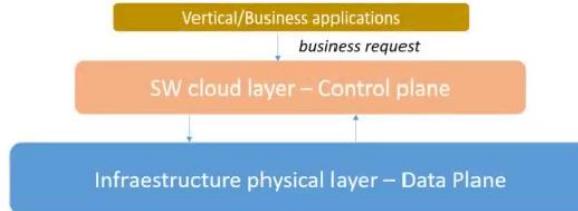
Figure 65. Presentation of the EVOLVED-5G project



## The potential for Verticals

Telecom networks are becoming live and full dynamic systems managed by SW.

- 5G Telecom Networks are now programmable.
- The network is now driven by SW that can take action based on *business requests* (or network events).
  - You can programme the access to network resources and capabilities based on your vertical's needs
  - Ex. of business request: "*I need location of my AGV below 1 meter precision*"

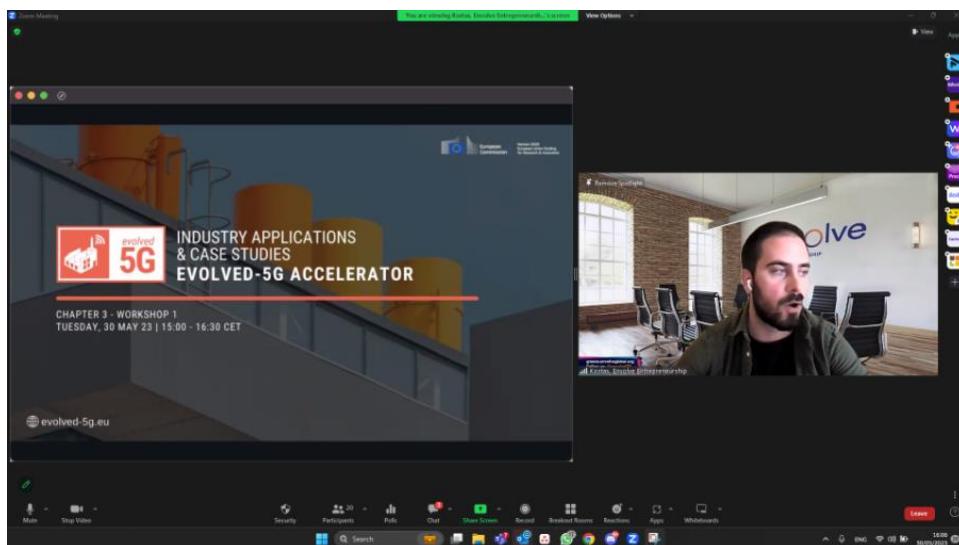


9

Figure 66. Presentation of the EVOLVED-5G project: Open Programmability aspects

### Industry & Case studies:

- **Workshop 1:** In this workshop, we discussed with the participants about their progress and satisfaction of the first two chapters. In the form of a feedback and mentorship session, we also had the opportunity to reflect on the workshops' material, speakers, and thematic points. With their feedback, for future workshops we brought on more external speakers, connecting them to the market, and bringing best business practices.
- **Workshop 2:** In this workshop, the cohort learned about the case study of Bespot, a multi-awarded startup in Greece, utilizing real time data connectivity and geo-location services to offer, more efficiently, data to their customers that can be used to increase profits and enhance operations. Hosting Leon Gavalas, Co-founder & CEO of Bespot, the cohort had the opportunity to learn about Bespot's 5G journey with 15,000 IoT Devices, the technology and the market potential behind their technology and how bespot commercialized it in different industries, as well as best practices and Bespot's growth and scale up strategy.





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Figure 67. Screenshot 1 of Industry Workshop 2

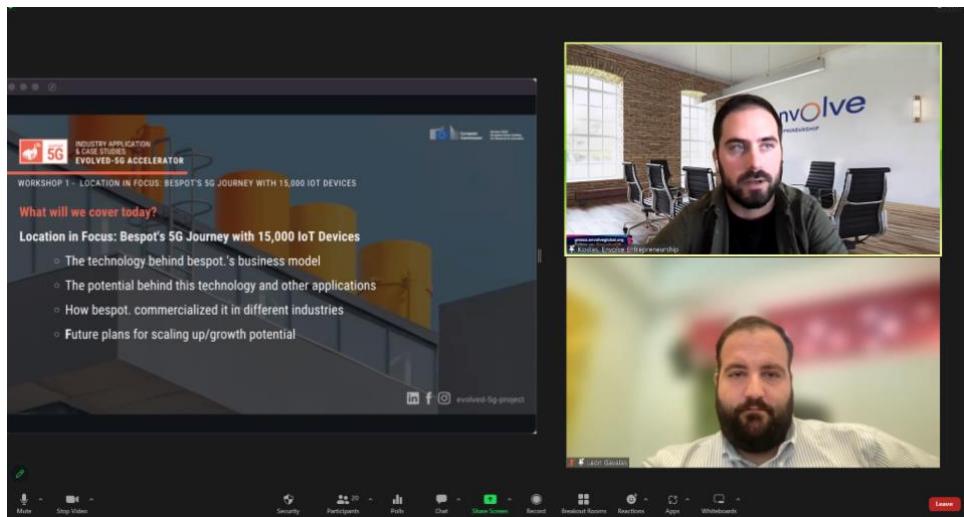


Figure 68. Screenshot 2 of Industry Workshop 2

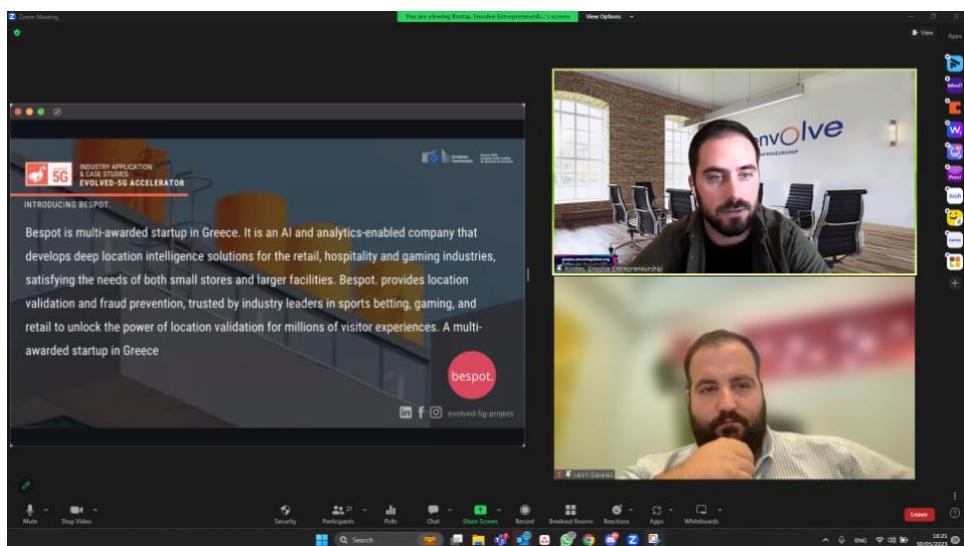


Figure 69. Screenshot 3 of Industry Workshop 2

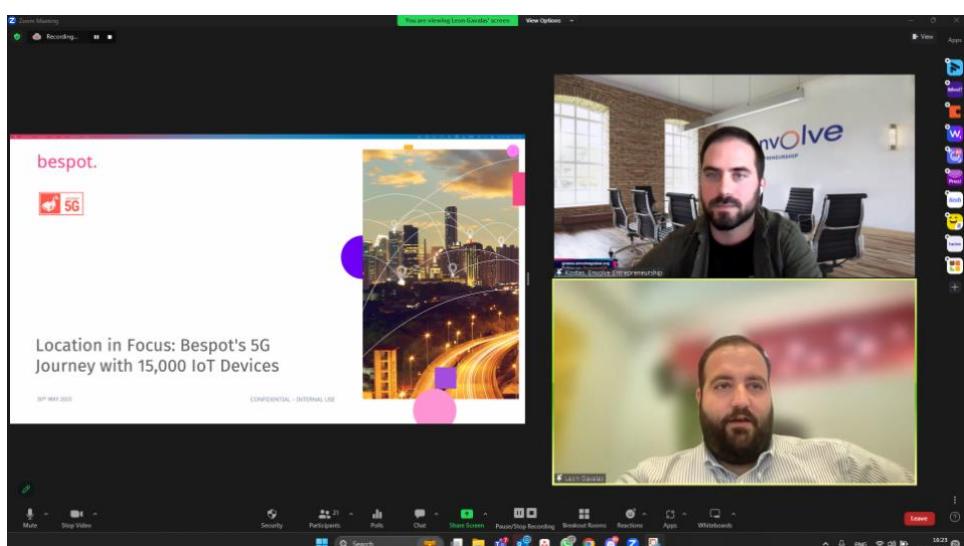


Figure 70. Screenshot 4 of Industry Workshop 2

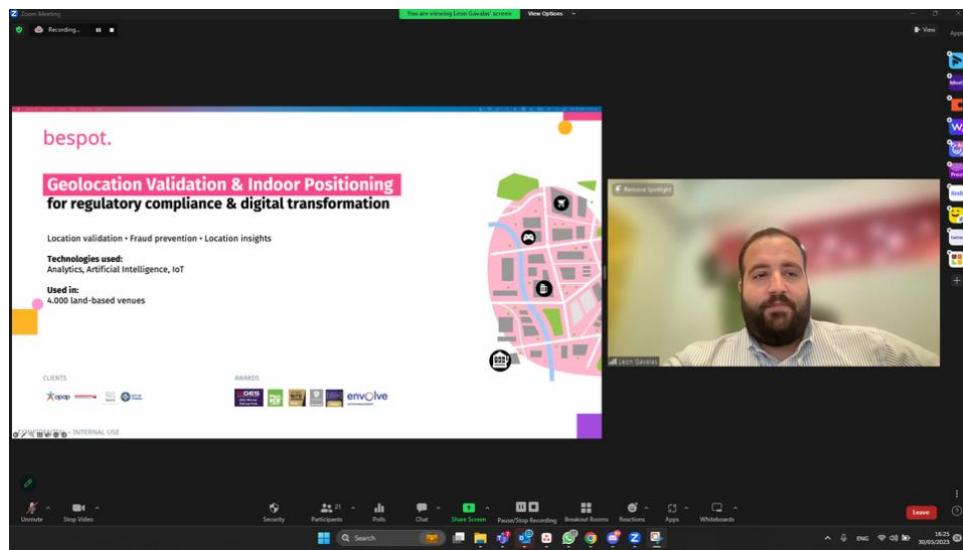


Figure 71. Screenshot 5 of Industry Workshop 2

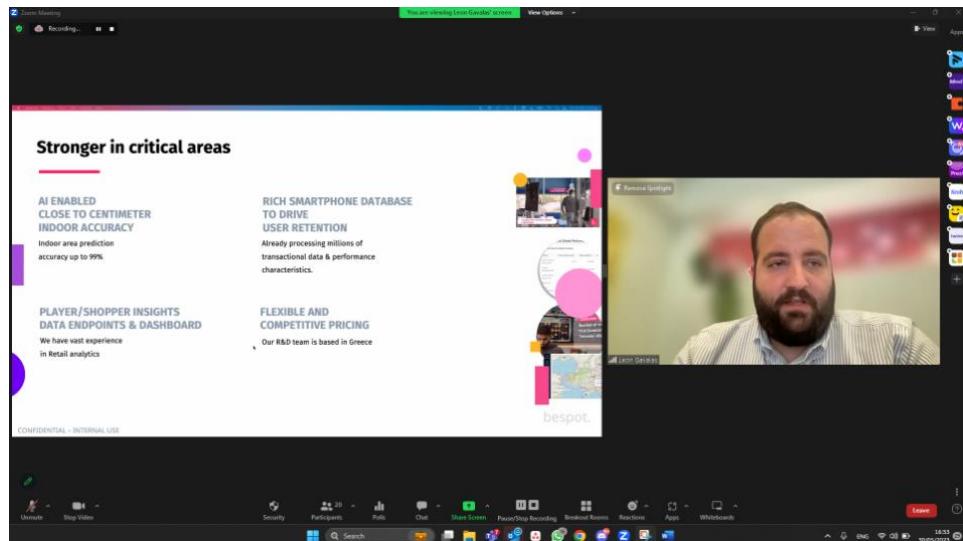


Figure 72. Screenshot 6 of Industry Workshop 2

- **Workshop 3:** In this workshop, we hosted two presentations focusing on innovation and funding opportunities within the SNS Ecosystem and the EU innovation ecosystem. Kostas Trichias from the 6G Smart Networks and Services Industry Association (6G-IA) in his workshop “Research & Innovation Funding Opportunities within the SNS Ecosystem” presented the future opportunities offered in the 5G and beyond industry and introduced the cohort to 6G-IA and their work regarding research and innovation funding opportunities. 6G-IA is the voice of European Industry and Research for next generation networks and services and presented the funding opportunities in the SNS Ecosystem. The second part of the workshop hosted Christina Skoubridou, Head of the EU Innovation Department of Envolve/IEA, who shared funding opportunities within the EU framework and instruments and how to pursue one that fits their



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overall strategy, while also pursuing their product development. She shared her expertise, insights and methodology for successful efforts in this industry.

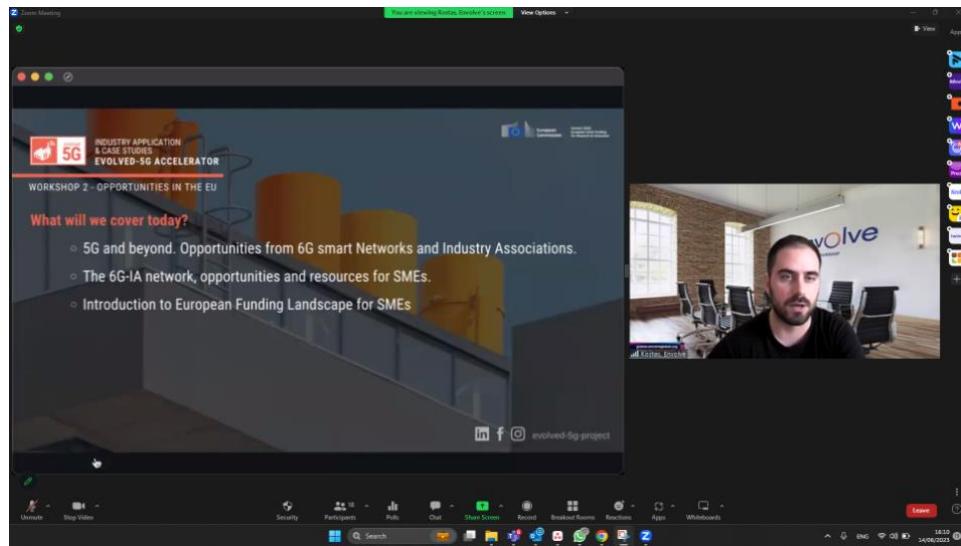


Figure 73. Screenshot 1 of Industry Workshop 3

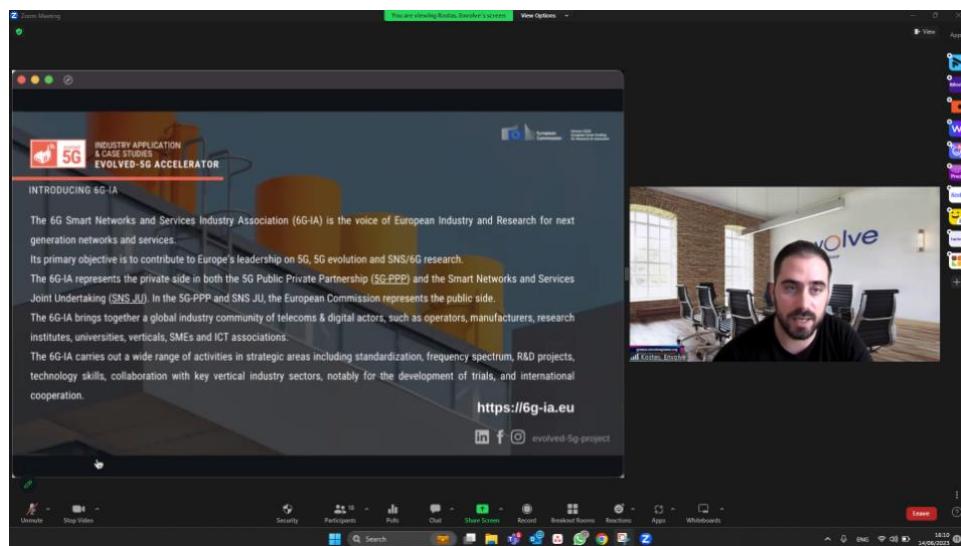


Figure 74. Screenshot 2 of Industry Workshop 3



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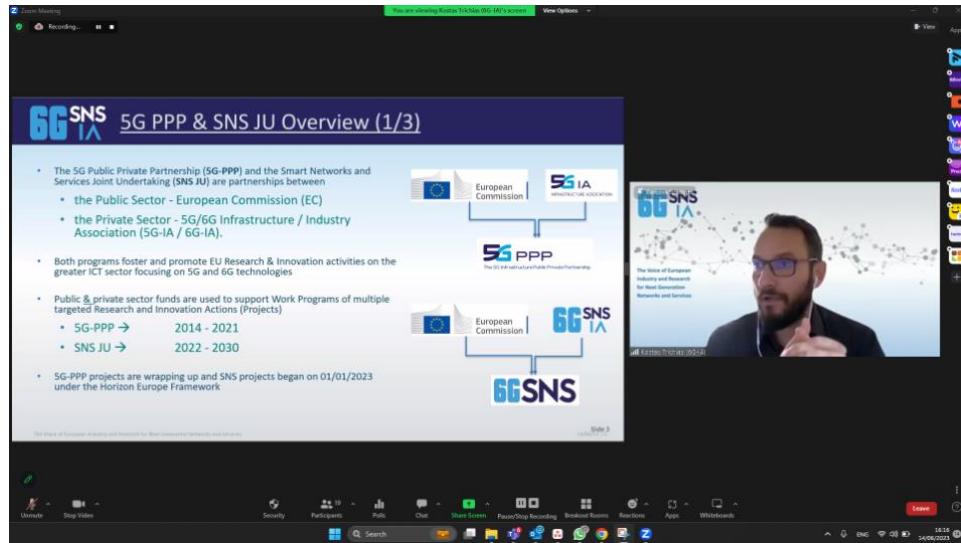


Figure 75. Screenshot 3 of Industry Workshop 3

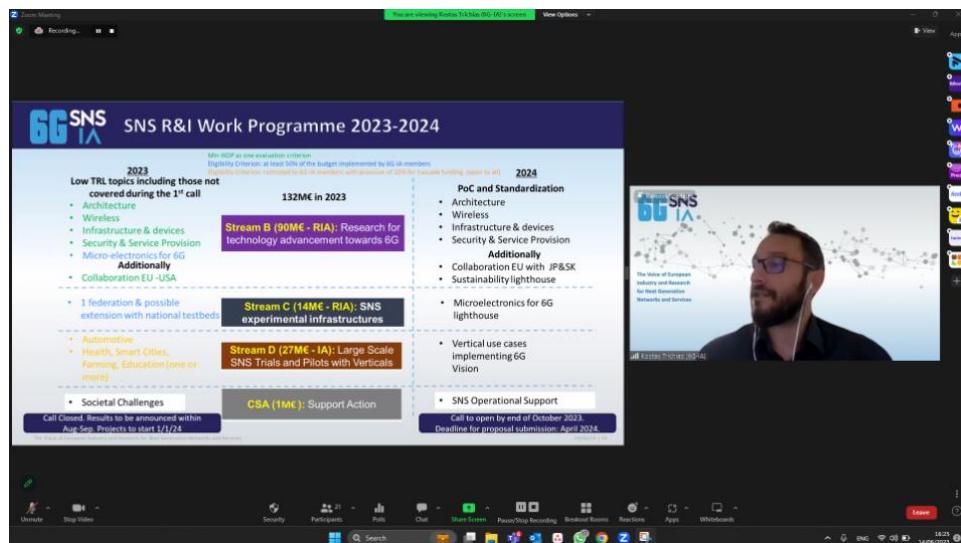


Figure 76. Screenshot 4 of Industry Workshop 3



Figure 77. Screenshot 5 of Industry Workshop 3

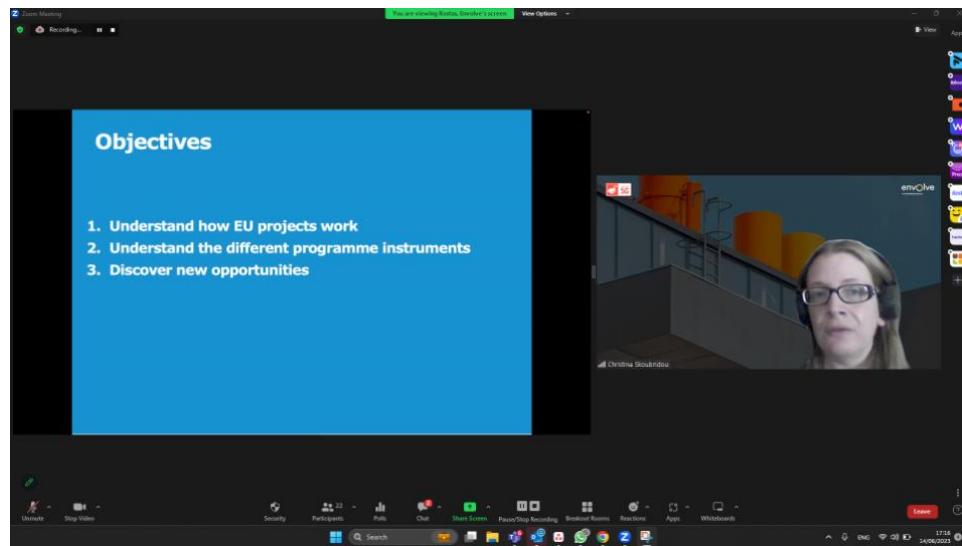


Figure 78. Screenshot 6 of Industry Workshop 3



Figure 79. Screenshot 7 of Industry Workshop 3

○ **Workshop 4:**

- In workshop “Iquadrat Informatica: Business Cases 2023”, the cohort learned about different business cases of IQUADRAT, 5G and robotics, and the internal research and development activities they were carrying out, at that moment. They also learned about Iquadrat testbed architecture and their solution for cloud/edge robotics.

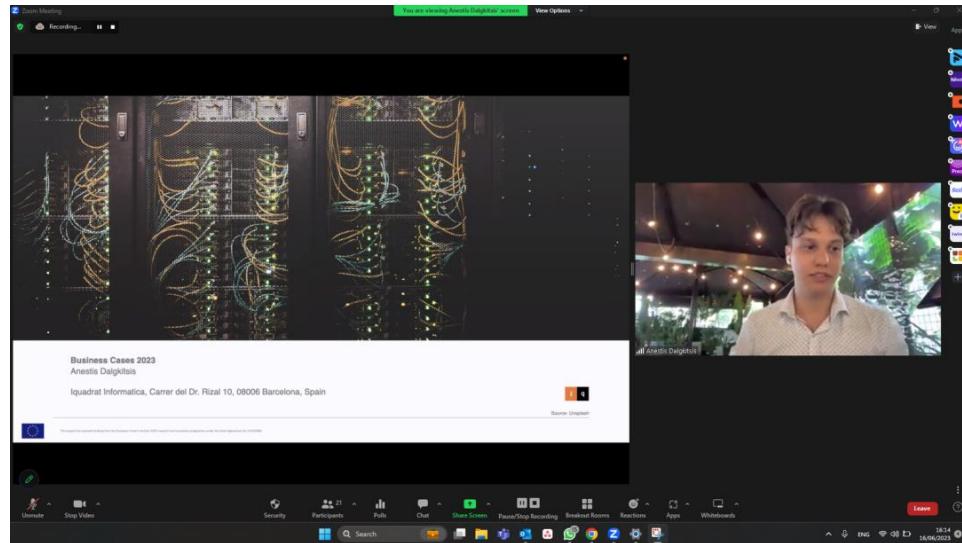


Figure 80. Industry Workshop 4

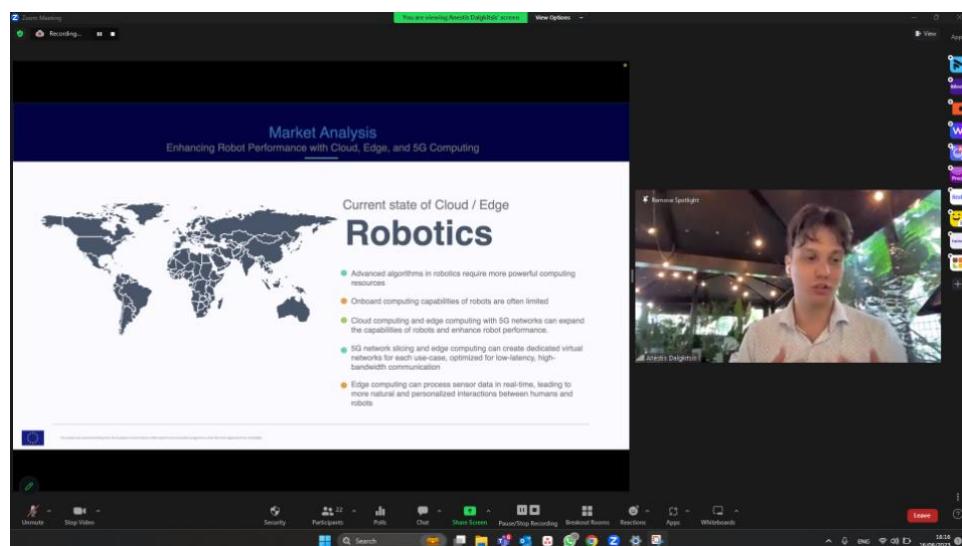


Figure 15. Presentation within Industry Workshop 4

o **Workshop 5:**

- In this workshop, participants got to hear from the Executive Director and Investor at Phaistos Fund, a 5G Ventures Fund that has supported and funded various 5G related businesses, across Europe. The cohort had the opportunity to learn about VC opportunities, investments made in the 5G sector, how Phaistos VC assesses new ventures and 5G Venture's portfolio. The speaker also gave their perspective on what they are looking for when making an investment in this field, which really proved to be helpful to the audience, since most of them are currently looking to raise funds for their projects.



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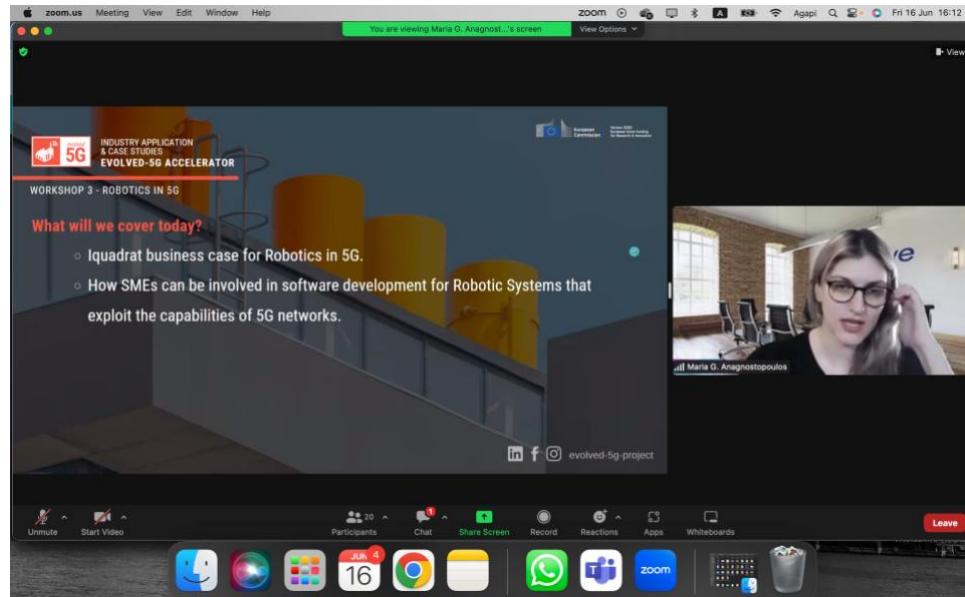


Figure 81. Industry Workshop 5





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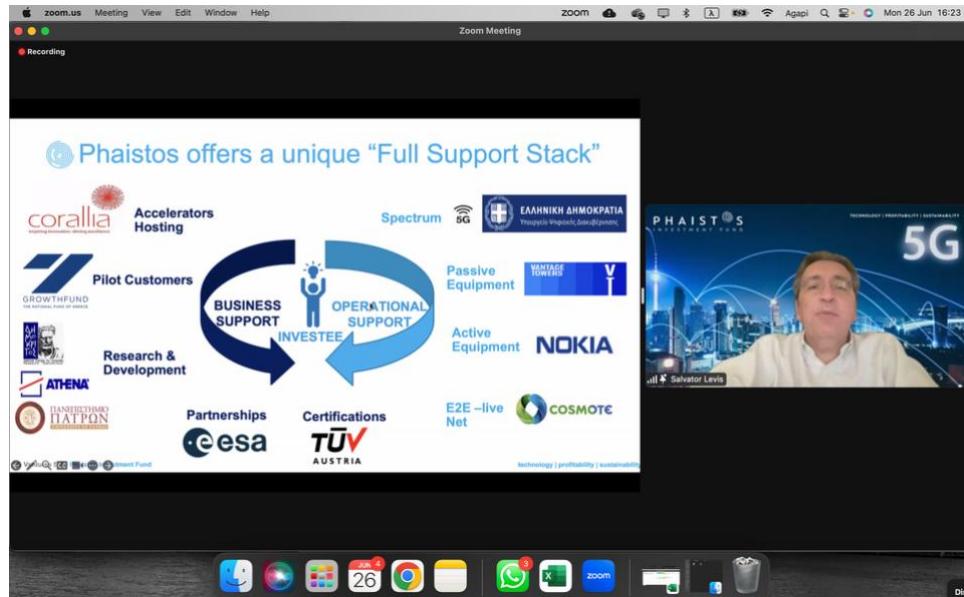


Figure 82. Phaistos presentation in Workshop 5

- **Workshop 6:** In this workshop, teams pitched their business ideas to the cohort and received valuable feedback from their peers and Envolve/IEA team. In an effort to prepare the cohort for the upcoming Demo Day and to track their progress, these pitches served as a short way to showcase their progress and receive targeted feedback and mentoring.
- **Workshop 7:** In this workshop by AI Catalyst President Paul Sotiriadis and BoD member, Stefanos Kollias, the cohort learned about the association and cluster, AI catalyst and its activities. The Association of Artificial Intelligence – AICatalyst is a broad network of experts from the Entrepreneurship, Science and Technology ecosystem. Its target is to contribute with critical interventions and become the catalyst for the fast transition to the new era through digital transformation.



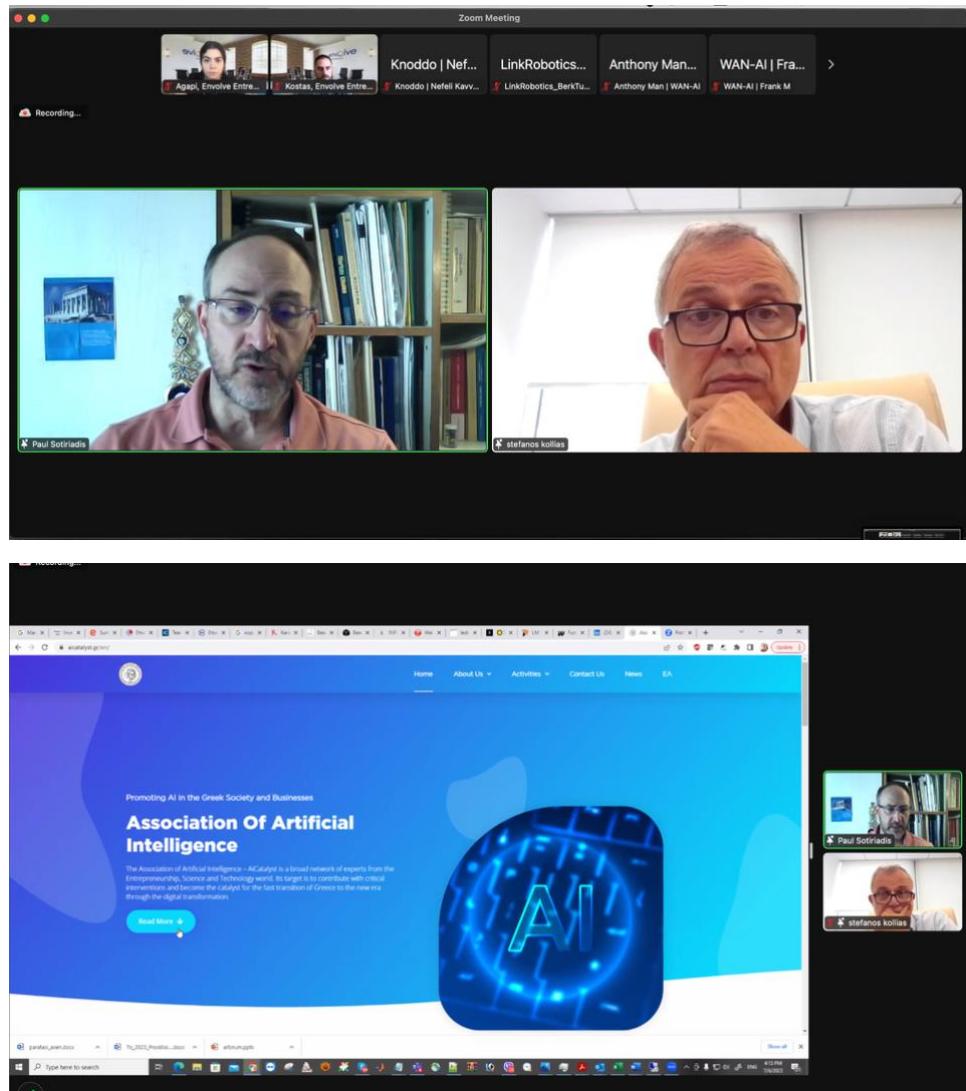


Figure 83. Screenshots of Workshop 7

- **Workshop 8:**
  - This mentoring and feedback workshop hosted teams' pitches and progress report. We also prepared the teams for the Demo Day, presenting the Presentation Guide, Powerpoint/presentation requirements, speakers, judges and selection criteria. We responded to their questions, while also prepared them about the procedure and flow of the event.
- **Workshop 9:**
  - During the last workshop of this chapter, the accelerator hosted the Founder & CEO of Allancode, Kostas Karolemeas, a multi-awarded startupper, offering startups and SMEs a free no-coding platform. He shared his journey and experience as well as market opportunities. The cohort had the opportunity to learn about Allancode's platform and how it can help them build their MVP from the ground up, more efficiently and effectively, with minimum knowledge and background experience on coding. Connecting the cohort with this platform served as a starting point for many members of the cohort who wished to plan their 5G deployment.



Getting feedback with an MVP

- **Assess the value generated from our product** (does it solve the problem 10x better?)
- **Identify customers' payment intent** (are they willing to purchase the product and what price?)
- **Analyze customers' behavior** as they use the product (how do they interact with its features?)

<> Allcancode

Figure 84. Screenshot 1 of Allcancode presentation

Non-functional requirements

Any performance, reliability, security, privacy, portability, scalability constraints

*The product should be a responsive web applications for both desktop, and mobile browsers (portability).*

*The product should be available 99% of the time (reliability).*

*Keywords used by the users should not be associated with them (privacy).*

*All data should be encrypted even at rest (security).*

*The product should handle thousands of daily active users (scalability) and return search results in < 1 sec (performance).*

Figure 85. Screenshot 2 of Allcancode presentation

Development plan

What is the plan

1. Research and discovery
  - a. Define project scope
  - b. Conduct stakeholder interviews
  - c. Conduct user interviews
2. Design
  - a. User flows
  - b. Wireframes & mockups
  - c. Technical design
3. Environment setup
  - a. Staging environment
  - b. Production environment
  - c. QA environment
4. Sprint 1
  - a. Sprint planning
  - b. Sprint period
  - c. Testing
5. Sprint 2
- ...



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Figure 86. Screenshot 3 of Allcancode presentation

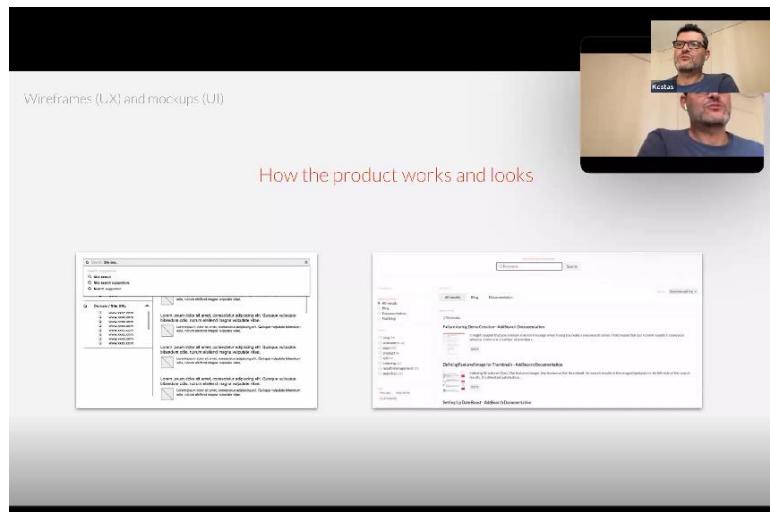


Figure 87. Screenshot 4 of Allcancode presentation

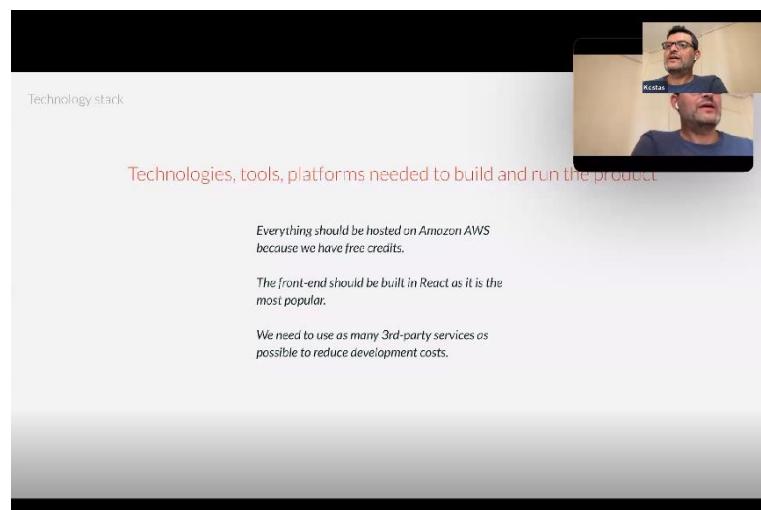


Figure 88. Screenshot 5 of Allcancode presentation

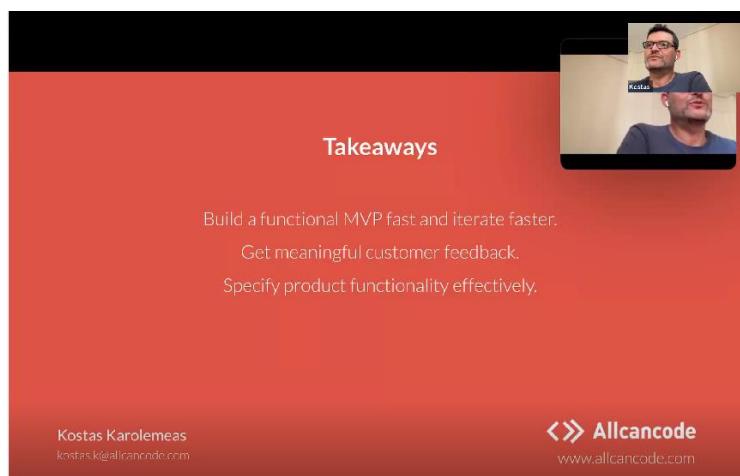


Figure 89. Screenshot 6 of Allcancode presentation



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

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Throughout the workshops, the cohort gave 5-min pitches, showcasing the progress in their business plan and investors pitch deck, receiving feedback from the cohort, Envolve/IEA team and guest speakers. It also served as an opportunity to present their ventures to industry experts and investors.



Figure 90. Cumucore pitch

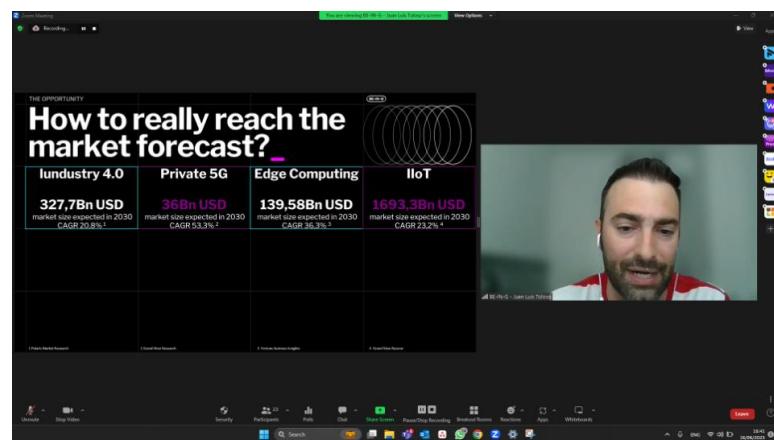


Figure 91. Pitch time in the workshop



Figure 92. TechNarts pitch

An intermediary feedback workshop took place in a format of open discussion, and online survey evaluating the acceleration process, their knowledge level prior to joining the cohort and the

outcomes after the conclusion of the main acceleration phase, as well as investigating their understanding of 5G Technology and readiness for 5G deployment.

Highlights of the workshops were shared on Envolve/IEA and EVOLVED-5G social media, featuring the speakers and the progress of the EVOLVED-5G Accelerator to the broader startup and SME ecosystem.



Figure 93. Accelerator Chapter 3

The questions included:

- Have you participated in an accelerator before?
- Did you have an innovation strategy prior to the Acceleration?
- Did you have a pitch deck prior to the Acceleration?
- Regarding the time the sessions held, could you let us know your preference regarding the time we meet? Regarding the Entrepreneurship Masterclass, could you provide us with your experience?
- Regarding the Introduction to 5G Technologies and EVOLVED-5G Network Apps, could you provide us with your experience?
- What could we improve for our next sessions?
- Are you ready to deploy 5G technologies in your business?
- Do you require a mentor to deploy 5G technologies in your business?

Below are the outcomes of this workshop.

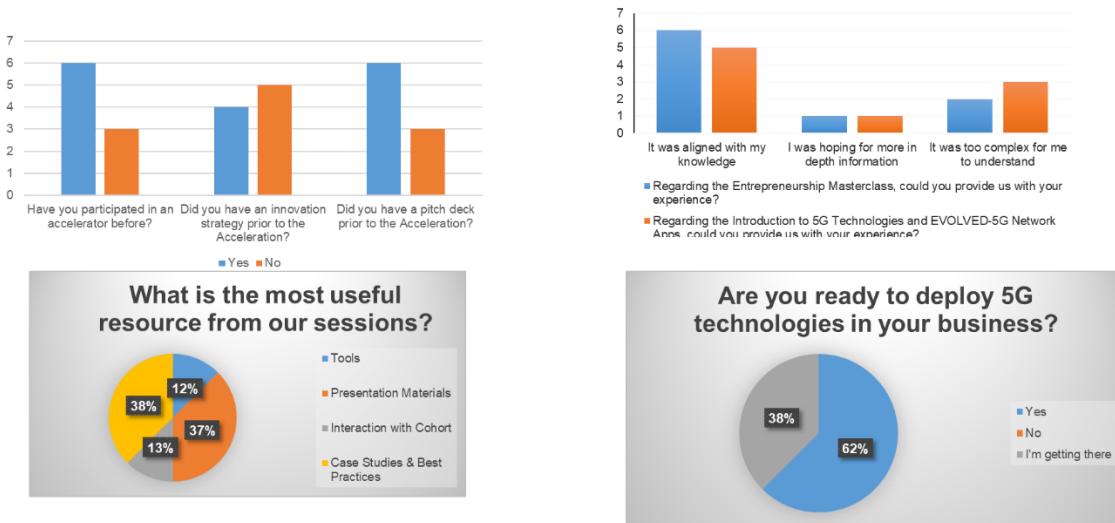


Figure 94. Workshop Outcomes

Regarding the final chapter of the EVOLVED-5G Acceleration program, the “Virtual Venture Support”, teams were divided into two focus groups. Considering the feedback received from them regarding their future needs, partners of the consortium were reached to assist with the mentoring facilitation. The teams have requested support or just an opportunity to pitch their businesses to the following consortium partners and receive their industry insights and feedback:

- NCSR Demokritos
- Atos
- Telefonica
- Immersion
- Cosmote
- Lenovo
- Unmanned Life
- Fokus

In the attempt to make these efforts more efficient, two one-hour sessions were hosted with each consortium partner/mentor and half of this chapter’s cohort, in order to directly address any questions they might have or pitch live to them and receive feedback. It represented also a good opportunity for the teams to receive additional feedback from their peers. Some teams requested additional 1-on-1 mentoring sessions with some of the partners, and for this reason those teams were privately connected with Immersion, Telefonica and Cosmote.

In order to select the 10 teams that will proceed to the final chapter of the EVOLVED-5G Acceleration Program, we hosted, as planned, the EVOLVED-5G Accelerator Demo Day. During the Demo Day, we had the chance to host talks and discussions from various stakeholders with different backgrounds, spanning from the public and research sector, to venture capitalists. Our aim was to provide extroversion to the participating teams while also provide them the opportunity to hear from professionals in the ecosystem, about market trends and insights as well as be inspired by best practices around Europe.

The demo day hosted 12 speakers, among them being:

- George Dimopoulos, Partner, Venture Friends

- Alexandros Nousias, Managing Director, Envolve Entrepreneurship
- Harilaos Koumaras, Computer Science & Telecom Research Associate Professor, NCSR Demokritos
- David Artunedo Guillen, Future Networks Lab Manager, Telefonica
- George Makropoulos, R&D Telecom Engineer, NCSR Demokritos
- Dimitris Tsolkas, R&D Manager, Fokus Innovations & Services PC
- Eirini Liotou, Project Manager/Researcher, Institute of Communication & Computer Systems (ICCS)
- Claire Visser, Innovation & Business Developer, TU Delft
- Leon Gavalas, Founder, Bespot
- Konstantinos Kissas, Business Development & Operations Manager, Envolve Entrepreneurship
- Maria Gabriela Anagnostopoulos, COO, Envolve Entrepreneurship
- Javier Rodrigo Garcia, EU Portfolio & Contracts Manager, Telefonica

Out of the total 25 teams participating in the EVOLVED-5G Acceleration program, the 15 most active and advanced teams were chosen to pitch live their business ideas to the judging committee and the attending audience. The choice was made upon evaluating general attendance and commitment to the workshops and sessions carried out throughout the first three chapters of the acceleration program, while also taking it account the business potential of each participating SME.

The Judging Committee consisted of the following people:

- Dimitris Tsolkas, R&D Manager, Fokus Innovations & Services PC
- Javier Garcia Rodrigo, EU Portfolio & Contracts Manager, Telefonica
- Vaios Koumaras, Managing Director Infolytics PC
- George Makropoulos, R&D Telecom Engineer NCSR Demokritos
- Harilaos Koumaras, Computer Science & Telecom Research Associate Professor, NCSR Demokritos
- Jana Cijan, Co-founder and Lead Developer, Internet Institute Ltd
- Ivano Manfredonia, Project Manager for Grants and R&I Activities, UN autonomous systems, Unmanned Life
- George Kanterakis, Research & Innovation, GMI AERO
- Eirini Liotou, Electrical and Computer Engineer, Project Manager/Researcher, Institute of Communication & Computer Systems (ICCS)

The results of the jury can be found in the following table:

| SME Name    | Points Scored |
|-------------|---------------|
| BE-IN-G     | 317           |
| WAN-AI      | 313           |
| Cumucore Oy | 299           |
| DIGIZONE    | 293           |
| ViZmerald   | 289           |
| AVERATO     | 288           |

|               |     |
|---------------|-----|
| Embneusys     | 282 |
| Link Robotics | 279 |
| IVOLUNTRY     | 276 |
| Knoddo        | 268 |
| Athleton Plus | 268 |

Table 8 Demo Day Contest results

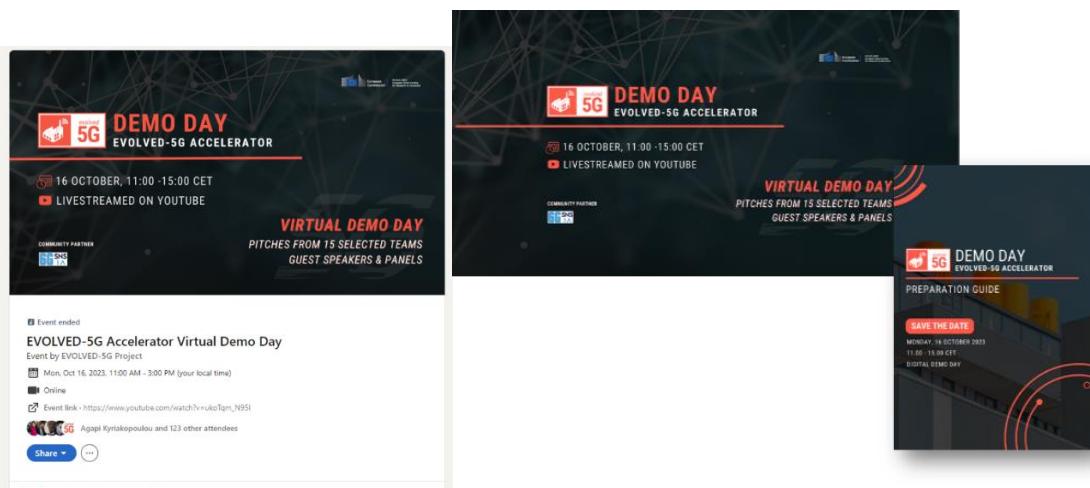
The jury committee evaluated the teams based on the below 4 (four) criteria with the highest possible score being 10 and the lowest one being 1.

- Business Model
- Team & Capacity
- Innovation Design
- Pitching

After having two teams scoring the same number of total points from the jury committee, it was decided to admit 11 teams to the final chapter of the EVOLVED-5G Acceleration Program.

The EVOLVED-5G Accelerator Demo Day attracted, in total, 239 views on the Youtube Channel<sup>9</sup> [14] of the EVOLVED-5G program, where it was also broadcast live, while also having 56 total participants in the Zoom Meeting, which was kept, only, open to speakers, participating teams and partners of the EVOLVED-5G Project. The LinkedIn Event Page<sup>10</sup> [15] created for the purpose of disseminating the Demo Day had attracted 124 attendees, in total, up until the day of the realization of the Demo Day.

**The event as promoted via a LinkedIn Event Page in the EVOLVED-5G Page. The Demo Day as promoted online and the respective Participation Guidelines, including presentation templates and selection criteria.** Below are some screenshots of the Demo Day, the participants guide, as well as screenshots from the live broadcast on YouTube Channel.



<sup>9</sup> [https://www.youtube.com/watch?v=ukoTqm\\_N95I](https://www.youtube.com/watch?v=ukoTqm_N95I)

<sup>10</sup> <https://www.linkedin.com/events/7113443961339285504/>

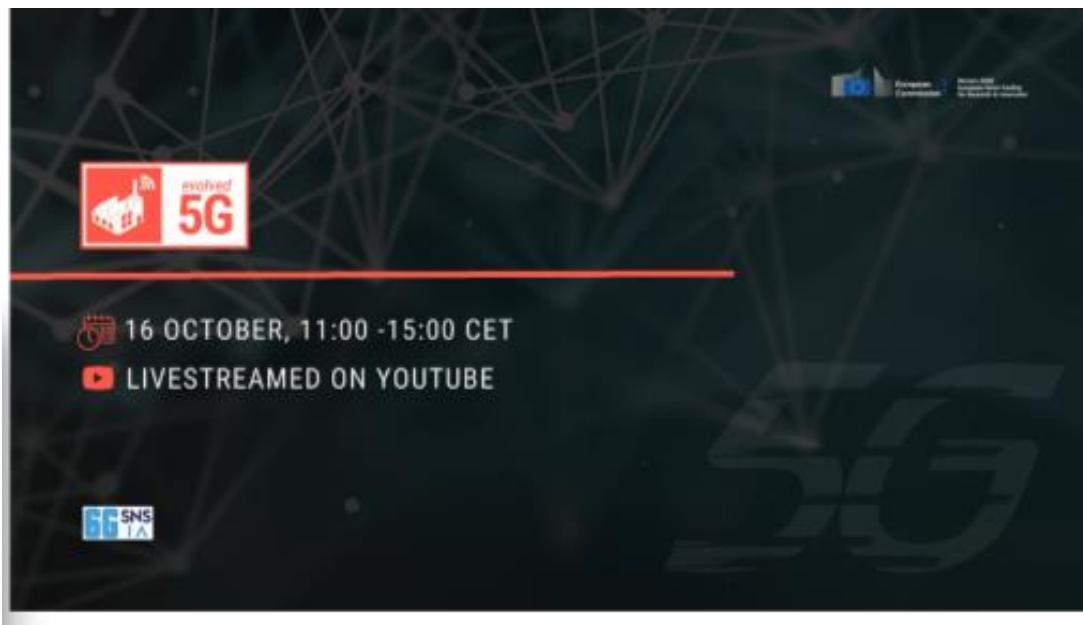


Figure 95. Demo Day Promotion

The event as promoted via a LinkedIn Event Page in the EVOLVED-5G Page. The Demo Day as promoted online and the respective Participation Guidelines, including presentation templates and selection criteria.

The Agenda, Speakers and Jury Members as shared online.



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The figure consists of four separate screenshots of a demo day agenda. The top-left screenshot shows the agenda for 10 OCTOBER 2023, 11:00 - 13:00 CET, featuring a welcome speech by María García (EVOLVE) and a presentation by Javier García (Telefónica). The top-right screenshot shows the agenda for 10 OCTOBER 2023, 11:30 - 13:00 CET, featuring a pitching and Q&A session moderated by Konstantinos Kesisas, with speakers from Telefonica, INOLYTIS, and TELECOM. The bottom-left screenshot shows the agenda for 10 OCTOBER 2023, 14:00 - 15:00 CET, featuring a discussion on the future of business with speakers from INOLYTIS, TELECOM, and TELEFONICA. The bottom-right screenshot shows the jury members for 10 OCTOBER 2023, 14:00 - 15:00 CET, listing nine individuals from various organizations.

Figure 96. Demo Day Agenda, Speakers and Jury Members

### The Guidelines for Pitching Teams



Figure 97. Guidelines for Pitching Teams

### Introducing the speakers on social media:



Figure 98. Speakers of the Demo Day



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The image displays six promotional cards for the "DEMO DAY EVOLVED-5G ACCELERATOR" on 16 OCTOBER 2023, 11.00 - 15.00 CET. Each card features a red header with the event details and a red footer with the "SNS TIA" logo.

- MEET THE SPEAKER**: DAVID ARTUÑEDO GUILLÉN, FUTURE NETWORKS LAB MANAGER, TELEFÓNICA
- MEET THE SPEAKER**: GEORGE DIMOUPOULOS, FOUNDING PARTNER, VENTURE FRIENDS VC
- MEET THE SPEAKER**: MARIA GABRIELLA ANAGNOSTOPOULOS, CHIEF OPERATIONS OFFICER, ENVOLVE ENTREPRENEURSHIP
- SPEAKER & JUDGE**: HARILAOS KOUMARAS, PhD, COMPUTER SCIENCE & TELECOM RESEARCH, ASSISTANT PROFESSOR, NCSR DEMOKRITOS
- MEET THE SPEAKER**: KONSTANTINOS KISSAS, BUSINESS DEVELOPMENT & OPERATIONS MANAGER, ENVOLVE ENTREPRENEURSHIP
- MEET THE JUDGE**: DR. GEORGE KANTERAKIS, RESEARCH & INNOVATION, GMI AERO

Figure 99. Speakers of the Demo Day



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

**DEMO DAY**  
EVOLVED-5G ACCELERATOR

16 OCTOBER 2023  
11.00 - 15.00 CET

**MEET THE JUDGE**

**IVANO MANFREDONIA, PhD**  
PROJECT MANAGER FOR GRANTS AND R&I ACTIVITIES -  
UM AUTONOMOUS SYSTEMS  
UNMANNED LIFE

COMMUNITY PARTNER SNS ITA

**DEMO DAY**  
EVOLVED-5G ACCELERATOR

16 OCTOBER 2023  
11.00 - 15.00 CET

**MEET THE SPEAKER**

**ALEXANDROS NOUSIAS**  
MANAGING DIRECTOR  
ENVOLVE ENTREPRENEURSHIP

COMMUNITY PARTNER SNS ITA

**DEMO DAY**  
EVOLVED-5G ACCELERATOR

16 OCTOBER 2023  
11.00 - 15.00 CET

**MEET THE JUDGE**

**JAKA CIJAN**  
CO-FOUNDER AND LEAD DEVELOPER  
INTERNET INSTITUTE LTD

COMMUNITY PARTNER SNS ITA

**DEMO DAY**  
EVOLVED-5G ACCELERATOR

16 OCTOBER 2023  
11.00 - 15.00 CET

**MEET THE JUDGE**

**VAIOS KOUMARAS**  
MANAGING DIRECTOR  
INFOLOGY P.C.

COMMUNITY PARTNER SNS ITA

Figure 100. Speakers and judges of the Demo Day

**DEMO DAY**  
EVOLVED-5G ACCELERATOR

16 OCTOBER 2023  
11.00 - 15.00 CET

**MEET THE JUDGE**

**IVANO MANFREDONIA, PhD**  
PROJECT MANAGER FOR GRANTS AND R&I ACTIVITIES -  
UM AUTONOMOUS SYSTEMS  
UNMANNED LIFE

COMMUNITY PARTNER SNS ITA

**DEMO DAY**  
EVOLVED-5G ACCELERATOR

16 OCTOBER 2023  
11.00 - 15.00 CET

**MEET THE SPEAKER**

**ALEXANDROS NOUSIAS**  
MANAGING DIRECTOR  
ENVOLVE ENTREPRENEURSHIP

COMMUNITY PARTNER SNS ITA

Figure 101. Speakers and judges of the Demo Day



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

### Screenshots from the Demo Day as livestreamed on YouTube

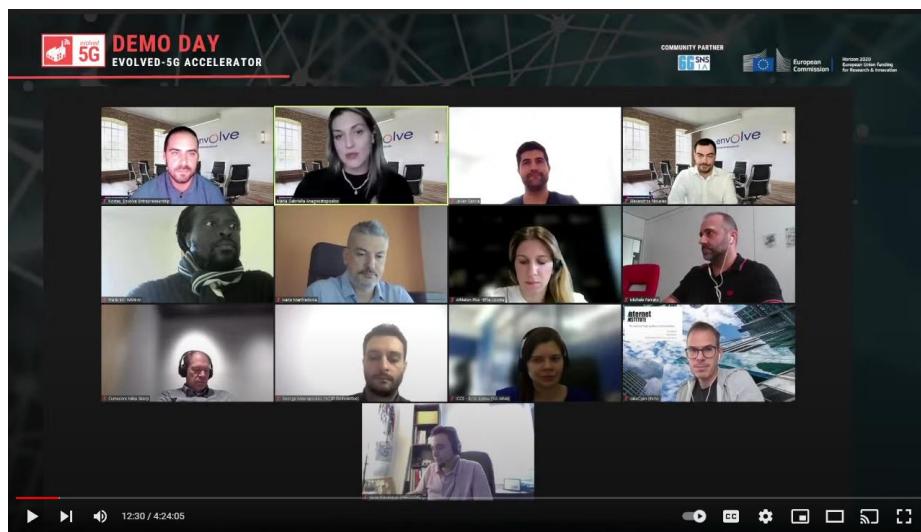
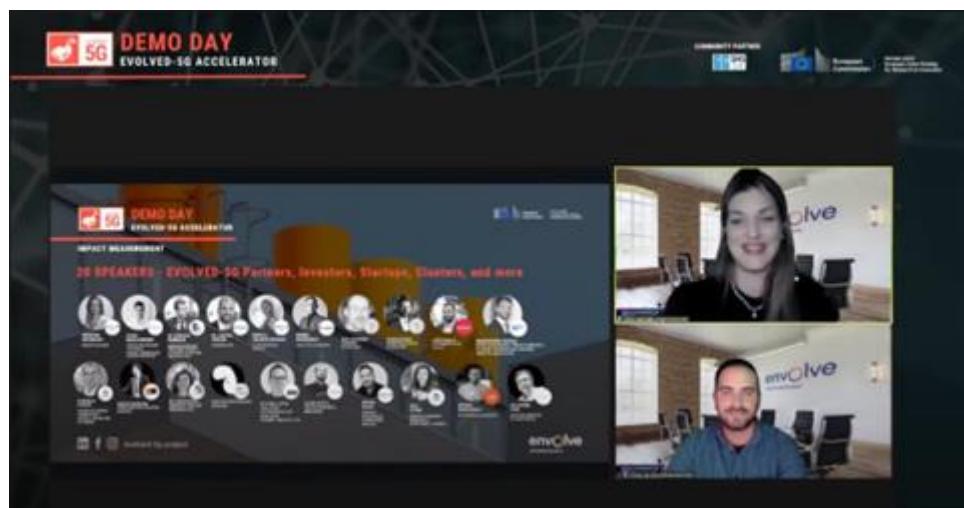


Figure 102. Demo Day



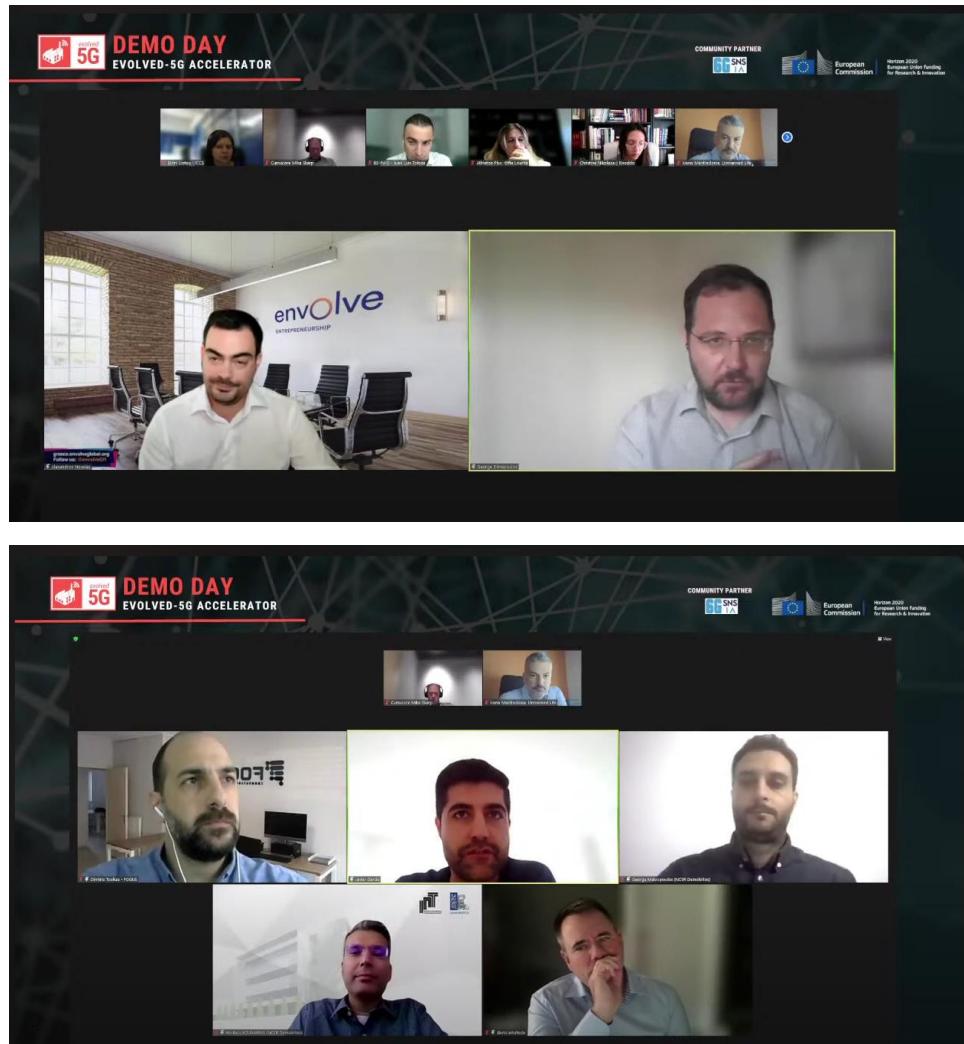


Figure 103. Screenshots of the Demo Day event

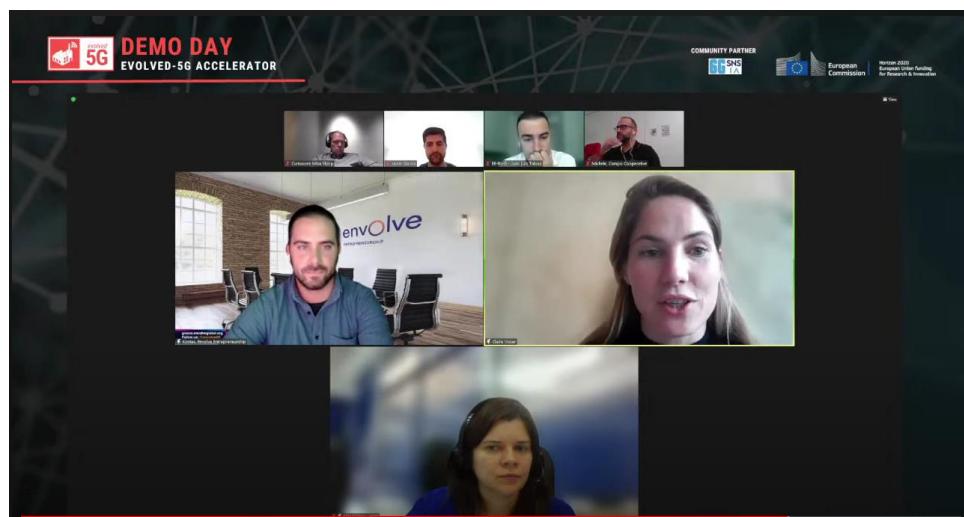


Figure 104. Online discussion and idea sharing in the Demo Day

Throughout the whole acceleration program, all 25 participants had the opportunity to receive one-to-one mentoring and feedback workshops with management of the Envolve

Entrepreneurship/IEA, partners of the EVOLVED-5G Network as well as stakeholders of the ecosystem. A total of 12 hours in one-to-one mentoring and feedback workshops were provided to the cohort, upon request.

Mentors who provided their industry insights and expertise on topics such as business opportunities, fundraising, EU programs and R&D funds, business development, risk assessment, 5G deployment, telecommunications market, EVOLVED-5G network applications, and more, were namely:

- Alexandros Nousias, Managing Director, Envolve Entrepreneurship/IEA
- Christina Skoubridou, Director of EU Innovation Department, Envolve Entrepreneurship/IEA
- Maria Gabriella Anagnostopoulos, COO, Envolve Entrepreneurship/IEA
- Konstantinos Kissas, Business Development & Operations Manager, Envolve Entrepreneurship/IEA
- Fotini Setaki, Cosmote
- Dimitris Dimopoulos, Lenovo
- Javier Garcia Rodrigo, Telefonica
- Leon Gavalas, Co-Founder, Bespot
- Paul Sotiriadis, President, AI Catalyst

The EVOLVED-5G Accelerator created a private LinkedIn Group, to facilitate the cohort networking and exchange of progress outside of workshop hours and further connect with speakers featured throughout the acceleration program.



## EVOLVED-5G Accelerator Cohort - Private Group

Figure 105. Accelerator Cohort Private Group

Closing, the EVOLVED-5G Accelerator provided to the cohort business methodologies and tools, which they could use to make more insightful business decisions and create solutions and products based on their customers' needs.



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

**USER PERSONA**  
EVOLVED-5G ACCELERATOR

|   |                    |                  |                               |
|---|--------------------|------------------|-------------------------------|
| <b>PERSONA 1</b><br>Age:<br>Occupation:<br>Location:<br>Income range: | <b>PERSONALITY</b> | <b>GOALS</b>     | <b>QUOTE</b>                  |
|   |                    |                  |                               |
|   | <b>MOTIVATION</b>  | <b>INFLUENCE</b> | <b>BRANDS/APPS</b>            |
| <b>DESCRIPTION</b>  |                    |                  |                               |
|   | <b>FRUSTRATION</b> | <b>INTERESTS</b> | <b>SOURCES OF INFORMATION</b> |
|   |                    |                  |                               |

European Commission Horizon 2020 European Union funding for Research & Innovation

EVOLVED-5G.EU

Figure 106. User Persona Tool



Figure 107. Customer Journey Map

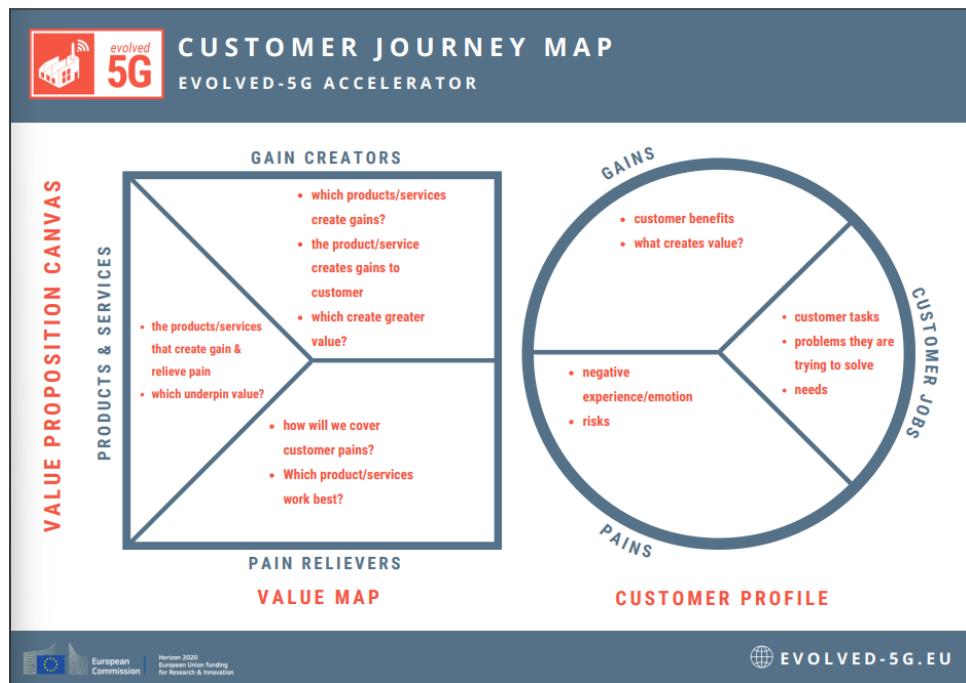


Figure 108. Customer Journey Map – Image 2

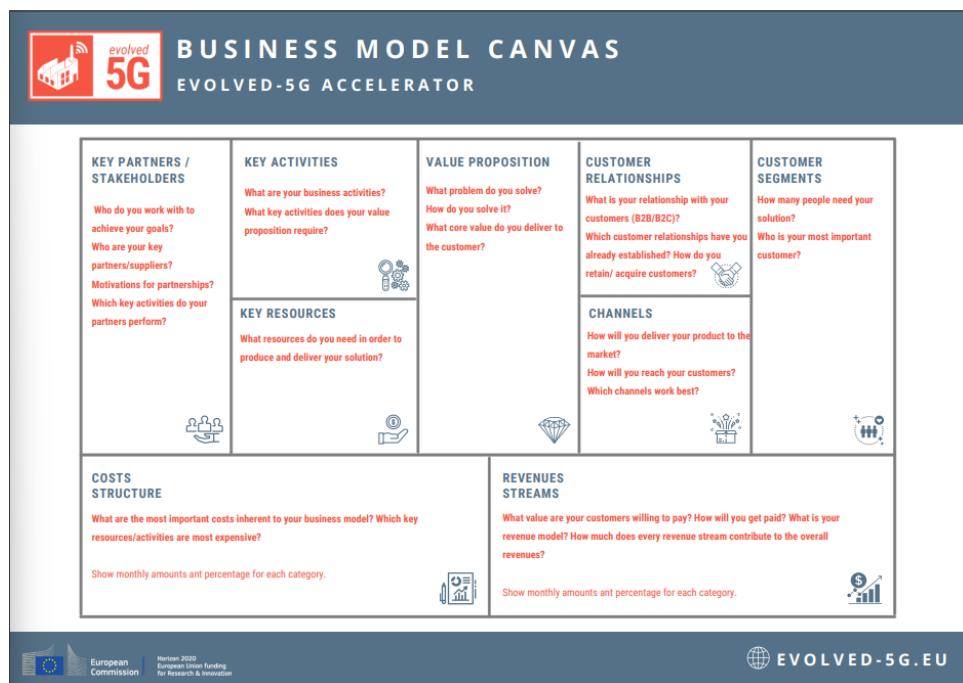


Figure 109. Business Model Canvas

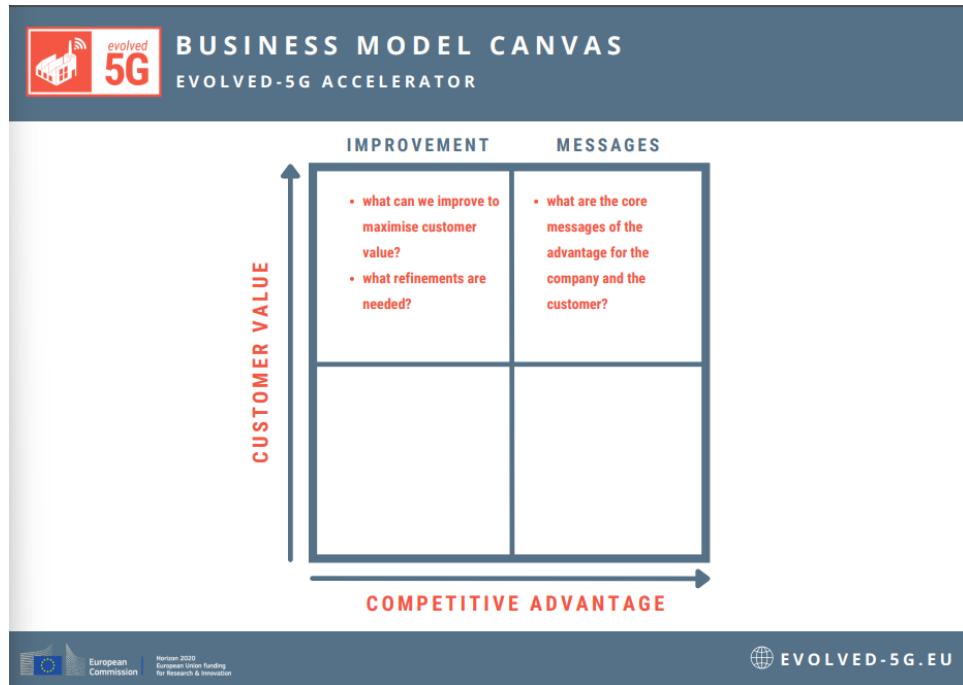


Figure 110. Customer Value and Competitive Advantage table

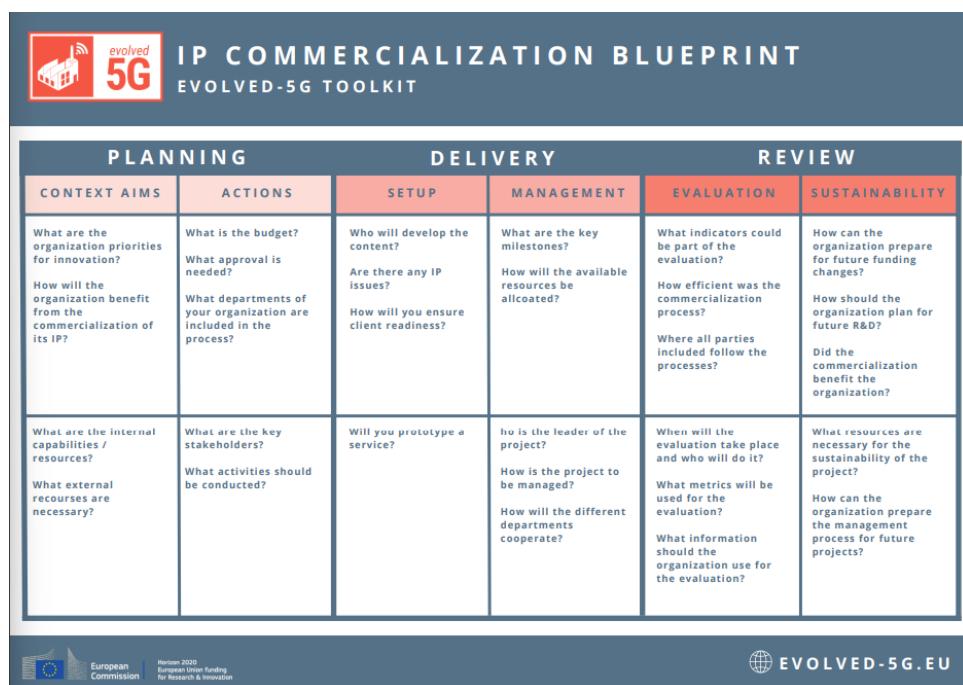
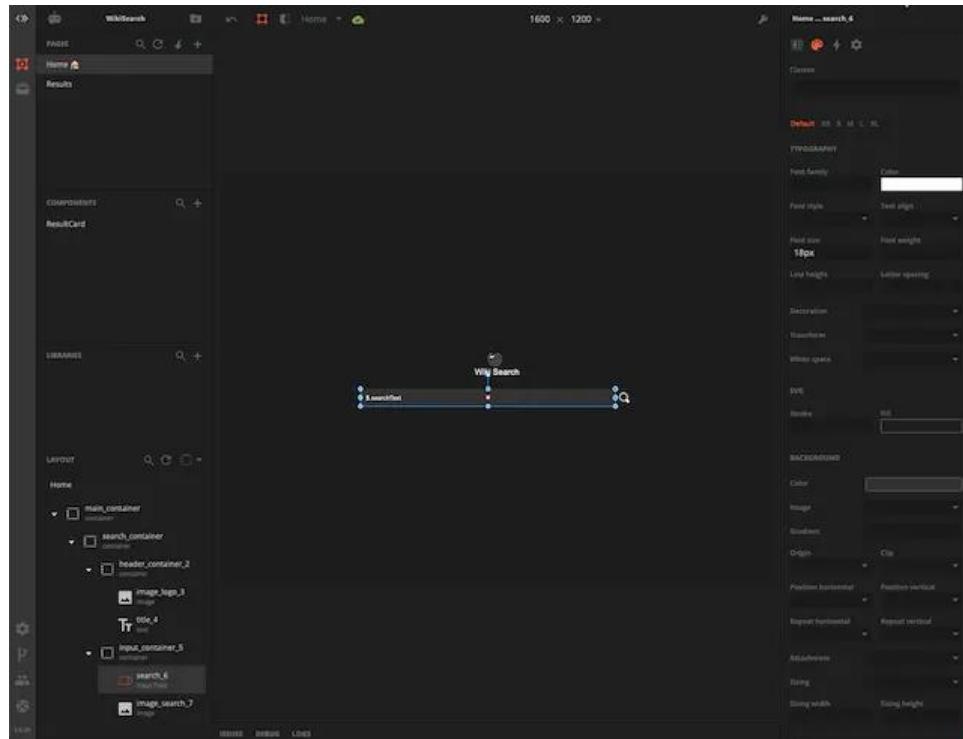
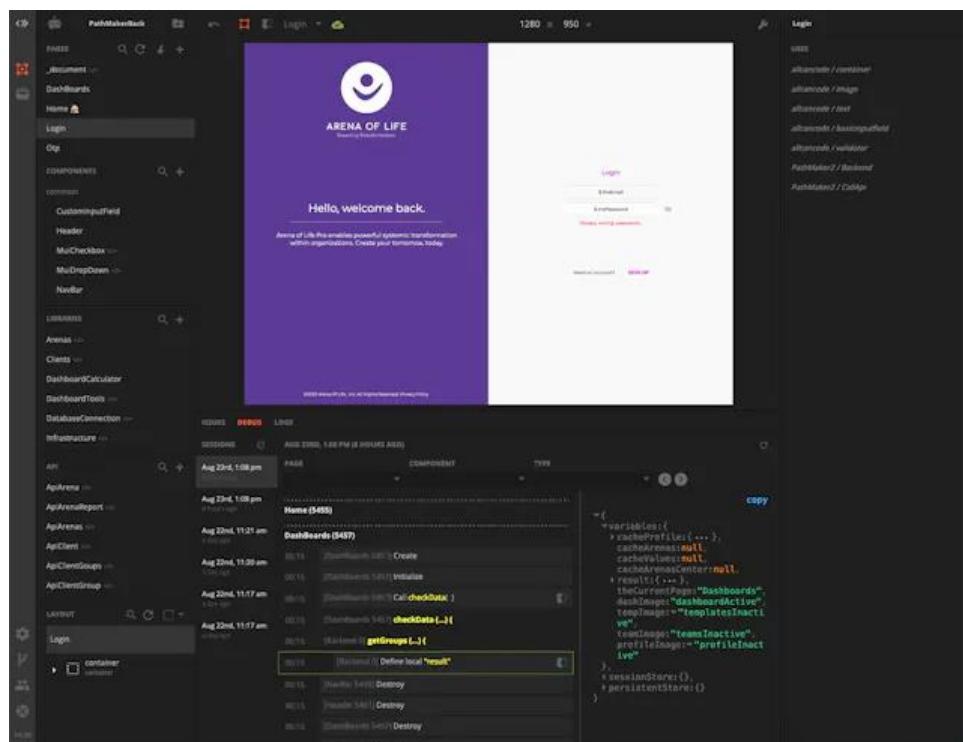


Figure 111. Progress Plan Toolkit



*Figure 112. Example of cohort computer-based tool*





## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

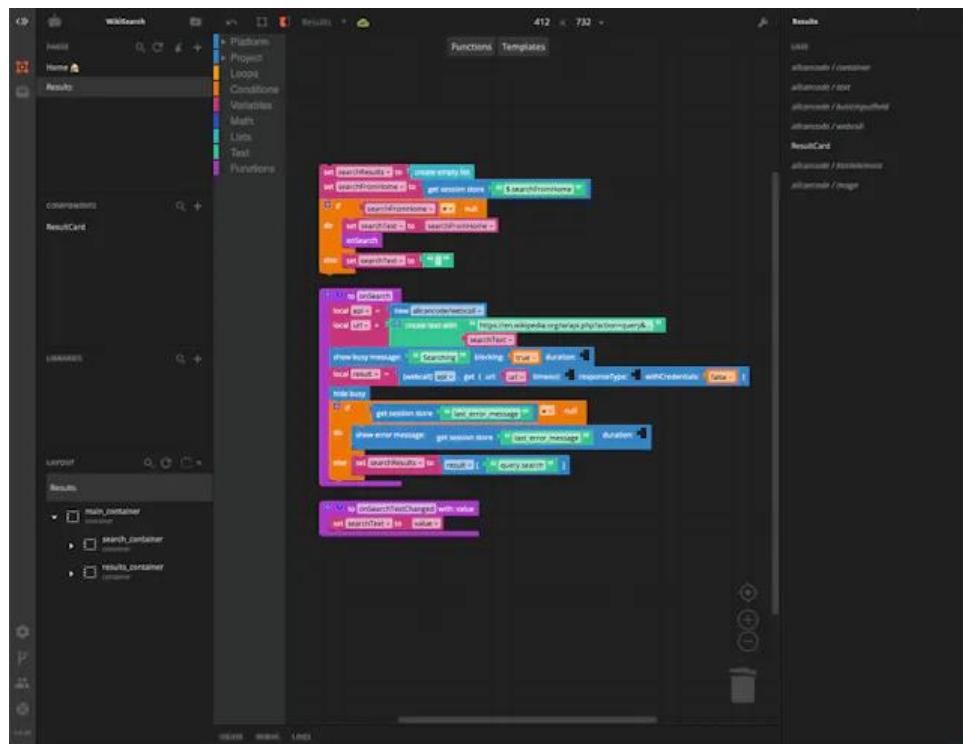


Figure 113. Set of cohort business methodologies and tools

### 3.1.2 Accelerator Library

The EVOLVED-5G Accelerator Library [2] is a key instrument, through which the EVOLVED-5G Project communicates with the wider audience of SMEs, startups and those interested in the capabilities of 5G as an enabler of entrepreneurship and better solutions. Its goal is to boost the adoption of 5G technologies and applications from SMEs and startups across industries and provide resources for the community. With content including workshops, case studies, industry best practices, community updates, expert editorials, resources, tools, it attracts the interest of hundreds of users from several countries.



Figure 114. Accelerator Library welcome image

The EVOLVED-5G Accelerator Library is a web-based platform hosted on the EVOLVED-5G Marketplace.



The EVOLVED-5G Accelerator Library contains 59 entries, starting with an Introduction to the Library: "Building a community of SMEs & startups open to innovation offering an accelerator library of resources, news and links to courses introducing to 5G technologies, methodologies and deployment for a maximum business impact. Available for users of Evolved-5G marketplace offering off-line opportunity to dive-in to the specifics of 5G technologies and methodologies to either incorporate in their businesses for higher efficiency, automation and virtualization, or to either build new products & services addressing emerging markets."

The following table represents a Content Guide of the Library, providing the list of available entries on it. A very detailed description of the entries provided is presented in Annex 4 : EVOLVED-5G Library Items.

| #  | Item Title   | Item Type                        | Link  | Views |
|----|--|----------------------------------|---|-------|
| 1  | The Accelerator Library – An Introduction  | Library Entry                    | <a href="https://forum.evolved-5g.eu/t/the-accelerator-library-an-introduction/45/2">https://forum.evolved-5g.eu/t/the-accelerator-library-an-introduction/45/2</a>   | 195   |
| 2  | WP6 INFOLYSIS Training Demo  | Training Demo                    | <a href="https://forum.evolved-5g.eu/t/wp6-infolysis-training-demo/42">https://forum.evolved-5g.eu/t/wp6-infolysis-training-demo/42</a>   | 245   |
| 3  | EVOLVED-5G Dtsolkas Slids  | Workshop – Workshop Presentation | <a href="https://forum.evolved-5g.eu/t/fogus-dtsolkas-envolved5g-ecosystem-presentation/34">https://forum.evolved-5g.eu/t/fogus-dtsolkas-envolved5g-ecosystem-presentation/34</a>   | 235   |
| 4  | EVOLVED-5G Towards the Industrial Revolution of the 21st Century   | Article                          | <a href="https://forum.evolved-5g.eu/t/evolved-5g-towards-the-industrial-revolution-of-the-21th-century/47">https://forum.evolved-5g.eu/t/evolved-5g-towards-the-industrial-revolution-of-the-21th-century/47</a>   | 231   |
| 5  | INFORLYSIS Chatbot and Network application for Precise Maintenance in 5G-enabled Industry 4.0            | Use Case                         | <a href="https://forum.evolved-5g.eu/t/infolysis-chatbot-and-network-application-for-precise-maintenance-in-5g-enabled-industry-4-0/163">https://forum.evolved-5g.eu/t/infolysis-chatbot-and-network-application-for-precise-maintenance-in-5g-enabled-industry-4-0/163</a>   | 75    |
| 6  | EVOLVED-5G Open Course on Network App Development  | Open Course                      | <a href="https://forum.evolved-5g.eu/t/evolved-5g-open-course-on-network-app-development/78">https://forum.evolved-5g.eu/t/evolved-5g-open-course-on-network-app-development/78</a>   | 561   |
| 7  | Deployment tests for the 5G enabled Security Information and Event Management system Deployment of FOGUS | Report                           | <a href="https://forum.evolved-5g.eu/t/deployment-tests-for-the-5g-enabled-security-information-and-event-management-system-of-fogus/142">https://forum.evolved-5g.eu/t/deployment-tests-for-the-5g-enabled-security-information-and-event-management-system-of-fogus/142</a> | 87    |
| 8  | EVOLVED-5G in DEFEA 2023   | Event Report                     | <a href="https://forum.evolved-5g.eu/t/evolved-5g-in-defea-2023/147">https://forum.evolved-5g.eu/t/evolved-5g-in-defea-2023/147</a>   | 102   |
| 9  | Guide for Network App Containerization & External Development Configuration for Developers               | Guide                            | <a href="https://forum.evolved-5g.eu/t/guide-for-netapp-containerization-external-configuration-for-developers/46">https://forum.evolved-5g.eu/t/guide-for-netapp-containerization-external-configuration-for-developers/46</a>   | 361   |
| 10 | IWAPS 2023: EVOLVED-5G Co-Workshop organised workshop  | Report                           | <a href="https://forum.evolved-5g.eu/t/iwaps-2023-evolved-5g-co-organised-workshop/138">https://forum.evolved-5g.eu/t/iwaps-2023-evolved-5g-co-organised-workshop/138</a>   | 152   |



|    |  |               |   |     |
|----|--|---------------|---|-----|
| 11 | Remote assistance in Mixed Reality White Paper by Immersion  | White Paper   | <a href="https://forum.evolved-5g.eu/t/remote-assistance-in-mixed-reality-white-paper-by-immersion/137">https://forum.evolved-5g.eu/t/remote-assistance-in-mixed-reality-white-paper-by-immersion/137</a>   | 115 |
| 12 | Network Apps Enabling Application-Layer Analytics for Vertical IoT Industry                            | Article       | <a href="https://forum.evolved-5g.eu/t/network-apps-enabling-application-layer-analytics-for-vertical-iot-industry/136">https://forum.evolved-5g.eu/t/network-apps-enabling-application-layer-analytics-for-vertical-iot-industry/136</a>   | 155 |
| 13 | INFOLYSiS Chatbot in the Chatbot Context of EVOLVED-5G   | Showcase      | <a href="https://forum.evolved-5g.eu/t/infolysis-chatbot-in-the-context-of-evolved-5g/135">https://forum.evolved-5g.eu/t/infolysis-chatbot-in-the-context-of-evolved-5g/135</a>   | 132 |
| 14 | 5GPPP TB Workshop Session on Workshop Network Applications   | Report        | <a href="https://forum.evolved-5g.eu/t/infolysis-chatbot-in-the-context-of-evolved-5g/135">https://forum.evolved-5g.eu/t/infolysis-chatbot-in-the-context-of-evolved-5g/135</a>   | 142 |
| 15 | EVOLVED-5G Newsletter #7   | Newsletter    | <a href="https://forum.evolved-5g.eu/t/evolved-5g-newsletter-7/97">https://forum.evolved-5g.eu/t/evolved-5g-newsletter-7/97</a>   | 150 |
| 16 | 5G Network performance and radio coverage monitoring for Industry 4.0 enhanced by drone Use Case       |               | <a href="https://forum.evolved-5g.eu/t/5g-network-performance-and-radio-coverage-monitoring-for-industry-4-0-enhanced-by-drone/36/2">https://forum.evolved-5g.eu/t/5g-network-performance-and-radio-coverage-monitoring-for-industry-4-0-enhanced-by-drone/36/2</a>   | 308 |
| 17 | EVOLVED-5G Open Course on NETWORK APPS   | Open Course   | <a href="https://forum.evolved-5g.eu/t/evolved-5g-open-course-on-network-apps/72">https://forum.evolved-5g.eu/t/evolved-5g-open-course-on-network-apps/72</a>   | 356 |
| 18 | 5G for Absolute Beginners  | Online Course | <a href="https://forum.evolved-5g.eu/t/5g-for-absolute-beginners/35/2">https://forum.evolved-5g.eu/t/5g-for-absolute-beginners/35/2</a>   | 217 |
| 19 | 5G for Everyone Course Qualcomm on Coursera  | Online Course | <a href="https://forum.evolved-5g.eu/t/iae-5g-for-everyone-course-qalcomm-coursera/40">https://forum.evolved-5g.eu/t/iae-5g-for-everyone-course-qalcomm-coursera/40</a>   | 308 |
| 20 | Network Transformation 101 by Training Intel Network Academy   | Program       | <a href="https://forum.evolved-5g.eu/t/iae-network-transformation-101-by-intel-network-academy-coursera/41">https://forum.evolved-5g.eu/t/iae-network-transformation-101-by-intel-network-academy-coursera/41</a>   | 308 |
| 21 | 5G A Deeper Dive – Intel Network Academy   | Online Course | <a href="https://forum.evolved-5g.eu/t/5g-a-deeper-dive-intel-network-academy-coursera/85">https://forum.evolved-5g.eu/t/5g-a-deeper-dive-intel-network-academy-coursera/85</a>   | 187 |
| 22 | 5G roll-out in the EU. Special Report 2022   | Report        | <a href="https://forum.evolved-5g.eu/t/report-5g-roll-out-in-the-eu-special-report-2022/87">https://forum.evolved-5g.eu/t/report-5g-roll-out-in-the-eu-special-report-2022/87</a>   | 171 |
| 23 | 5G roll-out in the EU. Special Report 2022   | Report        | <a href="https://forum.evolved-5g.eu/t/report-cocom-working-group-on-5g/88">https://forum.evolved-5g.eu/t/report-cocom-working-group-on-5g/88</a>   | 140 |
| 24 | 5GCybersecurity Standards: Analysis of Standardisation Requirements in Support of Cybersecurity Policy | Report        | <a href="https://forum.evolved-5g.eu/t/report-5g-cybersecurity-standards-analysis-of-standardisation-requirements-in-support-of-cybersecurity-policy/89">https://forum.evolved-5g.eu/t/report-5g-cybersecurity-standards-analysis-of-standardisation-requirements-in-support-of-cybersecurity-policy/89</a> | 186 |



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| 25 | Case Study: Bringing 5G business value to industry: A case study uncovering 5G's potential for real-time control in manufacturing - Ericsson | Case Study    | <a href="https://forum.evolved-5g.eu/t/case-study-bringing-5g-business-value-to-industry-a-case-study-uncovering-5g-s-potential-for-real-time-control-in-manufacturing-ericsson/90">https://forum.evolved-5g.eu/t/case-study-bringing-5g-business-value-to-industry-a-case-study-uncovering-5g-s-potential-for-real-time-control-in-manufacturing-ericsson/90</a> | 160 |
| 26 | Quarterly Report of the Industry European 5G Observatory   | Report        | <a href="https://forum.evolved-5g.eu/t/report-quarterly-report-of-the-european-5g-observatory/91">https://forum.evolved-5g.eu/t/report-quarterly-report-of-the-european-5g-observatory/91</a>   | 174 |
| 27 | 5G Technology Strategy: Next Generation Mobile Networking  | Online Course | <a href="https://forum.evolved-5g.eu/t/course-5g-technology-strategy-next-generation-mobile-networking/92/2">https://forum.evolved-5g.eu/t/course-5g-technology-strategy-next-generation-mobile-networking/92/2</a>   | 201 |
| 28 | Cisa's 5G Innovation & Transformation Video Series   | Video Series  | <a href="https://forum.evolved-5g.eu/t/videos-cisa-s-5g-innovation-transformation-video-series/94/2">https://forum.evolved-5g.eu/t/videos-cisa-s-5g-innovation-transformation-video-series/94/2</a>   | 165 |
| 29 | 5G for Industry 4.0 Operational Technology Networks - GSMA   | Paper         | <a href="https://forum.evolved-5g.eu/t/report-5g-for-industry-4-0-operational-technology-networks-gsma/93">https://forum.evolved-5g.eu/t/report-5g-for-industry-4-0-operational-technology-networks-gsma/93</a>   | 207 |
| 30 | EU Toolbox for 5G Security   | Toolbox       | <a href="https://forum.evolved-5g.eu/t/eu-toolbox-for-5g-security/86">https://forum.evolved-5g.eu/t/eu-toolbox-for-5g-security/86</a>   | 167 |
| 31 | 5GPPP Newsflash September 2022   | News          | <a href="https://forum.evolved-5g.eu/t/5gppp-newsflash-september-2022/98">https://forum.evolved-5g.eu/t/5gppp-newsflash-september-2022/98</a>   | 139 |
| 32 | Discover the Power of 5G – Ericsson  | Article       | <a href="https://forum.evolved-5g.eu/t/discover-the-power-of-5g-ericsson/100">https://forum.evolved-5g.eu/t/discover-the-power-of-5g-ericsson/100</a>   | 176 |
| 33 | Top 10 5G Use Cases  | List          | <a href="https://forum.evolved-5g.eu/t/top-10-5g-use-cases/119">https://forum.evolved-5g.eu/t/top-10-5g-use-cases/119</a>   | 154 |
| 34 | "Intent-driven Chatbots for Precise Maintenance in 5G-enabled Industry 4.0 Environments"   | Presentation  | <a href="https://forum.evolved-5g.eu/t/intent-driven-chatbots-for-precise-maintenance-in-5g-enabled-industry-4-0-environments-infocom-world-fiber-5g-highways-digitall-greece/124">https://forum.evolved-5g.eu/t/intent-driven-chatbots-for-precise-maintenance-in-5g-enabled-industry-4-0-environments-infocom-world-fiber-5g-highways-digitall-greece/124</a>   | 141 |
| 35 | 5G: the first step for a new era (in Greek)  | Article       | <a href="https://forum.evolved-5g.eu/t/5g-the-first-step-for-a-new-era-in-greek/131">https://forum.evolved-5g.eu/t/5g-the-first-step-for-a-new-era-in-greek/131</a>   | 126 |
| 36 | IBM 5G and edge computing  | Article       | <a href="https://forum.evolved-5g.eu/t/ibm-5g-and-edge-computing/130">https://forum.evolved-5g.eu/t/ibm-5g-and-edge-computing/130</a>   | 143 |
| 37 | A guide to 5G network security 2.0   | Article       | <a href="https://forum.evolved-5g.eu/t/a-guide-to-5g-network-security-2-0/129">https://forum.evolved-5g.eu/t/a-guide-to-5g-network-security-2-0/129</a>   | 152 |
| 38 | What is 5G NR-Light a.k.a. RedCap and how will it  | Article       | <a href="https://forum.evolved-5g.eu/t/what-is-5g-nr-light-a-k-a-redcap-and-how-will-it/138">https://forum.evolved-5g.eu/t/what-is-5g-nr-light-a-k-a-redcap-and-how-will-it/138</a>   | 138 |



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|    | accelerate the growth of the connected intelligent edge?                                   | <a href="https://forum.evolved-5g.eu/t/redcap-and-how-will-it-accelerate-the-growth-of/128">redcap-and-how-will-it-accelerate-the-growth-of/128</a> |  |
| 39 | Online Article about 5G Architecture   | Article   | <a href="https://forum.evolved-5g.eu/t/online-article-about-5g-architecture/126">https://forum.evolved-5g.eu/t/online-article-about-5g-architecture/126</a> 121  |
| 40 | European Commission's Innovation Radar   | Information   | <a href="https://forum.evolved-5g.eu/t/european-commisions-innovation-radar/140">https://forum.evolved-5g.eu/t/european-commisions-innovation-radar/140</a> 129  |
| 41 | Network Apps Enabling Application – Layer Analytics for Vertical IoT Industry              | Article   | <a href="https://forum.evolved-5g.eu/t/network-apps-enabling-application-layer-analytics-for-vertical-iot-industry/136">https://forum.evolved-5g.eu/t/network-apps-enabling-application-layer-analytics-for-vertical-iot-industry/136</a> 156                          |
| 42 | Nokia Core E-Book  | E-Book  | <a href="https://forum.evolved-5g.eu/t/nokia-5g-core-e-book/139">https://forum.evolved-5g.eu/t/nokia-5g-core-e-book/139</a> 118  |
| 43 | 5G will Accelerate a New Wave of IoT Applications  | Article   | <a href="https://forum.evolved-5g.eu/t/5g-will-accelerate-a-new-wave-of-iot-applications/141">https://forum.evolved-5g.eu/t/5g-will-accelerate-a-new-wave-of-iot-applications/141</a> 111  |
| 44 | How 5G and Private Networks are Making Stadiums Smarter and Events more Engaging           | Case Study  | <a href="https://forum.evolved-5g.eu/t/how-5g-and-private-networks-are-making-stadiums-smarter-and-events-more-engaging/143">https://forum.evolved-5g.eu/t/how-5g-and-private-networks-are-making-stadiums-smarter-and-events-more-engaging/143</a> 102                |
| 45 | 5GPPP Newsflash Issue 75   | Newsletter  | <a href="https://forum.evolved-5g.eu/t/5gppp-newsflash-issue-75/144">https://forum.evolved-5g.eu/t/5gppp-newsflash-issue-75/144</a> 90   |
| 46 | Smart Cities and 5G: Taking it to the Next Level   | Article   | <a href="https://forum.evolved-5g.eu/t/smart-cities-and-5g-taking-it-to-the-next-level/145">https://forum.evolved-5g.eu/t/smart-cities-and-5g-taking-it-to-the-next-level/145</a> 115  |
| 47 | 5G Network Fundamentals Course on Coursera   | Course  | <a href="https://forum.evolved-5g.eu/t/5g-network-fundamentals-course-on-coursera/146">https://forum.evolved-5g.eu/t/5g-network-fundamentals-course-on-coursera/146</a> 96   |
| 48 | Why 5G and the Edge Could Be the Keys to the Metaverse                                     | Article   | <a href="https://forum.evolved-5g.eu/t/why-5g-and-the-edge-could-be-the-keys-to-the-metaverse/148">https://forum.evolved-5g.eu/t/why-5g-and-the-edge-could-be-the-keys-to-the-metaverse/148</a> 80   |
| 49 | What is 5G Technology and How Will it Impact your Business?                                | Article   | <a href="https://forum.evolved-5g.eu/t/what-is-5g-technology-and-how-will-it-impact-your-business/149">https://forum.evolved-5g.eu/t/what-is-5g-technology-and-how-will-it-impact-your-business/149</a> 96   |
| 50 | European 5G Annual Journal of 2023   | Report  | <a href="https://forum.evolved-5g.eu/t/european-5g-annual-journal-of-2023/161">https://forum.evolved-5g.eu/t/european-5g-annual-journal-of-2023/161</a> 82   |
| 51 | 5GPPP Trials Results 2022 – Key Performance Indicators Measured in Advanced 5G Trial Sites | Paper   | <a href="https://forum.evolved-5g.eu/t/5gppp-trials-results-2022-key-performance-indicators-measured-in-advanced-5g-trial-sites/162">https://forum.evolved-5g.eu/t/5gppp-trials-results-2022-key-performance-indicators-measured-in-advanced-5g-trial-sites/162</a> 81 |



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| 52 | 5GPPP Trials Results 2022 – Key Performance Indicators Measured in Advanced 5G Trial Sites | Paper   | <a href="https://forum.evolved-5g.eu/t/digital-systems-security-training-session/165">https://forum.evolved-5g.eu/t/digital-systems-security-training-session/165</a>                             | 77 |
| 53 | What is 6G? How is it different from 5G?   | Article | <a href="https://forum.evolved-5g.eu/t/what-is-6g-how-is-it-different-from-5g/166">https://forum.evolved-5g.eu/t/what-is-6g-how-is-it-different-from-5g/166</a>                                   | 64 |
| 54 | 5G Networks: Bridging the Infrastructure Gap   | Article | <a href="https://forum.evolved-5g.eu/t/5g-networks-bridging-the-infrastructure-gap/167">https://forum.evolved-5g.eu/t/5g-networks-bridging-the-infrastructure-gap/167</a>                         | 79 |
| 55 | Will 5G Really Lead to a Revolution  | Article | <a href="https://forum.evolved-5g.eu/t/will-5g-really-lead-to-a-revolution/168">https://forum.evolved-5g.eu/t/will-5g-really-lead-to-a-revolution/168</a>   | 58 |
| 56 | The Impact of 5G on Renewable Energy and Sustainability                                    | Article | <a href="https://forum.evolved-5g.eu/t/the-impact-of-5g-on-renewable-energy-and-sustainability/170">https://forum.evolved-5g.eu/t/the-impact-of-5g-on-renewable-energy-and-sustainability/170</a> | 43 |
| 57 | 5G IoT and the Future of Connected Vehicle   | Article | <a href="https://forum.evolved-5g.eu/t/article-5g-iot-and-the-future-of-connected-vehicle/171">https://forum.evolved-5g.eu/t/article-5g-iot-and-the-future-of-connected-vehicle/171</a>           | 52 |
| 58 | 5G in Healthcare   | Paper   | <a href="https://forum.evolved-5g.eu/t/paper-5g-in-healthcare/172">https://forum.evolved-5g.eu/t/paper-5g-in-healthcare/172</a>   | 36 |
| 59 | 5G Transforming the Healthcare Industry  | Article | <a href="https://forum.evolved-5g.eu/t/article-5g-transforming-the-healthcare-industry/173">https://forum.evolved-5g.eu/t/article-5g-transforming-the-healthcare-industry/173</a>                 | 41 |

Table 3 List of resources of the Library

### 3.2 TRAIN THE TRAINER PROGRAM

On November 22<sup>nd</sup>, Envolve hosted an online event on Capacity Building: Catalyzing Startup Success in Higher Educational Institutes. The two-hour session hosted key-note speeches on designing incubation services for startups in academic settings, startup success stories, as well as innovation and entrepreneurship practices beyond 5G technologies. The online event was open to any interested party, across Europe, seeking more information in establishing a well-structured business support programs to help SMEs locally, grow their businesses internationally, with the scope of 5G and beyond technologies.

Through this event, Envolve's aim was to empower Higher Education Institutions (HEIs) to play a leading role in the development and implementation of Beyond 5G networks and applications.

In the scope of the event, Maria Gabriela Anagnostopoulos presented the work that has been done through the EVOLVED-5G program to assist the community into developing new business solutions or leveraging upon existing ones with the support of 5G technologies. Maria presented the tools provided by the EVOLVED-5G program, such as the courses [4] [5], the library [2], the marketplace [9] and Github [12]. Additionally, she presented the process of establishing a tailor-made, industry-specific upon 5G technologies business acceleration program, by showing the steps that were taken, from the open call publication and teams' selection phase, to designing a structured business support program that can help SMEs implement 5G technologies to improve their processes and adapt more efficiently to a fast changing digital economy.



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After the presentation and Q&A session, an interactive discussion followed, covering topics such as the needs of the teams that we've witnessed throughout the program, the stage in which the teams entered the acceleration program as well as the wide range of industry experts' network that we've utilized to help support the teams more efficiently.

Below, there are some screenshots of the online event via Zoom.

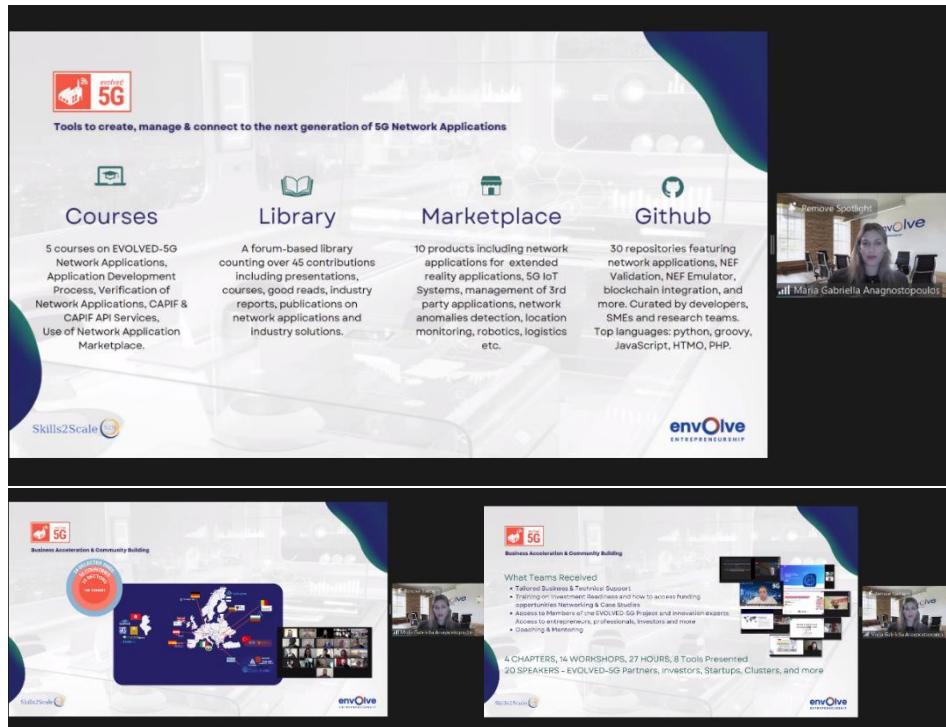


Figure 115. Train the Trainer presentation

### 3.3 COMMUNITY BUILDING STRATEGY

#### 3.3.1 Community partners

Community partners can be considered all key stakeholders that were utilized throughout the implementation of the EVOVLED-5G Acceleration Program. Those key stakeholders, consisting of industry experts, startup founders and CEOs, cluster manager and network operators, business support coaches and researchers, acted as Ambassadors of the project to their respective networks, promoting EVOLVED-5G project's actions and showcasing their involvement in the acceleration program.

Significant efforts were made by the team to reach the target groups and scout ideas through the most effective communication channels. Communication efforts were held through two directions:

- Towards achieving the highest possible number of spontaneous applications, when potential beneficiaries were reached by conventional communication actions.
- Towards deploying an intensive scouting and recruitment process of ideas and talented partners whereby the team went beyond just calling for participation in EVOLVED-5G Acceleration program, but also actively seeking for potential partnerships and subsequently carrying out a pull effect translated into triggered applications.

Ideas were scouted through:



- Community partners: People, organizations and institutions well positioned in each country with large knowledge of the identification of contacts as potential partners and ideas.
- Workshops/Webinars: Workshops and/or webinars were organized with the help of the community partners, and included one part of appealing lectures (5G, digitalisations, market trends and insights) and free training sessions to encourage the participation in the idea generation.
- Contacts with stakeholders to obtain information about interesting events where the talent is present, interesting partners and ideas
- Contacts with tech partners to include them in the ideas generation and either as experts or workshop facilitators.

The EVOLVED-5G consortium acted upon the importance of building up an effective network of community partners throughout Europe to accelerate results on both the dissemination and partners' engagement strategy for the call for expression of interest, the Library, the Marketplace and the challenge of selecting the accelerator participants with a wide geographical and sectoral balance. Consequently, special efforts were put into the community partners' engagement strategy to enlarge our community.

Envolve's efforts were focused on identifying the appropriate organizations, assigning them as community partners and making them part of the EVOLVED-5G community. The EVOLVED-5G consortium collaborated with the country partners to co-organize events in as many participating countries as possible, so they triggered the participation in the EVOLVED-5G acceleration activities.

Various events were organized according to the following actions:

- Inspirational lectures (including 5G trends and market trends on technological advancements)
- Evolved-5G info session (including presentation of the call for expression of interest and training on how to apply and use the Library and Marketplace).
- B2B meetings with key stakeholders
- Workshops and Webinars with ecosystem stakeholders and industry experts

Some of the key players that were reached were:

- F6S (Ireland, EU)
- Lux Innovation (Luxemburg)
- Transylvania Start Up (Romania)
- Bulgarian Startup Association (Bulgaria)
- Startup Latvia (Latvia)
- Startup Lithuania (Lithuania)
- University of Zagreb (Croatia)

The following organizations embraced the role of community partner:

- MBB (Malta)
- Deep Ecosystems (Germany)
- Uptec (Portugal)
- Vestbee (Poland)
- Venture Cap (Denmark)



- Xpress (Hungary)

Also, among those participating in the events organized, such as the Capacity Building Workshop for 5G technologies and beyond, in addition to the above were:

- Uzhhorod National University (Ukraine)
- Technical University of Liberec (Czechia)
- Lapland University (Finland)
- Catholic University of Portugal (Portugal)
- ACCIÓ - Agency for Business Competitiveness (Spain)
- Hungarian Innovation Agency (Hungary)
- Acceler8 Limited (Malta)
- Startup Europe Regions Network (Belgium)
- The National Association of Community Enterprise Centres (Ireland)

### 3.3.2 Community partners' Engagement and Management Strategy

The community partners' engagement strategy's main aim was to shed greater light on EVOLVED-5G and attract more applications across eligible countries. Envolve/IEA was responsible for the engagement of the Community partners and the management of the network.

Its efforts were focused on identifying the right people/organizations, assigning them as country community partners and making them part of the EVOLVED-5G Community. Country Community partners are organizations, well positioned in each country with large knowledge of the identification of contacts as potential EVOLVED-5G beneficiaries.

Community partners helped the project goals in many ways. They expanded its outreach, attracted SMEs and startups from their respective countries and promoted its results, therefore offering greater visibility of the work being done.

The project partners collaborated, as well, with the Community partners, in order to co-organize events in as many participating countries as possible, so that they enabled the idea-generation process, and the participation in the EVOLVED-5G Call for Expression of Interest. These workshops, webinars and inspiration speeches were organized with the help of the country community partners, and included one part of appealing lectures (included 5G, digitization, technology, market trends and insights) and free training sessions to encourage the participation of local SMEs and startups.

Envolve actively reached out and came in contact with potential community partners that fulfil the profile the EVOLVED-5G project is looking for organizations with similar interests in promoting 5G technologies.

Envolve prepared the engagement and management strategy for the community partners to facilitate this task while also continuously looking for new collaboration opportunities and to strengthen the projects "representation" in any participating country that does not show the interest foreseen.

The Community partners Strategy aimed to promote the greater EVOLVED-5G's vision as well as the implementation of the Acceleration Program, through extensive support to its community partners' network. This Strategy provides a framework for the promotion, recruitment, retention, recognition and reward of EVOLVED-5G's community partners at a European level.

Last but not least, it encourages a responsive and supportive environment for all of the Community partners.

Aims of the Community partners Strategy were:

- Promote Community partners opportunities to everyone, who has the right profile to become one
- Engage and retain Community partners
- Ensure standards of best practice and consistency in supporting Community partners
- Recognize and reward Community partners

As EVOLVED-5G moves forward, we want to be confident that our contribution to the Community partners Network serves us well. EVOLVED-5G Community partners are a resource that we should nurture, support and celebrate. Through effective collaboration, we will continue to review the achievements of the action plan, evaluate new opportunities and monitor the resources available, to ensure we continue to work more effectively.

The engagement strategy can be summarized in the below figure, including these 4 axes.



Figure 116. Engagement Strategy Steps

Priority Axis 1: The consortium worked to raise the profile of Community partners and Community partners Network across the EVOLVED-5G countries.

Priority Axis 2: The consortium provided a consistent recruitment of potential new Community partners.

Priority Axis 3: The consortium worked towards ensuring our Community partners are supported with consistency, providing opportunities and sharing information.

Priority Axis 4: The consortium acknowledged the valued contributions of Community partners and rewarded them accordingly.



### 3.3.2.1 *Community partners Tasks*

Community partners are considered people and organizations with deep knowledge of local innovation ecosystems and how the local target groups are associated and were in charge of scouting potential beneficiaries for the acceleration program and the Library. Community partners were in contact with hubs, incubators, universities, accelerators, SMEs and startups, or be one of the above, collaborating with the project team to promote Evolved-5G, scouting relevant ideas and potential partners within an assigned European region. Community partners were treated as key stakeholders with whom the team worked very closely to perform tasks such as representation of activities to disseminate the project.

Community partners held some or all the below roles:

- Scouting relevant startups/SMEs.
- Collaborate in the organization/facilitation of online events, such as webinars, workshops, inspiration speeches.
- Connect with other local relevant key stakeholders to disseminate the project and the call for expressions of interest.
- Assist the consortium into spreading the word about the EVOLVED-5G to their respective communities and publication of articles and posts on their websites, social media channels, newsletters or any sectorial magazine

### 3.3.2.2 *Community partners Benefits*

The EVOLVED-5G Ambassadors, as described above, played a pivotal role in the success and dissemination of the EVOLVED-5G activities and acceleration program. Their multifaceted involvement significantly contributed to fostering a collaborative environment within the community, bringing together diverse stakeholders to collectively address the challenges and opportunities presented by 5G technology. Through their active participation in program activities, they not only facilitated knowledge exchange but also leveraged their expertise to mentor and guide other community members, thereby enhancing the overall effectiveness of the initiative.

Furthermore, the community partner's dedication to disseminating information about the EVOLVED-5G program yielded substantial benefits. By organizing workshops and webinars, they ensured that valuable insights and outcomes reached a wider audience, fostering awareness and understanding of the transformative potential of 5G technology. This dissemination effort not only empowered local businesses and individuals with cutting-edge knowledge but also positioned the community as a hub for innovation and technological advancement. In essence, their sustained engagement and dissemination activities not only amplified the impact of the EVOLVED-5G program but also left a lasting positive imprint on the community's technological landscape.

Community partners gained benefits through the following:

- Participation in the train the trainer program
- They represented community gains relevant positioning, recognition and influence.
- Visibility in the Library
- By hosting/facilitating workshop events, relevant knowledge and value was offered to their affiliates/community without any cost
- Business opportunities and possible synergies through EVOLVED-5G networks and participating SMEs



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- Advertised profile through the EVOLVED-5G dissemination and communication activities

## 4 PUBLIC RESOURCES, OUTREACH ACTIVITY & IMPACT

### 4.1 PUBLIC RESOURCES FOR THE COMMUNITY

The EVOLVED-5G project has made publicly available online resources for the Community that can be used by a wide range of users such as internal or external developers, academia and other stakeholders. This set of resources can be useful either for users with a high knowledge of 5G network and Network Applications and newcomers.

As an example to illustrate this feature, the EVOLVED-5G Forum represents a space where either newbies or experienced users are able to exchange knowledge by asking or replying questions posed about the utilization of the developed software within the EVOLVED-5G or more regular questions related to what a Network Application is or how a 5G network works.

All those public resources are explained in detail in the following subsections.

#### 4.1.1 Community Block

The Community block of the EVOLVED-5G architecture has the overarching aim to encourage the creation of a community around the EVOLVED-5G project of developers, SMEs, academia and other stakeholders within and outside the project consortium. Contributing to boost development and technical support to everyone involved in the Forum, open repositories and other resources in the project.

The Community block enhance such contribution and collaboration between internal and external users and stakeholders promoting, the continuous development of technical innovations implemented in the project.



Figure 117. Community Block of the EVOLVED-5G Architecture

This architectural block comprises four main resources developed and maintained in the frame of Work Package 6: the Wiki, the Forum, the Library, and the Training Course Spaces. All of them have been created to provide knowledge and disseminate all the software and technical vision and outcomes developed in the project.

#### 4.1.2 Wiki

The EVOLVED-5G Wiki [1], described in detail in 2.4, has been created to unify in one place all the technical information related to the project. There it can be found the EVOLVED-5G vision about Network Applications, their different lifecycle phases, as well as the project's architecture. Moreover, technical documentation about for the development, verification, validation,



certification and publication of Network Apps is provided, as well as regarding Network Exposure Tools (NEF, CAPIF, TSN) and the EVOLVED-5G Service Package.

#### 4.1.3 Forum

The Forum [6] was born with the aim of a public online discussion platform where community users can exchange ideas, topics and post questions regarding the EVOLVED-5G project, providing interaction among the community users (internal and external to the project). Moreover, the Forum provides support for technical questions provided by software developers' from EVOLVED-5G project. The following Figure provides an overview of the Forum frontpage.

The screenshot shows the EVOLVED-5G Forum interface. At the top, there is a navigation bar with the 'evolved 5G' logo, 'Sign Up', 'Log In', a search icon, and a menu icon. Below the navigation bar, there are tabs for 'all categories' (highlighted), 'Categories', 'Latest', and 'Top'. The main content area is divided into two columns: 'Category' on the left and 'Topics' on the right. The 'Category' column lists four categories with their respective counts: 'Network App Development Support' (17), 'How to build a Network App' (6), 'Training Courses from EVOLVED-5G proj...' (7), and 'EVOLVED-5G Ecosystem' (2). The 'Topics' column lists individual forum posts with details like title, number of replies, creation date, and a brief description. For example, under 'Network App Development Support', there are posts titled 'Beginner's Guide for Network App development, validation, certification and publication' and 'How to build a Network App'. Under 'Training Courses from EVOLVED-5G proj...', there are posts for 'Network Apps Open Course', 'Network App Development Course', 'Network App Verification Course', and 'Course on the use of the EVOLVED-5G Network App Marketplace'.

Figure 118. EVOLVED-5G Forum

#### 4.1.4 Library

The Library [2] has been envisaged as a set of entries related to EVOLVED-5G project which are publicly accessible through the Forum [6] or the main EVOLVED-5G site<sup>11</sup> [11], such as articles, presentations or links to relevant news related to the project as well as the EVOLVED-5G online training courses. The resources available in the Library at the submission date of this document are detailed in Annex 4 : EVOLVED-5G Library Items, while a summary and a guide of contents has been provided in 3.1.2.

<sup>11</sup> <https://evolved-5g.eu/>



The screenshot shows a forum interface with a blue header bar. On the left is the 'evolved 5G' logo. In the center, the title 'D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)' and 'GA Number 101016608' are displayed. On the right are search, filter, and user icons. Below the header, there's a navigation bar with 'Accelerator Library' (selected), 'Latest' (highlighted in red), and 'Top'. A 'New Topic' button is also present. The main area is a table with columns: 'Topic', 'Replies', 'Views', and 'Activity'. The topics listed are:

| Topic   | Replies | Views | Activity |
|---|---------|-------|----------|
| # About the Accelerator Library category<br>Explore this category Educational material related with <a href="https://evolved-5g.eu/community-accelerator/">https://evolved-5g.eu/community-accelerator/</a> | 0       | 226   | Apr '22  |
| Will 5G really lead to a revolution?  | 0       | 6     | 22d      |
| 5G Networks: Bridging the Infrastructure Gap  | 0       | 12    | 22d      |
| What is 6G? How is it different from 5G?  | 0       | 11    | 23d      |
| "Digital Systems Security" training session   | 0       | 11    | 24d      |
| EVOLVED-5G Open Course on Network App Development   | 1       | 341   | 29d      |
| INFOLYSIS Chatbot and Network application for Precise Maintenance in 5G-enabled Industry 4.0  | 0       | 23    | Jun 30   |

Figure 119. EVOLVED-5G Library

#### 4.1.5 Training Course Spaces

To expand and disseminate all the expertise, knowledge and software developed within the project, in the scope of T6.1 a series of training courses have been created for both internal and external stakeholders to train them on how to use the whole EVOLVED-5G ecosystem.

The material in the courses range from the basics about what is an open repository or a Network Application definition up to how to upload a certified Network Application in the Marketplace.

In order to inform and provide a quick access to such courses, it has been provided a space for Training Courses (hosted both in the Forum [6] and in the Wiki [1]).



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The screenshot shows a forum interface with a dark blue header. The header includes the 'evolved 5G' logo, a search icon, a menu icon, and a user profile icon. Below the header, there are tabs for 'Training Courses from EVOLVED-5G project' (selected), 'Latest' (highlighted in red), and 'Top'. There are also buttons for 'Edit', '+ New Topic', and a notification bell. The main content area displays a list of course topics:

| Topic   | Replies | Views | Activity |
|---|---------|-------|----------|
| How to access Training Courses (Registration)               | 0       | 3     | 7d       |
| About EVOLVED-5G Training Courses                           | 0       | 86    | 26d      |
| Network Apps Open Course                                    | 0       | 96    | 26d      |
| Network App Development Course                              | 0       | 96    | 26d      |
| Network App Verification Course                             | 0       | 84    | 26d      |
| Course on the use of the EVOLVED-5G Network App Marketplace | 0       | 78    | 26d      |
| Course for Network App Validation                           | 0       | 89    | 26d      |
| Network App Certification course                            | 0       | 79    | Oct 15   |

Figure 120. Training Course Space I (Forum): list of courses and registration instructions

The screenshot shows a wiki page titled 'Training / Training-courses'. The left sidebar has a dark blue background with white text, listing categories like 'EVOLVED-5G VISION', 'EVOLVED-5G Architecture', 'NETWORK SERVICE EXPOSURE', 'EVOLVED-5G SERVICE PACK', and 'VERIFICATION OF NETWORK APPS'. The main content area has a light gray background. It features a section titled 'Online Training Courses' with a brief description: 'EVOLVED-5G offers free online training on technical topics related to the project vision and to the use, development and validation of Network Apps.' Below this is a section titled 'EVOLVED-5G Network App' with a sub-section for 'EVOLVED-5G Open Course regarding the EVOLVED-5G Network App concept'. It includes a note about availability on educational platforms UPVx/EDX and a description of the course content. At the bottom of the page is a box titled 'EVOLVED-5G NETAPPS' containing a small diagram of a network.

Figure 121. EVOLVED-5G Training Course Space II (Wiki)

### 4.1.6 Github

In order to centralize all the developments including, Network Applications, instructions, CAPIF, NEF, SDK and so on, the EVOLVED-5G project has decided to use a free open repository as GitHub [12] which also enables collaboration among many developers (internal or external) promoting a continuous development as well as increasing visibility and participation. Although this



element is not considered a part of the community block in the EVOLVED-5G architecture, it is tightly related to this architectural block.

The following Figure shows an overview of the EVOLVED-5G GitHub [12].

The screenshot displays the GitHub profile for the 'EVOLVED-5G' organization. At the top, there's a pinned repository named 'EVOLVED-5G-overview' which is public. Below this, there's a search bar and a list of repositories. One repository, 'cicd', is highlighted with a green waveform graphic. On the right side, there are sections for 'Customize pins', 'View as: Public' (set to public), 'Discussions' (with a link to 'Turn on discussions'), and 'People' (showing a grid of user profiles). The overall interface is dark-themed.

Figure 122. EVOLVED-5G GitHub

## 4.2 OUTREACH

Within the scope of the EVOLVED-5G training program, a strategy has been developed to enhance outreach efforts and boost interaction with external target groups by means of training initiatives.

EVOLVED-5G outreach strategy is a main tool that sets the pace for promoting training activities of the project and for leveraging collaborations and partnerships with stakeholders beyond the project's scope and framework. In this regard, this section outlines the outreach strategy for training, which is designed to engage external target audiences through training events and material. The primary goal is to inform them about the technical vision, specifics, and progress of the EVOLVED-5G project. This includes discussing technical aspects related to the project and encouraging their active involvement with the project, its vision, and its technical advancements.

The EVOLVED-5G's training's outreach targets in a broad spectrum of audiences which includes research and scientific institutions and communities, developers, academia, and SMEs. Although the primarily targeted audiences are the developer and academic communities, the outreach scope is not restricted to those. There is no limit to the involvement of other categories of stakeholders who have an interest in EVOLVED-5G and the technical subjects associated with the project.

EVOLVED-5G Training receives an important support from other tasks to maximize impact, creating synergies that lead to higher audience reach. To attract the related audiences, the aid of communication and dissemination activities is significantly helpful.

More specifically Task 7.1 which is responsible for the communication and dissemination activities plays a major role in the promotion of the training activities, reaching and attracting a large number of potential participants.

A tentative list of tools utilized in the context of T7.1 for the promotion of training activities is the following one:

- Website
- Social Media Channels
- Newsletters
- Printed Material (stickers, leaflet, posters)
- Mailing Lists
- Related associations such as 5GPPP, SNS, etc

Apart from means directly correlated with T7.1, tools that stem from the context of WP6 are of utmost importance to the training outreach strategy. The following list briefly presents these tools.

- EVOLVED-5G Forum [10]
- EVOLVED-5G WIKI's page [9]
- Accelerator Library [8]
- Training Course Space I [4]
- Training Course Space II [5]
- UPV [X] platform [2]
- EVOLVED-5G Marketplace [13]
- EVOLVED-5G GitHub repository [12]

From what we have seen above the website of EVOLVED-5G [15] provides access and higher visibility to all the training activities and materials. This happens because it provides links and hosts all the related webpages to the training activities. Also, it orchestrates the activities by providing sufficient information and connection to already performed and upcoming events. Through the EVOLVED-5G website each interested stakeholder can find all related information about the training events of our project. The information included in our website are curated by INFOLYSiS team in accordance with the involved and responsible partners.

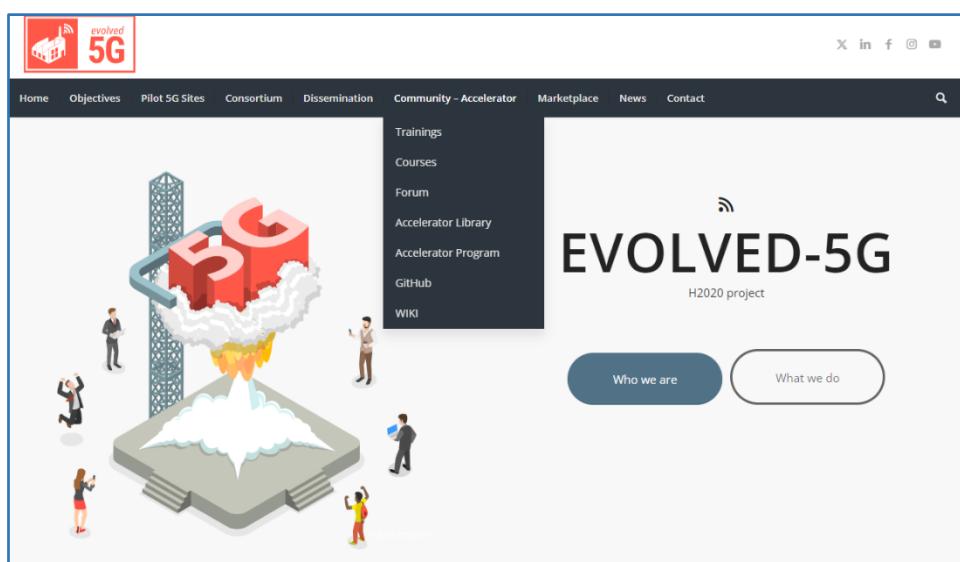


Figure 123. Community-Accelerator Menu in the EVOLVED-5G Website

The following figure summarizes how the website support the WP6 activities of the project by providing access to WP6 elements through specific links. Also, the Community elements (Wiki, Forum, Training Course Spaces, Library) are interconnected and inter-linked, communicating and promoting other elements that support training and the creation of a Community around EVOLVED-5G vision and technical outcomes.

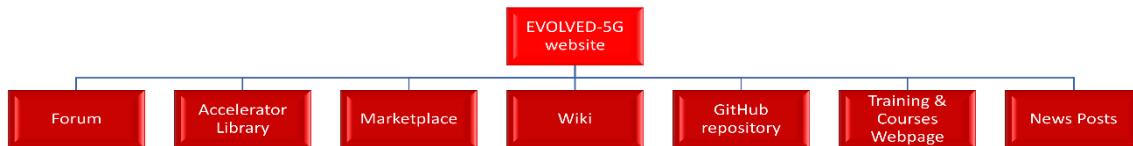


Figure 124. Direct links on the EVOLVED-5G website to Community elements, GitHub and Marketplace

Through the news webpage of the EVOLVED-5G webpage, all interested stakeholders have the chance to read dedicated news posts about training events. It is another additional feature that actually supports the training activities.



"Digital Systems Security" Training Session  
July 5, 2023 / in News

On Monday 3rd of July INQBIT partner organised "Digital Systems Security" training session. The session took place online and in the context of Master Course on Cyber Security by University of Piraeus and more than 25 attendees were connected.



Figure 125. EVOLVED-5G news on a Training Session

Apart from the website, another additional pillar of the communication of training activities are the social media channels of the project. Social media channels are a powerful tool for the attraction and the engagement of external stakeholders. Dedicated posts with informative nature or posts that had the form of "Call-to-action" were made during the previous period.

The communication of activities through the project's social media channels significantly contribute to boost at the maximum level the promotion of such event. They were used to promote an upcoming event, with information on the place, the subject and the registration way. Furthermore, social media were used after an event took place, with the purpose of providing information and material from the performed activity. Actually, this type of posts seemed to be one of the most popular, because they attracted audience and had more engagement than other ones.



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The screenshot shows a Twitter post from the official account of the EVOLVED-5G Project (@You). The post features a blue header with the project's logo and name. Below the header, there is a summary of the project: "EU H2020 5G-PPP Research project (ICT-41-2020) at European Com... 2mo • 5G". The main content of the post is a promotional message about the Accelerator Library, encouraging users to visit the online forum. It includes a link: <https://lnkd.in/eC29G2Dm>. The post also includes hashtags: #5G #5GPPP #SNS #H2020 #6G #library #research #articles. The post has received 358 impressions and includes standard Twitter interaction buttons: Like, Comment, Repost, and Send.

Figure 126. Twitter post promoting the EVOLVED-5G Library

Another tool that helped with the promotion of such activities is the Newsletters of the project. It is a mean that allows us to promote and dedicate specific place for the training activities. EVOLVED-5G were issued on a periodically basis, every three months. In that way all interested stakeholders were able to read and be informed about performed activities or performed ones. The EVOLVED-5G newsletter was mainly in digital form so, it was easier for partners to share it to their networks.

► The EVOLVED-5G online courses are communicated at the 5GPPP platform. You may access more information here: <https://5g-ppp.eu/evolved-5g-online-courses/>

The screenshot shows a section of the 5GPPP website dedicated to EVOLVED-5G online courses. At the top, there is a logo for "EVOLVED-5G ONLINE COURSES". Below the logo, there is a heading "EVOLVED-5G online courses". A text block states: "EVOLVED-5G project has created some courses related to 5G in the Universitat Politècnica de Valencia UPV's EDI platform. These courses are the following ones: • EVOLVED-5G Open Course on NetApp Development (here) • EVOLVED-5G NETAPPS (here) • 5G & Industry 4.0 (here)". At the bottom, there is a note: "These courses are prepared by experienced staff and you may enroll for free! You may learn more information about the courses and the community building activities of our project in the EVOLVED-5G forum here."

Figure 127. Newsletter showing how EVOLVED-5G training courses are communicated in 5G-PPP website



Also, printed material was used throughout the project's lifetime to promote not only communication and dissemination activities but training too. The role of such material is completely supplementary and used for branding purposes.

NEWSFLASH JANUARY 2023 Home /



**NEWSFLASH**

**Check out the latest 5G TOP news!**

**5G PPP** **6GSNS**

**A new wave of projects in 2023, the promise of an intense research year in Europe**

■ ARIADNE project published White Paper ■ Int5Gent published new Paper ■ 5G!Drones Athens final trials ■ SCoDIHNet monthly activity report ■ EVOLVED-5G WIKI ■ Network Europe, Strategic Research and Innovation Agenda ■

### EVOLVED-5G WIKI



The EVOLVED-5G WIKI webpage is now available! In this page you will find documentation for the implementation and usage of EVOLVED-5G framework elements and key information regarding the EVOLVED-5G vision, architecture, and the concept of NetApp. You may find more information [here](#).

Figure 128. 5G-PPP Newsletter announcing and promoting the EVOLVED-5G Wiki

An additional crucial mean in terms of the attraction of external stakeholder is the specific mailing lists. Mailing lists of organisations such as 5G-PPP<sup>12</sup>, SNS<sup>13</sup>, AIOTI<sup>14</sup>, of other sister and EU projects provide us segmented audience for the better communication of our activities. Mailing lists are a powerful tool that maximise impact and provide visibility not only through the recipients of the email, but due to the consecutive re-shares. Also, email to such a mailing list led to dedicated news posts in different platforms such as 5G-PPP and SNS.

Such organisations are important not only for the progress of a training activity but for the smooth progress of the whole project. Organisations like these apart from audience and

<sup>12</sup> <https://5g-ppp.eu/>

<sup>13</sup> <https://smart-networks.europa.eu/>

<sup>14</sup> <https://aioti.eu/>



promotion of the activity can offer advises for the prompt operation of an event. Also, such platforms attract broader audience and helps for the distribution of the information.

These tools along have also contributed to attracting a community around the project. Of course, various training activities are suitable for specific target audience for instance developer-focused events and seminars. These events are particularly well-suited for providing technical training and have the capacity to draw in the specific outcomes. Other training activities with more generic nature had audience from other EU Projects and people with not so technical background. However, the main goal was one to attract and engage the broadest possible audience.

### 4.3 IMPACT RESULTS

The EVOLVED-5G Accelerator aimed to accelerate the SMEs participating in the program, introduce them to 5G technology and the EVOLVED-5G Network Applications as well as present use cases to identify best practices and opportunities across verticals. The aim was also to connect the cohort with other SMEs and ecosystem stakeholders, such as clusters, startup founders, investors, research teams, innovation agencies. The teams displayed progress in their business plans, defining their value proposition, improving their presentations, utilizing new methodologies and tools, and reaching out to investors with a well-planned investment strategy. They also understand the opportunity of 5G deployment and are planning to invest in such solutions. A proof of this is a request by cohort members who wished to purchase and use solutions provided by the Internet Institute, BE-IN-G and WAN-AI (cohort members) partnering with Cumucore (cohort member) to use their private network solutions. In addition, BE-IN-G in his mentoring sessions with Fotini Setaki (Cosmote) received valuable feedback for his deployment plans in markets such as Greece and the market opportunities and obstacles. BE-IN-G connected with Lenovo and discussed their business case, solutions and use cases and how Lenovo could facilitate their business, production activities. WAN-AI reviewed partnership opportunities with Telefonica, to test their new solution. WAN-AI participant stated: "The (Entrepreneurship) Master Classes have been very useful and this has helped us to make progress with our Customer Discovery process. The introduction to 5G technology was informative and we have connected with Telefonica Innovation lead and R&I institutions e.g., NCSR Demokritos." The above validated the EVOLVED-5G Accelerator methodology and implementation as an impactful program, bridging the gap between R&D in 5G Technology and startups and SMEs.

The program received great exposure to associations and clusters such as 6G-AI, AI Cluster, 5G Ventures V.C. (Phaistos V.C.), Venture Friends V.C. engaging with and directly connecting the cohort and their ventures to the various stakeholders.

The Demo Day hosted 12 speakers from Telefonica, TU Delft, Envolve, Venture Friends V.C. (Community Partners), NSCR Demokritos, Fokus, Bespot, 5G-IANA. The event hosted 9 Jury Members (EVOLVED-5G partners) and was livestreamed to 180 participants on Zoom and YouTube.

The EVOLVED-5G Accelerator hosted 11 workshops with 33 hours dedicated to accelerator workshops, feedback workshops, mentorship and one-to-one meetings. The Accelerator hosted 15 speakers, amongst which 8 EVOLVED-5G partners were engaged, while 7 tools were presented, including the EVOLVED-5G IP Commercialization Blueprint.

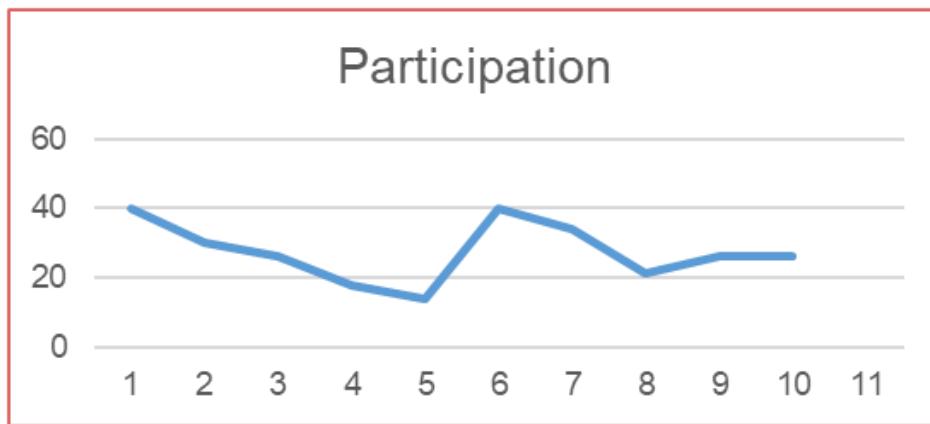


Figure 129. Evolution of the participation of teams

The participation of teams as showcased in the image above indicates that at least nine member per team was always present, with increased interest during the Entrepreneurship Masterclass as well as during the workshops with representatives of the industry with case studies.

The teams had the opportunity to pitch their ventures multiple times to receive feedback and work on their presentations. The total of 6 pitching sessions, resulted to an exceptional presentation during the Demo Day.

The EVOLVED-5G Accelerator Library, featured diverse reading material, including articles, reports, publications, use cases, as well as access to training material, free courses, industry insights, events and networking opportunities. The Library containing 59 diverse resources from industries such as renewable energy, transportation, autonomous driving, healthcare, HealthTech and industry 4.0 is a point where SMEs, developers and those interested in 5G technology can find the material to explore about the industry and jumpstart their plans.

A reader commented in one of the training courses shared both in the Library and the Courses Space: "It's great to see such opportunities for learning and skill development in the field of 5G Network App creation. The availability of this course on educational platforms like UPVx/EDx ensures that individuals interested in 5G Network App development can access the training conveniently. It's wonderful that the course follows the EVOLVED-5G vision and is open to everyone."



## 5 CONCLUSIONS

This document has provided a detailed report on the activities carried out in Task 6.1, "Developers-oriented Events and Related Training Material," and Task 6.2, "SMEs and Startup Acceleration Program," under WP6 during Period 2 of the EVOLVED-5G project, from M17 until the project's completion, after the achievement of MS5 "Training Materials and Startup Acceleration Program fully active." Throughout this period, both WP6 tasks have focused on actively establishing a vibrant community of startups and developers associated with the EVOLVED-5G project.

This deliverable has highlighted the progress made in developing new training activities and training courses. Notably, 5 additional on-demand open courses on EVOLVED-5G technical topics, and one course extension, have been developed. Those courses have been pointed out as a great training opportunity in a recent cutting-edge tech topic such as 5G & B5G Network App creation by members of the Community (external public), who have expressed spontaneously this opinion posting it in the Library and Forum. Moreover, the spontaneous user feedback posted highlights the openness and online on-demand availability of the courses in well-known educational platforms, that allow to any person interested in this field to find, access them, and take advantage of this learning opportunity to acquire timely technical skills on the field of 5G Network Apps. Significantly, another aspect that has been positively appreciated is the presentation of the EVOLVED-5G vision within them.

Moreover, various training activities and workshops have been conducted. Specifically, EVOLVED-5G partners have organised 11 separated events, exclusively dedicated to EVOLVED-5G training. Additionally, consortium partners have arranged broader-scope events addressing EVOLVED-5G technical topics. Within these events, 16 hands-on activities and 5 presentations or lectures focused on EVOLVED-5G's technical vision, developments, and framework have taken place. Moreover, in this task the EVOLVED-5G Wiki has been developed to attract and support the developer community and presents 18 root topics with different entries for technical contents, linking to EVOLVED-5G GitHub projects, to the Marketplace, Forum and the project website. Furthermore, technical support has been provided to both internal and external developer audiences, managed through the Forum.

This document has also outlined the activities related to the SMEs and Startup Acceleration Program. The EVOLVED-5G Library has provided insightful and interesting articles, reports, announced courses or addressed any industry related topics, counting almost 60 entries at the submission time of this deliverable. The Acceleration Library currently hosts 59 unique resources, garnering a total of 9189 views. Moreover, during the Train the Trainer program, 20 diverse organizations spread across Europe were contacted, to further extend EVOLVED-5G support towards building robust ecosystems fostering the adoption and development of 5G technologies and beyond.

Furthermore, a set of online resources developed and maintained by WP6 are and will be available after the end of the project to stakeholders and any external audiences: namely the EVOLVED-5G Wiki, Forum, Accelerator Library and the Training Course Spaces and published EVOLVED-5G MOOCs. These resources will contribute to fostering and nurturing a Community around EVOLVED-5G technical developments after the lifetime of this project.

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[14] “EVOLVED-5G Demo Day” in EVOLVED-5G Youtube Channel

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## 7 ANNEXES

### 7.1 ANNEX 1: TRAINING COURSE REGISTRATION

It is only required to have a user account to enrol in the EVOLVED-5G open online training courses. Any person can register a user and access these courses free of cost.

The steps for accessing a course are the following:

1. Create an account at UPVx if you have not registered.
  - a. Navigate to UPVx main page: [www.upvx.es](http://www.upvx.es)



- b. Click "Sign in"



- c. Click "Create an Account"

UNIVERSITAT  
POLITECNICA  
DE VALÈNCIA

UPV[X]  
Formación Online

CREDITOS POR ACTIVIDADES UPV

First time here? [Create an Account.](#)

**Sign In**

Email  The email address you used to register with UPV[X]

Password

[Forgot password?](#)

Remember me

**Sign in**

d. Fill out the registration form and create the account

UNIVERSITAT  
POLITECNICA  
DE VALÈNCIA

UPV[X]  
Formación Online

CREDITOS POR ACTIVIDADES UPV

Already have an UPV[X] account?  
[Sign in.](#)

**Create an Account**

Create an account using

Or create a new one here

Full Name  This name will be used on any certificates that you earn.

Public Username  The name that will identify you in your courses. It cannot be changed later.

Email  This is what you will use to login.

Password

City (optional)

Country

Gender (optional)  Year of birth (optional)

Highest level of education completed (optional)

Mailing address (optional)

Tell us why you're interested in UPV[X] (optional)

Review the Honor Code  agree to the UPV[X] Honor Code

Review the Terms of Service  agree to the UPV[X] Terms of Service

**Create account**

2. Log in to the [UPVx](#) platform



First time here? Create an Account.

**Sign In**

Email

The email address you used to register with UPV[X]

Password

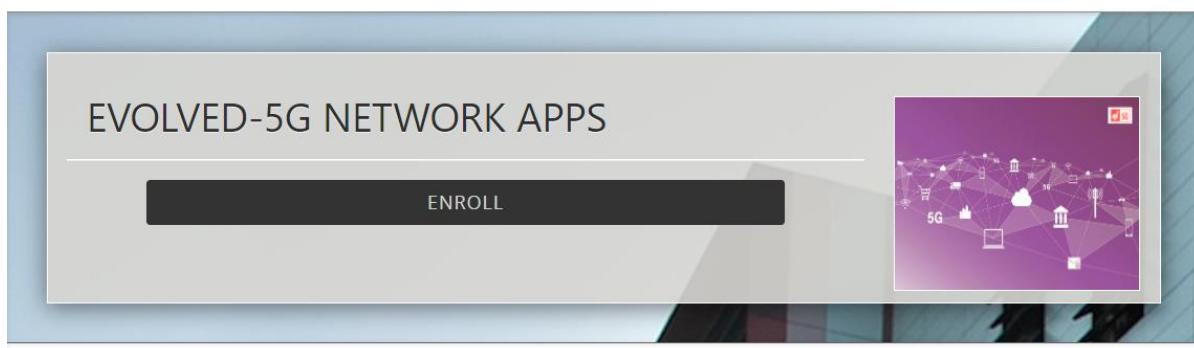
[Forgot password?](#)

Remember me

**Sign in**



3. Access the main course page (e.g., link for "[EVOLVED-5G NetApp Development](#)" course) and click on the "ENROLL" button. You can also search for EVOLVED-5G courses in the main page, using the search option, to access to them.



4. After being enrolled, you will be able to access course resources and take lessons. You also have the possibility of obtaining a course certificate.



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

View this course as: Staff

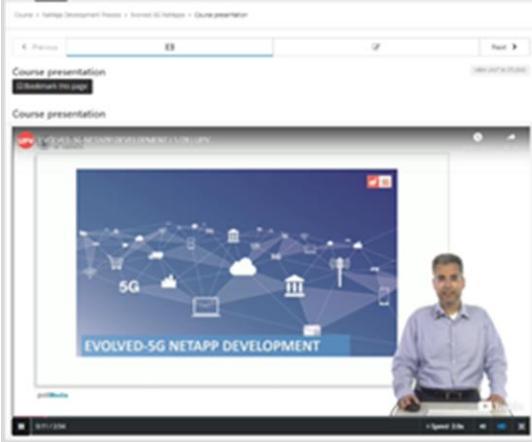
Home Course Discussion Progress Programs Preguntas frecuentes Instructor

### Evolved-5G NetApp Development

**NetApp Development Process**

- Evolved-5G NetApps
- 5G Programmability & SBA
- Capif
- Evolved-5G NetApp Vision
- Advantages of the creation & use of Evolved-5G NetApps
- Design of the NetApp
- Steps for NetApp Development
- Implementation Principles
- Definition of the NetApp API
- Further Steps for NetApp Creation

Module Exam  
examen unidad 0f



## 7.2 ANNEX 2: EVOLVED-5G COMMUNITY RESOURCES

This Annex is an information leaflet for external stakeholders (e.g., developers, external SMEs from the accelerator program, etc..) regarding the community resources available from the project, namely the Wiki, the Forum, the Library and the Training Course Space, as well as the Marketplace and the GitHub organization.

### EVOLVED-5G COMMUNITY RESOURCES

**WIKI**



Centralized technical documentation source of the EVOLVED-5G project

[wiki.evolved-5g.eu](http://wiki.evolved-5g.eu)

**FORUM**



Public space for inquiries, discussion, and technical support around EVOLVED-5G-related topics

[forum.evolved-5g.eu](http://forum.evolved-5g.eu)

**LIBRARY**



Online Library where different resources, links and entries of interest regarding topics related with EVOLVED-5G can be found

[forum.evolved-5g.eu](http://forum.evolved-5g.eu)

**TRAINING COURSES**



Free online courses for training step-to-step regarding EVOLVED-5G vision and technical topics, such as Network App development

[wiki.evolved-5g.eu](http://wiki.evolved-5g.eu)  
[forum.evolved-5g.eu](http://forum.evolved-5g.eu)

**GITHUB**



Open-source code of Network Apps & other EVOLVED-5G developments at EVOLVED-5G GitHub Organization

[github.com/evolved-5g](http://github.com/evolved-5g)

**MARKETPLACE**



Free online Network Apps from EVOLVED-5G project, ready-to-use with a large variety of use cases

[marketplace.evolved-5g.eu](http://marketplace.evolved-5g.eu)



EVOLVED-5G project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement N° 101016608



PUBLIC-PRIVATE PARTNERSHIP



### 7.3 ANEX 3: EVOLVED-5G TRAINING COURSES LEAFLET



Experimentation and Validation Openness for Long-term evolution of VErtical inDustries in 5G era and beyond

**EVOLVED-5G FREE TRAINING**



Free online technical training courses on top educational platforms

**Network App creation**



Step-to-step course to develop Network Apps that will enable new applications and services

**Network App Verification course ✓**

How to verify the correct performance of your Network App using free tools from EVOLVED-5G

**EVOLVED-5G Network App Marketplace**

Guide to search and retrieve Network Apps for your App, or to publish your Network Apps in the EVOLVED-5G Marketplace



www.evolved-5g.eu



EVOLVED-5G project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement N° 101016608





Experimentation and Validation Openness for Long-term evolution of VErtical inDustries in 5G era and beyond

**EVOLVED-5G FREE TRAINING**



Free online technical training courses on renowned educational platforms

**Network Application course**



What is a Network App and the benefits that provides, enabling new applications and services or improving functionality of existing ones

**Certification of Network Apps**



Nobel certification concept from the EVOLVED-5G project.  
How to obtain a Network App certificate from EVOLVED-5G and what essential technical aspects guarantee

**Validation of Network Apps**



Using the specific methodology of EVOLVED-5G and 5G validation platforms, how to validate a Network App and retrieve specific KPIs



EVOLVED-5G project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement N° 101016608



132



## 7.4 ANNEX 4 : EVOLVED-5G LIBRARY ITEMS

### Entry 1: The Accelerator Library – An Introduction

Views: 195

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/the-accelerator-library-an-introduction/45/2>

The Accelerator Library – An Introduction

MariaAnagnostopoulos May '22

**ACCELERATOR LIBRARY**  
RESOURCES FOR THE COMMUNITY

Building a community of SMEs & startups open to innovation offering an **accelerator library** of **resources, news and courses** introducing to **5G technologies**, methodologies and deployment for a maximum business impact. Available for users of Evolved-5G marketplace offering **off-line opportunity** to dive-in to the specifics of 5G technologies and methodologies to either **incorporate** in their businesses for higher efficiency, automation and virtualization, or to either build **new products & services** addressing emerging markets.

Reply

The Library contains presentations and workshops communicating the results of the EVOLVED-5G Project and sharing resources and knowledge to the community.

### Entry 2: WP6 INFOLYSiS Training Demo

Views: 245

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/wp6-infolysis-training-demo/42>



WP6 INFOLYSiS Training demo

Accelerator Library

MariaAnagnostopoulos May '22 May 2022 1/1 May 2022

**5G Networks Programmability**  
New Opportunities and Perspectives in the context of the European Research Programme EVOLVED-5G

21 & 22.03.2022 13.00-16.00

INFOLYSiS team participated in the "5G Networks Programmability" on the 21st and 22nd of March. In this joint workshop organized by EVOLVED-5G project and the Computer Science department of Athens Metropolitan College, several partners presented the main characteristics of 5G networks and initial developments in the framework of EVOLVED-5G project. Also, three SMEs involved in the project presented their NetApp demos. INFOLYSiS, one of the three SMEs, presented the "INFOLYSiS NetApp".

INFOLYSiS ([www.infolysis.gr](http://www.infolysis.gr)) is a Greek IT SME which specializes on the development of viber and web-based chatbot applications. In the context of EVOLVED-5G project INFOLYSiS utilizes the web-based chatbot platform in order to provide self-contained information within the factory environment and support workers during their everyday workflow. The web-based chatbot is boosted by the 5G network to provide accurate indoor location. In the INFOLYSiS demo, the inside area of the factory is divided in different cells according to the placement of the 5G network and each cell consists of several machines. Since the workers of the factory have access to the chatbot application via a smart device, they can easily use it for support to their maintenance and reporting procedures. More specifically, according to the accurate cell location, provided by the 5G network, the chatbot can not only narrow down the list of machines to the ones close to the worker's location but also ensure that only authorized workers can operate on the machines, ensuring their safety. Lively conversations offered by the chatbot app can guide the worker to easily store

The INFOLYSiS team participated in the "5G Networks Programmability" on the 21st and 22nd of March 2022 and organized a joint workshop by the EVOLVED-5G project and the Computer Science department of Athens Metropolitan College, where several partners presented the main characteristics of 5G networks and initial developments in the framework of EVOLVED-5G project. Also, three SMEs involved in the project presented their NetApp demos. INFOLYSiS, one of the three SMEs, presented the "INFOLYSiS Network App". This entry includes presentations from INFOLYsis 5G Programmability Workshop presenting their Chatbot Assistant Case study.

Chatbot Assistant

5G Programmability Workshop

INFO  
LYSiS

Presenter: Dounia Theoni  
Technical Team Member at INFOLYSiS

21/03/2022 EVOLVED-5G 5G Programmability Workshop

### Entry 3: EVOLVED-5G Workshop – Dtsolkas Slids



Views: 235

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/fogus-dtsolkas-envolved5g-ecosystem-presentation/34>

**Fogus-DTsolkas\_ENVOLVED5G ecosystem presentation**

■ Accelerator Library

**M MariaAnagnostopoulos** May '22

Dr. Dimitris Tsolkas, Deputy Technical Manager of EVOLVED-5G, presented **the EVOLVED-5G Ecosystem** in the workshop “5G Networks Programmability” on the 21st and 22nd of March. The workshop organized by EVOLVED-5G project and the Computer Science department of Athens Metropolitan College.

Event announcement page: [link](#)

Related content: [link](#)

Event video: TBA

The presentation targets students of computer science and telecommunication departments or people with basic knowledge on telecommunications and mobile networks.

The content includes:

- What 5G is about, what 6G will bring
- 5G flexibility and openness

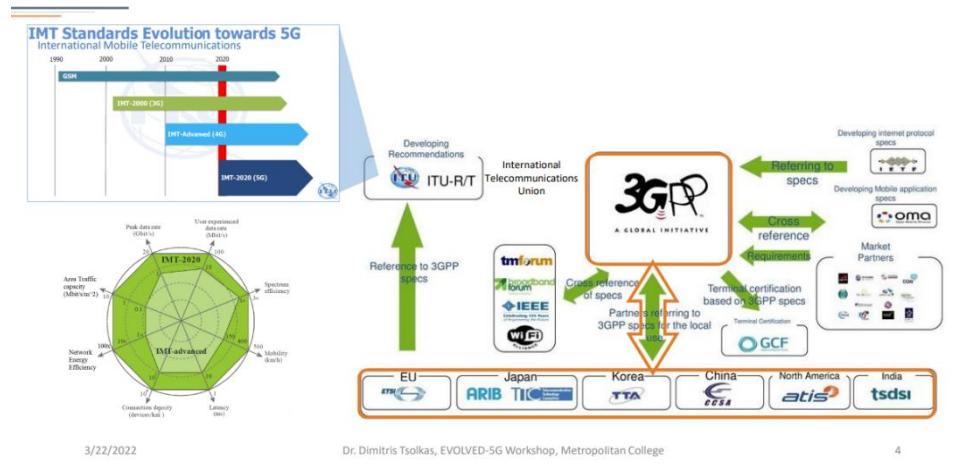
This entry includes the presentation of the EVOLVED-5G project partner at the abovementioned “5G Networks Programmability” Workshop in March 2022. The presentation “The EVOLVED-5G Ecosystem, NetApp Lifecycle and Different Development Environments” by Dr. Dimitris Tsolkas, Technical Manager Deputy of the EVOLVED-5G Project from FOGUS Innovation and Services, targets students of computer science and telecommunication departments or people with basic knowledge on telecommunications and mobile network.

The content includes:

- What 5G is about, what 6G will bring
- 5G flexibility and openness
- 5G from the SDOs perspective
- Vertical Service Providers and NetApps
- The ingredients for a Network App ecosystem (the EVOLVED-5G approach)



...5G from the SDOs perspective **5G**



3/22/2022

Dr. Dimitris Tsolkas, EVOLVED-5G Workshop, Metropolitan College

4

#### Entry 4: EVOLVED-5G Towards the Industrial Revolution of the 21<sup>st</sup> Century

Views: 231

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/evolved-5g-towards-the-industrial-revolution-of-the-21th-century/47>



## EVOLVED-5G-Towards the industrial revolution of the 21th century

■ Accelerator Library



MariaAnagnostopoulos

May '22

EVOLVED-5G: towards the industrial revolution of the 21th century

EVOLVED-5G: the European project that aims to achieve the industrial revolution of 21th century with smart factories, leveraging the immense potential of 5G through a brand new concept of 5G NetApps

UPV

Research staff from the Universitat Politècnica de València is participating in the European H2020 EVOLVED-5G project that will introduce 5G technology in industry, in particular the Distributed Real-Time Systems and Applications Laboratory (SATRD) of the UPV's Department of Communications. The aim of this project is to make a very important leap towards the industrial revolution of the 21st century, with the arrival of smart factories, by the design, creation and use of 5G NetApps that allow to deeply exploit 5G potential.

There is currently great technological and economic interest in the application of 5G technology in the industrial field because it will be the driving force behind technological innovation in the sector.

EVOLVED-5G has a vision for a new type of 5G Network Application, that will act as a bridge between the 5G network core and common Fabric-of-the-Future applications, allowing applications to fully exploit 5G capabilities. This type of NetApps embrace the vision of the 3GPPP organization, responsible for making 5G possible, by promoting, designing and defining the specifications of this new generation of mobile networks. In this regard, EVOLVED-5G NetApps adopts the Common API Framework (CAPIF) proposed by the 3GPP.

EVOLVED-5G aims to provide industry with 5G technological tools and infrastructures adapted to production environments to facilitate the creation, testing, certification and dissemination of innovative 5G network applications. For example, this project will facilitate the creation of an application development kit (SDK) for 5G NetApps, or will provide access to virtual marketplaces to enable the distribution and deployment of these 5G network applications globally.

This article developed by the Universitat Politècnica de València outlines the importance of the EVOLVED-5G Project and Network Applications for the smart factories and the factory of the future. The article covers how the application of 5G technology will enable the rapid digitisation of industry with the creation of highly innovative technological solutions that were not possible with 4G or 3G networks, such as complex internet of things (IoT) systems, artificial intelligence and massive data computing in the cloud.

### Entry 5: INFOLYSiS Chatbot and Network application for Precise Maintenance in 5G-enabled Industry 4.0

Views: 75

Published: June 2023

Link: <https://forum.evolved-5g.eu/t/infolysis-chatbot-and-network-application-for-precise-maintenance-in-5g-enabled-industry-4-0/163>

## INFOLYSIS Chatbot and Network application for Precise Maintenance in 5G-enabled Industry 4.0

Accelerator Library

Vasileios\_Mavrikakis Jun 30

INFOLYSIS is part of the first pillar Innovation; the Interaction of Employees and Machines pillar. For our chatbot application we take advantage of the indoor location that 5G provides to offer a solution for automating some time-consuming procedures of factories. In specific, a Chatbot application for workers/engineers within a factory that facilitates the reporting procedure of faulty machinery, ensuring the workers' safety, and provides the authorized personnel with the necessary documentation for the repair. EVOLVED-5G INFOLYSIS chatbot is relied on the web-based version of the INFOLYSIS chatbot platform in order to be self-contained within the factory environment. Utilizes the 5G functionality to provide accurate indoor location.

**Functionalities:**

- User authentication
- Location share
- Multiple choice buttons
- Free text
- File sharing

**INFOLYSIS Use Case Overview**

A Chatbot application that:

- facilitates the reporting procedure of faulty machinery,
- ensuring the workers' safety, and
- provides the authorized personnel with the necessary documentation for the repair
- the authorized Worker/Engineer can check for potential errors on the spot of the respective area/faulty machine.

This is a scenario where no faulty machines were spotted.

No faulty machines are mapped to the specific cell id

This entry showcases the use case of INFOLYSIS for the materialization of the EVOLVED-5G Chatbot Application for workers/engineers within a factory that facilitates the reporting procedure of fault machinery, ensuring the workers' safety, and provides the authorized personnel with the necessary documentation for the repair.

More specifically:

If a worker identifies an issue inside the factory areas, he will use the chatbot on his smart device for:

- Spotting the issue and the faulty machine
- if the respective area is closed due to safety reasons, the worker is promptly notified to evacuate,
- in any other case, a list of machines that fall under this specific area, appears on the chatbot screen,
- afterwards, if the worker has the proper authorization level to perform an action on the selected machine, a series of questions dedicated to the reporting procedure appears on the screen in order to guide the worker
- After the reporting, the worker will download, through the chatbot, the necessary documentation/manual to perform the repair,
- if the worker has no access to the specific faulty machine,
  - the proper message appears on the chatbot screen,
  - the closest authorized worker is automatically notified, through the chatbot app on his smart device

Hypothetical Repair Manual

Error detected on "Machine 5" and the device manual appears

**Machine 5 Repair Manual**

- Power off the machine and disconnect all power sources.
- Remove all external components and check for any visible damage.
- Thoroughly inspect all internal components and note any abnormalities.
- Replace any broken or damaged parts as required.
- Reassemble the machine and reconnect all power sources.
- Test the machine to ensure it is functioning correctly.
- Adjust the machine settings to meet production requirements.
- Run a diagnostic test to check for any further issues.
- Perform a final inspection of the machine before reinserting it into the production line.
- Monitor the machine's output to ensure it is running correctly.

## Entry 6: EVOLVED-5G Open Course on Network App Development



Views: 561

Published: June 2022

Link: <https://forum.evolved-5g.eu/t/evolved-5g-open-course-on-network-app-development/78>

The screenshot shows a course entry titled "EVOLVED-5G Open Course on Network App Development". It includes a "Regel" (Rule) icon, a "Jun '22" date, and a "6" rating. The course description states: "EVOLVED-5G offers an on-demand open training course for NetApp development [18], available in the educational platforms UPVx/EDx." Below this, a text box says: "This course guides on the creation of 5G NetApps following the EVOLVED-5G vision, and can be accessed by everyone. It only requires you to register on the platform if you don't have an account." A large thumbnail image for the course shows a network diagram with various icons like clouds, servers, and mobile phones connected by lines, with "5G" prominently displayed.

This entry is an EVOLVED-5G open course on Network App Development available on UPVx/EDx. It includes an on-demand open training course on Network App development. The course guides on the creation of 5G Network Applications following EVOLVED-5G vision, communicating the project, methodology and network applications to a wider audience, through the Universitat Politècnica de València e-learning infrastructure. This entry resulted in engagement from the community, commenting on the learning and skills development opportunity this course brings.



1 YEAR LATER

K

karfageniyy

Jul 13

Thank you for sharing information about the EVOLVED-5G open course on network app development! It's great to see such opportunities for learning and skill development in the field of 5G NetApp creation.

The availability of this course on educational platforms like UPVx/EDx ensures that individuals interested in 5G NetApp development can access the training conveniently. It's wonderful that the course follows the EVOLVED-5G vision and is open to everyone.

For those who are interested, registering on the platform will grant access to this training course. It's a valuable opportunity to enhance one's skills and knowledge in network app development specifically tailored for the 5G domain.

If you're seeking further information on educational app development costs and insights into creating such apps, you can refer to this post about [how to make education app](#). It provides useful guidance and can assist you in making informed decisions.

Best of luck to those taking the EVOLVED-5G open course! It's an exciting opportunity to delve into the world of network app development in the 5G era.



UNIVERSITAT  
POLITÈCNICA  
DE VALÈNCIA

## Evolved-5G NetApp Development

ENROLL

DURATION    **WHAT I WILL LEARN**    PREREQUISITES    TEACHERS

### What I will learn

Along the course you will learn:

- What is 5G programmability and which are the huge advantages of its exploitation
- What is a 5G NetApp, its highly innovative approach and the significant benefits from NetApp application
- How to develop a NetApp
- How to use the most important software tools that can assist you in the development a NetApp
- How to install and use the EVOLVED-5G SDK for creating NetApps
- How to start coding your NetApp from a generic NetApp template
- How to use SDK libraries for exploiting 5G Core functionality in an easy manner

### Entry 7: Deployment tests for the 5G enabled Security Information and Event Management system of FOGUS

Views: 87



Published: May 2023

Link: <https://forum.evolved-5g.eu/t/deployment-tests-for-the-5g-enabled-security-information-and-event-management-system-of-fogus/142>

**Deployment tests for the 5G enabled Security Information and Event Management system of FOGUS**

■ Accelerator Library

Vasileios\_Mavrikakis May 3

The FOGUS 5G add-on application extends the capabilities of a Security Information and Event Management system to include 5G devices in the monitoring process. The application was successfully deployed and tested at Athens 5G platform in NCSR Demokritos campus by FOGUS and NCSR partners on Thursday 23rd March 2023. Find out more in the following video in the EVOLVED-5G's YouTube channel here: <https://www.youtube.com/watch?v=5Zb6SHLP7Uk&t=1s>

Reply

This entry reports the deployment and testing of the FOGUS 5G add-on application of a Security Information and Event Management system at the Athens 5G platform in NCSR Demokritos campus by FOGUS and NCSR partners. This entry showcases the progress of the EVOLVED-5G project and methodology, as well as serves as a use case for the community in an interactive format.



The image shows a YouTube video thumbnail. The video title is "Deployment tests for the 5G enabled Security Information and Event Management system of FOGUS." It features the FOGUS logo at the top, followed by the text "Network App deployment activities in Athens B5G Experimentation Platform NCSR ‘Demokritos’". Below the video player, there is a small image of a classical Greek bust labeled "DEMOKRITOS". The video has 65 views and was posted 7 months ago. The channel is "Evolved-5G Project" with 71 subscribers. Buttons for Analytics, Edit video, Share, Promote, Download, and more are visible.

Deployment tests for the 5G enabled Security Information and Event Management system of FOGUS.

Evolved-5G Project 71 subscribers

Analytics Edit video Share Promote Download ...

65 views 7 months ago

The FOGUS 5G add-on application extends the capabilities of a Security Information and Event Management system to include 5G devices in the monitoring process. The application was successfully deployed and tested at Athens 5G platform in NCSR Demokritos campus by FOGUS and NCSRD partners on Thursday 23rd March 2023. ...more

The image shows a screenshot of a web browser displaying the Mongo Express interface. The interface lists four databases: "admin", "capif", "config", and "local". Each database entry has a green "View" button on the left and a red "Delete" button on the right. Below the database list, there is a "Server Status" section with the message "Turn on admin in config.js to view server stats!". The browser's address bar shows "Instances - OpenShift Container Platform" and "Mongo Express". The status bar at the bottom indicates "1:09 PM" and "3/23/2023".

Databases

|  | Database Name | Action |
|--|---------------|--------|
|  | admin         |        |
|  | capif         |        |
|  | config        |        |
|  | local         |        |

Server Status

Turn on admin in config.js to view server stats!

Deployment tests for the 5G enabled Security Information and Event Management system of FOGUS.

Evolved-5G Project 71 subscribers

Analytics Edit video Share Promote Download ...

65 views 7 months ago

The FOGUS 5G add-on application extends the capabilities of a Security Information and Event Management system to include 5G devices in the monitoring process. The application was successfully deployed and tested at Athens 5G platform in NCSR Demokritos campus by FOGUS and NCSRD partners on Thursday 23rd March 2023. ...more

## Entry 8: EVOLVED-5G in DEFEA 2023



Views: 102

Published: May 2023

Link: <https://forum.evolved-5g.eu/t/evolved-5g-in-defea-2023/147>



## EVOLVED-5G in DEFEA 2023

Accelerator Library



Vasileios\_Mavrikakis

May 10

EVOLVED-5G was present at DEFEA 2023. INFOLYSiS and InQbit represented the project through a booth. DEFEA is a high-profile International Defence Exhibition where the leading Greek and international companies present land, sea and air defence systems to a highly specialized audience of the Greek and international community.



This entry reports on the presence of the EVOLVED-5G Project at DEFEA 2023 (<https://defea.gr/>) with the participation of INFOLYSiS and InQbit. DEFEA is a high-profile International Defence Exhibition where the leading Greek and international companies present land, sea and air defence systems to a highly specialized audience of the Greek and international community. The results of this representation was communicated to the community with 102 views.



#### Entry 9: Guide for NetApp Containerization & External Configuration for Developers

Views: 361

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/guide-for-netapp-containerization-external-configuration-for-developers/46>



## Guide for NetApp Containerization & External Configuration for Developers

■ Accelerator Library



MariaAnagnostopoulos

May '22

GUIDELINES FOR THE DOCKERFILE AND CONFIGURATION FILE OF A NETAPP

Version: 0.1

### 1 INTRODUCTION

All NetApp deployments must have the following 2 files:

- **Dockerfile** ( or docker-compose.yml if the NetApp requires more than one container). This file allows for the virtualization and containerization of the NetApp.
- NetApp configuration file named **config.json**: All hardcoded parameters in your code (e.g. usernames, passwords, IP, endpoints) must be added to this configuration file and removed from your code. These configuration values must be loaded in the NetApp through this configuration file and must not be directly hardcoded in the code.

2 DOCKERFILE GUIDELINES

### 2.1 STEPS

#### 0) Install Docker

Install Docker from the official Docker webpage if you don't have Docker already installed in your system - it is preferable than installing Docker from repositories, that may be outdated-. If you need to use docker-compose (only in the case of requiring a multi-container deployment), also install it from the official webpage.

#### 1) Create the Docker image of your NetApp

Create a **requirements.txt** file in the root folder of your NetApp project containing the names of the Python dependencies required (e.g. flask, evolved5g, jsonpickle...), filling 1 dependency per line.

**requirements.txt**

This entry includes guidelines from the EVOLVED-5G project targeted for the developers' community for the containerization and external configuration of Network Applications. A 6-step guide including commands, files, github links and other useful information to complete the process.

### Entry 10: IWAPS 2023, EVOLVED-5G Co-organised workshop

Views: 152

Published: April 2023

Link: <https://forum.evolved-5g.eu/t/iwaps-2023-evolved-5g-co-organised-workshop/138>



**IWAPS 2023, EVOLVED-5G Co-organised workshop**

■ Accelerator Library

V Vasileios\_Mavrikakis Apr 4

This workshop aims to strengthen security and privacy through research and relevant activities in the models and design of secure, privacy-preserving and trust architectures, investments in cyber-defense, data analyses, fusion platforms, protocols, algorithms, services, and applications for next generation systems and solutions. We especially encourage security and privacy solutions that employ innovative machine learning techniques to tackle the issues of inspecting large data volumes, cyberattacks, and variety problems that are systemic in IoT platforms, theoretical and practical challenges related to the design of privacy-preserving AI systems and algorithms and will have strong multidisciplinary components, including soliciting contributions about policy, legal issues, and societal impact of privacy and affect the cyber risk of the participating entities.

The 2023 IWAPS will bring together researchers, engineers, and practitioners to present and discuss latest advances and innovations in theories, infrastructure, schemes, and applications for secure computation, privacy technologies, security economics, human computer interaction, as well as to identify emerging research topics and define the future trends.

The workshop will take place in the context of the 18th International Conference on Availability, Reliability and Security (ARES 2023) in Benevento, Italy, on August 29 – September 01, 2023.

Find out more here: <https://www.ares-conference.eu/workshops/iwaps-2023/>

**IWAPS 2023**  
3rd International Workshop on Advances on Privacy Preserving Technologies and Solutions to be held in conjunction with the 18th International Conference on Availability, Reliability and Security  
AUGUST 29 – SEPTEMBER 01, 2023

This entry communicates the learning and network opportunity, through a workshop organized at IWAPS 2023 by the EVOLVED-5G project aiming to strengthen security and privacy through research and relevant activities in the models and design of secure, privacy-preserving and trust architectures, investments in cyber-defense, data analyses, fusion platforms, protocols, algorithms, services, and applications for next generation systems and solutions.

#### Entry 11: -"Remote assistance in Mixed Reality" White Paper by Immersion

Views: 115

Published: April 2023

Link: <https://forum.evolved-5g.eu/t/remote-assistance-in-mixed-reality-white-paper-by-immersion/137>



## "Remote assistance in Mixed Reality" White Paper by Immersion

Accelerator Library



Vasileios\_Mavrikakis

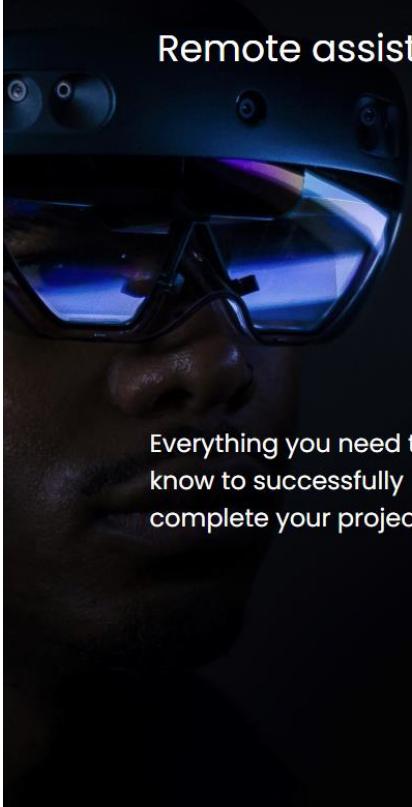
Apr 4

Working with others has always raised multiple questions. What is the optimal process to take together the best decisions? Which solutions can facilitate the communication between participants? How to handle conflicts and contradictory opinions? Answering such questions is already complex when users are co-located, but it becomes even more tricky when it is not the case. Remote assistance scenarios imply two main characteristics: 1) users do not share the same physical space and 2) they do not have the same knowledge and capacities. On the one hand, local users can physically act on their surroundings, but need help because they do not know how to proceed with the task they have in mind. On the other hand, remote helpers have the expertise to perform this task, but cannot achieve it because they are not physically present at the corresponding location. Remote assistance is thus closely linked to remote guidance.

Find more in the White Paper here: <https://r8sw9eo7.sibpages.com/>

  ...  Reply

This entry includes a white paper published by Immersion, an SME from the EVOVLED-5G project featuring remote assistance in mixed reality to support SMEs and developers to utilized for their projects, including wealth of information for those who want to go deeper into the subject, with scientific articles deciphered and summarized for easy access, a rich bibliography and many anecdotes to shine in society.



IMMERSION  
IMAGINATION, INTERACTION...

Microsoft Partner | Mixed Reality

## Remote assistance in Mixed Reality

Everything you need to know to successfully complete your project.

Download our white paper

First name

Name

Company

Email

Choose your language  
-- choose an option --

Download

I agree to receive your e-mails and confirm that I have read your [privacy policy](#) and [legal notice](#).

### Entry 12: Network Apps Enabling Application-Layer Analytics for Vertical IoT Industry

Views: 155

Published: March 2023

Link: <https://forum.evolved-5g.eu/t/network-apps-enabling-application-layer-analytics-for-vertical-iot-industry/136>



## Network Apps Enabling Application-Layer Analytics for Vertical IoT Industry

■ Accelerator Library



Vasileios\_Mavrikakis

1 Mar 15

This article presents the concept of vertical application enablement which is a framework that enables the integration of vertical IoT apps within future mobile networks. The vertical application enablement provides a toolbox of value-add services, realized via so-called Network Applications (NetApps), that form an optimization and translation layer, which eases the interaction between vertical IoT apps and mobile networks. The importance of data management at the telco cloud platforms, and in particular the data collection and analytics enablement, necessitates a new category of NetApps which aims at supporting cross-domain integrated analytics to optimize end to end application performance. In this article, we review the various vertical application enablement frameworks, and we consider more specifically the NetApps that can be used to expose their services/capabilities. We also discuss the Application Data Analytics Enablement Services (ADAES) that can provide app-layer analytics services to vertical IoT apps, and we present its architecture, capabilities, and its current standardization status in 3GPP. In addition, we present an innovative implementation of analytics enablement through NetApps, which enables vertical IoT clients to select the best vertical IoT server instance, which is expected to provide the best performance. You may find the article here:

<https://ieeexplore.ieee.org/document/10012484>

The entry includes an article presenting the concept of vertical application enablement which is a framework that enables the integration of vertical IoT apps within future mobile networks. The authors of this article are members of the EVOLVED-5G project.

### Entry 13: INFOLYSIS Chatbot in the Context of EVOLVED-5G

Views: 132

Published: March 2023

Link: <https://forum.evolved-5g.eu/t/infolysis-chatbot-in-the-context-of-evolved-5g/135>



## INFOLYSIS Chatbot in the context of EVOLVED-5G

■ Accelerator Library



Vasileios\_Mavrikakis

1 Mar 14

INFOLYSIS Intent driven chatbot, for precise maintenance in 5G-enabled Industry 4.0 environment, was successfully deployed and tested at Athens 5G platform in NCSR Demokritos campus by INFOLYSIS and NCSRD partners on Wednesday 7th December 2022. You may find more information here: <https://www.youtube.com/watch?v=kVv3lpeghso&t=28s>

... Reply



This entry showcases the chatbot developed by INFOLYSIS, which was deployed and tested at Athens 5G platform in NCSR Demokritos campus by INFOLYSIS and NCSR partners. It includes a link to the YouTube video explains how the deployment took place.

INFOLYSIS Intent-driven chatbot deployment tests at NCSR Athens 5G platform

Evolved-5G Project 71 subscribers

Analytics Edit video Share Promote Download ...

60 views Mar 7, 2023

INFOLYSIS Intent driven chatbot, for precise maintenance in 5G-enabled Industry 4.0 environment, was successfully deployed and tested at Athens 5G platform in NCSR Demokritos campus by INFOLYSIS and NCSR partners on Wednesday 7th December 2022.

#### Entry 14: 5GPPP TB Workshop Session on Network Applications, Dr. Dimitris Tsolkas

Views: 142

Published: October 2022

Link: <https://forum.evolved-5g.eu/t/infolysis-chatbot-in-the-context-of-evolved-5g/135>



## Presentation: 5GPPP TB Workshop Session on Network Applications, Dr. Dimitris Tsolkas

Accelerator Library

MariaAnagnostopoulos 1 Oct '22

5G PPP TB Workshop Session on Network Applications The ecosystem of Network Applications: From the experimentation Facilities to a Common API management framework Dr. Dimitris Tsolkas (DTM, EVOLVED-5G project) EPOSUS

**5GPPP TB WORKSHOP SESSION ON NETWORK APPLICATIONS BY DR. DIMITRIS TSOLKAS**

Dr. Dimitris Tsolkas, Deputy Technical Manager of EVOLVED-5G, gave a presentation during the 5GPPP Technology Board workshop that was held by Institute of Communication and Computer Systems (ICCS), NTUA, Greece, in October 6, 2022. The presentation was about the main principles of Network Applications, as well as the role of experimentation facilities and API management frameworks in the emerging ecosystem of network applications.

Related content: [link](#)

The presentation targets experts in 5G systems as well as vertical industries interested in developing network applications.

The presentation touches research aspects currently investigated within the 5GPPP ICT-41 projects, including the FV01 VFD-5G project. Key reference of the presentation is the 3GPP

This entry includes a report on the presentation on 5GPPP TB workshop Session on Network Applications, the ecosystem of Network Applications, from the experimentation to facilities to a common API management framework. This includes the presentation slides, targeting experts in 5G systems as well as vertical industries interested in developing network applications.

### EVOLVED-5G Vision: Support the emerging ecosystem of Network Applications



#### • The NetApp Definition

**SoftNet WG - WP:** Network Application is a piece of software that interacts with [the control plane](#) of a mobile network by consuming the exposed Application Programmable Interfaces (APIs).

An EVOLVED-5G Network Application is a software piece that composes a service [for a vertical](#) by consuming native network APIs.

A SGASp Network Application, is defined as set of services that provide certain functionalities [to the verticals](#) and their associated use cases.

\***Network Application:** A third-party application that interacts with the network to provide network- or vertical- oriented services

NetApps provide network- or vertical- oriented services, meaning that they can assist/enhance either the network operation/management or the vertical application

As third-party apps, the NetApps interact with network functions/nodes through [open and standardized interfaces/APIs](#) that can reside at any plane (user, control, management) or any domain (core, radio, transport)

**Network core** (e.g., the EVOLVED-5G approach, NEF APIs are used for interaction with the NetApps)

**Management and orchestration** (e.g., the majority of ICT-41 projects that MANO APIs for their NetApps – 5G-ERA utilizes an OSM unified interface based on NFV S1/S0/S5 specifications to enable an intent engine/NetApp to control the full operation of Network Services and Network Slices)

**RAN-level** (O-RAN rApps & xApps can also be considered as NetApps, 5G-BAINS foresees ML-based control on top of flexRIC sdk/an O-RAN-compliant implementation)

\*To be added in the next White paper of the Arch WG



## Entry 15: EVOLVED-5G Newsletter #7

Views: 150

Published: October 2022

Link: <https://forum.evolved-5g.eu/t/evolved-5g-newsletter-7/97>

The screenshot shows a forum post from the 'Accelerator Library' category. The post is by user 'Vasileios\_Mavrikakis' on October 22, 2022. The subject is 'Evolved-5g newsletter #7'. The message content is: 'The 7th issue of the **EVOLVED-5G newsletter** is now available! In this issue you may all related information about activities for the July - September period! Find it online here: [Newsletter – EVOLVED-5G](#)'.

Below the message are standard social media sharing icons (heart, share, etc.) and a 'Reply' button.

This entry includes a newsletter disseminated to the EVOLVED-5G Community, which includes multiple resources, workshop material, usecases and networking opportunities.

The screenshot shows three video thumbnails from the EVOLVED-5G YouTube channel:

- YouTube Videos**
  - Harilaos Koumaras EVOLVED-5G technical manager presented the conference paper entitled " NEFSim: An open experimentation framework utilizing 3GPP's exposure services" during EUCNC 2022. The video is available at the EVOLVED-5G YouTube channel here: <https://www.youtube.com/watch?v=VDQVUvUHeu8>
  - Harilaos Koumaras EVOLVED-5G technical manager presented the conference paper entitled " A Network Programmability Framework for Vertical Applications in the Beyond 5G Era" during EUCNC 2022. <https://www.youtube.com/watch?v=WO6KdwCM4Yk>
  - A EVOLVED-5G video has been produced by Atos, showcasing the journey a developer takes starting from the creation of a NetApp until its verification in the EVOLVED-5G framework. The video overviews in brief the whole process, from joining the EVOLVED-5G GitHub until the verification. The video is available at the EVOLVED-5G YouTube channel here: <https://www.youtube.com/watch?v=6BBIF3V1g24>



## Entry 16: 5G Network performance and radio coverage monitoring for Industry 4.0, enhanced by drone

Views: 308

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/5g-network-performance-and-radio-coverage-monitoring-for-industry-4-0-enhanced-by-drone/36/2>

The screenshot shows a forum post titled "5G Network performance and radio coverage monitoring for Industry 4.0, enhanced by drone". The post is authored by MariaAnagnostopoulos and dated May '22. The content discusses the development and implementation of a Network Application targeting 5G network performance and coverage monitoring for Industry 4.0 environments. It mentions the use of Internet Institute's qMON quality monitoring suite product, which includes drone assistance for height relation perspective monitoring and real-time video streaming to identify potential sources of performance drop (e.g., sources of radio interferences, metal obstacles causing signal scattering, etc.).

**Diagram illustrating the architecture:**

The diagram illustrates the architecture for 5G network performance and coverage monitoring. It shows a flow from a "Smart factory" (containing a 5G Modem, Monitoring Agent, Industrial GW, and Drone) through a "5G Edge Cloud" (with Reference Server and Monitoring Agent) and a "5G Core Network/Cloud" (with KPI Collector, Reference Server, Management, Analytics, and Video Proxy). The "Metrics and KPI" and "Drone-based video stream" are collected and sent to the "Management" and "Live streaming" components in the "Data visualization and Reporting" section, which also includes an "Analytics" component.

Use case study has been presented in Testing and optimizing 5G for industrial verticals presentation at the 25th Seminar on Radio Communications in Ljubljana, Slovenia (2 – 4)

This entry includes a use case presented in the testing and optimizing 5G for industrial verticals by Internet Institute, who is working in the EVOLVED-5G project on the development and implementation of a Network Application targeting 5G network performance and coverage monitoring for industry 4,0 environments and the factory of the future.

## Entry 17: EVOLVED-5G Open Course on NETWORK APPS

Views: 356

Published: June 2022

Link: <https://forum.evolved-5g.eu/t/evolved-5g-open-course-on-network-apps/72>



**EVOLVED-5G Open Course on NETWORK APPS**

■ Accelerator Library

 Regel ⓘ

5 Jun '22

There is an [EVOLVED-5G Open Course](#) regarding the EVOLVED-5G Network App concept [6](#) available in the educational platforms UPVx/EDx. Enrollment and access to materials are free to everyone.

This course allows in an easy, descriptive way to initiate your knowledge on EVOLVED-5G Network Apps and how 5G can be exploited to provide benefits in any area.

**EVOLVED-5G NETAPPS**

[ENROLL](#)



[UPVX Formación Online](#) ⓘ

**UPV [X]** MOOC, cursos gratuitos online masivos de la UPV en España, UPV[X]. Más de 40... ⓘ

This entry includes an open course developed by the EVOLVED-5G Project and hosted on Universitat Politècnica de Valencia platform for on demand learning. A free course, allowing an easy, descriptive way to initiate your knowledge on EVOLVED-5G Network Apps and how 5G can be exploited to provide benefits in any area.

The EVOLVED-5G Accelerator Library also includes multiple good reads, resources, courses and papers published by the general 5G community to promote 5G technologies and best practices across different industries.

#### Entry 18: 5G for Absolute Beginners

Views: 217

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/5g-for-absolute-beginners/35/2>



The screenshot shows a course entry for '5G for Absolute Beginners' from the Accelerator Library. The course is offered by MariaAnagnostopoulos on Udemy. It was published in May '22. The course title is 'Free 5G Tutorial - 5G for Absolute Beginners'. The description states: 'Learn basics of 5G mobile wireless technology - Free Course'. Below the course details, there are logos for Udemy, 5G, and 3G4G. The course title '5G for Absolute Beginners' and 'Promo video' are displayed prominently. The video was created by ZAHID GHADIALY in APRIL 2020. A 'Play' button and a Twitter link (@3g4gUK) are also visible.

In this free 50min course, provided by Udemy, you are going to get acquainted with the basics of 5G mobile wireless technology. The course is designed for people with little or no understanding of 5G technology. It will look at different aspects of 5G and will introduce details gradually, covering a wide range of topics necessary to understand what is meant by 5G and who is behind the development of standards. What is meant by 5G and how does 5G promise to revolutionize the world. The course is divided into 12 sections with on-demand video lectures and quizzes that will help you thoroughly understand the topics covered.

This entry includes a free course published on Udemy, for those you wish to get acquainted with the basics of 5G mobile wireless technology. The course is designed for people with little or no understanding of 5G technology and was included in the Library having the startups and SMEs in mind, who are now exploring the opportunities of 5G technologies and network applications for their businesses. The course is divided into 12 sections with on-demand video lectures and quizzes.

#### Entry 19: 5G for Everyone Course Qualcomm on Coursera

Views: 308

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/iea-5g-for-everyone-course-qalcomm-coursera/40>



The screenshot shows the course landing page for '5G for Everyone' on Coursera. The course is offered by Qualcomm Wireless Academy. The page includes a brief description: 'Offered by Qualcomm Wireless Academy. Take the next step in your career by gaining a greater understanding of 5G technology and how it is ... Enroll for free.' Below this is a large thumbnail image showing the course's objective section. The objective section contains three bullet points: 'Define 5G private networks', 'Identify the key considerations for private networks', and 'List the benefits of 5G private networks for Industrial IoT'. At the bottom of the thumbnail, there is an 'Enroll for Free' button. Below the thumbnail, there is a rating section showing '★★★★★ 4.9 (31 ratings)' and '2.5K Students Enrolled'. At the very bottom of the page, there is a small note: 'Take the next step in your career by gaining a greater understanding of 5G technology and how it is changing the way'.

This entry includes a free 12-hour course by Qualcomm Wireless Academy, which is targeted for beginners to gain an in-depth understanding of how 5G is revolutionizing the way we do business in the 2020s, learn about the technologies that make 5G possible, including mmWave, Massive MIMO, RAN, and more, learn how companies can take advantage of 5G Private Networks and Industrial IoT to transform the way they operate on a daily basis and gain the base-level knowledge of 5G you need to continue your wireless education and advance in the rapidly-growing field of wireless technology.

#### Entry 20: Network Transformation 101 by Intel Network Academy

Views: 308

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/iea-network-transformation-101-by-intel-network-academy-coursera/41>



## D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)

GA Number 101016608

The screenshot shows the course page for 'IEA - Network Transformation 101 by Intel Network Academy\_Coursera'. At the top, there's a banner for 'evolved 5G'. Below it, the course title is displayed. A user profile for 'MariaAnagnostopoulos' is shown, along with the date 'May '22'. The main content area features a thumbnail for the 'Intel® Network Academy – Network Transformation 101' course, which includes a brief description: 'Offered by Intel. Welcome to the Intel® Network Academy – a comprehensive training program on network transformation. In this program, we ... Enroll for free.' Below this, a detailed course outline is visible, showing sections like 'Welcome', 'Network Transformation Drivers for Service Providers', and '5G'. A video thumbnail for the '5G' section is shown, titled '5G is a Critical Element of the New Data Economy', featuring a man speaking. The page also includes navigation links for 'Notes' and 'Discuss'.

A 19-hour comprehensive training program on network transformation, covering the topic areas of software defined infrastructure (SDI) network functions virtualization (NFV), software-defined networking (SDN), industry trends, and technical aspects of NFV deployments. An introduction to digital transformation and IoT

This entry includes a free 19-hour training program on network transformation, covering the topic areas of software defined infrastructure (SDI) network functions virtualization (NFV), software-defined networking (SDN), industry trends, and technical aspects of NFV deployments. This entry serves as an additional free course for those who are exploring the role of network applications in business and industry.

### Entry 21: 5G A Deeper Dive – Intel Network Academy

Views: 187

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/5g-a-deeper-dive-intel-network-academy-coursera/85>



The screenshot shows a video lesson titled '5G: A Deeper Dive - Intel Network Academy - Coursera'. The video features Maria Anagnostopoulos, a man in a blue polo shirt, standing in front of a large screen displaying a slide about 'What is 5G?'. The slide compares 2G, 3G, 4G, and 5G technologies. It lists the benefits of 5G: Next generation of wireless networks, higher speeds, greater capacity, lower latency, supporting billions of devices, and distributing intelligence. Below the video, there is a summary of the course content.

**What is 5G?**

- Next generation of wireless networks
- Will provide higher speeds, greater capacity, and lower latency
- Will be capable of supporting billions of connected devices and "things"
- Distributes intelligence throughout the network

2G Cellular Comics

3G Data and the app revolution

4G Faster data rates

5G Reactive, smart, and connected everything

Intel® Network Academy organizes a comprehensive training program on network transformation. In this program, the topic areas of software defined infrastructure (SDI) network functions virtualization (NFV), software-defined networking (SDN) and beyond will be discovered. The Network Academy includes a broad collection of online content and technical training aimed to assist technical professionals in the network industry to improve their knowledge of key Intel® technologies, industry trends, and technical aspects of NFV deployments. Moreover, after completing this training course, the Intel Network Academy suggests finding Network Transformation 102 to advance our technical expertise.

Digital Transformation lesson:

- The Evolution of Mobile Wireless Network – Toward 5G and IoT
- 5G: A Deeper Dive
- 5G Use Cases: A Deeper Dive
- 5G Implications for the Core Network
- Customer Premises Equipment (CPE) and SD-WAN (Software Defined WAN)
- SD-WAN with CPE

This entry includes a course which provides additional and more in depth information on 5G technologies, organized by Intel Network Academy. This course includes a broad collection of online content and technical training aimed to assist technical professionals in the network industry

### Entry 22: 5G roll-out in the EU. Special Report 2022

Views: 171

Published: May 2022

Link: <https://forum.evolved-5g.eu/t/report-5g-roll-out-in-the-eu-special-report-2022/87>

  
**Report: 5G roll-out in the EU. Special Report 2022**

Accelerator Library

MariaAnagnostopoulos Sep '22



The European Court of Auditors presents the Special Report of 2022 concerning the 5G roll-out in the EU. Progress but also delays in deployment of networks with security issues remaining unresolved. The “fifth generation” of telecommunication systems, or 5G, is a new global wireless standard that offers a much higher data capacity and transmission speeds. 5G services are essential for a wide range of innovative applications which have the potential to transform many sectors of our economies and improve citizens’ daily lives. 5G is therefore of strategic importance for the entire single market.

5G is expected to add up to €1 trillion to the European GDP between 2021 and 2025, with the potential to create or transform up to 20 million jobs across all sectors of the economy. However, the European Court of Auditors observed that delays are putting at risk the achievement of the EU’s objectives for 5G deployment and that further efforts are necessary to address security issues. In the report, several recommendations addressed to the Commission, aimed at pushing forward the timely and concerted implementation of secure 5G networks in the EU.

Click [here](#) for more info.



This entry includes a report by the European Court of Auditors regarding the 5G roll-out in the EU and the importance for the entire single market.



**Special Report**

**Special Report**

**03  
2022**



## 5G roll-out in the EU: delays in deployment of networks with security issues remaining unresolved

**About the report:**

5G is expected to add up to €1 trillion to the European GDP between 2021 and 2025, with the potential to create or transform up to 20 million jobs across all sectors of the economy. We observed that delays are putting at risk the achievement of the EU's objectives for 5G deployment and that further efforts are necessary to address security issues. In the report, we make a number of recommendations to the Commission aimed at pushing forward the timely and concerted implementation of secure 5G networks in the EU.

ECA special report pursuant to Article 287(4), second subparagraph, TFEU.

This publication is available in 24 languages and [PDF](#)  
in the following format:



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[Executive summary](#)

[Introduction](#)

[Audit scope and approach](#)

[Observations](#)

[Conclusions and recommendations](#)

## Executive summary

The "fifth generation" of telecommunication systems, or 5G, is a new global wireless standard that offers a much higher data capacity and transmission speeds. 5G services are essential for a wide range of innovative applications which have the potential to transform many sectors of our economies and improve citizens' daily lives. 5G is therefore of strategic importance for the entire single market.

In its 2016 5G Action Plan, the Commission put forward the objective of ensuring uninterrupted 5G coverage in urban areas and along main transport paths by 2025. In March 2021, it extended the objective to include 5G coverage of all populated areas by 2030.

### Entry 23: 5G roll-out in the EU. Special Report 2022

**Views: 140**

**Published: September 2022**

**Link: <https://forum.evolved-5g.eu/t/report-cocom-working-group-on-5g/88>**



The screenshot shows a webpage from the European Commission's website. At the top, there is a red header bar with the 'evolved 5G' logo. Below it, a blue navigation bar contains the text 'Report: COCOM Working Group on 5G' and a link 'Accelerator Library'. A profile picture of Maria Anagnostopoulos and the date 'Sep '22' are also visible. The main content area has a dark blue header with the text 'Shaping Europe's digital future'. Below this, a navigation menu includes links for Home, Policies, Activities, News, Library, Funding, Calendar, and Consultations. A breadcrumb trail shows 'Home > Library > COCOM Working Group on 5G - Report on the exchange of Best Practices concerning national broadband strategies and 5G "path-to-deployment"' followed by a timestamp 'REPORT / STUDY | Publication 15 October 2018'. The main title of the report is 'COCOM Working Group on 5G - Report on the exchange of Best Practices concerning national broadband strategies and 5G "path-to-deployment"'. A brief description states: 'The purpose of this Report is to summarise the exchanges of best practices conducted during the work of the COCOM Working Group on 5G. It identifies the most common strategic elements being considered by Member States when setting out their 5G plans.' A link to download the report is provided.

This entry includes a report summarising the exchanges of best practices conducted the work of COCOM Working Group on 5G, identifying the most common strategic elements being considered by Member States, when setting out their 5G plans. This entry is targeted for those who are making strategic business decisions, to understand European trends in the market and respective opportunities.

#### **Entry 24: 5GCybersecurity Standards: Analysis of Standardisation Requirements in Support of Cybersecurity Policy**

**Views: 186**

**Published: September 2022**

**Link:** <https://forum.evolved-5g.eu/t/report-5g-cybersecurity-standards-analysis-of-standardisation-requirements-in-support-of-cybersecurity-policy/89>



## Report: 5G CYBERSECURITY STANDARDS: Analysis of standardisation requirements in support of cybersecurity policy

Accelerator Library



MariaAnagnostopoulos

Sep '22



### Report: 5G CYBERSECURITY STANDARDS: Analysis of standardisation requirements in support of cybersecurity policy

The ambition of this report is to outline the contribution of standardisation to the mitigation of technical risks, and therefore to trust and resilience, in the 5G ecosystem. The 5G ecosystem considered in this report is a multi-dimensional space encompassing not only technological and functional domains, but also the related technology lifecycle processes and stakeholders. This report focuses on standardisation from a technical and organisational perspective. Considerations of the effectiveness of specific standards and of the strategic aspects related to 5G security, although important, are outside the scope of this report.

Read the report [here](#) 2

This entry includes a report on 5G Cybersecurity Standards focusing on standardisation from a technical and organisational perspective.

### Entry 25: Case Study: Bringing 5G business value to industry: A case study uncovering 5G's potential for real-time control in manufacturing - Ericsson

Views: 160

Published: September 2022

Link: <https://forum.evolved-5g.eu/t/case-study-bringing-5g-business-value-to-industry-a-case-study-uncovering-5g-s-potential-for-real-time-control-in-manufacturing-ericsson/90>



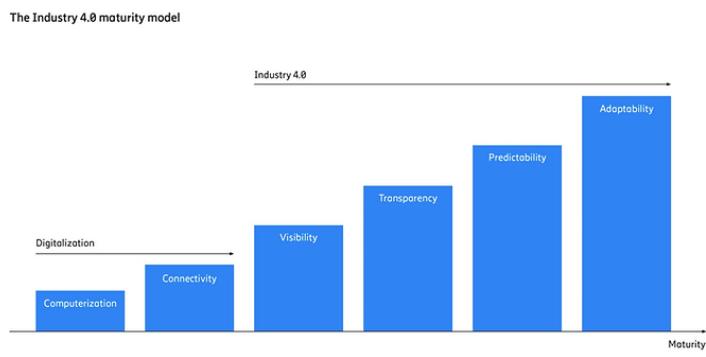
## Case Study: Bringing 5G business value to industry: A case study uncovering 5G's potential for real-time control in manufacturing - Ericsson

■ Accelerator Library



MariaAnagnostopoulos

Sep '22



### Bringing 5G business value to industry: A case study uncovering 5G's potential for real-time control in manufacturing

The next wave of industrial productivity is known as Industry 4.0. Encompassing technologies centered on automation, business information and manufacturing systems, the Industry 4.0 vision includes connected production where all components are tracked and configured in a self-managing system. The research has looked specifically at the manufacture of bladed disks (BLISKs), which are important components of turbines such as aircraft jet engines. Consisting of a rotor disk and multiple blades around its edge (see Figure 1), BLISKs are one of the most demanding metal processing applications.

This entry includes a case study on 5G's potential for real-time control in manufacturing published by Ericsson. In this case study, the value, in terms of both economic and sustainability value, is uncovered for using 5G technology in the production of Bladed Disks (BLISKs), which are important components of turbines such as aircraft jet engines and are one of the most demanding metal processing applications.

### Entry 65: Quarterly Report of the European 5G Observatory

Views: 174

Published: September 2022

Link: <https://forum.evolved-5g.eu/t/report-quarterly-report-of-the-european-5g-observatory/91>



## Report: Quarterly Report of the European 5G Observatory

Accelerator Library



MariaAnagnostopoulos

Sep '22



European 5G Observatory

### Quarterly Report of the European 5G Observatory

On 6th of May the European 5G Observatory published the latest quarterly report and 5G scoreboard. The focus of reporting is now shifting from 5G readiness to 5G deployment monitoring. As a result, the score board has been redesigned to emphasize progress regarding 5G network deployment and actual spectrum availability.

As compared to the previous quarter, all EU countries have now launched commercial 5G services in at least a part of the country. The average level of 5G coverage now reaches 64% of population in the EU. However, a significant share of this 5G coverage is achieved using 4G spectrum instead of the 5G pioneer bands. The pioneer bands offer a higher performance potential and will become essential to deliver the advanced 5G services for machine-to-machine communications and the digital transformation of industry.

The 5G Observatory provides a factual source of information on 5G deployment in Europe and complements the Digital Economy Society Indicator (DESI) published by the European Commission.

Click [here](#) for more info. [Read the report \(.pdf\)](#) ①

This entry includes an industry report by the European 5G Observatory, focusing on the shift of 5G readiness to 5G deployment monitoring, presenting a score board to emphasize the progress regarding 5G network deployment and actual spectrum availability. The 5G Observatory provides a factual source of information on 5G deployment in Europe and complements the Digital Economy Society Indicator published by the European Commission.

### Entry 27: 5G Technology Strategy: Next Generation Mobile Networking

Views: 201

Published: September 2022

Link: <https://forum.evolved-5g.eu/t/course-5g-technology-strategy-next-generation-mobile-networking/92/2>



**Course: 5G Technology Strategy: Next-Generation Mobile Networking**

Accelerator Library

MariaAnagnostopoulos Sep '22

**Latency and Data Volume**

- These latency and data rates show how 5G will perform for:
  - Medical centers
  - Sports arenas
  - Airports
  - Cities



**5G Technology Strategy: Next-Generation Mobile Networking**

Course on LinkedIn Learning by:  
**Ryan Spence**  
Director of Enterprise Mobility Management at MOBI

Explore 5G, the fifth generation of wireless technology for digital cellular networks. Instructor Ryan Spence offers a quick review of wireless networks, explaining the origins and the development path that led to the arrival of 5G. Learn about the requirements for 5G adoption, the role of the government in 5G availability, and market leaders in 5G capability. Plus, discover some of the advances enabled by 5G technology that can inform business strategy as 5G becomes available.

**Learning objectives**

- Overview of wireless technology
- Using a 5G network
- Hardware requirements
- Opportunities and risks
- Potential market advantages

This entry includes a course hosted on LinkedIn learning by Ryan Spencer, Director of Enterprise Mobility Management at MOBI. This course offers a quick review of wireless networks and the development path that led to the arrival of 5G technology, as well as the business strategy advancements enabled by 5G.

### Entry 28: Cisa's 5G Innovation & Transformation Video Series

Views: 165

Published: September 2022

Link: <https://forum.evolved-5g.eu/t/videos-cisa-s-5g-innovation-transformation-video-series/94/2>



**Videos: Cisa's 5g innovation & transformation video series**

Accelerator Library

MariaAnagnostopoulos Sep '22



**CYBER SECURITY & INFRASTRUCTURE AGENCY'S 5G INNOVATION & TRANSFORMATION VIDEO SERIES**

CISA's National Risk Management Center (NRMC) has compiled this library of free, voluntary resources to help the public and stakeholders better understand the wide array of 5G benefits, the risks that comes with 5G deployment, and steps that can be taken now to ensure 5G security and resilience.

Whether you're curious about the fundamentals or in the process of deploying 5G, this library includes the National 5G Strategy, CISA's 5G Strategy, educational videos, 5G cloud cybersecurity guidance, and other resources.

View the video series [here](#).

This entry includes a link to a library curated by CISA's National Risk Management Center including free, voluntary resources to help public and stakeholders better understand the benefits of 5G and the steps to ensure 5G security and resilience.

#### Entry 29: 5G for Industry 4.0 Operational Technology Networks - GSMA

Views: 207

Published: September 2022

Link: <https://forum.evolved-5g.eu/t/report-5g-for-industry-4-0-operational-technology-networks-gsma/93>



**Report: 5G for Industry 4.0 operational technology networks**  
**GSMA**

Accelerator Library

MariaAnagnostopoulos Sep '22



**5G for Industry 4.0 operational technology networks**  
A comparison of the features and application of 5G and Wi-Fi 6 for manufacturing, production and supply chain use cases  
March 2021

**5G for Industry 4.0 operational technology networks**  
*A comparison of the features and application of 5G and Wi-Fi 6 for manufacturing, production and supply chain use cases*

This paper explores the technical and operational differences between Wi-Fi and 4G/5G mobile networks and then reviews a broad range of manufacturing and supply chain related use cases for the application of these connectivity options. It is hoped that manufacturing and supply chain companies reviewing technology options for Industry 4.0 will see that 5G networks, whether supplied by mobile network operators or standalone, provides the best choice for the Industry 4.0 operational technology network with support over a wide range of use cases. In time it is likely that manufacturing and supply chain companies will consolidate wireless networks and due to

This entry includes a paper which explores the technical and operational differences between Wi-Fi and 4G/5G mobile networks and then reviews a broad range of manufacturing and supply chain related use cases for the application of these connectivity options.

### Entry 30: EU Toolbox for 5G Security

Views: 167

Published: September 2022

Link: <https://forum.evolved-5g.eu/t/tool-eu-toolbox-for-5g-security/86>

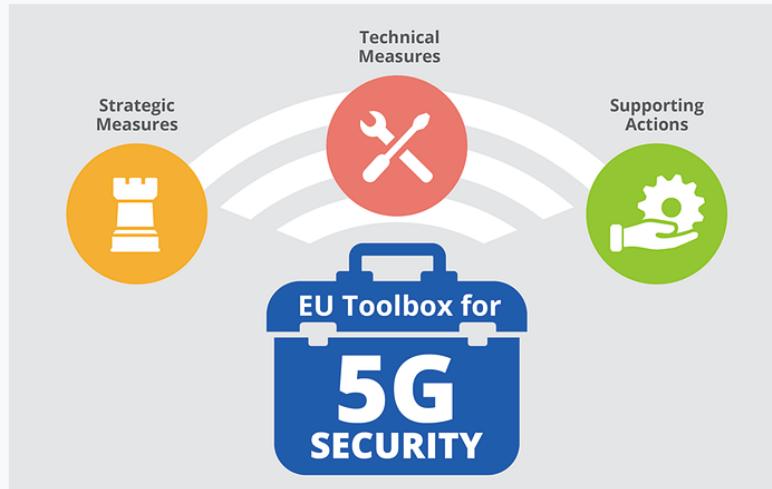
## Tool: EU toolbox for 5G security

■ Accelerator Library



MariaAnagnostopoulos

1 Sep '22



The EU toolbox for 5G security is a set of robust and comprehensive measures for an EU coordinated approach to secure 5G networks. More precisely, these measures aim to strengthen security requirements for mobile networks; assess the risks posed by suppliers; limit any dependency on a single vendor and stimulate the EU's own 5G capabilities. So, Member States should have these measures in place and powers to mitigate risks. It's a factsheet that provides all the important information about 5G in European Union. [Here](#) you can find the Cybersecurity toolbox factsheet in every language.

This entry includes a Toolbox for 5G security, which is a set of comprehensive measures for an EU coordinated approach to secure 5G networks. It is a cybersecurity factsheet that provides all the important information about 5G in the European Union.

### Entry 31: 5GPPP Newsflash September 2022

Views: 139

Published: October 2022

Link: <https://forum.evolved-5g.eu/t/5gppp-newsflash-september-2022/98>

## 5gppp newsflash september 2022

■ Accelerator Library



Vasileios\_Mavrikakis

1 Oct '22

The latest 5GPPP newsflash (issue 68) is now available! You may access it and learn all about activities related to 5G projects. Find it online here:  
<https://5g-ppp.eu/newsflash-september-2022/>

... Reply



This includes news from the 5GPPP community including all activities related to 5G projects, including workshops, networking events, forums and reports.

### Entry 32: Discover the Power of 5G - Ericsson

Views: 176

Published: October 2022

Link: <https://forum.evolved-5g.eu/t/discover-the-power-of-5g-ericsson/100>



### Discover the power of 5G – Ericsson

Accelerator Library



Vasileios\_Mavrikakis

Nov '22

5G is the fifth generation of cellular networks. Up to 100 times faster than 4G, 5G is creating never-before-seen opportunities for people and businesses.

Faster connectivity speeds, ultra-low latency and greater bandwidth is advancing societies, transforming industries and dramatically enhancing day-to-day experiences. Services that we used to see as futuristic, such as e-health, connected vehicles and traffic systems and advanced mobile cloud gaming have arrived.

With 5G technology, we can help create a smarter, safer and more sustainable future.  
You may learn more here: [What is 5G? How will it transform our world? - Ericsson](#) 3

Reply

This entry includes an article published by Ericsson regarding 5G and how it can create a smarter, safer and more sustainable future. It showcases the opportunities and capabilities of 5G for people, businesses and society.



Discover the power of 5G  
Fast, available, secure, reliable and capable

Table of contents ▾

HOME > 5G

## 5G by Ericsson

Available in English Français Español 日本語

5G isn't just a new generation of mobile networks – it's transforming the world as we know it.

### Entry 33: Top 10 5G Use Cases

Views: 154

Published: November 2022

Link: <https://forum.evolved-5g.eu/t/top-10-5g-use-cases/119>

**Top 10 5G Use Cases**

Accelerator Library

Vasileios\_Mavrikakis Nov '22

Nowadays that 5G networks are gaining traction throughout the globe, it's a good time to consider most of the inventive 5G use cases that will change the world as we know it. The most fascinating component of every change to our mobile phone network architecture is the efficiency and consistency it delivers. That, along with lower latency, can be enough to foresee some of the benefits that 5G will bring in the future years. Among the most prominent 5G use cases include technology that can possibly be enhanced with a stronger data connection. Smart cities, automated vehicles, and enterprises are examples of this. Access the full article online here:

[analyticssteps.com 1](https://analyticssteps.com/1)

**Top 10 5G Use Cases | Analytics Steps 1**

The number of 5G use cases is growing day by day, we'll look at some of the most inventive initiatives now underway throughout the world.

This entry includes 10 5G use cases, including technology that can be enhanced with a stronger data connection. Smart cities, automated vehicles, and enterprises are examples of this.



**Entry 34: “Intent-driven Chatbots for Precise Maintenance in 5G-enabled Industry 4.0 Environments”, presentation at 24th Conference InfoCom World “Fiber & 5G Highways: DigitAll Greece!**

Views: 141

Published: November 2022

Link: <https://forum.evolved-5g.eu/t/intent-driven-chatbots-for-precise-maintenance-in-5g-enabled-industry-4-0-environments-presentation-at-24th-conference-infocom-world-fiber-5g-highways-digitall-greece/124>



## **“Intent-driven Chatbots for Precise Maintenance in 5G-enabled Industry 4.0 Environments”, presentation at 24th Conference InfoCom World “Fiber & 5G Highways: DigitAll Greece!**

■ Accelerator Library

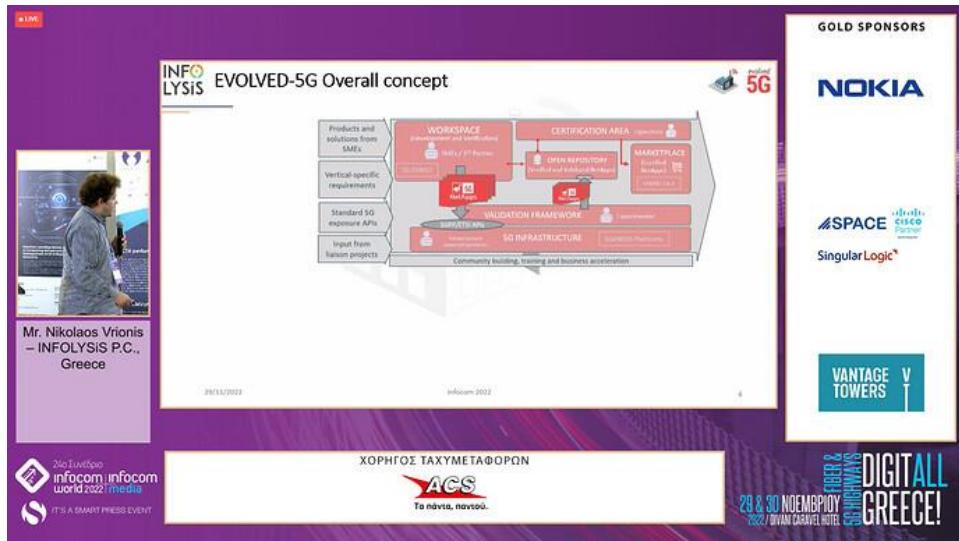


Vasileios\_Mavrikakis

Nov '22

In this session, Nikolaos Vrionis from INFOLYSiS presented the overall concept of EVOLVED-5G. He presented the way a chatbot is being used in the context of our project, while also sharing information about the nature of the chatbot. Also, briefly explained the role of INFOLYSiS in the project and especially in the first pillar, which is the main field of INFOLYSiS Chatbot. Furthermore, a demo of the communication of chatbot and NEF emulator took place during his presentation. Finally, some information were shared about INFOLYSiS team and operational format.

This presentation took place in the context of “Research Projects for creating the Future and Innovative Telecoms Market” and “Research Programs for the Creation of the Future and Innovative Telecommunications Market” sessions of the 24th Conference InfoCom World “Fiber & 5G Highways: DigitAll Greece. The proposed Workshop focuses thematically on the description of various -in progress- “European research programs for the creation of a future and innovative telecommunications market”. In particular, the Workshop aims to highlight many potential challenges arising from ongoing research funded by the European Commission but also to present various solutions regarding 5G networks and applications-services, capable of creating prospects for innovation and development. The Workshop is organized in nine (-9-) distinct thematic Sessions, in order to present both the scope and the results of the respective programs which are financed by the European Commission (in the context of H2020, 5G-PPP and SNS actions), in order to identify and to highlight growth opportunities for the market. There are strong conceptual interactions and common “grounds” between the thematic frameworks of the Synods. The proposed distinction can be evaluated as “indicative” and mainly as “oriented to relevant fields of the European Commission”, according to the current 5G-PPP/H2020 and/or SNS framework.



This entry includes a report on the presentation, which took place at InfoCom World 2022, where INFOLYSiS presented the concept of EVOLVED-5G and the deployment of 5G in INFOLYSiS chatbot, including a demo of the communication of chatbot and NEF Emulator.

### Entry 35: 5G, the first step for a new era (in Greek)

Views: 126

Published: 20 February 2023

Link: <https://forum.evolved-5g.eu/t/5g-the-first-step-for-a-new-era-in-greek/131>

## 5G, the first step for a new era (in Greek)

■ Accelerator Library

Vasileios\_Mavrikakis Feb 20

5G offers a multitude of possibilities that promise to change our daily lives and the way we perceive reality. Find out more about 5G and EVOLVED-5G project here:

Μικρόφωνο – 16 Feb 23 1

**5G, το πρώτο βήμα για μία νέα εποχή | Mikrofwno.gr** 2

To 5G είναι σχεδόν εδώ και πλέον όλοι αναζητούν τις δυνατότητες του. Το 5G λοιπόν, προσφέρει μια πληθώρα δυνατοτήτων που υπόσχονται να αλλάξουν την καθημερινότητα μας και τον τρόπο που αντιλαμβανόμαστε την πραγματικότητα. Αρχικά, δεν είναι μόνο το...

This entry included an article published in Greek media, in Greek, and explains how 5G offers a multitude of possibilities that promise to change our daily lives and the way we perceive reality.



### Entry 36: IBM 5G and edge computing

Views: 143

Published: 10 February 2023

Link: <https://forum.evolved-5g.eu/t/ibm-5g-and-edge-computing/130>

The screenshot shows a forum post titled "IBM 5G and edge computing" by user "Vasileios\_Mavrikakis". The post discusses the growing significance of 5G and edge computing, driven by the proliferation of smart devices, the need for faster processing, and increased network pressure. It emphasizes the potential of edge computing, especially when combined with 5G, to enhance digital experiences, improve performance, ensure data security, and enable continuous operations across various industries. The piece highlights IBM's view on edge computing, its benefits such as better data control and lower costs, and the challenges involved, including the need for automated edge management processes. The convergence of 5G and edge computing is projected to transform industries, and adopting an open hybrid multi-cloud architecture is recommended for delivering connected experiences across diverse data environments.

This entry includes an article that discusses the growing significance of 5G and edge computing, driven by the proliferation of smart devices, the need for faster processing, and increased network pressure. It emphasizes the potential of edge computing, especially when combined with 5G, to enhance digital experiences, improve performance, ensure data security, and enable continuous operations across various industries. The piece highlights IBM's view on edge computing, its benefits such as better data control and lower costs, and the challenges involved, including the need for automated edge management processes. The convergence of 5G and edge computing is projected to transform industries, and adopting an open hybrid multi-cloud architecture is recommended for delivering connected experiences across diverse data environments.

### Entry 37: A guide to 5G network security 2.0

Views: 152

Published: February 2023

Link: <https://forum.evolved-5g.eu/t/a-guide-to-5g-network-security-2-0/129>



## A guide to 5G network security 2.0

Accelerator Library



Vasileios\_Mavrikakis

Feb 1

This report will uncover the telecom security aspects in the era of 5G. Telecom networks are evolving rapidly across a broad technological environment which includes virtualization, disaggregation, cloud, AI, IoT and Industry 4.0. This is met by an equally broad yet an increasingly challenging cybersecurity environment.

ericsson.com 3



**A guide to 5G network security insight report** 3

Conceptualizing security in telecom networks – how does 5G fit in?

Understanding security in the 5G era and mitigating security and privacy threats under 5G.

This entry includes an article that explores the security aspects of telecom networks in the era of 5G, emphasizing the evolving nature of telecom networks amidst technological advancements like virtualizations, cloud, AI, IoT, and Industry 4.0. It discusses the unique security challenges posed by 5G, highlighting the shift towards digitization, automation, and connectivity to machines. The report delves into the security considerations for mobile network assets, the criticality of core network functions, and the protection of subscriber data. It also addresses general threats faced by telecom networks, emphasizing the need for robust security measures to safeguard against cyber-attacks. Additionally, the report discusses the impact of 5G on network security and the key technology trends, such as virtualization, AI, and distributed cloud computing. The adoption of a security assurance scheme, the Network Equipment Security Assurance Scheme (NESAS), is highlighted, along with Ericsson's approach to 5G product security. The report concludes by stressing the importance of conceptualizing security on a system-wide level in the 5G era.

**Entry 38: What is 5G NR-Light, a.k.a. RedCap, and how will it accelerate the growth of**

**Views: 138**

**Published: January 2023**

**Link:** <https://forum.evolved-5g.eu/t/what-is-5g-nr-light-a-k-a-redcap-and-how-will-it-accelerate-the-growth-of/128>



[Sign Up](#)

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## What is 5G NR-Light, a.k.a. RedCap, and how will it accelerate the growth of

■ Accelerator Library  [qualcomm.com](#)



Vasileios\_Mavrikakis

Jan 9

5G is envisioned and being designed to serve [an unprecedented range of capabilities with a single global standard](#). With enhanced mobile broadband (eMBB), massive IoT (mIoT), and mission-critical IoT, the three pillars of 5G represent extremes in performance and associated complexity. For massive IoT services, narrowband IoT (NB-IoT) and enhanced machine type communication (eMTC) devices prioritize low power consumption and the lowest complexity for wide-area deployments (LPWA), while enhanced ultra-reliable, low-latency communication (eURLLC) devices deliver on the most stringent use case requirements in industry. But there exists an opportunity to address a broad range of mid-tier applications more efficiently, with capabilities between these extremes. You may find the article here: [What is 5G NR-Light, a.k.a. RedCap, and how will it accelerate the growth of the connected intelligent edge?](#)



[Reply](#)

### Suggested Topics

This entry includes an article that introduces 5G NR-Light, a new device class in the 5G standards designed to bridge the capability and complexity gap for mid-tier IoT use cases. With optimized features such as narrower bandwidths, reduced complexity, and lower power consumption, NR-Light devices aim to efficiently support diverse applications, from smart cities and industrial IoT to mobile consumer devices, contributing to the expansion of the 5G ecosystem.

### Entry 39: Online Article about 5G Architecture

Views: 121

Published: December 2022

Link: <https://forum.evolved-5g.eu/t/online-article-about-5g-architecture/126>



## Online Article about 5G Architecture

■ Accelerator Library



Vasileios\_Mavrikakis

Dec '22

The primary goal of previous mobile network generations was to offer fast, reliable mobile data services to network users. 5G has broadened this scope to offer a wide range of wireless services delivered to the end user across multiple access platforms and multi-layer networks.

5G creates a dynamic, coherent, and flexible framework of advanced technologies to support a variety of applications. 5G utilizes a more intelligent architecture, with Radio Access Networks (RANs) no longer constrained by base station proximity or complex infrastructure. 5G leads the way towards disaggregated, flexible, and virtual RAN with new interfaces creating additional data access points.

You may find the article online here: [5G Network Architecture. Core, RAN, & Security Architecture For 5G](#)



This entry includes an article that provides an overview of the 5G network architecture, highlighting its evolution from previous mobile network generations. It covers key aspects such as the 3GPP's role in shaping 5G specifications, the spectrum and frequency allocation, the significance of Multi-Access Edge Computing (MEC), Network Function Virtualization (NFV), the role of beamforming, and the core architecture differences between 4G and 5G. Additionally, it discusses the options for 5G deployment modes and the global adoption of 5G, emphasizing the importance of security measures in the new 5G architecture.

#### Entry 40: European Commission's Innovation Radar

Views: 129

Published: April 2023

Link: <https://forum.evolved-5g.eu/t/european-commisions-innovation-radar/140>

The screenshot shows a post on the European Commission's Innovation Radar. The post is authored by Vasileios\_Mavrikakis and dated April 5. The text discusses the purpose of the Innovation Radar, which is to identify high potential innovations and innovators in EU-funded research and innovation projects. It aims to allow every citizen, public official, professional and business person to discover the outputs of EU innovation funding and give them a chance to seek out innovators who could follow in the footsteps of companies like Skype, TomTom, and ARM Holdings. The post also mentions that this platform is a first step to achieving such ambitions, making information about EU-funded innovations visible and accessible to the public via the Innovation Radar platform. Moreover, by providing greater access to such information, the platform aims to encourage the development of a dynamic ecosystem of incubators, entrepreneurs, funding agencies and investors that can help get EU-funded innovations faster to market. The source of the data behind the platform is described as independent experts involved in reviewing ongoing projects funded by the EU under various programs like Horizon Europe, Horizon 2020, LIFE Programme, Framework Programme 7 (FP7), and the Competitiveness and Innovation Programme (CIP). A link is provided for more information.

This entry includes information about the European Commission's Innovation Radar. This platform is a first step to achieving such ambitions. We will make information about EU-funded innovations from high-quality projects visible and accessible to the public via the Innovation Radar platform. Moreover, by providing greater access to such information we aim to encourage the development of a dynamic ecosystem of incubators, entrepreneurs, funding agencies and investors that can help get EU-funded innovations faster to market.

#### Entry 41: Network Apps Enabling Application – Layer Analytics for Vertical IoT Industry

Views: 156



Published: March 2023

Link: <https://forum.evolved-5g.eu/t/network-apps-enabling-application-layer-analytics-for-vertical-iot-industry/136>



## Network Apps Enabling Application-Layer Analytics for Vertical IoT Industry

■ Accelerator Library



Vasileios\_Mavrikakis

1 Mar 15

This article presents the concept of vertical application enablement which is a framework that enables the integration of vertical IoT apps within future mobile networks. The vertical application enablement provides a toolbox of value-add services, realized via so-called Network Applications (NetApps), that form an optimization and translation layer, which eases the interaction between vertical IoT apps and mobile networks. The importance of data management at the telco cloud platforms, and in particular the data collection and analytics enablement, necessitates a new category of NetApps which aims at supporting cross-domain integrated analytics to optimize end to end application performance. In this article, we review the various vertical application enablement frameworks, and we consider more specifically the NetApps that can be used to expose their services/capabilities. We also discuss the Application Data Analytics Enablement Services (ADAES) that can provide app-layer analytics services to vertical IoT apps, and we present its architecture, capabilities, and its current standardization status in 3GPP. In addition, we present an innovative implementation of analytics enablement through NetApps, which enables vertical IoT clients to select the best vertical IoT server instance, which is expected to provide the best performance. You may find the article here:

<https://ieeexplore.ieee.org/document/10012484>

This entry includes an article presenting the concept of vertical application enablement, enabling the integration of vertical IoT apps within future mobile networks. The vertical application enablement provides a toolbox of value-added services, through Network Applications, forming an optimization and translation layer.

### Entry 42: Nokia Core E-Book

Views: 118

Published: April 2023

Link: <https://forum.evolved-5g.eu/t/nokia-5g-core-e-book/139>



**Nokia 5G Core E-Book**

Accelerator Library

Vasileios\_Mavrikakis Apr 5

5G is your opportunity to become the company you were meant to be. But how do you serve everyone and everything, while maximizing returns? The answer lies in rethinking the core. Our 5G Core frees the innovation within your network, so you can automate, customize and monetize your core with total confidence. The architectural design is inherently cloud-native, secure and resilient. Network functions are deployed and scaled, rapidly and wherever required. The software is continuously optimized for performance, efficiency and sustainability. Find the e-book [here](#) 3

Reply

NOKIA ≡

## Nokia 5G Core (5GC)

Our 5G Standalone Core frees the innovation within your network, so you can automate, customize and monetize your core with total confidence.

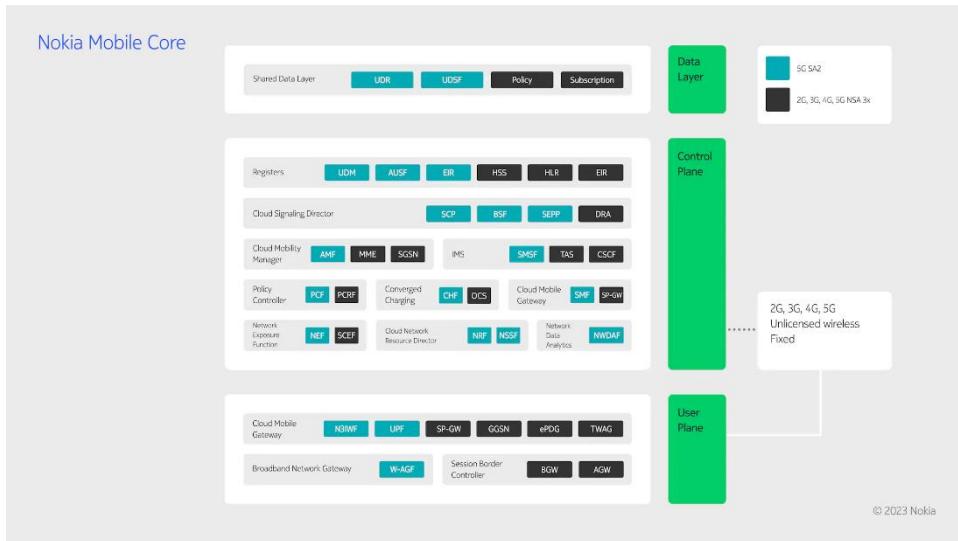
[Save energy with 5G Core](#)



5G is your opportunity to become the company you were meant to be. But how do you serve everyone and everything, while maximizing returns? The answer lies in rethinking the core. Our 5G Standalone Core frees the innovation within your network, so you can automate, customize and monetize your core with total confidence. Nokia proudly celebrates that CSPs and Enterprises all over the world are partnering with us to deliver the extraordinary.

#### On this page

- ↓ What is a 5G Core network?
- ↓ 5G Core network functions
- ↓ Resolving 5G's challenges
- ↓ 5G core how to guides
- ↓ See our case studies
- ↓ Why choose Nokia?
- ↓ Related topics
- ↓ Related products and solutions
- ↓ Learn more



This entry includes an e-book published by Nokia, presenting their 5G Standalone Core, providing companies to automate, customize and monetize their core.

### Entry 43: 5G will Accelerate a New Wave of IoT Applications

Views: 111

Published: April 2023

Link: <https://forum.evolved-5g.eu/t/5g-will-accelerate-a-new-wave-of-iot-applications/141>



## 5G Will Accelerate a New Wave of IoT Applications

Accelerator Library



Vasileios\_Mavrikakis

Apr 26

5G is driving change in the Internet of Things (IoT). It's a powerful enabling technology for a new generation of use cases that will leverage edge computing to make IoT more effective and efficient.

In many ways, the narrative of 5G is the interaction between two inexorable forces: the rise in highly reliable, high-bandwidth communications, and the rapid spread of available computing power throughout the network. The computing power doesn't just end at the network, though. End-point devices that connect to the network are also getting smarter and more powerful.

The increasingly dynamic and powerful computational environment that's taking shape as telcos begin to redesign their networks for 5G will accelerate the uptake of IoT applications and services throughout industry. We expect that 5G will enable new use cases in remote monitoring and visual inspection, autonomous operations in large-scale remote environments such as mines, connected vehicles and more.

The rapidly expanding range of computing options requires a much more flexible approach to building and deploying applications and AI models that can take advantage of the most cost-efficient compute resources available. These AI models can now even run on edge devices that connect to the network edge, allowing more secure and efficient processing of data.

You may find the whole article online here: [5G Will Accelerate a New Wave of IoT Applications](#)

This entry includes an article by IBM on 5G and how it impacts the new wave of IoT Applications. The article also presents IoT Use Cases, such as remote and visual inspection, AI

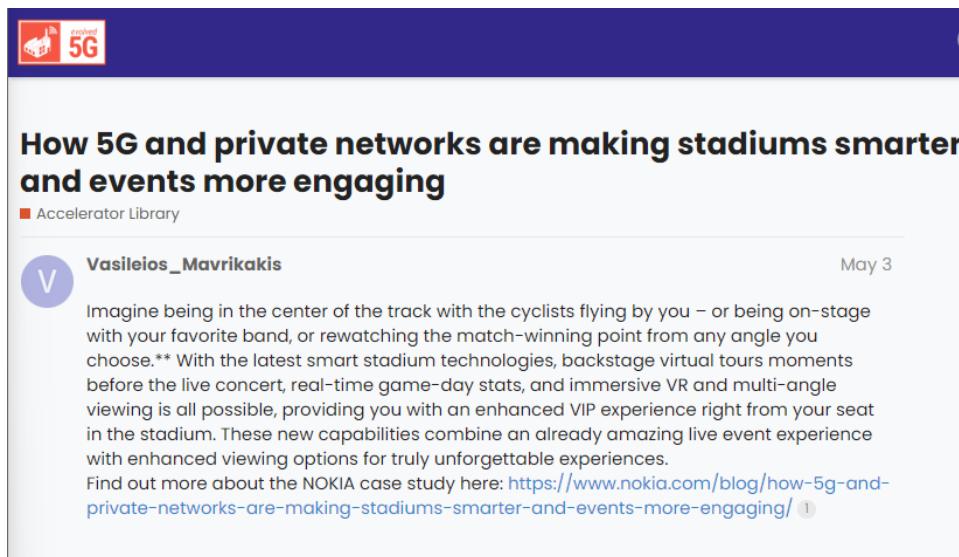
and augmented reality technician assistance, buildings and facility management, connected vehicles, agriculture, shipping and logistics.

#### **Entry 44: How 5G and Private Networks are Making Stadiums Smarter and Events more Engaging**

**Views: 102**

**Published: May 2023**

**Link:** <https://forum.evolved-5g.eu/t/how-5g-and-private-networks-are-making-stadiums-smarter-and-events-more-engaging/143>



The screenshot shows a forum post from the 'Accelerator Library' category. The post is titled 'How 5G and private networks are making stadiums smarter and events more engaging' and is attributed to user 'Vasileios\_Mavrikakis'. It was posted on May 3. The content discusses how 5G technology enhances stadium experiences through virtual tours, real-time stats, and VR viewing. It includes a link to a Nokia case study: <https://www.nokia.com/blog/how-5g-and-private-networks-are-making-stadiums-smarter-and-events-more-engaging/>.

This entry includes a Nokia case study on how 5G and private networks are making stadiums smarter and events more engaging, with a smart stadium showcase at the 5G Stadium Lab in France's National Velodrome. With the latest smart stadium technologies, backstage virtual tours moments before the live concert, real-time game-day stats, and immersive VR and multi-angle viewing is all possible, providing an enhanced VIP experience right from the seat in the stadium.



#### **Entry 45: 5GPPP Newsflash Issue 75**

**Views: 90**



Published: May 2023

Link: <https://forum.evolved-5g.eu/t/5gppp-newsflash-issue-75/144>

The screenshot shows the homepage of the 5GPPP Newsflash Issue 75. At the top, there's a header with the 5G logo and the text "D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)" and "GA Number 101016608". Below the header is a banner with the text "Published: May 2023" and a link "Link: https://forum.evolved-5g.eu/t/5gppp-newsflash-issue-75/144". The main content area has a title "5GPPP Newsflash Issue 75" and a subtitle "Accelerator Library". A post by "Vasileios\_Mavrikakis" dated "May 3" is displayed, featuring a thumbnail image of a hand holding a globe with 5G connectivity icons, a "NEWSFLASH" button, and the text "Check out the latest 5G TOP news!". Logos for "5G PPP" and "6GSNS" are shown below the post. A blue bar at the bottom says "Latest 5G top news".

This entry includes the April 2023 newsletter of the 5GPPP network, which featured the EVOLVED-5G publication: “NetApps Enabling Application-Layer Analytics for Vertical IoT Industry”.

The screenshot shows a journal paper titled "NetApps Enabling Application-Layer Analytics for Vertical IoT Industry" by "Journal Paper". It features the "evolved 5G" logo. The text describes the acceptance of the paper into the IEEE Internet of Things Magazine, Volume 5, Issue 4. The abstract discusses the concept of vertical application enablement as a framework for integrating vertical IoT apps into mobile networks, mentioning the importance of data management and the development of NetApps for analytics enablement. It also highlights the Application Data Analytics Enablement Services (ADAES) and their implementation through NetApps. The paper is available online at <https://ieeexplore.ieee.org/document/10012484>.

#### Entry 46: Smart Cities and 5G: Taking it to the Next Level

Views: 115



Published: May 2023

Link: <https://forum.evolved-5g.eu/t/smart-cities-and-5g-taking-it-to-the-next-level/145>

**Smart Cities And 5G: Taking It to the Next Level**

Accelerator Library

V Vasileios\_Mavrikakis May 3

5G brings the capacity that smart cities need to connect—enabling the use of sensors, data, analytics, and more. Critical to the evolution of urban spaces into sustainable, resilient, and efficient entities, 5G quite simply is the key to the future of smart cities. Find out more here: <https://www.forbes.com/sites/deloitte/2022/11/15/smart-cities-and-5g-taking-it-to-the-next-level/?sh=4fb37d61e49>

This entry includes an article published by Forbes regarding Smart Cities and 5G and cities' plans to become eco-friendly and smart, using artificial intelligence and smart energy management and the role of 5G and IoT. This article includes case studies, global infrastructure report by Deloitte, and the role of cities.

#### Entry 47: 5G Network Fundamentals Course on Coursera

Views: 96

Published: May 2023

Link: <https://forum.evolved-5g.eu/t/5g-network-fundamentals-course-on-coursera/146>

**5G Network Fundamentals Course on Coursera**

Accelerator Library

V Vasileios\_Mavrikakis May 3

In recent years, operators have been deploying 5G technology on commercial mobile networks. The latter is announced as a major technological breakthrough with speeds beyond Gbit/s, very low latencies and above all a distribution in many sectors of activity.

Beyond the announcement effects, this technology relies heavily on 4G. The waveform for radio transmission is identical, the management of data flows is similar. However, 5G significantly extends the possible options both in the choice of architectures and in the radio interface configurations as well as in the security mechanisms.

Find out more about this course here: <https://www.coursera.org/learn/5g-network-fundamentals>

This entry includes a Coursera course on 5G Network Fundamentals by Institute Mines-Telecom, which is a 7-module MOOC including services and architecture of 5G networks, the main principles of the new radio interface (NR), data flow management, security and the new Service-Based Architecture (SBA).

#### Entry 48: Why 5G and the Edge Could Be the Keys to the Metaverse



Views: 80

Published: May 2023

Link: <https://forum.evolved-5g.eu/t/why-5g-and-the-edge-could-be-the-keys-to-the-metaverse/148>



## Why 5G and the edge could be the keys to the metaverse

■ Accelerator Library



Vasileios\_Mavrikakis

May 24

The metaverse is the coming together largely from two main concepts. Accessed through augmented reality (AR) tools and VR headsets, [Web3] is ushering in a new level of experience where websites and apps will be able to process information in a smart, human-like way in real-time using machine learning.

Find out more here: [Why 5G and the edge could be the keys to the metaverse | VentureBeat](#)

This entry includes an article published on Venture Beat showcasing the metaverse market, its role in the future of workplace, and the connectivity cornerstone with the next generation of connectivity and 5G and its role in Metaverse technology's business transformation. This entry serves as a good read for the community, highlighting latest market trends.

## Entry 49: What is 5G Technology and How Will it Impact your Business?

Views: 96

Published: May 2023

Link: <https://forum.evolved-5g.eu/t/what-is-5g-technology-and-how-will-it-impact-your-business/149>



## What is 5G Technology and How Will It Impact Your Business?

■ Accelerator Library



Vasileios\_Mavrikakis

May 24

Faster internet speeds, increased traffic, and seamless tech integration are just a few business benefits, here are a few more benefits that may make your company consider investing in and prioritizing 5G tech. Find out more here: [What is 5G Technology and How Will It Impact Your Business?](#)

This entry includes an article on 5G technology and how it benefits businesses. Starting with the basics of 5G technology and the adoption of such technologies by larger corporations, it highlights the benefits in business, including intelligent IoT devices, Network Slicing, and Multi-Access Edge Computing. This article aims to showcase the rising trend in 5G technology, its role in business and the talent corporations are looking for to invest in 5G connectivity.

## Entry 50: European 5G Annual Journal of 2023

Views: 82



Published: June 2023

Link: <https://forum.evolved-5g.eu/t/european-5g-annual-journal-of-2023/161>

The European 5G Annual Journal of 2023 is out! The latest update of our project is available online on page 83! Find the Journal online here: <https://bscw.5g-ppp.eu/pub/bscw.cgi/d532066/6GStart%20European%205G%20Annual%20Journal%202023-web.pdf>

## EVOLVED-5G

**Experimentation and Validation Openness for Longterm evolution of VErtical inDustries (EVOLVED) in 5G era and beyond**

Coordinated by Javier Garcia Rodrigo (Telefonica)  
January 2021-December 2023  
Website: [www.evolved-5g.eu](http://www.evolved-5g.eu)  
Twitter: @evolved5g

### Objectives

With Non-Public 5G Networks (NPN) already emerged, the existing experimentation platforms around Europe should increase the development pace to incorporate realistic business cases for the use of 5G by vertical industries. In this endeavour, the directions provided by 3GPP are considered as an effort to provide verticals with a common ground for upgrading their applications. A central concept that has emerged is the composition of **network applications** i.e., services that consume 3GPP APIs (native APIs) as well as other telco assets (referring to business support system – BSS APIs, e.g., service orchestration APIs) to support the vertical application with network-related capabilities. For example, a Network App could consume APIs that provide monitoring events and network slice configuration analysis to compose a service that guarantees quality of experience for latency-sensitive applications.

*EVOLVED-5G embraces the potential of the emerging Network App ecosystem under a twofold scope: i) to build an open experimentation facility for Network App creation, validation, and certification, and ii) to provide the means and the tools for long term evolution of 5G-enabled vertical industries.*





This entry is an annual report on 5G advancements. It is the 7<sup>th</sup> edition of the European 5G Annual Journals and presents major achievements and results of Phase 3 projects which are still running or recently ceased activity. This report hosts a 2.5 page reference to the EVOLVED-5G Project.

### Entry 51: 5GPPP Trials Results 2022 – Key Performance Indicators Measured in Advanced 5G Trial Sites

Views: 81

Published: June 2023

Link: <https://forum.evolved-5g.eu/t/5g-ppp-trials-results-2022-key-performance-indicators-measured-in-advanced-5g-trial-sites/162>



## 5G PPP Trials Results 2022 – Key Performance Indicators measured in advanced 5G Trial Sites

■ Accelerator Library



Vasileios\_Mavrikakis

Jun 30

As the 5G Public Private Partnership (5G PPP) has entered its last stage, and the 5G PPP Research and Innovation (R&I) projects and Working Groups (WG) are wrapping up their activities with a target end date at the end of 2023, it is important to record and analyse the trial findings and gained insights of the latest 5G PPP projects that engaged in 5Genabled field trials. This white paper by the Test, Measurement and KPIs Validation (TMV) WG, provides the state of play of recently finished and still active projects from Phase 3 of 5G PPP, aggregates their field measurements, presents and analyses their 5G network (and application level) KPIs and discusses the gained insights, from the latest 5G PPP trials.

This white paper is a natural conclusion of the work of the TMV WG as presented in its previous white papers, which are summarized here along with the key achieved results of the WG, as it complements the recorded metrics and KPIs from previous 5G PPP phases with Phase 3 results. Additionally, it provides insights regarding the performance of state-of-the-art 5G features/technologies (e.g., 3GPP Rel. 16 SA), that were not available in previous trials, but have been validated during Phase 3 trials.

Find out the White Paper here: [https://5g-ppp.eu/wp-content/uploads/2023/06/5GPPP-TMV\\_White-paper\\_Final-Trial-KPIs\\_v1.0.pdf](https://5g-ppp.eu/wp-content/uploads/2023/06/5GPPP-TMV_White-paper_Final-Trial-KPIs_v1.0.pdf)

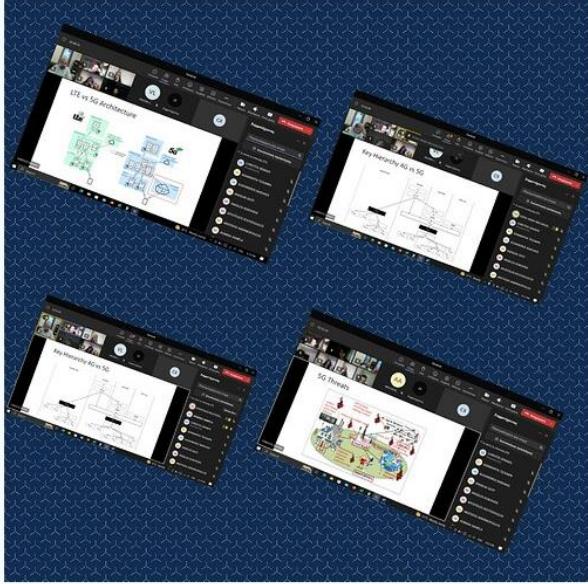
This entry is a paper by 5GPPP recording and analysing the trial findings and gained insights of the latest 5GPPP projects that engaged in 5G enabled field trials. It provides the state of play of recently finished and still active projects from Phase 3 of 5GPPP, aggregates their field measurements, presents and analyses their 5G network (and application level) KPIs and discusses the gained insights, from the latest 5GPPP trials. Additionally, it provides insights regarding the performance of state-of-the-art 5G features/technologies. This entry is to showcase the developments from the community.

### Entry 52: 5GPPP Trials Results 2022 – Key Performance Indicators Measured in Advanced 5G Trial Sites

Views: 77

Published: July 2023

Link: <https://forum.evolved-5g.eu/t/digital-systems-security-training-session/165>



**“Digital Systems Security” training session**

Accelerator Library

V Vasileios\_Mavrikakis Jul 18

On Monday 3rd of July InQbit - The Q-Bit Innovation partner, organised “Digital Systems Security” training session. The session took place online and in the context of Master Course on Cyber Security by University of Piraeus and more than 25 attendees were connected.

This entry reports the activities in the community and specifically the Digital Systems Security training session, which was held by InQbit, as part of the Master course on Cybersecurity by the University of Piraeus.

#### Entry 53: What is 6G? How is it different from 5G?

Views: 64

Published: July 2023

Link: <https://forum.evolved-5g.eu/t/what-is-6g-how-is-it-different-from-5g/166>



**What is 6G? How is it different from 5G?**

Accelerator Library

Vasileios\_Mavrikakis Jul 19

Though 6G network is still non-existent and is just in a research phase, enterprises have started envisioning state-of-the-art wireless use cases with 6G technology after successful comparison of 5G vs 6G network. The main aim is to transition in to the new era of wireless technology and bring on new innovations to transform the world in the upcoming years. Highly exciting possibilities with respect to speed and reliability are anticipated to become a reality soon once the new generation of wireless network i.e., when 6G mobile network hits the telecom space on a wider zone. This new-age technology is certainly going to give new dimensions to the way we are living or doing our business virtually today and in the post-covid era, making it as a hyper-connected world.

Find out more here: <https://www.rantcell.com/how-is-6g-mobile-network-different-from-5g.html#:~:text=Faster%20than%205G%20technology&text=Operating%20at%20terahertz%20frequency%20bands,reliability%20and%20wider%20network%20coverage>.

This entry includes an article featured in RantCell, which covers the topic of 6G technology and its difference from 5G technology. As 6G is in research phase, it gives an overview of how the 6G architecture is expected to look like and add a spotlight to the stakeholders who are currently researching on 6G technology. This entry serves as a good read to those who wish to understand the future developments of 5G technology, the upcoming innovations and key players.

#### Entry 54: 5G Networks: Bridging the Infrastructure Gap

Views: 79

Published: July 2023

Link: <https://forum.evolved-5g.eu/t/5g-networks-bridging-the-infrastructure-gap/167>

**5G Networks: Bridging the Infrastructure Gap**

Accelerator Library

Vasileios\_Mavrikakis Jul 20

5G connectivity opens the door to new applications, sources of business, and cost reductions – with significant benefits for industries including logistics, transportation, health, and education. Access more information about the 5G era here:

<https://www.github.org/articles/5g-networks-bridging-the-infrastructure-gap/>

This entry is an article featured in the Global Infrastructure Hub, which highlights the importance of 5G for new data collection and exploitation techniques including Big Data, Augmented Reality, and Deep Learning, for significant socio-economic benefit. It offers an overview of the investments needed and the efforts made up to now in private and public sector.

#### Entry 55: Will 5G Really Lead to a Revolution?



Views: 58

Published: July 2023

Link: <https://forum.evolved-5g.eu/t/will-5g-really-lead-to-a-revolution/168>

The screenshot shows a forum post from the 'Accelerator Library' section. The title is 'Will 5G really lead to a revolution?'. The post was made by 'Vasileios\_Mavrikakis' on 'Jul 20'. The content discusses how 5G will bring about a major revolution in communication, mentioning IoT, Big Data, and Artificial Intelligence. It includes a link to a Telefonica blog article.

**Will 5G really lead to a revolution?**

■ Accelerator Library

V Vasileios\_Mavrikakis Jul 20

The answer is yes, 5G is going to bring about a major revolution in how we communicate, and it's regarded as the engine that will help to accelerate and implement technologies such as the Internet of Things (IoT), Big Data and Artificial Intelligence. Find out more in the following article: <https://www.telefonica.com/en/communication-room/blog/will-5g-really-lead-to-a-revolution/>

This entry is an article featured in Telefonica's blog, showcasing the latest developments, growth rate, trends, the key features in 5G technology, its impact on other technologies and the actual use cases implemented by Telefonica.

### Entry 56: The Impact of 5G on Renewable Energy and Sustainability

Views: 43

Published: September 2023

Link: <https://forum.evolved-5g.eu/t/the-impact-of-5g-on-renewable-energy-and-sustainability/170>

The screenshot shows a forum post from the 'Accelerator Library' section. The title is 'The Impact of 5G on Renewable Energy and Sustainability'. The post was made by 'Vasileios\_Mavrikakis' on 'Sep 19'. The content discusses how 5G can boost the transition to renewable energy sources, mentioning smart grid technology, smart metering, and sustainable urban development.

**The Impact of 5G on Renewable Energy and Sustainability**

■ Accelerator Library

V Vasileios\_Mavrikakis Sep 19

A very interesting article shows how 5G can boost the transition to renewable sources. You may find more information here: <https://ts2.space/en/the-impact-of-5g-on-renewable-energy-and-sustainability/>

This entry is an article on how 5G can boost the transition to renewable sources and how 5G network connectivity can help power the renewable energy revolution, with low-latency, high-speed, and secure communications, optimizing the grid and facilitating the integration of renewable energy resources into existing power grids. This article touches upon various features regarding sustainable transition, including smart grid technology, smart metering, sustainable urban development, efficient management, etc.

### Entry 57: 5G IoT and the Future of Connected Vehicle

Views: 52

Published: September 2023

Link: <https://forum.evolved-5g.eu/t/article-5g-iot-and-the-future-of-connected-vehicle/171>



## Article: 5G IoT and the Future of Connected Vehicle

Accelerator Library



MariaAnagnostopoulos

Sep 20



### 5G IoT and the Future of Connected Vehicle

An article by Jayna Locke, Senior Marketing Manager, Digi International regarding cellular technology and traffic communications and how 5G technology in automotive applications is on a rising trajectory today, with the advance of in-vehicle technologies, IoT innovations and the deployment of high-speed networks.

Read the article here: [5G IoT and the Future of Connected Vehicle | Digi International](#)

This entry is an article by Jayna Locke, Senior Marketing Manager, Digi International regarding cellular technology and traffic communications and how 5G technology in automotive applications is on a rising trajectory today, with the advance of in-vehicle technologies, IoT innovations and the deployment of high-speed networks. This article sets the trends and market opportunities in autonomous driving.

## Entry 58: 5G in Healthcare

Views: 36

Published: September 2023

Link: <https://forum.evolved-5g.eu/t/paper-5g-in-healthcare/172>



The screenshot shows a digital interface for a paper. At the top left is the 'evolved 5G' logo. To its right, the title 'D6.3 Training Material and SMEs and Startup Acceleration Program Activities (Final)' is displayed above the 'GA Number 101016608'. Below the title, the paper's title 'Paper: 5G in Healthcare' is shown in bold black text, followed by a small note 'Accelerator Library'. The author's name, 'MariaAnagnostopoulos', is next to a circular profile picture containing a white letter 'M'. To the right of the author's name is the date 'Sep 20'. The main content area features a photograph of a Black female doctor in a white lab coat sitting at a desk, looking at a chest X-ray. On her desk is a computer monitor displaying a 3D anatomical model of lungs.

## Paper: 5G in Healthcare

Accelerator Library



MariaAnagnostopoulos

Sep 20



### PwC Paper on 5G in Healthcare

Combining 5G with other leading-edge technologies to create the opportunity to transform many aspects of patient care, while catalysing the emergence of a new healthcare ecosystem.

Read more here: [5G In Healthcare: PwC](#)

Download the paper here: <https://www.pwc.com/gx/en/industries/tmt/5g/pwc-5g-in-healthcare.pdf>

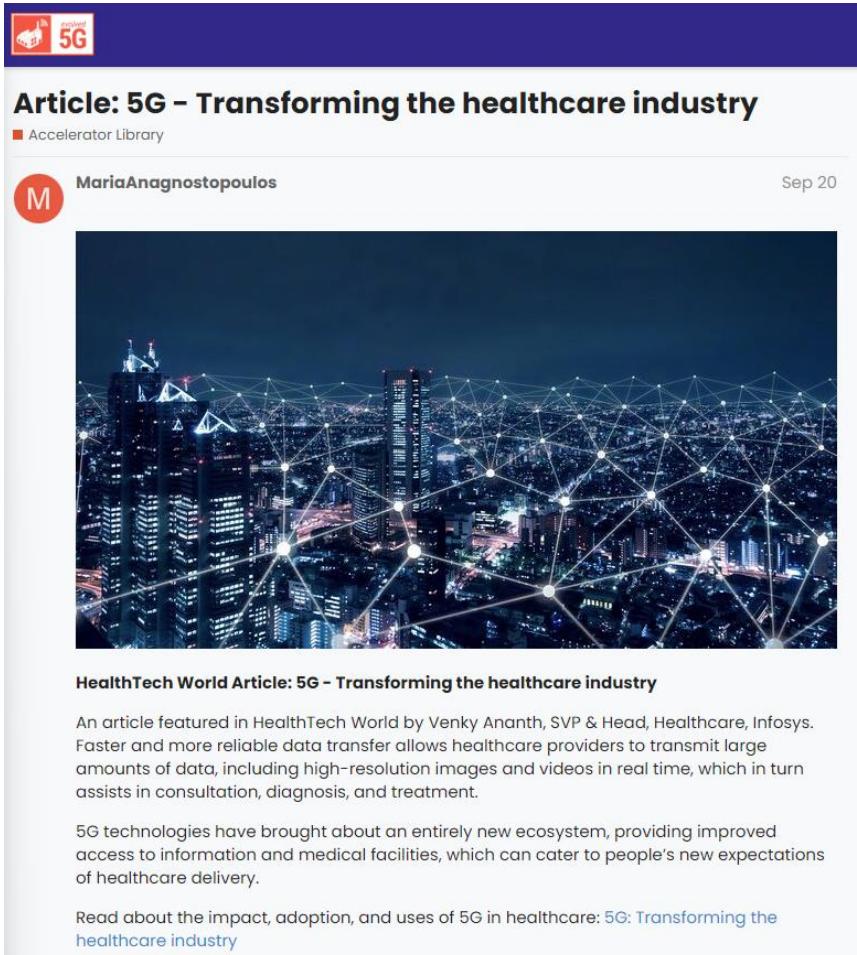
This entry features a paper published by PwC on 5G in healthcare and how combining 5G with other leading-edge technologies can create the opportunity to transform many aspects of patient care, while catalysing the emergence of a new healthcare ecosystem.

## Entry 59: 5G Transforming the Healthcare Industry

Views: 41

Published: September 2023

Link: <https://forum.evolved-5g.eu/t/article-5g-transforming-the-healthcare-industry/173>



**Article: 5G – Transforming the healthcare industry**

MariaAnagnostopoulos Sep 20

**HealthTech World Article: 5G – Transforming the healthcare industry**

An article featured in HealthTech World by Venky Ananth, SVP & Head, Healthcare, Infosys. Faster and more reliable data transfer allows healthcare providers to transmit large amounts of data, including high-resolution images and videos in real time, which in turn assists in consultation, diagnosis, and treatment.

5G technologies have brought about an entirely new ecosystem, providing improved access to information and medical facilities, which can cater to people's new expectations of healthcare delivery.

Read about the impact, adoption, and uses of 5G in healthcare: [5G: Transforming the healthcare industry](#)

This entry is an article featured in HealthTech World by Venky Ananth, SVP & Head, Healthcare, Infosys. The article covers the impact, adoption and uses of 5G in healthcare, featuring use cases.