



**5TH GENERATION END-TO-END NETWORK, EXPERIMENTATION,
SYSTEM INTEGRATION, AND SHOWCASING**

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Deliverable D7.9

Innovation and exploitation activities report (Release B)

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Version History

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LIST OF ACRONYMS

Acronym	Meaning
5GIC	5G Innovation Center
API	Application Programming Interface
AR	Augmented Reality
BEREC	Body of European Regulators for Electronic Communications
CA	Consortium Agreement
CNCF	Cloud Native Computing Foundation
CRUD	Create, Read, Update and Delete
DEC	Department of Electronic Communications
GA	Grant Agreement
E2E	End-to-End
ELCM	Experiment Life Cycle Manager
FP	Framework Programme
GST	Generic network Slice Template
ICT	Information and Communication Technologies
IMT	International Mobile Telecommunication
ISG	Industry Specification Group
ITU	International Telecommunication Union
KPI	Key Performance Indicator
M&A	Monitoring and Analytics
ML	Machine Learning
MANO	Management and Orchestration
MWC	Mobile World Congress
NSI	Network Slice Instance
NST	Network Slice Template
OAI	Open Air Interface
PoC	Proof of Concept
QoE	Quality of Experience
QoS	Quality of Service
RAN	Radio Access Network
REST	REpresentational State Transfer
RR	Radio Regulation
RSRP	Reference Signal Received Power
SAB	Strategy Advisory Board
SLA	Service Level Agreement
SME	Small and Medium Enterprise
SNR	Signal- to-Noise Ratio
SSG	Standards Sub Group
SVR	Support Vector Regression
TAP	Test Automation Platform
TRL	Technology Readiness Level
UE	User Equipment
VN	Virtual Node
VR	Virtual Reality

WG	Work Group
WRC	World Radiocommunication Conference

Executive Summary

This deliverable, D7.9 “Innovation and exploitation activities (Release B)”, reports the activities of the 5GENESIS consortium on the Innovation management program and on exploitation activities performed by the project partners from the month nine to the month eighteen of the project lifetime.

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1. INTRODUCTION

This deliverable reports the activities of the months between nine and eighteen of the 5GENESIS project lifetime regarding two important project-wide topics, i.e., the consortium-wide innovation management program, and the exploitation activities.

The content of this deliverable is organized according to the following structure:

- ***Section 1 “Introduction”***: where the scope, content and structure of this deliverable are clarified.
- ***Section 2 “Innovation Management Program”***: where the activities performed to foster a better innovation management in all project partners are reported.
- ***Section 3 “Exploitation Activities”***: where an update on the several exploitation actions performed by all project partners are reported. Especially the joint work with other relevant collaborative EU-funded projects and the impact on the numerous 5G-PPP and NetWorld2020 working groups are elaborated. Finally, also some key project assets are highlighted, and an update on the regulatory bodies interaction is provided.
- ***Section 4 “Exploitation Strategy Methodology”***: where a well-known method, i.e. the Value Proposition Canvas, is proposed to be applied in the last two quarters of the project lifetime to perform the business and techno-economic analysis of the project outcomes.
- ***Section 5 “Conclusion”***: where finally the deliverable conclusions are drawn.

2. INNOVATION MANAGEMENT PROGRAM

This section reports on the activities, performed between month nine and month eighteen of the 5GENESIS project lifetime, of the innovation management program and sketches the plan of actions for the forthcoming months, i.e., till the project end.

This section is composed of two main parts:

- **Section 2.1 (Platform-focused activities)** elaborates on the activities of the innovation program that have focused on the needs of a whole Platform (i.e., each one of the five Platforms that are part of the 5GENESIS project);
- **Section 2.2 (Plan of future actions)** describes the planned actions of the innovation management program till the end of the project. Both Platform- and partner-specific actions are described.

2.1. Platform-focused activities

Each one of the five 5GENESIS Platforms has its own specific set-up, equipment, technical aspects and focus areas, and subset of consortium partners that collaborate on its development. Therefore, each Platform has its own specific needs and characteristics. For that reason, the innovation management program, even though based on the same principles and run following a common pattern, is declined in slightly different ways, depending on the needs and the requests of the specific Platform.

The innovation management program is driven by the 5GENESIS Innovation Manager. In the first nine months of the project one Platform workshop was held in Berlin. From month nine to eighteen another Platform workshop took place in Malaga. The activities done there are reported in the next section.

2.1.1. Workshop @Malaga

On the 12th of March 2019 the Malaga Platform innovation workshop took place at the premises of the University of Malaga. The workshop lasted half a day, saw the participation of the project partners involved in the Malaga Platform and was driven by the 5GENESIS Innovation Manager Dr. Valerio Frascolla.

The Innovation Workshop aimed at improving the capability of dealing with innovation of the participants, especially having in mind the specificities of the Malaga Platform.

The participants were around twenty people, therefore a huge number of project partners took part to it, as shown in the following two pictures.



Figure 1: Start of the Innovation Workshop



Figure 2: Final phases of the Innovation Workshop

Also partner not directly involved in the Malaga Platform took part to the Innovation Workshop, as they wanted to learn more about the local issues and were very keen on providing their feedbacks on the technical discussions focusing on highlighting some key issues, as described below.

During the Innovation Workshop discussions were held on aspects related to the Malaga Platform and a fruitful and open confrontation of different opinion took place (see the following picture).

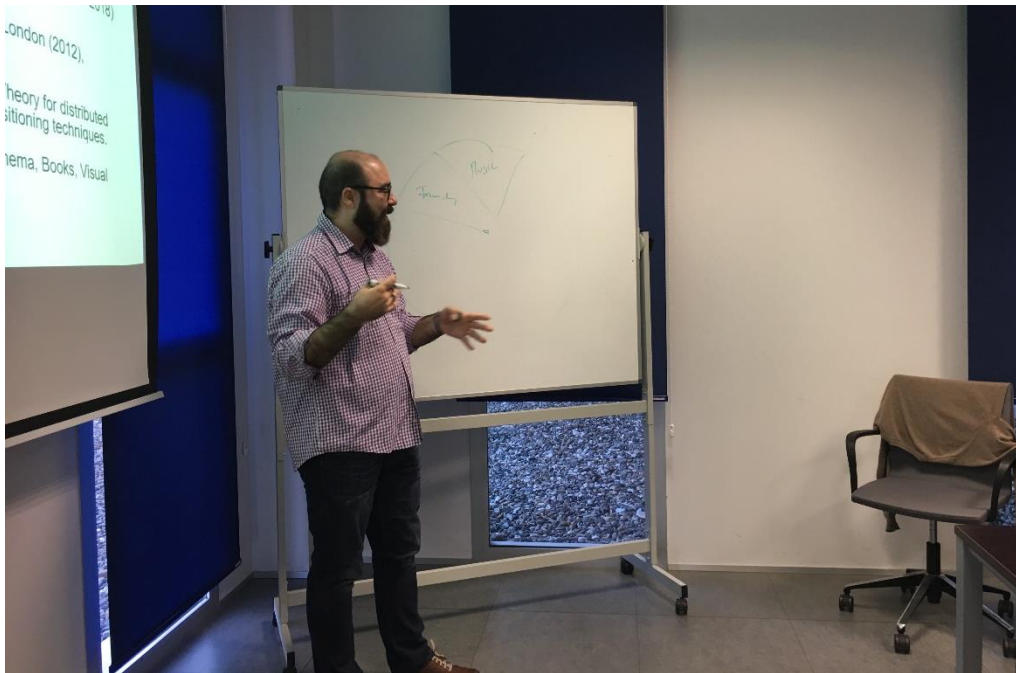


Figure 3: Running some exercise during the Innovation Workshop

1. *Start of the Innovation Workshop*

The Innovation Workshop started with an exercise meant to highlight how important is to deliver the right level of information to the right audience in a due set time. All participants were asked to introduce themselves in sharp two minutes, they were free to use whatever means they preferred, the only constraint is that if no slide was provided, they had to use the white board and write at least one thing about themselves.

The scope of this exercise is to highlight the importance of an effective communication, especially when a huge number of people have to discuss together on complex issues, like the ones to be discussed during the 5GENESIS general assembly in the next three days following the Innovation Workshop. Some takeaways were shared among the presenters and lessons learnt were identified on DO's and DON'T's of exchanging information among a group of people.

2. *Game 2 - 'Lightning Ball'*

After the first block all participants were asked to participate to the game "Lightning ball".

Time: 5 min.

Scope: A tennis ball is to be brought in the shortest possible time from point A to point B within a room (e.g. corner-to-corner).

Available Item: A tennis ball.

Game with Rules:

- Each team member has to touch the ball at least once.
- The ball cannot be thrown towards Point B, it has to be put in a stable state on Point B.

Alternatives:

- The game can be repeated two times (phase 1 and Phase 2), so to include learnings.
- Team members cannot talk among themselves.
- The ball cannot be thrown at all, not even among team members.

---> The target is to understand the following:

- Discuss on the role rules play.
- Analyze participants' reactions to rules and to potential immediate change of them.
- Discuss what is taken as assumption vs. what is clearly spelled out.

Following the conclusion of the game, a reflection part was run, where the following points were discussed:

- a. What was not successful?
- b. How did you like it?
- c. What have you learnt from this game?
- d. How does the game relate to the issues you face in the project?

3. Malaga Platform Problem Statement

Following the two blocks above the work focused on identifying what were the most important aspects of the work in the Malaga Platform that would need clarification. All partners were asked to provide a ranked list of max 3 items (short and concise problem statements).

After all inputs were collected, the team selected (providing a vote from 1 (highest) to 3 (lowest) on each item), which one it was most important for the team.

The exercise created the following list of items to be discussed (in parenthesis the number of votes the item took):

- How to measure using commercial devices (12)
- How do we monitor the infrastructure (9)
- How to show MEC functionalities (8)
- How to integrate WiFi, which WiFi technology (7)
- How to integrate the AIRBUS technology in the platform? (7)
- Open API (3)

- 5G NR what and when (5)
- How can data analytics be used for the Platform (4)
- What do we mean with “Experiments’ (2)
- Which components of the architecture are part of the Platform (1)
- Which use cases are planned to be demonstrated in Malaga (4)
- Delta between current status and what is needed (1)
- MCS use cases – how are they defined (3)
- How does MEC communicate with the core of the network (6)
- How to integrate different technologies w.r.t. data centers (4)
- Who does configure UEs (4)
- Which MEC technologies are going to be used (2)
- How to integrate users’ KPIs into the platform (2)

The team therefore decided to move to the next block and start elaborating on the first three items of the list. The other bullets were left out due to lack of time and the Platform responsible person took them as an indication of what aspects would need most of the attention in the forthcoming months of the Malaga Platform activity.

4. *Solution Space of the problem statement Phase*

The discussion on just the first identified bullet was so intense and went in such a depth that only a small amount of time could be dedicated to the other two points.

That was a sign that a discussion in the same room with all the partners working on the Malaga Platform was really due and could provide beneficial output.

This part of the Innovation Workshop was driven by the 5GENESIS Technical Manager Prof. Pedro Merino, as also shown in the following picture.



Figure 4: Prof. Merino, 5GENESIS TM, summarizing some main outcomes of the Innovation Workshop

The summary of the long discussion can be summarized in the following three points and action items, to be dealt with in forthcoming Malaga Platform calls and 5GENESIS WP3 calls.

- How to make use of Eurocom equipment?
- How to make use of commercial equipment?
- Which are the monitoring tools in both branches (Eurocom/commercial)?

The identified issues were planned to be discussed in WP3 w.r.t. plans of the three consortium vendors for deployment and in the slot allocated to the Malaga platform in the forthcoming General Assemblies.

2.2. Plan of future actions

The innovation program has two different target audience: foster the way innovation is dealt with at the Platform-level, and at the partner specific-level.

Regarding the *Platform-level*, two Innovation Workshops were held in the first eighteen months of the project, and the 5GENESIS consortium has elaborated a plan to run the still missing Innovation Workshops as follows:

- Athens Platform in Q1 2020

- The plan is to organize the Innovation Workshop in the framework of a dissemination event for 5G new market, together with the startup community in Athens. Details will be defined in Q1 2020.
- Limassol Platform in Q2-Q3 2020.
- Surrey Platform in Q4 2020.

Regarding the *partner specific-level*, several partners asked for focused Innovation Workshops at their premises, and the following partners will be the ones selected for such workshops in the first three quarters of 2020:

- Simula and KAU University, in conjunction with the September Consortium meeting planned in Oslo.
- IT with a dedicated event in Aveiro.
- Nemergent in conjunction with a local event focused on fostering innovation in Spanish SMEs. This will be a good opportunity for 5GENESIS to also impact the local SME ecosystem with its findings and proposed technologies.
- The consortium partners based in Cyprus active in the Limassol Platform in days after or before the Platform-specific Innovation Workshops planned in Q2-Q3 2020.
- The Greek consortium partners active in the Athens Platform in days after or before the Platform-specific Innovation Workshops planned in Q1 2020.

3. EXPLOITATION ACTIVITIES

3.1. Rationale and scope

In this section what the 5GENESIS consortium consider the main assets, the 5GENESIS facility (the one that will most probably be used as the main exploitation activities of the project) is briefly summarized.

Further down, the important aspects of aligning the project efforts with other relevant activities in the research and innovation ecosystems are reported.

Finally, a summary of the outcome of the most important conference on spectrum matter is provided, together with an update from each Platform on frequency spectrum matters.

3.2. Innovation from the project: Project assets

This section updates the content of the previous deliverable D7.8 (“Innovation and exploitation activities (Release A)”) regarding what the 5GENESIS consortium reports as the main assets of the projects. Such assets are defined as the main items that can distinguish the project from other research endeavors, and that have the biggest potential to be exploited, e.g., by embedding them in future products that will be launched in the respective targeted markets of each consortium partner, either during the project duration, or, and especially, after the project end.

The 5GENESIS consortium has defined the coordination layer and slice manager components as the common software to be installed in all 5GENESIS Platforms. Such software will be considered as the “5GENESIS Facility”. Any 5G platform that exposes its functionality with this common 5GENESIS Facility can be considered a 5GENESIS Platform. The software will be available as open source, and will help implementing advanced features like slice management, as well as allowing automation of experiments, definition of experiments with a user-friendly interface, analytics, connection with other 5GENESIS Platforms, etc.

One of the main targets of the 5GENESIS consortium is to make available to interested experimenters effective and as much as possible open means to showcase and try their own new technology enablers and innovative ideas on how to make the best use of the 5G technology for the broadest possible target. To that extent, the 5GENESIS Facility is a key enabler of such activities and can be considered a game changer in both the research and in the implementation ecosystems. In fact, the 5GENESIS Facility will foster a faster adoption of technologies and novel ideas both coming from SMEs and from the industry. For its flexibility, scalability and easy of use, the 5GENESIS Facility is considered a key element for advanced experimentations in the international scene.

The 5GENESIS facility is composed by the coordination layer and the slice manager defined in the Deliverable 2.2. Within the coordination layer, the two main modules are the Experiment LifeCycle manager and the Monitoring and Analytics Framework. The following items summarizes their main benefits compared with the state of the art in experimentation in mobile networks.

- The ELCM is the entity that performs the management, coordination and execution of the experiments in 5GENESIS Platforms. The ELCM enables to sequence the tasks involved in the execution of an experiment, which are basically three, the configuration, running and recollections of the results. The ELCM is oriented towards the execution of test cases and is easily extensible to support new test cases. This can attract attention of standardization bodies and technological alliances looking for benchmarking solutions to test and compare 5G products. This may be the characteristic that makes the difference compared to other experimentation platforms. The ELCM also enables the execution of custom experiments which provide a higher degree of freedom for running field tests. The ELCM The Experiment Life Cycle Manager (ELCM) Release A has been released in month 15 and described in Deliverable D3.15.
- Network slicing plays a significant role in the 5GENESIS framework, as it enables the creation of multiple virtual networks on top of the physical architecture of each Testbed, allowing platforms to provide portions of their infrastructure (e.g. network slices) that fit with the requirements by different experimenters. In 5GENESIS the slice view will be provided and controlled from a central software component, the Slice Manager. The 5GENESIS Slice Manager is based on a highly modular architecture, built as a diverse set of microservices, each of which is running on a docker container. The key advantages of this architectural approach are that it offers simplicity in building and maintaining applications, flexibility and scalability, while the containerized approach makes the applications independent of the underlying system. More details are available in D3.3 (5GENESIS Consortium, 2019), where the Release A of 5GENESIS Slice Manager is presented.
- The instantiation of a Monitoring and Analytics (M&A) framework is of great importance in 5G networks and experimental testbeds [4]. For this reason, the 5GENESIS consortium is developing a full-chain M&A framework, which aims to

ensure all the components of the infrastructure are working as expected during the experiments, so that 5G KPIs can be validated. The “Release A” of the M&A framework spans across the 5GENESIS reference architecture, interconnects with it through the ELCM, and already includes advanced Monitoring tools and Machine Learning-based Analytics. In light of state-of-the-art M&A functionalities, the framework positions itself as a key enabler for the validation of 5G KPIs. Moreover, its design, which takes roots from former EU H2020 Projects TRIANGLE and MONROE [9][10], and its development, which is based on widespread programming languages and is provided as open-access software, allow a lightweight integration, use, and exploitation in heterogeneous hardware/software platforms, within and beyond the 5GENESIS scopes. More technical details on the framework are given in the project Deliverable D3.5 [5].

3.3. Alignment with other research activities

In this section are reported the main synergy with the surrounding ecosystems that 5GENESIS has realized from month nine up until month eighteen of the project.

3.3.1. 5G-PPP

Since the project start, 5GENESIS has appointed several partners to contribute to the following 5G-PPP activities:

- 5G-PPP Steering Board.
- 5G-PPP Technical Board.
- 5G-PPP Comms.
- Pre-Standardization Work Group (WG).
- Spectrum WG.
- 5G Architecture WG.
- SDN / NDF WG.
- Network Management & QoS WG.
- Vision and Societal Challenges WG.
- Security WG.
- SME WG.
- Trials WG.
- 5G Automotive WG.

- IMT-2020 Evaluation Group.

The 5GENESIS project partners have been actively participating (and will continue to do so) to the 5G-PPP organized activities, in order to align, impact and synergize with the 5G-PPP WGs. This stream of activities is very important to ensure that the outcomes of the 5GENESIS project are aligned with what is happening in the surrounding international research ecosystem, and that the main achievements, especially the technical ones, get proper visibility in the research community and impact the society, in the broadest possible way.

An ongoing monitoring activity is being performed by the partners following the most important 5G-PPP WGs, and – when the case – contributions from the 5GENESIS project are discussed in the telcos or at the face-to-face workshops organized by the 5G-PPP association.

The following activities have been performed by 5GENESIS members during the reporting period:

- 5G-PPP Steering board (SB)
 - 5GENESIS representatives participated in the face-to-face meetings and conference calls of the 5G-PPP steering board. This activity contributed in the definition of the collaboration between ICT-17 and ICT-19 projects, but also on the formation of new WGs, such as the TMV working group, where the 5GENESIS consortium has actively contributed. Moreover, the transition of the leadership of this WG from phase 2 to phase 3 project representatives was also one of the major issues that was addressed during the meetings, where the SB reassured a smooth transmission and continuation of the WGs.
 - On the experimentation methodology and experimentation tables that 5GENESIS has been defined (used in D6.1), 5GENESIS presented a preliminary version of this methodology at the Global 5G event in June 2019 in Valencia, which is the top ranking event of the 5G-IA.
 - Other activities of 5G-PPP SB related to 5GENESIS, were discussions that took place for the collaboration of ICT-17 projects with the ICT-19 projects, where 5GENESIS will support the vertical industries that participate in other EU funded research projects like 5G!Drones, 5G-VICTORI, and 5G-HEART.
- 5G-PPP Technical Board (TB)
 - 5GENESIS partners attended all the conference calls and the 5G-PPP meeting in Brussels on the 21st of May 2019.

- 5GENESIS, through University of Malaga and Prof. Pedro Merino (5GENESIS TM), was the host of the 5GPPP Technical Workshop and Technical Board meeting in Malaga Malaga since 8th October to 10th

5GENESIS was very active in the technical workshop with one session on “Key Enablers in 5G Experimentation” organized by Dr. Dimitris Tsolkas (DTM) and Dr. Almudena Díaz (leader of WP3), one session on “The Role of Edge Computing in 5G” organized by Dr. David Artuñedo (5GENESIS standardization manager)

The following pictures capture some of this activities in the technical workshop



Figure 5: 5GPPP Tech. workshop participants visiting 5GENESIS Malaga platform



Figure 5: 5GPPP Tech. workshop: Prof. Pedro Merino presenting the status of 5GENESIS



Figure 7: 5GPPP Tech. workshop: Dr. Almudena Díaz and Dr. Dimitris Tsolkas in the special session

- The two main activities in this period are related to KPI evaluation and European cartography:
 - 5GENESIS contributed to the TB work on the coordination of the platforms cartography in collaboration with the Trials WG, to be expanded also with a vertical cartography (ICT-17 TMs and DTMs leading). The current output of the cartography is available at <https://5g-ppp.eu/5g-ppp-platforms-cartography>.
 - 5GENESIS also actively took part in the discussions on how to define and measure KPIs and took part to the Technical Board activities on KPIs synchronization with the TMV WG.
- A third main activity in the TB was the identification of new white papers to be produced by the WGs in a cooperative way.
- 5G-PPP Comms
 - 5GENESIS took an active role in all the conference calls which are organized each other month, to share information and align the activities of all the EU-funded projects that are under the 5G-PPP umbrella.
 - 5GENESIS representatives have been actively participating to the activities of this WG, by informing and disseminating 5GENESIS project activities and proactively proposing joint collaborations with other funded projects, e.g. the co-organization of workshops and special sessions at international flagship conferences.
- Pre-Standardization WG
 - 5GENESIS representatives have participated in the monthly calls of this WG, aligning and sharing their views on the activities of the WG.
 - 5GENESIS has actively contributed to this WG, and especially:
 - On the continuous tracking of 3GPP study and work items for releases 16 and 17 and on the mapping of items across 3GPP system and vertical applications.

- On the publication of the Verticals Cartography information at Global5G.org (see also text above in the 5G-PPP TB subsection).
 - On the publication of the actions from the 2nd Verticals user group: <https://www.global5g.org/sites/default/files/Action%20Plan%20from%202nd%20vertical%20user%20workshop.pdf>.
 - 5GENESIS took part in the 2nd 5G Vertical User Workshop in Rome in July 2019, where verticals like Media, Security and Public Safety, Non-Terrestrial Networks and Aviation/Drones have been discussed and their requirements analyzed. Those verticals matched some of the use cases that 5GENESIS is building in its different Platforms.
- Spectrum WG
- 5GENESIS representatives are regularly taking part in Spectrum-WG conference calls.
 - 5GENESIS actively contributed to the following documents which were recently generated:
 - WG Spectrum Response to 5G-IA on RSPG 2nd Opinion5G.
 - Key recommended spectrum areas for FP9 - High-level overview.
 - 5G IA Response to the Public consultation on the Draft RSPG Opinion on 5G implementation challenges (RSPG 3rd opinion on 5G) – in progress.
 - In August 2019 the WG was asked to provide suggestions to BEREC (Body of European Regulators for Electronic Communications) regarding new topics that should be taken into consideration in the regulation of 5G. WG members were invited to contribute by email. It is worth mentioning that only two contributions were sent, and one of them was from 5GENESIS (driven by the consortium partner IT).
- Architecture WG
- 5GENESIS has taken part in the 5G Architecture WG Meeting held in Munich on March 18-20 2019, which involved the preparation of the third release White Paper of the WG. The work is ongoing and some contributions from 5GENESIS will be included, in order to even further increase the number of contributions for the next release of the White Paper.

- As part of this WG, 5GENESIS presented the topic “Transport Network Infrastructure” at the WG Architecture Workshop which was held at EuCNC 2019 in Valencia.
- The Architecture WG Chairs have released the v3.0 of the Architecture WG White Paper, where 5GENESIS was the Chapter 4 Editor.
- SDN / NFV WG
 - Since the beginning of the project, 5GENESIS has been focusing on participating in all calls performed by the group and in collaborating with the White Paper (EUCNC 2019 release).
 - The WG worked on the collection of Open Source Contributions outputs from the different projects, and 5GENESIS included its contributions to this action. Moreover, as soon as the project obtains the expected outputs described in the GA, the ones related to SDN and NFV functions will be included in the repository of software outputs created by this WG.
 - 5GENESIS contributed to the Software Networks Whitepaper released in September [17]. The paper analyzes how 5G-PPP projects interpret Cloud-Native design patterns and identify adoption barriers. 5GENESIS participated with the Málaga MCPTT use case. This whitepaper has direct impact in appointing a liaison member from ETSI Industry Specification Group (ISG) to CNCF (Cloud Native Computing Foundation).
 - The WG is now discussing a new Whitepaper for the Mobile World Congress 2020. Content is open and 5GENESIS will contribute to it as appropriate.
 - The WG is also working on the creation of a new White paper in collaboration with the Architecture WG about Edge computing, to define and clarify concepts and questions that may have arisen.
 - A 5GENESIS representative attended as a listener to the Workshop organized by the WG, for the EUCNC 2019 named: “From cloud ready to cloud-native transformation”.
- Network Management & QoS WG
 - 5GENESIS representatives of this WG have contributed with a description of the 5GENESIS Slice Manager, the workflow for the instantiation and the

configuration of a network slice, and a discussion regarding where Artificial Intelligence (AI) and ML can play a role on the Slice Manager functionality.

- The mandate of this WG is now deemed completed and the WG has been suspended in October 2019.
- Vision and Societal Challenges WG
 - 5GENESIS representatives constantly and actively attended all three sub-WGs calls which are:
 - *Smartnet*, led by Arturo Azcorra, which focuses on the structure and scope of the Framework Programme 9 (FP9), called Horizon Europe (HE), i.e., the successor of the FP8, which is getting fast close to its completion.
 - *Pre-structuring Model* (PSM), led by Didier Bourse, which defines the Pre-structuring Model phase III of the forthcoming EU calls of the FP8 programme, to be released in several updates starting with June 2019.
 - *Member State Initiative* (MSI), led by Miquel Pajaro, which focuses on fostering the interaction with the EU member states and their local initiatives.
 - In the PSM sub-WG, 5GENESIS actively contributed to the definition of ICT-41, ICT-42, and ICT-52 topics.
- Security WG
 - 5GENESIS took part in the conference calls and to the physical meeting which was hosted at Orange Garden in Chatillon France on the 22nd of November 2019.
 - During the November 2019 physical meeting, 5GENESIS presented its two identified security topics: “Security Analytics platform” and “Security of the mission critical services (MCS)”
 - The next step will be to produce whitepapers and to organize workshops
- SME WG
 - 5GENESIS took part in the following telco meetings:
 - In September 2019, where the following was discussed:

- Potential request to 5G-PPP to plan for a call that refers to 5G implementation in rural areas.
 - A new NetWorld2020 SME webpage was made available: <https://www.networld2020.eu/find-the-sme-you-need-new-page/>
 - A dedicated “SN&S (Smart Networks & Services) Task Force” has initiated discussions about the partnership programme that should succeed 5G-PPP in the upcoming FP9 (Horizon Europe) framework programme.
 - In November 2019, where we provided information regarding our participation in the MWC2020.
- Trials WG
- 5Genesis has joined this group in Q2 2019. The group is active with projects from Phase 1 and 2, integrating new projects from Phase 3.
 - This WG has been focused in producing the “5G PPP PLATFORMS CARTOGRAPHY” available at <https://5g-ppp.eu/5g-ppp-platforms-cartography/>, where the 5GENESIS Platforms have been integrated.
 - This WG is producing detailed online information of the testbeds available at <https://www.ip45g.de/en/5g-testbeds/>. 5GENESIS Platforms are already listed in the tool (see the following Figure).

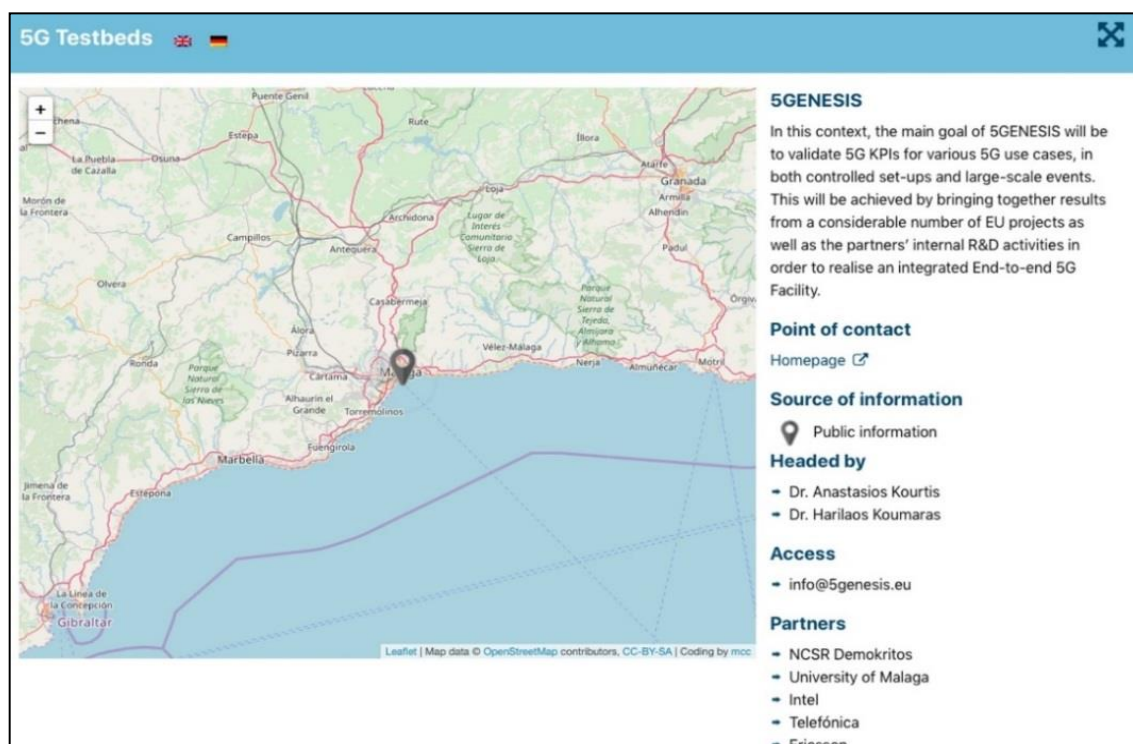


Figure 8. 5G testbeds online information

- 5GENESIS is now working with the WG on ICT-19 Platforms Cartography (Features/Capabilities, Verticals, KPIs...) and Verticals Trials & Pilots (ICT-19, Phase 2 and ICT-18 Projects) based/targeted on ICT-19 Platforms & Nodes.
- This WG produced the “Roadmap Version 5.0 - 10 Phase 2 Projects Trials & Pilots.” The goal of this activity was to have an objective/approach for the 10 Phase 2 Projects Trials & Pilots to be highlighted in the "Roadmap Version 5.0" document and to be possibly included in the EU 5G Observatory (Category 3). Evaluation criteria and selection Panel is being addressed to have a 100% transparent selection process. The Release date was set to September 2019 and presentation and communication during IEEE 5G World Summit was organized on 29.09-02.10.19 in Dresden (<https://sites.ieee.org/wf-5g/>).
- 5G Automotive WG
 - 5GENESIS took part in the meetings of this WG.
 - 5GENESIS project aims to provide relevant vision on evaluation of KPIs in several experiments based on the performance of the 5G infrastructure developed, although not a specific use case is focused on automotive sector, similar ULRRRC such as Mission Critical services targets low latency and reliable communication.
- IMT-2020 Evaluation Group
 - IMT-2020 5G PPP Evaluation Group officially initiated their work in January 2018 based on the cooperation of Phase II 5G projects. Phase III projects have been invited to cover possible gaps beyond July 2019 until the end of the evaluation process. 5GENESIS is currently monitoring the status and the work of the Evaluation Group in order to examine potential contribution of the project. 5GENESIS has joined this group in Q1 2019. The group is active with all projects from Phase 3, integrating new projects from Phase 2.
 - 5GENESIS has taken part in the following activities:
 - Definition of the same methodology on test, measurement and validation of the common KPIs.
 - Incorporation of previous projects methods.
 - Alignment of KPIs definition between project (phase II and ICT-17).

- Review of KPIs document created by the TB Task force (cartography of KPIs and innovation).
- Preparation of cloud native White paper.
- The ICT-17 projects 5GENESIS, 5G-VINNI and 5G-EVE are implemented under complementary Grant Agreements (GA) through the use of the respective options of Article 2, Article 31.6 and Article 41.4 of the Model Grant Agreement. Under this complementary activity. The three projects are collaborating through two different channels: i) Via the 5G-PPP WGs and the ii) Via commonly organized activities. A major requirement from this collaboration is the definition and adoption of a common experimentation framework, which will allow the comparison and benchmarking of the experimental results that are gathered by the execution of experiments across the different platforms.
- Towards this, 5GENESIS has developed a KPI formalization framework, which presented also at Global 5G Event at a commonly organized session by the three projects, and has been also used as an input to the newly form TMV group.
- Moreover, the three projects have co-organized together different special sessions and workshops at conferences and other events (such as ICT-19 InfoDay in Brussels, EuCNC 2018 and EuCNC 2019).

3.3.2. Netowrld2020

The activity of the Netowrld2020 are not so frequent and do not include so many participants as the several WGs of 5G-PPP. Never the less, the scope of Netowrld2020 is quite important in defining the content of the forthcoming calls of the EU and in pushing there some key innovations coming out, for instance of the work of key collaborative research projects like 5GENESIS.

A 5GENESIS representative attended the Netowrld2020 meeting held in Lisbon in the morning of the 29th of November. Several topics were discussed, all focused on defining the right approach for the feedback to be given to EU and the related technical document to be prepared in Q1 2020. 5GENESIS will push its inputs into the document, especially the most advanced ones, like the dynamic management of spectrum in 5G and beyond networks.

3.3.3. Synergies and supporting activities to other H2020 projects

The 5GENESIS project, as an ICT-17 5G experimentation platform, has already got involved in synergies and supporting actions of ICT-19 projects, which aim at validating 5G vertical use cases, on top of the 5GENESIS infrastructure. This is based on the plan that the 5GENESIS Facility is provided as an experimental asset to the potential vertical industries that are interested to test the performance of their services in the forthcoming 5G and beyond system environments.

More specifically, 5GENESIS supports three ICT-19 projects, namely 5G-VICTORY, 5G!Drones and 5G-HEART.

The 5GENESIS Berlin Platform will support the trials within the 5G-VICTORY project. 5G-VICTORY will conduct large scale trials for advanced vertical use case verification focusing on Transportation, Energy, Media and Factories of the Future and cross-vertical use cases. It leverages 5G network technologies developed in 5G-PPP Phase-1 and Phase-2 projects 5G-XHaul and 5G-PICTURE, and exploits extensively existing facilities interconnecting main sites of all ICT-17 infrastructures i.e. 5G-VINNI, 5GENESIS, 5G-EVE, and the 5G UK test-bed in a Pan-European Infrastructure.

The 5GENESIS Surrey Platform will support the activities of the 5G-HEART project. 5G-HEART focuses on the vital vertical use-cases of healthcare, transport and aquaculture. In the health area, 5G-HEART will validate pillcams for automatic detection in screening of colon cancer and vital-sign patches with advanced geo-localization as well as 5G Augmented Reality / Virtual Reality (AR/VR) paramedic services. In the transport area, 5G-HEART will validate autonomous/assisted/remote driving and vehicle data services. Regarding food, focus will be on 5G-based transformation of aquaculture sector (worldwide importance for Norway, Greece, Ireland). Trials will run on sites of 5G-Vinni (Oslo), 5Genesis (Surrey), 5G-EVE (Athens), as well as Oulu and Groningen, which will be integrated to form a powerful and sustainable platform where slice concurrency will be validated at scale.

The 5GENESIS Athens platform will support the activities of the 5G!Drones project. The project will drive the UAV verticals and 5G networks to a win-win position, on the one hand by showing that 5G is able to guarantee UAV vertical KPIs, and on the other hand by demonstrating that 5G can support challenging use-cases that put pressure on network resources, such as low-latency and reliable communication, massive number of connections and high bandwidth requirements, simultaneously. 5G!Drones will build on top of the 5G facilities provided by the ICT-17 projects and a number of support sites, while identifying and developing the missing components to trial UAV use-cases. The project will feature Network Slicing as the key component to simultaneously run the three types of UAV services on the same 5G infrastructure (including the RAN, back/fronthaul, Core), demonstrating that each UAV application runs independently and does not affect the performance of other UAV applications, while covering different 5G services.

In the framework of the supporting actions between 5GENESIS and the aforementioned projects, common sessions at the GA meetings of 5GENESIS have been organized, where representatives of the ICT-19 projects have presented the planned use-cases to be performed on top of 5GENESIS platforms, together with the relevant requirements.

Finally, 5GENESIS will strongly collaborate with the projects of ICT-41-2020 in order to validate vertical use cases, on top of the 5GENESIS infrastructure. This is based on the plan that the 5GENESIS facility is provided as an experimental asset to the potential vertical industries that are interested to test the performance of their services in the forthcoming 5G system environment.



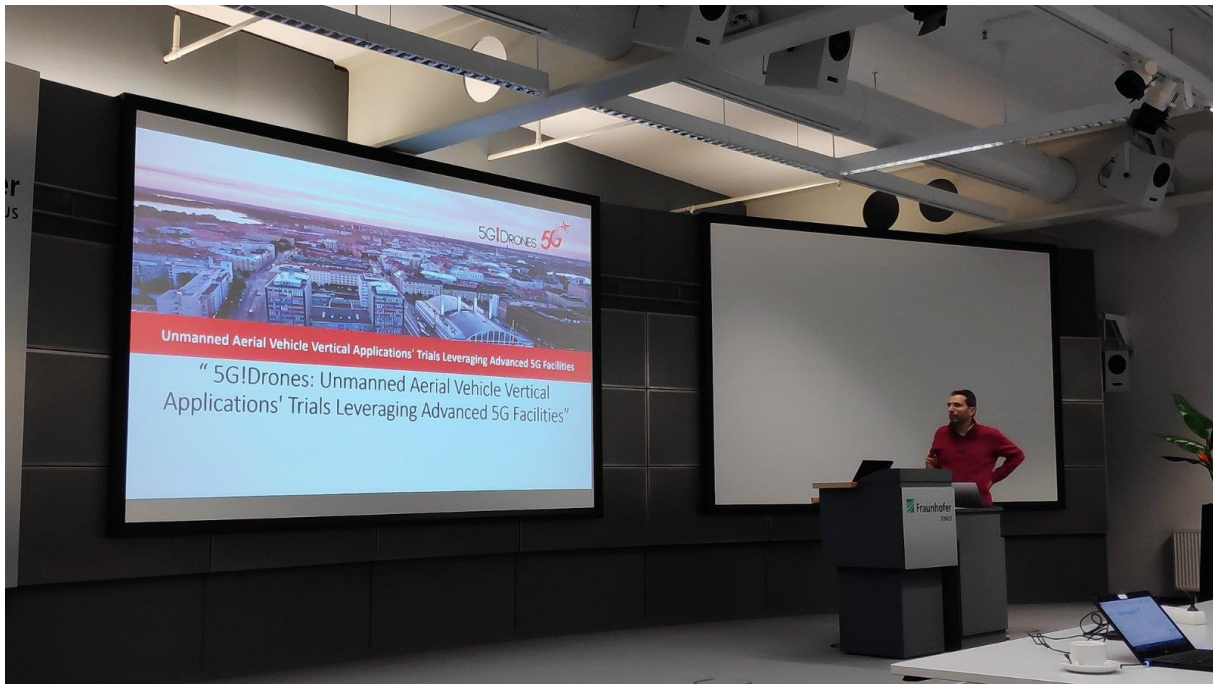


Figure 9. ICT-19 Project presentations at 5GENESIS meeting in Berlin

The following figure represents the process and the steps that an ICT-41-2020 project (and not only) should follow in order to be engaged with 5GENESIS platforms.

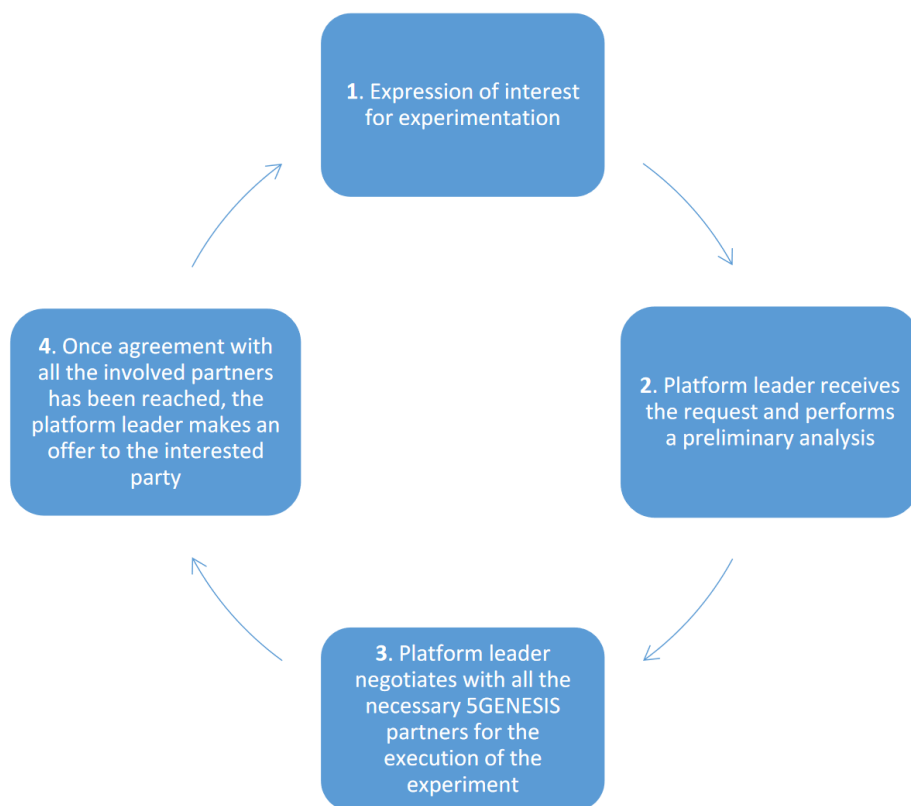


Figure 10. Process diagram of 5GENESIS Facility exploitation by a vertical industry

3.4. Regulatory bodies impact

2019 has been a year of frantic activities in all regulatory bodies around the world, due to the preparation of the long-awaited for World Radiocommunication Conference (WRC) 2019. The reason is that the WRC-19 was chartered with the task of defining the bands to be used for the forthcoming years, especially those for 5 services in the lower mmWave bands above 28 GHz and below 90 GHz. At the light of the above, the consortium decided to engage with regulatory body in the weeks and quarters after the conclusion of the conference, so to better understand what the implications on the 5GENESIS exploitation plans might be.

In this section we provide a short summary of what WRC-19 is and its main outcomes, and then provide the points of view of the different 5GENESIS Platforms on spectrum related topics and their relationships with the relevant local regulatory bodies. Finally, a plan for further action till the project end is provided.

3.4.1. Analysis of the WRC-19 outcome and decisions

The WRC-19 was held in Egypt 28.10.2019 – 22.10.2019. The WRC is the most important conference in the world for spectrum matters and usually is held once each four years.

The conference is a quite unique venue where Radio Regulations (RR) are ratified and taken decisions have a worldwide reach and validity. Periods of time between WRCs are called study periods, and modification proposals to RR are driven by the ITU-R, i.e. the Radiocommunication sector of the International Telecommunication Union. The ITU is an agency of the United Nations responsible for matters concerning Information and Communication Technologies (ICT). The role of ITU-R is, according to the ITU website “... to manage the international radio-frequency spectrum and satellite orbit resources and to develop standards for radiocommunication systems with the objective of ensuring the effective use of the spectrum“ [18]. Administrations sign the so-called treaty at the end of the conference, to stress their willingness to follow the decisions taken by the WRC. An important outcome of WRC is also the set of so-called Resolutions and Recommendations that aim at facilitating the process of absorbing and implementing with local regulations the decisions taken during the WRC.

Finally, it is worth mentioning what International Mobile Telecommunication (IMT) stands for: it is comprised of IMT-2000, IMT-Advanced, and IMT for 2020 and Beyond, i.e., the ITU terms for the 3rd, the 4th and the 5th generation of mobile broadband systems as specified, documented, and regularly updated in a series of the ITU-R Recommendations.

The decisions taken came after quite some harmonization efforts to accommodate the different requirements of all the worldwide involved stakeholders, and can be summarized in what follows (this is not the right document to elaborate on the detailed technical decisions and more background would be needed to fully understand the involved constraints):

- 26 GHz: Global identification with technical conditions;
- 40 GHz: Global identification with technical conditions;
- 45.5 47 GHz: Identified for IMT, but without global validity and with technical conditions;
- 47.2-48.2 GHz: identified for IMT, but without global validity and with technical conditions;
- 66-71 GHz: Global identification with technical conditions.

The other important decision taken out of the WRC-19 was the definition of the agenda of the next WRC, to be held in 2023. It is worth noting that the current draft of the agenda is mainly focused on bands below 10 GHz (including the new chunks 6.5 – 7.1 GHz, around 10 GHz and below 500 MHz).

The impact on the work of 5GENESIS of the decisions taken deserve more studies, as the consortium didn't have the time in December to fully analyze the results of the work, also considering that some document have not been released right after the end of the WRC at the end of November. In the next deliverable a more detailed analysis will be performed and the potential impact on the consortium work will be identified.

3.4.2. Surrey Platform

UNIS, being the home of the 5G Innovation Centre (5GIC) and the leader of the 5GENESIS Surrey platform, has a very close relationship with Ofcom, the UK regulatory body, which is one of the 5GIC's twelve founding members. The 5GIC's Strategy Advisory Board (SAB) is chaired by visiting Professor David Hendon, who is also a part time senior advisor at Ofcom. Among the key responsibilities of this board is to approve the core research projects identified by the University to be undertaken under the core research programme and generally advise on, and encourage good research practice, as well as to agree on the principles around IP exploitation and contributions to standards bodies.

Moreover, the 5GIC Standards Sub Group (SSG) provides the 5GIC members with the opportunity to meet with its industry members involved in standards and regulatory activities. Ofcom participate in this, predominantly for ITU spectrum related issues. The role of SSG includes:

- discussion and analysis of the work by 5GIC,
- the identification of suitable work in 5GIC that can be submitted to the standards bodies, taking account of any relevant IPR,
- the reporting back to 5GIC the relevant standards work and its progress,

- the feeding back to the standards bodies any problems with or gaps in the specifications identified by simulations run on the Test Bed.

There have been four meetings of the SSG this year, with Ofcom participation. Therefore, these are the main channels through which 5GENESIS, and the Surrey platform in particular, can communicate its findings in major regulatory, standardization and industrial stakeholders.

3.4.3. Berlin Platform

Fokus has engaged with BNetzA (the German regulatory body) in order to obtain a license for the 3.7 to 3.8 GHz spectrum which is required to provide 5G RAN Access for the Berlin Platform at Fraunhofer FOKUS. As a result, FOKUS has been granted an R&D license (100MHz, from 3.7 to 3.8 GHz) at the FOKUS' premises. The license is valid until the end of 2020, which is maximum duration of a R&D license; the R&D license is renewable. Having been granted the license assure to operate 5G RAN equipment at the Berlin Platform at Fraunhofer FOKUS in order to conduct the evaluation of KPIs for 5Genesis.

In order to allow for a long-term planning of R&D activates, FOKUS will further engage with BNetzA to obtain a commercial license in the 3.7 to 3.8 GHz spectrum in addition to the granted R&D license. Such a commercial license could be granted of up to ten years.

The allocation of the 5G frequencies allows the Berlin Platform to evaluate 5G KPIs over (pre-) commercial 5G Stand Alone RAN equipment. Besides, the allocation allows the Berlin Platform to offer an integration environment in which they can conduct interoperability tests between their RAN equipment and the Open5GCore. First integration tests with 5G Stand Alone equipment have been started.

3.4.4. Malaga Platform

Pedro Merino has communicated the progress of the 5GENESIS Malaga Platform and the whole project to the staff of the Dirección General de Telecomunicaciones during the 5GForum event, held in Malaga last April 2019, and also by periodic email communications.

The request to provide 500Mhz in 28Ghz MHz for experimental use in the project is currently still being evaluated by the regulator.

Among the next steps it is worth mentioning that the current commitment with the Spanish regulator is to provide a summary of the results obtained with the outdoor 5G deployment at UMA and Malaga city. In parallel, the legal aspects to have the 28GHz spectrum for the Malaga Platform will be finished in the next quarters.

3.4.5. Athens Platform

NCSR Demokritos has already received a 5G Experimental License from the Ministry of Digital Governance especially for the activities of the 5GENESIS tests in Athens in the band 42 (3.4-3.6GHz) with 80MHz bandwidth for the needs of the project. The license has been provided till the end of Dec 2019 and NCSR has proceeded with all the necessary actions for renewing the license for another year, so to continue the relevant experiments needed to enhance and evolve the Athens Platform.

3.4.6. Limassol Platform

Primetel PLC already acquired a 5G Experimental Licence from the Department of Electronic Communications (DEC) Cyprus from December 2018 – November 2019 for the use of 3.4 to 3.5 GHz spectrum.

With the 5G experimental license the Mobile Network Department of Primetel was in the position to test commercial equipment from different vendors.

Face to face meetings with the Director of the Telecommunications Authority of Cyprus, and the department of electronic communications (regulation authority) have been scheduled for 2020.

Primetel PLC has been in correspondence with DEC for renewal of this Licence. Until then, tests are carried out in isolated environments (e.g. in RF cages) to avoid any interference to incumbents.

3.4.6.1. Engagements with other regulatory bodies

After an educated discussion held during one of the 5GENESIS general assembly, the consortium didn't consider relevant to engage with regulatory bodies outside of the five countries (Spain, UK, Germany, Cyprus and Greece) where 5GENESIS Platforms are foreseen. The reason for that is that in any case local (national) constraints and different rules apply, and therefore the value of engaging with regulatory bodies outside of those countries will not bring much benefit to the ongoing and planned work of the project.

4. EXPLOITATION STRATEGY METHODOLOGY

This Section explains the methodology that is followed in order to define the 5GENESIS project exploitation strategy. It starts by clarifying the definition of an exploitable outcome in 4.1.1 and the proposition of a generic classification of the project's results in 4.1.2. Building on these constructs, it then introduces in 4.2.1 the methodology to identify exploitation opportunities and challenges by formalizing a value proposition canvas, and through the lean canvas methodology of 4.2.2 support the business case development for mature direct exploitable assets.

4.1. Exploitation Potentials and Project Results

This section clarifies the types of an exploitable outcome and proposes a categorization of the project results. These are the basic constructs upon which the exploitation methodology presented subsequently is based.

4.1.1. Types of Exploitable Outcome

Various types of partners may participate in a collaborative research EU-funded project - universities, research centres, commercial companies and SMEs - and depending on their expertise and areas of interest, the exploitation strategy and activities vary accordingly. Universities and research centres focus on exploitation activities regarding research items, while commercial companies and SMEs are mainly involved with the exploitation of commercially oriented products. In the light of this diversity, we can identify five major categories of exploitable outcome:

- **Product development** which includes the introduction of new products or features (together with a roadmap definition) and the product validation that increases the technology readiness level (TRL) towards a successful deployment. This outcome category is related mostly to commercial companies and SMEs.
- **Business development** which includes enhancement of existing processes and services or the creation of new services and activities. This category is also related mostly to commercial companies and SMEs.
- **Standardization** is a process through which the commercialization and sustainability of projects results can be supported. Partners that are actively involved in standardization may promote the results of the project to provide technical contributions to relevant standards bodies, if the proposed innovation fits the time window of the discussions in related standardization bodies.

- **Research achievements**, including publications, IPRs and prototypes, which can be produced by all partners.
- **Start-Up companies**. These can be established mainly by universities and research centres in order to exploit one or more of the project's exploitable outcomes and indirectly pursuit product development outcome.

The exploitable outcome categorization is graphically depicted in the figure below.

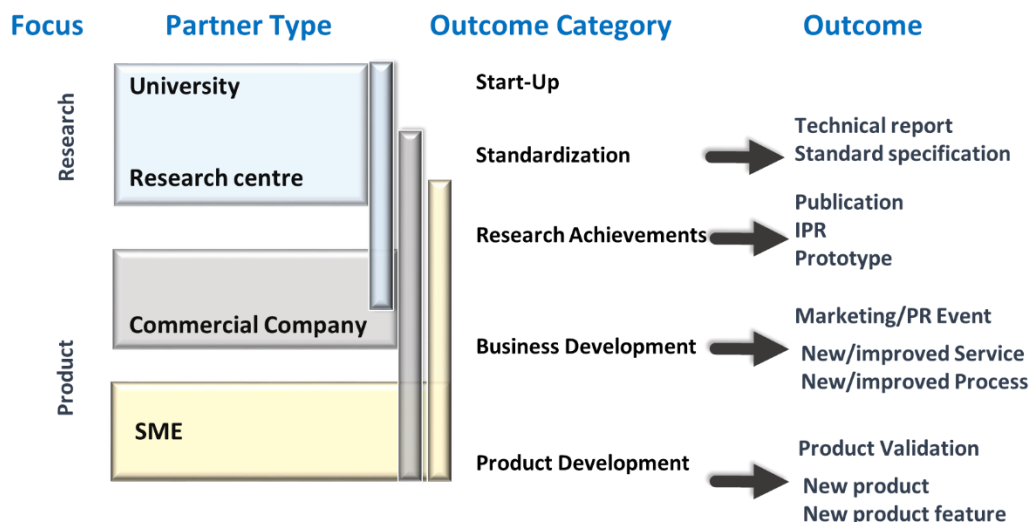


Figure 11: Partner Type and Related Exploitation Types and Outcome

4.1.2. Categories of the Results of the Project

5GENESIS, as a European-funded research project with contributions from partners of varying focus and type, is considered to deliver results that span in the following categories:

- **Demonstrators** – Demonstrations of one or more 5GENESIS results or products in the field or in lab environment; either as Proof of Concept (PoC) or as solutions addressing specific end-user needs. Demonstrators are usually joint results of more than one partners and partner types.
- **Prototypes** - Stand-alone, modular products which have been either developed or enhanced in the context of the project. Prototypes may be developed by commercial companies and SMEs or by academic or research initiatives with no direct commercialization capability.
- **Validation Activities** – Activities aiming at validating the functionalities of specific products; these can be considered as exploitation activities aiming at increasing the TRL of the associated products.
- **Contributions to standardization and publications** – Indirectly exploitable results delivered to the industry through standardization and dissemination paths.

- **Other Achievements** – Activities and tools aiming at enhancing processes or services related to the introduction or deployment of the project results (ex. studies, algorithms, techno-economical tools, knowledge transfer, etc.), or other intangible items like better project or product management techniques, as well as innovation management techniques.

4.2. Exploitation Methodology

There are two prevailing models in the market for customer centric identification of the exploitable potentials for a given product or result. The Value Proposition Canvas that is presented in Section 4.2.1 and for more mature propositions the Lean Canvas in Section 4.2.2.

The process to be followed encompasses the following steps:

- As a first step each project member provides input towards the potential exploitable outcomes. This is a structured information associating the Outcome with the Result Category, an Exploitation Type and the target Customer Segment. This is assessed and aligned across the project to offer a concrete final list.
- For each Exploitable Outcome and Customer Segment, the Value Proposition Canvas is filled. Through the identification of gains, pains and opportunities a clear and structured value proposition statement for the outcome is provided.
- For the Outcomes with promising Value Propositions, the Lean Canvas methodology is used to further analyze the exploitation potential and identify the key parameters to build the business case.

4.2.1. Value Proposition Canvas Methodology

The Value Proposition Canvas [19] has two sides, the Customer Profile (on the right) and the Value Proposition (on the left), as graphically depicted in the following figure.

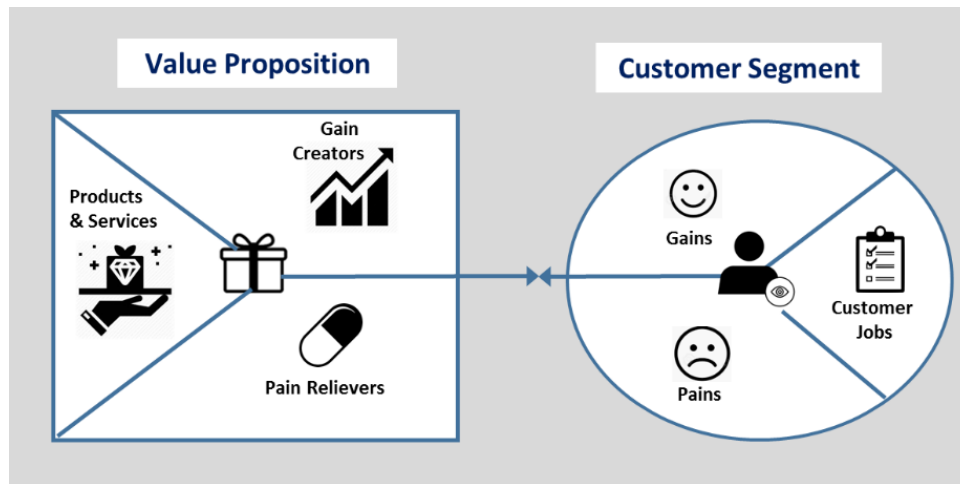


Figure 12: Value Proposition Canvas

The Value Proposition part is used to depict and identify information regarding the features of a product or service targeting a specific Customer. The Value Proposition is broken down into:

- **Products and services:** the list of 5GENESIS products and services targeting the value proposition to a specific customer segment;
- **Pain relievers:** the ways in which these product and services will alleviate specific Customer Pains;
- **Gain creators:** the ways in which these products and services can create gains for the Customer.

The Customer Segment describes the target customer profile and relevant key information to understand the expected value to be provided by 5GENESIS results:

- **Customer Jobs:** the existing customer jobs and business processes executed by the prospect (corporate) users that are relevant to each 5GENESIS product;
- **Pains:** the risks, obstacles, problems related with the existing way (without the 5GENESIS product) of performing the Customer Jobs;
- **Gains:** the outcome customers want to achieve or concrete benefits they are seeking from their Jobs.

4.2.2. Lean Canvas Methodology

The Lean Canvas Model is a business case development method that is based on the graphic representation of a number of variables that show the values of a business or organization. Lean Canvas is adapted from The Business Model Canvas [20] and can be applied at for direct exploitable assets of a commercial initiative. The Canvas is presented in the table below:

Table 1: Lean Canvas Model

PROBLEM	SOLUTION	UNIQUE VALUE PROPOSITIO N	UNFAIR ADVANTAG E	CUSTOMER SEGMENTS
EXISTING ALTERNATI VES	KEY METRICS		CHANNELS	EARLY ADOPTERS
COST STRUCTURE			REVENUE STREAMS	

The key parameters foreseen in the Lean Canvas Model are explained in detail as follows:

- **Problem:** The top problems that can be addressed from the offered new product or service, addressing the jobs that are affected, why, how and who is concerned;
- **Existing Alternatives:** Other solutions solving the same or a similar problem;
- **Solution:** A brief description of what the solution does and how, with special focus on the main features that differentiate it from the alternatives;
- **Key Metrics:** Key activities that will be measured to track the success (e.g., units sold, users registered, etc.);
- **Unique Value Proposition:** The critical success factors of 5GENESIS's product proposition towards satisfying customers' needs especially in comparison to the alternatives. The statement should underline the product's uniqueness and provide numbers to explain performance gains;
- **Unfair Advantage:** Identify advantages compared to the competition, such as acquisition, switching and maintenance costs;
- **Channels:** Detail the channels to be used to contact customers, promote and deliver the value promised;

- **Customer Segment:** The customer segment in focus, which has a problem and would be interested in buying a related solution. The customer segment can be split in vertical segments to identify the strongest vertical to target for;
- **Early Adopters:** A small niche that is having the biggest problem, the ones who suffer the most and could become early adopters. In the process of identifying early adopters, geographic location, industry and connection to the problem are important aspects;
- **Cost Structure:** The main costs as soon as the solution is ready for the market (e.g., customer acquisition costs, distribution costs, hosting, human resources costs, etc.). To build a subtle business case the costs should be estimated in the short term (six months) and longer-term (three years);
- **Revenue Streams:** The main revenue streams when the solution is ready for the market in the short-term (six months) and longer-term (three years);

4.3. Next steps

The methodology described above will be used in selected relevant assets of 5GENESIS, so to provide a business analysis and a techno-economic study of the main project outcomes. Those selected assets will be chosen once the 5GENESIS consortium will have delivered most of the expected results of the project, and relevant results will be described in the final Deliverable of WP7, i.e., D7.10 “Innovation and exploitation activities report (Release C)”, due by the end of June 2021.

Prior to that, a *stakeholder analysis* will be performed on the focus areas where the methodology described above will be applied. Such analysis is a known means to identify who are the main players in a certain economic scenario and to better understand the potential money flow among the key beneficiaries of the newly proposed technologies.

Currently it is reasonable to foresee that the project will have produced stable results when entering the last semester (not before the end of 2020). By then the consortium will start running the planned measures to deliver a business and a techno-economic analysis of the selected project results.

5. CONCLUSION

This deliverable presents the work done by the 5GENESIS consortium on the Innovation Management program and on the exploitation activities between month nine and month eighteen of the lifetime of the project. Also a plan for the work to be done in the next quarters is provided, as well as the chosen methodology to perform in the last part of the project a business and techno-economic analysis of the main project outcomes.

Regarding the Innovation Management program, a Workshop was held at the Malaga Platform, which was instrumental to highlight some key open points and to start elaborating on an effective way forward, as then refined and taken care of in the technical work packages calls and in the forthcoming general assemblies.

Regarding the exploitation activities, details have been provided on the impact that the project has achieved on the surrounding ecosystem, mainly on the several parallel activities of the 5G-PPP and on the NetWorld2020 gremia. Relations with the ICT-17 and ICT-19 projects have been identified as well. Moreover, an update on the main identified project assets has been performed, a new asset has been identified (compared to the previous deliverable D 7.8), i.e. the 5GENESIS Facility. Finally, more details have been shared on the relevant topic of spectrum usage in the different project Platforms and on the outcome of the MWC-19, held in November 2019.

In the fourth section of this deliverable the chosen methodology for business aspects and techno-economic analysis is introduced and explained. Such methodology will be applied once the project will provide the final results (i.e. starting not before the semi-last quarter of the project lifetime), so to better judge on the reach and exploitation activities of the different partners after the project end.

In summary, this deliverable not only reports on the activities performed between the month nine and eighteen of the project lifetime, but also provides concrete plans for the next actions to be run, regarding both the innovation management program and the exploitation activities.

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