H2020 5GASP Project

Grant No. 101016448

D6.2 Interim progress report on NetApps Community & Certification process

Abstract

This document is the interim deliverable report (a) on 5GASP community portals, namely, NetApp Community and NetAppStore; (b) on the delivered community events for the reported interim period; and (c) on the 5GASP-C certification midterm progress. Regarding community portals, this report summarises the details of the finalised version of NetAppCommunity and NetAppStore's beta version. Regarding events, we present the outcome of the successful delivery of community engagement events and the successful launch of the NetAppLab programme attracting SME organisations into training, advising and learning about 5G NetApps and 5GASP testbed facilities across all European 5GASP testbed sites. Further, we also outline our plan for future events and attracting stakeholders from the wider 5G community, particularly from other ICT-41 projects, as well as vendors. Finally, the document presents updates on processes regarding 5GASP-C certification while presenting a 5GASP-C certification template and discussing the next steps for completing the 5GASP-C certification testing.

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Executive Summary

This deliverable report is the second one in a series of three deliverable reports scheduled for M13 (delivered and requested to revise document D6.1), M23 (current interim report) and M36 (final report), respectively. The present interim report provides updates according to the progress of WP6 tasks and milestones, the running of community events, the NetAppLab programme and future events approaching stakeholders. Regarding the latter in particular, and in order to address reviewers' feedback regarding D6.1, we dedicate a special section, Section 3.5, to discussing stakeholders' feedback on utilising 5GASP facilities, and on plan details for future events aiming to attract the interest of stakeholders from the wider 5G community, particularly from other ICT-41 projects and vendors. The report also summarises the progress and maintenance activities of the two project community portals that support SMEs, and other developers engaging with 5GASP NetApp development and/or other activities or events. Last, the present interim report discusses updates on the certification plan (5GASP-C) process, noting progress regarding the initial implementation of basic tests, advancing further regarding test definitions and the definition of certification testing axes. Further definitions will be part of the upcoming deliverable report D5.4, paving a safe way towards a complete certification scheme to be reported with the final report D6.3 scheduled for M36.

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List of Acronyms

5GASP-C	5GASP Certification
AT	Authorised Testbed
CA	Certification Authority
CI/CD	Continuous Integration - Continuous Delivery
EENA	European Emergency Number Association
FAQ	Frequently Asked Questions
ITS	Intelligent Transportation Systems
PSCE	Public Safety Communication Europe
SME	Small and Mid-size Enterprise
Telcos	Telecommunication service providers
V2C	Vehicle-to-Cloud

1. Introduction

1.1. Objectives of this document

The purpose of this document is to present the midterm progress on three tasks within WP6, namely, Task 6.1 on "5GASP Platforms", Task 6.2 on "Community Engagement Events", and Task 6.3 regarding the "Certification process for SMEs".

The NetApps Community building is essential part of WP6. To support this activity, the NetAppCommunity portal has been developed as a part of Task 6.1. This task was completed in compliance with two milestones: MS6.1 'NetAppCommunity portal – beta version' in M6 and MS6.3 'NetAppCommunity portal – final version' in M20. Thus, for the moment of reporting the NetAppCommunity portal is matured to its final version. A complimentary portal for the NetAppCommunity portal is the NetAppStore portal. Its development is also a part of Task 6.1. This task has two milestones: MS6.2 'NetAppStore portal – beta version' in M15 and MS6.4 'NetAppStore portal – final version' in M27. Thus, the NetAppStore portal is in a beta version at the moment of reporting this document. Moreover, this document presents the advancement in the development of both portals that was achieved after reporting in D6.1 'Initial report on building NetApps Community & defining a certification process' [1] in M13.

Next, Task 6.2 promotes the 5GASP NetAppLab initiative by promoting and hosting Community Engagement Events that are an essential part of not only WP6 but the whole project. Interm activities within the context of Task 6.2 include the Third Community Event and NetAppLab Program Launch Event, as well as present and future plans for NetAppLab program activities as well as activities for attracting further interest and participation by external to 5GASP stakeholders.

Finally, we report the interim progress made on Task 6.3 in support of the certification process to ensure its efficiency. This includes updates on the 5GASP-C certification process, the introduction and definition of the initial implementation of basic tests, further Test definitions, and the definition of certification testing axes. The latter is particularly important for shaping the delivered certification to NetApps, with the complete certification scheme scheduled to be fully reported in the final deliverable report D6.3 on M36.

1.2. Document structure

This document is structured as follows. Section 1 outlines the purpose of the document and its structure. Section 2 presents the progress status of two 5GASP platforms: *NetAppCommunity* and *NetAppStore*. Section 3 provides the details on the community engagement events held in the reported period. Section 4 presents our progress steps towards the certification process of NetApps. Finally, section 5 summarises and concludes this interim delivery report.

2. 5GASP Platforms

In this section we present the updated status of both the NetAppCommunity portal and the NetAppStore portal that are complementary portals developed within WP6.

2.1 NetAppCommunity Portal

The NetAppCommunity portal [2] aims to support the community of developers and users of NetApps, Network Functions, and Network Services. The final version of this portal has been developed by the milestone MS6.3 (M20). The NetAppCommunity portal supports the Community members and all interested visitors with technical documentation, user guides, video and other related information as well as it enables discussions on the developers' forum.

2.1.1 Updated Requirements, Site Map and Contents

The final version of the NetAppCommunity portal implements additional requirement for the content: to add the page "5G NetApp Lab" that presents information about NetApp Lab events and activities. The page is visible to all visitors. To reflect the new requirements, the site map has been updated, as depicted in Fig. 1.

In its final version, the main menu includes six items:

1. NetAppCommunity,
2. Wiki Space,
3. Developer Forum,
4. Public Repository,
5. Multimedia,
6. Register.

The section 'NetAppCommunity' includes four pages, including the new page '5G NetApp Lab' (Fig. 2). The purpose of this section is to present the generic information about the Community, its registered members, the Community engagement activities, and the 5GASP project. According to the statistics (Fig. 3), this is one of the most often visited categories of pages.

The section 'Wiki Space' provides the essential information to the NetAppCommunity portal visitors: the knowledge base (definitions, papers, tutorials), the certification guidelines, NetApp case studies, the 5GASP Project documentation, and FAQs. The most frequently visited page among pages of this section is 'NetAppCommunity Knowledge Center' page (Fig. 3).

The 'Developer Forum' (Fig. 4) is a dynamic part of the portal content. The portal users can ask questions and discuss the NetApp development issues with experts using this forum.

The page 'Public Repository of Experiments' presents NetApps. At the time of reporting, the list of NetApps includes 11 NetApps that are currently under development and validation on the 5GASP infrastructure.

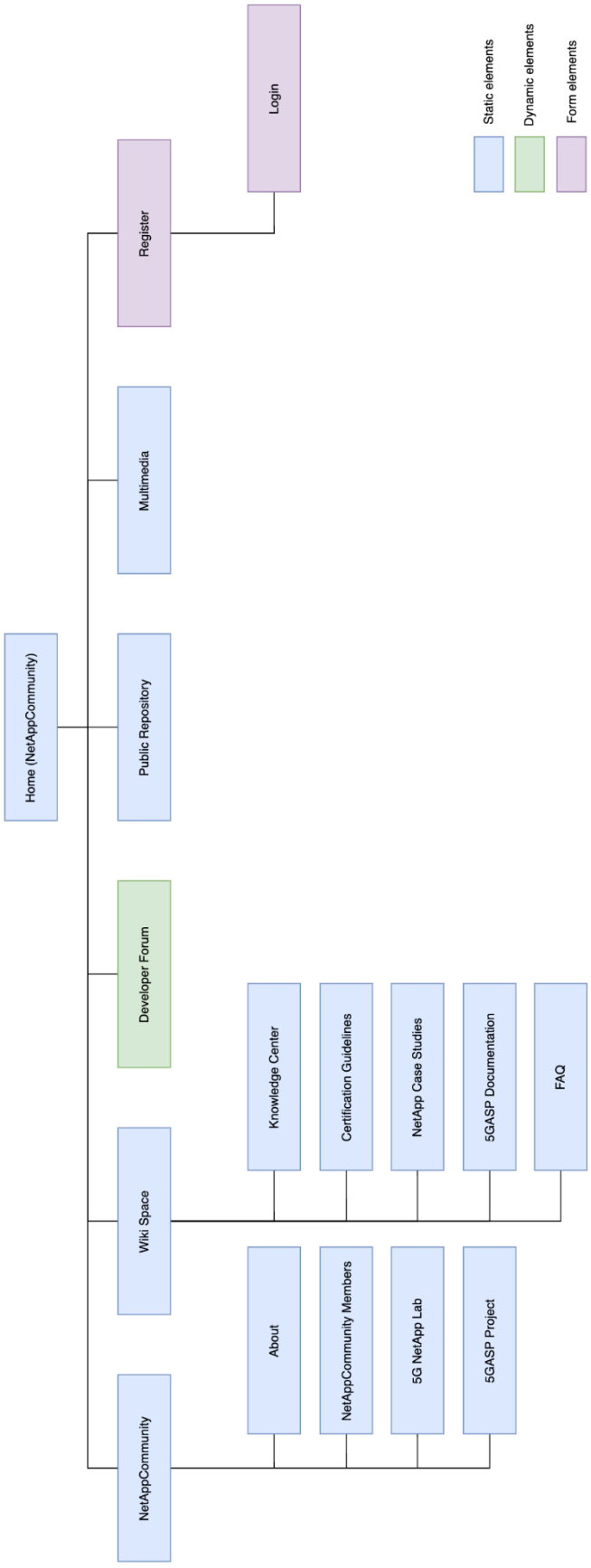

Figure 1. The site map for the NetAppCommunity portal.

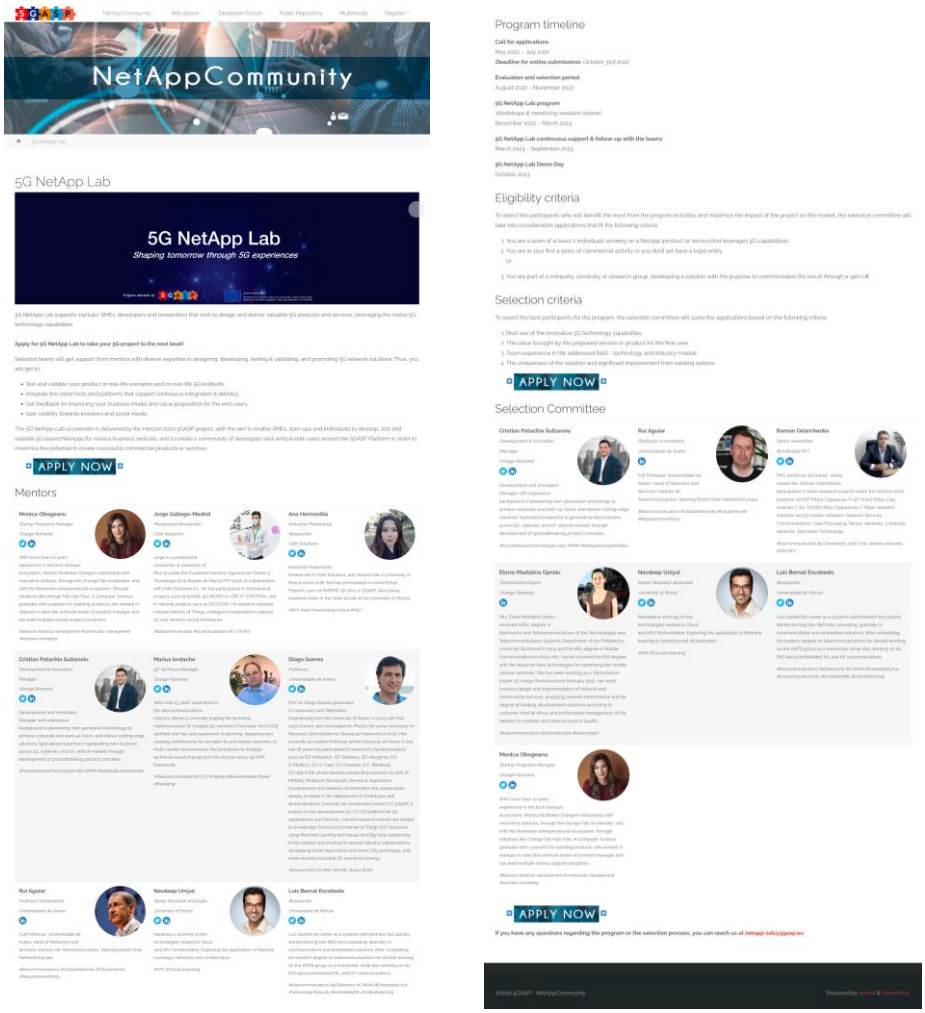

Figure 2. The '5G NetApp Lab' page.

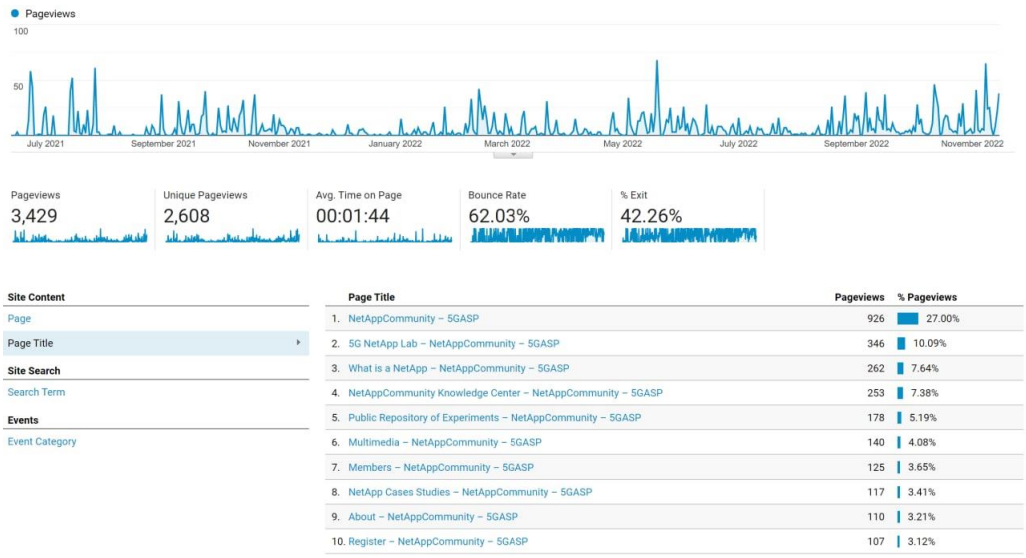

Figure 3. The statistics of using the NetAppCommunity content.

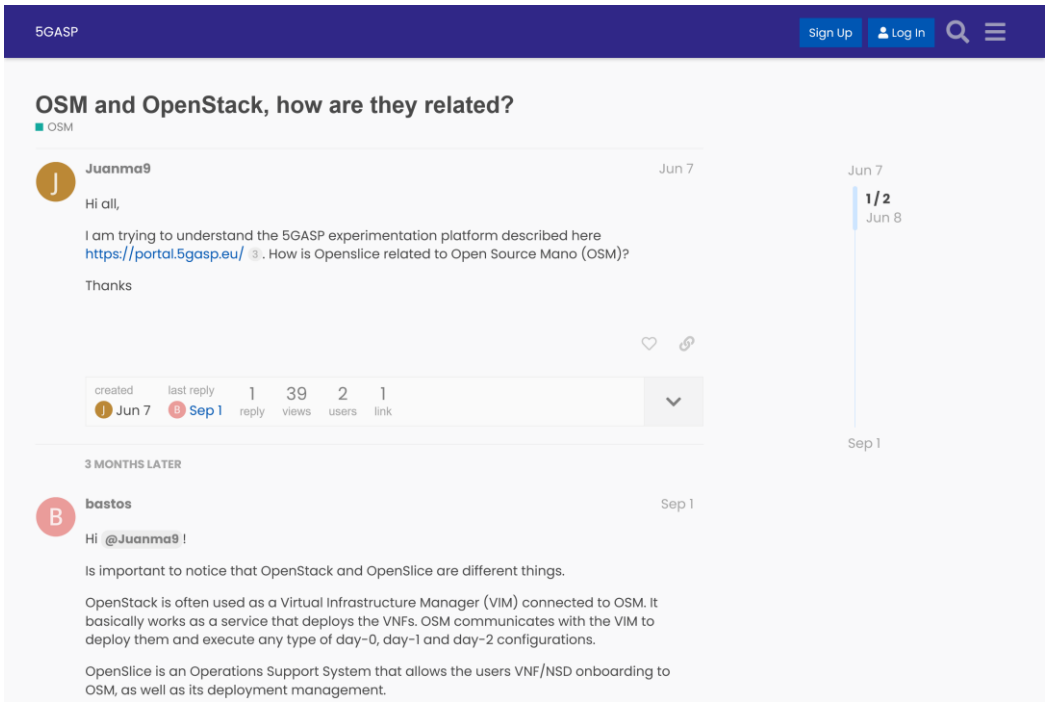

Figure 4. The Developer Forum.

The page 'Multimedia' provides video and photo materials,in particular, at the time of authoring this document, it gives access to 29 video tutorials and lectures placed on the YouTube platform.

The 'Registration' page enables the registration of new Community members. After registration, a new member organization's logo or representative photo appears on the NetAppComunity Members page (Fig. 5).

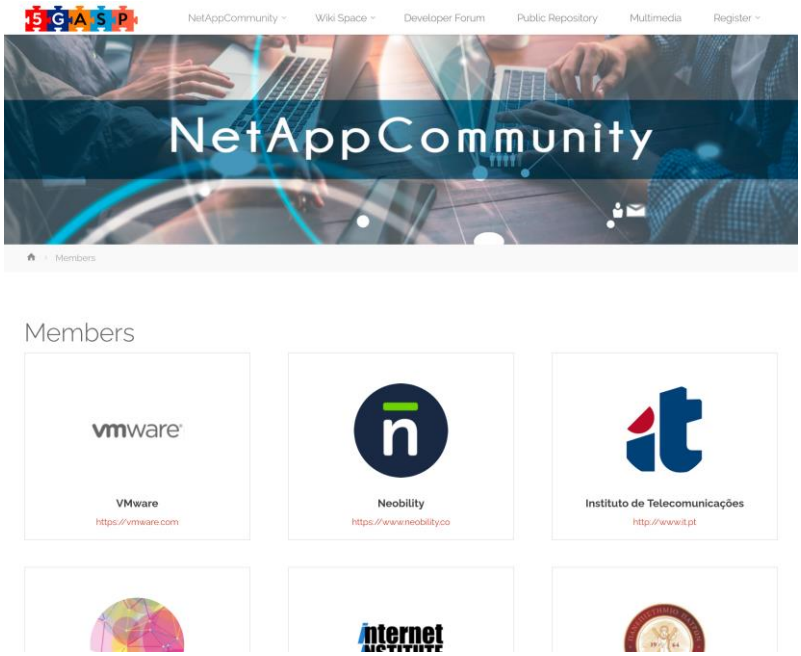

Figure 5. The page 'NetAppComunity Members'.

It is important that the NetAppCommunity portal includes several pages essential for promotional activity and dissemination:

- Events,
- News,
- Blog.

The latest posts of these pages are available on the main page of the portal (Fig. 6). The full version of these pages is accessible through the links on the main page.

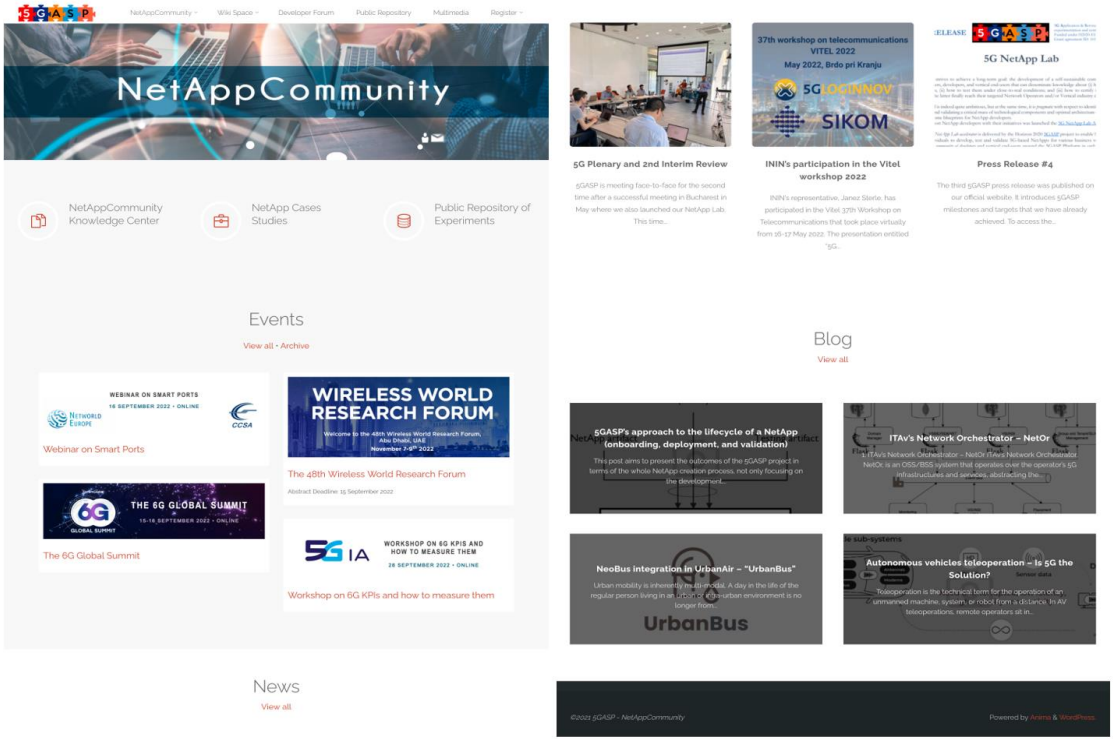

Figure 6. The main page of the NetAppCommunity portal.

The developed final version satisfies all requirements of the NetAppCommunity development defined in our initial report D6.1 [1].

2.2 NetAppStore Portal

The NetAppStore portal [3], one of the 5GASP innovative solutions for business, provides operational information collected automatically during the NetApps' independent testing on the 5GASP platform. This section presents the current status of the beta version of the NetAppStore.

2.2.1 Requirement Specification

There we have some updates related to the NetAppStore:

- Changes in "Upper menu";
- Changes in "Sort menu + Search field";
- Changes for the "Content".

Changes that we need to involve for each part of the NetAppStore portal are described in the Table 1.

Table 1. Needed changes for the parts of NetAppStore.

Menu element	Changes	Visibility
Upper menu	– Display (distance between menu items); – Shadow on hover; – Adjust highlight on hover; – Edit panel should open edit menu (add icon to content items)	Visible to all visitors
Sort menu + Search field	– Resize buttons according to SearchField; – Set orange color and underline on hover; – Fix search field logic	Visible to all visitors
Content	– Create grid with fixed cell size and set inner cards (resize cells -> auto resize card); – Add button to change view	Visible to all visitors

2.2.2 Design (pages and contents, development details)

The NetAppStore portal is designed in accordance with the defined requirements. The site map is shown in Fig. 7. The portal includes pages of three types:

1. "Static" elements (content is to be updated by the portal admin);
2. "Dynamic" elements (content is to be updated according to users' entries);
3. Windows with form.

The portal's graphical design is shown in Fig. 8. When a user first enters the site, he will be able to view all available NetApps, as shown in Fig. 9. Also, the user will be able to use the roadmap to navigate to the resources of interest and a variety of filters and/or search field to change the order of displaying content.

When the user selects any of the NetApps, the latter will have a distinctive highlight, as shown in the Fig. 9.

For each NetApp, at least the following fields will be available:

- Title;
- Edit button (optional – available only if "Edit Panel" button was pressed);
- Description;
- Image (logo or similar);
- Image description;
- Link for more details;
- Last update date.

The next iteration of the NetAppStore portal will focus on the content's maturity and polishing the graphical design.

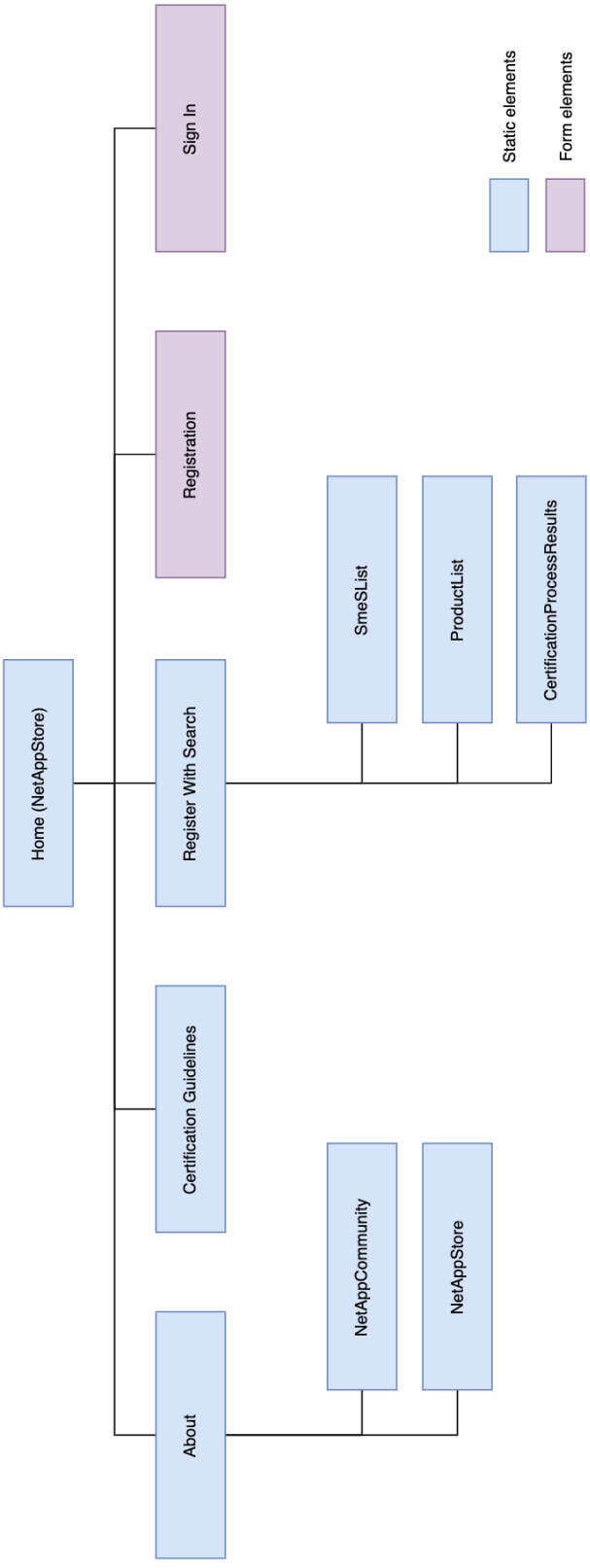

Figure 7. The site map for the NetAppStore portal.

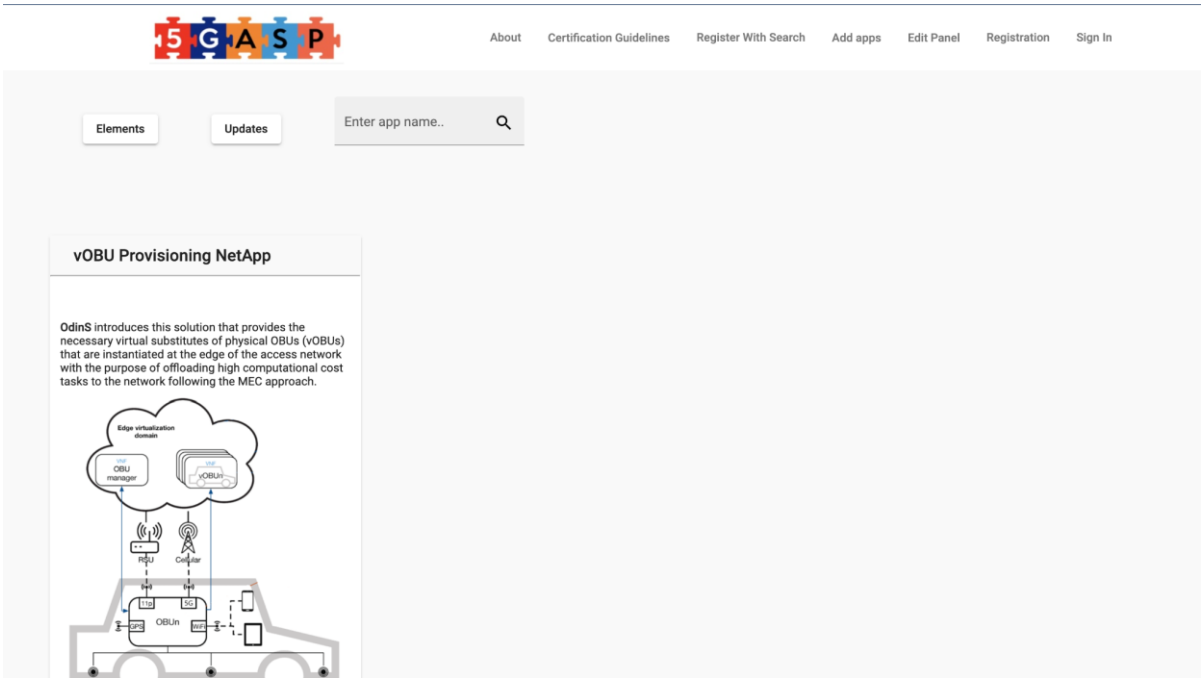

Figure 8. The main page of the NetAppStore with 5GASP logo and graphical content.

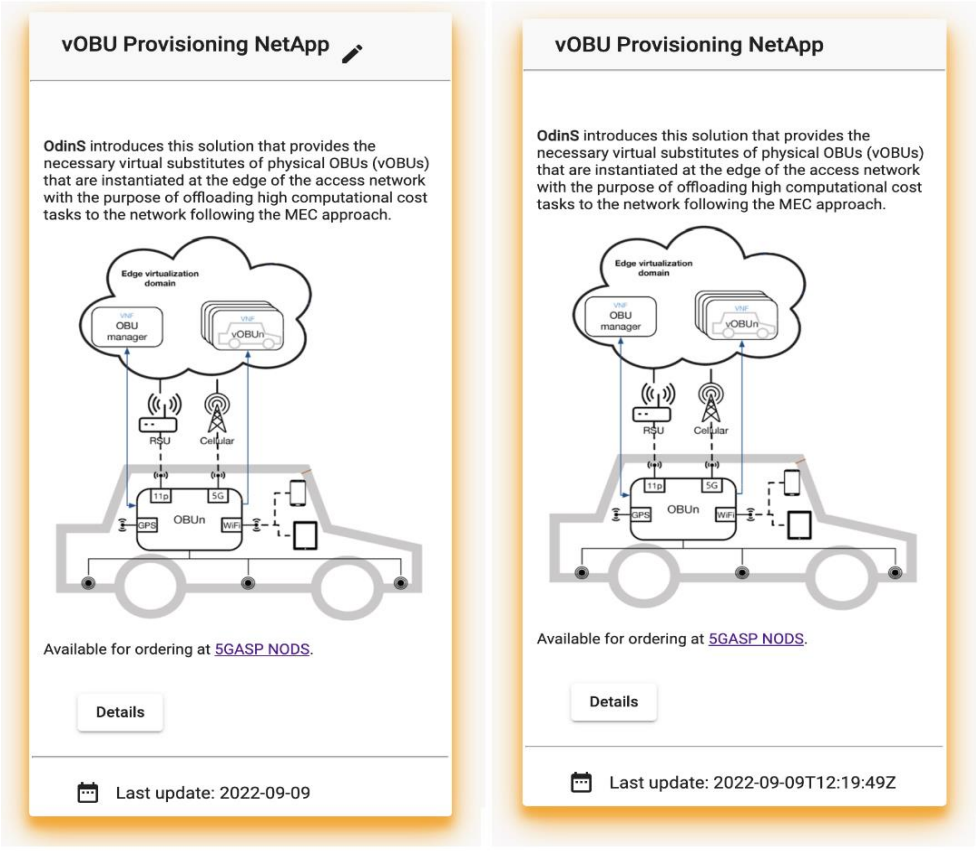

Figure 9. A selected card for “vOBU Provisioning NetApp”: right – basic, left – with edit function.

3. Community Engagement Events

The Community Engagement Events continued to be an important part of the 5GASP project, disseminating the progress on 5GASP platforms, certification progress and engaging with NetApp developers – SMEs, startups, researchers, developers, as well as other Horizon 2020 projects.

While we have also held our first physical event (M.S. 6.5 First NetApp Lab event hosted by ORO), we have maintained the online setting as well, to allow a wider audience to participate. In the second part of the year we promoted the NetApp Lab program, looking for NetApp developers who are interested to engage more in depth with our project. We have so far identified 2 interested companies and we are advancing with them in further activities.

3.1 Third Community Event

On February 17, 2022, we held the third online webinar (Fig. 10), entitled Building NetApps in the 5G Ecosystem. The webinar was focused on presenting examples of NetApps and presenting more in depth what it means to develop NetApps on 5G infrastructures. Participants could ask any questions they had on the topic and also learned about the progress done with the 5GASP certification process and how they could get involved in the 5GASP community.

Figure 10. The Third Community Event introductory slide.

The event took place online, via Zoom webinar and Eventbrite link and the full recording is available on the 5GASP YouTube channel [4]. The event was mainly presented via the Eventbrite public page and was promoted on all 5GASP channels, as well as partners channels [5]. The agenda included an introduction about the 5GASP project delivered by Diogo Gomes, 5GASP Project Coordinator, Instituto de Telecomunicações Portugal. Further, Rudolf Susnik, Project Manager at the Internet Institute Ltd. presented an extensive case-study on the "5G

Isolated Operation for Public Safety" NetApp. Ben Shaw, Senior Test Engineer at EANTC AG talked about the 5GASP NetApp certification process.

The main discussion panel of the webinar included experienced expert and 5G-PPP Software Network Group Chairs Bessem Sayadi, also Dept Head of Cloud Native Telco Platform-Operations at Nokia-Bell Labs, Giada Landi, R&D Architect at Nextworks and also a representative of the VITAL-5G project, Andrei Radulescu, CTO of Neobility and Ciprian Comsa, Co-funder of INTERACT, Academic Liaison & Innovation Manager at Continental Automotive. They all shared their varied experience building applications in the 5G ecosystem, presenting their current efforts and views into what it takes for future developers to build NetApps.

The event concluded with a presentation of the 5GASP Community Portal delivered by Dr Roman Odarchenko, Senior Researcher at Bundleslab KFT and a round of Q&A with all the speakers.

Event analytics (as of November 22, 2022)

The third webinar gathered 100 registrations, with the public event page reaching 707 views (Fig. 11-12). The YouTube recordings have gathered 122 views by November 15, 2022.

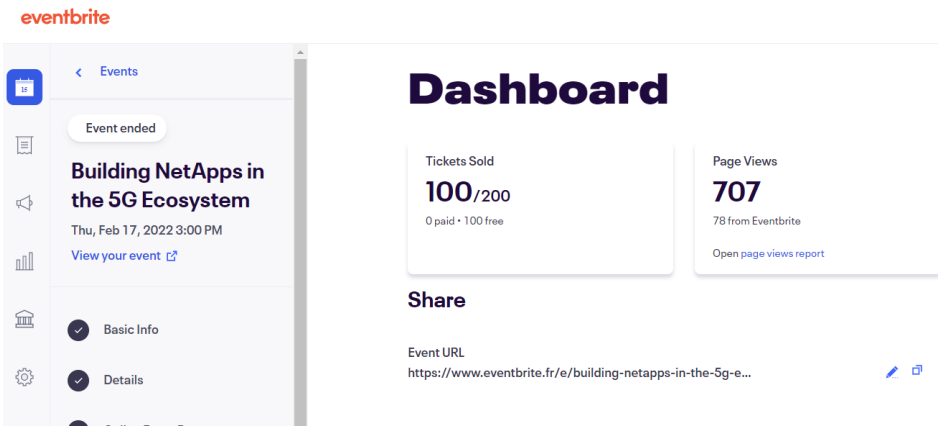

Figure 11. Main Eventbrite Analytics Numbers for the Third Community Event.

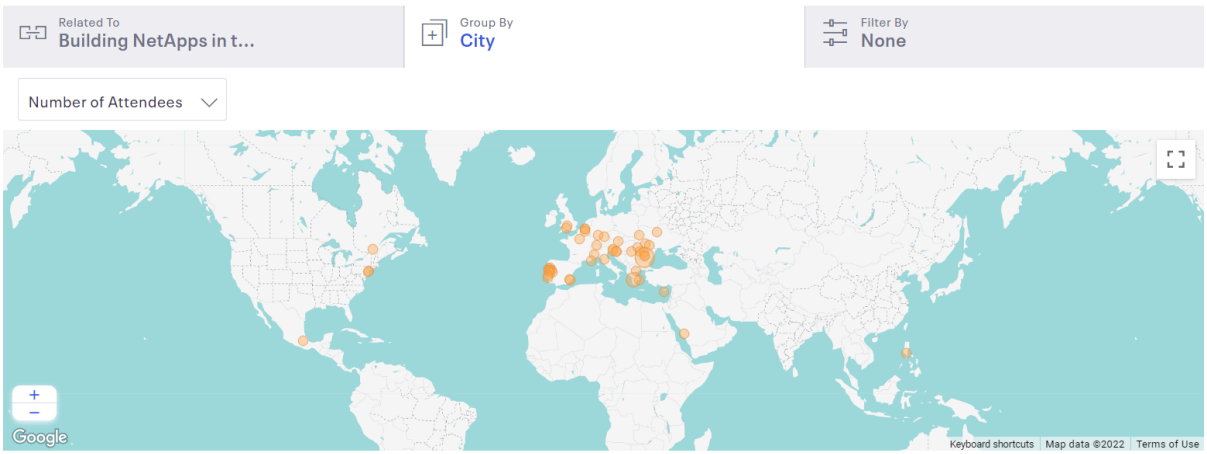

Figure 12. The geographical spread of Eventbrite registrations for the Third Community Event.

During the month of February, most of the social media activity was channeled towards promoting the webinar. On Twitter, @5GASP gathered 3872 Tweet impressions and 2409 Profile visits. On LinkedIn, the 5GASP page gathered 47 pageviews and 24 unique visitors.

3.2 NetApp Lab Program Launch Event (M.S. 6.5 - 1st NetApp Lab event hosted by ORO)

An important milestone event of the project, 1st NetApp Lab event hosted by ORO (M.S. 6.5) was held in a hybrid format (Fig. 13). It was entitled "5G NetApp Lab Launch Event" and its' purpose was to present how NetApp developers can benefit from the platforms and processes developed in the 5GASP project. The event was also aimed at potential developers and thus aimed to inspire different use cases that can be addressed by showcasing the NetApps that are part of the project, as well as invited guests, part of the VITAL-5G project.

Figure 13. NetApp Lab Program Launch Event introductory slide.

The event took place on May 19, 2022. The physical event was hosted in Orange Romania's Business Center, an event space in the company's main headquarters in Bucharest, Romania. The online event was hosted via Zoom and the Eventbrite live page. The recording of the full event is available on the 5GASP YouTube channel, in the dedicated playlist availalbe here [6]. The event was mainly presented via the Eventbrite public page and was promoted on all 5GASP channels, as well as partners' channels [7].

Following a welcome message by Radu Milosoiu, Head of Engineering of Orange Romania, the agenda started with a presentation about the 5GASP Project and how it can support NetApp developers via the NetApp Lab program, delivered by Diogo Gomes, 5GASP Project Coordinator, Instituto de Telecomunicacoes Portugal.

Following up next, Jorge Gallego-Madrid, Researcher at the University of Murcia and Odin Solutions, together with Rafael das Neves Simoes Direito, Researcher at Universidade de Aveiro held an in-depth presentation on the 5GASP infrastructure and platforms.

Further on, to serve as inspiration and concrete examples of NetApps, in shorter pitch-presentations, were presented a first set of *8 NetApps*:

1. Vehicle Route Optimizer NetApp presented by Andrei Radulescu, CTO of Neobility & UrbanAir;
2. 5G Isolated Operation for Public Safety NetApp presented by Luka Korsic, Co-founder and Head of R&D at Internet Insitutute Ltd;
3. Efficient MEC handover NetApp presented by Juan Marcelo Parra Ullauri - Senior Research Associate at the University of Bristol together with Navdeep Uniyal, Senior Research Associate at the High Performance Networks Research Group, Smart Internet Lab at University of Bristol;
4. Vehicle-to-Cloud (V2C) Real-Time Communication NetApp and Remote Human Driving NetApp presented by Eli Shapira, Director of Innovation at DriveU;
5. Virtual On-Board Unit Provisioning NetApp and Multidomain Migration NetApp presented by Jorge Gallego-Madrid - Researcher, University of Murcia and Odin Solutions.
6. Virtual Road Side Unit NetApp Netapp presented by Emanuel Thierry, Principal Architect of YoGoKo.
7. Central ITS station Netapp presented by Emanuel Thierry, Principal Architect of YoGoKo.
8. Privacy Analyzer NetApp presented by Leonidas Lymberopoulos, Senior Research Consultant at Lamda Networks.

Continuing the day after the lunch break, Ben Shaw, Senior Test Engineer, EANTC AG described in detail the certification process being designed and implemented in the 5GASP project. Then, the event continued with a new set of NetApp presentations: 'Fire Detection and Ground Assistance Using Drones and PrivacyAnalyzer NetApp' presented by UoP; 'Virtual RoadSide Unit NetApp and ITS Station NetApp' presented by Emmanuel Thierry, CTO & Co-founder at YoGoKo as well as the 'Privacy Analyzer cross-vertical NetApp' presented by Leonidas Lymberopoulos, Senior Research Consultant at Lamda Networks.

Invited local SME Beia Consult International was represented by Alexandru Vulpe, Researcher, who presented the Onboard Data Collection & Interfacing for Vessels NetApp, and Marius Iordache, 5G Technical Manager at Orange Romania, presented the VITAL-5G project ecosystem.

The event concluded with a session of Q&A from both the on-site and online audience with all the speakers present. Throughout the day, the event was moderated by Monica Obogeanu, Startup Programs Manager at Orange Romania.

Event analytics

The event gathered 48 online registrations, with the public event page reaching 651 views (Fig. 14-15); 27 persons attended in person. The YouTube recordings gathered 492 views by November 15, 2022.

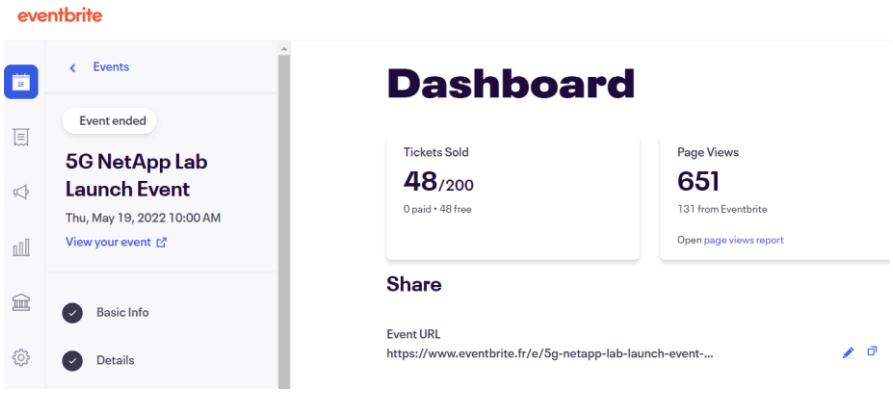

Figure 14. Main Eventbrite Analytics Numbers for NetApp Lab Program Launch Event.

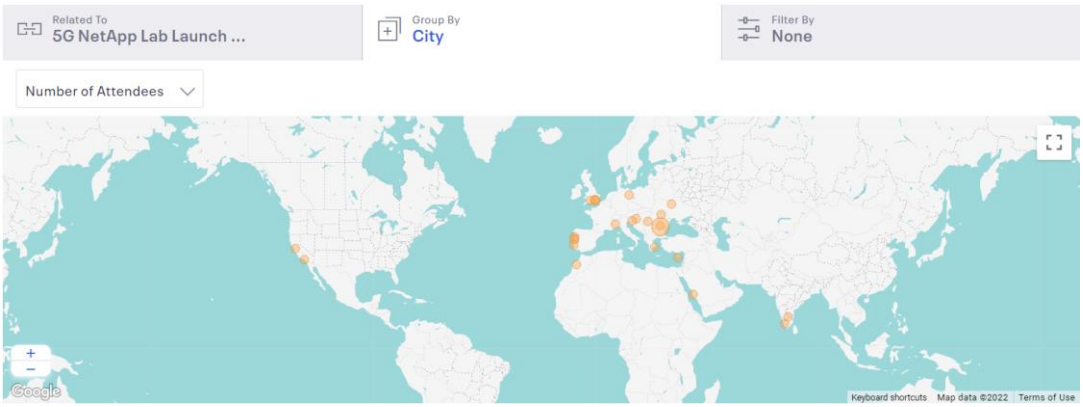

Figure 15. The geographical spread of Eventbrite registrations for NetApp Lab Program.

During the month of May, most of the social media activity was channeled towards promoting the 5G Netapp Launch event.

- **On Twitter,** the 5GASP profile gathered *3312 Tweet impressions and 3184 profile visits*.
- **On LinkedIn**, the 5GASP page gathered *86 page views and 37 unique visitors*.

3.3 NetApp Lab program activities

The program is communicated via its dedicated webpage in the 5GASP Community Portal [8]. Interested NetApp developers, SMEs, startups or researchers can apply for the program via the online application form.

The NetApp Lab program was promoted via online channels, as well as through direct connections by the consotrium partners. Several visual resources were used, as well as an aftermovie of the Launch event highlighting some of the topics addressed [9].

Two companies have so far expressed their interest in participating to the NetApp Lab program. OpenSpace [10] is a company that develops 5G NTN and Satellite SDN Modems with applications in 5G usecases like AR, immersive video, drone technologies, edge computing, SATCOM back haul. MOBIUS-5G [11] develops a Public Protection and Disaster Relief

Communication Network that supports first responders for day-to-day operations and emergency disaster relief operations.

We started discussions with the two companies to understand more in depth what they are building, what their needs are and how they can benefit from the 5GASP resources. In the following months, we will continue with educational activities and practical support to integrate them in the 5GASP platforms according to the planning (Fig. 16).

Activity	Q1			Q2			Q3			Q4		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NetAppLab - Continuous support & follow-up												
NetApp Lab - Demo Day												
MS6.6 Second NetAppLab event hosted by ITAV												

Figure 16. 5GASP events plan for the year 2023.

3.4 Other Events, Plans and Cross-project events

Partners have been involved in local dissemination of the NetApp Lab program through presentations in events and local publicity. In particular, the program was presented at “O Futuro das Telecomunicações” event held on October 12, 2022 in Braga, Portugal (Fig. 17).

Figure 17. Participation in the Event "O Futuro das Telecomunicações".

In October 2023 Instituto de Telecomunicações will host the final NetApp Lab Event, which will present results of the work package and will include a Hackathon on ideas and prototypes for future networks.

3.5 Analysing stakeholders needs and hazards, and planning future events and engagement with ICT-41 projects

To continue to raise awareness and attract NetApp developers to interact with the 5GASP project, we will explore the organisation of open classes, part of the NetApp Lab program, as well as new events aiming to engage other ICT-41 projects, SMEs, startups and developers.

In addition, we try to identify and address the reasons that may prevent stakeholders from investing time and effort in testing and using NetApps over the 5GASP ecosystem, not only in the short term but also in the medium and long term. To do so, we have engaged in many interviews with startups and SMEs. As a result, we identified a different level of interest in working in 5G for short-term commercially focused companies versus bleeding-edge technology developers. The ones eager to engage with the 5G ecosystem are the latter, while those in the first category are just starting to understand the opportunities and potential that the 5G technology brings to develop new, innovative, commercially viable new products. With the continued expansion of commercial stand-alone 5G networks across Europe (which will allow for a fast deployment of their solutions towards the end-users), supported by continued efforts of promotion and education towards the potential future developers, we believe we will see a rise in interest and new products coming from the "commercially-focused companies" as well.

All above will be considered throughout our future efforts for engaging more participance and usage of our 5GASP NetApp testing facilities. In this context, our future plan for creating liaisons and attracting more stakeholders, besides and beyond our community events, includes the following.

1. 5GASP will explore the potential of organising a joint ICT-41 event at 2023 EUCNC.
2. We shall try to organise joint meetings with other ICT-41 projects on sharing a common NetApps marketplace.
3. We shall organize an event presenting 5GASP platform results (if possible, together with other ICT41) to other new SNS projects, especially from Stream D that will utilize the 5G system.
4. We will leverage our upcoming presence and invited talk in the 6G-IA organized session on "Self-organizing, self-managing (AI-driven) Autonomous 6G network" on Monday 29th, May 2023 and at time 16:15-18.00, to be held in the IEEE ICC'23 conference in Rome[1] Italy. Besides the general visibility attraction for the audience present, this event will allow us to communicate 5GASP developments with an emphasis on NetApps potential for AI-driven autonomous networking directly to other invited projects in the same workshop event, namely, ARIADNE, B5G-OPEN, DAEMON, Hexa-X and TeraFlow.
5. Together with projects 5G-IANA, VITAL-5G and 5G-META we have prepared a proposal for a special session on the Intelligent Transportation Systems (ITS) Congress, targeting the dissemination of 5G potential to companies mostly focused in ITS and less on 5G.
6. We will explore the potential of presenting PPDR-related project results at the conferences organised by the European Emergency Number Association (EENA),

[1] https://icc2023.ieee-icc.org/

Public Safety Communication Europe (PSCE) and other relevant organisations in the safety domain. Regarding the EENA event, in particular, which will be held in 2023 in Ljubljana, we are currently preparing a proposal for a presentation, aiming to present exploitation potential of the developed 5G results to public safety stakeholders.

In these as well as other opportunities that may arise, 5GASP members will seize every chance for attracting attention by external stakeholders, whether that would be SMEs, individual developers and/or other ICT project members.

4. 5GASP Certification Processes

4.1 Certification Guidelines

5GASP Certification (5GASP-C) adopts a standard path design that comprehends a series of guidelines that guarantee NetApps' deployability, security, functionality and capability to use the resources of a 5G network environment as the provided at 5GASP state-of-the-art 5G testbeds & testing environment.

For convenience, in the rest of the document, "NetApp Applicant" or "Developer" is referred to as the "Applicant", the "Authorized Testbed" is abbreviated as AT, and the 5GASP "Certification Authorities" is abbreviated as CA.

The Applicant is responsible for issuing a Certification Request, the test materials submission, and caring for debugging activities, review and solutions when test issues are not associated with Testbed Optimization. In the case of Testbed Optimization issues, they are handled by the AT responsible.

The CA assumes primary review responsibilities and certification request approval duties; the CA plays the arbitration role in case of rejection or any issues related to a graded Certification. The functions of the different stakeholders in the Certification Process are automated per design; human intervention is applied when automatism is impossible.

4.1.1 Certification Process Updates regarding D6.1

To improve the logic of the Certification Process, the workflows have been updated in comparison with their definition in D6.1 [1].

4.1.1.1 Certification Request

After passing the 5GASP approval process, the NetApp Applicant shall agree to the 5GASP Certification Agreement.

4.1.1.2 Certification Testing

To handle any required optimization operations of the testbed itself, possible testbed issues are needed to be discovered and resolved; these operations are considered as automated ones (Fig. 18).

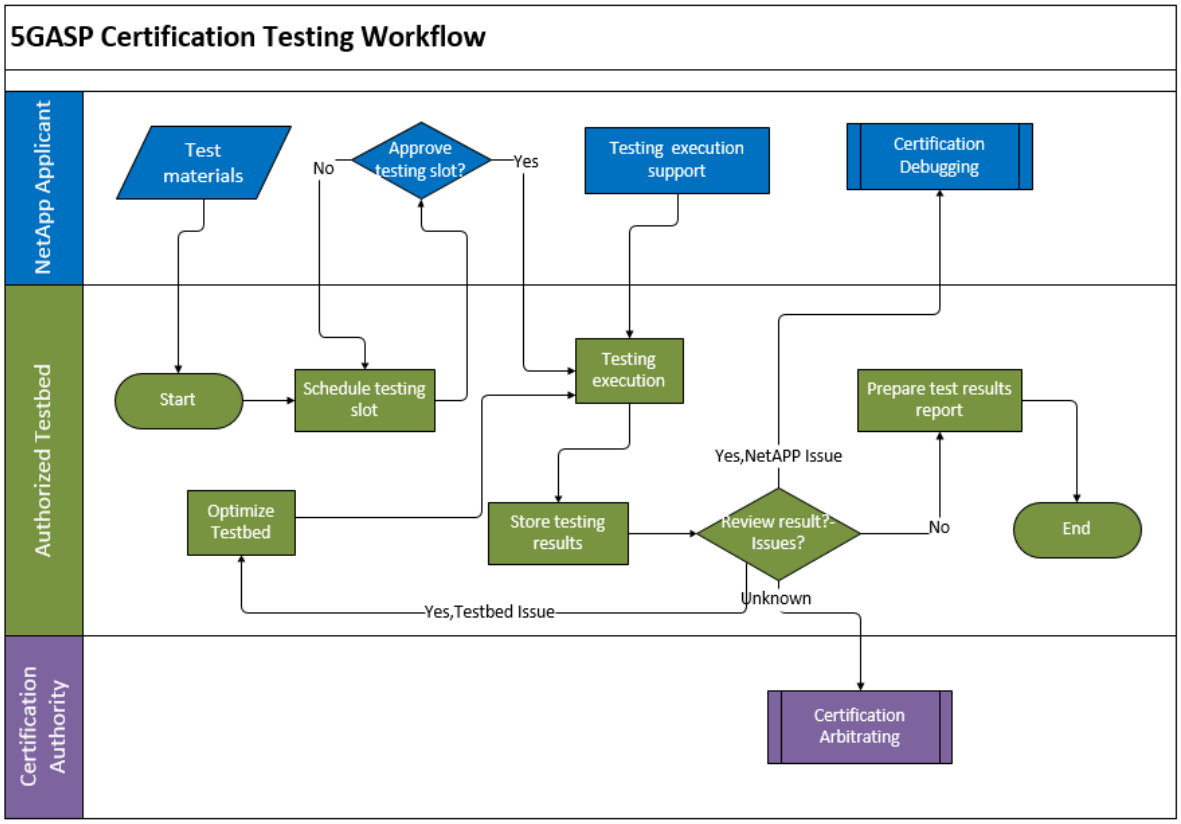

Figure 18. 5GASP-C Testing Workflow.

4.1.1.3 Certificate Issuing

If the testing results are not approved, the Applicant may apply for a Re-Certification as offered by the decision box “Request new Certificate” (Fig. 19).

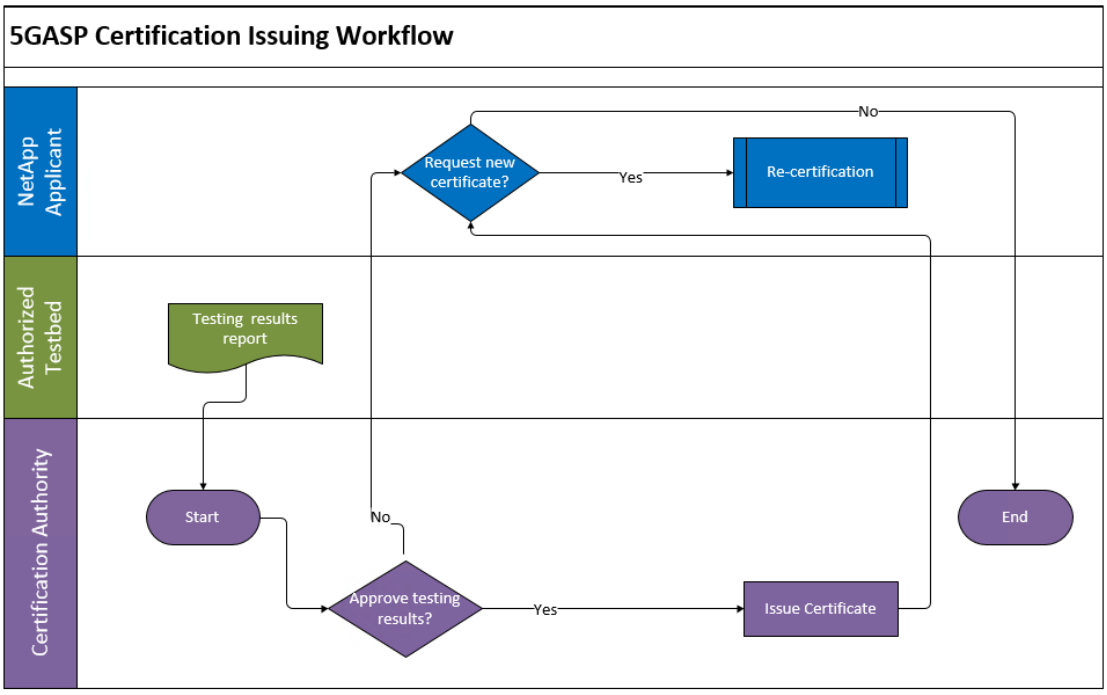

Figure 19. 5GASP-C Issuing Workflow.

4.1.1.4 Certificate Debugging

In the 5GASP-C Debugging Workflow (Fig. 20), “Testbed issue” and “Optimize Testbed” boxes are added for the same purpose as explained in 4.1.1.2.

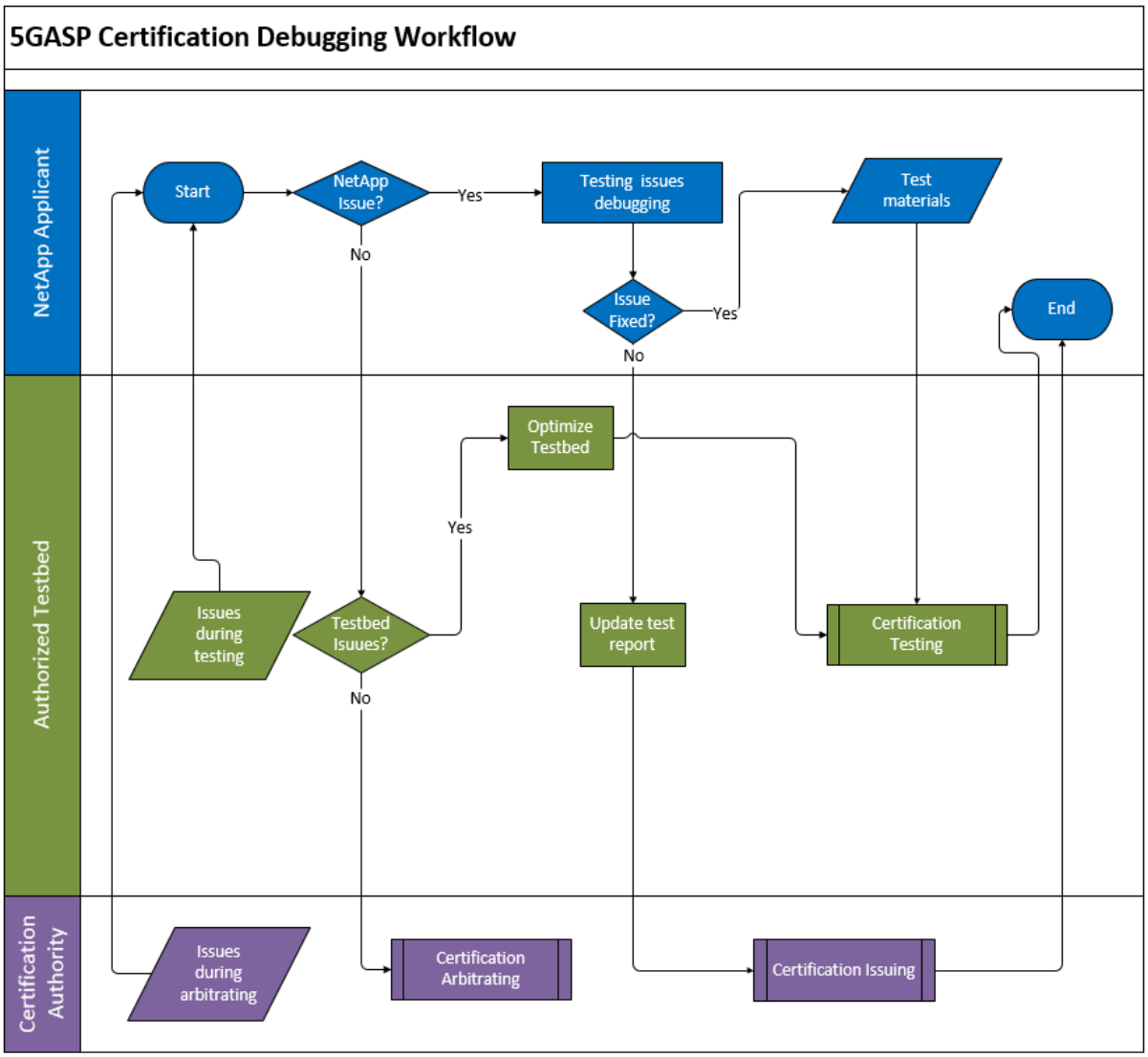

Figure 20. 5GASP-C Debugging Workflow.

4.1.1.5 Certificate Arbitrating

The testbed optimization has been excluded from this workflow and added to the "Certification Testing" and "Certification Debugging" workflows.

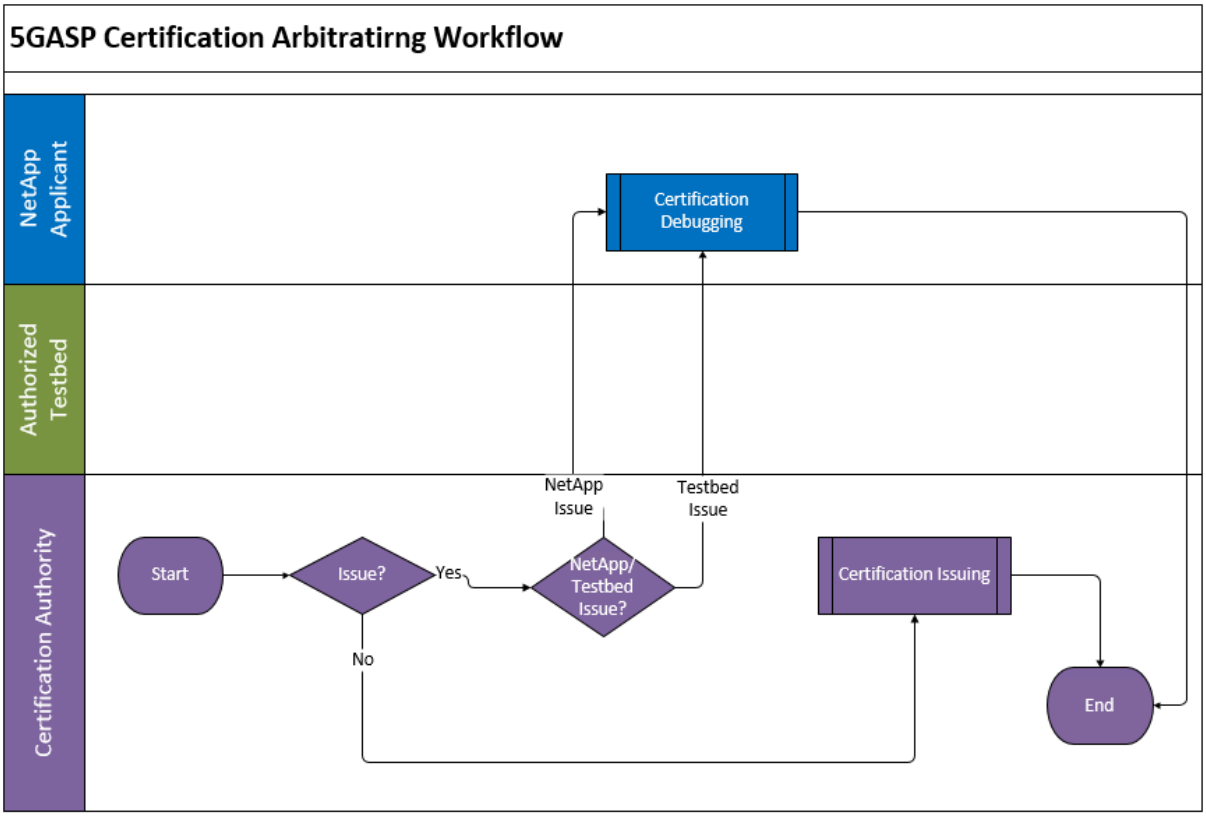

Figure 21. 5GASP-C Arbitrating Workflow.

4.1.1.6 Re-Certification

The Re-Certification was simplified by including “Testbed selection”, “Test materials” and “Certification Testing” operations in the “Certification Request” sub-process (Fig. 22).

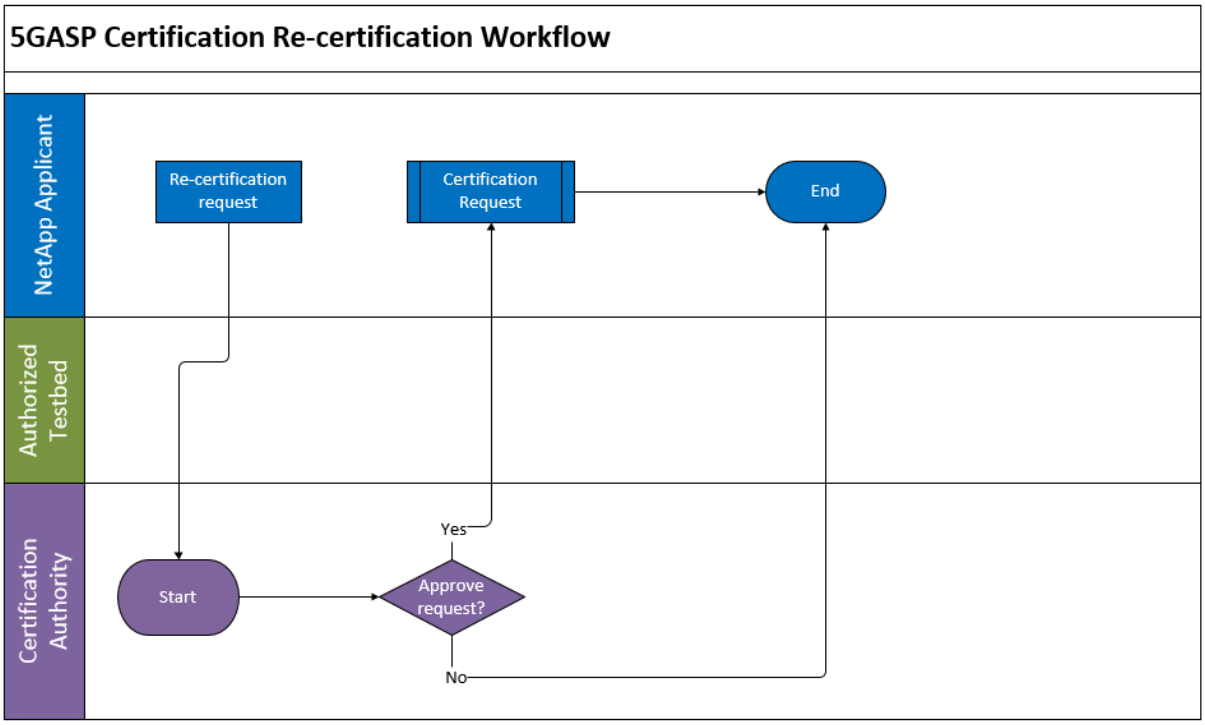

Figure 22. 5GASP-C Re-Certification Workflow.

4.2 Test Certification Criteria

NetApps subject to the Certification process will be evaluated based in the following 5 axes:

1. Baseline/prerequisites
2. Security & Privacy
3. 5G Readiness
4. Performance and Scalability
5. Availability and Continuity

The results will be presented as part of the Certification report, including a Test Results Chart visualizing certification grading in each of the axes. Each test axis will be overall graded in [0..10] scale as depicted on Fig. 23.

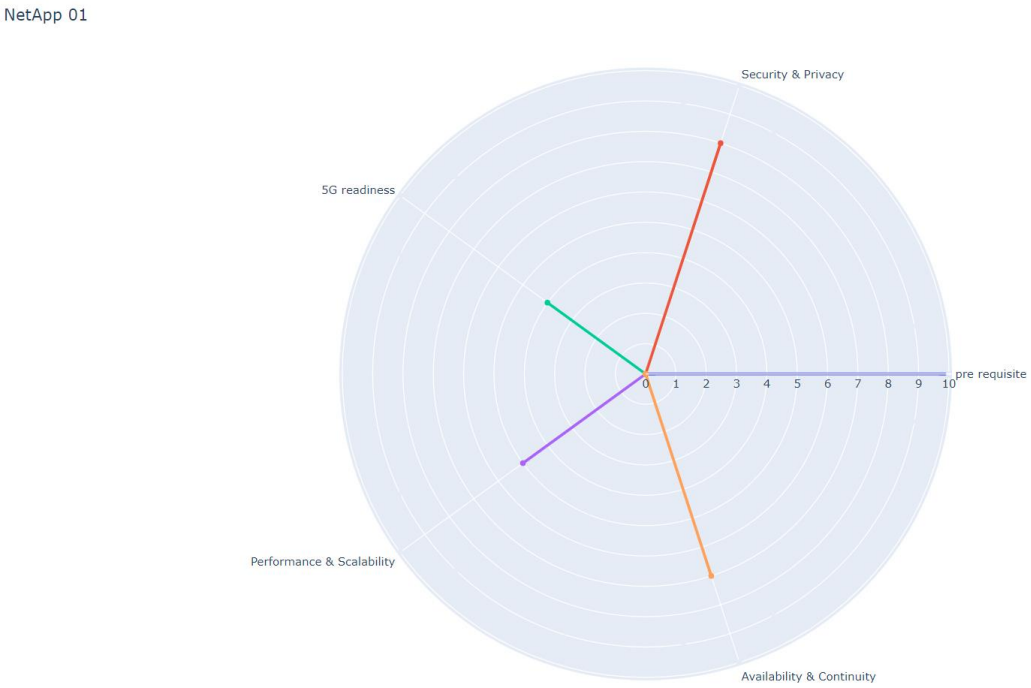

Figure 23. An example of the Test Result Chart.

Upon a successful certification process, 5GASP will issue a Certificate document. The applicant will be able to download a Test Report with detailed information about the NetApp Executed Test and Testing History.

4.3 Linking to an Ecosystem of Certification Programs

Many telecommunication service providers (telcos), telco vendors and alliance organizations host 5G VNF/CNF certification programs. This 5GASP certification process workflow can provide clear guidance and a path for participating NetApp entities to also participate in those programs.

For example, 5GASP partner VMware hosts a Ready for Telco program [12] where over 270 5G network functions have been validated for use and deployment on the infrastructure of CSPs worldwide. The program certifies that network functions interoperate and prepares NetApps for their rapid deployment to CSP infrastructure by ensuring gVNFM interoperability and the creation/verification of standards-based onboarding artefacts.

The VMware program, in particular, has two certification forms that a NetApp developer can choose, an on-premise lab verification process or a self-certification process. This 5GASP certification process workflow assists NetApp developers with the successful enrollment in such ecosystem certification programs, ensuring the NetApps are technically prepared for onboarding, assisting with the additional certification path and offering support as a NetApp developer goes through a self-certification process. Such assistance can lead to NetApps being available in other marketplaces [13], expanding the impact of the 5GASP project.

5. Conclusions

The current deliverable report follows D6.1 [1] and precedes our third and final report, to be delivered at M36 (D6.3). In this interim report, we first presented in detail the finalised design version and delivery of 5GASP's two complementary portals: the (i) *NetAppCommunity* [2] and the (ii) *NetAppStore* [3] portals. Both portal descriptions entail detailed requirements specifications site maps with content information and corresponding content types, i.e. static, dynamic or other special types.

Further, this interim report deliverable discusses our latest community engagement events since the delivery of D6.1, including detailed information about launching, promoting and progressing the NetApp Lab programme for SMEs interested in learning about 5G capabilities and using the 5GASP testbed facilities. Also, we array a series of data and analytics regarding attendance reports and post-event video viewing numbers. In addition, we commit to continuing raising awareness and to attracting more NetApp developers, to organising open classes as part of the NetApp Lab program, and to organise new events as part of our plan for engaging more external stakeholders such as other ICT-41 projects, more SMEs, startups and developers.

Regarding our approach to NetApp certification, namely 5GASP-C, the current document steps on the ground of the certification process definition reported in D6.1 [1] in M13. New contributions will be referred for further implementation of additional tests and their definitions, according to the agreed certification testing, as part of upcoming D5.4 work. Last, a possible linking of 5GASP-C to a broader ecosystem of certification program is also discussed.

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