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D8.6 – Dissemination & Standardization Activities (1st Period)

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| AUTHOR(S) | J. Klimt (RWTH), F. Maier (EDD), M. Sophocleous (EBOS), T. Velivassaki (SYN), M. Stebakow (CAP), L. Dmitrij (AALTO), |
| REVIEWER(S) | J. Escrig (I2CAT), A. Corsi (ENG) |
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Document History

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List of Acronyms and Abbreviations

| 5G ACIA | 5G Alliance for Connected Industries and Automation |
|---------|---|
| 5G IA | 5G Industry Association |
| 5GPPP | 5G Infrastructure Public Private Partnership |
| AIOTI | Alliance for Internet of Things Innovation |
| BDVA | Big Data Value Association |
| DIH | Digital Innovation Hub |
| ECSO | European Cyber Security Organisation |
| EFFRA | European Factories of the Future Research Association |
| ENoll | European Network of Living Labs |
| GA | Grant Agreement |
| INATBA | International Association for Trusted Blockchain Applications |
| IoT | Internet of Things |
| моос | Massive Open Online Courses |
| NESSI | Networked Software and Services Initiative |
| NGI | Next Generation Internet |
| NG-loT | Next Generation IoT |
| ONF | Open Network Foundation |
| OSM | Open Source MANO |
| WP | Work Package |



Executive Summary

The public deliverable D8.6 – "Dissemination & Standardisation Activities (1st Period)" of the IoT-NGIN project provides a strategic Dissemination Plan highlighting the target audiences as well as the target journals, conferences and standardisation organisations. Moreover, D8.6 provides an update on the dissemination, communication & standardisation activities for the first half of the project.

Initially, this deliverable provides a detailed, timely and strategic dissemination and communication plan describing the multiple phases of the plan starting from the online and social media presence all the way to reaching specialised audience and IoT experts. The plan indicates specific audiences from the 4 verticals, the scientific community and the general public whilst measurable goals have been identified for each group.

On the communication and dissemination front the project is able to demonstrate:

- 17 Talks & Presentations
- 14 Events & Trainings
- 2 Scientific Journals
- 1 PhD Dessertation
- 1 Video
- 36 Blogposts
- 2 Newsletters
- 2 Brochures & 1 Poster
- 1 Press Release
- 4 Social Media accounts (Facebook, Linkedin, Twitter, Youtube)

On the clusters and associations front, the project is able to demonstrate contribution in:

- 4 Communication clusters & associations
- 4 IoT clusters & associations
- 4 Software clusters & associations
- 7 various other clusters & associations
- 6 target open-source foundation and potential interactions
- 12 standards related organizations

Since the beginning of the project, we have been running monthly meetings to coordinate our activities with relation to clusters and associations. Bi-monthly meetings have been organized focused on the topic of standards. As a result of these meetings, relationships have been established to a wide range of clusters, associations and standardisation bodies.

Although we are just finishing the first reporting period of the project, we have already achieved significant impact with our initial project results. With the project moving towards the second half, extensive results are expected to be produced by the partners, leading to higher dissemination, standardisation and exploitation opportunities for the project.

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D8.6 – Dissemination & Standardization Activities (1st Period)

1 Introduction

All the dissemination activities fo the IoT-NGIN project which were conducted in the first half of the project (M1-M18) are documented and summarized in this deliverable. This includes dissemination to professionals in the buisiness and academic domain, contributions to standardisation bodies and associations, but also to the public by means of for example blogposts or social media.

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1.1 Intended Audience

This document is intended for the general public with a special focus on users of IoT-NGIN solutions which could use the information from this deliverable to find further information on the IoT-NGIN topics.

1.2 Relations to other activities

This deliverable touches on all aspects of the project by nature as dissemination happens on all aspects of the project. The deliverables D8.1 (*Project Web site & Social Channels set-up*) and D8.2 (*Marketing & promotional Tools*) can be highlighted for a particularly close connection to the contents of this document.

1.3 Document overview

In Chapter 2, we recapiutlate the general dissemination strategy and list the target audiences. The dissemination activities conducted so far are listed and described in Chapter 3. Finally chapter 4 summarizes our activities related to clusters, associations and standardisation bodies.



2 Dissemination Strategy

IoT-NGIN aims to maximize the impact of the project activities by raising awareness about the project outcomes among the interested communities. More specifically, dissemination has the main objectives to:

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- Create awareness, involve and stimulate the uptake of the IoT-NGIN achievements;
- Promote the demand of final users, e.g., Smart City authorities, smart Farmers, smart factories, Energy utilities, technology providers and integrators, researchers and the general public;
- Create awareness among stakeholders, investors, additional actors of the business value chain;
- Inform the academic/research/scientific community.

The project dissemination strategy has been presented in D8.2 "Marketing and Promotional Tools" as summarized in Figure 1: IoT NGIN dissemination strategy.



Figure 1: IoT NGIN dissemination strategy

The dissemination strategy consists of three phases.

- Phase I: Stakeholders outreach plan and early dissemination activities(M1-M18)
 - Scope: To design a dissemination strategy, identify the target groups and key messages for each group and inform the market regarding the scope and the objectives of IoT-NGIN.
 - Measures: A website and blog, social media accounts, a calendar of external events, a comprehensive list of journals and publications, a comprehensive list of relevant clusters, associations, communities, SDOs, join relevant groups, perform dissemination activities
- Phase II: Policy fostering business innovation (M19-M30)
 - Scope: Identify sector-specific tangible outcomes and engage
 - Measures: Actively participate in scientific and industrial events, monitor and contribute to SDOs, raise awareness through social media and more targeted channels
- Phase III: Matching market analysis and Exploitation (M31-M36):
 - Scope: Support end users in getting familiar with the technology.
 - Measures: Organize and attend events addressed to end-users, developers, targeted audience and key stakeholders in industry and research, organize



workshops and training sessions targeting end user and attending events for raising awareness among general public.

In the following, we identify the target groups and relevant measures to access them, as well as the monitoring and evaluation process for the dissemination activities.

2.1 Target Groups

Since the early stage of the project, the main stakeholder groups have been identified, spanning different disciplines and having different interest on the project results. As part of the agile approach adopted for dissemination, the target groups are revisited and updated at least once in every dissemination phase. As presented in D8.2 and repeated in Table 1 of this document, three different target groups have been identified for the impact creation activities, namely end users & regulators, the scientific community and the general public.

| Target Group | Measure | Goal |
|---|---|--|
| Smart Cities, Industry 4.0, Smart Energy/Grid, Farmers Cooperatives, Public, Private and Market Stakeholders/ Decision Makers | Communication Channels, Events, Advisory board, Alliances, Standardisation Organizations. Invitations to midterm and final IoT- NGIN Open Day events. Web site and social media. | Achieve a consensus on requirements, functionalities and security issues that need to be addressed by next generation loT Create awareness of the IoT risks and future cyber/human threats, IoT-NGIN roadmap and human centric security opportunities. |
| Scientific Community, Active Ecosystem of all relevant IoT stakeholders SDOs, IoT/5G Alliances | Scientific conferences, Journals/ Magazines, mainly open access for larger impact. Web site and social media. Open source repositories. Special sessions in events. | Increase awareness and feedback towards the research gaps, requirements, functionalities, Human centric and security issues for joint optimisation of IoT and 5G infrastructure. |
| Wider Audience and Life-long learning community | Short MOOC courses to create awareness on Next Generation IoT potential and IoT-NGIN features. | To accelerate the uptake of IoT- NGIN concepts and results for maximising awareness of their availability. |

Table 1 - Target groups in IoT-NGIN.

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2.2 Website and public profiles

In today's digital world, an extensive presence in the web is relevant, not only but especially for a project like IoT-NGIN having "Internet" as part of their name. We did establish a presence on all of the following online platforms to maximize the outreach of the project, and the wide range of services enables direct interaction with people from all the previously mentioned target groups and audiences.

Website: <u>https://iot-ngin.eu</u>

Linkedin: https://www.linkedin.com/company/iot-ngin/

Twitter: <u>https://twitter.com/lotNgin</u>

Facebook: <u>https://www.facebook.com/lotNgin</u>

Youtube: https://www.youtube.com/channel/UCE9C_yYWVXcrAlc2i4wKUjw

F6s: https://www.f6s.com/iot-ngin-1st-open-call

FundingBox: https://spaces.fundingbox.com/@iotngin/profile

GitLab: https://gitlab.com/h2020-iot-ngin

DockerHub: https://hub.docker.com/u/iotngin

2.3 Monitoring

The effectiveness of the dissemination activities is monitored on a regular basis, usually monthly, evaluating the project progress towards the targeted dissemination and communication KPIs, as described in the DoA. This evaluation is based on the tracked dissemination activities through the dissemination tracker, which is a living online document, accessible by all partners and aimed to keep information about the conducted activities. Moreover, online analytics tools are used to track the online dissemination progress. Specifically, the project website activity is monitored via Google Analytics, while the corporate analytics tools of the used social media are also exploited to monitor the online presence in the social media. After each evaluation, the dissemination team identifies whether the impact creation progresses as expected or whether additional measures to reinforce dissemination and communication are needed and are planned accordingly.



3 Dissemination Contributions

This chapter summarizes the conducted dissemination activities of the first half of the project. The corona pandemic with all its implications on public life, business activities and scientific work has also impacted the dissemination work in IoT-NGIN. The project coped with this by shifting the focus towards online events, presentations and activities, of which numerous can be reported. Thanks to the emerging improvement of the situation throughout Europe, we are optimistic that we can also shine in presence activities in the second half of the project.

3.1 Talks and Presentations

The following talks or presentations were held either directly about IoT-NGIN or the project's main topics.

| Title | From Promises to Concretia - GAIA-X |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 05.02.2021 |
| Туре | Keynote |
| Venue | GAIA-X Industry Data Space workshop for Finnish Indusries |
| Description/ Abstract | SITRA, the Finnish Innovation Fund arranged online workshop for the Finnish This event showcased the importance of GAIA-X for industries and highlighted the best ways to interact with the GAIA-X AISBL, the national hub network and the data space projects. It brought forward the alignment of IoT, 5G, AI solutions for data strategies. |

| Title | IoT-NGIN vision |
|--------------------------|--|
| Speaker | Artemis Voulkidis |
| Date | 25.02.2021 |
| Туре | Presentation |
| Venue | NGIOT "IOT and Edge: Instruments, Priorities and Partnerships" |
| Description/ Abstract | Presentation of the IoT-NGIN project |

| Title | GAIA-X Smart Cities WG-event |
|--------------------------|---|
| Speaker | Ilkka Lakaniemi |
| Date | 02.03.2021 |
| Туре | Presentation |
| Venue | GAIA-X Finland Hub - Smart City coordination meeting |
| Description/ Abstract | Hosted by Slovenia and task force arranged by Belgium, Germany and Finland (Lakaniemi) to write the Smart City-position paper for GAIA-X. |

| Title | Developing Information Society from the 1980s to Present Day |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 17.03.2021 |
| Туре | Keynote |
| Venue | Finnish Development Centre for Information Society (TIEKE) at the TIEKE 40 Years Anniversary Seminar |
| Description/ Abstract | This was a large-scale event held in Helsinki, Finland at 40 year anniversary of TIEKE. Mr Lakaniemi is the Chairman of the organization and gave reflections of the current EU data economy, socio-economic benefits and EU research co-operation as a vehicle for lasting digital transformation. |

| Title | Nordic and Baltic Co-operation for Data Economy and GAIA-X |
|--------------------------|---|
| Speaker | Ilkka Lakaniemi |
| Date | 24.03.2021 |
| Туре | Keynote |
| Venue | Baltics' Opportunity to Become Data Economy Leaders in EU. Event organized by the Estonian, Lithuanian and Latvian governments |
| Description/ Abstract | Ministerial and policymaker event on experiences and development of the European data economy with specific focus on industry collaboration such as GAIA-X. |

| Title | Pitch: IoT-NGIN |
|--------------------------|--|
| Speaker | Terpsi Velivassaki |
| Date | 30.03.2021 |
| Туре | Presentation |
| Venue | NG-IoT Thematic Workshop: Smart Cities & Communities |
| Description/ Abstract | Presentation of the IoT-NGIN vision |

| Title | RustyHermit: A Scalable, Rust-Based VirtualExecution Environment |
|--------------------------|--|
| Speaker | Stefan Lankes |
| Date | 14.04.2021 |
| Туре | Invited Talk |
| Venue | Illinois Institute of Technology |
| Description/ Abstract | Presentation of the Unikernel work at the Institute and how we plan to use this technology in IoT-NGIN |

| Title | EU Smart City developments and key learnings for NEOM |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 08.06.2021 |
| Туре | |
| Venue | Online City as a Service (CaaS): Public Services Shared Experience for the NEOM-project in the Kingdom of Saudi Arabia. |
| Description/ Abstract | Presentation on key EU smart city developments, the OASC-network and its impact + smart city use cases for greenfield and brownfield city development. |

| Title | FIWARE online conference |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 09.07.2021 |
| Туре | Presentation |
| Venue | online FIWARE Smart Fest |
| Description/ Abstract | Presentation on data governance and management use cases for smart industry and smart public services – the Nordic experience. |

| Title | Project Presentation/ Open Calls Presentation |
|--------------------------|---|
| Speaker | Ghasan Bhatti, Dimitrios Skias, Artemis Voulkidis |
| Date | 30.08.2021 |
| Туре | Presentation |
| Venue | IoT week 2021 |
| Description/ Abstract | Project presentation for the upcoming open call |

| Title | ElaaS (Edge Intelligence as a Service) The IoT-NGIN paradigm |
|--------------------------|--|
| Speaker | Terpsi Velivassaki |
| Date | 01.09.2021 |
| Туре | Presentation |
| Venue | IOT week 2021- EDGE INTELLIGENCE AND INDUSTRIAL INTERNET OF THINGS |
| Description/ Abstract | ElaaS (Edge Intelligence as a Service) The IoT-NGIN paradigm |

| Title | GAIA-X and the Nordic industries |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 16.09.2021 |
| Туре | Presentation |
| Venue | Finnish Industrial Internet Forum (FIIF) |
| Description/ Abstract | Presentation on the emerging GAIA-X use cases and architecture for all industry sectors- specific impact of Nordic and EU collaboration in projects. |

| Title | The role of national hub network of GAIA-X |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 08.12.2021 |
| Туре | Presentation |
| Venue | GAIA-X Finland online event on Industry data and smart cities. |
| Description/ Abstract | Presentation on key WGs in the national hub network and specific links to lighthouse projects such as Catena-X and Eona-X as best practice sharing and scaling networks. |

| Title | GAIA-X |
|--------------------------|--|
| Speaker | Ilkka Lakaniemi |
| Date | 14.12.2021 |
| Туре | Presentation |
| Venue | GAIA-X as an enabler for realizing European data economy, online event by Taltech, Tallin University of Technology |
| Description/ Abstract | Presentation on current AI, ML, IoT and data analytics development under the auspices of GAIA-X/Nordic-Baltic co-operation opportunities and joint EU collaboration. |

| Title | Interledger and Self-sovereign identities |
|--------------------------|--|
| Speaker | Dmitrij Lagutin |
| Date | 07.02.2022 |
| Туре | Presentation |
| Venue | EU-IoT Training Workshops Series: Decentralizing IoT Intelligence using Distributed Ledger Technologies |
| Description/ Abstract | The presentation describes how Interledger approach can be used to bridge multiple different ledgers. It also discusses use of self-sovereign identities in the IoT context. |

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| Title | Key Circular Economy event for the Finnish policymaking and research |
|--------------------------|---|
| Speaker | Ilkka Lakaniemi |
| Date | 16.02.2022 |
| Туре | Presentation |
| Venue | Data4Circularity online/hybrid event on industry data business cases and the EU ecosystems |
| Description/ Abstract | Presentation and comments to all key Finnish policymakers and research organizations on the objectives of GAIA-X and EU initiatives for using data as a key growth enabler. |

| Title | EU experience for Indonesian New Capital development |
|--------------------------|---|
| Speaker | Ilkka Lakaniemi |
| Date | 21.02.2022 |
| Туре | Presentation |
| Venue | City as a Service (CaaS): online event for the Indonesian new capital team. |
| Description/ Abstract | A Business Finland facilitated event for the Indonesian ministries in charge of Indonesian new capital development. |



3.2 Events & Trainings

At the following events, IoT-NGIN partners could participate and present the project or teach about the project's topics.

| Title | Kick-off meeting of the Finnish Advanced Manufacturing Network-task force |
|-------------|---|
| Туре | Steering Board meeting |
| Date | 17.03.2021 |
| Link | |
| Location | Federation of the Technology Industries in Finland, Helsinki, Finland |
| Description | Ilkka Lakaniemi participated as a Member of the Task Force and expert on data and platform economy. |

| Title | Workshop on Circular Economy |
|-------------|--|
| Туре | Training talk |
| Date | 31.03.2021 |
| Link | |
| Location | Helsinki, Finland |
| Description | Ilkka Lakaniemi participated as an expert at a training event for the Finnish Association for Civil Engineers. |

| Title | NGIoT Training Workshop on "AloT and Edge Machine Learning" |
|-------------|---|
| Туре | Training workshop |
| Date | 21.05.2021 |
| Link | https://www.ngiot.eu/event/eu-iot-training-workshops-series-aiot-and- edge-machine-learning/ |
| Location | Online |
| Description | Artemis Voulkidis presented cybersecurity contexts in Federated Machine Learning |

| Title | NGIoT Training Workshop on "Enabling the Tactile Internet with IoT" |
|-------------|--|
| Туре | Training workshop |
| Date | 08.07.2021 |
| Link | https://www.ngiot.eu/event/enabling-the-tactile-internet-with-iot/ |
| Location | Online |
| Description | Stavroula Bourou presented "Designing IoT-powered XR services and applications towards a Tactile Internet" |

| Title | IoT week 2021 - Training Session on Machine Learning at the Edge and the FarEdge |
|-------------|---|
| Туре | Training workshop |
| Date | 30.08.2021 |
| Link | https://sites.grenadine.co/sites/iot/en/iot-week-online- edition/schedule/7947/Training Session on Machine Learning at the Edge and the FarEdge |
| Location | Online |
| Description | Artemis Voulkidis presented "Introduction to Federated Machine Learning (FL) and FL Cybersecurity" |

| Title | Next Generation Architecture for the Internet of Things |
|-------------|--|
| Туре | Training webinar |
| Date | 09.11.2021 |
| Link | https://www.ngiot.eu/event/eu-iot-training-workshops-series-next- generation-iot-architectures/?instance_id=188 |
| Location | Online |
| Description | Artemis Voulkidis presented "(Meta)Architecture considerations" |

| Title | International Webinar on Smart Grid and Green Energy Systems |
|-------------|--|
| Туре | Webinar |
| Date | 15.11.2021 |
| Link | https://crgconferences.com/greenenergy/2021/ |
| Location | Online |
| Description | Francesco Bellesini presented "The role of electric mobility in the transition to green energy", https://www.youtube.com/watch?v=0Ut33vYgYmc |

| Title | 5G-SMART Webinar on Demystifying 5G and Industrial Networks slicing, from theory to practice |
|-------------|---|
| Туре | Webinar |
| Date | 18.11.2021 |
| Link | https://www.linkedin.com/posts/5gsmart_5g-smart-webinar-on- demystifying-5g-and-industrial-activity-6867811960600305665-C5Sm |
| Location | Online |
| Description | Cumucore has completed the implementation of Network slice manager to be used for industrial deployments to comply with security requirements IEC and isolate IoT traffic with different requirements. Cumucore demonstrated the network slice manager live in the webinar |

| Title | IoT-NGIN webinar for the 1st open call |
|-------------|---|
| Туре | Webinar |
| Date | 25.11.2021 |
| Link | https://iot-ngin.eu/index.php/2021/11/19/iot-ngin-webinar-for-open-call- candidates/ |
| Location | Online |
| Description | Artemis Voulkidis presented the project and meta-archtecture to open call candidates. |



| Title | EBDVF 2021 - Session: Edge Computing - the convergence point in the human-cloud continuum framework |
|-------------|---|
| Туре | Online session |
| Date | 01.12.2021 |
| Link | https://european-big-data-value-forum.b2match.io/agenda |
| Location | EBDVF21 - Online |
| Description | Artemis Voulkidis presented the project during the "Edge Computing - the convergence point in the human-cloud continuum framework" session of EBDVF21 |

| Title | IoT-NGIN Project |
|-------------|---|
| Туре | Online booth |
| Date | 03.12.2021 |
| Link | https://european-big-data-value-forum.b2match.io/participations/92123 |
| Location | European Big Data Value Forum 2021- Online |
| Description | IoT NGIN project presentation and virtual booth |

| Title | AI4EU Stakeholder Days |
|-------------|--|
| Туре | Chair of Panel |
| Date | 9.12.2021 |
| Link | https://www.ai4europe.eu/news-and-events/events/ai-event/ai4eu- stakeholder-forum |
| Location | AI4EU Stakeholder Days. Hybrid - Bologna, Italy |
| Description | Chair of the panel at the AI4EU Stakeholder Days, Bologna, Italy, a hybrid event on business cases, data and AI. Arranged by the EU AI ecosystem. |

| Title | ENoLL Empower everyone to innovate |
|-------------|--|
| Туре | Webinar |
| Date | 14.02.2021 |
| Link | https://enoll.org/ |
| Location | Online |
| Description | Presenting the concepts and ideas of ENoLL |

IOT-NGIN

| Title | Finnish Strategy for Data and Platform Economy |
|-------------|---|
| Туре | Panelist |
| Date | 30.03.2022 |
| Link | |
| Location | Ministry for Economy and Employment, Helsinki, Finland |
| Description | Presentation and panelist on the current status of data and platform economy in Finland and EU. |

3.3 Scientific Publications

Even though the technical work in the project is still ongoing, a number of scientific articles and documents were already published. We expect the number of publications to rise in the second half of the project, when the focus shifts from the development of new technologies to the dissemination of results.

| Title | Cricket: A Virtualization Layer for Distributed Execution of CUDA Applications with Checkpoint/Restart Support |
|---------------------------------|---|
| Туре | Journal Paper |
| Author List | Niklas Eiling, Jonas Baude, Stefan Lankes, Antonello Monti |
| Conference/Journal | Wiley's Concurrency and Computation: Practice and Experience - Special Issue on Heterogeneous Computing |
| DOI | <u>https://doi.org/10.1002/cpe.6474</u> |
| State | Published |
| Publication/ submission date | Published: 06 July 2021 |

| Abstract | In high-performance computing and cloud computing the introduction of heterogeneous computing resources, such as GPU accelerator have led to a dramatic increase in performance and efficiency. While the benefits of virtualization features in these environments are well researched, GPUs do not offer virtualization support that enables fine-grained control, increased flexibility, and fault tolerance. In this article, we present Cricket: A transparent and low-overhead solution to GPU virtualization that enables future research into other virtualization techniques, due to its open-source nature. Cricket supports remote execution and checkpoint/restart of CUDA applications. Both features enable the distribution of GPU tasks dynamically and flexibly across computing nodes and the multitenant usage of GPU resources, thereby improving flexibility and utilization for high-performance |
|----------|--|
|----------|--|

| Title | A Review of Tabular Data Synthesis using GANs on an IDS Dataset |
|---------------------------------|---|
| Туре | Journal Paper |
| Author List | Stavroula Bourou, Andreas El Saer, Terpsichori-Helen Velivassaki, Artemis Voulkidis, Theodore Zahariadis |
| Conference/Journal | MDPI Information |
| DOI | https://doi.org/10.3390/info12090375 |
| State | Published |
| Publication/ submission date | Published: 14 September 2021 |
| Abstract | Recent technological innovations along with the vast amount of available data worldwide have led to the rise of cyberattacks against network systems. Intrusion Detection Systems (IDS) play a crucial role as a defense mechanism in networks against adversarial attackers. Machine Learning methods provide various cybersecurity tools. However, these methods require plenty of data to be trained efficiently, which may be hard to collect or to use due to privacy reasons. One of the most notable Machine Learning tools is the Generative Adversarial Network (GAN), and it has great potential for tabular data synthesis. In this work, we start by briefly presenting the most popular GAN architectures, VanillaGAN, WGAN, and WGAN-GP. Focusing on tabular data generation, CTGAN, CopulaGAN, and TableGAN models are used for the creation of synthetic IDS data. Specifically, the models are trained and evaluated on an NSL-KDD dataset, considering the limitations and requirements that this procedure needs. Finally, based on certain quantitative and qualitative |



|--|

| Title | Discovering the Digital Twin Web - From singular applications to a scalable network |
|---------------------------------|--|
| Туре | Doctoral Dissertation |
| Author List | Juuso Autiosalo |
| Conference/Journal | - |
| DOI | http://urn.fi/URN:ISBN:978-952-64-0621-3 |
| State | Published |
| Publication/ submission date | Published: 2021 |
| Abstract | Digital twins are virtual entities that are linked to real-world entities. Twins mirror their real counterparts and consist of features that are selected to serve the underlying use cases. This dissertation set out to build machine design-focused digital twins for industrial products, specifically for an industrial overhead crane, but also a need for more general work was identified during the work. The four main results are a feature-based digital twin framework, a case study on practical digital twin development, preliminary digital twin document specification as a method for describing digital twins, and Twinbase as server software for distributing digital twin documents. As a synthesis of the results, the dissertation introduces the Digital Twin Web (DTW) as an initiative for building a global network of digital twin document. The structure of DTW is analogous to the World Wide Web (WWW), consisting of servers and clients and leveraging open specifications. Key differences are the direct relation to the real world and readability for both humans and machines. Standardisation of the digital twin document is seen as an imperative topic for future research. |

It might be worth mentioning, that another paper "Smart Grid Energy flexibility as 5G Use Case and the Authors" was submitted, but wasn't accepted for publication in the end.

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D8.6 – Dissemination & Standardization Activities (1st Period)

3.4 Online Activities

As already mentioned, due to the circumstances we put a stronger emphasis on online activities. The following sections summarize these.

ICT-NGIN

3.4.1 Videos

During the reporting period, the 1st Consortium video was released in M13. This video has included the introduction, described the project and summarised the goals the consortium would like to achieve. The video has been published on the <u>IoT NGIN website</u>¹ and on the project's <u>youtube channel</u>² and disseminated on all IoT-NGIN channels.



IoT-NGIN Video

Figure 2 The IoT-NGIN project video

3.4.2 Blogs

With the scientific publications, talks, and trainings we aim to disseminate towards specific audiences. In contrast, with the IoT-NGIN blogs we target a broader audience. To archive this, the Posts are focusing on single topics and give an introduction and overview of the respective topic or present advancements and new trends.

¹ <u>https://iot-ngin.eu/index.php/media/</u>

² <u>https://www.youtube.com/watch?v=DEZQi9IMzRM</u>

Table 1: IoT-NGIN Blogposts in 2021

| Author | Title and Link |
|---|--|
| САР | Dissemination, communication and exploitation in IoT-Ngin |
| https://iot-ngin.eu/in in-iot-ngin/ | ndex.php/2021/04/02/dissemination-communication-and-exploitation- |
| EBOS | Steps towards cybersecurity and information security |
| https://iot-ngin.eu/in security/ | ndex.php/2021/04/22/steps-towards-cybersecurity-and-information- |
| EMOT | e-Mobility in Terni pilot site |
| https://iot-ngin.eu/ir | ndex.php/2021/04/29/e-mobility-iot-cyber-security/ |
| SYN | Leveraging Generative Adversarial Networks (GAN) for malicious attack detection (MAD) in IoT |
| https://iot-ngin.eu/ir | ndex.php/2021/05/24/leveraging-generative-adversarial-networks-gan- |
| tor-malicious-attack | c-detection-mad-in-iot/ |
| AALTO | Making Europe fit for the Digital Age (GAIA-x) |
| <u>https://iot-ngin.eu/i</u> i | ndex.php/2021/05/27/making-europe-fit-for-the-digital-age/ |
| СМС | SECURITY AS KEY ENABLER FOR RELIABLE MOBILE COMMUNICATIONS |
| https://iot-ngin.eu/in communications/ | ndex.php/2021/06/14/security-as-key-enabler-for-reliable-mobile- |
| EDD | Addressing a fragmented IoT connectivity market |
| <u>https://iot-ngin.eu/ir market/</u> | ndex.php/2021/05/31/addressing-a-fragmented-iot-connectivity- |
| RWTH | Containers and Unikernels – More Isolation for your Software |
| https://iot-ngin.eu/in software/ | ndex.php/2021/06/25/containers-and-unikernels-more-isolation-for-your- |
| ABB | IoT-NGIN and big data in industry |
| https://iot-ngin.eu/index.php/2021/08/02/iot-ngin-and-big-data-in-industry/ | |
| INTRA | Honeypots as Moving Target Defense (MTD) in IoT Systems |
| https://iot-ngin.eu/in systems/ | ndex.php/2021/07/05/honeypots-as-moving-target-defense-mtd-in-iot- |
| OPT | Access control in IoT networks |

| https://iot-ngin.eu/index.php/2021/07/29/access-control-in-iot-networks/ | | | |
|--|--|--|--|
| ASM | IoT and energy asset management: a new framework for a multi-objective analysis | | |
| https://iot-ngin.eu/ii framework-for-a-mu | ndex.php/2021/07/26/iot-and-energy-asset-management-a-new- Jlti-objective-analysis/ | | |
| ENG | Machine Learning in the browser | | |
| https://iot-ngin.eu/i | ndex.php/2021/07/30/machine-learning-in-the-browser/ | | |
| FVH | Smart City Living Lab and IoT-NGIN technologies | | |
| https://iot-ngin.eu/i | ndex.php/2021/10/19/living-lab/ | | |
| PRI | IoT-NGIN Open Call 1 | | |
| https://www.privan | ova.com/iot-ngin-open-call-1/ | | |
| SU | Device-to-device communications, a good friend of cellular networks | | |
| https://iot-ngin.eu/in friend-of-cellular-ne | ndex.php/2021/11/23/device-to-device-communications-a-good- tworks/ | | |
| BOSCH | Internet of Things in industrial environments | | |
| https://iot-ngin.eu/i | ndex.php/2021/09/28/internet-of-things-in-industrial-environments/ | | |
| I2CAT | Ambient Intelligence and Tactile IoT in IoT-NGIN | | |
| https://iot-ngin.eu | /index.php/2022/01/10/ambient-intelligence-and-tactile-iot-in- | | |
| ATOS | New paradigms for AI on the Edge | | |
| https://iot-ngin.eu/i | https://iot-ngin.eu/index.php/2021/09/14/new-paradigms-for-ai-on-the-edge/ | | |
| CAP | Implications of IoT system on European Lives | | |
| https://iot-ngin.eu/index.php/2021/10/22/implications-of-iot-system-on-european-lives/ | | | |
| EBOS | Automated Decision-Making Systems & IoT for Smart Agriculture | | |
| https://iot-ngin.eu/i smart-agriculture/ | ndex.php/2021/10/22/automated-decision-making-systems-iot-for- | | |
| EMOT | European smart charging stations overview | | |

| https://iot-ngin.eu/index.php/2021/10/22/european-smart-charging-stations-overview/ | |
|--|--|
| SYN | GPU passthrough in OpenStack |
| https://iot-ngin.eu/ii | ndex.php/2021/11/25/gpu-passthrough-in-openstack/ |
| EDD | Mission Critical Networks for secure communications in critical operations |
| https://iot-ngin.eu/index.php/2021/12/03/mission-critical-networks-for-secure- communications-in-critical-operations/ | |

IoT-NGIN

Table 2: IoT-NGIN Blogposts in 2022

| Author | Title and Link |
|--|---|
| INTRA | Cybersecurity for IoT Federated Learning |
| <u>https://iot-ngin.eu/i</u> i | ndex.php/2022/01/03/cybersecurity-for-iot-federated-learning/ |
| ABB | CAD models & industry 4.0 |
| <u>https://iot-ngin.eu</u> | /index.php/2022/01/10/cad-models-industry-4-0/ |
| СМС | Is 5G over hyped? |
| <u>https://iot-ngin.eu</u> | /index.php/2022/01/18/is-5g-over-hyped/ |
| RWTH | microVMs to reduce the overhead of virtualization |
| https://iot-ngin.eu virtualization/ | /index.php/2022/01/18/microvms-to-reduce-the-overhead-of- |
| AALTO | Privacy-preserving Identifiers for IoT |
| <u>https://iot-ngin.eu</u> | /index.php/2022/02/02/privacy-preserving-identifiers-for-iot/ |
| OPT | From cloud to fog to edge and swarm computing! |
| https://iot-ngin.eu computing/ | /index.php/2022/02/04/from-cloud-to-fog-to-edge-and-swarm- |
| ENG | Predictive Digital Twins |
| https://iot-ngin.eu | /index.php/2022/02/04/predictive-digital-twin/ |
| FVH | The urban digital twin supports Living Lab activities |

| https://iot-ngin.eu/index.php/2022/02/16/urban-digital-twin-supports-living-lab- activities/ | | | |
|---|--|--|--|
| PRI Benefits of GDPR Compliance for Exploitation of Project Results | | | |
| https://iot-ngin.eu/index.php/2022/02/25/benefits-of-gdpr-compliance-for- exploitation-of-project-results/ | | | |
| SU D2D, an innovative communication approach | | | |
| https://iot-ngin.eu/index.php/2022/03/21/d2d-an-innovative-communication- approach/ | | | |

3.4.3 Newsletters

IoT-NGIN is publishing semi-annual newsletters, one in spring and one in autumn. These should inform not only on the progress of the project, but also give a few insights on the partners and inform on upcoming relevant events for the European IoT landscape. In the first newsletter we also took the opportunity to introduce the project and our goals, whereas the second newsletter was a good chance to present the developed IoT-NGIN Metaarchitecture. We also presented the 1st open call and asked for submissions.

One can easily subscribe to the newsletters on the IoT-NGIN website by entering an emailaddress to the field at the bottom of the page. We also publish all newsletters on the website after sending:

https://iot-ngin.eu/index.php/newsletters/

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Newsletter Spring 2021

Welcome Note



In our contemporary society, we are heading towards an automated and highly customized style of living. In the futuristic smart world, which we have envisioned for some time now, the power and potential of smart devices around us will not be limited to human comfort but would also help us increase our productivity multi-fold. In light of the same, I am pleased to introduce you to the project IoT-NGIN.

The IoT-NGIN project is a European Union funded collaborative project aiming at unleashing the power of Next Generation IoT as an essential dimension of the Next Generation Internet (NGI) and become the "IoT Engine". This project uncovers patterns based meta-architecture that

become the foil Engine . This project uncovers patients based meta-architecture that encompasses evolving, legacy, and future lof architectures. The project also optimizes IoT/M2M and 5G/MCM communications, including using secure-by-design micro-services to extend the edge cloud paradigm. Moreover, it enables user and self-aware, autonomous IoT systems through privacy-preserving federated ML and ambient intelligence, with AR support for humans. The project will also conduct 7 trials at different locations to validate the results in real-lime.

The newsletter serves as a means for us to communicate with interested audience, our international network of experts and stakeholders whom we want to keep informed of the project's status, activities, upcoming events and validate our preliminary findings, wherever possible.

I am thus pleased to welcome you and share with you our first issue of the IoT-NGIN newsletter, where you will find more information about the project as a whole, including our

Figure 3: Screenshot of the first IoT-NGIN newsletter

3.4.4 Social Media Activities

We are active on the three most relevant social media platforms for the project. These are Twitter, LinkedIn and Facebook. On Twitter and LinkedIn we have at the time of writing more than 250 followers respectively and are satisfied with the outreach we have. Unfortunately we see that the relevance of Facebook in the target audiences seems to drop and we have to report a very low number of followers here (14).

We are very active on all three platforms and published in the first project period more than e.g., 390 posts on twitter. All partners give input on current topics and ideas in their domain of expertise and we regularly post these to inform not only on the project progress but also on the general status and developments of the IoT landscape. However, interactions and reactions are also part of the social media activites and are important to engage better with the general public.

IOT-NGIN

D8.6 – Dissemination & Standardization Activities (1st Period)



Figure 4: The IoT-NGIN social-media presences

3.5 Open Calls

IoT-NGIN has successfully performed the 1st Open Call to invite interested SMEs to contribute to extending the IoT-NGIN meta-architecture. The 1st Open Call was open for submissions from 1st October 2021 till 30th December 2021. In addition, a call for expression of interest by external experts to act as evaluators for the 1st Open Call has been open from 18th September 2021 till 15th December 2021.

The 1st Open call has been disseminated via different dissemination and communication channels.

First, a dedicated webpage has been created on the official website of the project, accessible at https://iot-ngin.eu/index.php/open-calls/, as depicted in Figure 5.



I&T-NGIN

Figure 5: 1st Open Call dissemination on the project's website.

Moreover, a dedicated profile has been created on the f6s platform, as depicted in Figure 6, available at https://www.f6s.com/iot-ngin-1st-open-call, which served as the venue for the submission of proposals, as well as the platform for open discussions with the Open Call candidates.

I**⇔T-NGIN**

D8.6 – Dissemination & Standardization Activities (1st Period)



Figure 6: IoT-NGIN 1st Open Call page on f6s platform.

Moreover, the open call has been published EU site for competitive calls and calls for third parties³, as depicted in Figure 7.

Leveraging our cooperation with EU-IoT, IoT-NGIN has disseminated information about the open call in the meetings of the Communication Task Force and the meeting of the Open Calls team of EU-IoT, in which IoT-NGIN actively participates. Moreover, the Open Call information has been disseminated on the dedicated page for open calls on the NG-IoT website⁴.

IoT-NGIN organized a webinar for presenting the project and the open call to interested parties on November 25th, 2021. This event has been held online and attracted high attention. The event has been disseminated through the project website and social media, as well as through the relevant channels of EU-IoT.

In addition, the IoT-NGIN 1st open call has been presented in "Open Calls workshop" of IoT week 2021on August 30th, 2021.

³ <u>https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/competitive-calls</u>

⁴ <u>https://www.ngiot.eu/event/iot-ngin-open-calls/</u>



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Figure 7: IoT-NGIN 1st Open Call on EC's website.

The Open Call updates have been shared through the "News" section in IoT-NGIN website⁵, as well as the social media accounts. It has to be noted that the relevant post inviting submissions has been pinned on all three social media accounts for the whole submission period.

Moreover, visual content has been prepared for each relevant post, following the project's identity, in order to make the relevant updates more effective and eye-catching. An indicative example is depicted in Figure 8 for inviting applications to the Open Call.

⁵ <u>https://iot-ngin.eu/index.php/news/</u>



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Figure 8: Visual content for sharing open call updates through online channels.

Last, but not least, anticipating the 2nd Open Call, we have identified potential networks of Digital Innovation Hubs (DIHs) to raise awareness about the 2nd Open Call plans. As the 2nd open call creates significant funding opportunities for solutions at a higher level of maturity, through experimentation in the LLs, it may be of high interest to innovative SMEs across Europe. DIHs have at the core of their activities to assist SMEs in reaching funding sources. Thus, we raise awareness about the 2nd Open Call on networks of DIHs across Europe.

As a first step, IoT-NGIN has been introduced in DIHNET.eu community⁶, as depicted in Figure 9.

⁶ <u>https://spaces.fundingbox.com/spaces/dihnet-community-dihnet-eu-introduce-yourself-1/6236e444a00ca005d3d2aca6</u>



IOT-NGIN

Ov tivities conducted for the Open Calls are summarized in Table

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|--------|------|----|----|-----|-----|-----|-----|-----|---|
| | | | | | | | | | |

3.

| Channel | Activity |
|-----------------|---|
| Online | Preparation of marketing material |
| project website | dedicated page for 1st Open call |
| Project website | dedicated page for expression of interest by external experts |
| F6s platform | Dedicated profile, application form & open discussion |
| EU website | Publication of open call details on competitive calls and calls for third parties |
| EU-IoT meetings | Dissemination to Communication Task Force |
| EU-IoT meetings | Dissemination to Open Calls team |
| EU-loT website | Dedicated page for IoT-NGIN open call |
| Webinar | Presenting the project & the 1st open call |

Table 3: Open Call dissemination activities.



| Project website & social media | Webinar dissemination |
|--------------------------------|---|
| EU-IoT website & social media | Webinar dissemination |
| IoT Week 2021 | Presentation in Open Calls workshop |
| DIHNET.eu community | IoT-NGIN introduction to the community |
| AI & BIG DATA CONGRESS 03 | Dissemination during CIDAI presentation |

3.6 Other Activities

Besides the aforementioned actions, there were are a number of activities not fitting in these categories. So the following table lists the most relevant other dissemination activities:

| Туре | Date | Description |
|--------------------------|------------|---|
| Press release | 07.10.2020 | Press Release "Synelixis To Lead Flagship European Project On IoT" (<u>https://synelixis.com/synelixis-to-</u> <u>lead-falgship-european-project-on-internet-of-</u> <u>things-iot/</u>) |
| Project Brochure | 23.02.2021 | First IoT-NGIN Project Brochure |
| Interview | 22.04.2021 | SYN was interviewed by EU-IOT project members about the Smart Agricultural use cases. The discussion was focused on SYN's SynField IoT solution, while the extensions and improvements within IoT-NGIN were also presented. |
| Dissemination to cluster | 24.05.2021 | SYN provided an overview of IoT-NGIN to AIOTI. |
| Interview | 15.06.2021 | EMOT was interviewed by EU-IOT project members about the Smart Grid use cases. The discussion was focussed on EMOT's IoT solutions within IoT-NGIN project. |
| Interview | 28.07.2021 | Speaker for German Ministry for Economy and Energy/BMWi on the international collaboration experiences for industry technology projects. Recorded interview for the ministry's internal use. |
| Project Brochure | 13.09.2021 | Second IoT-NGIN Project Brochure |

Table 4: Other dissemination activities.



| Poster | 17.09.2021 | IoT-NGIN Project Poster |
|-----------------------------|------------|--|
| Whitepaper | 30.9.2021 | A Vision on Smart, Decentralised Edge Computing Research Directions (https://zenodo.org/record/5837299) |
| Contribution to association | 25.11.2021 | NetWorld SRIA Visions for Future Communication Summit Presentations by EDD and I2CAT on 5G/6G topics. Slides available here: |
| Whitepaper | 29.11.2021 | Towards a vibrant EU IoT ecosystem (<u>https://zenodo.org/record/58371391</u>) |
| Project Brochure | 22.03.2022 | Third IoT-NGIN Project Brochure |

3.7 KPIs achievement level

The following table shows the progress on the Dissemination KPIs. It should be noted that the achievement of some KPIs was made more difficult by the pandemic situation, e.g., exhibition stands or scientific conferences. We will put a stronger emphasis on these in the second half of the project. Another note here is, that a number of the KPIs are not improved gradually but require the project to run for some time and achieve technical progress, such as the scientific publications. We do keep an eye on all the KPIs and put a stronger emphasis where required in the 2nd period of the project.

| KPI | Measure | Progress |
|--------------------------------------|---|-------------------------|
| Number of newsletters | 2 newsletters/year | 2 |
| Nb of blogposts | > 120 blogposts | 36 |
| Nb of leaflets/flyers/brochures | 2 per year | 3 Brochures/1 Poster |
| Nb of videos/podcasts | >3 | 1 Video |
| Nb of whitepapers published | >3 for the whole project duration | 0 |
| Exhibition stands in large events | 3 (i.e. EuCNC, European Utility Week etc.) | 0 |
| Nb of Open days/workshops organized | 2 workshops trough the project lifecycle | 0 |

Table 5: Dissemination KPI summary for the first 18 months of the project



| Open days at trial sites | 4 open days with guided presentations | 0 |
|--|--|--|
| Publicity via local media e.g. Newspapers/magazines/TV/Ra | 4 press releases at 4 EU languages | 1 Press Release |
| dio | 4 appearance in newspapers, TV, radio | 0 |
| simplified content at web and media | >200 posts | > 390 Tweets, 36 Blogposts, 28 newsposts |
| | >4000 reads | ✓ |
| Online training sessions | 3 presentations >100 attendees | 3 >100 attendees |
| MSc and PhD Thesis | > 4 on IoT concepts/solutions | 1 |
| Training sessions in relevant events | >2 with free access, >100 attenders | 0 |
| Nb of significant actions in liaison with other projects/initiatives | establish a collaboration with at least 5 IoT projects/initiatives | ✓ (See Table 9) |
| Visiblity/ popularity | <5 results Google page (SERP) | \checkmark |
| Nb of visitors | >500 visits per year | \checkmark |
| Landing pages | >1 page per topic (events, Labs) | √ (19) |
| Nb of followers in Twitter and LinkedIn | >300 to each of them from outside the project | 250 linkedIn / 252 twitter / 14 Facebook |
| Nb of tweets including campaigns & monitor outcomes | >120 (re)tweets in 1 year | 166 in Y1 |
| Nb of youtube video posts | >10 video posts viewed by > 100 | 1 |
| Publication in highly ranked journals and open access magazines | > 10 | 2 |
| Contributions in international peer-reviewed conferences and events | > 15 | 0 |

4 Activities with clusters, associations and standardisation bodies

In this chapter, we provide an overview of our method of work, the results of our investigations of relevant clusters, associations and standards bodies, a summary of our actions in relation to these organizations and our achievements on relevant project KPIs in the first reporting period.

The **objectives** of our interactions with clusters, associations and standards organizations are to:

- Establish contacts with and identifying clusters and associations
- Build our work on the resources already available from relevant organizations
- Contribute to open-source foundations and repositories
- Contribute to standards organizations

4.1 Method of work and achievements in the first reporting period

In the first reporting period, the project work with clusters and associations has started its work by conducting a broad survey on potentially relevant clusters and associations at European and to some extent global level. The completed survey can be found in the annex. In the original plan, as defined in the Grant Agreement, six organizations were listed as a specific focus for project interactions (AIOTI, BDVA, ENOLL, DIH, 5GPPP and NGI). In our survey, we went far beyond the scope of the six organizations defined in the GA and we investigated the activities of 25 clusters and associations and 12 standards organizations which we thought could be relevant to the work of the project.

We have categorized relevant clusters and associations in two major categories and multiple sub-categories:

- Clusters and associations:
 - o Communication clusters and associations,
 - o IoT clusters and associations,
 - Software clusters and associations,
 - o Various other clusters and associations
- Open-source foundations and repositories
- Standard bodies and standards related organizations

To develop a better understanding of the potential interactions between the IoT-NGIN project and the many clusters active in the sectors addressed by the IoT-NGIN project, we invited selected clusters and associations to present their activities during the monthly meetings. The presentations were prepared and presented by invited representatives of the clusters or in some cases by IoT-NGIN project participants involved in the activities of a particular cluster. The following clusters and associations were presented in task meetings: 5G-PPP, 5G-IA, NetworldEurope, BDVA, 5G-ACIA, Open Source MANO, NGI, DIH, Gaia-X, EFFRA, ECSO, ENOLL (in cooperation with WP7). We documented suggestions for potential relationships to each cluster and followed up on suggestions on our monthly meetings.



Relationships with all organizations developed well. In particular, the project has had extensive interactions with NG-IoT, EU-IoT, BDVA, AIOTI and NetworldEurope. Project partners disseminated information on the work of the IoT-NGIN project through participation in the activities of organizations particularly relevant for the work of the project.

4.2 Clusters and associations investigated and summary of actions

In tables Table 6, Table 7, Table 8, Table 9, and Table 10 below, we list the clusters and associations that we identified at the beginning of the project, and which we have been targeting for contributions. The partners active in each association were identified and their activities tailored to reflect the focus of the IoT-NGIN project.

| Association | Partners involved | Project actions |
|--------------------|--|---|
| Networld Europe | I2CAT, ATOS, EBOS, EDD, SYN, AALTO | Two text contributions and two presentations were made by project partners to the strategic research agenda SRIA in November 2021 based on project work. See Annex to this document. |
| 5G-PPP, 5G IA | SYN, I2CAT, ATOS, EBOS, EDD, AALTO, ENG | We are investigating making a presentation on project results to 5G IA in Q3 2022. Ongoing promotion of IoT-NGIN project work to |
| NGI | EBOS, AALTO | Promotion of the IoT-NGIN project to the association and dissemination of results as they are developed. |

 Table 6: Communication clusters and associations

Table 7: IoT clusters and associations

| Association | Partners involved | Project actions |
|-------------|--|---|
| AIOTI | SYN, INTRA, AALTO, RWTH, BOSCH | IoT-NGIN partners contribute regularly to smart agriculture and smart manufacturing working groups. Feedback to AIOTI questionnaire including a short overview of IoT-NGIN and participation in many activities organized by AIOTI. |
| ECS | ATOS | Board of directors' membership and co-chair of WG6 (SRIA and cyber security technologies). Activities of ECS presented to IoT-NGIN partners. |

| 5G ACIA | EDD, ABB | IoT-NGIN work on the 5G API is based directly on 5G ACIA API proposals for smart manufacturing and smart logistics. Activities of the organization were presented in IoT-NGIN. |
|---------|----------------|--|
| EFFRA | atos, bosch | Activities of the organization reviewed. Results of Living Labs will be contributed. |
| ECSO | ATOS | ATOS is part of WG6: SRIA and Cyber Security Technologies. In particular Atos is cochair of WG6.2 Digital Transformation in Verticals. ATOS will use IoT NGIN results and lessons learnt to contribute to these ECSO activities. |

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Table 8: Software clusters and associations

| Association | Partners involved | Project actions |
|-------------|---|--|
| BDVA | I2CAT, INTRA, ATOS, EBOS, ENG | Presentations of IoT-NGIN results in the Group Activities of BDVA and in the workshops organized by the different subgroups (Agriculture, Mobility and Logistics, Smart Governance and Smart Cities, Smart Manufacturing Industry, Energy) |
| | | Active contributions to general strategic activities, such as those driven by the Board of Directors, and more content-oriented ones following the work structure of the association. Promotion of IoT-NGIN during Data Week 2021 and Big Data Value Forum 2021 in talks and booths. BDVA position paper on Data Act |
| | | Investigation of the activities of the organization. |
| AI4EU | | Promoting IoT-NGIN industry collaboration with AI4EU ecosystem. |
| | AALTO | The AI4EU catalogue on the platform consists of tools and use cases, where IoT-NGIN can contribute its content to be shared EU-wide. |
| | | IoT-NGIN can benefit from their work as a dissemination channel and contribute to their work via the LL work. |
| INATBA | AALTO | Investigation of the activities of the organization. AALTO was a member of this organization but is no longer a member. The blockchain focused activities of this association are being tracked by IoT-NGIN partners focused on security issues. |

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|---------------|-----|

| NESSI | SYN, EBOS, ENG | Investigation of the activities of the organization before the organization was closed and activities were taken over by other organizations. |
|-------|----------------------|---|
|-------|----------------------|---|

| Association | Partners involved | Project actions |
|------------------|------------------------------|--|
| NG-loT | Project as a whole | Investigation of the activities of the NG-IoT project. IoT-NGIN is a member of NG-IoT and actively supports the initiative with presentations and invited talks. Several partners took part in a range of meetings and workshops of the association and the work of the IoT- NGIN project was introduced in the association. |
| EU-IoT | Project as a whole | Investigation of the activities of the EU-IoT project. IoT-NGIN is a member of EU-IoT and actively supports the initiative with presentations and invited talks. Several partners took part in a range of meetings and workshops of the association and the work of the IoT- NGIN project was introduced in the association. Contribution to EU-IoT white paper on IoT open-source ecosystems (link). |
| DIH | SYN | Investigation of the activities of the organization. We have used social media channels of DIH to disseminate IoT-NGIN project information and results. |
| ENOLL | I2CAT, FVH | Investigation of the activities of the organization. The IoT-NGIN Living Labs learned about the ENoLL 3- layered model. Project partners are considering joining ENoLL groups. Project partners are planning to promote IoT-NGIN results in ENoLL events, such as the Open Living Lab Days. |
| LIVING- IN.EU | PRI, SYN, CMC, ATOS | Investigation of the activities of the organization and active promotion joining the organization to project partners. IoT-NGIN supports the initiative, and it has been presented and discussed several times in project general meetings. Tracking LIVING-IN.EU's news and activities and providing feedback to them on IoT-NGIN results. |

Table 9: Various other clusters and associations

Linux

D8.6 – Dissemination & Standardization Activities (1st Period)

| | | Information about the IoT-NGIN project was disseminated in an event organized by LIVING-IN.EU in June 2021. | |
|-------------------------------|------|--|--|
| Coalesce Research Group | emot | A presentation, titled "The role of electric mobility in the transition to green energy", was presented in November 2021 during the International Webinar on Smart Grid and Green Energy Systems organized by Coalesce Research Group. The IoT-NGIN project and its main objectives were presented. A video of the presentation can be found <u>here</u> . | |
| Crowdhelix | PRI | Investigation of the activities of the organization. Dissemination of information about the IoT-NGIN project and promotion of the IoT-NGIN open calls on the Crowdhelix website. | |

Table 10: Open-source foundations

Partners involved **Project** actions Association ATOS holds a board member position. Investigation of the activities of the organization. AALTO. GAIA-X IoT-NGIN solutions presented at the committee and ABB. Foundation aligned with GAIA-X activities. IoT-NGIN took part in a ATOS GAIA-X organized mapping and business exercise to elaborate the wider impact of the projects. Investigation of the activities of the organization and FIWARF ATOS, promotion of the use of FIWARE modules in IoT-NGIN Foundation RWTH project developments. Investigation of the activities of the organization. ONF (Open Planned contribution of the IoT-NGIN open-source PCF Network CMC component for managing network slices for IoT Foundation) applications. Investigation of the activities of the organization. Open We plan to promote and share the IoT-NGIN Source **I2CAT** knowledge with OSM mainly focusing on our results MANO regarding the resource management APIs and (OSM) protocols.

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| | | project open-source components to the Linux Foundation is being considered. |
|---|--|--|
| ECLIPSE Foundation An in-depth ECLIPSE worksh took place in February 202 consortium took part in the | | An in-depth ECLIPSE workshop on the activities of the foundation and potential contributions from IoT-NGIN took place in February 2022. The whole project consortium took part in the workshop. |
| | | The contribution of project open-source components to the ECLIPSE Foundation is being considered. |

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4.3 Standardisation

The purpose of the standardisation activities within the IoT-NGIN is to provide sustainability to the project. IoT-NGIN is targeting standardisation bodies through partner established relationships and established memberships.

Many standardisation bodies have recently started to consider the topic of IoT as IoT applications mature. They are starting new working groups and tailoring their work to meet the needs of the IoT communities. Many IoT-NGIN partners are active contributors and members of IoT-related standardisation as shown in Table 11 below. IoT-NGIN partners are actively seeking opportunities to contribute project results to standard organizations and to build the work on the project on existing and emerging standards wherever possible.

Table 11: Standardization bodies followed by partners

| Partner | Standardisation bodies |
|---------|--|
| AALTO | GAIA-X, IDSA, ITU Smart City |
| ABB | Platform Industry 4.0 & IEC/TC 65/WG 24 Asset Administration Shell, GAIA-X |
| BOSCH | 5G-ACIA (Alliance for connected industries and automation) |
| СМС | ONF |
| EDD | 3GPP |
| FVH | OGC Point of Interest SWG (W3C POI, ISO 19112, ISO 19155) |
| PRI | NIST, ENISA, IOS |

Based on initial project results, IoT-NGIN partners are investigating on contributing to the 5G-ACIA (Alliance for connected industries and automation), 3GPP, and ONF (Open Networking Foundation) organizations, as shown in Table 12 below.

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Table 12: Investigation of contributinos to standards

| Partner | Activity |
|---------|---|
| BOSCH | 5G-ACIA (Alliance for connected industries and automation): will contribute evaluating the 5G performance in a real industrial environment and validating several POC (Proof Of Concept) and prototypes |
| СМС | ONF: contribute the PCF for managing network slicing as Open Source |
| EDD | 3GPP: Investigations of the possibilities to contribute new features from 5G device management API are ongoing |

4.4 KPI achievement level

In Table 13 below, we show how IoT-NGIN has exceeded the majority of the KPIs relevant to our work with clusters, associations and standards and how it is well on the way to achieving or exceeding all of the KPIs for these activities by the end of the project.

Table 13: KPIs related to activities with clusters, associations and standards

| KPI | Target | Achievements |
|---|------------------------------|--|
| Contribution to em | erging or future standards c | and pre-normative activities |
| Number of BDVA Task Forces (TF) to be followed with Human-Centric Al related contributions | ≥4 | 5 (Data Sharing Spaces TF, Programme TF, Community TF, Technical TF and Applications TF) |
| Number of IoT related standards/WG to be followed | ≥4 | 12 (GAIA-X, IDSA, ITU Smart City, Platform Industry 4.0, IEC/TC 65/WG 24, ONF, 3GPP, OGC, NIST, ENISA, IOS, 5G ACIA) |
| Number of 5G/IoT and Human-Centre Associations | ≥5 | 5 (5G IA, Networld Europe, NGI, 5G-ACIA, AIOTI) |
| Number of monitored SDOs | ≥5 | 12 (GAIA-X, IDSA, ITU Smart City, Platform Industry 4.0, IEC/TC 65/WG 24, ONF, 3GPP, OGC, NIST, ENISA, IOS, 5G ACIA) |

| Number of Clusters and Associations to contribute | >6 | 12 standards and pre-normative clusters and associations targeted (see tables Table 6 - Table 8) | |
|--|---|--|--|
| Maintain an | active ecosystem of all rele | vant IoT stakeholders | |
| Number of registered DIHs to be contacted | ≥ 620 (450 DIH registered via DIATOMIC + 150 DIH via SmartAgriHubs + 20 DIH via AIOTIDIHN) | 266 (DIHNET.eu community and the Agrifood cooperation platform targeted in the first reporting period) | |
| Number of Alliances and Association | ≥8 | 25 clusters and associations and foundations targeted (see see tables Table 6 -Table 10) | |
| Number of clusters/vertical and European Innovation Partnership | ≥ 4 | 9 (6 open-source communities, AIOTI, BDVA, DIH) | |
| Mobilise key IoT players in security and privacy | | | |
| Contribution to cybersecurity clusters and platforms | ≥ 5 | 3 (1 presentation to EU-IoT on Interledger and Self-sovereign identities, 1 board membership in ECS and 1 co-chair position in ECS WG6 SRIA and cyber security) | |

Conclusion

In this document, we reported the public deliverable D8.6 "Dissemination & Standardisation Activities (1st Period)" of the IoT-NGIN project related to Work Package 8, which provides the Dissemination, Communication, contribution to clusters and associations & Standardisation activities of the first half of the project.

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The deliverable presents the timely and strategic IoT-NGIN Dissemination & Communication plan. It describes our achievements on the dissemination and communication front, including but not limited to the key parametric indicators achieved in the first reporting period of the project. Furthermore, the public engagement events the consortium took part in (such as conferences, invited talks and exhibitions) are presented. On the standardisation front, the deliverable presents a mapping of partners engagement in relevant standards organizations and our ongoing investigations of how the project can contribute to these organizations.

The project is now starting the second reporting period. In the coming months, as all the technical work packages start producing more extensive experimental results, we expect that project dissemination, standardisation and communication activities will accelerate. In the years to come, momentum is expected to be gained as project results are prepared for exploitation.

Further progress will be reported in Deliverable D8.7: Dissemination & Standardization Activities (2nd Period).

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D8.6 - Dissemination & Standardization Activities (1st Period)

Annex 1 IoT-NGIN project contributions to NetworldEurope SRIA

NetworldEurope is currently developing a new version of the Strategic Research and Innovation Agenda (SRIA) as input to the European Commission for consideration in the preparation of the HorizonEurope Calls for Proposals for the Mobile Communications Networks research topics expected to be published by the European Commission in late 2022 and during 2023. Two partners, I2CAT and EDD, participated in NetworldEurope's Visions for Future Communication Summit on November 25, 2021 and both made contributions in text and as slide sets to ideas for inclusion in the forthcoming SRIA edition. We intend to follow the development of the discussions on the SRIA to be held in the EuCNC'22 conference to be held in June 2022 in Grenoble, France.

I2CAT made a contribution as a presentation and slide set, based on their experiences in the IoT-NGIN and other projects, focused on building capabilities into 6G so that it can offer optimal support to vertical sectors and IoT applications serving them. See slides attached in the Annex.

EDD made a contribution remotely as a presentation and slide set, based on their work in WP2 of IoT-NGIN, focused on new exposure functionalities of mobile networks for industrial use cases, making it easier for sector actors to make use of 5G/6G. See slides and text attached in the Annex.

In the following annexes, we provide the slides presented by I2CAT (Annex 2), the text contribution of EDD (Annex 3) followed by the EDD presentation (Annex 4).

Annex 2 I2CAT contribution to Networld-Europe SRIA



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Convergence of 3 Worlds: Connecting Intelligence(s)

 6G will be about bringing the physical objects to the digital world through creating digital twins that allow real-time control and monitoring of everything.

• 6G will be about **bringing human beings to the digital world** through truly immersive experiences that create a parallel reality for humans; the so-called **metaverse**.

• 6G will be about **connecting all intelligent objects and people**, creating a network of intelligences and allowing technology to "disappear" from our lives and become part of them.



)i2cat

Source: https://5g-ppp.eu/wp-content/uploads/2021/06/WhitePaper-6G-Europe.pdf



i2cat

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6G: The Essential Vision





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Annex 3 EDD text contribution to Networld Europe

Contribution to NetWorld SRIA Visions for Future Communication Summit on "5G Network Functionality Exposure for industrial sectors"

Authors, date and version: Fiona Williams, Felix Maier, Ericsson, 22 October, 2021, Version: 1.0

- What is the topic?

5G has been designed with the needs of industrial users in focus. Much needs to be done to tailor 5G to the needs of specific industrial sector users and to influence concept development for future 6G systems. The ability to expose 5G network functionality needs to be tailored to fit industry needs now.

As is described in the recently updated 5G-ACIA white paper on 5G Network Functionality Exposure, (5G-ACIA white paper on network function exposure) industrial automation applications would benefit from access to 5G capabilities such as communication service monitoring and network management, to use them for factory and process automation, production IT and logistics and warehousing applications. Due to the generic nature which the exposed 5G capabilities defined for the industrial automation use cases could have, such requirements could be extended to support use cases in other industrial sectors. Examples of sectors which have related use cases include rail transportation, electrical power distribution, and central power generation.

What needs to be researched are the precise requirements of industrial sectors as well as methods for seamless integration with existing technologies for network capability exposure together with the relevant sector actors, developing an alignment of the strategic technology plans of the mobile sector to develop 5G network function exposure with the infrastructure evolution plans of in individual industrial sectors, maximizing the ability of the industrial sectors to exploit and benefit from the 5G innovation in developing network exposure. Collaborative projects are needed to develop and validate prototypes of such capabilities and to prepare the basis for member submissions to standards bodies, such as 3GPP, to achieve globally standardized interfaces to 5G network function exposure.

- Why is it important?

The Covid-19 pandemic highlighted the importance of digitalisation to political leaders globally. 5G has an important contribution to make to the digitalisation of many, if not all, industrial sectors, improving their flexibility, productivity and efficiency and ability to realise new digitally-based business models. This potential of 5G needs to be realized through R & I.

Many industrial sector users want to have control of 5G communications to their control devices, enabling them to directly integrate 5G into their management and control applications. Providing 5G network function exposure would address this need providing the benefits of 5G network security and the flexibility to adapt to the changing needs of their customers. To achieve such goals, collaboration between the 5G sector and a wide range of industrial, research and academic sector actors is needed at European level to define the requirements of industrial sectors and support consensus development as preparation for global standards.

- What do we expect to achieve with proper research?



Research and innovation on 5G network exposure will provide the basis for global standards contributions, raise awareness in industrial sectors of 5G in relation to their digitalisation and aid their moves towards data-driven, Al-enhanced management and control approaches. European organisations will be better able to increase their market share and creating a new basis for their growth.

Annex 4 EDD presentation to Networld-Europe SRIA



Dr. Fiona Williams, Ericsson Germany Dr. Gergely Seres, Ericsson Hungary

November 25, 2021

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I&T-NGIN

New network functionality exposure APIs for **simplicity** for industrial sector users!

Why do industrial sectors need tailored network exposure APIs?

What are network exposure APIs?

What research is needed?

How will results impact 5G & 6G?

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How will the results make 5G & 6G easier to use?

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Why do industrial sectors need tailored network exposure APIs?

To increase uptake

of 5G in industrial

sectors

Providing better security

and flexibility based on

Industrial users offered

new control options for

5G

5G...

e APIs?

To create new opportunities for application developers

Integrating 5G into industrial applications becomes easy

Developing new markets for 5G applications in industrial sectors

To make industrial sector requirements

Bringing industrial sector requirements into alobal

more visible

requirements into global 5G standards

Requirements will be available as a basis for 6G development

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To accelerate digitization in industrial sectors

Improving flexibility, productivity, efficiency

Enabling new digitallybased business models

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What are network exposure APIs?



What research is needed?



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- Investigation of the API requirements of industrial sectors
- Research on automation of current manual tasks around building and reconfiguring industrial systems
- Integration of 5G wireless access into existing IT/Operational Technology systems
- Prototyping of new API functionality
- Organisation of field trials to validate the new functionality with industrial sector actors
- Preparation of standards input on the new API functionality and the requirements

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How will results impact on 5G and 6G?

New functionality can beadded to current 5G networks!



Precise requirements will be available fordiscussion for 6G networks!

How will the results make 5G & 6G easier to use for industrial sector users?

Industrial sector users will be able to **quickly start using 5G** without spending time learning about the detail of 5G networks!

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The effort required to integrate 5G networks with industrial IT systems, IoT platforms, automation tools and IoT devices will **significantly decrease!**

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