NANCY

An Artificial Intelligent Aided Unified Network for Secure Beyond 5G Long Term Evolution [GA: 101096456]

Deliverable 1.6

Initial Impact Creation Report

Programme: HORIZON-JU-SNS-2022-STREAM-A-01-06

Start Date: 01 January 2023

Duration: 36 Months

Document Control Page

Deliverable Name	Initial Impact Creation Report
Deliverable Number	D1.6
Work Package	WP1
Associated Task	T1.5 Dissemination & Exploitation Activities
Dissemination Level	Public
Due Date	31 December 2023 (M12)
Completion Date	29 December 2023
Submission Date	30 December 2023
Deliverable Lead Partner	TEI
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Version	1.0

Document History

Version	Date	Change History	Author(s)	Organisation
0.1	10 October 2023	Structure definition	Giuseppe Celozzi, Cosimo Zotti, Georgia Simadi	TEI, TEI,DRAXIS
0.2	04 November 2023	First version of the Table of Contents prepared	Giuseppe Celozzi, Cosimo Zotti, Georgia Simadi	TEI, TEI,DRAXIS
0.3	11 November 2023	Section 2 prepared	Giuseppe Celozzi, Cosimo Zotti, Marco Tambasco	TEI
0.4	04 December 2023	Section 3 prepared	Georgia Simadi, Christina Dolianidi,Konstantinos Kyranou, Maria Tzana, Zisis Batzos	DRAXIS, DRAXIS, SID, SID, SID
0.5	07 December 2023	Section 4 prepared	Maria Belesioti, Ioannis Chochliouros	OTE
0.6	11 December 2023	Overall contribution reviewed	Giuseppe Celozzi, Cosimo Zotti, Marco Tambasco	TEI

0.7	15 December 2023	Reviewed Initial Version	Olga Segou	INTRA
0.8	18 December 2023	Reviewed Initial Version	Hatim Chergui	I2CAT
0.9	21 December 2023	Review comments addressed and document sent to quality manager	Cosimo Zotti, Marco Tambasco	TEI
0.95	27 December 2023	Input in Section 4	Ioannis Makris, Alexandra Geni Giola, Nikolaos Ntampakis	MINDS
0.95	27 December 2023	Input in Section 4	Konstantinos Kyranou, Maria Tzana, Zisis Batzos	SID
1.0	27 December 2023	Final Revisions	Panagiotis Sarigiannidis, Xrysanthi Iakovidou, Evanhtia Ntina, Thomas Lagkas, Dimitrios Pliatsios	UOWM

Internal Review History

Name	Organisation	Date
Olga Segou	INTRA	15 December 2023
Hatim Chergui	I2CAT	18 December 2023

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List of Acronyms

Acronym	Explanation
AI	Artificial Intelligence
B5G	Beyond 5G
CAPEX	Capital Expenses
CI/CD	Continuous Integration / Continuous Deployment
DRL	Deep Reinforcement Learning
DX.Y	Deliverable X.Y
EU	European Union
FAIR	Findable, Accessible, Interoperable, Reusable
ICT	Information and Communication Technology
KER	Key Exploitable Result
KPI	Key Performance Indicator
ML	Machine Learning
OA	Open Access
OPEX	Operating Expenses
OTT	Over The Top
PQC	Post Quantum Cryptography
QKD	Quantum Key Distribution
R&D	Research and Development
RAN	Radio Access Network
SME	Small and Medium Enterprises
TX.Y	Task X.Y
WP	Work Package

Executive summary

This document outlines the strategy and methodology employed for generating impact, detailing the initial initiatives related to dissemination, publicity, and exploitation activities carried out by all partners in the first year of NANCY. The final status related to impact creation activities will be available in D1.9 "Final Impact Creation Report" at the end of the project.

Specifically, this deliverable contains the initial outcomes of publicity and dissemination efforts, in addition to the comprehensive strategy employed to promote the project's results and engage relevant stakeholders. The primary objective of NANCY's dissemination and communication activities is to foster widespread awareness of the project and its outcomes, ensuring that acquired knowledge and information are accessible to different audiences at national, European, and global levels. During the project's inaugural year, partners committed to leveraging their academic and industrial network and extensive experience in EU-funded projects to actively contribute to communication and dissemination activities. The activities conducted in the first year demonstrate that the project, as a whole, possesses the critical mass required to generate a substantial impact.

Regarding exploitation aspects, the individual exploitation plan of all partners is available in Table 5 where exploitation goals, applicable fields, and the activities planned to reach them are specified. In addition, the results reached by each partner in the first year of the project are reported in Table 6.

The document is organized into distinct sections covering the strategy and methodology for impact creation, dissemination activities, and exploitation activities.

1. Introduction

1.1.   Purpose of the document

The deliverable aims to address NANCY impact creation aspects in terms of the strategy, the methodology, the tools, and the result evaluation indicators used to promote the project's results.

Communication, dissemination, and exploitation activities represent the way the impact creation will be pursued. This document reports the status of the activities performed in the first year of the project compared to the expected KPIs, while the final evaluation results will be provided in D1.9 "Final Impact Creation Report" foreseen at the end of the project.

Inputs to the deliverable are the Grant Agreement (and its amendments), the deliverable D1.2 related to the defined communication channels to be used to spread the project outcomes, and the deliverable D1.3 regarding the initial communication, dissemination, and exploitation plan and strategy.

To impact creation, contribute also:

- the Standardization and Clustering aspects: the project expectation, KPIs, and achieved results related to them will be specifically addressed in the deliverables D1.7 "Initial Standardisation Activities Report" and D1.10 "Final Standardisation Activities Report".
- the Business and Marketing aspects that are covered in the D1.8 "Market Analysis, Roadmap and Business Modelling Report" and D1.11 "Techno-economic Analysis and Commercialization Plans".

1.2.   Structure of the document

The deliverable is structured in the following sections:

- **Section 1 – Introduction**: The purpose and the structure of the deliverable are presented.
- **Section 2 – Impact creation strategy and methodology**: This section provides information related to the applied strategy and methodology and to the target group to be addressed.
- **Section 3 – Communication and Dissemination Activities Monitoring**: This section presents the activities for communication and dissemination.
- **Section 4 – Exploitation Activities Monitoring:** This section provides an overview of the exploitation activities.
- **Section 5 - Conclusion:** This section concludes the deliverable.

2. Impact creation strategy and methodology

2.1. Vision and objectives

NANCY aims to provide innovative solutions able to address the needs and expectations of the future network beyond 5G, in line with the new Horizon Europe Programme and EU expectations, contributing to the generation of competitive advantages for the European Information and Communications Technology (ICT) market. Due to the convergence of the telecommunications and IT market and the increasing impact of the over the top (OTT) players, with the emergence of new vertical business segments and services for consumers and enterprise customers, it is crucial to appoint a large effort to ensure project visibility toward several different multiple target audiences at national, European and global levels.

The first step towards this direction is the identification of target groups and key stakeholders specified in D1.3 "Plans for Publicity, Dissemination and Exploitation":

- Telecom operators, vertical industries, telecom and infrastructure providers, vendors, software development SMEs, and industrial associations.
- Scientific community of software engineering in the fields of Beyond 5G (B5G), Artificial Intelligence (AI), Machine Learning (ML), Blockchain, Open Radio Access Network (RAN), and related EU-funded projects.
- EU Institutions (EU Commission, EU Science foundation), 5GPPP, 6G-IA, Standardisation bodies, Regional and national regulators, and policymakers including telecoms and digital governance departments.

2.2. Impact awareness-raising strategy

The NANCY awareness-raising strategy is structured in three main phases.

The first phase is the "Preliminary Project Promotion" phase. The objective of this phase is to agree upon the strategy and the activities that will be conducted regarding dissemination and communication.

The second phase is the "Project Commercialization" phase, which we are currently in, that aims to create a more targeted awareness regarding NANCY technologies with key players and potential users and also inform the target market about the technological benefits of NANCY.

Last but not least, the third phase, namely the "Business Strategy" phase will focus on maximizing the awareness of the target market and the industry regarding the NANCY system and ensuring the project's sustainability and exploitation.

Figure 1 provides a visual representation of the three awareness strategy phases.
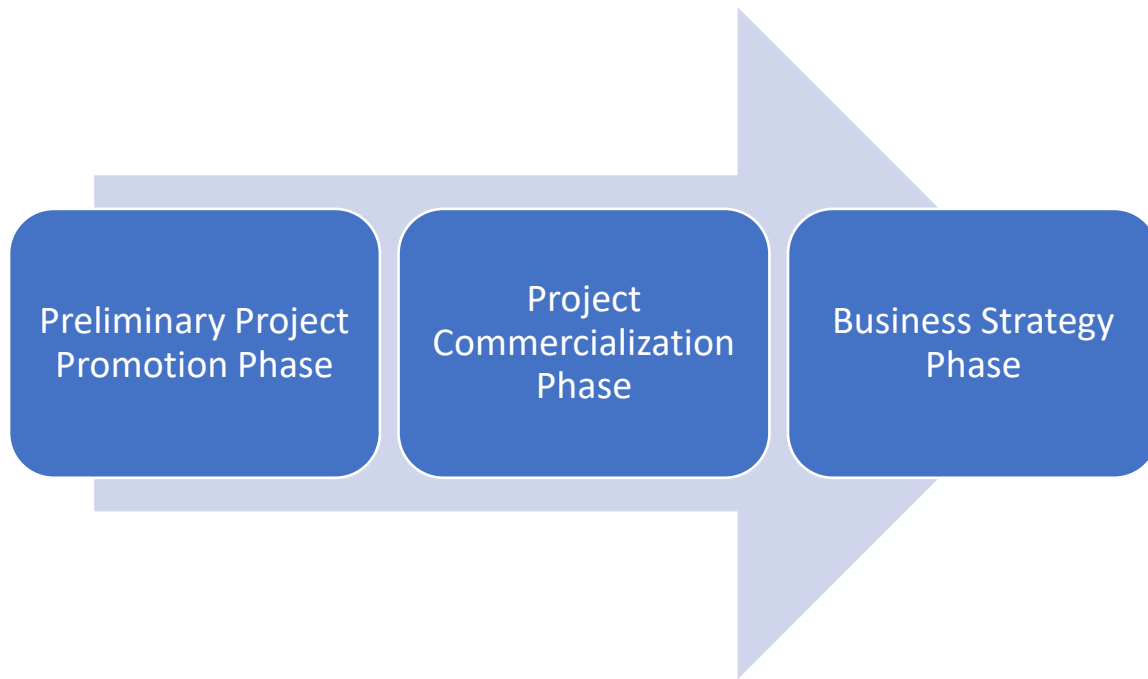
Figure 1 - Awareness-raising strategy phases

2.3. Fostering a Culture of Innovation

In the project lifecycle, we will explore the crucial role that our initiatives play in driving research and innovation within our project and will delve into the ways in which our commitment to innovation has led to meaningful contributions to our industry and beyond.

Innovation is at the core of the NANCY project. The consortium believes that a culture of innovation not only leads to our continued growth but also benefits the wider research and business community. The strategies we have employed to foster innovation are described in the next paragraphs.

2.4. Impact directions

Impact creation involves not only conducting high-quality research but also strategically planning and communicating how that research can make a positive difference in the world. It is about demonstrating the relevance, significance, and applicability of the project's outcomes to bring about meaningful change or advancement and generate meaningful and positive effects on our intended audience, community, and the broader society.

To this end, we are considering economic/technological, scientific, and social impact directions to be addressed in the project's outcome validation:

2.4.1. Economic/Technological impact

The following aspects will be considered:

- Optimization of resource allocation and cost savings to infrastructure providers (e.g., cloud providers, telcos) operations.
- Increase the adoption of AI solutions and complex AI systems by the European industry and enterprises leading to cost savings and increased enterprise competitiveness.
- Full leverage of the benefits (i.e., energy efficiency, low latency, privacy, and data protection) of edge computing by industrial adopters and users of 5G and AI technologies.
- Help address interoperability challenges among computing and data platform enterprises

- Creation and update of open standards, interoperability models, and open platforms.
- The deployment of smart objects in complex industrial settings and use cases in NANCY will unlock the technological potential of autonomous systems in high-value applications leading to tangible economic savings.
- NANCY will provide a pool of technologies for robust, safe, resilient, and accurate 5G networks that will open new horizons in the development of B5G systems.
- Network and learning latency minimization ("almost-zero" latency);
- Energy efficiency (energy consumption reduction by 20x compared to 5G);
- Ultra-high reliability for a massive number of nodes with a probability of availability in the order of 99.9999%;
- Ultra-high scalability and flexibility (resource availability ~99.999%);
- Dynamic reusability (estimated reusability rate>90%); Operation cost reduction (>30%);
- Bandwidth saving and traffic reduction complexity and overhead reduction;
- E2E coverage (100m outdoor);
- B-RAN model accuracy that approaches 100%.

2.4.2. Scientific impact

The following aspects will be considered:

- Boost the EU scientific and research capacity in various cutting-edge areas.
- Produce high-impact publications (as FAIR assets), along with prototypes and datasets that will be openly accessible.
- The NANCY scientific resources (e.g., FAIR Datasets, open access (OA) publications) will be actively disseminated to relevant communities (i.e., DAIRO, AI4EU, EOSC).
- NANCY will provide research solutions made-in-Europe for compliance to European mandates stemming from the European mandates stemming from the European data strategy and the emerging AI regulation.

2.4.3. Social impact

The following aspects will be considered:

- NANCY will contribute to solutions that protect privacy-sensitive data (e.g., in areas like healthcare).
- NANCY will promote a more sustainable paradigm that optimizes CO_2 emissions for the cloud- and AI-based 5G application contributing to a carbon-zero society.
- NANCY will help solutions developers and industrial enterprises to contribute to the ambitious sustainability targets of the European Green Deal through a multi-faceted approach to Greener AI.
- The project's use cases will provide specific and practical demonstrators of NANCY's potential socio-economic impact.
- The project's socially aware approach to AI will foster AI adoption in B5G networks while facilitating migration from manual to fully automated scenarios.

3. Communication and Dissemination Activities Monitoring

3.1. Communication and Dissemination Activities

3.1.1. Activities

To ensure the comprehensive success of the NANCY Project and effectively engage with its diverse target groups, which are presented in Section 3.1.2.3, a series of strategic activities must be undertaken.

3.1.1.1. Website

The NANCY project's website (https://nancy-project.eu/) serves as an important source of information, offering comprehensive insights into the project's objectives, vision, deliverables, and more. Launched in the first month of the project, the website provides a user-friendly platform for staying informed about the NANCY initiative. Specific analytics will be collected to monitor the web site access by stakeholders and potential end users. The project is exploring alternative ways to obtain the most relevant once. Monitoring will be performed during the second and third years of the project life to collect feedback for improving communication/publicity/dissemination activities in order to maximize the expected impact. The results will be presented in the deliverable D1.9 - "Final Impact Creation Report".

3.1.1.2. Corporate Design/Branding

The visual identity of the project is carefully crafted to create a consistent presence across social media platforms, aiming at brand recognition. A distinct color palette has been chosen and used in all places. The NANCY logo is used in all content created and social media templates have been created to maintain a consistent brand, as shown in the following figures. The graphic design elements chosen for the social media templates, convey the message of a professional, high-tech project and aim to capture the attention of the users. The ultimate goal of the branding activities is to make the NANCY graphics and design recognizable and attractive to the target groups.

Figure 2 - Indicative Social Media template

Figure 3 - Publication post template

3.1.1.3. Social Media Platforms

The project leverages three well-known Social Media Platforms, LinkedIn, X (Twitter), and Facebook. NANCY has established key performance indicators for its social media presence, aiming for over 10 posts throughout the project's three-year duration, accumulating more than 100 contacts, attaining 50 likes per post, and receiving 2 or more comments per post. NANCY has achieved these numbers, within the first year of the project, accumulating a total of 149 contacts, 7 engaging posts, and actively resharing noteworthy content from the SNS JU accounts and sister projects' accounts.

An indicative post is presented below, which gathered more than 50 likes and 2 comments. The post, as shown in Figure 4, has also been reposted 7 times and has reached 1190 organic impressions on LinkedIn.

Figure 4 - Post on LinkedIn

LinkedIn serves as a key platform for professionals in the fields of B5G, AI, Blockchain, and Open-RAN. NANCY's LinkedIn presence, with 81 followers and 3275 impressions from organic traffic, as of November 30th, demonstrates promising engagement within the professional community.

On X (Twitter), NANCY strategically navigates the diverse landscape catering to both industry professionals and the broader public interested in the project's domain. Having reached 50 followers, the project strives for a dynamic online presence, ensuring that its updates and insights resonate across a wide spectrum of audiences.

Facebook, recognized as a platform with broader outreach, becomes the focal point for engaging with the general public. NANCY's goal through Facebook is to adopt an approach that transcends technicalities, making complex concepts accessible and intriguing to a wider audience. This aligns with the project's commitment to fostering awareness and interest among the broader public, making 5G, AI, and Blockchain more relatable and comprehensible.

A content calendar has been created to proactively prepare the content of the posts, preventing delays, and ensuring consistency. The posts on social media are bi-weekly with regular project updates.

The content strategy encompasses a spectrum, including introductory posts at the beginning of the project, followed by event highlights such as EuCNC & 6G Summit participation, images from attended events, updates on plenary meetings, and informative posts on industry trends. A curated reposting strategy amplifies important content, particularly from the Smart Networks and Services Joint Undertaking accounts, maximizing information dissemination and community engagement.

Table 1 provides an overview of the online community and the increase in each Social Media platform from M6 to M11.

Table 1 - Social media increase

Platform	Online community by M6	Online community by M11	Increase
LinkedIn	44 followers	81 followers	+59.2%
Twitter (X)	18 followers	50 followers	+94.1%
Facebook	10 followers	18 followers	+ 57.1%

The NANCY Project maintains a professional yet accessible language, as the audience may include stakeholders with diverse backgrounds. The goal is to communicate a message that is clear, simple, and focused on interesting updates of the project. Due to the nature of the project, many updates include technical details that could be very interesting to experts and researchers. However, it is crucial to be inclusive and involve the general public, some of whom might not be familiar with technical terminology but are keenly interested in the project's results. A balance is kept, with content that avoids unnecessary jargon and acronyms and provides useful context in as many cases as possible. The key messages conveyed are frequently adapted and reviewed according to the audience, the needs, and the progress of the project.

In Figure 5, the four main target groups are presented. The next section explores the approaches employed to engage with our audience through various Social Media Channels.

Telecom operators, infrastructure providers, vendors, telecom providers and vertical industries

Scientific community

Policy makers and regulatory bodies

The general public

Figure 5 - NANCY Target Groups

The first group includes telecom operators, infrastructure providers, vendors, telecom providers, and vertical industries. The project strategically engages with this audience on LinkedIn and Twitter, using technical language to highlight NANCY's value proposition and provide insightful updates. NANCY's communication strategy aims to identify and address the unique needs of each group, such as scalable and secure solutions for operators and innovation opportunities for equipment vendors. The ultimate goal is to engage this group and integrate their valuable feedback at key points of the project.

The second group is the scientific community. LinkedIn is utilized in order to reach the scientific community, engage, share insights, and developments, and encourage discussions. NANCY employs a language characterized by precision, technical depth, and a focus on cutting-edge advancements and is committed to targeting high-quality publications in esteemed conferences and journals, fostering collaboration between industry and academia. In order to effectively reach this community, partners are leveraging their contacts and cooperations with other research projects and participating in strategic conferences.

The third group, consisting of policy makers and regulatory bodies, plays a pivotal role in shaping strategic decisions for the evolution of beyond 5G technology. NANCY recognizes the significance of an open dialogue to showcase key aspects of its concept and gather valuable feedback for continued exploration. The engagement with policy makers and regulatory bodies extends through LinkedIn, fostering a platform for informed discussions and insights, with the ultimate goal of establishing connections with relevant actors, ensuring that our project aligns seamlessly with regulatory considerations and contributes to informed policy decisions. In engaging with policy makers and regulatory bodies, NANCY adopts a language that emphasizes the project's strategic relevance and impact on the evolution of beyond 5G technology. The language employed is structured, policy-oriented, and focused on facilitating a constructive exchange of ideas to influence strategic choices in the evolving technology landscape.

The fourth group is the general public. Engaging with the general public can be very beneficial for NANCY. By reaching out to the broader audience, we are raising awareness about the project's goals, impact, and contributions to the advancement of 5G technologies. This connection with the general public ensures transparency and inclusivity, fostering a better understanding of the project's significance in shaping the future of wireless networks. It also allows us to gather public perspectives, insights, and support, creating a more informed and engaged community around the innovative work being conducted within NANCY. In communicating with the general public, NANCY adopts an accessible and engaging language that conveys the essence and impact of the project in a user-friendly manner. The primary platforms leveraged for outreach include Facebook and Twitter, recognizing the widespread accessibility of these social media channels. The language used is clear, free from technical jargon, and aims to spark interest and curiosity about the project's goals and contributions.

3.1.1.4.   Printed dissemination material

Printed material including leaflets, flyers, and roll-up banners have been created and used in the consortium's dissemination activities, as shown in the following figures.

Figure 6 - Project's roll-up banner, flyer and leaflet

Additional material such as the deliverable template, presentation template, newsletter template, and white paper has also been created since the start of the project, as shown below.

Figure 7 - Project's templates

3.1.1.5.   Publications

To effectively share the impactful outcomes of the NANCY project with the research community, a strategic emphasis is placed on publishing high-quality and influential research papers. The total number of workshop and conference papers to be published is 30 and the total number of journal papers to be published is 50. The project's primary focus lies not merely in quantity but rather in the quality and subsequent impact of these publications, measured by factors like citations. Through these publications, the project aims to disseminate its results widely among researchers, utilizing open-access platforms to ensure broader accessibility. Recognizing the ambitious target KPIs, the consortium partners emphasize planning and have proactively scheduled publications for Year 2 and Year 3. Since the project's initiation, 14 publications have been submitted, as detailed in Table 4. The numbers for the initial year reflect the unfolding nature of the project, as many work packages commenced later in the year. Anticipations are high for a notably productive Year 2.

3.1.1.6. Participation in related conferences and events

Since the beginning of the project, partners have participated in various conferences and events such as the EuCNC & 6G Summit in Gothenburg, with an attendance of more than 1300 participants, while also having a dedicated booth at the EuCNC Exhibition (Figure 8). NANCY also participated in the BalkanCom 2023, organizing a special session at the conference. Furthermore, NANCY was present at the DSD'23 with a special session titled: "HSTIEC: Hardware, Software, and Tools for the IoT-to-Edge-to-Cloud Continuum". Moreover, partners have organized dedicated sessions at Infocom World 2023, one of the biggest ICT industrial events in Athens, on the 14th of December 2023, presenting the project's objectives, architecture, use cases, market opportunities, and the Smart Pricing Policies scheme. The following figures showcase photos of the NANCY partners in exhibitions and conferences.

Figure 8 - NANCY at the EuCNC Exhibition

Figure 9 - NANCY at IEEE Future Networks World Forum 2023

3.1.1.7. Workshops

Workshops serve as a great way to disseminate the project results, while also exchanging experiences and valuable ideas. The feedback gathered from the workshops can be of great value for the

requirements of the project's testbeds. NANCY partners have organized various workshops such as the RAGE Real-time And intelliGent Edge computing workshop at CPS-IoT-Week 2023, organized by SSS. Moreover, I2CAT also organized a workshop on scalable and trustworthy AI for 6G Wireless Networks (6GSTRAIN) at the IEEE ICC'2023, targeting the Science Community and Researchers. Partners have also organized Advanced Trainings, such as the "ZSM and policy-based dynamic security orchestration in O-RAN architectures for 6G and beyond" training (PhD), organized by UMU as well as the Seminar Series on "5G/6G Load Balancing algorithms", given to students of the Master Degree in Control Engineering at Sapienza University of Rome, in the context of the course of Control of Communication and Energy Networks, by CRAT.

3.2.   Key Performance Indicators

The Key Performance Indicators (KPIs) concerning the dissemination and communication activities are respectively summarized in Table 2 and Table 3.

Table 2 - Dissemination KPIs

Activity	Indicators	M1-M12
Workshops co-located with major conferences	# of workshops organized (3+/at least one per-year) # of participants in each workshop (~50)	# of workshops: 2 # of participants: No1: 35, No2: 40
On-site demonstrations	10 demonstrations	N/A. Too early in the project for demonstrations. The first one is planned in February 2024 (Y2).
Scientific papers, targeting workshops, conferences and journals, such as EuCNC, IEEE Global Communications Conference, IEEE International Conference on Communications, IEEE Conference on Computer Communications, IEEE Transactions on Network and Service Management, IEEE Transactions on Industrial Informatics, IEEE Communication Magazine, International Journal of Computer and Telecommunications Networking, 5G Annual Journal	# of workshop papers published (>2 per-year) # of workshop and conference papers published (30+) # of journal papers published (50)	# of Workshop Papers: 1 # of Workshop and Conference Papers: 7 # of Journal Papers: 7
Social network posts, to take advantage of modern communication channels for a wider dissemination	# of NANCY posts (≥10) # of contacts (≥100) # of likes (≥ 50 likes / share) # of comments (≥2 com. / share)	Nancy Posts: 7 # of contacts: 149 # of likes/ share: 57 # of comments/ share: 2
Participation in trade fairs/exhibitions showcasing project's solutions	# of trade fairs/exhibitions (≥2) # of project brochure copies delivered (≥10)	N/A
Project website, providing scientific papers, public project deliverables and software tools	Top 5 Search Engine Page Ranking (SEPR)	The project appears first in many searches such as: "Nancy project", "Nancy SNS JU", "Nancy EU",

| | | "Nancy Horizon", "Nancy B5G" (Nov 30th 2023) |

Table 3 - Communication KPIs

Activity	Indicators	M1-M12
Online publishing (e.g., online magazines, newspapers, blogs)	≥ 5 publications / year ≥ 500 views	N/A
Inclusion of light content for nonspecialized audience in the project website, blog, social media, as well as publishing "lighter" versions of project newsletters, leaflets, flyers, etc.	# of non-specialized material ≥ 5	# of non-specialized material & posts: 3
Participation in media (TV, newspapers, radio) events in order to communicate NANCY results of the project and explain its benefits to EU citizens, industry, etc.	# of media appearances ≥ 5	1 (Appearance in Telecompaper, a research and publishing company, delivering news for telecom professionals: "EU selects 35 projects in EUR 250 mln 6G research call").
NANCY news will appear in blogs and websites targeting non-specialized audience, especially the youngest one, focusing on technology news and trends.	# of reads ≥100	Expected in Year 2
Exhibitions/workshops with free access	# of exhibitions/ workshops ≥ 1 # of non-specialized attendees ≥ 50	N/A
Online and/or F2F training sessions	# of online session(s) ≥ 1 # of non-specialized attendees ≥ 50	2 F2F training sessions (UMU & CRAT) # of non-specialized attendees: N/A
F2F interactions with local people	# of local events ≥ 1 # of appearances in local media ≥ 3	N/A
Free trials for the general public	# of testers ≥ 5	N/A
Marketing events, e.g., trade fairs/exhibitions	# of marketing events ≥ 1 in YR2, ≥ 2 in YR3	1 expected in YR2, 2 expected in YR3

3.3. Communication and Dissemination monitoring – Year 1

Each NANCY partner has outlined a dedicated dissemination plan. This section will conduct a comprehensive monitoring of each partner's activities in accordance with their respective plans for the first year of the project (Table 4).

Table 4 - Partners' dissemination activities

Partner	M1-M12
UOWM	Scientific Publications: 1. "Localization as a key enabler of 6G wireless systems: A comprehensive survey and an outlook" - IEEE Open Journal of the Communications Society. Can be accessed here. 2. "Energy Efficient OFDM with Intelligent PAPR-aware Adaptive Modulation" - IEEE Communications Letters. Can be accessed here. 3. "Elevating 5G Network Security: A Profound Examination of Federated Learning Aggregation Strategies for Attack Detection" - IEEE Future Networks World Forum. 4. 6 journal papers were submitted to IEEE Transactions on Wireless Communications, IEEE Open Journal of the Communications Society, IEEE Transactions on Vehicular Technology, IEEE Wireless Communications Letters, and IEEE Communications Letters, IEEE Journal on Selected Areas in Communications 5. 2 Conference papers were submitted to IEEE Wireless Communications and Networking Conference (WCNC). Dissemination activities: 1. Participation in Conference/Exhibition: Booth at EuCNC Exhibition
NEC	Social Media post on LinkedIn: "NEC joining the NANCY project". Can be accessed here.
Bi2S	Bi2S's is heavily involved in research and development activities related to AI and machine learning components of the project. There are a number of publications planned for the future, but such activities will take place after Bi2S has completed a part of the development, run some experiments, and obtained some results.
CERTH	Currently, CERTH is working on drafting two papers based on the extensive research gathered over the preceding months, scheduled for submission in the upcoming months.
CRAT	Advanced Training – Seminar: 1. "5G/6G Load Balancing algorithms". Seminar given to the students of the master's degree in Control Engineering at Sapienza University of Rome, in the context of the course of Control of Communication and Energy Networks 2. "Anomaly Detection in Heterogeneous Terrestrial Networks". Seminar given to the students of the Master Degree in Control Engineering at Sapienza University of Rome, in the context of the course of Control of Communication and Energy Networks.
DRAXIS	Social Media Post on LinkedIn. Can be accessed here.
i2CAT	Workshop - IEEE ICC'2023 Workshop on Scalable and Trustworthy AI for 6G Wireless Networks (6GSTRAIN) Link: here

	Audience: Science Community/Higher education, Research
INNO	Scientific Publication: 1. "Semantic communications for image-based sign language Transmission." Can be accessed here. 2. "Localization as a Key Enabler of 6G Wireless Systems: A Comprehensive Survey and an Outlook" - IEEE Open Journal of the Communications Society. Can be accessed here. Dissemination activities: 1. Social media posts through the company's LinkedIn account about Scientific Publications. Can be accessed here.
ITL	Social Media post on LinkedIn: Announcement of involvement in new "Horizon Europe" research projects. Can be accessed here.
IJS	Scientific Publications: 1. "Feature Management for Machine Learning Operation Pipelines in AI Native Networks" – Conference. Can be accessed here. 2. "XAI for Self-supervised Clustering of Wireless Spectrum Activity" – Conference. Can be accessed here. 3. "Graph Neural Networks Based Anomalous RSSI Detection" – Conference. Can be accessed here. 4. "Machine Learning Operations Model Store: Optimizing Model Selection for AI as a Service" – Conference. Can be accessed here. 5. "Self-supervised learning for clustering of wireless spectrum activity" - Article in Journal - Computer Communications. Can be accessed here. 6. "Deep Feature Learning for Wireless Spectrum Data" - IEEE MeditCom 2023: IEEE International Mediterranean Conference on Communications and Networking 2023. Can be accessed here. Dissemination activity: Special Session at a conference – BalkanCom 2023
SSS	Publications: 1. Publication in Conference Proceedings: "Enhancing the Availability of Web Services in the IoT-to-Edge-to-Cloud Compute Continuum: A WordPress Case Study" - 26th Euromicro Conference on Digital System Design (DSD). Not available online yet. 2. Publication in Conference proceedings: "Bounding the Data-Delivery Latency of DDS Messages in Real-Time Applications". Can be accessed here. Dissemination activities: 1. Post on Social Media: Presentation of the NANCY project and participation in kick-off meeting. Can be accessed here. 2. Social Media Posts on LinkedIn & Twitter (X) regarding the 2nd Plenary meeting in Pisa. Can be accessed here. 3. Webpage about NANCY on the official SSS website. Can be accessed here. 4. Organization of Workshop: Organization of the RAGE Real-time And intelliGent Edge computing workshop at CPS-IoT-Week 2023. 5. Organization of the Special Session "HSTIEC: Hardware, Software, and Tools for the IoT-to-Edge-to-Cloud Continuum" at DSD'23

UMU	Scientific Publication: 1. Article in Journal: "Fast Traffic Processing in Multi-Tenant 5G Environments: A Comparative Performance Evaluation of P4 and eBPF Technologies" 2. Chapter in book: Resource Management for Cloud Computing, Springer. Chapter: "eBPF and XDP Technologies as Enablers for Ultra-Fast and Programmable Next-Gen Network Infrastructures". 3. Chapter in book: TinyML for Edge Intelligence in IoT and LPWAN Networks, Elsevier Chapter: "Embedded Intelligence in Internet of Things Scenarios" 4. Article in Journal: "Machine Learning-powered Fast Traffic Processing within the Linux Kernel" 5. Advanced Training: ZSM and policy-based dynamic security orchestration in O-RAN architectures for 6G and beyond (PhD) Exploitation: Integration of NANCY advances in academic courses/lectures 6. Press release: La red privada 5G de la UMU se usa como demostrador de experimentos con sistemas de transporte inteligentes y dinámicos (The UMU's private 5G network is used as a demonstrator of dynamic wireless networks).
VOS	Dissemination activities: Webpage dedicated to the NANCY Project. Can be accessed here. Social Media Post on Twitter. Can be accessed here.
INTRA	The tasks assigned to INTRA had not commenced until M9. During the reporting period, INTRA frequently interacted with the project's social media to enhance its reachability.
MINDS	Scientific Publication: "Elevating 5G Network Security: A Profound Examination of Federated Learning Aggregation Strategies for Attack Detection" - IEEE Future Networks World Forum Participation in Conference: Booth of NANCY to 2023 EuCNC & 6G Summit in Gothenburg.
TECNALIA	TECNALIA's technical tasks started in M9-M11. Dissemination activities as well as scientific publications have been planned for the second year of the project.
UBITECH	UBITECH's public website: Dedicated project webpage about the NANCY Project. Can be accessed here. Social Media post on LinkedIn about NANCY. Can be accessed here.
8BELLS	Project announcement at 8BELL's website. Can be accessed here. Conference presentation: Presentation of NANCY Smart Pricing Policies at Infocom World 2023.
OTE	Participation to EuCNC 2023/ Booth organization - OTE made all the necessary arrangements for NANCY project to be present @EuCNC 2023 Participants : >1300 OTE public site: Dedicated project webpage in the OTE corporate website. High visibility due to the visibility of the site.

	Workshop organization/ Organization Of NANCY dedicated session/ Liaison with other projects: Infocom World 2023, taking place on the 14th of December 2023.
TEI	Project presentation: Ericsson Italy Innovation Day 2023 - NANCY innovations and solutions were presented to internal stakeholders, customers (telco operators, ISPs, CSPs companies), and universities TEI cooperates with.
SID	Scientific Publication: • "Elevating 5G Network Security: A Profound Examination of Federated Learning Aggregation Strategies for Attack Detection" - IEEE Future Networks World Forum Participation in Conference: Booth of NANCY to 2023 EuCNC & 6G Summit in Gothenburg Post on LinkedIn about the plenary meeting. Can be accessed here.

4. Exploitation Activities Monitoring

The expected impact of NANCY, as introduced in Section 2, constitutes the basis of the development plan for the entire NANCY ecosystem:

- **Economic Impact:** NANCY's impact on the European economy will be reflected in its ability to deliver new and innovative concepts, products, and services that require B5G capabilities and will be built on a B-RAN architecture.
- **Social Impact:** NANCY architecture supports hyper-dense ambient networks with dynamically changing topologies and high complexity due to large-scale networks and large data volumes. The solution proposed by NANCY will maximize the network's energy efficiency and will support ultra-high availability, reducing both capital expense (CAPEX) and operating expense (OPEX) and paving the way for new and innovative B5G services.
- **Impact on sustainability:** The AI-enabled B5G approaches promoted by NANCY contribute to sensitive data protection while boosting the transition to a carbon-zero society contributing to the ambitious sustainability targets of the European Green Deal.
- **Impact on the telecommunications industry:** NANCY aims to support multi-tenant connectivity and to develop low-latency consensus mechanisms by designing B-RAN-enabled advance cooperative and multi-hop relaying access schemes.

Partners' exploitation is one the most important ways to contribute to NANCY impact creation.

Key Exploitable Results (KERs), reported in deliverable D1.3 - "Plans for Publicity, Dissemination and Exploitation", are ongoing to be developed and according to the defined project schedule will be detailed in a sustainable business plan focusing on target markets, joint exploitation, and key sub-value chains. The results will be available in deliverable D1.8 - "Market Analysis, Roadmap and Business Modelling Report".

4.1.1. Individual Partners' exploitation plans

The individual exploitation plan of each partner is provided in Table 5 as specify the goals, topic/domains where they apply, and approaches and activities to be implemented to reach them.

Table 5 - Partners' Individual Exploitation Plans

Partner	Individual Exploitation Plan
UoWM	<u>Goals:</u> UOWM will utilize the project innovations with respect to Artificial Intelligence-based orchestration, Multi-access Edge Computing, and Software Defined Networking technologies for Beyond-5G networks in both teaching and research activities. The undergraduate curriculum will be updated and advanced in terms of the project's targeted research areas while the experience gained will be included in new courses. UOWM will be able to pursue more R&D projects at national and European levels and exploit the NANCY outcomes related to Artificial Intelligence and Machine Learning algorithms and novel networking technologies. <u>Topics/Domain:</u> Artificial Intelligence, Multi-Access Edge Computing, Software Defined Networking, Cybersecurity. <u>Approaches & Activities:</u> a) Exploitation of project findings to update the existing curriculum undergraduate and postgraduate programs with explainable AI, and healthcare privacy and security-related courses, b) Enhance the Department with more research staff (PhD candidates and post-docs) working in the context of the project

UBITECH	Goals: UBITECH will reinforce its portfolio by exploiting the acquired knowledge and technological results of the project with respect to security and privacy and AI-based energy-efficient RAN orchestration. This way UBITECH will increase its competitiveness, targeting both the public and private sectors. Topics/Domain: Artificial Intelligence, Cybersecurity, Radio Access Networks. Approaches & Activities: UBITECH intends to identify opportunities for technology transfer into the industry in future collaborations with industrial partners. Towards this, UBITECH will also leverage its network of vendors, manufacturers, and network operators.
TECNALIA	Goals: TECNALIA´s exploitation strategy for developed NANCY results will be mainly related to selling the tools and mechanisms developed during the project, but not only, TECNALIA will transfer the knowledge and lessons learned to the companies interested in the deployment of BlockChain Marketplace. The work to be done in the QKD experiments will be extended in future research projects where this technology is relevant. Topics/Domain: Cybersecurity: QKD and BlockChain. Approaches & Activities: In order to finally define the concrete strategy to be used, the potential options will be explored around the project end with TECNALIA Ventures. TECNALIA Ventures is a wholly owned subsidiary for the commercialization of innovative technology-based results, turning innovative technology assets into new profitable and sustainable businesses and generating economic value for society. TECNALIA focused on putting into the market assets developed in R&D projects. The marketization of the NANCY results may involve seeking additional funds from investors or business capitalists as well as transferring the intellectual property to a company interested in the technology and approach developed in this project.
NEC	Goals: NEC's goals within exploitation are based on two areas. Firstly, the protection of smart contracts is a research area of great interest to the company. Secondly, the development of the NANCY blockchain and its integration with PQC together with the development of SSI-capabilities in the wallet following the W3C did-core and verifiable credentials is of importance for the company's Web3 portfolio. Topics/Domain: Distributed Ledger Technology, Cybersecurity. Approaches & Activities: NEC will leverage the project outcomes to extend its knowledge in distributed ledger technologies, create new IP, and potentially explore product avenues with NEC Japan.
i2CAT	Goals: Endow the slice manager asset with inter-slice conflict and underutilization minimization capabilities, leveraging the AI virtualizer developed in T3.4, which consists of the multi-agent communication framework. Progress on the development of the RIC Manager tool according to NANCY topics. Design of AI/ML-based rApps empowered by RIC Manager functionalities. Topics/Domain: Multi-agent communication, slice orchestration, O-RAN RIC Manager, AI/ML-based rApps. Approaches & Activities: I2CAT will integrate novel AI-based emerging protocols for inter-slice conflict and underutilization minimization into its slice manager asset. Share proposed innovations and developments among industry, public administration, and the academic environment, starting with our board of trustees which includes MNOs like Orange, Vodafone, Telefonica, and Parlem, and vendors like Juniper, Cisco and Fujitsu. Generation of new consortiums exploiting NANCY assets for future SNS calls.

ITL	Goals: 5G and Edge computing are topics of great interest to Italtel's research and innovation activities. In fact, Italtel is following the evolution of Information and Telecommunication Technologies (ICT) whose use is increasing in several vertical markets. Enhanced 5G based solutions can be proposed to several customers who want to speed up their digital transformation process. Topics/Domain: System Integration, Solution provider. Approach & Activities: In the context of NANCY, the integration of innovative technologies that enable RAN optimization and sharing leveraging blockchain is in line with the Italtel objective to expand its business in the 5G market for public and private networks.
INTRA	Goal: Our goal is to reinforce the Netcompany-Intrasoft solutions portfolio through the offering of innovative and specialized applications and services not yet present in the evolving for INTRA market sectors. INTRA will be involved in the integration of the proposed platform. Its experience in integrating large-scale systems will be valuable for the consortium. Through its participation in the project, INTRA is expecting to: • Exploit the proposed platform and S/W components that can be individually or in collaboration with the other consortium partners, sold to interested customers. • Deliver consultancy services to customers interested in deploying similar infrastructures. • Cooperate with the leading research institutes and software developers participating in the consortium that may lead to strategic alliances in the field of commercialization and technology transfer of innovative aspects of technology. Hence, the formation of synergies/collaboration with the partners in the context of another project is also being considered.
8BELLS	Goals: 8BELLS' exploitation plans are based on the incorporation of individual research results into already existing products in order to strengthen its market potential. Significant benefits are to be gained by commercialising the individual R&D results through their integration with current solutions. 8BELLS will also contribute to the commercialisation of the overall solution by participating in agreements between partners, performing activities together in specific tasks, and establishing measures for joint exploitation. Topics/Domain: Through the project 8BELLS aims to pursue each of the two proposed products due to their relevance to the 5G market. Both proposed solutions (DFM and Portable 5G) are already TRL6 and will reach at least TRL7 during the project, thus, they will be market-ready by the end of NANCY. Approaches & Activities: 8BELLS will exploit its products through the network of ICT vendors, integrators, and telecom operators that participate in this project. We will exploit them by fully defining the value chain, performing competitive analysis, identifying strategies for market traction, and demonstrating the products to the corresponding interested parties. Our products will be protected by conducting mutual agreements with partners that collaborate with 8BELLS in products that require co-development, or by copywriting the products that are only developed by 8BELLS.
TDIS	Goals: Our exploitation goal is first to provide on-the-field direct implementations of the developed module about PQC into NANCY. We intend also to address new markets with partners, especially with the ones we made the demonstrator. Topics/Domain: Due to the recent engagement of the EU regarding eWallet, we can expect that such eWallet will be largely used & and deployed in all domains; and our crypto module using PQC will be reused & and part of such new European eWallet.

	<u>Approaches & Activities:</u> We will build our exploitation plan on two pillars with a standardization approach and with specific dedicated local use-cases.
DRAXIS	<u>Goals:</u> DRAXIS aims to leverage the expertise (Smart Contracts) and connections acquired during the NANCY project to introduce a range of innovative products and services to the market. With a strategic focus on AI, Blockchain, IoT, and edge computing domains, the company plans to expand its service offerings significantly. Moreover, DRAXIS aims to investigate strategies for integrating the knowledge gained in Smart Contracts into its business solutions for current clients in the private and public sectors. Simultaneously, the company will endeavor to expand its market presence, targeting markets that were previously inaccessible. <u>Exploitation Activities:</u> The primary approach involves organizing targeted B2B and B2G meetings with key stakeholders and active participation in relevant industrial fairs. These engagements will serve as platforms to showcase DRAXIS' capabilities and initiate discussions aimed at exploring collaboration opportunities leveraging upon the cutting-edge domains advanced within NANCY. Additionally, DRAXIS intends to capitalize on the existing partnerships established during the NANCY project, seeking further exploitation opportunities through collaborative endeavors. To reinforce these efforts, the company will channel exploitation initiatives through its Brussels branch, strategically positioning itself to capitalize on EU-specific opportunities and networks.
OTE	OTE is highly interested in accelerating the development, deployment, and validation of innovative telecommunication services and related solutions, such as those developed by NANCY. OTE will exploit NANCY results with regard to the exploitation of Blockchain and ML methodologies in 5G networks by assessing its efficiency in the network and testing its performance. The R&D labs of OTE belong to the Strategy and Development Department and the deliverables and milestones of the projects provide useful results to the upper management. Moreover, every year an internal workshop is organized for the presentation of the R&D projects' results and milestones to OTE's staff and in general to the Deutsche Telecom group since OTE is part of it. The results are considered for future initiatives and for the establishment of new technologies and services. With the synergy and cooperation of OTE with Deutsche Telecom AG, as part of its group, the project results will be even more beneficial for bringing new ideas and propositions to the planning and strategy managerial staff.
VOS	VOS plans to strengthen its ARM products offer, especially VOSySmonitor, the company's system partitioner for ARM embedded systems. As of today, this system partitioner is optimized for embedded use-cases, where safety and security are essential characteristics of the integrated system. In NANCY, VOS will explore other directions in order to make VOSySmonitor a candidate for cloud-oriented use cases, where having many partitions with low overhead is more important than having a few highly isolated ones. To reach this goal, VOS will extend the ecosystem that is already available around its system partitioner with new software modules. These are specifically designed to create edge computing nodes capable of hosting multiple operating systems without requiring the usual type-1 or type-2 hypervisor, thus involving less overhead and power consumption. VOS plans to create a demonstrator of these functionalities with a Texas Instrument AM69 board, which will be duly disseminated on its website and international venues. This will be the starting point to introduce the new VOSySmonitor functionalities to existing customers, as well as new ones. VOS, as an SME, can guarantee high flexibility in terms of licensing options which is a non-

	negligible added value that makes it suitable for the majority of business models of possible buyers. In addition to this, VOS plans to extend the scope of its services thanks to the know-how acquired in NANCY. Specifically, by mastering the constraints and requirements of MEC-enabled devices, it will be possible to provide hard-to-find consulting and development services targeting the use of virtualization technologies in the context of 5G and 6G RANs.
IJS	<u>Goals</u>: IJS plan is to overcome scientific state-of-the-art in terms of AI algorithms for time series processing, MLOps pipelines, and Deep Reinforcement Learning (DRL) and publish scientific papers on new concepts an solutions. <u>Topics/Domain</u>: AI/ML research, MLOps, time series <u>Approaches & Activities</u>: JSI will exploit the advances in AI/ML for time series processing, MLOps pipelines, and DRL, which will help us also with training students from different domains in the said topics, and enhance our institution with more research staff. It will also help disseminate our knowledge to the Slovenian Industry.
CRAT	<u>Goals</u>: to overcome scientific and technical limitations in the state-of-the-art literature related to anomaly detection and self-healing mechanisms and to provide seminars and workshops on new concepts and control algorithms. <u>Topics/Domain</u>: Self-healing networks, AI/ML research. <u>Approaches & Activities</u>: CRAT will exploit the design and implementation of Machine-Learning based algorithms for anomaly detection and self-recovery mechanisms to enlarge the educational offer provided within the Master degree in Control Engineering, active in one of the universities participating as members of CRAT consortium. The acquired knowledge will be used to provide students with seminars and updated material tackling the innovations brought by the NANCY modules and architectures.
TEI	<u>Goals</u>: TEI will specifically look for NANCY results regarding the implementation of the relevant business use case and related requirements using the advanced Security solution, like Network Vulnerability Control via Distributed Ledger Technology that will be developed in the project. Moreover, TEI Customer Units will be involved in conveying project outcomes to customers and exploiting the results in the development and extension of future TEI telecom infrastructure products. <u>Topics/Domain</u>: 5G and Beyond, Distributed Ledger Technology, Cybersecurity <u>Approaches & Activities</u>: TEI will leverage the project outcomes to extend its telecom infrastructure, as well as convey the project outcomes to its customers.

BI2S	<u>Goals:</u> BI2S will expand its asset portfolio and increase the quality of the provided services by integrating the technical outputs of the project into its solutions, which are under development. BI2S leverages machine learning methodologies to provide intelligent analytics in agriculture, telecommunications, and energy domains. Since the products under examination are in the development stage, there is significant room for improvement, especially on the technical side i.e., in algorithms and machine learning models. This is a unique opportunity for BI2S to develop, validate, and test technologies that can be re-used within the company's solution. <u>Topics/Domain:</u> Artificial Intelligence, machine learning, edge computing ecosystems. <u>Approaches & Activities:</u> BI2S searches for opportunities related to technology transfer, technology diffusion, and Key Exploitable Result (KER) reusability. Technology transfer can be achieved by bringing some of the NANCY's technology outputs to BI2S's products. This will increase the service quality and can help BI2S to become more competitive. Technology diffusion will be pursued through the commercialisation of BI2S's solution in a specified market (e.g. telecommunications). This will increase the company's branding and will generate revenue for further development options. KER reusability is critical for targeting diverse market verticals. Reusability can enable a KER to be re-used to cover additional needs that stem outside its original domain. For example, a machine learning model that optimizes the data offloading process to the edge of the network can be adjusted to predict disruption events in data transmission in 6G systems. This approach will provide BI2S with flexibility and will increase its diversification opportunities.
INNO	<u>Goals</u>: INNO will promote its current intelligent solutions to manage decentralised autonomous, and energy-efficient orchestration, as well as improve them with regard to cybersecurity protection, thus creating novel tools capable of revolutionizing the communications sector. Moreover, INNO aims to take advantage of the knowledge acquired throughout the NANCY project in different scenarios by means of transfer learning strategies. <u>Topics/Domain</u>: INNO will use the advancements achieved in NANCY to improve the currently offered tools and services, which will aid in consolidating existing clients, and widening its clientele. Also, new algorithms and systems will be applied in system management tools to improve their robustness and cybersecurity, and therefore improve the quality of these services and consolidate INNO's market position. Specifically, INNO will improve its arsenal by developing holistic risk management services that enhance the internal AI decision-making processes by adding a layer of explainability and facilitating an increase in clients' trust. The developed system will be capable of dynamic identification of various energy-related IoT devices, sensors, and components (both physical and software), while it will support neuromorphic encryption methods to ensure cybersecurity. Moreover, INNO will contribute not only to the development and optimization of an innovative B5G network with regard to physical security and response effectiveness but also to achieving efficient data distribution by means of minimizing energy loss as well as blocking malicious actions from network assets, isolating infected network sections and minimizing cascading effects of large scale or small-scale network attacks. <u>Approaches & Activities</u>: INNO will continue with its planned roadmap while enriching its portfolio with new tools and functionalities. The aforementioned results that will be developed by INNO in the NANCY project will foster the increase of its current business and provide new types of innovative services.

CERTH	<u>Goals:</u> CERTH will leverage the project's activities and outcomes to enhance its research portfolio mainly in AI and ICT <u>Topics/Domain</u>: DLT, Blockchain, AI, Telecom, ICT <u>Approaches & Activities</u>: CERTH will exploit the project's results to enhance the research activities on AI technologies. CERTH is interested in commercializing modules of the developed platform through its spinoff company Infalia or licensing the developed services to interested clients. Furthermore, part of the CERTH's business plan is to participate in a number of new spin-off commercial companies capable of exploiting its research when new market needs and solutions are identified. The Information Technologies Institute of CERTH has all the necessary support including legal support and business management in order to create innovative enterprises.
SID	<u>Goals:</u> Building on the insights gained from participating in NANCY, SID aims to enhance its range of products and solutions by incorporating state-of-the-art tools designed to fortify security and reliability in 5G and B5G systems. <u>Topics/Domain:</u> Cybersecurity, Artificial Intelligence, Telecom, ICT <u>Approaches & Activities:</u> SID will explore the possibility of introducing the results of NANCY to the Cypriot market as an independent product. This may involve establishing a distinct commercial entity dedicated to this initiative. Additionally, SID plans to leverage its connections and engagements with private sector companies in Cyprus to underscore the advantages offered by the capabilities developed through NANCY.
UMU	<u>Goals:</u> UMU will exploit the project results in different ways: (i) improving its academic offer to students; (ii) positioning the institution as a research leader, and (iii) industry transfer through its spin-off company ODIN Solutions. <u>Topics/Domain</u>: Cybersecurity, blockchain, advanced network infrastructure deployment <u>Approaches & Activities</u>: Master and PhD programs in Telematics Engineering will directly incorporate the results of the project as part of the scientific contents of some courses that are related to NANCY. The current network infrastructure in UMU will be enriched with the advances developed in NANCY to attract top international researchers and companies to perform tests and research.
SSS	<u>Goals:</u> to overcome scientific and technical limitations in the state-of-the-art literature related to guaranteeing real-time performance for allocated software components and to provide seminars and workshops on new concepts and control algorithms. <u>Topics/Domain:</u> Time- predictable performance of allocated software components. <u>Approaches & Activities:</u> SSS will exploit the novel algorithms and mechanisms for allocating software components with strict timing constraints to broaden the educational offer within its PhD courses. The acquired knowledge will help deliver seminars and updated material tackling the innovations brought by the NANCY modules and architectures.
MINDS	<u>Goals:</u> MINDS aims to leverage the expertise and technological advancements gained from the project to enhance its current offerings in the cybersecurity sector. This initiative is geared towards expanding MINDS' services and competitiveness across both public and private sectors, with a specific focus on the industry. The utilization of NANCY outcomes will involve: (a) customizing and optimizing MINDS' intrusion detection and prevention solutions, (b) providing highly explainable AI-enabled solutions, and (c) strengthening technical proficiency in secure data sharing. MINDS also aspires to capitalize on its technical accomplishments from NANCY to identify opportunities for collaboration with industry partners, such as

	software development SMEs, Information Technology (IT) solutions vendors, and consultants in the Balkans and East Europe. The integration and adaptation of technical achievements will be approached collaboratively. Topics/Domains: Artificial Intelligence, Cyber-resilience, Cybersecurity, Explainable AI, Intrusion Detection & Prevention, and Privacy. Approaches & Activities: MINDS plans to integrate resultant software, AI models, and security services into specialized applications as part of its existing services. Research findings will be disseminated and shared with industry peers, SMEs, and academia. Additionally, MINDS intends to leverage its connections and engagements with private sector companies in Greece to showcase the advantages of its capabilities, emphasizing best practices established through the NANCY project.

4.2. Innovation and Exploitation Activities

NANCY partners have already engaged in innovation and exploitation activities as described in Table 6.

Table 6 - NANCY first year deployed innovation and exploitation activities

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
INTRA	New/Improved Product	INTRA deploys CI/CD infrastructure for NANCY, related to our CI/CD line of products, and advances it to telco production quality.	WP6 (T6.2)	CI/CD system saves time and makes development and deployment more agile.
Impact to your organisation				
Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
This can be an improved version of CI/CD products, adding to our revenue and client base.	Not estimated at this time, as the task has not officially started.	CI/CD brings improvements in development and quality control and advances development skills/knowledge.	Enhancing our product implicitly increases our competitive advantage and our reputation as a leader to the outside world.	Potential for further growth and expansion of revenues.
Impacts external to your organisation				
Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
		Cost reduction for clients adopting the solution.		

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
INNO	New/Improved Product	We are developing a B-RAN simulator that is very relevant to INNO's network simulator (INNONS), which is augmented by adding B-RAN theoretical modelling into its arsenal.	WP2 (T2.2)	Theoretical modeling of B-RAN based on Markov chain modelling and intelligent approaches that can support performance evaluation without the requirement of experimental implementations.

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
This can augment the current INNONS network simulator product.	The knowledge gained by the effort devoted to the development of this task can be easily applied to a plethora of other domains and applications.	CI/CD brings improvements in the theoretical modelling of complex procedures improved the mathematical and AI expertise of INNO's personnel. and quality control and advances development skills/knowledge.	INNO's augmented offering of mathematical modeling and intelligent techniques increases its competitive advantages.	

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
Increased trustworthiness in networks due to B-RAN enabling distributed management of the network as well as additional monetary incentives for the end users.	Theoretical modeling of complex systems based on mathematical Markov-chain based models as well as AI methods.	B-RAN will enable additional monetary incentives for the end users.		

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
INNO	New/Improved Product	We are developing novel semantic communication approaches that are very relevant to INNO's AI toolbox (INNOLearn), which is augmented by adding semantic communication approaches into its arsenal.	WP4 (T4.4)	Semantic communication approaches based on intelligent knowledge extraction techniques can be utilized for improving the data/spectral/energy efficiency of next-gen networks.

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits

This can augment the current INNOLearn AI toolbox.	The knowledge gained by the effort devoted to the development of this task can be easily applied to a plethora of other domains and applications.	The development of semantic communication approaches based on AI depended INNO's expertise in AI and goal-oriented communications.	INNO's augmented offering of semantic communications increases its competitive advantages in the landscape of 6G networks and services.	

Impacts external to your organisation				
Societal Benefits	**Benefits to Scientific Community**	**Economic benefits**	**Environmental benefits**	**Other Impacts relevant to highlight**
Increasing energy efficiency of networks, thus reducing carbon footprint and increasing sustainability.	Intelligent approaches to communications and networks are of great importance to the scientific community in order to achieve the targeted KPIs of 6G.	B-RAN will enable Cost of ownership reduction for network operators due to increased spectral/data/energy efficiency. monetary incentives for the end users.	Increasing energy efficiency of networks, thus reducing carbon footprint and increasing sustainability.	

Partner	**Outcome/Result**	**Description**	**WP**	**Advancement over and above SOTA**
TEI	New/Improved Product	We would like to develop a Post Quantum Cryptography secure communication prototype module.	WP (T5.1)	PQC prototyping and algorithms comparison.
Impact to your organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
The knowledge gained and the prototype can be an input to improve the safety of TEI products.	Starting to investigate PQC can be a competitive advantage for the organization.	Post Quantum Cryptography secure communication.	Improving the security of communication can be a reputational advantage for the organization.	
Impacts external to your organisation				

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
Increase security of communications to be prepared to Post Quantum Cryptography.	Performance evaluation of various PQC algorithms.			

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
TEI	New/Improved Product	In the project, TEI will implement a Big Data Platform serving as analytics component for the self-healing and the self-recovery mechanism.	WP5 (T5.4)	Implement the necessary big data management mechanisms to allow NANCY to scale up to extreme data volumes.

Impact to your organisation				
Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
The knowledge gained and the prototype can be an input to Increase the knowledge about Big Data Platform to be eventually commercially exploited.	Starting to investigate PQC can be challenging. The acquired knowledge could be used to improve or propose new products.	Big Data Platform with high data volumes.		

Impacts external to your organisation				
Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
The platform will be used in self-healing self-recovery Nancy module, improving the network availability.	Improve the scaling of Big Data Platforms.	The self-healing and self-recovery mechanism will reduce costs for operators.		

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
DRAXIS	New/Improved Component/Asset	DRAXIS develops a Smart Contract that serves as a fundamental component of the decentralized blockchain utilized across the NANCY solution.	WP5 (T5.3)	As for advancements over and above the state-of-the-art (SOTA) in Smart Contracts, there are several areas where innovation and improvement can be pursued in, including: a. Privacy and Confidentiality area (Enhancements in Smart Contract Technology could focus on providing stronger privacy features such as zero-knowledge proofs), b. Scalability area (improving scalability by introducing new consensus mechanisms), sharding techniques, or off-chain solutions that allow for greater transaction processing capabilities. c. Interoperability area (facilitate seamless interaction and information exchange between Smart Contracts across diverse blockchain ecosystems)

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
Leveraging the expertise and insights acquired from the NANCY project, DRAXIS intends to utilize this technology to enter new markets and expand its portfolio of offerings, in turn generating, more revenue.	Reducing expenses linked to intermediaries in transactions, streamlining paperwork, and reducing the time required for manual processing in its service-related transactions. This effort is geared towards cost reduction	The development of Smart Contracts provides a multitude of benefits for building competencies and expertise across various fields, including programming, blockchain technology, security, industry-	Enhancing a positive perception and credibility among stakeholders, which may potentially lead to new partnerships, attracting customers, and unlocking further opportunities.	

within DRAXIS' service provisions.	specific domains, compliance, and integration. The multidisciplinary nature of this field necessitates ongoing learning and staying up-to-date with the latest advancements in blockchain technology and Smart Contract best practices.		
Impacts external to your organisation			

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
Contributing to societal progress by fostering increased transparency, trust, and security in transactions, fostering efficiency and inclusivity.	Leveraging SotA methods in creating Smart Contracts such as engaging Ricardian Contracts in the blockchain can be of significant importance to the scientific community.	Enhancing transaction speed (automated transactions with no manual processing) and cost efficiency (affordable for smaller market players). Reduction of bureaucratic hurdles within the specialized domains of the Nancy project. Enable access to new markets and application of innovative business models for SMEs and smaller companies without relying on hefty infrastructure costs.	Reducing the reliance on energy-intensive intermediaries and promoting more sustainable and efficient transaction processes.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
BI2S	New/Improved Component/Asset	Bi2S develops machine learning algorithms and artificial intelligence frameworks which are relevant to the company's service portfolio.	WP3 (T3.3) WP4 (T4.1)	Artificial Intelligence methods for Edge computing ecosystems often utilise simulation-based approaches (for validation) which do not rely on real data. These approaches undermine the quality of the trained models

				since ML models are trained with either incomplete or non-real-world data. Additionally, the complexity of Edge computing in the 6G era comes both from its ultra-low latency requirements and from the high amount of optimisation parameters that are involved in the process. Due to complexity reason, it is not uncommon for existing solutions to make assumptions instead of relying purely on network observations. Within the NANCY project, the consortium develops AI novel models that do not only push the accuracy of the outcomes beyond the state-of-art, but also rely on real-world data that are collected through network observations. BI2S will employ novel approaches to model architecture to design complex machine learning algorithms, capable of solving optimisation problems with a large number of parameters and will pave the road towards the adoption of such methods by commercial solutions.
Impact to your organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
BI2S will leverage the knowledge acquired by the research activities of the NANCY project,	Reduced expenses related to: Hardware resource utilisation, energy savings, reduced time	BI2S's involvement in NANCY will provide several benefits to the organisation. In terms of	Brand recognition through the involvement of the NANCY project, visibility in the scientific	

and the outcomes of it to improve the models, algorithms and services it provides. This will increase its competencies and could open up possibilities to enter new markets.	requirements for the integration of new AI models into products and services.	knowledge gain, BI2S will improve its skills and expertise in Artificial Intelligence, distributed data processing, machine learning inference and data analysis techniques. All of the aforementioned domains are critical for the company's market position since BI2S specialises in solutions that employ such technologies.	ecosystem through publications and partnerships through the company's participation in industrial events and exhibitions.	

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
Contribution to societal progress by facilitating high-quality telecommunication networks which can be leveraged by users to communicate, exchange ideas, and shorten the gap between large geographical distances.	Leveraging SotA methods in creating Smart Several publications to scientific conferences and journal are foreseen which will advance the scientific knowledge and will provide innovative ways to solve problems.	By increasing the quality of telecommunication services (5G/6G), there are significant economic benefits related to new job positions, higher investment rates, higher market capitalisation, and faster technological growth. All these factors positively affect the economy and increase the technology adoption rate by SMEs and large enterprises. The expansion of the business ecosystem within the next generation of telecommunication networks is expected to be significant and thus, the aforementioned benefits could snowball to significant levels.	The reduction of energy consumption is a major concern when it comes to digital infrastructure and telecommunications. The environmental footprint of such technologies is not insignificant and comes from their large energy requirements. Within NANCY, the use of ML and AI models comes with very strict energy consumption requirements, which will lead to lower energy consumption and in turn, to a more environmentally friendly network infrastructure.	

NANCY

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
TDIS	New/Improved Product	TDIS will develop a PQC digital signature Token implementing a new quantum-safe signature algorithm. This algorithm will follow the PQC standardization process led by NIST.	WP5 (T5.1)	Within the NANCY project, TDIS's objective is to work on the following innovations on the PQC Digital Signature component. Starting from the existing component, TDIS will develop the Crystals Dilithium SHAKE with Security Level 3 as recommended by NIST. The new challenges for this innovation will be to keep the same requirement constraints as classical cryptography while implementing a much stronger PQC algorithm: o Frugal implementation of PQC Digital Signature on tiny CPU devices environment (32bits CPU, 24kB RAM) o High secure implementation of the cryptographic algorithm including countermeasures against state-of-the-art attacks (side channel, fault injection attacks)o Acceptable performance compared to classical cryptography. Moreover, TDIS targets to bring a novel mechanism for Crypto Agility as recommended by National Security Agencies. As of today, such capability is not supported on smart tokens.

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
All the major national security agencies are recommending that all the cybersecurity industries anticipate and be ready for the post-quantum era by 2030. Therefore, TDIS is preparing the migration of all its security products using public key cryptography to the post-quantum. This PQC signature Token will be the first quantum-safe product to be deployed in our digital identity solutions.		Our cryptography experts have started working on PQC algorithms for many years. TDIS has participated actively in the PQC standardization process providing several PQC candidates, 1 being selected during NIST round 3 (FALCON algorithm for signature). Thales continue its participation to the 4th round by submitting again several candidates. https://csrc.nist.gov/projects/post-quantum-cryptography.	TDIS is the world leader in smartcards with first-class expertise in security. Through this project on PQC, TDIS's ambition is to keep strengthening this leading position.	

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
Public key cryptography is present everywhere in our society (finance, telecom, public security, social networks, ...). Therefore it is obvious to maintain the highest level of cybersecurity and resilience towards the security threats introduced by the upcoming quantum era.	TDIS contributes to the PQC standardization process led by NIST by submitting several PQC candidates.		Digital Identity contributes strongly to dematerialization in all domains such as financial, administrative, legal, etc.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
NEC	Improved asset / research	Protection of Smart Contracts	WP5	Improve the security of smart contracts by developing more accurate tools and tools that can automatically harden smart contracts without requiring developers to understand the vulnerabilities.

Impact to your organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
Research progress in this area will create new IPs for the company and augment our Web3 portfolio. No immediate revenue.	Not estimated at this time.	Improved knowledge of distributed security, specifically on the prevention of vulnerabilities and exploits in the design of Smart Contracts.	IP ownership is of great importance to NEC and one of its key values as a company.	

Impacts external to your organisation				
Societal Benefits	**Benefits to Scientific Community**	**Economic benefits**	**Environmental benefits**	**Other Impacts relevant to highlight**
Smart contract vulnerabilities can be exploited and this (1) damages the reputation of the blockchain owners, (2) can translate into revenue losses of millions, (3) takes a long time to recover from. Smart contracts are/can be IT equivalents to legal agreements. If not protected, the user can lose rights, money, QoS, and any other features as expressed in the agreement.	At least one publication will be submitted, focusing on this area.	See "Societal Benefits"		

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
NEC	New/Improved component	NANCY blockchain wallet with SSI and PQC capabilities	WP5	No existing wallet supports both SSI and PQC
Impact to your organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
No immediate revenue, however, the integration of said technologies (distributed ledger with augmented security and privacy) in controlled demonstrators will help us benchmark several KPIs that will be potentially helpful for other NEC assets.	Not estimated at this time	Improved knowledge of distributed security and privacy, specifically on the latency imposed by PQC and different privacy schemes by means of SSI.	Web3 is of great importance to NEC's future assets and its position in the IT arena.	
Impacts external to your organisation				
Societal Benefits	**Benefits to Scientific Community**	**Economic benefits**	**Environmental benefits**	**Other Impacts relevant to highlight**
Digital privacy prevents the illegitimate use of users' personal data and automatically improves the blockchain owner's reputation. On Web3, protecting a user from having non-necessary information shared with third parties without their consent or knowledge is of fundamental importance.	Better benchmarking of several security and privacy KPIs.	Based on "Societal Benefits" and the reputation of the system, it is expected that future users of Web3 will converge to systems that guarantee the protection of their personal data and assets by means of improved security and privacy schemes.	The use of lightweight consensus in said blockchain implementation will contribute to the reduction of computing resources i.e. energy consumption.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
IJS	Scientific publication	Developing self-evolving model repository for B-RAN, B5G localization service and B-RAN resource elasticity	WP3 (T3.2, T3.3) and WP4 (T4.2)	The Decentralized Self-Evolving Model Repository, with its distributed AI model storage, real-time evolution, continuous network-wide retraining, enhanced scalability and efficiency, and increased resilience, represents a ground-breaking advancement beyond the current state-of-the-art in AI system adaptability and performance. - The AI-based techniques for B5G localization services, leveraging advanced data analysis for precise localization, enhanced network management, high precision, and reliability for critical applications, seamless IoT integration, and readiness for future technological demands, significantly surpass the current state-of-the-art in network localization and connectivity. - The development of resource elasticity will enhance the AI solution's integration of dynamic adaptability, advanced learning techniques, and application-specific optimization, representing a significant advancement over current state-

				of-the-art network management and AI solutions.
Impact to your Organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
No immediate revenue, however, the development of said technologies helps us with the education process, extend the knowledge, business opportunities, industry scenarios.	Not estimated at this time	Improved knowledge and expertise in decentralised computational frameworks, MLOps, AI-based techniques.	The competencies, expertise, and tools developed through the project will greatly enhance our competitiveness, thereby reinforcing our reputation as a valuable and influential partner in the industry.	
Impacts External to your organisation				
Societal Benefits	**Benefits to Scientific Community**	**Economic benefits**	**Environmental benefits**	**Other Impacts relevant to highlight**
Distributed computing framework and resource elasticity strategies will increase the energy efficiency of networks, thus reducing carbon footprint and increasing sustainability.	We expect to make multiple submissions to scientific conferences and journals, contributing to the advancement of scientific knowledge and presenting innovative approaches.	Provide knowledge, competencies, expertise and tools will strengthen the competitiveness of Slovenian industry.	Our work will enhance the energy efficiency of networks, thus reducing the carbon footprint, and subsequently making the networks more sustainable.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
8BELLS	New/Improved Component/Asset	8BELLS will develop a smart pricing policies.	WP4 (T4.5)	Compared to SOTA, the smart pricing policies of NANCY need to adopt the security and privacy mechanisms developed within the project and most importantly to be scalable to the massive number of mobile users that NANCY envisions to utilize in resource sharing and data

				relaying. Additionally, game theoretic pricing schemes should be considered to facilitate the balance between the strategy and choices of each user.

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
Initiate the development of a novel intellectual property to bolster and expand our investigation into the financial aspects of 5G technology. No immediate revenue	Not estimated at this time	The investigation into 5G mesh networks has substantially enhanced our comprehension of the shift from consumer to provider functions. This entails possessing a comprehensive understanding of the financial ramifications linked to these transitions, which encompass explicit expenditures on infrastructure and service provision.	Improving our product's strength automatically increases our competitive advantage and solidifies our position as the industry leader in the perspective of external stakeholders.	

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
The introduction of automated monetary costing is poised to enhance telecommunications on a broader scale, fostering improvements in efficiency and overall performance within the industry.	Emerging AI and game theory techniques will be investigated and presented.	Will reduce the expenditure associated with utilizing 5G in terms of both resources and finances.	Reducing resource consumption will positively impact the environment by minimizing harmful emissions, leading to the development of greener and more affordable technology.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
I2CAT	New/Improved Component/Asset	i2CAT is currently working on developing the AI-virtualiser for underutilized computational & and communication resource exploitation.	WP3 (T3.4)	The incoming 6G technology will rely heavily on AI and will provide a native playground for machine learning applications. With this native-enabled technology in mind, it is vital that new ML alrogrithms are integrated throughout the network, providing control and efficiency in end-to-end communication.

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
No immediate revenue.	Not estimated at this moment.	The investigation into Multi-Agent Deep Reinforcement Learning has opened a plethora of possible future implementations and applications that could help the incoming 6G networks in terms of infrastructure and energetical terms.	Being part of the first research centers to provide tried ML applications for incoming communication networks would provide a competitive advantage and a reputational increase for the center and the project as a whole.	

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
By providing a way to make telco infrastructure more efficient, the need to install more infrastructure or nodes would decrease, having as a side effect the reduction of electrical energy consumption, providing an	Introducing new ways of providing optimization tools for network infrastructure.	For the MNO associated with this technology, their Capital Expenditures and their Operational Expenditures could potentially decrease.	Reducing the carbon footprint and minimizing the costs and damages associated with manufacturing and installing new infrastructure.	

advantage in the sustainability of the networks.				

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
I2CAT	New/Improved Component/Asset	O-RAN based RIC manager.	WP3/WP4	The RIC manager leverages some of the functions present in O-RAN's SMO and non-RT RIC in order to abstract them and facilitate the integration with different O-RAN RICs and the development of AI/ML-enabled rApps.

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
No immediate revenue is foreseen.	Not estimated at this moment.	Improved knowledge on O-RAN functions and the integration with AI/ML workflows and MLOps functions.	Strengthen our position and relevance in O-RAN landscape.	Potential participation in future SNS proposals.

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
O-RAN paradigm benefits innovation, and competition and targets RAN optimisations and increased network performance. RIC manager contributes to these ideas.	Contributions to O-RANs SotA through publications. Open-source developments available to the community will be studied.	OPEX could potentially decrease by facilitating the development of AI/ML-based rApps independently of the RICs.	One of the current O-RAN trends is to develop AI/ML-based rApps targeting Energy Efficiency. RIC manager could help in their development.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
UOWM	New/Improved Component/Asset	Laboratory testbed for research, development, and prototyping activities.	WP6	The in-lab testbed will facilitate research and development activities related to the configuration and deployment of Software Defined Radio-based 5G Base Stations and User Equipment.

Impact to your organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
No revenue is foreseen.	No cost reduction potential.	The testbed will enable the experimentation with Software Defined Radio technologies, as well as the validation of the theoretical network/resource orchestration approaches in real-world environments.	Strengthen UOWM's position related to Radio Access Networks and Software Defined Radio technologies.	Further exploitation and expansion of the testbed are foreseen in future research projects and activities.

Impacts external to your organisation				
Societal Benefits	**Benefits to Scientific Community**	**Economic benefits**	**Environmental benefits**	**Other Impacts relevant to highlight**
The mechanisms/techniques that optimize the network resources can increase the quality of experience and quality of service of the end users/consumers.	Dissemination of the experimental results generated from the testbed to scientific journals and conferences. Demonstration of the testbed in various exhibitions.	The mechanisms/techniques that optimize the resources can increase the network's capacity and reduce the operating costs for service providers.	The development of energy-efficient orchestration mechanisms can lead to a reduced environmental footprint.	N/A

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
MINDS	Scientific Publication	Examination of the impact of Aggregation Strategies on Intrusion Detection Systems in Federated Learning environments in the context of 5G Network	WP5	While most Federated Learning approaches consider a simple averaging for the aggregation of the local models in federated learning, this scientific publication conducted extensive experiments utilizing both averaging algorithms, and optimisation strategies

Impact to your organisation				
Revenue Implications	**Cost Reduction potential**	**Advancement of Skills/Knowledge**	**Reputational advantages**	**Other benefits**
No revenue, but through this publication, Anomaly Detection in the context of NANCY can take advantage of the results of this publication.	No cost reduction potential.	Optimisation-focused Aggregation Strategies that are based on traditional and famous optimisation algorithms such as Adam, Adagrad, and Yogi can have an impact on the performance of an AI model. Through this publication, extensive knowledge and understanding of the aforementioned algorithms was gained.	Strengthen MINDS position and visibility which is a challenge for SMEs.	Participation in prestigious conferences has a significant impact on networking, exchanging opinions, and getting familiar with new technologies and works.

Impacts external to your organisation				
Societal Benefits	**Benefits to Scientific Community**	**Economic benefits**	**Environmental benefits**	**Other Impacts relevant to highlight**
Through Federated Learning, the privacy of personal data is highly preserved, as no data exchange between different providers is needed	This publication can serve as the basis for researchers to extend and develop custom aggregation strategies that will serve a specific purpose.	Flower, a fast-evolving FL framework, was utilised for the experimentation. Flower is an open-source and powerful framework that many SMEs and	The nature of the FL foresees that no data exchange is needed. As a result, no significant communication cost is needed, resulting in more	N/A

		larger organisations can benefit from without any cost.	environmentally friendly implementation.	

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
MINDS	New/Improved Component/Asset	MINDS is currently developing an eXplainable AI toolkit to provide insights into the decisions made by AI models	WP5	NANCY's XAI toolkit will leverage a number of XAI techniques to provide both local and global explanations, and, simultaneously, will be combined with FL.
Impact to your organisation				
Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
No immediate revenue is foreseen.	No cost reduction potential.	XAI techniques are an emerging topic in order for both unspecialised and experts to be able to understand and interpret AI models.	MINDS can combine XAI with its custom tools.	Providing high-quality technologies can bring both investments and prestige to an organisation.
Impacts external to your organisation				
Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
Through XAI, any individual can potentially understand AI models.	Contribution to the networking community which the utilization of AI models is not extremely mature.	XAI techniques are based on statistics, game theory, and mathematics. So, the implementation of both traditional methods and custom has no cost.	A potential environmental benefit is that through the interpretation of an AI model, an expert can identify that a significantly smaller AI model with fewer parameters can have the same performance. As a result, the AI model will need less time to be trained, and, thus, reduced carbon emissions.	N/A

Partner	Outcome/Result	Description	WP	Advancement over and above SOTA
SID	New/Improved Component/Asset	SID has undertaken the development of verification processes using digital signatures. This sub-module, will receive the transaction signature and verify it, utilising the public key.	WP5	Advancing beyond the state-of-art, NANCY aims to enhance verification processes by implementing cutting-edge cryptographic techniques, such as zero-knowledge proofs to further strengthen transaction security and privacy while utilising the public key for authentication

Impact to your organisation

Revenue Implications	Cost Reduction potential	Advancement of Skills/Knowledge	Reputational advantages	Other benefits
No immediate revenue is foreseen.	No cost reduction potential.	Blockchain is a disruptive technology with a huge impact across industries, especially in the networking and telecommunication industries. Employing advanced cryptographic mechanisms further increases the reliability and trustworthiness of the network.	Strengthen SID's position and visibility which is a challenge for SMEs.	By delivering top-tier innovative technologies, the tangible benefits are to attract investments, participate in prestigious academic events, participate in future SNS proposals and elevate the reputation of SID.

Impacts external to your organisation

Societal Benefits	Benefits to Scientific Community	Economic benefits	Environmental benefits	Other Impacts relevant to highlight
By enhancing transaction security through state-of-the-art cryptographic techniques, NANCY contributes to a safer and more trustworthy digital environment. Moreover, this heightened level of security can	Contribution to the Blockchain technology, which is disruptive and yet immature.	N/A	N/A	N/A

foster increased trust among individuals and organisations engaging in digital transactions, thereby promoting the widespread adoption of secure digital signatures.			

5. Conclusion

This deliverable outlines the initial impact creation, dissemination, and exploitation activities undertaken during the inaugural year of the NANCY project. It introduces the report on the project's initial dissemination and exploitation activities, detailing the comprehensive efforts made in dissemination and communication throughout the first year. This document serves as the initial monitored report on impact creation and successful implementation.

The first section of the document introduces the purpose and structure of the deliverable. Section two provides information concerning the applied strategy, methodology, and the target audience to be addressed. Section three delves into the monitoring of communication and dissemination activities, providing a detailed report. Finally, section four offers an overview of the exploitation activities carried out during the specified period.