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A Smart and Adaptive Framework for Enhancing Trust in 6G Networks

Deliverable D6.2: Standardisation, Innovation, Exploitation and Technology Transfer Plan

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GLOSSARY

Abbreviations/Acronym	Description
3GPP	Third Generation Partnership Project
AI	Artificial Intelligence
API	Application Programming Interface
BI	Business Intelligence
CA	Consortium Agreement
DoA	Document of Action
E2E	End to End
ENI	Experiential Network Intelligence
ENISA	European Union Agency for Cybersecurity
ESO	European Standards Organization
ETSI	European Telecommunications Standards Institute
EU	European Union
FaaS	Function-as-a-Service
FG	Focus Group
GA	Grant Agreement
GSMA	Global System for Mobile Communications Association
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IoT	Internet of Things
IP	Intellectual Property
IPR	Intellectual Property Rights
ISG	Industry Specification Group
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
JU	Joint Undertaking
KER	Key Exploitable Results
KPI	Key Performance Indicator
MEC	Multi-Access Edge Computing
ML	Machine Learning
NEF	Network Exposure Function
NF	Network Function
NFV	Network Functions Virtualisation
NGMN	Next Generation Mobile Networks
NIST	National Institute of Standards and Technology
NLP	Natural Language Processing
OCF	OpenCAPIF
P2P	Peer-to-peer
R&D	Research and Development
R&I	Research and Innovation
SACM	Security Automation and Continuous Monitoring
SAI	Securing Artificial Intelligence
SBA	Service Based Architecture
SDN	Software Defined Networking
SDO	Standard Developing Organization
SDPs	Software-Defined Perimeters

SDQC	Software-Defined Quantum Communication
SNS	Smart Networks and Services
SSI	Self-Sovereign Identity
TC	Technical Committee
TSG SA	Technical Specification Group Service and System Aspects
VNF	Virtual Network Function
WG	Working Group
ZSM	Zero Touch Network & Service Management

EXECUTIVE SUMMARY

This document describes initial plans and roadmaps for the standardisation, innovation and exploitation of the works developed in the SAFE-6G project.

Regarding standardisation, the initial plan proposes to i) identify the most relevant SDOs and other European initiatives working in security and trust, and ii) actively monitor and analyse potential contributions to engage with them. The proposed contributions will take various forms, including monitoring activities, active participation, engaging representatives from SDOs, and proposing new study and work items that may lead to new standards.

Regarding innovation and exploitation, the initial plan and roadmap outlines the strategic phases and milestones designed to foster innovation and maximize the exploitation of project outcomes through robust IPR management. By analysing the specific contributions and limitations of each partner, the SAFE-6G project is well positioned to enhance network performance, security, and scalability, thereby achieving its strategic goals and maximizing the potential for successful exploitation of new technologies.

With this deliverable, partners will have a roadmap and guidelines to ensure the optimal use of the project's results in terms of standardisation, innovation and exploitation.

KEYWORDS

Standardisation, Innovation, Exploitation plan, IPR, SDO

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1 INTRODUCTION

1.1 DOCUMENT OBJECTIVE

The SAFE-6G project focuses on developing a novel architecture and a suite of components aimed at providing trustworthiness in user-centric distributed 6G systems. The most significant paradigm adjustments in the envisioned user-centric 6G system are the shift from a security-only focus to a broader scope of native trustworthiness, clarifying that the term "trustworthiness" refers to a holistic approach, including safety, security, privacy, resilience and reliability. Moreover, a realistic solution to this trustworthiness challenge must recognize that all security measures (i.e. safety, security, privacy, resilience and reliability) come at a cost in terms of usability, agility, or swiftness. As a result, the envisioned trustworthiness framework should provide a balance between the various security measures by dealing with a security-by-design approach, as well as a wide range of themes, such as the trust model and the application of new cognitive coordination technologies (e.g., Intent-based trustworthiness, based on Artificial Intelligence (AI) and Machine Learning (ML) techniques). The deliverable *D2.1-Definition of Technical Requirements for User-centric 6G Trustworthiness* describes the first blueprint of this envisioned architecture, highlighting the different components that will be developed in the project.

The consortium aims at devising and implementing a plan for aligning to Standard Developing Organizations (SDOs) that are most relevant to the project and contributing the main project results to relevant SDOs (task 6.3).

Moreover, the project aims at ensuring a commercial exploitation and impact assessment of project results to ensure their long-term viability through i) identification of the commercial exploitation strategy employing lean canvas to model project outcomes and assess business opportunities, business models and market dynamics ii) definition of partner level exploitation plans to monetise the individual results. In addition to exploitation activities, the Intellectual Property (IP) management is an important activity that safeguards the partners' resources investment in order to maximise the exploitation potential of the individual and project level results (task 6.4).

This document covers initial plans regarding standardisation, innovation and exploitation for SAFE-6G. The realization and implementation of these plans will be reported for intermediate version in deliverable *D6.4-Standardisation, Innovation, Exploitation and Technology Transfer Activities (Intermediate)* due on M18 and in final version of *D6.6-Standardisation, Innovation, Exploitation and Technology Transfer Activities (Final)* due by the end of the project.

1.2 DOCUMENT STRUCTURE

Besides this introductory chapter, the structure of this document is as follows:

- Chapter 2 presents the initial standardisation plan to cover as much as possible the most relevant SDOs and initiatives to the SAFE-6G project.
- Chapter 3 presents the agreed exploitation strategy methodology and roadmap regarding exploitation and innovation plans.

- Conclusion presents a summary of the work done and the next steps.

1.3 Target Audience

The primary audience for this deliverable comprises the partners involved in the technical part of SAFE-6G project and the end users who will use the SAFE-6G framework.

With this deliverable, partners will have a roadmap and guidelines to ensure the optimal use of the project's results in terms of standardisation, innovation, and exploitation.

2 STANDARDISATION

2.1 INTRODUCTION

The SAFE-6G project focuses on developing a novel architecture and a suite of components aimed at providing trustworthiness in user-centric distributed 6G systems.

Throughout the project, every research finding will be assessed to identify potential contributions, which will then be proposed to relevant SDOs. It is important to note that SAFE-6G does not restrict its activities solely to SDOs. Instead, SAFE-6G aims to engage with other European initiatives that may have also the capacity to influence standards, as outlined in Section 2.2. Ultimately, the goal of SAFE-6G is to facilitate the adoption of its research outcomes by any European entity capable of standardising key technologies and principles, which could be integrated into the 6G roadmap.

The aim of this section is to provide a comprehensive description of the initial standardisation plan devised for SAFE-6G. The goal of this plan is twofold:

1) Identify key stakeholders: SAFE-6G aims to identify the most relevant SDOs and other European initiatives working in security and trust that are best suited for the project. Section 2.2.1 provides an overview of the standardisation landscape relevant to SAFE-6G.
2) Active monitoring and analysis on potential contributions (sections 2.2.2, 2.2.3 and 2.2.4 in the standardisation plan below): SAFE-6G partners' representatives will indeed monitor the most relevant initiatives and roadmaps related to security and trust to ensure alignment in two ways:
    a. First, to guarantee that SAFE-6G outcomes not only are in line with the standards already established but also keep pace with already existing and ongoing discussions.
    b. Secondly, to potentially provide a contribution that may be adopted by the targeted organization. Indeed, as part of the standardisation plan, the project will analyse which of the project' outcomes may achieve significant participation and impact, thereby contributing to the SDOs' roadmaps.

Regarding the implementation of this plan, a step-by-step process is presented in the next sections of the deliverable.

2.2 STANDARDISATION PLAN

The standardisation plan consists of the following steps:

1. Standardisation landscape: The goal is to map the current standardisation landscape to identify key players, trends, and gaps that SAFE-6G can address.
2. Standardisation landscape covering: This aims to provide a comprehensive overview of existing standards and initiatives that are relevant to SAFE-6G, ensuring thorough understanding and strategic positioning.
3. Type of contributions: the objective is to categorise and define the types of contributions that SAFE-6G can make to the standardisation process, such as technical specifications, guidelines, or best practices.

4. Contribution follow-up: The goal is to establish a process for monitoring and evaluating the impact of SAFE-6G's contributions, ensuring they are effectively integrated into the standardisation activities and adjusting strategies as needed.

2.2.1 STANDARDISATION LANDSCAPE

According to the Description of Action (DoA) nine key organizations relevant to the standardisation landscape and related to 6G security and trustworthiness were identified during the proposal preparation phase: ETSI, ITU-T, 3GPP, NIST, IETF, 5G-PPP, NGMN, IEEE and CAMARA.

It is however worth mentioning that 5G-PPP is no longer an active initiative under the Horizon Europe Framework Programme. Instead, the Smart Networks and Services Joint Undertaking (SNS-JU) has taken over the responsibility for implementing the related research and innovation (R&I) programme leading to the conception and standardisation of 6G around 2030.

As mentioned in the introduction section, SAFE-6G is also considering other cybersecurity initiatives that are highly relevant to SDOs because of its key role in enhancing cybersecurity standards and practices across Europe. That is the case for the European Union Agency for Cybersecurity (ENISA) that is dedicated to achieving a high common level of cybersecurity across Europe. Indeed, ENISA plays a key role in shaping European Union (EU) cyber policy, enhances the trustworthiness of Information and Communication Technology (ICT) products, services and processes with cybersecurity certification schemes. The Agency also collaborates with Member States and EU institutions and helps Europe stay prepared for the cyber challenges of tomorrow.

The full list of SDOs and other relevant initiatives with possible impact in SDO's roadmap and relevant to the scope of work for SAFE-6G can be found in Table 1 and Table 2.

Nevertheless, during the project implementation this landscape may evolve with new SDOs or other relevant initiatives.

SDO	***Description***
ETSI	European Telecommunications Standards Institute (ETSI) provides members with an open, inclusive and collaborative environment. This environment supports the timely development, ratification and testing of globally applicable standards for ICT-enabled systems, applications and services. ETSI is a European Standards Organization (ESO) and is the recognized regional standards body dealing with telecommunications, broadcasting and other electronic communications networks and services. ETSI supports the development and testing of globally applicable standards for ICT systems and services across all sectors of industry and society.

ITU-T	International Telecommunication Union (ITU) is the United Nations' specialized agency for ICTs. It facilitates international connectivity in communication networks, allocates global radio spectrum and satellite orbits, develops the technical standards that ensure networks and technologies connect seamlessly, and works to improve access to digital technologies in underserved communities worldwide. The ITU aims to bring digital connectivity to everyone, providing a trusted, multilateral platform to broker international agreements and standards, share knowledge, build capacity, and work with members and partners to spread access to technology around the world. The Study Groups of ITU's Telecommunication Standardization Sector (ITU-T) assemble experts from around the world to develop international standards known as ITU-T. Recommendations which act as defining elements in the global infrastructure of ICTs. Standards are critical to the interoperability of ICTs and whether we exchange voice, video or data messages, standards enable global communications by ensuring that countries' ICT networks and devices are speaking the same language.
3GPP	The 3rd Generation Partnership Project (3GPP) unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as "Organizational Partners" providing their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies. 3GPP specifications cover cellular telecommunications technologies, including radio access, core network and service capabilities, which provide a complete system description for mobile telecommunications. The 3GPP specifications also provide hooks for non-radio access to the core network, and for interworking with non-3GPP networks
NIST	The National Institute of Standards and Technology (NIST) mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. Innumerable products and services rely in some way on technology, measurement and standards provided by the NIST. In terms of communication, secure, reliable, high-speed wireless communications are critical to the economic and national competitiveness of the United States. Advanced communications are enabling dramatic changes in how consumers, manufacturers, governments, and others provide and consume information, transact business, provide and use essential services, and shop, among other tasks. The insatiable societal demand for connectivity will require significant advancements in communication technologies. NIST is currently the U.S. government's leader in fundamental and applied research, standards and government-academia-industry coordination for advanced communications technologies.
IETF	The Internet Engineering Task Force (IETF) is the premier SDO for the Internet. The IETF makes voluntary standards that are often adopted by Internet users, network operators, and equipment vendors, and it thus helps shape the trajectory of the development of the Internet. The IETF's mission is to produce high-quality, relevant technical and engineering documents that influence the way people design, use, and manage the Internet, aiming

	to make the Internet work better. These documents include protocol standards, best current practices, and informational documents of various kinds. The IETF divides its work into several Areas, each comprised of working groups that relate to that Area's focus. Examples of areas include Application and real-time area, Operations and management area, Routing area and Security area.
GMN	The Next Generation Mobile Networks Alliance (NGMN) is a forum founded by world-leading Mobile Network Operators and open to all partners in the mobile industry. Its goal is to ensure that next generation network infrastructure, service platforms and devices will meet the requirements of operators and ultimately will satisfy end user demand and expectations. The vision of NGMN is to provide impactful industry guidance to achieve innovative, sustainable and affordable mobile telecommunication services for the end user with a particular focus on Mastering the Route to Disaggregation / Operating Disaggregated Networks, Green Future Networks and 6G, whilst continuing to support 5G's full implementation. NGMN seeks to incorporate the views of all interested stakeholders in the telecommunications industry and is open to three categories of participants/NGMN Partners: Mobile Network Operators (Members), vendors, software companies and other industry players (Contributors), as well as research institutes (Advisors). NGMN invites all parties across the entire value chain to join the Alliance in these important endeavours.
IEEE	The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. Below, you can find IEEE's mission and vision statements. IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. IEEE will be essential to the global technical community and to technical professionals everywhere and be universally recognized for the contributions of technology and of technical professionals in improving global conditions. IEEE nurtures, develops, and advances the building of global technologies. As a leading developer of industry standards in a broad range of technologies, IEEE SA drives the functionality, capabilities, safety, and interoperability of products and services, transforming how people live, work, and communicate. IEEE standards provide the bricks and mortar for a globally level playing field for innovation; protect public safety, health, and wellbeing; and contribute to a more sustainable future.

Table 1: List of SDOs of interest for SAFE-6G project

Relevant initiative	***Description***
CAMARA	CAMARA is a Linux Foundation open-source project that defines, develops, and tests Application Programming Interfaces (APIs). To match API requirements and publish API definitions and APIs, CAMARA collaborates closely with the Global System for Mobile Communications Association (GSMA) Operator Platform Group. API harmonisation is accomplished by the creation of quick and agile functional code with developer-friendly documentation. The API descriptions and reference implementations are available for free (Apache2.0 license).

	SAFE-6G will consider potential contributions to CAMARA based on 6G trustworthiness related APIs that may be defined within the project activities.
SNS-JU	The SNS-JU is a Public-Private Partnership that aims to facilitate and develop industrial leadership in Europe in 5G and 6G networks and services. The SNS-JU funds projects that shape a solid R&I roadmap and deployment agenda by engaging a critical mass of European stakeholders and facilitating international cooperation on various 6G initiatives. Regarding standardisation, the SNS-JU has the specific objective of facilitating the development of technologies able to meet advanced communication requirements while supporting European excellence in smart networks and services technologies and architectures and their evolution towards 6G. This includes strong European positions on standards, essential patents, and key requirements such as requirements for spectrum bands needed for future advanced smart network technologies.
ENISA	The goal of the Union's ENISA agency is to raise the standard of cybersecurity throughout all of Europe. Founded in 2004 and reinforced by the EU Cybersecurity Act, ENISA supports EU cyber policy, works with Member States and EU agencies to improve the cybersecurity of ICT products, services, and processes with cybersecurity certification schemes, and aids Europe in preparing for future cyber challenges.

Table 2: List of relevant initiatives for SAFE-6G project

2.2.2 STANDARDISATION LANDSCAPE COVERING

Our initial landscape study provides direct access to five critical SDOs and relevant initiatives like ETSI, IETF, 3GPP, CAMARA, and ENISA. This engagement strategy leverages the unique expertise and strategic positions of SAFE-6G project's partners, ensuring that SAFE-6G can effectively contribute to the evolving 6G standardisation landscape.

SAFE-6G engagement Strategy:

Overall SAFE-6G engagement strategy with the SDOs or initiative where the project has representation would be threefold:

1) Use existing standards whenever relevant (e.g., CAPIF).
2) Monitor activities / liaise.
3) Contribute to SDOs activities by providing project's selected insights and/or results to influence standardisation activities ongoing and so future standards as much as this is possible.

This overall SAFE-6G SDO/initiative engagement strategy will obviously also be adapted to each of the specificities of the SDOs/initiatives in scope:

- ETSI: SAFE-6G involvement with ETSI will focus on Industry Specification Groups (ISGs), particularly those dealing with Network Functions Virtualisation (NFV), AI, and network automation. By contributing to the development of technical standards within these groups, SAFE-6G may ensure that the security and functionality of these technologies are robustly addressed.

- IETF: SAFE-6G engagement with the IETF will be around Security Automation and Continuous Monitoring (SACM) Architecture, which is critical for dynamic security information exchange.
- 3GPP: SAFE-6G can support SA3 by providing security analyses and mitigation techniques for AI/ML-based network functions. It can also contribute expertise on privacy-preserving data sharing and protection mechanisms for AI/ML training datasets. In addition, SAFE-6G's work can inform SA3 security requirements for Network Data Analytics Function (NWDAF), especially around secure analytics, model integrity, and trusted data collection.
- CAMARA: As an initiative focused on API development and harmonization, CAMARA offers a unique platform for SAFE-6G to contribute to new or existing CAMARA APIs in order to address 6G trustworthiness aspects too.
- SNS-JU: Besides SNS-JU working groups (WGs) where SAFE-6G partners are involved, SAFE-6G will rely also on the 6G SNS tracker tools to follow activity regarding standardisation.
- ENISA: Working with ENISA, we will focus on enhancing cybersecurity policies and certification schemes across Europe.

Table 3 presents the potential WGs of interest that have been already identified during these first eight months of the project:

SDO/RI	***WG/sub-project***	***Description***
ETSI	ETSI SAI	TECHNICAL COMMITTEE (TC) SECURING ARTIFICIAL INTELLIGENCE (SAI) The aim of TC SAI is to develop technical specifications that mitigate against threats arising from the deployment of AI, and threats to AI systems, from both other AIs, and from conventional sources. Whilst in the short to medium term the focus of TC SAI will be on the application of ML the group shall also give guidance and evaluation reports to ETSI and its stakeholders on the wider developments of AI.
ETSI	ISG NFV	INDUSTRY SPECIFICATION GROUP (ISG) NETWORK FUNCTIONS VIRTUALISATION (NFV) ISG NFV has developed numerous specifications and reports for the virtualization of network functions, with focus on the management and orchestration of virtualized resources. NFV specifications describe and specify virtualization requirements, NFV architecture framework, functional components and their interfaces, as well as the protocols and the APIs for these interfaces. ISG NFV also studies Virtual Network Function (VNF) performance, reliability, and resiliency matters, analyses the security challenges linked to virtualization (trust, attestation, regulation) and specifies associated requirements.

ETSI	ISG ZSM	ZERO TOUCH NETWORK & SERVICE MANAGEMENT (ZSM) The pivotal deployment of 5G and network slicing has triggered the need for a radical change in the way networks and services are managed and orchestrated. These new deployments come with an extreme range of requirements, including massive seemingly infinite capacity, imperceptible latency, ultra-high reliability, personalized services with dramatic improvements in customer-experience, global web-scale reach, and support for massive machine-to-machine communication. The ETSI ZSM group aims at accelerating the definition of the required end-to-end architecture and solutions.
ETSI	ISG MEC	INDUSTRY SPECIFICATION GROUP (ISG) ON MULTI-ACCESS EDGE COMPUTING (MEC) ISG MEC group creates a standardized, open environment allowing the efficient and seamless integration of applications from vendors, service providers, and third parties across multi-vendor MEC platforms. The work benefits several entities within the value chain, such as mobile operators, application developers, Over the Top players, Independent Software Vendors, telecom equipment & IT platform vendors, system integrators, and technology providers, who are all interested in delivering services based on MEC concepts. The group develops normative specifications, informative reports and white papers.
ETSI	SFG OCF	SOFTWARE DEVELOPMENT GROUP OPENCAPIF (OCF) The SDG OCF is developing an open-source Common API Frameworks, as described by 3GPP, allowing to expose and consume APIs in a secure and consistent way. SDG OCF collaborates with other ETSI software and open-source projects, such as Open-Source MANO, TeraFlowSDN and OpenSlice, in order to share best practices and find synergies, joint activities, and opportunities for component reuse.
3GPP	SA 3	3GPP SA 3 Within the 3GPP Technical Specification Group Service and System Aspects (TSG SA), the main objectives of the group SA 3 include defining the requirements and specifying the architectures and protocols for security and privacy in 3GPP systems. SA 3 is currently responsible for security in the 5G System including the 3GPP enhancements for Internet of Things (IoT) and vertical industries. Furthermore, since the introduction of the 5G System, SA 3 has been developing the security requirements and test cases for network equipment implementing any of the new 5G Network Functions. SA 3 works include also security aspects concerning NWDAF (Network Data Analytics Function), the network function defined by 3GPP that enables network data analysis for mobile core network.

IETF	Security area	IETF SECURITY AREA The Security Area is the home for working groups focused on security protocols. They provide one or more of the security services: integrity, authentication, non-repudiation, confidentiality, and access control. Since many of the security mechanisms needed to provide these security services employ cryptography, key management is also vital. The Security Area intersects with all other IETF Areas, and the participants are frequently involved with activities in the working groups from other areas. This involvement focuses upon practical application of Security Area protocols and technologies to the protocols of other Areas.
CAMARA	Quality on demand	SUBGROUP QUALITY ON DEMAND The subgroup proposes service APIs for "Quality on Demand". It provides the users with the ability to: i) set quality for a flow within an access network connection (e.g. mobile device connection or fixed access between a home gateway and the service providers gateway router); ii) get notification if the network cannot fulfil.
SNS-JU	6G SNS Standards Tracker	6G SNS STANDARDS TRACKER SNS-JU deployed means to better follow works on pre-standardisation and standardisation. Indeed, tracking progress in R&I developments is crucial for staying alert to evolving needs and fostering potential synergies within the SNS R&I project community. This platform not only keeps the community informed about the activities of SDOs and relevant telecommunications standards but also aids in navigating the evolving landscape of 5G transitioning towards 6G.
ENISA	Emerging Technologies	ENISA remains alert and prepared with the best up-to-date information and advice concerning cybersecurity developments in critical emerging areas such as the IoT, 5G communications, ML and AI. Indicative of this targeted focus was ENISA's Artificial Intelligence Threat Landscape report of late 2020 and Supply Chain Threat Landscape of 2021, as well as the works of ENISA on IoT (baseline security recommendations, secure software development lifecycle and Industry 4.0).

Table 3: SDO and relevant initiatives subgroups

By strategically engaging with these SDOs and initiatives, SAFE-6G aims to ensure that the standards developed are comprehensive, forward-looking, and capable of addressing the unique challenges posed by trustworthy 6G networks/systems. This approach will also help in building a robust foundation for the wide adoption and implementation of SAFE-6G technologies.

2.2.3 TYPE OF CONTRIBUTIONS

SAFE-6G's contributions towards SDOs and relevant initiatives as previously introduced will take various forms.

- **Monitoring activities** within each SDO or initiative will keep us informed and ensure our contributions are relevant and timely.
- **Active participation** in meetings and workshops will allow us to present our research findings and proposed standards effectively.
- **Engaging representatives from SDOs in SAFE-6G meetings** will foster collaboration and alignment with ongoing efforts.
- **Proposing new study and work items that may lead to new standards based on SAFE-6G results**, such as components, architectures, and methodologies, will ensure our innovations are integrated into the broader standardisation landscape.

These contributions will be carried out directly by project partners or through participation in the SNS/6G-IA WGs (especially under the Pre-standardisation 6G-IA WG), ensuring broad representation and impact.

2.2.4 CONTRIBUTION FOLLOW-UP

To ensure systematic follow-up of contributions, a template will be used to document and share all activities related to the standardisation process. This template will capture key details such as the action type, contribution made, and any relevant comments. By maintaining thorough records, SAFE-6G can track progress, identify areas for improvement, and ensure alignment with Key Performance Indicators (KPIs). Table 4 illustrates content examples.

Lastly, regular meetings (each quarter) will be organized in the context of WP6 to analyse SDOs roadmaps and project works and results that could be relevant for the SDOs and relevant initiatives.

Action #	***Date***	***SDO/Relevant initiative***	***Action type***	***SAFE-6G contribution***	***Comments***
1	TBD	ETSI	Meeting	Presented AI-driven security protocols to ETSI	Awaiting feedback
2	TBD	IETF SACM	Workshop	Proposed ML techniques for IETF SACM architecture	Follow-up required
…					

Table 4: Follow-up table (with illustrative examples)

2.3 NEXT STEPS

The next steps in our standardisation efforts will focus on:

- **Leveraging ongoing engagement**: Create and maintain active engagement with identified SDOs and relevant initiatives to ensure that whenever opportunities are found, contributions are timely and impactful.
- **Landscape Monitoring**: Continuously monitoring the standardisation landscape to identify new opportunities and/or relevant SDOs or initiatives that align with project goals.
- **Standardisation Plan Updates**: Regularly updating the standardisation plan to reflect new developments, contributions, and strategic adjustments as necessary.
- **Reporting on activities performed**: Documenting all contributions and engagement activities to provide transparency and track progress against project's KPIs.
- **Reporting on performance**: evaluating the effectiveness of our standardisation efforts (through KPIs defined and that apply) and ensure continuous alignment with project goals.

Lastly, it is important to share the outcomes of the standardisation efforts with key stakeholders to keep them informed about the latest advancements and the project's impact. This can be achieved through publishing papers, presenting at conferences, and collaborating with industry associations like 6G-IA, among others.

3 INNOVATION, EXPLOITATION AND TECHNOLOGY TRANSFER

3.1 INTRODUCTION TO INNOVATION AND EXPLOITATION

Innovation and exploitation are the driving forces behind the SAFE-6G project. Effective management of Intellectual Property Rights (IPRs) is essential in harnessing innovation and ensuring that new developments are effectively protected and utilized. This chapter outlines the strategic phases and milestones designed to foster innovation and maximize exploitation of project outcomes through robust IPR management.

Figure 1 illustrates the timeline with the phases and milestones for the three years of the project. Each year is divided into specific phases, each with clearly defined milestones to guide the project's progress.

Year 1 (2024):

- Phase 1: Background IP Identification (M01 to M06).
- Phase 2: Foreground IP Identification & Definition of Business Tools (M07 to M12).

Year 2 (2025):

- Phase 3: Key Exploitable Results (KER) Identification & Exploitation Plans (M13 to M18).
- Phase 4: Business Intelligence (BI) Tools & Initial Market Analysis (M19 to M24).

Year 3 (2026):

- Phase 5: IP Finalizing (M25 to M27).
- Phase 6: IPR Ownership (M28 to M30).
- Phase 7: Final Business and Market Analysis (M31 to M36).

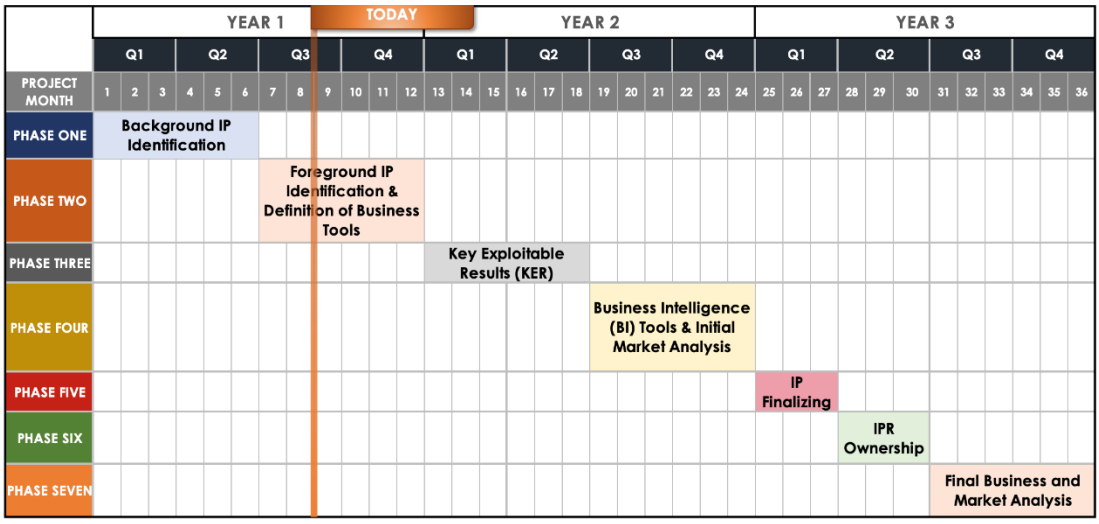

Figure 1: Phases of Innovation, Exploitation, and IPR Management

3.2 Phases of Innovation, Exploitation, and IPR Management

The SAFE-6G project follows a structured approach to innovation and exploitation, divided into distinct phases with specific milestones. This ensures systematic development, protection, and utilization of intellectual property assets.

3.2.1 Phase 1: Identifying Background IP

During the first 6 months, the identification of Background IP assets took place, updating those already outlined in the Consortium Agreement (CA), making it a valuable starting point for populating the list.

MS1 (M01-M03): In the first 3 months of the project, initial meetings were conducted to outline specific tasks and responsibilities for identifying background IP (section 3.5). This phase ensures that all relevant parties understand their roles and the importance of accurately documenting existing IP assets.

MS2 (M04-M06): During the subsequent three months, gathering detailed information on partners' background assets using a structured questionnaire was the focus of this activity. This information is then organized into a BG to IPR Matrix to provide a clear overview of the existing IP landscape within the consortium.

At this point in the project, the partner-specific sections that follow mainly describe background assets and initial exploitation intentions, which is consistent with the current maturity of the technical results. As the work progresses, these initial plans will be expanded in the next exploitation deliverable (D6.4), where WP6 will integrate foreground results, clarify IP ownership and access conditions, and outline more detailed exploitation roadmaps for each participant. The final WP6 exploitation deliverable will then update and consolidate these elements, using the final technical and pilot outcomes to ensure a clear and well-coordinated exploitation of the project results.

3.2.2 Phase 2: Foreground IP Identification & Business Tools Definition

In this phase, the primary focus is on two key actions: identifying all foreground IPs and defining the business tools essential for exploiting these innovations.

MS3 (M07-M09): After successfully collecting the Background assets in the first milestone, the subsequent phase involves the acquisition of all pertinent Foreground IPs. Foreground IPs may either be derived from Background assets (e.g., additional functions) or entirely new assets created during the project. A structured template is used to document these IPs, with indicative questionnaires needed to gather relevant information provided in Figure 2 below.

Asset Name	Asset Type	Asset description	Authors	Availability	Protection	Specific limitations and/or	Comments	Objections	Decisions	Status
<Short name of the Foreground asset>	<Type of the asset: 'Platform Component', 'Building Block', 'Application', ...>	<Description of the asset that is sufficient to identify related intellectual properties>	<Authors of the asset>	<Describe how the asset is or will be made available to the Consortium and others>	<Describe already applied or planned actions to protect related intellectual properties>	<describe specific limitations for implementation or exploitation, if any>	<comments	<objecting partners and reasoning>	<EDC decisi	<Asset status: pending, agreed or rejected>

Figure 2: Foreground Asset Template

MS4 (M10-M12): During this milestone, it is essential to define all the business tools to be employed. While some tools may already be specified in the Grant Agreement (GA), additional tools better suited for business analysis can be proposed. Below are some representative tools with the possibility of being suggested additionally based on the requirements and needs of the project:

Business Model Canvas

- Description: A strategic management tool to visualize and assess business models.
- Purpose and Objectives: To map out the building blocks of the SAFE-6G project's business model, including value propositions, customer segments, channels, and revenue streams.
- Technical Specifications: Available as a printable template or through various online platforms (e.g., Strategyzer).
- Implementation Plan: Conduct workshops with key stakeholders to fill in each section of the canvas.
- Evaluation Criteria: Completeness of the canvas, stakeholder alignment, and clarity of the business model.

SWOT Analysis

- Description: A tool to identify strengths, weaknesses, opportunities, and threats related to the SAFE-6G project.
- Purpose and Objectives: To provide a comprehensive overview of internal and external factors that could impact the project.
- Technical Specifications: Can be created using standard office software or specialized tools like MindTools.
- Implementation Plan: Facilitate brainstorming sessions with the project team to populate each quadrant.
- Evaluation Criteria: Depth and accuracy of the analysis, actionability of insights.

PESTLE Analysis

- Description: A framework to analyse the macro-environmental factors affecting the project.

- Purpose and Objectives: To evaluate the political, economic, social, technological, legal, and environmental factors influencing SAFE-6G.
- Technical Specifications: Available as templates in various office software suites.
- Implementation Plan: Assign team members to research and report on each PESTLE component.
- Evaluation Criteria: Relevance and thoroughness of the factors identified, and impact assessment.

By utilizing these tools, the SAFE-6G project can ensure a comprehensive and strategic approach to business analysis, adapting to evolving project requirements and opportunities.

3.2.3 Phase 3: Key Exploitable Results (KER) Identification & Exploitation Plans

This phase is pivotal, encompassing two fundamental aspects: identifying the project's KERs and creating individual exploitation plans for each project partner.

MS5 (M13-M15): In this milestone, the primary objective is to collect the essential exploitable outcomes of the project. The initial step involves reviewing the GA for references to the project's overarching exploitable assets. Subsequently, input is solicited from project partners through additional questionnaires, focusing on KERs. Collaboration with the Technical Coordinator is emphasized to identify KERs that might be overlooked.

MS6 (M16-M18): This milestone involves developing individual exploitation plans for each partner concerning the previously identified KERs. Each partner can articulate their preferred approach, outlining precise strategies and timelines for utilizing these identified strengths.

Note: To streamline the process and recognizing that partners often face challenges when filling out multiple questionnaires, one effective approach is to present the comprehensive strategic plan along with associated instructions and questionnaires in a single online IPR Matrix. This not only provides partners with the convenience of a structured framework but also allows them ample time to complete their submissions.

3.2.4 Phase 4: Business Intelligence Tools & Initial Market Analysis

In this phase, the objective is to ensure that all requisite information concerning the project's assets is accumulated. This comprehensive information will serve as the foundation for both business and initial market analysis.

MS7 (M19-M21): With the definition of business tools completed, pertinent information is collected through tailored questionnaires aligned with the chosen tools. Specific areas where these tools will be applied are determined, such as using PESTLE analysis for the entire project, Business/LEAN canvas for the Use Case, and SWOT analysis individually for each KER.

MS8 (M22-M24): The market analysis is directed toward the specific domains and sectors within which the project is actively engaged. It involves identifying potential stakeholders and clients and comparing competitors pinpointed through previous questionnaires with the project's positioning and objectives.

Note: The duration of this milestone can be flexible to accommodate preferences, but achieving a high-quality outcome may require substantial time and effort.

3.2.5 Phase 5: Finalizing IP

During this timeframe, the technical aspects should be stabilised, with no new assets anticipated to be identified.

MS9 (M25-M27): This period marks the completion of the IPR Matrix, Individual Exploitation Plans, and all tables within the IPR Management roadmap. Ensuring all aspects are finalized prepares the project for the next crucial phase of ownership establishment.

3.2.6 Phase 6: Establishing IPR Ownership

This milestone is of exceptional significance as it aims to establish the ownership of IPRs among the partners.

MS10 (M28-M30): To achieve this, a series of teleconferences and peer-to-peer (P2P) meetings with the pertinent partners will be conducted to finalize the ownership arrangements. The details of these ownership agreements will be documented accordingly.

3.2.7 Phase 7: Final Business and Market Analysis

In this ultimate phase, it is crucial to conduct a thorough and meticulous re-evaluation of all documents and analyses prepared throughout the project.

MS11 (M31-M33): The primary aim is to scrutinise each component with a discerning eye, seeking potential modifications or updates to enhance the quality and accuracy of the final deliverable. This process ensures that all information and insights are up to date, well structured, and poised for inclusion in the conclusive deliverable.

Exploitation Activities Roadmap: A comprehensive roadmap will outline the necessary activities at all levels (regulators, technology development/innovation, and industry) to pave a straightforward way for the introduction and sustainable use of SAFE-6G outcomes. This roadmap will relate the required activities across these sectors, ensuring a cohesive and coordinated approach to the successful deployment and lasting impact of the project's results, as presented below:

Engagement with Regulators:

- Objective: Ensure compliance with national and international regulatory frameworks.
- Actions:
  - Identify relevant regulatory bodies and establish communication channels.
  - Participate in regulatory consultations and standardisation activities.
  - Advocate for supportive policies and regulations that favour SAFE-6G deployment.
- Stakeholders Involved: Project team, legal advisors, regulatory bodies.
- Expected Impact: Smooth regulatory approval process, reduced compliance risks.

Compliance and Certification:

- Objective: Achieve necessary certifications for SAFE-6G technologies.
- Actions:
  - Conduct thorough reviews of regulatory requirements.
  - Prepare and submit documentation for certification.
  - Implement any required modifications based on feedback from certifying bodies.
- Stakeholders Involved: Compliance team, certification bodies.
- Expected Impact: Certified and compliant SAFE-6G technologies ready for market.

Research and Development (R&D) Activities:

- Objective: Continue innovation to refine and enhance SAFE-6G technologies.
- Actions:
  - Identify key areas for further R&D.
  - Secure funding and partnerships for ongoing R&D activities.
  - Foster collaboration with academic and industry research institutions.
- Stakeholders Involved: R&D team, academic partners, industry partners.
- Expected Impact: Continuous improvement and innovation in SAFE-6G technologies.

IP Management:

- Objective: Protect and manage IP generated by the project.
- Actions:
  - Identify and document all foreground IPs.
  - File patents and other IP protection measures.
  - Develop IP licensing strategies.
- Stakeholders Involved: IP management team, legal advisors.
- Expected Impact: Secured IP, revenue from IP licensing.

Market Analysis and Strategy:

- Objective: Develop a comprehensive market strategy for SAFE-6G products.
- Actions:
  - Conduct market research to identify target markets and customer segments.
  - Develop marketing and sales strategies tailored to identified markets.
  - Create business models to support commercial exploitation.
- Stakeholders Involved: Market analysis team, business development team.
- Expected Impact: Clear market entry strategies, increased market penetration.

Partnership and Ecosystem Development:

- Objective: Build a robust and sustainable ecosystem of partners and stakeholders.
- Actions:
  - Identify and engage with potential industry partners.

- Establish strategic alliances and collaborations.
- Participate in industry events and networks to promote SAFE-6G.

- Stakeholders Involved: Partnership team, industry partners.
- Expected Impact: Strong industry partnerships, enhanced ecosystem support.

3.3 IMPACT MEASUREMENT FRAMEWORK AND ROADMAP

At this stage of the project, WP6 primarily focuses on defining the exploitation framework, identifying preliminary Key Exploitable Results (KERs) and capturing partner-level exploitation intentions. While quantitative, activity-based indicators (e.g. number of dissemination events, standardisation contributions, open-source releases) are already being tracked, the assessment of impact beyond these counts will follow a staged approach aligned with the maturity of technical results.

In particular, WP6 will implement a structured impact measurement framework that combines quantitative KPIs with qualitative criteria related to technological, market and societal dimensions. This framework will be progressively refined and applied as follows:

In D6.4 (Intermediate Exploitation and Impact Assessment), WP6 will introduce and apply a multi-criteria evaluation of the main KERs, covering aspects such as technological maturity, market and adoption potential, contribution to standardisation and broader economic/societal impact. This will be complemented by use-case–specific analyses (e.g. Lean Business Canvas, SWOT, ecosystem mapping) to characterise expected impact in the targeted verticals.

In the final WP6 deliverable (Final Exploitation and Impact Assessment), this evaluation will be updated using the final technical, validation and pilot results. WP6 will provide a consolidated qualitative–quantitative impact assessment, explicitly linking the exploitation outcomes of the project to its expected scientific, industrial and societal impacts.

By explicitly defining this impact measurement roadmap already in D6.2, we ensure that impact is not limited to numerical activity metrics, but is systematically assessed and reported as the project's exploitable results and validation evidence become available in D6.4 and the final WP6 deliverable

3.4 EXPLOITATION PLAN CURRENT STATUS

As the 8th month of the project concludes, the initial phases have been successfully completed according to the timeline. This includes documenting the background contributions of each partner and partially concluding the first phase of foreground IP identification. Each partner has provided insights into their potential exploitation plans, which are detailed in the following subsections. These subsections describe each partner's background and conclude with a brief description of their potential individual exploitation plans.

At this stage of the project, the emphasis of WP6 is on establishing the overall innovation and exploitation framework and collecting preliminary partner intentions, while the main technical results are still maturing. Consequently, the exploitation aspects presented here remain high-level by design. In the next phase, these foundations will be substantially expanded in D6.4, where we will refine and prioritise Key Exploitable Results, develop more detailed partner-specific and joint exploitation plans

(including initial business-model considerations) and strengthen links with standardisation and ecosystem activities. The final WP6 exploitation deliverable at the end of the project will then consolidate these developments into a coherent commercialisation roadmap, aligned with the validated technical outcomes and pilot evidence.

Also , the market analysis are preliminary, as the main technical results and use-case assets are still under development. The current analysis therefore focuses on identifying initial target sectors and indicative application domains rather than providing a detailed segmentation or go-to-market plan. In the next phase (D6.4), WP6 will deepen this work by refining target segments, characterising representative adopter profiles and competitor landscapes, and linking these to more concrete partner-specific and joint exploitation plans, including first business-model elements around the project use cases. The final WP6 exploitation deliverable at the end of the project will then consolidate these elements into a more precise and evidence-based market strategy and commercialisation roadmap, informed by pilot results and stakeholder feedback.

3.5 Partner Background Contributions – Exploitation Phase I

Following the detailed exploration of the phases of innovation, exploitation, and IPR management, it is essential to delve into the specific contributions and limitations of each project partner. Understanding these contributions is critical for leveraging their strengths and addressing any potential limitations in the SAFE-6G project.

3.5.1 TELEFÓNICA INNOVACIÓN DIGITAL (TID)

Background: Telefónica provides OpenCAPIF, a management layer that standardizes API consumption in a 3GPP format.

Key Assets:

- OpenCAPIF source code under Apache License 2.0.

Potential Limitations for Exploitation: There are no specific limitations for exploiting OpenCAPIF within the project's scope.

Preliminary individual exploitation plan: Telefónica plans to leverage the outcomes from the SAFE-6G project to enhance its OpenCAPIF solution. By integrating new features and capabilities developed during the project, Telefónica aims to provide more advanced and standardized API management solutions, facilitating easier and more efficient integration of network resources for developers and service providers.

3.5.2 NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (NSCRD)

Background: NSCRD contributes the 6G-SANDBOX platform, an advanced experimental facility for 5G/6G technologies. This platform supports large-scale showcasing events, field trials, and various core implementations, ensuring efficient delivery of low-latency and high-bandwidth applications.

Key Assets:

- Open5GS for distributed Network Function (NF) deployments.
- Amarisoft 5G Core network solution.
- Network Exposure Function (NEF) simulator for network programmability.

Potential Limitations for Exploitation: NSCRD's platform and technologies are designed for experimental and testing purposes within the project, with no commercial applications.

Preliminary individual exploitation plan: NSCRD plans to utilise the outcomes of the SAFE-6G project to enhance its 6G-SANDBOX platform. By integrating new technologies and methodologies developed during the project, NSCRD aims to provide a more advanced and versatile testing environment for future 5G and 6G applications, facilitating innovation and collaboration among various stakeholders.

3.5.3 THALES SIX GTS FRANCE SAS (THA)

Background: Thales offers open-source Python modules for explaining ML models with Shapley Values and generating counterfactual examples.

Key Assets:

- Shapkit for local explanation of ML models.
- CFKit for counterfactual examples on tabular datasets.
- TSCFKit for time series datasets.

Potential Limitations for Exploitation: These tools are open-source and available for use within the project, under appropriate licensing terms.

Preliminary individual exploitation plan: Thales plans to leverage the outcomes from the SAFE-6G project to enhance its open-source ML tools. By integrating new features and capabilities developed during the project, Thales aims to provide more advanced and accessible ML model explanation and counterfactual generation tools, benefiting the broader AI research and development community.

3.5.4 INQBIT INNOVATIONS SRL (IQBT)

Background: InQbit's contributions are based on extensive experience from various projects such as PHYSICS, Evolved5G, and aerOS. Their expertise includes cloud computing, end-to-end communication security, Self-Sovereign Identity (SSI), and virtualized meta operating systems.

Key Assets:

- Function-as-a-Service (FaaS) methodologies.
- Security functions and SSI solutions.
- Virtualized meta operating systems for IoT-edge-cloud continuum.

Potential Limitations for Exploitation: Contributions are intended for the SAFE-6G project, with further development required for commercial use.

Preliminary individual exploitation plan: InQbit plans to extend its capabilities by integrating the outcomes from the SAFE-6G project into its existing solutions. By leveraging new methodologies and technologies, InQbit aims to enhance its FaaS, security, and SSI offerings, providing more comprehensive and secure solutions for IoT-edge-cloud environments.

3.5.5 IT ATOS IT SOLUTIONS AND SERVICES IBERIA SL (ATOS)

Background: ATOS primarily contributes a robust MLOps Framework, supporting the development and execution of AI/ML algorithms across various domains. This framework facilitates the entire lifecycle management of AI/ML models, from design and training to deployment in production environments, integrating seamlessly into management and orchestration domain control loops.

Key Assets:

- MLOps Framework for AI/ML lifecycle management.

Potential Limitations for Exploitation: Exploitation rights for the MLOps Framework will be agreed upon on an ad hoc basis, with no provision of source code.

Preliminary individual exploitation plan: ATOS plans to extend its expertise in AI/ML model management through the SAFE-6G project by offering enhanced consulting services. These services will focus on helping organizations implement and optimize AI/ML solutions within their 5G and 6G networks, ensuring seamless integration and improved performance across various applications.

3.5.6 PANEPISTIMIO DYTIKIS ATTIKIS (UNIWA)

Background: UNIWA provides computational resources based on cloud and HPC infrastructure, accessible via a secure encrypted tunnel (VPN).

Key Assets:

- Computational infrastructure for project use.

Potential Limitations for Exploitation: Access rights are limited to the CA and exclude commercial use.

Preliminary individual exploitation plan: UNIWA intends to leverage the computational advancements from the SAFE-6G project to enhance its infrastructure further. By incorporating new technologies and insights gained from the project, the University aims to offer more robust and efficient computational resources for research and development in telecommunications and related fields.

3.5.7 SPACE HELLAS ANONYMI ETAIREIA SYSTIMATA KAI YPIRESIES TILEPIKOINONION PLIROFORIKIS ASFALEIAS – IDIOTIKI EPICHEIRISI PAROCHIS YPERISION ASFA (SHG)

Background: SHG focuses on the design and development of a privacy function in 6G networks – a functionality that aims to ensure the privacy of stakeholders (operator, service user etc.) in a 5G/6G network, starting from scratch and building on extensive experience from past projects.

Key Assets:

- The work starts from scratch drawing on existing experience in privacy and security within 6G networks.

Potential Limitations for Exploitation: No specific limitations exist for exploiting SHG's work, as they own the results generated by their tasks. Further development and demonstration are required prior to exploring potential commercial use.

Preliminary individual exploitation plan: SHG plans to leverage the developments from the SAFE-6G project to enhance its privacy and security solutions for 6G networks. By integrating new insights and technologies gained during the project, SHG aims to provide more robust and comprehensive security solutions, ensuring the privacy and protection of data in next-generation communication networks.

3.5.8 INFOLYSIS P.C. (INF)

Background: INFOLYSIS brings to the project its advanced chatbot platforms, which feature intent-driven chatbots with indoor localization, deep learning, Natural Language Processing (NLP), and generative AI technologies. These platforms are designed for creating custom conversational chatbots and statistical dashboards.

Key Assets:

- AI enabled custom-made conversational chatbots and statistical dashboards.
- Chatbot-based platform for targeted notifications/messaging.

Potential Limitations for Exploitation: INFOLYSIS will further develop and provide its chatbot-based services and products for the project scope only, without source code provision, and with ownership retained by INFOLYSIS. Further commercialisation and exploitation rights might be determined on an ad hoc basis.

Preliminary individual exploitation plan: INFOLYSIS intends to leverage the SAFE-6G project outcomes to enhance its chatbot solutions further. By incorporating new technologies and insights gained during the project, in parallel, INFOLYSIS aims to offer more sophisticated and context-aware chatbot services, improving customer engagement and operational efficiency for clients across various sectors.

3.5.9 EBOS TECHNOLOGIES LIMITED (EBOS)

Background: eBOS offers patented processes for integrating Software-Defined Perimeters (SDPs) in 5G/6G networks and technologies ensuring security, privacy, and trustworthiness. Their contributions also include security testing and system performance evaluation for 6G networks.

Key Assets:

- Patented SDP integration processes.
- Security and privacy technologies.
- Performance evaluation tools.

Potential Limitations for Exploitation: Technologies developed by eBOS are not stand-alone solutions and they must be integrated with a Core provided by a third party.

Preliminary individual exploitation plan: eBOS plans to use the insights and advancements from the SAFE-6G project to bolster its security and privacy solutions. By integrating these innovations, eBOS aims to provide enhanced security testing and performance evaluation services, helping organizations safeguard their 5G and 6G networks against emerging threats.

3.5.10 UNIVERSITAT POLITÈCNICA DE VALÈNCIA (UPV)

Background: UPV provides the aerOS metaOS, which facilitates the registration, management, and monitoring of minimal processing units for Edge IoT devices, and coordinates diverse computing resources.

Key Assets:

- aerOS runtime for service execution and coordination.

Potential Limitations for Exploitation: Currently, aerOS is for internal project use only, pending the finalization of licensing details.

Preliminary individual exploitation plan: UPV intends to leverage the advancements from the SAFE-6G project to enhance its aerOS metaOS. By integrating new technologies and insights gained during the project, UPV aims to provide more robust and efficient solutions for managing and coordinating distributed Cloud, Edge and IoT devices, facilitating the seamless execution of services across a continuum of computing resources.

3.5.11 EIGHT BELLS LTD (8BELLS)

As the Innovation and Exploitation Manager for the SAFE-6G project, 8BELLS brings expertise in telecommunications, particularly in 5G and 6G network technologies. Its focus includes advanced network management, orchestration, and cloud safety solutions, especially in differential privacy and cybersecurity. This expertise is critical for advancing the SAFE-6G project by enhancing network performance, security, and scalability.

Key Assets:

- Expertise in developing 5G and 6G network solutions.
- Advanced network management and orchestration.
- Techno-economic assessments of telecommunications deployments.
- Specialization in differential privacy and cybersecurity for cloud safety solutions.

Potential Limitations for Exploitation: 8BELLS' technologies and methodologies do not have additional limitations on their use, except as outlined in the GA of the SAFE-6G project.

Preliminary individual exploitation plan: 8BELLS intends to extend its exploitation plan primarily through internal consulting services. By integrating the expertise and insights gained from the SAFE-6G project, 8BELLS aims to provide specialized advice on the effective deployment and optimization

of 5G and 6G technologies. This approach meets the specific needs of businesses seeking to utilize emerging technologies by providing customized solutions aligned with their operational demands.

3.5.12 CUMUCORE OY (CMC)

Background: CUMUCORE provides a 5G core for private industrial networks, offering documentation and REST interfaces for NEF and CNC.

Key Assets:

- 5G core binaries for research purposes.

Potential limitations for Exploitation: The 5G core is not for commercial installations and is intended for research within the project.

Preliminary individual exploitation plan: CUMUCORE plans to utilize the insights and advancements from the SAFE-6G project to enhance its 5G core solutions. By integrating new functionalities and capabilities developed during the project, CUMUCORE aims to provide more robust and secure 5G core solutions for private industrial networks, facilitating advanced research and development in the field.

3.5.13 IMMERSION (IMM)

Background: Immersion provides extensive expertise in the design and production of hardware and software solutions for data visualization and interaction. This includes virtual reality, augmented reality, mixed reality, 3D environments, multimodal systems, touch systems, haptic and tangible interfaces, and collaborative tools for synchronous local or remote collaboration.

Key Assets:

- Mixed reality applications for interacting with 3D content, offering an immersive experience.
- Collaboration software, enabling flexible sharing and annotation of digital information.
- Interaction and visualization techniques for a flexible and intuitive work environment.

Potential Limitations for Exploitation: The knowledge and tools developed by Immersion will be utilized specifically for the SAFE-6G project and are not intended for commercial use outside the project's scope.

Preliminary individual exploitation plan: Immersion plans to leverage the expertise and technologies developed in the SAFE-6G project to enhance its portfolio of mixed reality and collaborative solutions. By integrating these advancements into their existing offerings, Immersion aims to provide cutting-edge tools for various industries, ensuring that businesses can benefit from innovative interaction techniques and data visualization solutions.

3.5.14 KEYNECTIS

Background: Keynectis provides an SSI solution composed of components for registry, DID, and VC management, as well as authentication and authorization.

Key Assets:

- SSI solution accessible via SaaS for the project's duration.

Potential Limitations for Exploitation: Access to the SSI solution is provided on a royalty-free basis for the project's sole purpose and duration. Exploitation rights will be determined on an ad hoc basis.

Preliminary individual exploitation plan: Keynectis aims to leverage the developments from the SAFE-6G project to enhance its SSI solutions further. By incorporating new features and capabilities gained from the project, Keynectis intends to provide more robust and secure identity management services, catering to the growing needs for privacy and security in digital interactions.

3.6 Next Steps

Next steps will focus on refining these individual exploitation plans and organizing collaborative exploitation strategies. These will be based on market strategy and market penetration, considering the expected outcomes in the upcoming phases. Additionally, an initial IP strategy with a high priority on IP protection has been planned, considering the importance of patents for commercialization. Just as in 5G, patents are expected to play a crucial role in 6G, and special attention will be given to preparing the right strategy.

The project will develop a specific strategy for using patents for commercial offensive and defensive purposes, in line with the strategy of the partners, especially the industrial partners, and the litigation risks that each partner faces in their domain. The objective is to follow an aggressive tactic to ensure that the project's outcomes enhance not only the positions of the individual partners and the consortium but also the general goals of the SNS initiative.

The detailed patent strategy will be part of the upcoming deliverables, providing more mature insights about the potential impact of the expected results. This will include a comprehensive review of the potential IP and its strategic use for maximizing the project's commercial and strategic benefits.

4 CONCLUSION

The deliverable presents initial plans and roadmaps for the standardisation, innovation and exploitation works.

Regarding standardisation, the plan aims at covering the largest number of relevant SDOs or relevant initiatives and at sharing project results with them. Contributions may take different forms: monitoring activities, active participation, engaging representative from SDOs, proposing new study and work items that may led to new standards.

Regarding innovation and exploitation, by following a structured approach divided into distinct phases, the project ensures systematic development, protection, and utilization of IP assets. The specific contributions and limitations of each partner have been explored, emphasising their unique expertise. Understanding these contributions, allows leveraging strengths and addressing potential limitations effectively. By integrating the insights and expertise of all partners, the SAFE-6G project is well positioned to enhance network performance, security, and scalability, thereby achieving its strategic goals and maximising the potential for successful exploitation of new technologies.

This deliverable will serve as a roadmap and guidelines for the standardisation, innovation and exploitation works for SAFE-6G. The realization and implementation of these plans will be reported for intermediate version in deliverable *D6.4-Standardisation, Innovation, Exploitation and Technology Transfer Activities (Intermediate)* due on M18 and in final version of *D6.6-Standardisation, Innovation, Exploitation and Technology Transfer Activities (Final)* due by the end of the project.