CybAllaince WP4 Annual Report 2023
Innovation and Long-term Sustainability

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Executive Summary

This report presents the progress and achievements of Work Package WP4, encompassing three primary components: Experience Sharing (WP.4.1), Project Proposal Ideas (WP.4.2), and Joint Publication (WP.4.3). This year's efforts have resulted in significant advancements in digital security and healthcare technologies, marked by collaborative webinars, innovative project proposals, and impactful research publications.

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Introduction

Work Package WP4, a crucial component of our broader project, aims at driving innovation and excellence in the fields of digital security, healthcare technology, and collaborative research. This report provides a comprehensive overview of the achievements and progress made during the past year, encapsulating the diligent efforts and contributions of our dedicated team.

Work Package WP4 is structured into three distinct yet interconnected segments: WP.4.1, focusing on Experience Sharing; WP.4.2, dedicated to Project Proposal Ideas; and WP.4.3, centered around Joint Publication. Each of these segments plays a pivotal role in advancing our project's objectives, fostering an environment of knowledge exchange, innovation, and collaborative success.

In WP.4.1, we have endeavored to create a platform for sharing insights and experiences through a series of webinars, engaging expert speakers and reaching out to a diverse audience. This initiative not only spreads knowledge but also encourages dialogue and collaboration among professionals from various institutions and backgrounds.

WP.4.2 has been instrumental in conceptualizing and submitting innovative project proposals. These proposals, aimed at enhancing digital security in healthcare, reflect our commitment to addressing current challenges and anticipating future needs in this rapidly evolving field.

Lastly, WP.4.3 has seen the culmination of our research efforts in the form of scholarly publications. These publications, submitted to esteemed conferences and journals, highlight the cutting-edge research being conducted by our team, contributing significantly to the academic and practical aspects of cybersecurity and digital healthcare technologies.

This report not only reflects on our accomplishments but also charts a course for future endeavors, underscoring our ongoing commitment to excellence, innovation, and impactful collaboration. We invite you to explore the details of our journey through Work Package WP4, as we continue to push the boundaries of what is possible in our quest for advancement and growth in these critical domains.

Work Package WP.4.1: Experience Sharing

Overview

This package involved conducting webinars to share experiences and insights on various topics relevant to the project's scope. Key speakers from different institutions contributed to these sessions.

Webinar Details

- **Serial Number**: 1
- **Date**: 24-May-23

- **Topic/Theme**: Sensors Webinar | 5G-Enabled IoT and Digital Twins: Cybersecurity and Resilience
- **Speakers**: Dr. Sandeep Pirbhulal (CybAlliance), Dr. Ankur Shukla, Dr. Habtamu Abie (CybAlliance), Mr. Emiliano Marquesini, and Prof. Joaquin Garcia-Alfaro (CybAlliance).
- The webinar was supported by several esteemed partners, including the Center for Research-Based Innovation (SFI), the Norwegian Center for Cybersecurity in Critical Sectors (NORCICS), the International Alliance for Strengthening Cybersecurity and Privacy in Healthcare (CybAlliance), and the European Knowledge Hub and Policy Testbed for Critical Infrastructure Protection (EU-CIP). These collaborations highlight the broad, interdisciplinary support and commitment to advancing knowledge and solutions in the areas of 5G-enabled IoT, digital twins, cybersecurity, and resilience.
- **Partner Institution**: [MDPI](#)
- **Agenda:**

Speaker/Presentation	Time in CEST	Time in EDT	Time in CST Asia
Sandeep Pirbhulal Chair Introduction	09:00–09:05 a.m.	03:00–03:05 a.m.	03:00–03:05 p.m.
Joaquin Garcia-Alfaro Digital Twins and Cybersecurity in Critical Sectors	09:05–09:35 a.m.	03:05–03:35 a.m.	03:05–03:35 p.m.
Q&A Session	09:35–09:45 a.m.	03:35–03:45 a.m.	03:35–03:45 p.m.
Emiliano Marquesini 5G High-Performance Mobile Broadband Kit for IoT and OT-Cybersecurity Mission-Critical Applications and Infrastructure	09:45–10:15 a.m.	03:45–04:15 a.m.	03:45–04:15 p.m.
Q&A Session	10:15–10:25 a.m.	04:15–04:25 a.m.	04:15–04:25 p.m.
Open Discussion	10:25–10:55 a.m.	04:25–04:55 a.m.	04:25–04:55 p.m.
Sandeep Pirbhulal Closing of Webinar	10:55–11:00 a.m.	04:55–05:00 a.m.	04:55–05:00 p.m.

Work Package WP.4.2: Project Proposal Ideas

Overview

This package focused on the development and submission of project proposals aimed at advancing digital security in healthcare and other related fields.

Proposal Summaries

- **Title**: Decentralized Secure and Privacy-preserving Health Data Sharing (DeHelse)
  - **Proponent/Researcher**: Leader: USN; Partners: NR + DNV Imatis
  - **Date Submitted**: 01.09.2023
  - **Summary**: Focused on privacy-preserving medical data sharing using decentralized technology, addressing challenges in healthcare data sharing.
  - **Status**: Funded by Regional Forskningsfond kvalifiseringsstøtte 2023 i Vestfold og Telemark
  - **Collaboration for Innovation and Sustainability:** An important feature of this project is its inclusive collaboration framework, involving partners both within and outside the CyberAlliance network. This extends the project's outreach and brings diverse expertise and perspectives, fostering broader collaboration beyond the CyberAlliance partners.

- **Title**: INN-the-Loop: Human-Centered Artificial Intelligence
  - **Proponent/Researcher**: Leader: Høgskolen i Innlandet; Partners: NTNU, NR, SINTEF, VentureNet AS and N-Abel AS
  - **Date Submitted**: 01.09.2023
  - **Summary**: Aims to establish a multi-disciplinary research group for secure data exchange and human-centred AI in healthcare.
  - **Status**: Submitted to RFF-Innlandet
  - **Collaboration for Innovation and Sustainability**: This multi-disciplinary approach fosters a conducive environment for pioneering research in secure data exchange and human-centered AI in healthcare. The partnership is crucial for developing comprehensive solutions that are both innovative and sustainable, potentially setting new standards in healthcare technology and AI applications.

- **Title**: Developing Secure and Scalable Digital Twins for Future Healthcare
  - **Proponent/Researcher**: Leader: OUS; Partners: NTNU, NR, SINTEF, VentureNet AS, Tellu, NHT and Health2B, Oslo Municipality
  - **Date Submitted**: 13.09.2023
  - **Summary**: Aims to develop secure smart care prototypes using Digital Twin technology for enhancing healthcare delivery.
  - **Status**: Submitted to HealthPilot
  - **Collaboration for Innovation and Sustainability**: A pivotal aspect of this project is the involvement of OUS hospital, providing a real medical environment. This enables the partners to engage directly with tangible healthcare challenges, fostering innovation and practical solutions in digital healthcare research.

Work Package WP.4.3: Joint Publication

Overview

This package involved the submission of various research publications to different conferences and journals, focusing on cybersecurity and digital technologies in healthcare.

Publication Details

- **Title**: Characterizing Privacy Risks in Healthcare IoT Systems
  - **Lead Author**: Shuai Li
  - **Date Submitted**: For SUNRISE 2023, NIKT 2023
  - **Abstract**: Addresses privacy risks in healthcare IoT systems and proposes countermeasures.
- **Title**: Training on Social Media Cybersecurity Skills in the Healthcare Context
  - **Lead Author**: Mario Fernández Tárraga
  - **Date Submitted**: For SUNRISE 2023, NIKT 2023
  - **Abstract**: Analyzes Cyber Range platforms for training in cybersecurity skills.
- **Title**: Toward Next-Generation Cyber Range: A Comparative Study of Training Platforms
  - **Lead Author**: Alexandre Grimaldi
  - **Co-Authors**: Julien Ribiollet, Pantaleone Nespoli, Joaquin Garcia-Alfaro
  - **Date Submitted**: For SecAssure 2023, ESORICS 2023
  - **Abstract**: Discusses the evolution of Cyber Range platforms, focusing on application domains, methods of experimentation, infrastructure technologies, and topology generation. The paper also explores the role of AI in enhancing these platforms.
- **Title**: A Cognitive Digital Twin Architecture for Cybersecurity in IoT-Based Smart Homes
  - **Lead Author**: Sandeep Pirbhulal
  - **Co-Authors**: Habtamu Abie, Ankur Shukla, Basel Cat
  - **Date Submitted**: For ICST-2023
  - **Abstract**: Develops a conceptual Cognitive Digital Twin (CDT) architecture to enhance cybersecurity in IoT-based smart homes. The paper presents a dynamic threat detection and mitigation approach using AI and machine learning techniques for improved security in smart home environments.
- **Title**: Federated Learning in IoT Environments: On Examining the Three-way See-saw for Privacy, Model-Performances and Network-Efficiency
  - **Lead Author**: Roufaida Laidi
  - **Co-Authors**: Nassima Merabtine, Djamel Djenouri, Youcef Djenouri, Ilangko Balasingham
  - **Date Submitted**: 21/11/23 for IEEE Communications Surveys and Tutorials
  - **Abstract**: Presents an extensive survey on Federated Learning (FL) in IoT, focusing on privacy-preserving techniques. The paper introduces a taxonomy

to assess privacy levels, service quality, and network efficiency of various PPFL solutions within IoT. It also discusses future research directions, including the use of optimization techniques to balance data quality and privacy.

Conclusion and Future Work

WP4 has demonstrated remarkable progress across its three components, significantly contributing to digital security, healthcare technology, and academic research. The achievements align seamlessly with our project's overall objectives, establishing a robust foundation for future initiatives.

Future Work:

Organizing Healthcare-Specific Webinars: We plan to host webinars specifically tailored to the healthcare domain. These sessions will focus on emerging challenges and innovative solutions in healthcare technology, facilitating a more targeted knowledge exchange within this critical sector.

Expanding Project Proposals to European Projects: Building on our current success, we aim to extend our project proposals beyond Norway, targeting European-wide initiatives. This expansion will not only enhance our project's scope but also foster cross-border collaborations, bringing new insights and opportunities to our work.