NEXT GENERATION INTERNET

SUCCESS STORY BOOK

Part #1

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

NGI ENRICHERS TRANSATLANTIC

NGI ENRICHERS: THE TRANSATLANTIC FELLOWSHIP PROGRAM

The NGI Enrichers program supports European NGI researchers and innovators to spend 3-6 months in the US or Canada to work and collaborate with US and Canadian hosts, to promote knowledge-sharing and establish long-term collaborations on NGI technologies, services, and standards. The program provides travel funding, living allowance, and visa for visiting fellows from Europe, and supports both fellows and their hosts, with bootcamps, mentors, visibility, community building and more. Running from September 1, 2022, to August 31, 2025, the program is funded by the European Commission and contributions from the implementing consortium partners.

NGI ENRICHERS: THE TRANSATLANTIC FELLOWSHIP PROGRAM

NGI Enrichers aims to:

- Reinforce EU-US-Canada cooperation in the area of Next Generation Internet, and to establish a continuous dialogue among US, Canada and European innovators.
- Increase inclusiveness, by supporting a human-centered approach to technology development that is aligned with European social and ethical values, as well as sustainability.
- Sustain high-quality jobs by targeting skills mismatches, the need to empower workers, and ethical considerations relating to technological progress

NGI ENRICHERS TRANSATLANTIC

Visit our Website:
https://enrichers.ngi.eu/

OBJECTIVES OF THE SUCCESS STORY BOOK

The primary objective of the Story Book is to celebrate and illustrate the journeys and accomplishments of the NGI Enrichers fellows. By highlighting their innovative projects and the significant impacts they have made, this Story Book aims to inspire, inform, and engage you, readers, showcasing the transformative power of dedicated efforts and visionary initiatives. This first part covers the cohorts who traveled to Canada and to the United-States between May and December 2023.

NGI ENRICHERS TRANSATLANTIC

ACKNOWLEDGING OUR NGI ENRICHERS IMPLEMENTING CONSORTIUM PARTNERS

2023 NGI ENRICHERS

Click on the fellow's name to be directed to their presentation page

Edoardo GIUSTO - USA - Crit-Q-Cosmic Ray Impact On Transmon Qubits

Francisco J. GUILLÉN MARTÍNEZ - USA - Technology to Secure US Consumer Products, Services and IoT Platforms

Ido LEVY- USA - Safe Mode: Using AI & Behavioural Psychology to Improve Performance and Sustainability in Transportation

Roberto MEDINA - USA - InSee System: The First AI-Powered Respiratory Monitoring Platform

Ömar MERMER - USA - Deep Learning Based Harmful Algal Blooms Prediction

Gabriele ORAZI - USA - Rub Your Eyes: Robustness Analysis of Document Redaction for Anonymisation

NGI ENRICHERS TRANSATLANTIC

2023 NGI ENRICHERS

Click on the fellow's name to be directed to their presentation page

Vasileios Apostolos OURANIS - USA - Advanced Human Computer Interaction in Virtual Training and Simulation Environment

Martin PEČAR - USA - Pilot Implementations of Multi-Objective Route Optimization

Martin SERRANO - USA - C-Bridge: EU-US collaboration for Business Research, Incubation and the Development of Goals, Entrepreneurship and Adoption of Activities

Muhammad ZAWISH - USA - Complexity-Aware Collaborative AI Over Edge and Cloud

Simone ZERBINI - USA - Improving Fuzzing Through Symbolic Execution

Alexandru Panait – Romania - Gov-Smart – Blockchain-based Trustless Governance Model

NGI ENRICHERS TRANSATLANTIC

2023 NGI ENRICHERS

Click on the fellow's name to be directed to their presentation page

Alireza Entezami – Italy - Continuous Monitoring and Detection of Bridge and Road Damages via Smartphone Sensors and Artificial Intelligence under Big Data

Dror Jacoby – Israel - Intelligent Decision-Making with Data Fusion and Predictive Analytics for Multi-Sensor Environments

Fernando Gómez – Spain - AI for Onboarding SMEs / UMBC

Florian Kaltenberger – Austria - Driving Innovation in 6G Wireless Technologies: The OpenAirInterface Approach

Greg Agriopoulos – Greece - MAGOS – Touch the Intangible

Julien Paris – France - DATAMI – Visualize, Share, Edit, Contribute: Produce decentralized open data as inclusive digital commons

NGI ENRICHERS TRANSATLANTIC

2023 NGI ENRICHERS

Click on the fellow's name to be directed to their presentation page

Katalin Feher – Hungary - Strategic Foresight for Advanced Responsible AI

Nicola Di Cicco – Italy – Robust X-HAUL Management Based on Uncertainty-Aware ML

Soumya Kanti Datta – Inde - Secure, Privacy-Aware, Low-Code Platform for XR Content Creation and Publishing

Tessa Wagenaar – Netherlands - SplendoHealth – Redefining Cardiorespiratory Fitness Testing with an Innovative Assessment Software Platform

Dime Galapchev – North Macedonia - FINQUP – AI-Driven Automation for Financial Services

NGI ENRICHERS TRANSATLANTIC

Crit-Q-Cosmic Ray Impact On Transmon Qubits

Edoardo Giusto
Italy

Researcher (scientific/ technical/engineering)

Track
Challenges - USA

Host Organization
Fermilab-SQMS Center

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

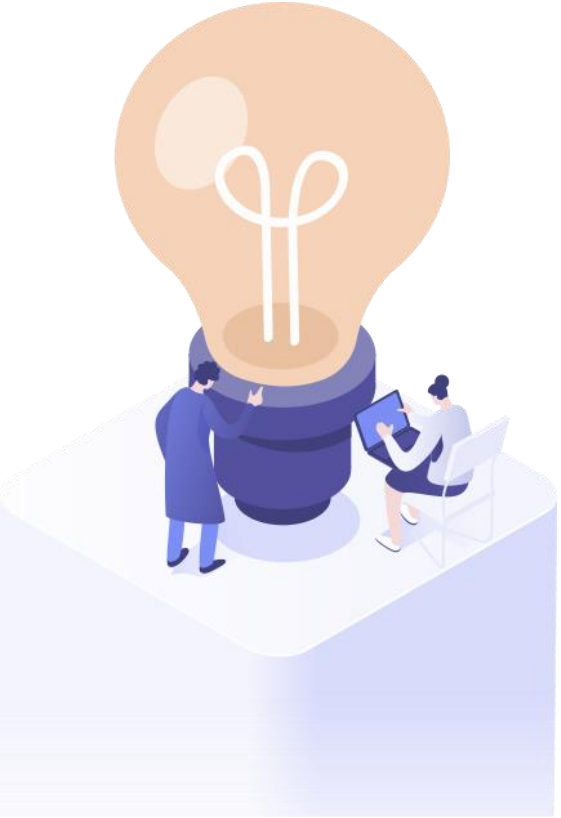
Cosmic Rays (CR) induce critical decoherence issues in superconducting qubits. It may hinder widespread adoption of this technology. There is no technique to characterize them – just general studies underlying the catastrophic effect of such phenomena.

Target audiences: All manufacturers of superconducting qubit machines, research institutions and commercial companies employing them.

Uniqueness: Companies like IBM/Google quantum could be working on something like this, but they are not disclosing such information.

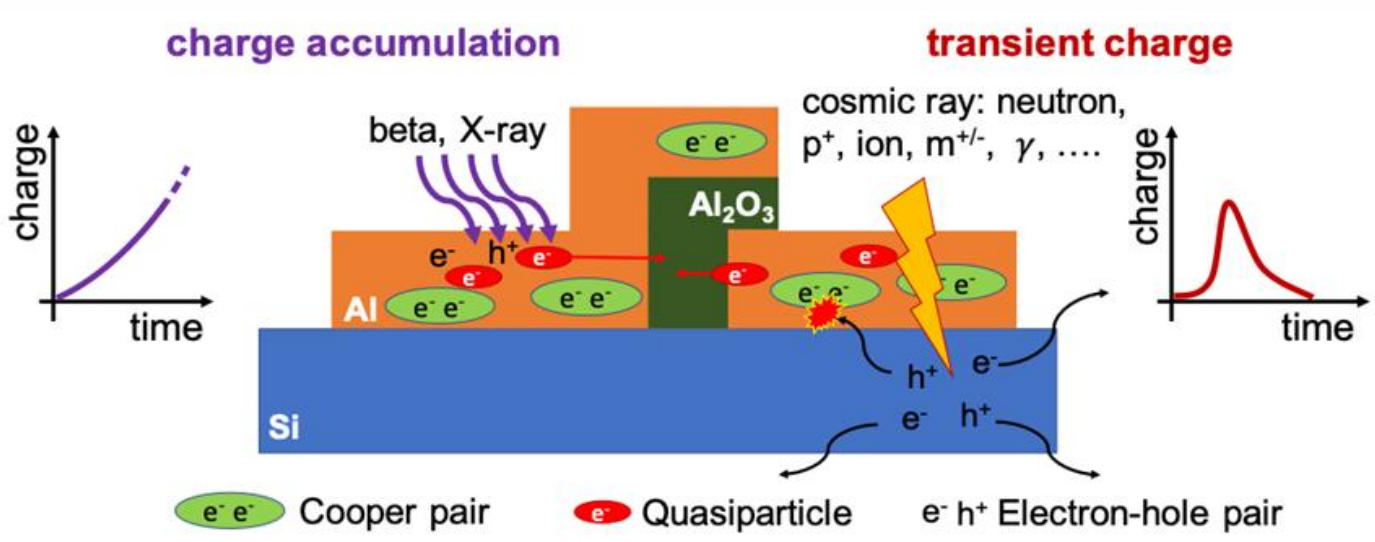
THE SOLUTION (1)

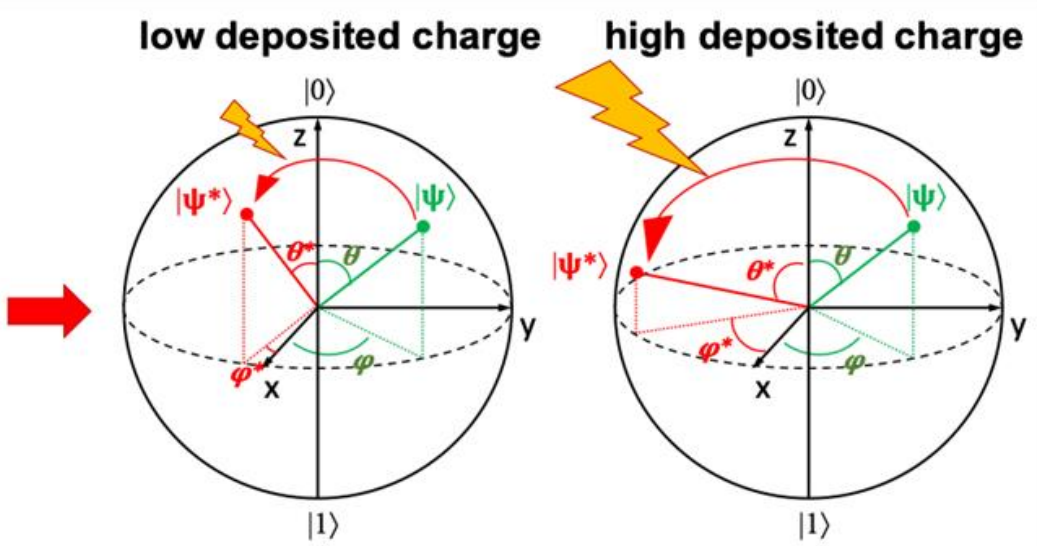
- The development of a technique to **characterize** the **impact** of CR particles on the quantum computation.
- The improvement of **reliability** of superconducting systems by developing further hardware/software, co-design techniques thanks to the **result of** the **characterization.**
- The building of a **bridge** between physics/technology experts and computer engineers working in the reliability domain.
- Operate in the **research** domain at the fundamental level.



THE SOLUTION (2)

- **Translation/Conversion of what happens in the physical domain in a shift in the logical domain.**





NGI ENRICHERS TRANSATLANTIC

EDO GIUSTO, ASSISTANT PROFESSOR @ UNIVERSITY OF NAPLES FEDERICO II, ITALY

Bio:

- BS, MS, PhD degree from Politecnico di Torino in Italy
- Assistant Professor at University of Naples Frederico II since Dec. 2023

Publications related to NGI:

"*A Systematic Methodology to Compute the Quantum Vulnerability Factors for Quantum Circuits*" IEEE TRANSACTIONS ON DEPENDABLE AND SECURE COMPUTING (IMPACT FACTOR: 7.3) 2023. D. Oliveira, E. Giusto, B. Baheri, Q. Guan, B. Montrucchio, P. Rech; https://doi.org/10.1109/TDSC.2023.3313934

"*QuFI: a Quantum Fault Injector to Measure the Reliability of Qubits and Quantum Circuits*". Baltimore, MD, US. IEEE/IFIP DSN 2022 (ACCEPTANCE RATE: 18%) June 27-30, 2022. D. Oliveira, E. Giusto, E. Dri, N. Casciola, B. Baheri, Q. Guan, B. Montrucchio, P. Rech; https://doi.org/10.1109/DSN53405.2022.00025

"*Understanding the Effect of Transpilation in the Reliability of Quantum Circuits*" N. Dilillo, E. Giusto, E. Dri, B. Baheri, Q. Guan, B. Montrucchio, P. Rech; Quantum System Stability and Reproducibility Workshop, co-located with QCE23. https://doi.org/10.1109/QCE57702.2023.10220

NGI ENRICHERS TRANSATLANTIC

THE TEAM

Dr Silvia Zorzetti, Deputy head, quantum computing co-design department, Fermi National Accelerator Laboratory | Ecosystem thrust leader, SQMS. Recipient of DOE Early Career Award.

Dr. Doğa Murat Kürkçüoğlu, Associate Scientist at Fermi National Accelerator Laboratory | Deputy Lead Algorithm & Theory at SQMS.

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

The Superconducting Quantum Materials and Systems Center, led by Fermi National Accelerator Laboratory, is one of five research centers funded by the U.S. Department of Energy as part of a national initiative to develop and deploy the world's most powerful quantum computers and sensors.

SQMS
SUPERCONDUCTING QUANTUM MATERIALS & SYSTEMS CENTER

SQMS brings together more than 500 experts from 30 partner institutions, national laboratories, academia and industry - in a mission-driven, multidisciplinary collaboration that integrates deep expertise in quantum information science, material science, applied and theoretical superconductivity, computational science, particle and condensed matter physics, cryogenics, microwave devices and controls engineering, industry applications and more.

THE KEY RESULTS (1)

- **In-depth literature review** of physical properties and fault mechanisms of **superconducting qubit devices**, carried out also **engaging** with **several** domain **experts** within SQMS and in outside institutions, namely Prof. John Martinis (UCSB) and Prof. Robert McDermott (UMadison).
- New version of fault injector simulating these specific events.

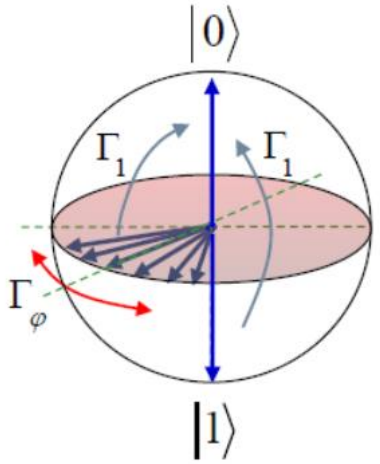
THE KEY RESULTS (2)

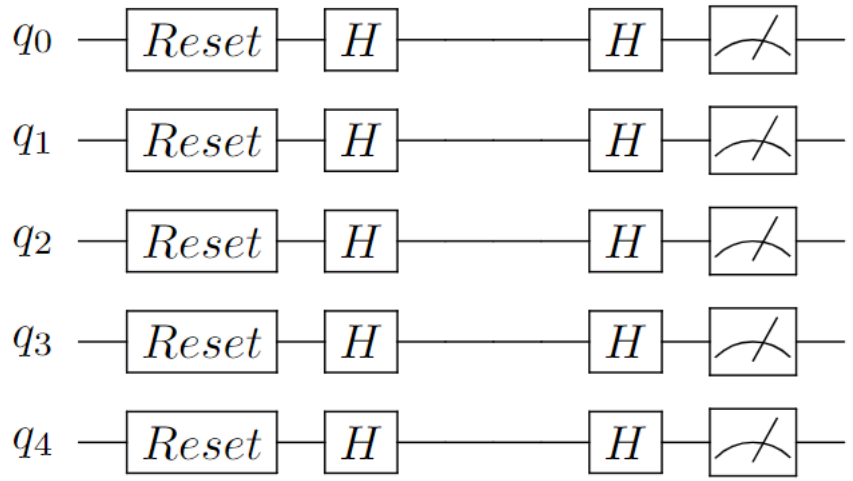
Devised **experiments** on real quantum devices to characterize correlated simultaneous events:

- Impact on **both** in **Z** and **Y** basis
  longitudinal relaxation – $\mathbf{T_1}$ pure dephasing – $\mathbf{T_\phi}$
- **Rate**

$$\Gamma_1 \equiv \frac{1}{T_1}$$

$$\Gamma_2 \equiv \frac{1}{T_2} = \frac{\Gamma_1}{2} + \Gamma_\varphi$$





IDLE

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (3)

- Collaboration set up between SQMS, Politecnico di Torino, University of Trento and University of Naples:
- Improved CR impact characterization;
- CR detection;
- Analysis of CR impact on surface codes for Quantum Error Correction.
- Potential collaboration initiated with Prof. Ravi Iyer at UIUC and Dr. Travis Humble at Oak Ridge National Lab to work on the reliability of emerging hybrid quantum-classical systems.
- Potential collaboration initiated with Prof. Swamit Tannu at University of Wisconsin-Madison to work on the reliability of purely quantum systems.

THE KEY RESULTS (4)

Poster at:

- USQIS @ SQMS-FNAL
- SQMS Annual Meeting

Presentation at:

- SQMS Annual Meeting

Invited talks:

- UIUC – Coordinated Science Laboratory – DEPEND group
- UIC – Quantum Information Science Society

THE IMPLEMENTATION

- Measurements on real devices at SQMS with help by Rigetti Computing (devices) and Quantum Machines (control and readout).

- Possible test of surface codes on real hardware

THE EXPECTED IMPACT

Quantum Computers solved problems too complex for classical (super)computers:

- Drug discovery, battery technology, forecasting
- Search, Optimization and Deep Learning
- Fleet management, routing, task scheduling
- Systems simulations

They also were more energy efficient at solving certain tasks with respect to classical counterparts, contributing to the reduction in climate footprint of heavy-load computing.

THE LESSONS LEARNED

The level of complexity of QC hardware and software development is high:

- It really takes a coordinated effort of several figures in the domain of physics, engineering, manufacturing, computer science to progress in this domain.
- On a personal level on how to work in a multi-disciplinary environment.
- On a technical level, better assess the complexity of a particular task.

NGI ENRICHERS TRANSATLANTIC

Edoardo Giusto

Assistant Professor at University of Naples Federico II, Italy

Edoardo Giusto

egiusto@ieee.org

presentation video of the project

https://enrichers.ngi.eu/fellow/edoardo-giusto/

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Implementation of Blockchain-based Authentication Technology to Secure US Consumer Products, Services and IoT Platforms

Francisco J. Guillén Martínez
Spain

Track
Paired Teams - USA

Host Organization
UC Berkeley Citris Innovation Hub

Innovators/Entrepreneurs

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

For Consumers

- Is this product safe or authentic?
- How can I find out about it immediately?
- Where does it come from?
- Where and to whom may I complain?

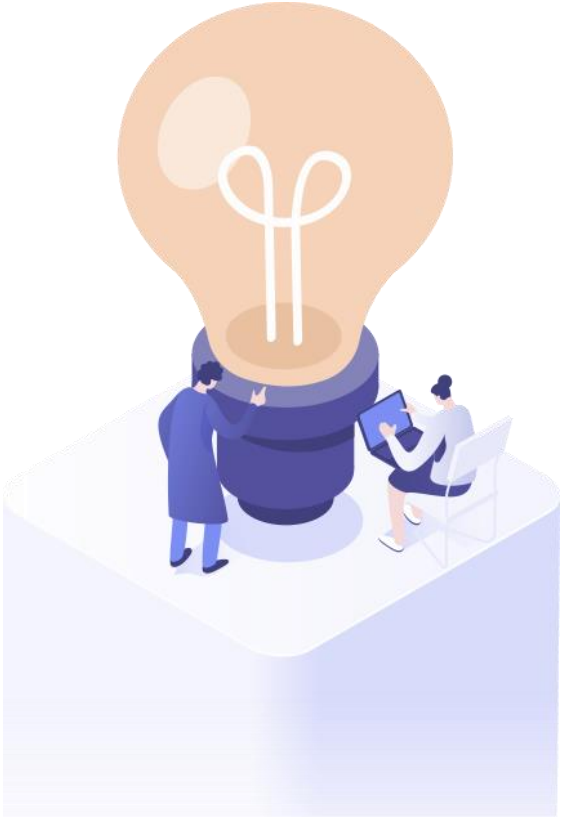
For Companies

- How do I prove the authenticity of my product?
- How do I defend myself against fraud?
- May the digital transformation help my organization?
- What do I do to know my customers better
- How do I contact them directly?

THE SOLUTION (1)

Certificates and single-use digital seals
for brand protection and consumer engagement

- Non-copyable identifiers.
- Different and unique for each product unit.
- Easily accessible to the buyer/user/citizen.
- immediate verification at no cost.
- Abundant technical and commercial information.
- Direct communication channel.



THE SOLUTION (2)

Issuer ID: https://blocktac.com/issuer/CITRISETHREAL.json

NGI ENRICHERS TRANSATLANTIC

FRANCISCO J. GUILLÉN, CEO OF BLOCKTAC

Bio:

- MD, PhD in Medicine from the University of Navarra.
- Fulbright Postdoctoral Fellow at Harvard Medical School.
- Master's in Business Administration from IESE.
- With over 25 years of international experience in establishing and managing public and private universities, Provost or Vice President.
- Director, Department of Health Sciences, Universitas Europaea of Andorra.
- Visiting Scholar at the CITRIS Institute of UC Berkeley and Santa Clara University.

THE TEAM

Francisco Guillén
CEO

Enrique Lizaso
R&D

Ricard Castellá
IT Engineer

Behnam Dezfouly
Associate Professor

Marta Romero
COO

Cristina Cantón
Account Manager

Pablo Flores
Account Manager

Jill Finlayson
Managing Director

Maiol Valentí
CTO

José María Muntané
CIO-Business Partner

Camille Crittenden
Executive Director

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

UC Berkeley is a university incubator offering soft landing services.

- Specialized in information technology solutions for society.
- Well positioned within the innovative spirit of Silicon Valley.
- With network of contacts in the region.
- With access to state and national policymakers, and companies.
- Experienced in interdisciplinary work.

CITRIS AND THE BANATAO INSTITUTE

THE KEY RESULTS (1)

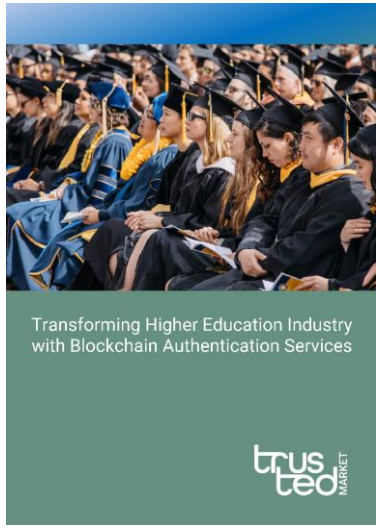
Milestones :

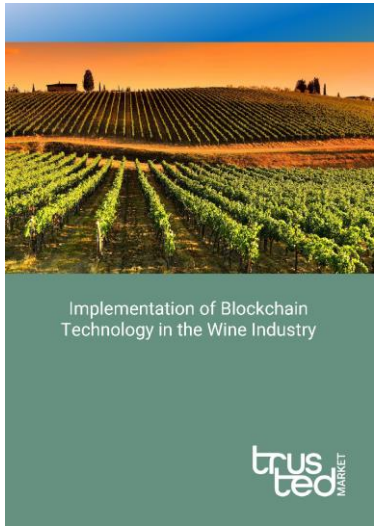
1. Industry reports review.

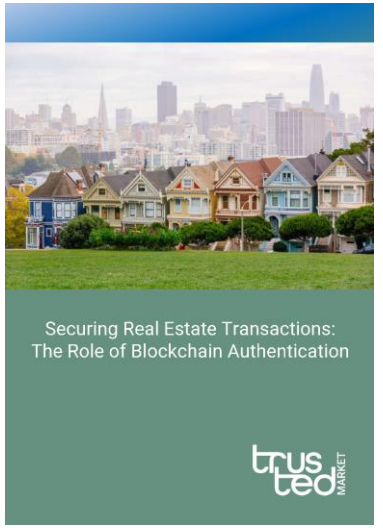
2. Industries stakeholder's database.

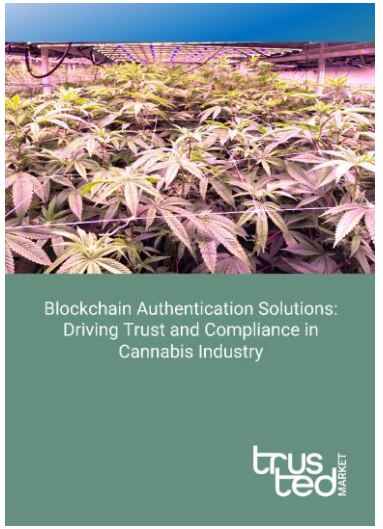
3. Presentation decks for the industries:

- Real Estate
- Higher Education
- Wine Industry
- Cannabis Industry









NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (2)

Milestones :

4. Realization of 3 demonstrations in Higher Education.

5. Realization of 3 demonstrations in Real Estate.

6. Realization of 3 demonstrations in Wine Industry.

7. Realization of 3 demonstrations in Cannabis Industry.

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (3)

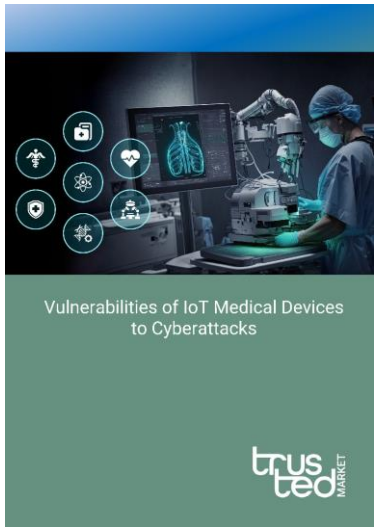
Milestones :

8. Pilot Project completion (2)

9. Deal closing (1)

THE KEY RESULTS (4)

- Strengthening innovation collaboration with the US.
- Building partnerships in the US.
- Engagements with investors, VCs.
- Accelerated business partnerships.
- Startup establishment.



THE IMPLEMENTATION

Next 12-month steps:

- Office of the Attorney General, State of California.
- Develop 3 contracts established in the Cannabis industry.
- First 20,000 bottles of wine in Sonoma.
- More extensive implementation in Higher Education.
- Find investors to expand to Southern California and other states.

THE EXPECTED IMPACT

Human-centric in NGI-relevant domains :

- Data privacy and sovereignty
- Data and consumer protection
- Digitalization
- Security
- Transparency
- User’s Experience

NGI ENRICHERS TRANSATLANTIC

THE LESSONS LEARNED

The six-month period is certainly very limited to properly develop a solvent project with real possibilities of implementation in the United States. The support and dedication of the local entity have not been as effective as expected. Fortunately, I have had the advantage of previous exploratory work, which has allowed me to achieve the ambitious goals set for the project.

Francisco J. Guillén Martínez

CEO of Blocktack

Francisco J. Guillén

fguillen@blocktac.com

presentation video of the project

www.blocktac.com

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

SafeMode: Using AI & Behavioural Psychology to Improve Performance and Sustainability in Transportation

Ido Levy
Israel

Researcher (multidisciplinary)

Track
Open Ideas- USA

Host Organization
University of Maryland

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Safe Mode addresses the crucial problem of driver motivation within the commercial fleet industry, compounded by driver shortages and ineffective use of data for behavioral change. Targeting fleet managers and operators, Safe Mode leverages advanced AI and behavior design models to engage drivers with a gamified app, providing real-time feedback and personalized incentives. While competitors exist in fleet management, Safe Mode differentiates itself with its unique focus on enhancing driver motivation and behavior, thus optimizing fleet performance and reducing operational costs in a low-margin industry.

THE PROBLEM

The problem identified by SafeMode revolves around the lack of driver motivation within the commercial fleet industry, exacerbated by a shortage of drivers and a high leverage in their hands. The issue is further compounded by the inability of fleet managers to effectively utilize technology-driven data, like GPS and dashcam footage, to enact positive behavioral changes in drivers. The main target audience for SafeMode includes fleet managers and operators who face these challenges of high labor costs, turnover rates, low driver motivation, and increasing operational costs, all within the low-margin transportation business.

The opportunity arises from the fact that while there are technological solutions in the form of telematics and fleet management systems, they often fall short in driving meaningful engagement and behavioral change among drivers. This is where SafeMode's unique approach using behavior design models and AI-driven analytics to motivate and engage drivers daily through a gamified app becomes a game changer.

Competitors in the fleet management and driver performance space might offer similar data-collection tools, but SafeMode distinguishes itself through its unique emphasis on driver motivation and behavior change, leveraging existing data more effectively to provide real-time feedback, personalized incentives, and a more engaging driver experience. This focus on motivation and behavior, backed by robust technology, presents SafeMode as a differentiated solution in the market.

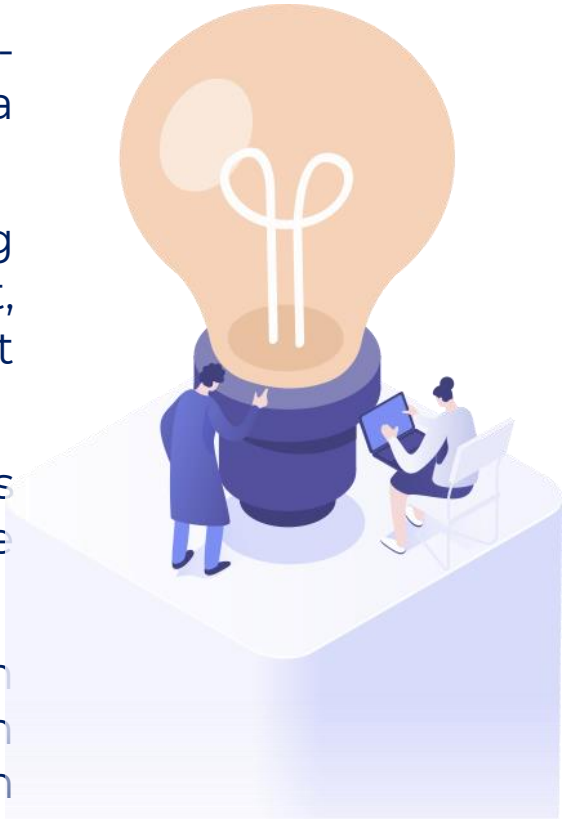
THE SOLUTION (1)

Technology: Safe Mode integrates AI and behavioral science into a cloud-based platform, automating data analysis and engaging drivers with a gamified app.

Differentiator: Its focus on enhancing driver motivation and behavior using state-of-the-art AI and behavioral Economics models, sets Safe Mode apart, utilizing personalized feedback and incentives in a way traditional fleet systems don't.

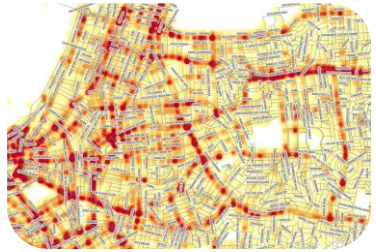
Competitive Advantage: Safe Mode approach leads to substantial reductions in operational costs and accidents, and its 80% average daily active user rate showcases its effectiveness and user acceptance.

Opportunity: The commercial fleet management market is large and in demand for innovative, cost-reducing solutions. Safe Mode's unique approach positions it well within this significant market, promising substantial growth and adoption.

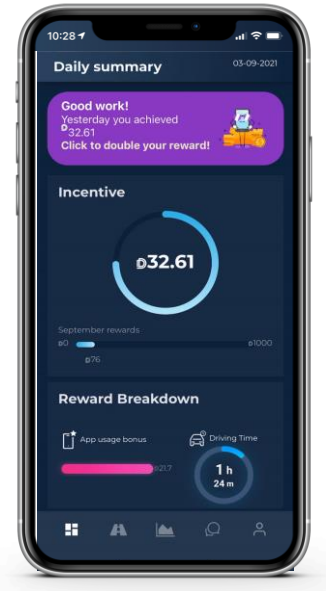


THE SOLUTION (2)

API integration system
Connect your existing data

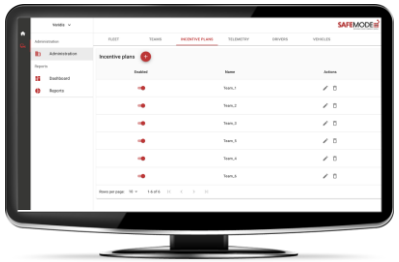


AI Algorithm trainer
Adopting driving patterns



Driver mobile app
Motivates drivers with **Dopamine Reward Loop**

Leadership Suite
Streamlined insights



Incentive program builder
Set your company's goals

NGI ENRICHERS TRANSATLANTIC

IDO LEVY, FOUNDER & CEO SAFEMODE MOBILITY

Bio:

- Founder and CEO of SafeMode Mobility
- Developed an award-winning platform that utilizes the latest advancements in Behavioral Science and Artificial Intelligence to create smart incentive programs for commercial drivers and fleets.
- Recognized by numerous organizations and awards, named a "top young entrepreneur" by the European Union (2019), "Rising Star of the Year - under 30" by TU-Automotive (2020), "Inspiration of the Year - under 30" by Informa Tech (2021), and winning the SAE WCX Connected Cars Challenge (2018). Prior to founding Safe Mode, Ido served as an officer in a counter-terrorism unit in the military.

THE TEAM

Marcelo Gilman, CTO

Prof. Erez Shmueli, Chief Scientist

Prof Ido Erev, Chief behavioral Officer

Ario Keshani, Advisor

Peter Glenn, Advisor

Prof. Houbing Song – Mentor and Host

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

University of Maryland, Baltimore County, USA

Department: Department of Information Systems/SONG Lab

(SONG Lab)!

Houbing Herbert Song, Ph.D., IEEE Fellow, AIAA Fellow, ACM Distinguished Member, WoS Highly Cited Researcher

Mission: to advance research and education through discovery and innovation at the confluence of AI/machine learning/data science, cybersecurity, and cyber-physical systems (CPS).

THE KEY RESULTS (1)

Designing and Launching a Large-Scale Pilot with Amazon Logistics and ICS Insurance Company:

Safe Mode's collaboration with Amazon Logistics and ICS Insurance led to a large-scale pilot that showcased the platform's efficacy in enhancing driver safety. The pilot achieved a remarkable 71% reduction in critical safety violations among Amazon delivery drivers. The success of this pilot was not just a testament to the platform's capabilities but also a significant milestone, leading to its presentation at the ICS insurance risk-management conference in Las Vegas. This pilot has set the stage for broader implementation and recognition within the logistics and insurance sectors.

Pilot summary and results: https://docsend.com/view/n9zv8ipwzm8wrqxt

Case study with ICS: https://docsend.com/view/uetd53n2rbke2g2r

THE KEY RESULTS (2)

Major Partnership Undergoing with Holmes Murphy:

The pilot's success has catalyzed a major partnership with Holmes Murphy, a leading player in the insurance brokerage space. This collaboration signifies Safe Mode's growing influence and integration within the insurance industry. Holmes Murphy's involvement in insurtech through their accelerator (BTV) further opens doors for Safe Mode, placing it in the selection process for investment and support, which could significantly accelerate growth and market penetration.

THE KEY RESULTS (3)

Designing a Pilot with the Largest Rental Car Company for Uber Drivers:

In a move to further expand its impact on road safety, SafeMode is designing a pilot set to launch in January 2024 with the largest rental car company catering to Uber drivers. This initiative aims to mitigate driver-related road accidents, addressing a critical need in the gig economy and urban mobility sectors. This pilot represents a strategic expansion into new markets and user demographics, showcasing SafeMode's adaptability and commitment to reducing road accidents across various transportation modes.

Launching New Partnerships and Integrations with Telematics Companies:

SafeMode's technological advancements have been further recognized and adopted through new partnerships and integrations with leading telematics companies like Trimble and Geotab. These collaborations enhance the platform's reach and functionality, allowing for broader data collection, analysis, and impact. By integrating with these established telematics systems, SafeMode ensures that its solutions are accessible and beneficial to a wider range of customers and industries.

THE KEY RESULTS (4)

Designing New Sets of Rules and Automation Processes for Large-Scale Customers:

To cater to the diverse and evolving needs of large-scale customers, SafeMode has been actively designing new sets of rules and automation processes. These developments are aimed at enhancing user engagement, safety outcomes, and overall efficiency, ensuring that the platform remains flexible, scalable, and effective for various customer segments.

Designing New Offering for Non-CDL Mobility Platforms:

Recognizing the growing market in non-CDL mobility platforms like car-sharing and car ownership models, Safe Mode is developing unique sets of incentive programs and engagement rules tailored to these users. This expansion reflects Safe Mode's commitment to broadening its impact and adaptability, offering innovative solutions that cater to the changing landscape of mobility and transportation.

THE KEY RESULTS (5)

Launching New Retail Customer:

Safe Mode's market presence has been significantly enhanced with the launch of new retail customers. This expansion into the retail sector represents a strategic move to diversify the customer base and tailor solutions to a wider audience. By catering to retail customers, Safe Mode is not just broadening its impact but also demonstrating the versatility and adaptability of its technology to meet various industry needs. This expansion is a testament to the platform's robustness and its ability to deliver value across different sectors, driving growth and recognition in the broader market.

Attending Industry-Related Conferences:

Safe Mode's commitment to staying at the forefront of industry trends and developments is exemplified by its active participation in significant industry-related conferences, such as ITC in Las Vegas. Attending these events provides the team with valuable networking opportunities, insights into the latest industry trends, and potential collaboration prospects. It's an essential strategy for maintaining visibility, learning from peers, and showcasing Safe Mode's latest innovations and successes. These conferences serve as a platform to engage with potential customers, partners, and investors, further solidifying SafeMode's position as a leader in driving safety and efficiency solutions.

THE KEY RESULTS (6)

SafeMode's active participation in industry-related conferences:

These activities significantly bolstered its presence and recognition in the market. Attending events like the Insurtech Insights NYC Conference, Western Region Captive Insurance Conference, HEAT Conference, McDermott Will & Emery Insurtech Summit, Insurtech Connect (ITC) in Las Vegas, and the ICS risk-management conference in Las Vegas has provided invaluable networking opportunities and insights into the latest industry trends and needs.

These conferences have served as platforms for showcasing Safe Mode's innovative approach to driver performance measurement and safety enhancement, allowing for the exchange of ideas and potential integration of Safe Mode's technology into broader insurance ecosystems. The participation in these events has not only expanded Safe Mode's customer base but also kept the team at the forefront of industry developments, ensuring that Safe Mode remains a leader in the insurtech space. The engagement in these conferences is a testament to Safe Mode's commitment to innovation, collaboration, and continuous learning in the pursuit of safer, more efficient driving worldwide.

THE IMPLEMENTATION

Safe Mode is deepening its partnership with insurance partners through to revolutionize commercial driving in the US. The company is expanding its collaborations with additional telematics partners to integrate its AI-driven driver performance measurement system. It's concluding a pilot program with retailers and transportation companies. Lastly, Safe Mode is exploring new revenue and funding opportunities to diversify income and attract investment for scaling operations and technological advancements.

THE EXPECTED IMPACT

From the implementation of our findings, Safe Mode is set to significantly impact our project and the world by revolutionizing driving behavior, enhancing road safety, and promoting environmental sustainability. By integrating advanced AI with a human-centric approach, we aim to empower drivers with greater autonomy, encourage safer driving practices, and reduce emissions. This commitment will not only elevate the driving experience but also contribute to a more sustainable and responsible global community, aligning with the core principles of the Next Generation Internet initiative.

THE LESSONS LEARNED

Surprises:

Good**:** The robustness and adaptability of the SafeMode platform exceeded expectations, particularly in how quickly it could be integrated and show results within different partner ecosystems.

Bad**:** Encountering unexpected slow-pace of large corporates even after the approval of a pilot or partnerships.

Challenges:

Balancing the rapid pace of startup growth with personal well-being and team dynamics. Navigating the intricate landscape of partnerships, customer expectations, and technological scalability under tight timelines.

Impact of Lessons Learned:

These experiences have instilled a greater emphasis on proactive planning, flexibility, and continuous learning within our team. They've also reinforced the importance of resilience and adaptability in both personal and professional realms, ultimately making our approach more robust and our solutions more tailored and effective.

Ido Levy

Founder & CEO of SafeMode Mobility

Ido Levy

Ido@safemode.co

https://www.safemode.co
Profile

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

InSee System: The First AI-Powered Respiratory Monitoring Platform

Roberto Miguel Medina Bujalance
Spain

Track
Paired Teams - USA

Host Organization
Sonoma State University

Innovators/Entrepreneurs

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Pneumonia. Current pneumonia prevention protocols are not effective!

Risk of Pneumonia in Hospitalized Patients

- 17% - Average Pneumonia Readmission
- 10% Pneumonia Mortality Rates
- $10 Billion - Pneumonia Readmission Cost to US Healthcare

Lung Exercise with Incentive Spirometers

- Incentive Spirometer: Disposable plastic ventilator for deep breathing exercise to reduce pneumonia risk
- 2 million units dispensed per year

Low Compliance Leads to Pneumonia

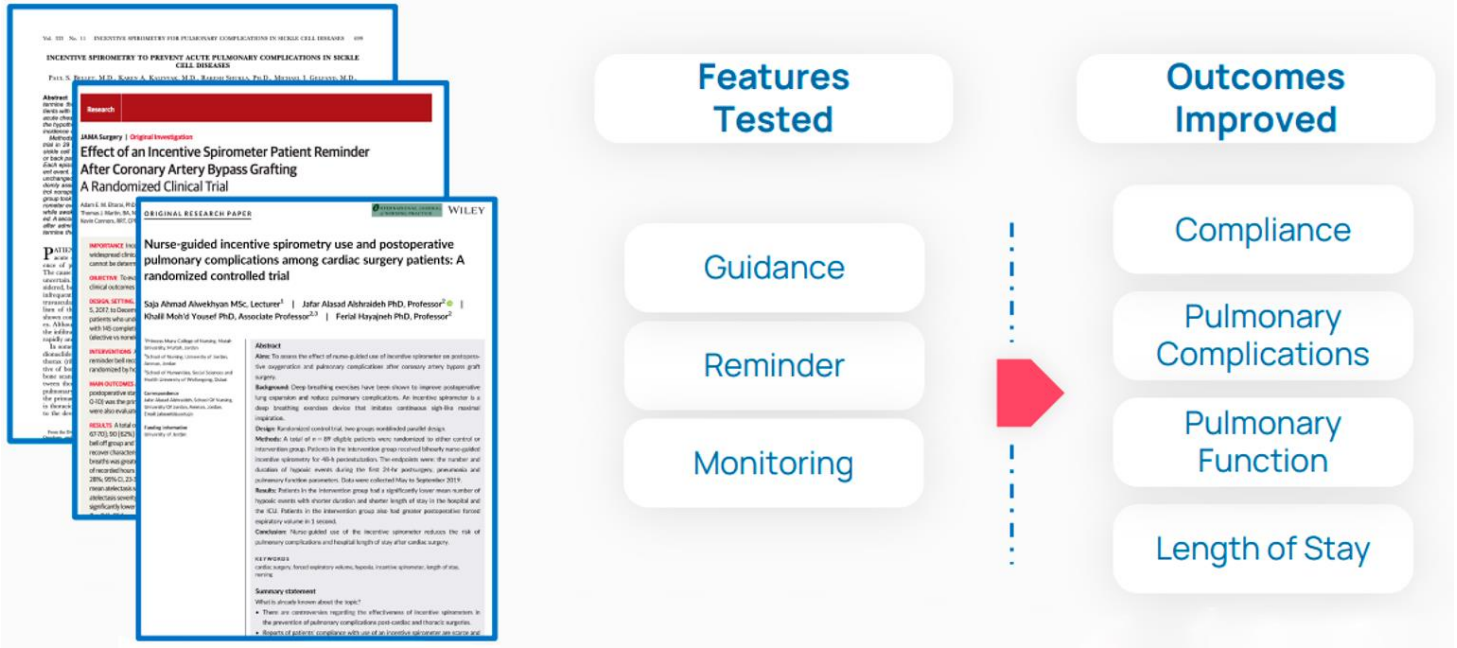
- Low Compliance & Limited Effectiveness
- Pneumonia remains the primary cause of readmission

NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (1)

The Research Backed Solution

Existing Research Studies demonstrate the need for better compliance and monitoring with Incentive Spirometry

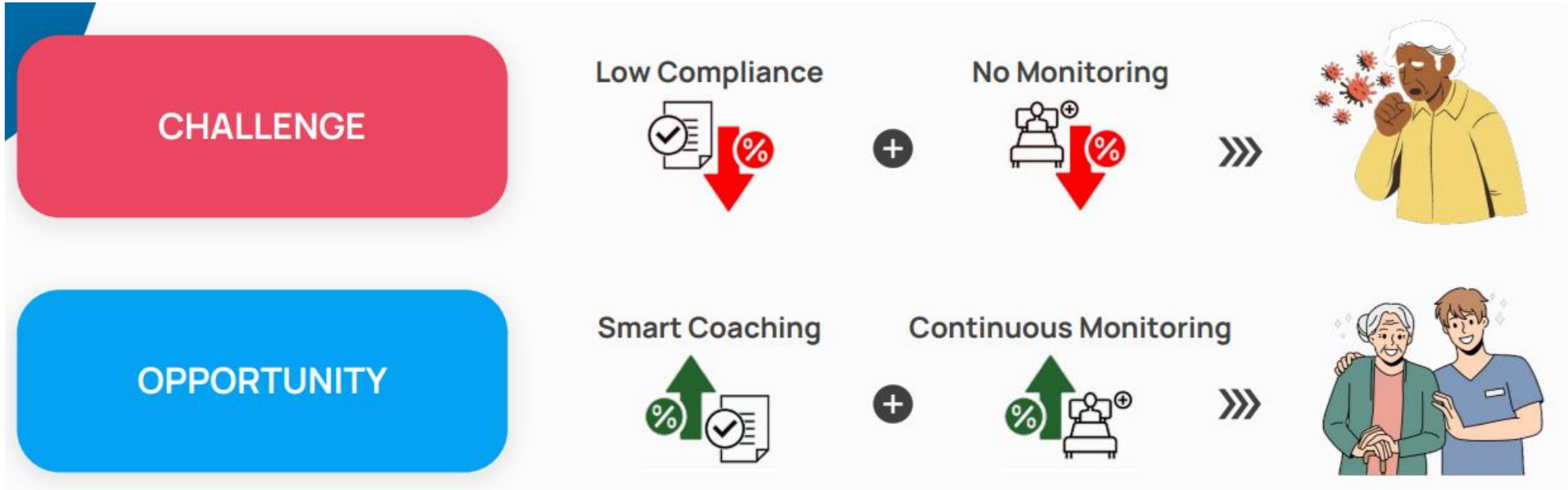


NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (2)

Challenge & Opportunity

Better patient compliance leads to lower incidence of pneumonia



NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (3)

INSEE: Smart Incentive Spirometry System

Smart Coaching, Continuous Monitoring, & Risk-stratifications

NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (4)

Objective Monitoring

Objective Data & Easy Documentation

Data Collection:

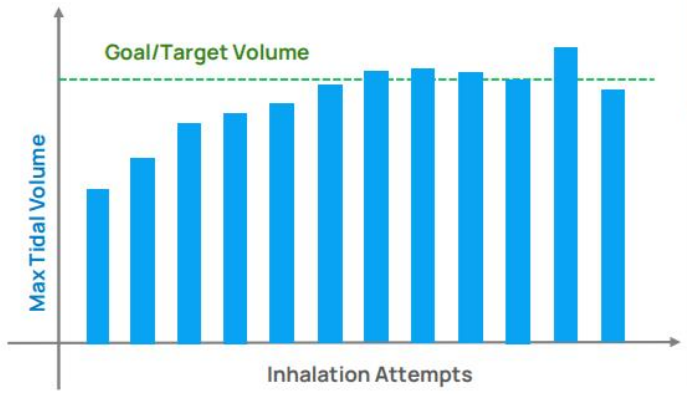
Current:
1. Device display
2. Download via USB-C cable

Future:
Wireless real- time data feed into EMR/EHR

Data Recorded:

Attempts/Success
Number of times patients used the ISand number of times patients reached goal volume

Max Tidal Volume
The highest volume inhaled by patient

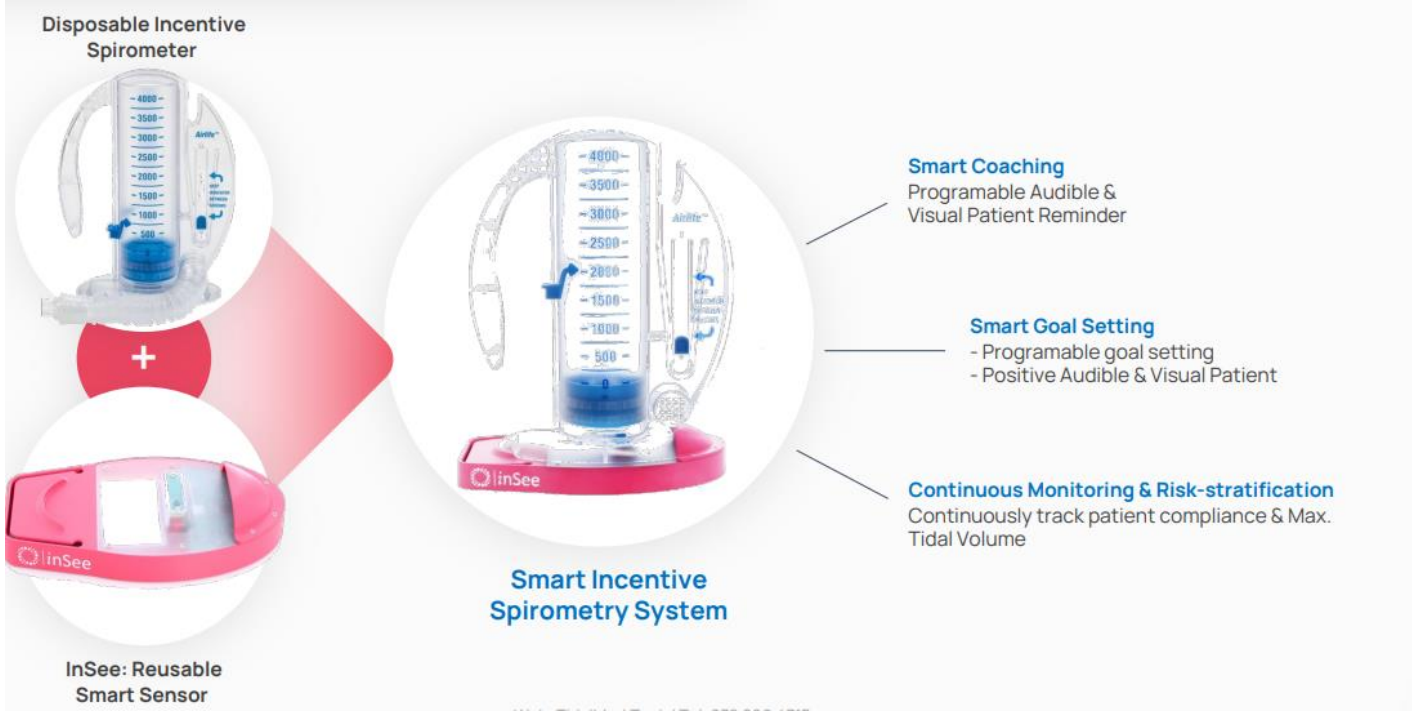


NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (5)

INSEE : Features

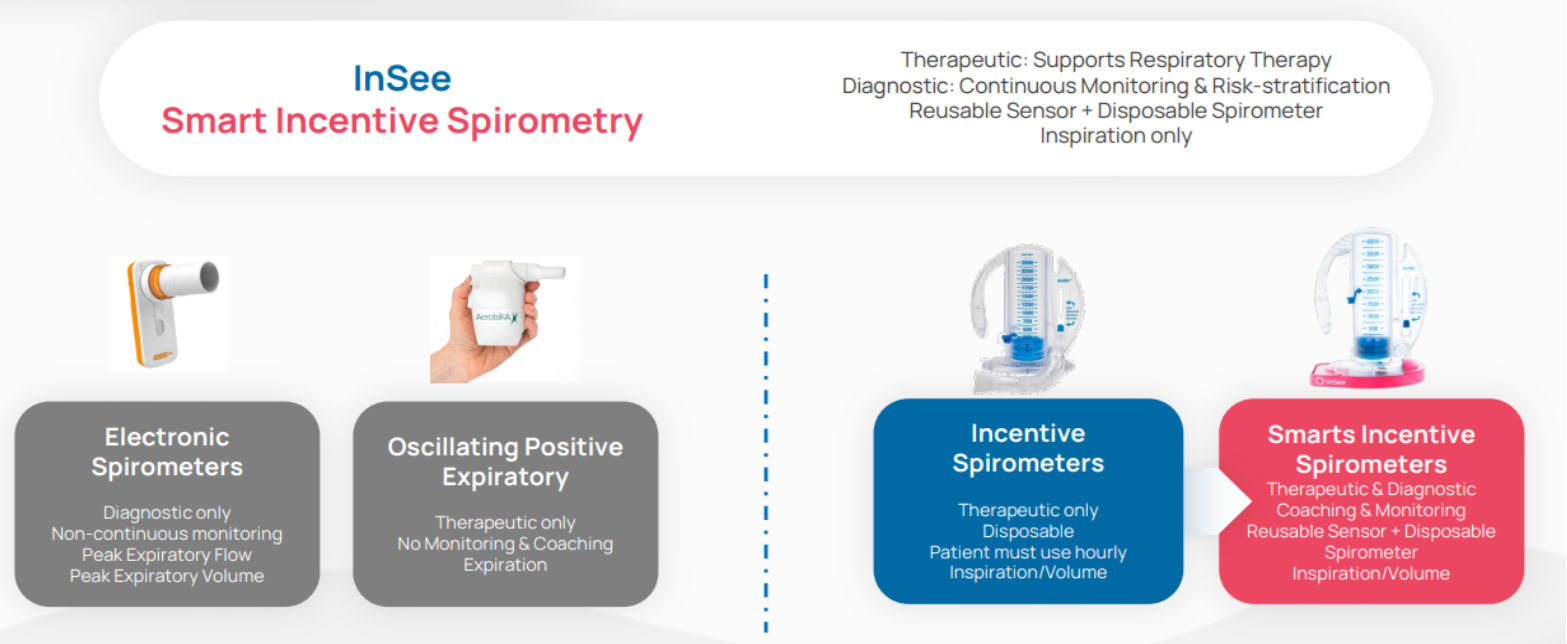
Smart Coaching, Continuous Monitoring, & Risk-stratifications



NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (6)

Competitive Landscape
Therapeutic vs Diagnostic



NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (7)

Opportunity & Milestones
Go-to-market: Q2 2024

Market Opportunity	▪ 28 million patients annually ▪ Immediate Markets: Hospital (inpatient) ▪ Future Markets: Outpatient, Skilled Nursing, AL/IL, Homecare, & RPM

ROBERTO MEDINA, CEO SOSTECO

Sosteco
Eficiencia y tecnología

With over 12 years of experience in Electronics Engineering, Roberto Medina specializes in Hardware & Software Development and Engineering Project Management.
Founder of Sosteco since 2015, his journey has been marked by significant achievements in technology and innovation.

- R&D radio, Smart cities, environment, connectivity, quality of air...
- NGI Explorers: Brightest EU Explorer.
- AEI 2022: 5G modem and contributing to openRAN infrastructure.

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

Sonoma State University

- Part of the public University system in California, north of San Francisco.
- A small campus with big ideas fosters intellectual, cognitive, social, and personal growth.
- I was a part of the Electrical engineering department, where I could do my research and work while maintaining a close relationship with students. Part of my time at SSU was:
  - Lectures.
  - Senior design assistance for students.
  - Students and companies' activities, such as Hackathon 2023.
  - Meetings with companies interested in collaborating with SSU.
  - Laboratory access and equipment.

THE TEAM

Farid Farahmand, Ph.D. – Sonoma State University

Roberto Medina, M.Sc. – Sonoma State University / Sosteco

Dr. Foad Farahmand, M.D. – President – inSee

Dr. Hasan Kakli, M.D. - CMO - inSee

Mehdi Arani, M.S. – CEO - inSee

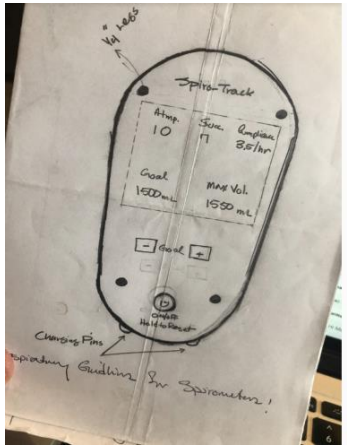
Michael Martin – Director Clinical Affairs - inSee

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (1)

Development/Advancement of Innovative Technologies

1) Hardware Development and Enhancements.
2) Firmware Creation and Compliance.
3) Manufacturing.
4) Regulatory Compliance and Certification.
5) Platform Development.
6) Scientific Validation through Clinical Trials and Collaboration with Hospitals.
7) Data, Algorithm, ML - AI and Improvements.



NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (2)

- Established collaboration-innovation or partnership with:
  - California Life Science in the USA.
  - Universities like Queensland University of Technology or UC Berkeley.
  - Vidavo S.A. or Aritrium in Europe.
  - Hospitals.
- Approached investors and VCs interested in the product, all waiting for the data.
- Fundraising, checking NSF in the USA and some Europe like EIT Health.

THE KEY RESULTS (3)

- Maintained stretch relations with the NGI community, expanding it to future work.
- Paper submission for further publications when obtaining enough data from the clinical trials and the Hospital's collaboration.
- Conference attendance, like Mechanical Ventilator conference, BioMedevice, or other respiratory events like Mayo Clinic.
- Startup creation in the USA and willing to start pursuing in Canada and Europe.
- New job opportunities and research.

THE IMPLEMENTATION

1. Data Validation
2. Commercialization, Production.
3. Testing new features and modifications for future.
4. Funding, Partnerships and Canada-Europe exploration
5. Improving infrastructure backend.
6. LoRaWAN and other radio like BLE/WiFi for large scale or at home.
7. Integrating ML Algorithm for improving the results and insights.
8. Testing connection between software and MR.

THE EXPECTED IMPACT

From the implementation of your findings, how are you going to impact your project and impact the world? Especially on the Human-centric NGI-relevant following domains:

- Better compliance and reduction in Pneumonia, the silent killer.
- Security and data protection with patients' records.
- Digitalization of health.
- Interoperability using standards and integrating with hospital systems.

THE LESSONS LEARNED

What you wished you had known prior.

- Visa process, SSN, and bureaucracy stuff.
- Car, maybe buy one or obtain one to travel more.

Any bad or good “surprises”?

- To me, everything was a good surprise. People, events, working, life...

Any challenges, personally and professionally

- Certification process.
- Pace, solving problems and bugs very fast.
- Working hours, between University and the project.
- Family, 6 months without them was a long time.

Impact of those lessons learned

- Stronger bonds.
- Problem solving.
- Team working and collab.
- Better professional.

Roberto Miguel Medina Bujalance

CEO @ Sosteco

Roberto Medina Bujalance

roberto@sosteco.es

presentation video of the project

Twitter

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Deep Learning Based Harmful Algal Blooms Prediction

Ömar Mermer
Türkiye

Researcher (scientific/ technical/engineering)

Track
Open Ideas - USA

Host Organization
University of Iowa, Hydroinformatics Lab

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Harmful algal blooms (HABs) have detrimental consequences for economies, environments, wildlife, water quality, fisheries, public health, and recreation. HABs are caused by agricultural activities, wastewater treatment plants, sewage system leaks, natural elements like pH and light, and climate change. Toxin-producing algae development and unpredictable lake conditions contribute to HABs. Current studies lack data and understanding of the main causes. To address this gap, This project aims **to develop a prediction model using deep learning, identify driving factors, and provide a benchmark dataset.**

- **Who is the main target audiences?**

- State agencies, universities, research institutes, environmental protection and rehabilitation services, and municipalities
- Decision makers regarding the sustainability of aquatic habitats and public recreational opportunities
- Strategy developers to tackle a significant environmental issue impacting public health and coastal ecosystem balance.

- **Who else is already addressing the problem, and why is there an opportunity?**

DL and other data-driven methods have proven useful for predicting HABs. However, insufficient data and an unclear understanding of the main HABs factors hinder modeling studies. To address this gap, this project aims to advance HABs research, using novel DL techniques to develop a prediction model and to identify key drivers. Remote sensing data and water quality measurements will also be used, and a benchmark dataset will be created for future studies.

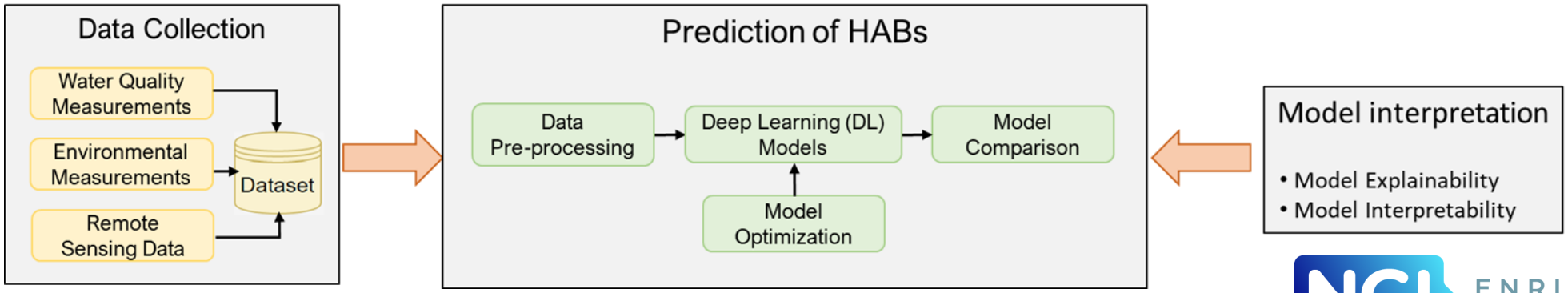
THE SOLUTION (1)

- In this project, our aim is to identify HABs and construct novel DL models with interpretable model output.
- While previous research has been conducted using measurement and statistical methods or deep learning techniques to predict HABs, few studies have been performed on different network architectures by using water quality and remote sensing data. Therefore, to facilitate fast and accurate predictions, this project will investigate specific DL model namely Transformer, GRU, LSTM, and compare the performance of them in HABs prediction.
- Previous studies have only addressed HAB prediction, as it was difficult for decision-makers and stakeholders to interpret the results of DL models because of their black-box nature. In this project, feature importance and multivariate regression analysis can be used to interpret HAB predictions made by DL models. In this way, high applicability can be achieved for decision-makers to establish effective water quality management strategies.
- In this project, compressive benchmark dataset including water quality parameters, physical environment parameters and existing literature data will be generated and used for HABs prediction.

THE SOLUTION (2)

The scope of this project is to identify HABs and construct DL models with interpretable model output. Three stage framework of the proposed project is given in below.

First, we will start with an extensive literature review for HABs and will evaluate previous studies to use machine learning models for prediction of water quality. Then, we will form an extensive dataset in which dependent/independent variables are defined by combining physical and environmental parameters, remote sensing data and existing data from literature. Second, we will build the deep learning models and will optimize them by using different hyper-parameters optimization. Finally, we will construct possible interpretations of HABs predictions performed by DL based models by using various techniques.



NGI ENRICHERS TRANSATLANTIC

OMER MERMER, PHD., SENIOR RESEARCH SCIENTIST, HYDROINFORMATIC LAB, UNIVERSITY OF IOWA

Bio:

Dr. Mermer is a Senior Research Scientist at University of Iowa HydroInformatic Lab (UIHI). He received his PhD. in Physics/Applied Engineering from University of Iowa. Dr. Mermer's research focuses on data driven approach, AI model development, feature engineering and intelligent sensor system. Currently, he is conducting studies on ML/DL model development for HAB/streamflow prediction, AI based digital twin framework and next-gen web technologies.

O. Mermer, B.Z. Demiray, I. Demir, " Deep Learning based Algal Bloom prediction and environmental driving force analysis", Journal of Hydroinformatics, 2024 (in preparation)
O. Mermer, B.Z. Demiray, I. Demir, " Identifying key driver parameters of Harmful Algal Bloom by using multivariate regression analysis", Environmental Modelling & Assessment, 2024 (in review)
B.Z. Demiray, M. Sit, O. Mermer, I. Demir, "Enhancing Hydrological Modeling with the Transformer: A Case Study in 24-hour Streamflow Prediction", Nature Scientific Reports, 2023 (in review)
L. A.V. Kadiyala, D. J. Samuel, Y.Sermet, O. Mermer, I Demir, "Comparison of large language model for hydrological uses cases", in preparation
B Kaynak, Y.Sermet, O. Mermer, I Demir, "HydroSignals: Integrating Web Technology and Intelligent Assistants for Advanced Hydrological Monitoring", in preparation

NGI ENRICHERS TRANSATLANTIC

THE TEAM

Dr. Ibrahim Demir is the Director of UI Hydroinformatics Lab (UIHILab), and an Associate Professor at the Civil and Environmental Engineering, and Electrical and Computer Engineering departments at the University of Iowa. His research focuses on hydroinformatics, environmental information systems, scientific visualization, big data analytics, AI and intelligent systems, and information communication. Dr. Demir currently serves as Associate Editor for Journal of Hydroinformatics (IWA) and Environmental Modeling and Software (Elsevier).

Dr. Yusuf Sermet is a research scientist at the University of Iowa, IIHR-Hydroscience & Engineering and UIHILab. Her expertise is in the field of computer sciences and engineering to environmental problems. He focuses on AI and NLP, web-based development, camera-based sensors, cyber infrastructure and water resources management.

Dr. Ozlem Baydaroğlu is a postdoctoral researcher at the University of Iowa, IIHR-Hydroscience & Engineering and UIHILab. Her expertise is in the field of environmental and meteorological engineering. She focuses on environmental and meteorological forecasting utilizing classical and machine learning approaches, inverse modeling, atmospheric dynamics, and linear and nonlinear data mining and modeling.

Bekir Zahit Demiray is PhD. student in Informatics at University of Iowa and is working at UI Hydroinformatics Lab (UIHILab). He focuses on DL model development on streamflow forecasting framework.

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

University of Iowa Hydroinformatics Lab (UIHILab)

The Iowa Institute of Hydraulic Research (IIHR), a World-renowned institution on hydrology and hydraulics research. The University of Iowa Hydroinformatics Lab (UIHILab), which is a leading hydroinformatics and environmental intelligence laboratory. Team members will work with the Iowa Healthy Lake Initiative, an interdisciplinary team focusing on measuring, informing, and solving Iowa's Harmful Algal Bloom Challenge. In this Project, data preparation/pre-processing and model training/test will be realized by using on a high performance computing cluster (https://research.its.uiowa.edu/argon) at the University of Iowa with GPU nodes (NVIDIA P100 GPUs and 1.5 TB RAM). The University of Iowa-Information Tech Facility has 70 Linux workstations and more than 240 individual PCs supporting the local centralized facilities. There are also 30 PC-based servers handling web, ftp, and specialized database services. This hardware is complemented by a carefully selected set of public domain, commercial, and proprietary software packages that include Tecplot, Gridgen, Fluent, FlowLab, Matlab, Origin, ERDAS, ERMapper, ERSI, Skyview, Mathematica, and the core GNU utilities. The University of Iowa Hydroinformatics Lab (UIHILab) has already been hosted a visitors as NGI partner.

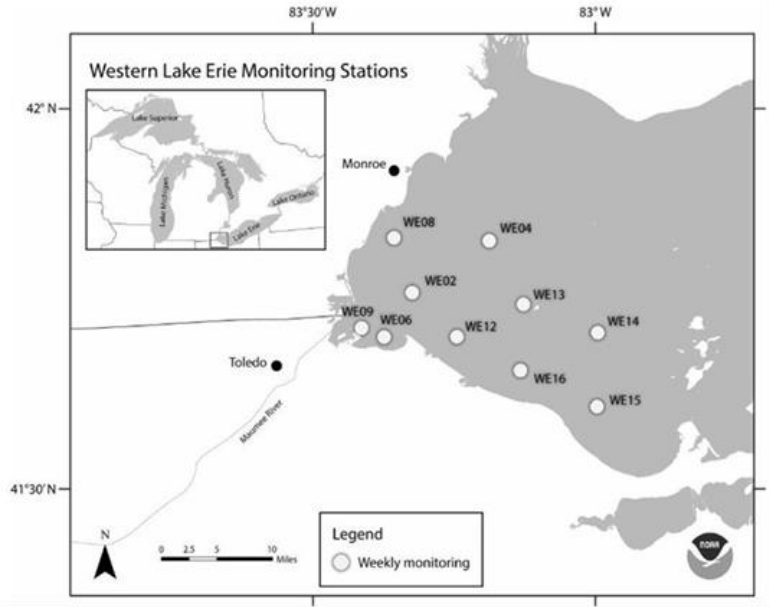
THE KEY RESULTS (1)

Literature review of the major HAB monitoring/prediction models

- More than 100 papers
- Categorized
  - -Pilot area(s)
  - -Input/output features
  - -Source of dataset
  - -Applied method

Variables	Min	Max	Mean	Median	Standard Deviation	Kurtosis	Skewness	Range
Secchi Depth (m)	0	5.3	0.785	0.500	0.690	7.739	2.289	5.3
CTD Temperature (°C)	2.9	29.7	22.107	23.000	4.196	2.819	-1.433	26.8
CTD Specific Conductivity (µS/cm)	19.9	583.3	339.009	331.700	68.468	1.258	0.376	563.4
CTD Dissolved Oxygen (mg/L)	4.2	13.04	7.529	7.570	1.263	1.317	0.336	8.84
Turbidity (NTU)	0.95	1148	29.968	15.200	77.590	137.431	10.740	1147.05
Total Phosphorus (µg P/L)	14.87	2482.24	119.857	80.550	179.638	90.015	8.264	2467.37
Total Dissolved Phosphorus (µg P/L)	2.67	273.58	31.127	17.260	34.623	8.296	2.432	270.91
Ammonia (µg N/L)	0.04	561.61	41.926	17.170	59.918	17.130	3.195	561.57
Nitrate + Nitrite (mg N/L)	0	9.45	1.329	0.630	1.683	3.716	1.870	9.45
Particulate Organic Carbon (mg/L)	0.15	219.34	3.893	2.020	15.210	175.663	12.975	219.19
Particulate Organic Nitrogen (mg/L)	0.03	40.93	0.667	0.340	2.729	180.555	13.136	40.9
Total Suspended Solids (mg/L)	1.25	540.8	25.982	16.000	44.114	67.338	7.117	539.55

Descriptive statistics of physical, chemical and biological water quality dataset



Study area of the project- Lake Erie

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (2)

Multivariable Linear Regression Analysis

- Using 13 variables
- Divided by 3 seasons (spring, summer, and fall)
- **Pearson's Correlation Coefficients**
- Strength and direction of the relationship between variables
- **Anova table summary**
- **Regression analysis summary**

Estimate of coefficients for multi variable linear regression model for full period

Chl-a= -12.222 **SD** + 0.794 **Tur** - 0.102 **TP** - 106.569 **POC** + 680.729 **PON** - 0.634 **TSS** + **35.241**

Model statistical summary

	r	R^2	Adjusted R^2	Standard error (SE)
Spring Season	0.837	0.700	0.641	10.270
Summer Season	0.996	0.992	0.992	45.627
Fall Season	0.971	0.943	0.937	13.643
Full Period	0.989	0.979	0.978	50.879

Pearson's Correlation Coefficients for all parameters

	SD	T	Cond	DO	Turbidity	TP	TDP	A	N	POC	PON	TSS	Chll-a
SD	**1.00**	0.12	-0.13	-0.05	-0.23	-0.27	-0.15	-0.06	-0.01	-0.12	-0.11	-0.35	-0.06
T	0.12	**1.00**	-0.01	-0.32	-0.07	-0.06	-0.06	-0.15	0.06	0.06	0.06	-0.16	0.07
Cond	-0.13	-0.01	**1.00**	-0.15	-0.04	0.09	0.40	0.39	0.50	-0.06	-0.06	-0.03	-0.05
DO	-0.05	-0.32	-0.15	**1.00**	0.10	0.03	-0.31	-0.32	-0.23	0.16	0.16	0.06	0.19
Turbidity	-0.23	-0.07	-0.04	0.10	**1.00**	0.88	0.11	0.06	0.05	0.89	0.91	0.93	0.75
TP	-0.27	-0.06	0.09	0.03	0.88	**1.00**	0.28	0.14	0.19	0.76	0.78	0.83	0.69
TDP	-0.15	-0.06	0.40	-0.31	0.11	0.28	**1.00**	0.48	0.61	-0.08	-0.08	0.17	-0.06
A	-0.06	-0.15	0.39	-0.32	0.06	0.14	0.48	**1.00**	0.46	-0.09	-0.09	0.12	-0.08
N	-0.01	0.06	0.50	-0.23	0.05	0.19	0.61	0.46	**1.00**	-0.09	-0.08	0.09	-0.07
POC	-0.12	0.06	-0.06	0.16	0.89	0.76	-0.08	-0.09	-0.09	**1.00**	0.99	0.78	0.71
PON	-0.11	0.06	-0.06	0.16	0.91	0.78	-0.08	-0.09	-0.08	0.99	**1.00**	0.76	0.79
TSS	-0.35	-0.16	-0.03	0.06	0.93	0.83	0.17	0.12	0.09	0.78	0.76	**1.00**	0.49
Chll-a	-0.06	0.07	-0.05	0.19	0.75	0.69	-0.06	-0.08	-0.07	0.71	0.79	0.49	**1.00**

ANOVA table summary for different seasons

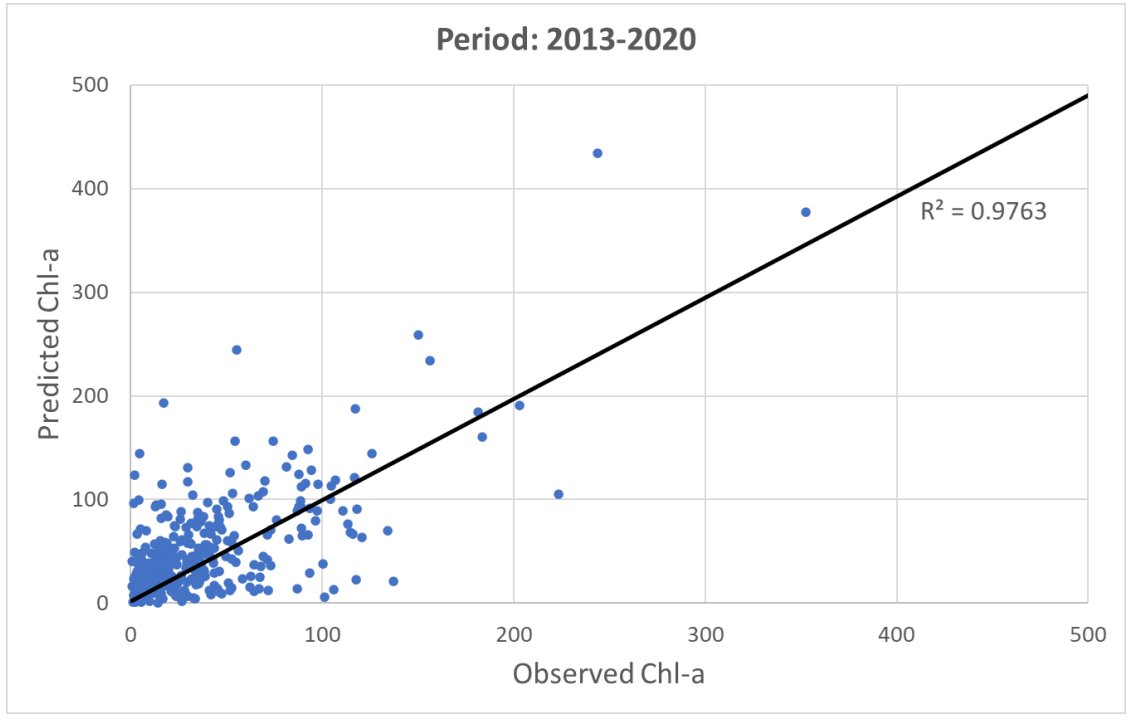
	df	Sum of square	Mean square	F-ratio	p-value
Spring Season (May-June)					
Regression	12	1.50E+04	1.25E+03	11.8745	< 1E-4
Residual	61	6.43E+03	1.05E+02		
Total	73	2.15E+04			
Summer Season (July-August)					
Regression	12	4.56E+07	3.80E+06	1823.63	< 1E-4
Residual	172	3.58E+05	2.08E+03		
Total	184	4.59E+07			
Fall Season (Sept-Oct)					
Regression	12	3.51E+05	2.92E+04	157.115	< 1E-4
Residual	115	2.14E+04	1.86E+02		
Total	127	3.72E+05			
Full Period					
Regression	12	4.57E+07	3.81E+06	1471.53	< 1E-4
Residual	384	9.94E+05	2.59E+03		
Total	396	4.67E+07			

NGI ENRICHERS TRANSATLANTIC

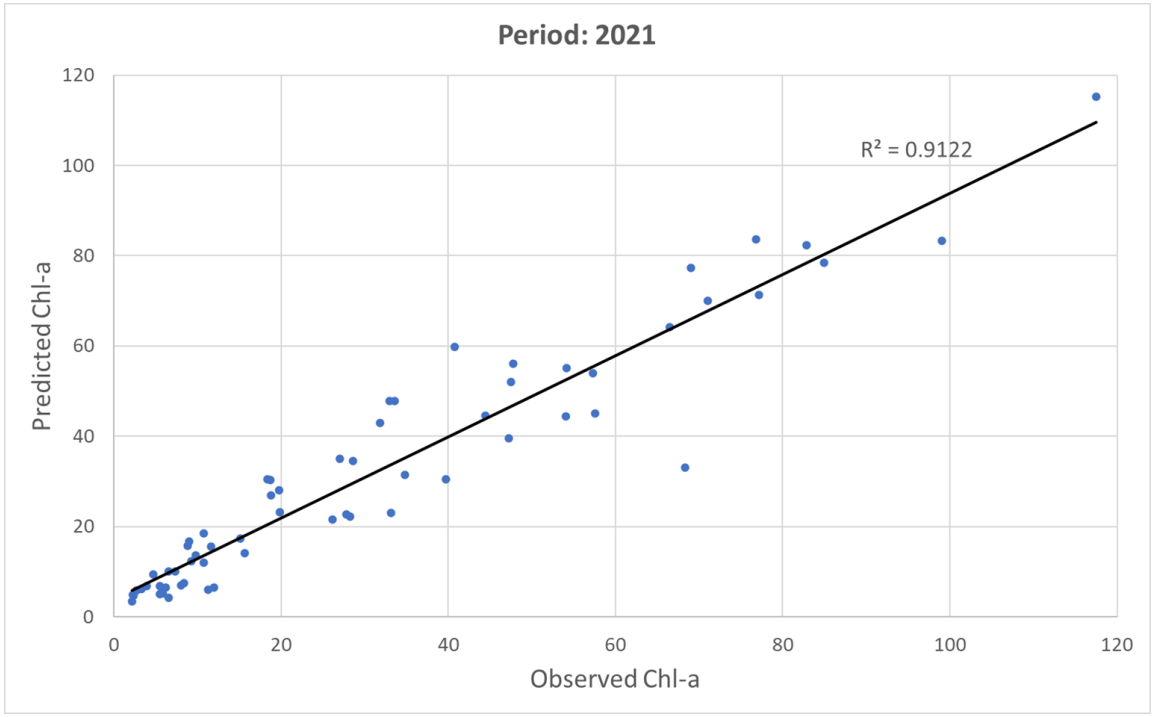
THE KEY RESULTS (3)

Performance of the regression model

Train for period: 2013-2020



Test for period: 2021

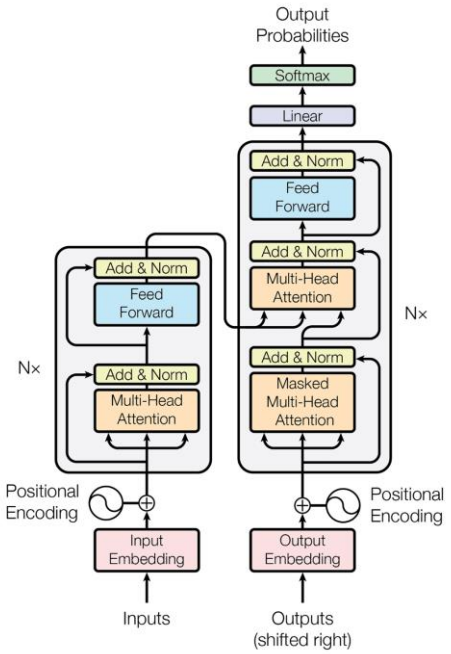


NGI ENRICHERS TRANSATLANTIC

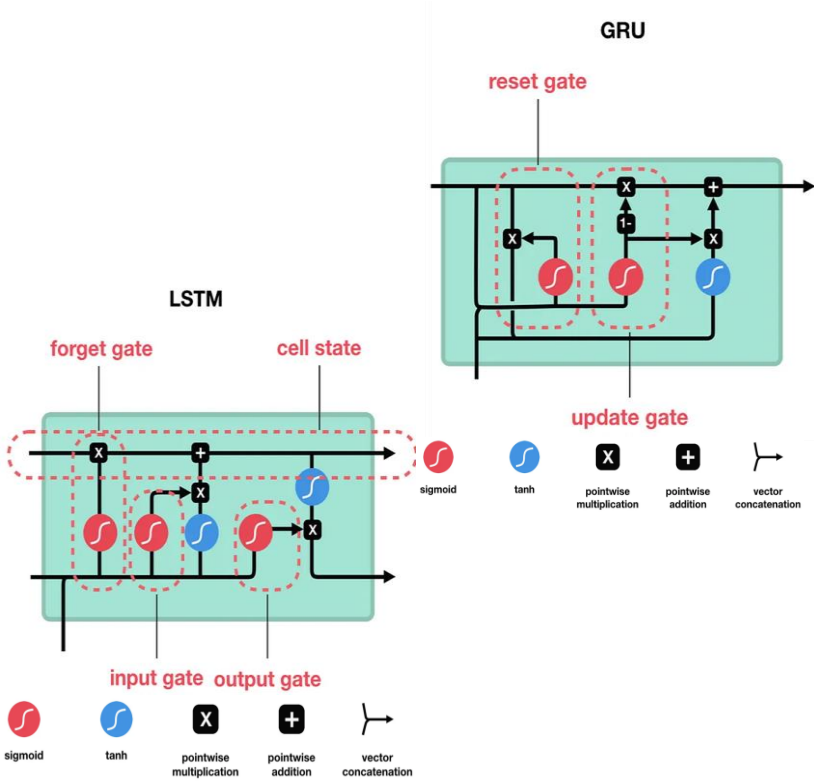
THE KEY RESULTS (4)

Performance of DL based HAB predictions

Transformer



Cutting edge DL architectures



Performance Metric

R-squared

A performance indicator used to assess the explanatory power of spatial and temporal prediction

$$R^2 = 1 - \frac{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}{\sum_{i=1}^{n}(y_i - \bar{y})^2}$$

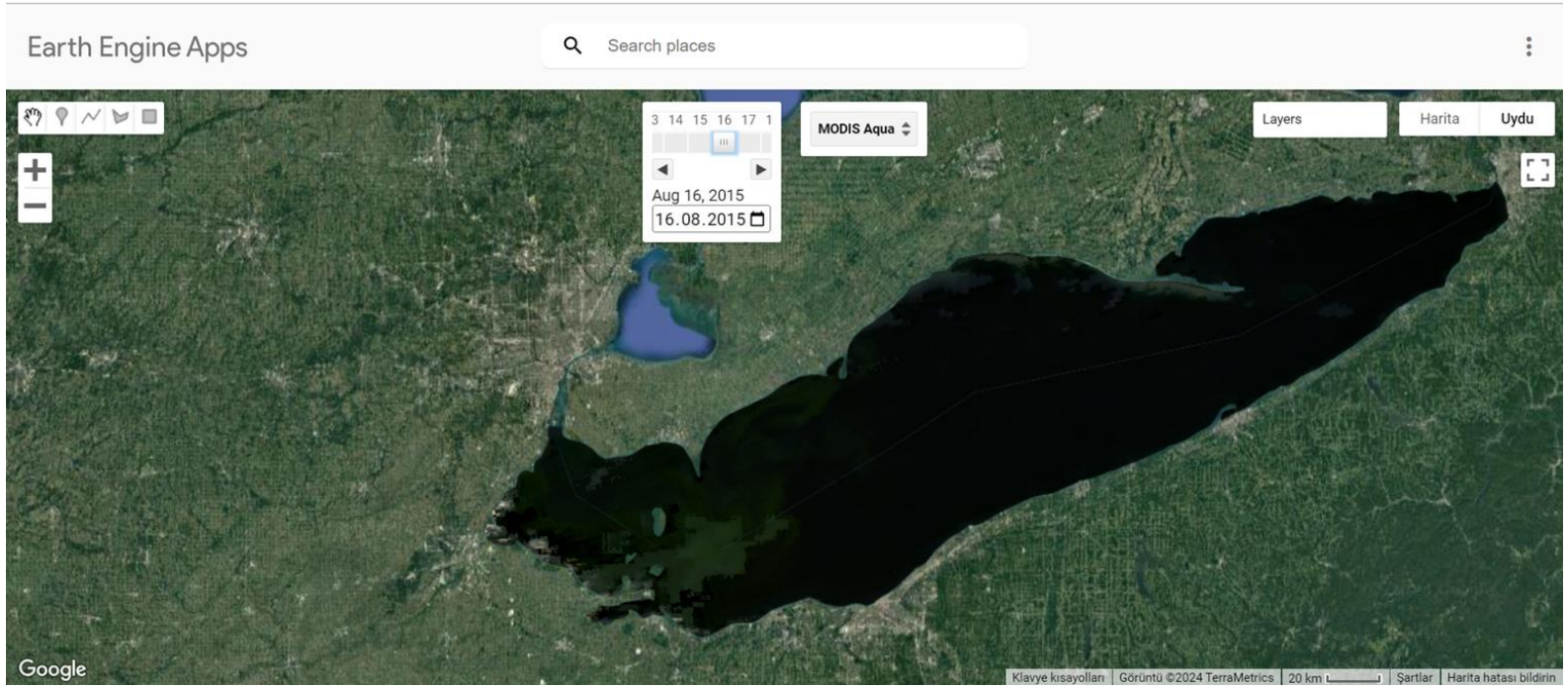
Performance comparison

Model	R^2
Transformer	0.923
Long Short-TermMemory (LSTM)	0.905
Gated Recurrent Units (GRUs)	0.856
Lasso Regression	0.807
Ridge Regression	0.714

THE KEY RESULTS (5)

Real time mapping and monitoring of HAB dynamics

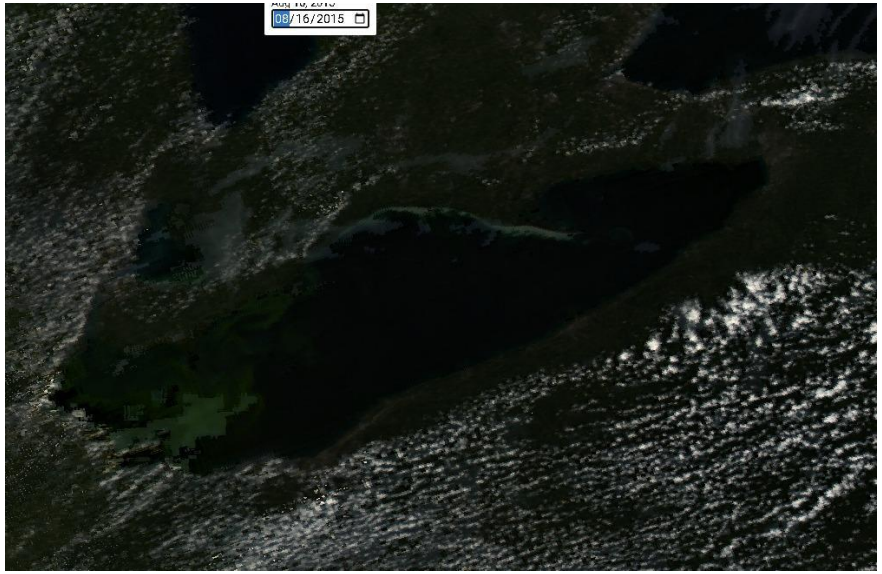
Product Dissemination
https://omermermer.users.earthengine.app/view/lakeerie
A Google Earth Engine based interface to intercompare dates



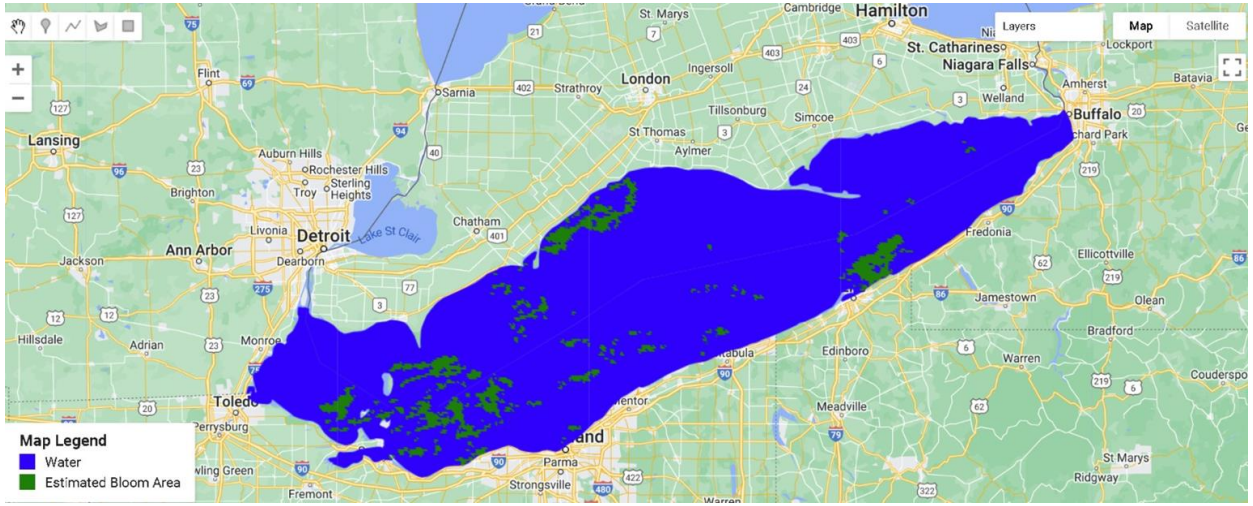
NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (6)

Real time mapping and monitoring of HAB dynamics



Real satellite image-True color



HAB monitoring and forecasting based on reflectance spectrum

Moderate Resolution Imaging Spectroradiometer (MODIS)

Spectral coverage: 36 bands (reflective+thermal) from 0.4 to 14.2 microns (Visible, NIR, Shortwave IR, Longwave IR)

Spatial resolution: 2 bands @ 250 m; 5 @ 500 m; 29 @ 1000 m

Revisit period: averages a 2-day

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (7)

Summary

Key Achievements:

- In-depth literature review
- Comprehensive dataset
- Survey of DL models and algorithms
- Optimized DL model and source code
- Identifying key factors of the model output
- Journal articles and Conference presentations

Position:

- **NGI Fellow** for 6 months between July-Dec 2023
- **Senior Research Scientist** at UIHILab, University of Iowa

Conference Presentations related to the NGI:

- O. Mermer, B.Z. Demiray, I. Demir, “Estimation of Chlorophyll-a concentration using transformer model”, Water Science Conference, 2024, MN.
- O. Mermer, I. Demir, “Multi regression analysis for key drivers of Harmful Algal Bloom in the Lake Erie”, Water Science Conference, 2024, MN.

THE KEY RESULTS (8)

Publication related to the NGI:

- O. Mermer, B.Z. Demiray, I. Demir, " Deep Learning based Algal Bloom prediction and environmental driving force analysis", Journal of Hydroinformatics, 2024 (in preparation)
- O. Mermer, B.Z. Demiray, I. Demir, " Identifying key driver parameters of Harmful Algal Bloom by using multivariate regression analysis", Environmental Modelling & Assessment, 2024 (in review)

Publication related to the other projects:

- L. A.V. Kadiyala, D. J. Samuel, Y.Sermet, O. Mermer, I Demir, "Comparison of large language model for hydrological uses cases", in preparation
- B Kaynak, Y.Sermet, O. Mermer, I Demir, "Hydro Signals: Integrating Web Technology and Intelligent Assistants for Advanced Hydrological Monitoring", in preparation
- B.Z. Demiray, M. Sit, O. Mermer, I. Demir, "Enhancing Hydrological Modeling with the Transformer: A Case Study in 24-hour Streamflow Prediction", EarthArXiv, 2023

Research Projects & Grants (current & pending):

- Deep Learning Based Harmful Algal Blooms Prediction, Funded by Next Generation Internet-Enrichers Transatlantic, PI, 2023
- Open-source web-based tool for estimating and monitoring long term HAB and water quality parameters, Climate Change AI Innovation Grants, 2024 (in preparation)
- Open-Source Community Development for Next-Gen Web Technologies in Hydrological Research and Education, Midwest Big Data Innovation Hub (MBDH), Co-PI, 2023-2024
- FloodAware: An open source web -based tool for community flood risk assessment, submitted to Amazon Research Award, 2023 (pending)
- Open-Source Ecosystem for Hydrological Education, Research, and Operations (OSE-HERO), submitted to NSF-POSE, (pending)

THE KEY RESULTS (9)

Impact of the fellowships

During the projects, the NGI Enricher fellowship has had a profound impact on the project itself and my professional career.

1. *Development/advancement of innovative technologies:*	Exposure to cutting-edge techniques such as DL, XAL, ML
2. *Testing technologies (demo, pilot…):*	Applying our models on Lake Erie as pilot ecosystem.
3. *Sound Scientific Validation*:	DL algorithms, data regression, XAL methods
4. *Strengthening research collaboration with the US:*	Working with different research lab, research institute and research community.
5. *Building solid connections and partnerships in the US:*	Working with nonprofit organization (MBDH), research community (CUAHSI)
6. *Fundraising (proposals to public organisations) - indicate, in the US/Canada or Europe:*	Preparing new projects for Climate Change AI and MBDH
7. *Paper submission for further publication – indicate, only EU author(s), or jointly with the host organisation:*	Preparing and submitted a journal article with the host organisation
8. *Conference attendance with paper/poster/proceedings:*	Preparing and submitted a journal article with the host organisation

THE IMPLEMENTATION

DL-based HAB prediction

- To optimize DL models (hyperparameter optimization, parameter sensitivity analysis.,,,)
- To interpret the output of the DL models (feature importance, XAI techniques)
- To expand our results to the different use cases

Web-based HAB and water quality monitoring and forecasting system

- To Implement and deployment
- To develop HAB early warning system-(remote sensing and mapping)
- To develop open-source web-based tool for estimating and monitoring long term HAB and water quality parameters

THE EXPECTED IMPACT

Human centric approach:

- The HAB forecast results will be provided with all key stakeholders (municipalities, DNRs, universities, and public) through an online platform so that they may be integrated into the appropriate decision-making systems.
- Comprehensive dataset can be designed and used for comparative analysis by using cutting-edge DL architectures. This benchmark data set will be utilized data-driven research and UI Hackahon.
- Key driving factors analysis can provide us more information about algae development which enables relevant institutions to take precautions before the algal bloom becomes more severe.
- In this project, The EarthAIHub platform (see https://earthaihub.org) powered by TensorFlow.js will be utilized for implementation and deployment of the project results and the benchmark dataset.
- We're dedicated to our project objectives and enthusiastic about deepening our involvement in HAB prediction through deep learning, supported by our team and stakeholders, as we work towards mitigating harmful algal blooms in aquatic ecosystems.

Ethical Consideration and Governance:

- When building DL model, regulation , ethical consideration and governance should be taken into account based on following topics:
- Fairness: A diverse and representative training dataset can be collected for the HAB prediction to prevent bias.
- Transparency and Explainability: The prediction model, dataset and code of the model will be shared with all stakeholders via GitHub and EarthAIHub. Several XAI techniques, will be used to interpret model output .
- Robustness: Various satellite images from the different sources can be part of our dataset. Besides, testing and validation phases ensure its functional robustness.
- Privacy: No personal data can be used, and no data privacy can be violated.
- Accountability: HABs predictions created by AI models will not be used directly but will be used as a resource for decision support.

THE LESSONS LEARNED

Surprises

- Data collection and preparation: This process took longer than we thought. It was very difficult to find the data we wanted for the lakes in the state of Iowa, which we chose as a pilot region. Therefore, we had to choose another lake as the pilot area.
- Remote sensing data is very challenging

Challenges

- Have skills for the novel DL models
- Remote sensing technology
- Water quality monitoring data
- Hydrology

Lessons learned:

- Data collection, preparation and pre-processing are the most important and time-consuming parts, and it is necessary to allocate more time.

Ömar Mermer

Phd, Senior Research Scientist
Hydroinformatic Lab, University of Iowa

Omer Mermer

omer-mermer@uiowa.edu

https://hydroinformatics.uiowa.edu/Profile

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Rub Your Eyes: Robustness Analysis of Document Redaction for Anonymisation

Gabriele Orazi
Italy

Track
Paired Teams - USA

Host Organization
Computer Science Department, University of California, Irvine

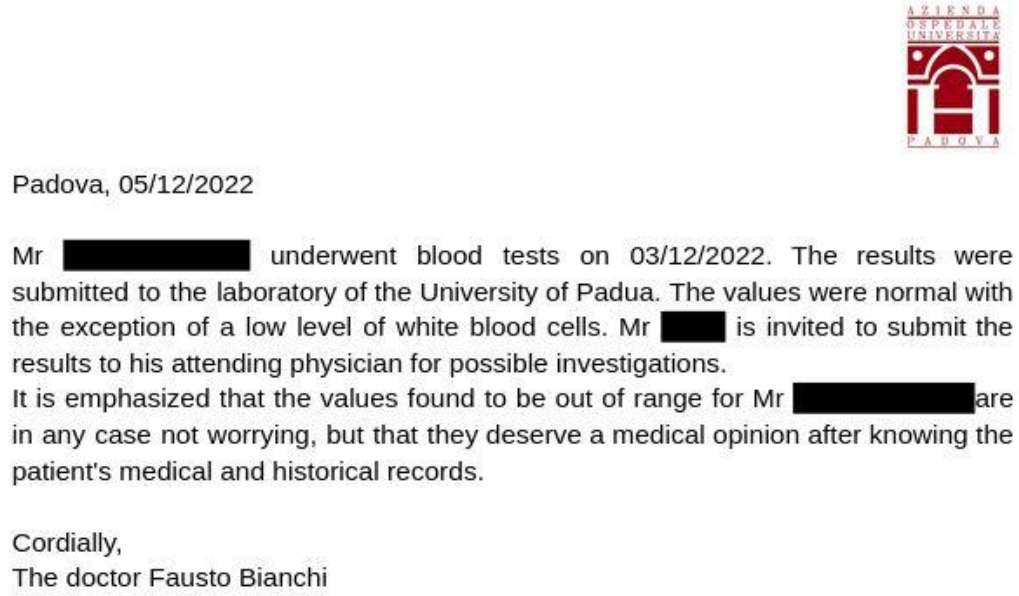
Researcher (scientific/ technical/engineering)

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (1)

- **No awareness** about **ineffectiveness of document redaction**
  - Information leakage, Data sharing skepticism

- **Main targets**
  - **Organizations** interested in sharing documents
  - **Research community**, for **open data** (Medical field)



AZIENDA OSPEDALE UNIVERSITÀ PADOVA

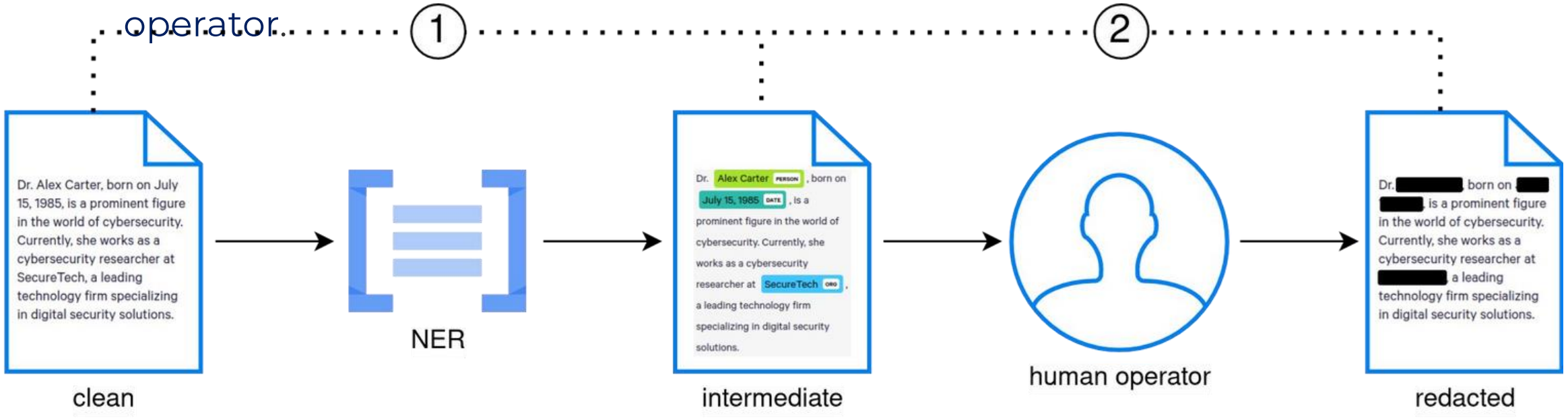
Padova, 05/12/2022

Mr [redacted] underwent blood tests on 03/12/2022. The results were submitted to the laboratory of the University of Padua. The values were normal with the exception of a low level of white blood cells. Mr [redacted] is invited to submit the results to his attending physician for possible investigations.
It is emphasized that the values found to be out of range for Mr [redacted] are in any case not worrying, but that they deserve a medical opinion after knowing the patient's medical and historical records.

Cordially,
The doctor Fausto Bianchi

THE PROBLEM (2)

Nowadays PII* are mostly discovered by NER, then verified by an operator



* Personal Identifiable Information ** Named Entity Recognition

THE SOLUTION (1)

Apply NER when entities are not there!

1 Analyze/extract features of the document

100

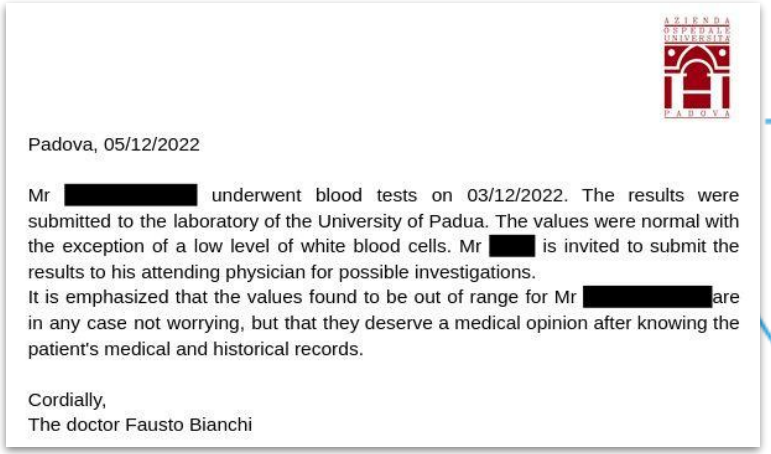
2 Extract text from the document

3 Analyze sentences' structure with NLP

4 Combine all the features to **predict which kind of entity** is behind the box

NGI ENRICHERS TRANSATLANTIC

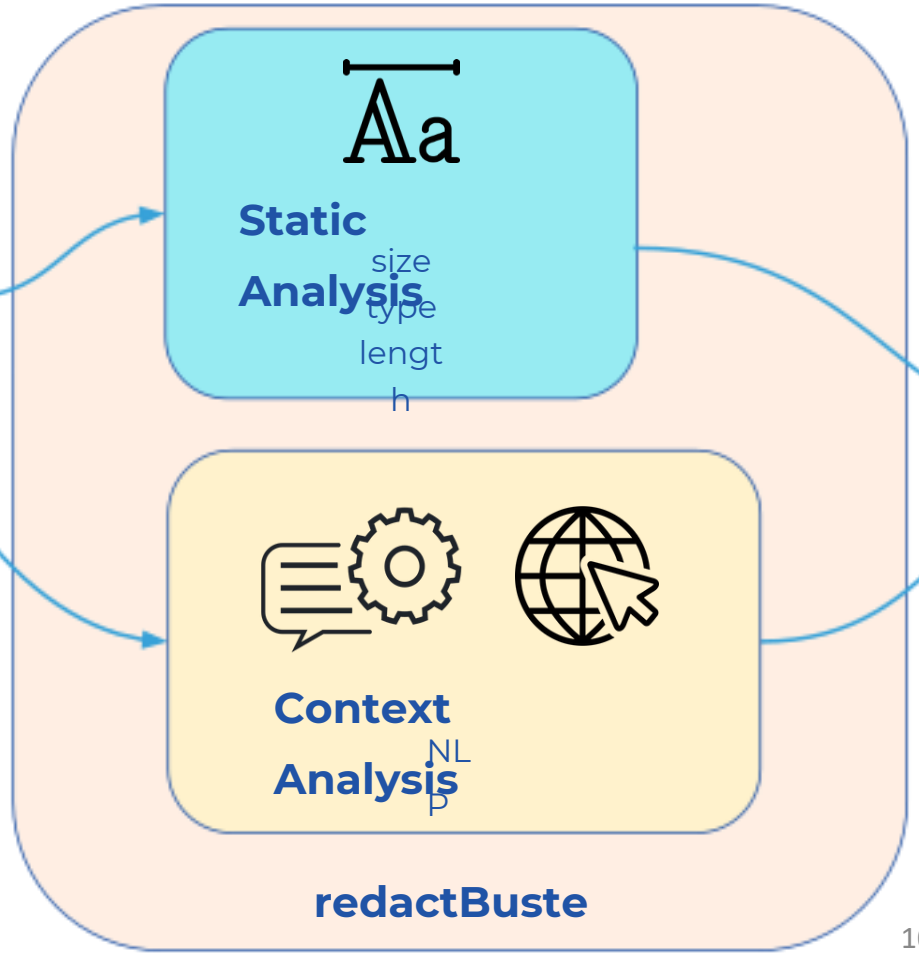
THE SOLUTION (2)



Padova, 05/12/2022

Mr [redacted] underwent blood tests on 03/12/2022. The results were submitted to the laboratory of the University of Padua. The values were normal with the exception of a low level of white blood cells. Mr [redacted] is invited to submit the results to his attending physician for possible investigations.
It is emphasized that the values found to be out of range for Mr [redacted] are in any case not worrying, but that they deserve a medical opinion after knowing the patient's medical and historical records.

Cordially,
The doctor Fausto Bianchi



Leakages:

BOX 1: Person, 15 chars long, Male
BOX 2: ...

101

NGI ENRICHERS TRANSATLANTIC

GABRIELE ORAZI, PHD STUDENT @UNIV PADOVA

- **Active Cyber Security Researcher in SPRITZ Research Group**

-Malware detection

-Privacy and Security

- **European Double Degree Programme for Master**

-University of **Trento** & University of **Turku**

-Major in **Cyber Security**, Minor in **Entrepreneurship**

- **Work experience in the field**

-**International experience in EU companies** as security expert / developer Tesla Consulting, Daimler, Awake.ai, XTN Cognitive Security

THE TEAM

Mauro Conti, Full Professor, University of Padua

- PhD supervisor, SPRITZ Group leader
- Head of Studies of Cyber Security Master Degree
- IEEE Fellow, Young Academy of Europe Fellow, EU Marie Curie Fellow Alumni, DAAD Fellow Alumni

Google Scholar

Cited by	
	All
Citations	21793
h-index	69
i10-index	294

Gene Tsudik, Distinguished Professor, University of California, Irvine (UCI)

- SPROUT Group leader
- Fulbright Scholar, a fellow of ACM, IEEE, AAAS, and IFIP, foreign member of Academia Europaea

Cited by	
	All
Citations	40117
h-index	102
i10-index	220

NGI ENRICHERS TRANSATLANTIC

103

THE HOST ORGANIZATION

- **Security and Privacy Research OUTfit (SPROUT), UCI**

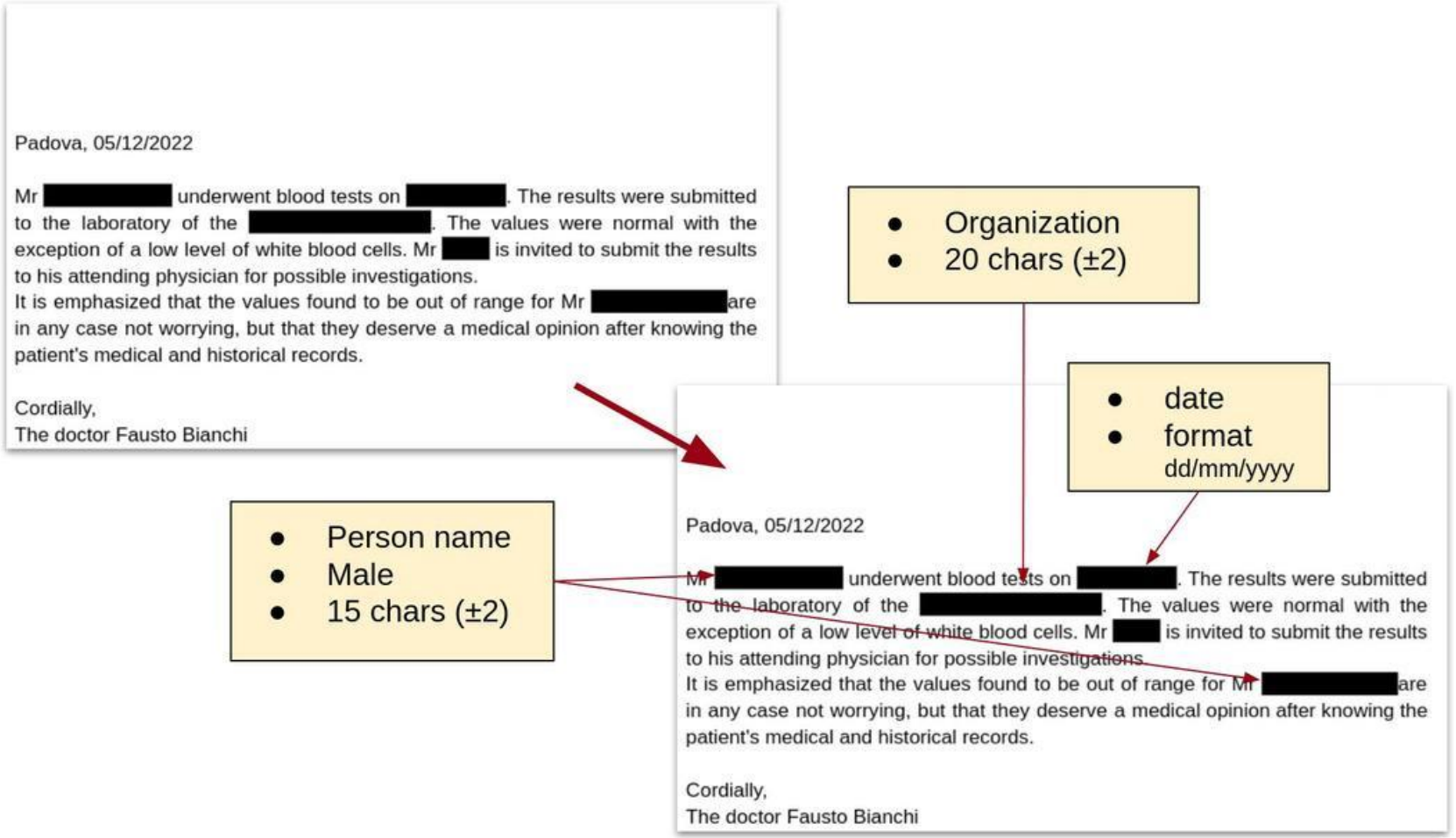
UCI Donald Bren School of Information & Computer Sciences
Security and Privacy, Applied Cryptography

- **Join interests**

prof. Tsudik **expertise** in the field
Long established partnerships, with past and ongoing projects
New connections with **young researchers** (7 PhD students colleagues)

THE KEY RESULTS (1)

- Creation of a **new NER model** without clear text;
- Creation of a **POC benchmarking tool** for the community with an easy pipeline for model customization.



THE KEY RESULTS (2)

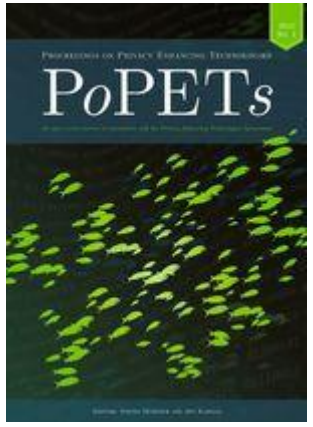
- Strengthening research **collaboration with SPROUT** Research Group
- **Start of new project ideas** to be implemented in the near future
- Contact with other cybersecurity research groups

THE KEY RESULTS (3)

Preparation of the paper for publication in a Conference for sponsoring the results:

- Scientific conferences (Usenix 2024, PETS 2024)
- Cyber Security focused conferences application (DEFCON 34, Disobey, NoHat)

usenix
THE ADVANCED COMPUTING SYSTEMS ASSOCIATION



DEFCON

COMPUTER SECURITY CONFERENCE
NO HAT

NGI ENRICHERS TRANSATLANTIC

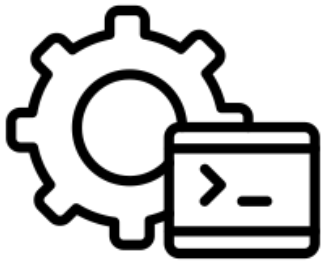
THE IMPLEMENTATION

- Achievement of the Conference Publication and sharing of the benchmark tool to both companies and researchers;
- Work with SPROUT Research Group for a Applied Cryptographic implementation of a **novel redaction method**.
  - Discussion about a **possible patent** in this regard.

NGI ENRICHERS TRANSATLANTIC

THE EXPECTED IMPACT

- Increasement awareness about the risks of excessive **private information** sharing;
- Establishment of a **standard testing tool** for anonymity of docs.



THE LESSONS LEARNED

What you wished you had known prior

- Deal with real personal data is almost impossible.

Surprises

- Single project workflow is possible and is efficient.

Challenges

- Adaptation to a different workflow in a different research group.

Impacts

- Importation in the research group some “healthy” habits
- Reevaluation of the daily workflow.

THE LESSONS LEARNED (bonus)

- Flying with a bike is easier than expected!
- **South California is AMAZING**!

NGI ENRICHERS TRANSATLANTIC

Gabriele Orazi

Phd student at University of Padova

Gabriele Orazi

gabriorazi07@gmail.com

presentation video of the project

https://goemon07.github.io/

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Advanced Human Computer Interaction in Virtual Training and Simulation environment

Vasileios Apostolos Ouranis
Greece

Track
Open Ideas - USA

Host Organization
Saint Louis University

Innovators/Entrepreneurs

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

The core problem addressed by the project lies in the **limitations of current Virtual Reality (VR) training and education applications, specifically the lack of natural touch interaction**. The primary target audiences for the project include **research centers**, **medical organizat**ions (clinics), and **aerospace companies** (for pilot and engineer training).

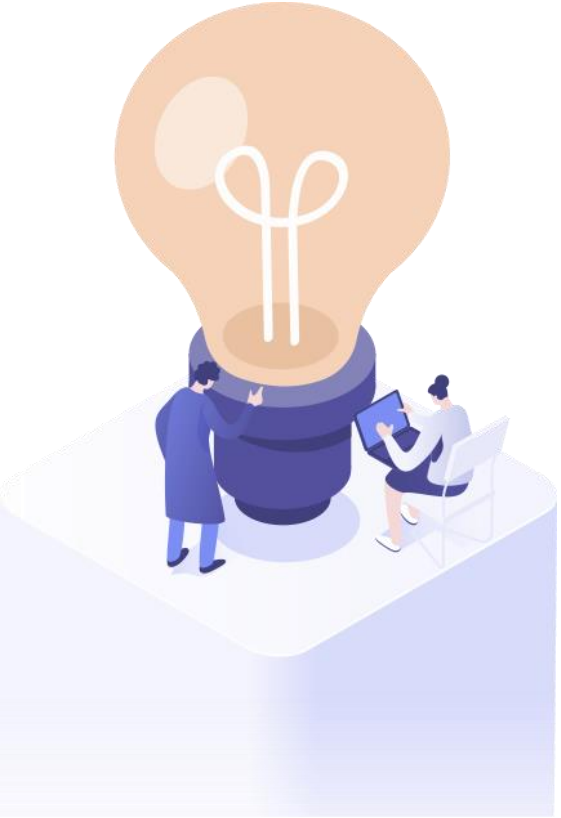
Companies, such as **haptX**, **Senseglove**, **Manus**, and **TeslaSuit**, are already working on solutions to address the touch sense challenge in VR. **These companies provide valuable solution, however none of them can dominate the VR haptic glove market because of their technology limitations**. The opportunity for the project lies in offering a more user-friendly and high-performance solution that bridges the gap between ease of use and realistic touch interaction

THE SOLUTION (1)

Technology:
VR Haptic Exoskeleton, comprises advanced finger tracking, tactile feedback, and kinaesthetic feedback technologies to replicate realistic touch sensations in virtual environments.

Differentiator/ Competitive advantage :
VR Haptic Exoskeleton differentiates itself by providing user-friendly, high-performance solution. It simplifies touch interaction in VR without compromising realism between VR interactivity.

Opportunity :
The opportunity arises from the persistent problem of limited touch interaction in VR, reflected in the 25% market share of the 2 billion euros global VR training and simulation market. VR Haptic Exoskeleton aims to capitalize on this by offering a superior touch-sensitive solution, targeting substantial market growth projected at 25 billion euros by 2026 with a 28% CAGR.



THE SOLUTION (2)

NGI ENRICHERS TRANSATLANTIC

VASILEIOS APOSTOLOS OURANIS, CO-FOUNDER OF MAGOS

- Before dedicating himself full-time to Magos in 2019, Vasapo gained valuable experience during his four-year journey at Deloitte, where he served as a Business Technology Consultant.
- Prior to his role at Deloitte, he contributed to the presales department of SAP, focusing predominantly on their flagship solution, the ERP system known as S/4HANA.
- He holds an educational background, with a Master of Science degree in Management Science and Technology. He also earned a Bachelor of Science degree in Management and Business Administration from Athens University of Economics and Business.

THE ORGANIZATION

Saint Louis University (SLU) is a private Roman Catholic research university located in St. Louis, Missouri, USA. Founded in 1818, SLU is one of the oldest universities west of the Mississippi River.

SAINT LOUIS UNIVERSITY™
EST. 1818

Computer Science department covers a broad range of topics related to computing, software development, algorithms, and emerging technologies. **The People and Technology Horizon (PATH)** group at Saint Louis University (SLU) is at the forefront of addressing the intricate relationship between humans and technology. Recognizing that the realms of technology design and human communication are deeply interconnected, PATH seeks to break down silos and integrate insights from linguistics and anthropology into cutting-edge engineering.

THE TEAM

Greg Agriopoulos, Founder + CEO
12+ years of experience BD Systems Engineering Electrical Engineering

Vasilostopolos Ouranis, Co-Founder + COO
8+ years of experience in Software Engineering Product Management Systems Engineering

Steve Smith, Aerospace executive
30+ years of experience in Go-to-market roadmaps Director at Blue Origin

Stelios Theodossiou, Industrial Designer
25+ years of experience in Industrial Design Human

Avgerinos Bakalidis, Hardware Engineer
8+ years of experience in Hardware architecture Electronics design

Low level programming

Greg Kalantzis, VR Software Engineer 5 years of experience in XR evangelist

S/W development

Flavio Esposito, Assistant Professor in the Computer Science Department at Saint Louis University.

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (1)

Key Activities conducted during the expedition included:

- Collaboration with the Computer Science (CS) Faculty at St. Louis University ·
- Presentation and Demonstration of my project to SLU audience
- Participation in TechCrunch Disrupt 2023
- Speaker at VRARA Saint Louis and Chicago Webinar

THE KEY RESULTS (2)

- Connection with more than 35 US based Universities.
- 3 requests from Us Universities for purchasing our solution.
- Effective communication of our VR haptic exoskeleton solution.
- Comprehensive VR haptic exoskeleton solution testing.

THE KEY RESULTS (3)

Milestones Achieved during the Fellowship:

- Participation in High-Profile Events
- NSF Proposal Collaboration with Professor Flavio Esposito
- Talent Connection Building
- Venture Capitalist Engagement

THE IMPLEMENTATION

Next steps for the next 6 months

- Finalization and Submition NSF Proposal: Systems (CPS).
- Exploration of Additional Research Proposals.
- Expansion of Network and Collaborations.
- Securing US-Based Funding Commitment.
- User Testing and Feedback Iteration.

THE EXPECTED IMPACT

VR haptic exoskeleton project significantly impacts key Human-centric NGI domains:

- It fosters **Cooperation** by enabling collaborative and immersive experiences in VR.
- The project prioritizes **Data Privacy**, ensuring that user information is secure.
- It contributes to **Digitalization**, offering a user-friendly and advanced solution.
- The project promotes **Diversity** and **Equity** by being an inclusive and accessible technology.
- It ensures **Interoperability** with various VR systems in diverse educational applications.
- It encourages **Social** participation by enabling shared virtual spaces.
- **Sustainability** is considered in the product life cycle.

THE LESSONS LEARNED

What you wished you had known prior.

Any bad or good “surprises”?
Navigating the vast opportunities in the USA was challenging. On the positive side, the multitude of opportunities allowed for significant growth and exploration. However, the need for a meticulously designed and clear execution plan became evident to maximize the potential benefits of this experience.

Any challenges, personally and professionally?
One notable challenge was adjusting to the substantial time zone differences between the USA and Europe. Being an integral part of a start-up based in Europe required early mornings to align with the team. This presented both a personal and professional challenge as I endeavored to maintain a balanced work-life schedule.

Impact of those lessons learned?
These challenges have significantly contributed to my personal and professional growth. Adapting to the time zone differences and the demanding nature of startup work has honed my agility and flexibility in managing daily schedules. This experience has underscored the importance of strategic planning and adaptability in a dynamic and diverse work environment.

Vasileios Apostolos Ouranis

Co-founder and COO of Magos

Vasilapostolos (Vasapo) Ouranis

Vasilapostolos@themagos.com

presentation video of the project

https://themagos.com/

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Pilot Implementations of Multi-Objective Route Optimization

Martin Pečar
Slovenia

Track
Paired Teams - USA

Host Organization
George Mason University - Mason Enterprise Center

Innovators/Entrepreneurs

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Local logistics / mobility:

- **Inefficiency, High costs and environment impact** – transport uses ⅓ of all our energy needs
- **Companies, doing distribution, deliveries, services, tranzit –** all of them face similar issues and problems
- **Many companies doing route optimization** – however, our proprietary multi-objective optimization algorithm can be used as an add-on and achieve additional 5-15% improvement

THE SOLUTION (1)

Multi-objective route optimization

- **Technology** – development of a novel proprietary algorithm which provides

a good approximation of the Pareto front

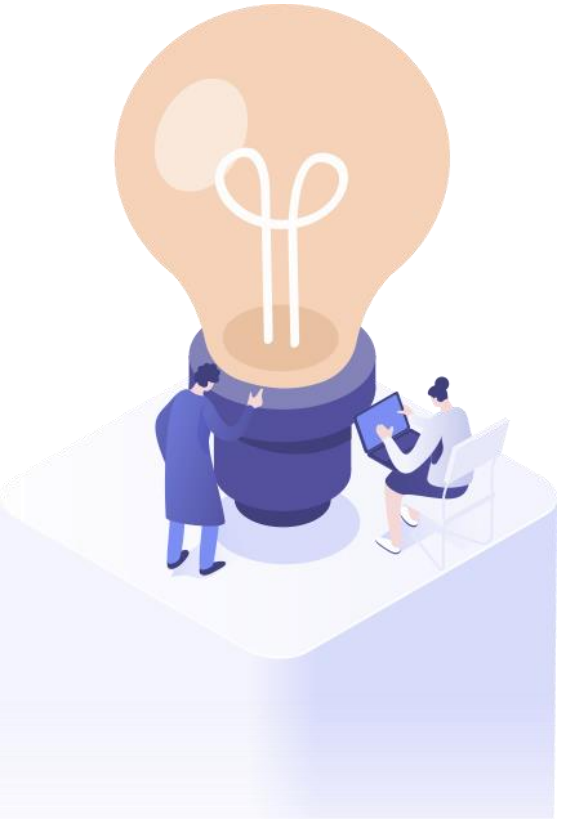
- **Differentiator –** everyone else uses single-objective optimization (e.g. fastest

routes)

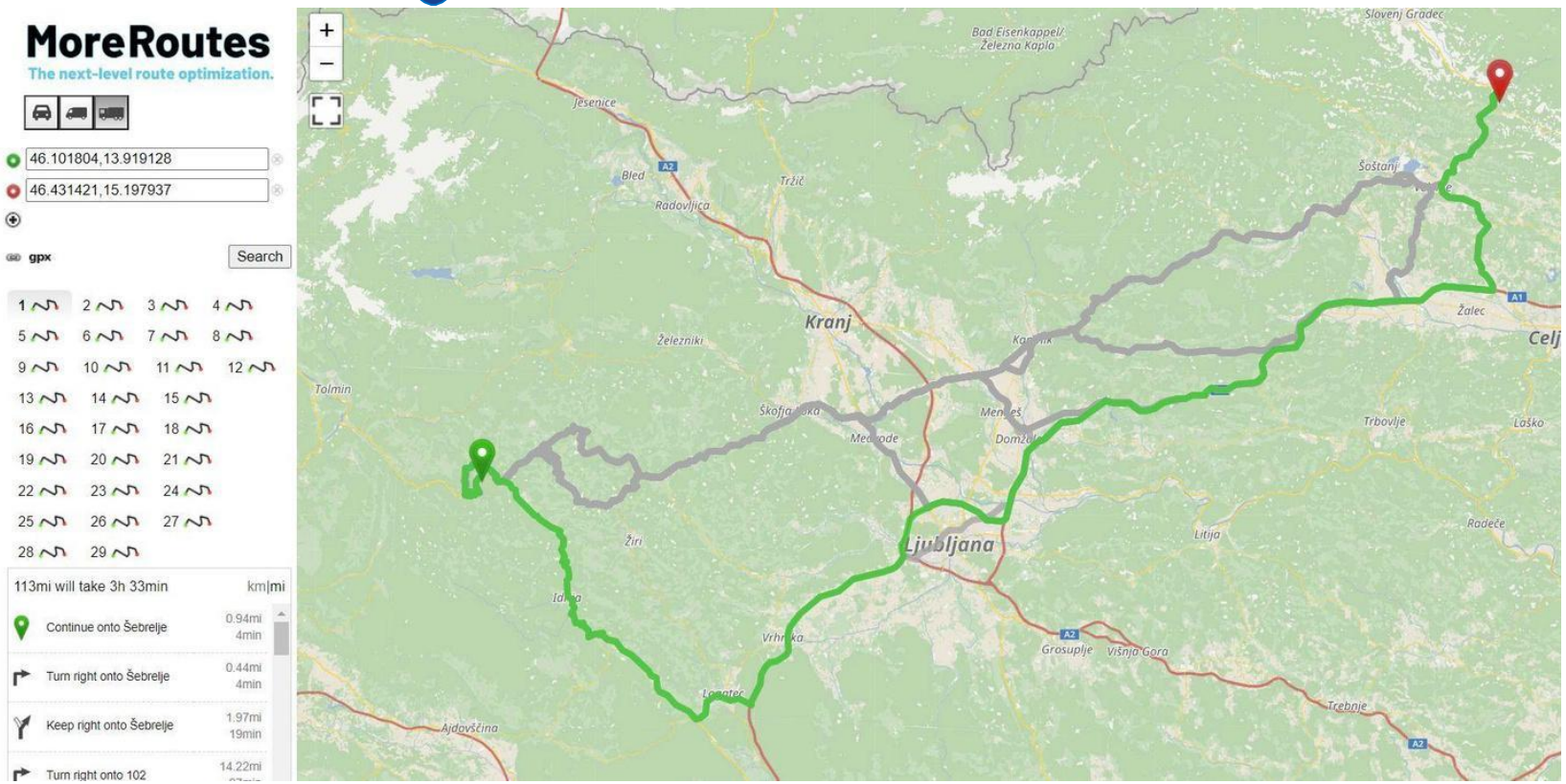
- **Development –** there is some additional work to integrate US real-time traffic

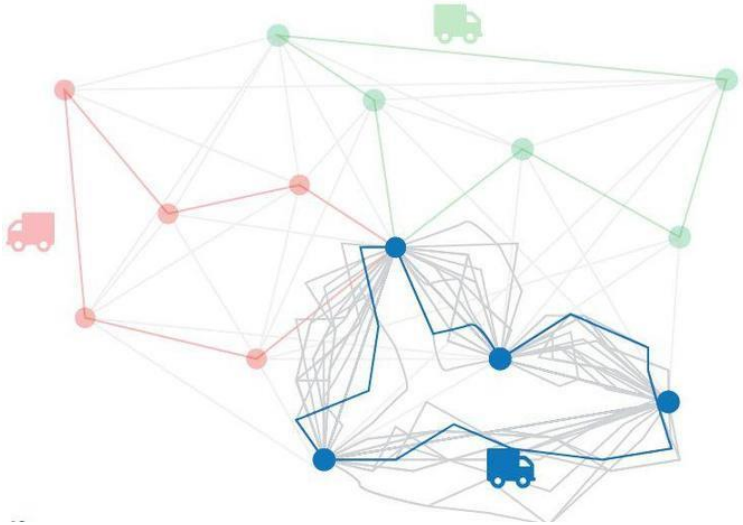
data, and more if there is a transfer to another domain (e.g. ships or airplanes)

- **Size** – the size of the market is over 300Bn



THE SOLUTION (2)





NGI ENRICHERS TRANSATLANTIC

MARTIN PEČAR, FOUNDER

Bio:

- Mathematician, R&D, sales, management, founder
- **Experience with NGI –** researcher at JSI, manager of cluster for Smart Cities, BlockChain Think Tank member (IoT, Big Data, Blockchain, Cloud computing / e-mobility, Autonomous V2X)
- **Achievements as NGI researchers/innovator –** mathematics PhD student, developed a new multi-objective algorithm, participated in PRACE (HPC) project

THE TEAM

2 employees –

Martin Pečar (founder),

Romi Koželj (Lead developer)

3 outsourced –
Simon Gabrijelčič (Marketing & Sales), Matjaž Kralj (DevOps), Edi Šuc (IT support)

3 student interns –
Mark Vale (frontend development), Ema Leila Grošelj (algorithm developer), Tadej Jeršin (frontend developer)

THE HOST ORGANIZATION

George Mason University, Mason Enterprise Center

- Strong Computer Science Department
- Position (East Coast, close to Washington D.C.)
- Cooperation with ENRICH in USA (soft landing hub)

THE KEY RESULTS (1)

- Discovering of Added Value
- Multi-objective optimization saves additional 5-15% of distance, fuel costs and emissions
- STEALTH ROUTING
- For security companies many possible routes decreases predictability and increases safety

THE KEY RESULTS (2)

Connection to the business ecosystem

- large retailers (Walmart, IKEA, Albertsons, Walgreens)
- security companies (Brinks, G4S)
- ports (Port of New York and New Jersey)
- prospective partners (ICF)

THE KEY RESULTS (3)

- Preparation of a joint paper with prof. Lance Sherry from GMU about air traffic control

- Work on a PoC of GMU transport (preliminary result 9% savings)

THE IMPLEMENTATION

- Going-back to various events to nurture relationships
- Finishing of the started project at the GMU
- Establishment partnerships and find new projects

THE EXPECTED IMPACT

- Decrease the use of resources for logistics by 5+%

THE LESSONS LEARNED

- Everyone is difficult to reach, including professors
- USA is fragmented, a lot of bureaucracy
- Everything takes more time and money than expected
- Good networking: events and warm introductions

Martin Pečar

Manager and Founder of Omniopti

Martin Pečar

martin.pecar@omniopti.si

watch

https://omniopti.si

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

[C-BRIDGE]: EU-USA Collaboration for Business Research, Incubation and the Development of Goals, Entrepreneurship and Adoption of Activities

Martin Serrano
Ireland

Researcher (multidisciplinary)

Track
Paired Teams - USA

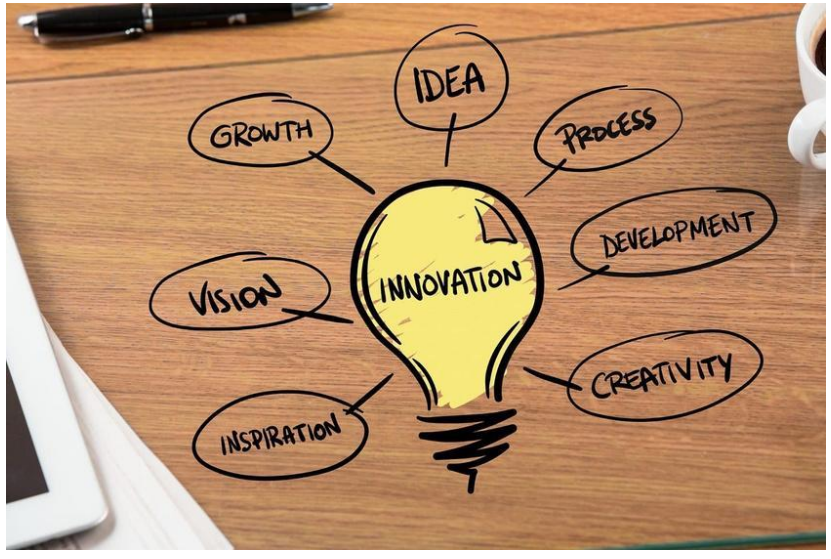
Host Organization
National Institute for Standards and Technology

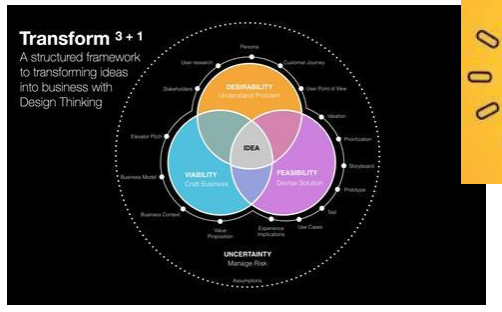
NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

DATA INNOVATION

Define a validated set of collaborative activities to assist on identifying Best Practices for **Business Research**, **Incubation Practices** and the **Development of Business Goals** to address solid principles for **Entrepreneurship** and for the Identification of market-related Activities.





Innovation is the ability to convert ideas into invoices.

— Lewis Duncan

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (2)

Scientists worldwide reaches 8.8M in 2018 Source: UNESCO report

United States Number of Researchers in 2022: Total 1.8M. Source CEIC

ACADEMICS COMMUNITY

RESEARCH COMMUNITY

POLICY MAKERS

GENERAL PUBLIC

NGI ENRICHERS TRANSATLANTIC

THE SOLUTION

5-Steps Process Approach

C-BRIDGE as a Technology differentiator provide competitive advantage and unveil new business opportunities -

Figure 2: Business research methods, incubation practices, and entrepreneurship activities promoting standardization for the next generation of smart cities and Services

The applicability for C-BRIDGE Methodology is domain agnostic and independent of the domain area where this can be used, its main purpose is helping to transform scientific knowledge into community impact(s) directing market opportunities.

THE SOLUTION (2)

APPLICABILITY EXAMPLE

5-Steps Process Approach

Financial Benefits ≠ Better Services

Data Producers

Data Consumers

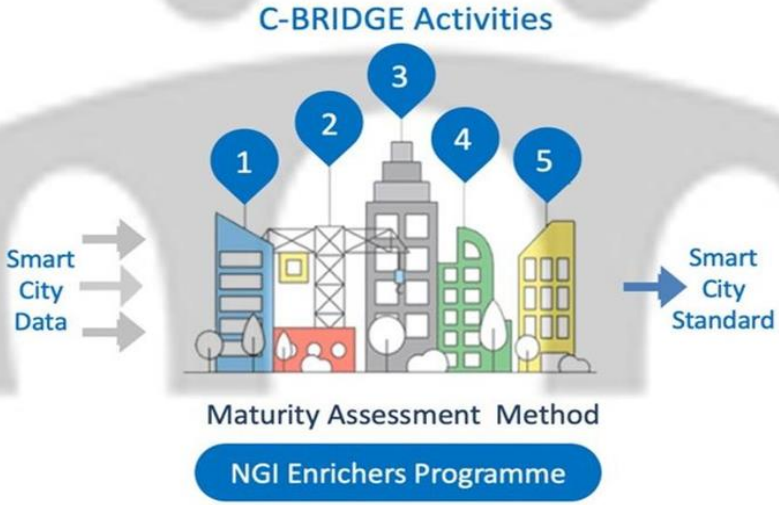
A New Methodology to Use Collected Data then Produce Economy Benefits

NGI ENRICHERS TRANSATLANTIC

THE SOLUTION (3)

IN PRACTICE
5-Steps Process Approach
C-BRIDGE method addresses the need for a new approach for data innovation.

Data Need to be Transformed into Value...



Data is a Valuable Asset!

C-BRIDGE is a methodology to account data values and improve Quality of Life of Society

DR MARTIN SERRANO, SENIOR RESEARCH FELLOW AND RESEARCH UNIT HEAD @UNIVERSITY OF GALWAY IRELAND

Bio:

Dr Martin Serrano is a recognised expert in **Semantic Interoperability and Distributed Systems** by 100+ Pair reviewed scientific publications. Dr. Serrano is also an innovator by his work on defining the **Data Interplay in Edge Computing** using the **Linked Data paradigm**. He has also **formalised the use of Statistical Methods for measuring Data Density in Complex environments** like Smart Cities and systems automatization and **Published the NIST H-KPI Framework,** NIST Technical Report NIST SP-1900-206

IEEE X 3 BestPapers Awards
ACM x 2 Best Paper Awards
5 Published Academic Books

2018 BEST Smart City Project
Smart City Solution

2023 BEST RESEARCH
Semantic Interoperability

2021 BEST NGI EXPLORERS
Research Impact

NGI ENRICHERS TRANSATLANTIC

THE TEAM

Dr.David Wollman
Deputy Division Chief at NIST

Michael Dunaway
Associate
Director of Innovation at NIST

Dr.Thomas Roth
Smart Connected Systems Program Lead at NIST

Dr.Edward Griffor
Associate Director
for Cyber-Physical Systems at NIST

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

National Institute of Standards and Technology
U.S. Department of Commerce

The National Institute of Standards and Technology (NIST) is an agency of the United States Government. NIST's mission is to promote innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life.

THE KEY RESULTS (1)

- The formulation of the IoT Science and The Study on C-BRIDGE Methodology
- C-BRIDGE project have discussed and extended, as result of different views in this collaborative project, the advances in device technology and increase of computing capacity following the progress of smart-x devices and human-centric applications.
- The use of IoT Cloud-Data for data exchange, semantic interoperability and device management federation for AI-Industrial Applications
- Keynote at ACM Conference September 10, 2023

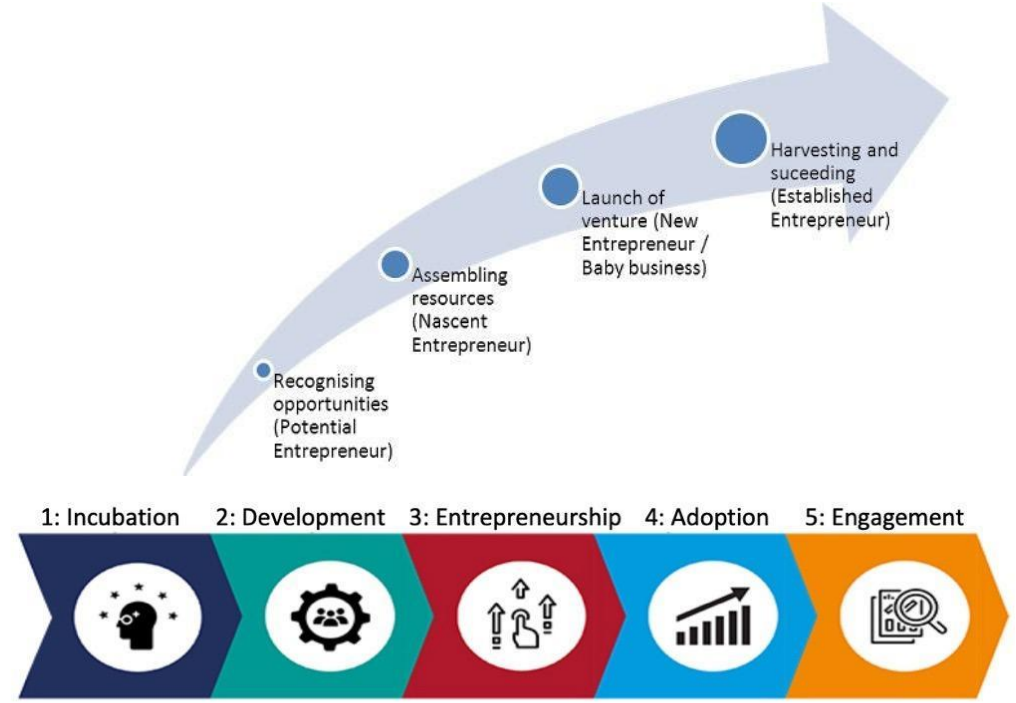


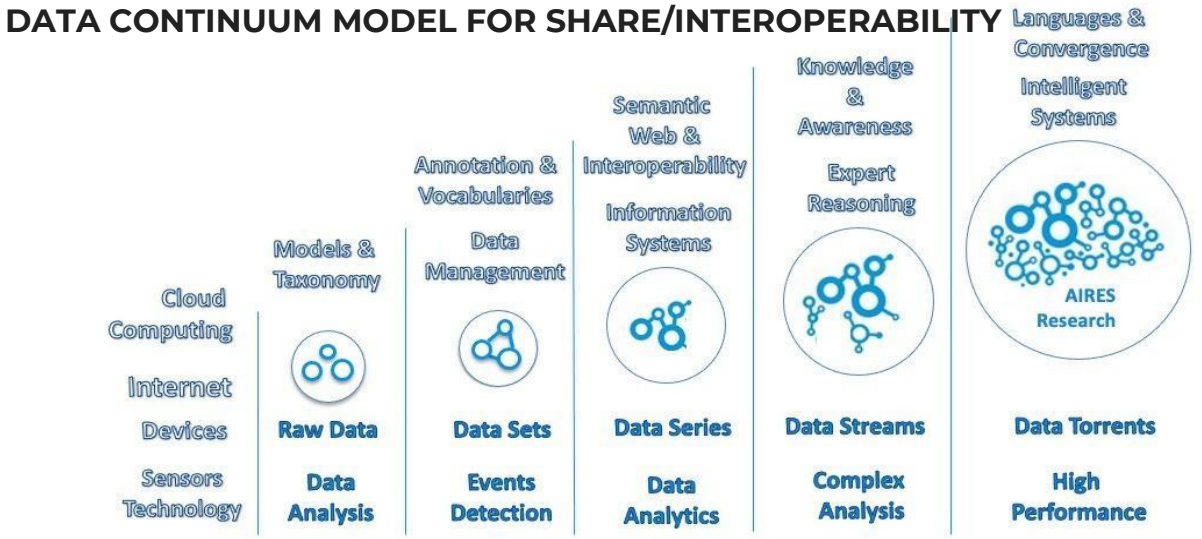
Figure 2: Business research methods, incubation practices, and entrepreneurship activities promoting standardization for the next generation of smart cities and Services

SIGCOMM 2023 New York City

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (2)

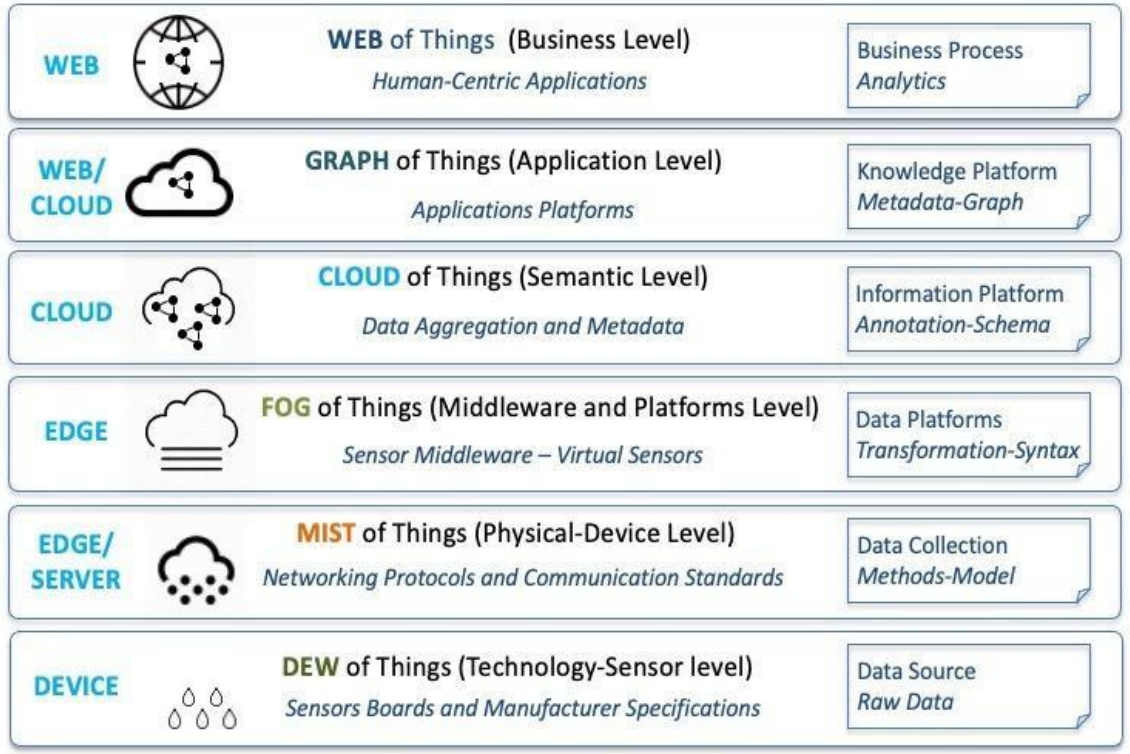
- Formulation of the Data Continuum and its applicability in Future Networks
- Use of the continuum of data from the interconnected data ecosystems create a connection through data-centric platforms
- Understanding of the Importance of Data Continuum enabling the Data Exchange, and Semantic Interoperability with Trust in Future Networks
- Paper Presentation at IEEE Conference November 15, 2023



NGI ENRICHERS TRANSATLANTIC

THE KEY RESULT (3)

- Formulation of the Data Cloud Stack The Data Cloud Stack Update for IoT Domains
- Need to integrate this data-centric new vision in the the IoT Stack is a concurrent demand within scientific and industrial communities mainly because its commercial value.



DATA PERSPECTIVE OF THE IOT DATA-CLOUD STACK

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULT (4)

C-BRIDGE PROJECT AWARDS / SUCCESS STORIES

- C-BRIDGE Project awarded 2023 Best Research for its Innovation & Contributions to the Industry and Research Communities

- C-BRIDGE Design Principles published in Conference Proceedings

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULT (4)

Impact	Type	Description	Impact Status
1	Development / advancement innovative technologies	The C-BRIDGE methodology has been described and proposed at NIST as best practices for incubating ideas and transfer this into actionable and innovative products.	C-BRIDGE methodology introduced to both EU and USA sides to different stakeholders, Researchers, Industry and Innovators communities.
2	Sound Scientific Validation	C-BRIDGE aspires to be an adopted methodology to accelerate innovation organising the process how ideas, developments and technologies are aligned to progress science and produce commercial value.	The C-BRIDGE methodology aims mainly to advance the state of the art in business planning/ incubation and exploitation.
3	Advancing standards	Currently there is a lack of a similar Innovation Methodology that needs in one hand the principles to innovate and define the commercial value of the data and in the other hand has the EU-USA international level, Thus advancing the creation of standards.	C-BRIDGE method discussed with NIST participants for further NIST Technical Report – Best Practices Standard Specification.
4	Strengthening research collaboration with the USA	C-BRIDGE activities enhanced already the vision towards what is achievable to innovate in the context of Data Interoperability, introducing the new parading of data continuum.	C-BRIDGE Project and its results produced three main scientific contributions strengthening EU-USA collaboration.
5	Strengthening innovation collaboration with the USA	The C-BRIDGE worked towards speeding up developments in the existing activities for smart city self-assessment and left published the process as the legacy to any other individual or organisation.	C-BRIDGE Project and its results in Data Interoperability C-BRIDGE awarded as 2023 best innovation.

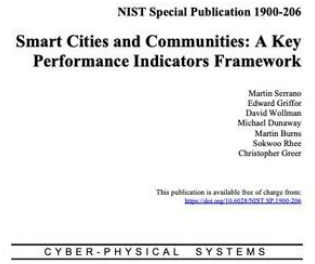
THE KEY RESULTS (5)

Impact	Type	Description	Impact Status
6	Building solid connections and partnerships in Europe and in the USA	The C-BRIDGE methodology is successfully designed and conceptualised in the context of the NGI Enrichers collaboration. EU-USA C-BRIDGE project, demonstrated that advancing on NGI technologies, services, standards and also look at the commercial opportunities is possible.	C-BRIDGE focused on maturing previous collaborative results on the H-KPI framework and set the preparative to innovate and consolidate long-term collaborations
7	Accelerated contacts/engagements with R&D partners for future collaborations	C-BRIDGE methods and H-KPI explorer framework are used as baseline to facilitate the innovation and entrepreneur practices, i.e. rapid prototyping that C-BRIDGE experiments and efforts can reduce considerably the learning time and thus guarantee execute the activities as proposed.	There is currently an opportunity to further collaborate with John Hopkins University JHU in in the area of smart cities innovation, to define an innovative solution to data management problems.
8	Expanding collaboration within the NGI community	An idea for a new project aspire to define an innovative solution to data management problems where C-BRIDGE methodology is the baseline.	There is currently a discussion for defining a project opportunity with FIWARE foundation and thus further collaborate in the development of standards in the area of data management and software data systems.
9	Paper submission for further publication – indicate, only EU author(s), or jointly with the host organisation	An accepted and published paper that contains the formulation of the Internet of Things Science Evolution approach, a design paradigm designed and discussed withing the C-BRIDGE project, also including the IoT Data-Cloud Stack Update, the innovative first of a kind Data Continuum and its applicability in Future Networks.	The design principles, the study results and the EU-USA C-BRIDGE methodology were presented.
10	Conference attendance with paper/poster/ proceedings	Three events for public engagement and introduce the outcomes and results of the C-BRIDGE project and the activities: ACM SIGCOMM Workshop Keynote , 2023 AIOTI Awards and IEEE Future Networks World Forum International Conference	C-BRDIGE design principles and methodology. C-BRIDGE was awarded 2023 Best Research. C-BRIDGE results were presented at the conference and paper available at conference proceedings.

THE IMPLEMENTATION

C-BRIDGE Design Principles published in Conference Proceedings

C-BRIDGE method discussed with NIST participants for produce a technical report and Specifications as a Standard following NIST processC-BRIDGE Research Results described as best practices Data Innovation


NIST Special Publication 1900-206

Smart Cities and Communities: A Key Performance Indicators Framework

Martin Serrano
Edward Griffor
David Wollman
Michael Dunaway
Martin Burns
Sokwoo Rhee
Christopher Greer

This publication is available free of charge from:

CYBER-PHYSICAL SYSTEMS

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

The C-BRIDGE Business Feasibility Study for the H-KPI framework

Framework to be
used by nation-wide US GCTC teams.

The C-BRIDGE assessment method to (re)use of the H-KPI Data

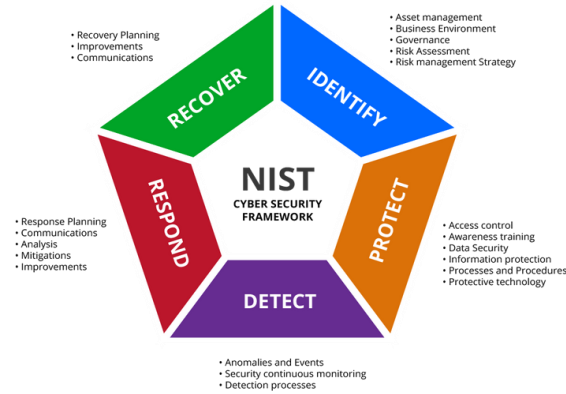
C-BRIDGE aims to further collaborate with John Hopkins University JHU in in the area of smart cities innovation, to define an innovative solution to data management problems.

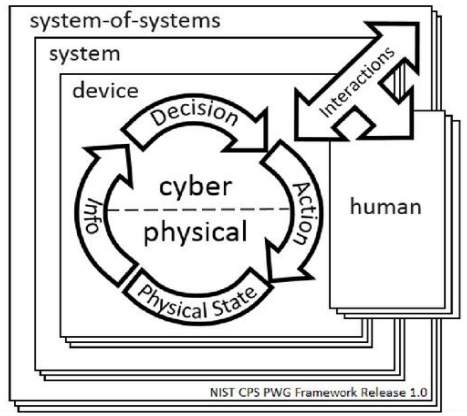
JOHNS HOPKINS UNIVERSITY

NGI ENRICHERS TRANSATLANTIC

THE EXPECTED IMPACT

- C-BRIDGE has successfully progressed, evaluating, studying and defining new approaches for innovation, this derivate in the extension of concepts and the creation of conceptual frameworks to enrich the methodology.
- C-BRIDGE currently focuses on the production of best practices and the creation of standards.
- The EU-USA C-BRIDGE project after It finishes will continue looking after further engagement and close collaboration with members of the NIST Smart Connected Division at CTL.





NGI ENRICHERS TRANSATLANTIC

THE LESSONS LEARNED

- Currently there is a lack of a similar Data Innovation Methodology, NIST offers a unique environment for us to test C-BRIDGE usability and validate this in multiple smart city systems with the idea to be large adopted and thus promote the creation of a standard method.

- It usually takes a huge amount of effort to deploy a robust large-scale deployment to show full scalable functionalities. C-BRIDGE is looking at possibilities to deploy/build a testbed-like demonstrator, following C-BRIDGE steps, with the objective to facilitate the innovation and entrepreneur practices.

- The increased level of top research from both partners in the team, participating in the C-BRIDGE activities enhanced already the vision towards what is achievable to innovate in the context of Data Interoperability, introducing the new parading of data continuum.

Martin Serrano

Senior Research Fellow in the Insight Centre for Data Analytics at the University of Galway

Martin Serrano

martin.serrano@insight-centre.org

presentation video

(N/A)

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Complexity-aware Collaborative AI over edge and cloud

Muhammad Zawish
Ireland

Researcher (scientific/ technical/engineering)

Track
Open Ideas - USA

Host Organization
Saint Louis University

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

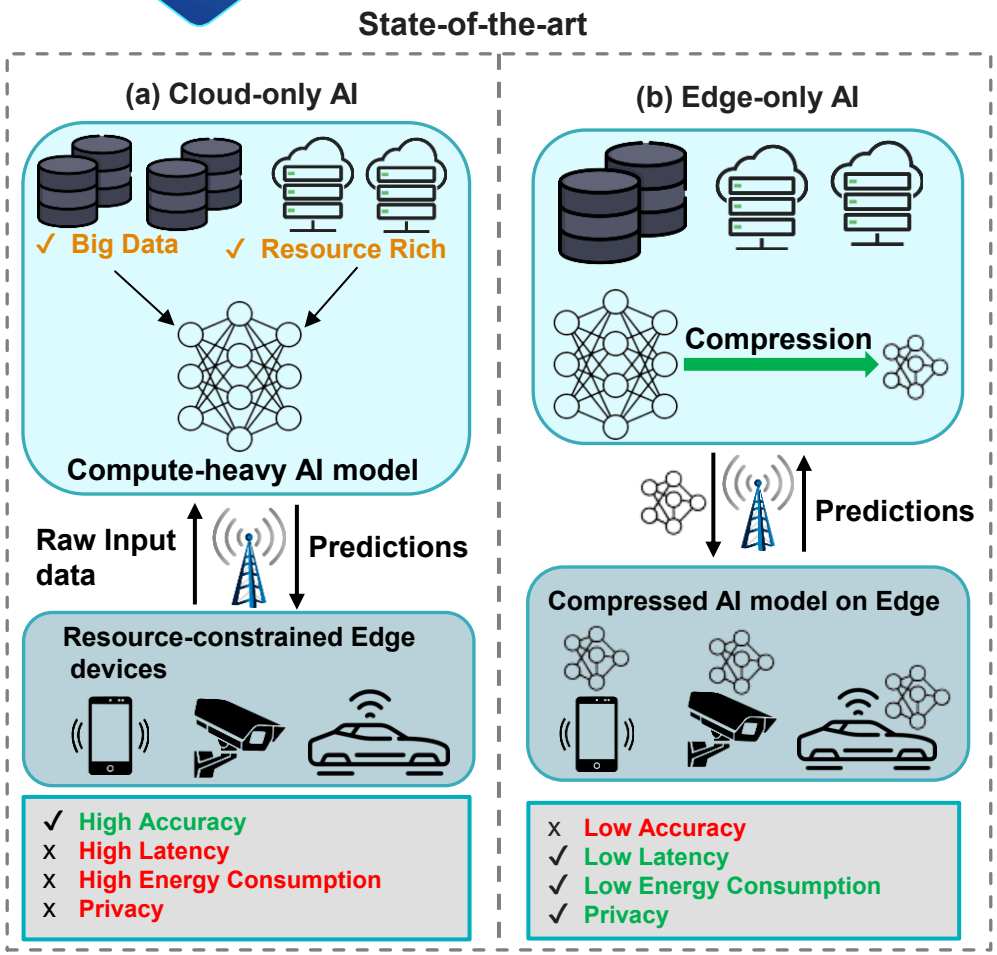
- **Define the problem (need or gap) being solved by your project** - The nexus of Artificial Intelligence (AI) and the Internet of Things (IoT) can realize many applications in smart agriculture, intelligent transportation, coordinated remote surgery and immersive healthcare and education. Traditionally, AI is hosted on the cloud, leading to significant delay in response. In contrast, pushing AI on the edge of the network is challenging because edge devices are typically resource-constrained; and the computational complexity reflected by AI models, particularly Deep Neural Networks (DNNs), restricts the realization of decision-making on such devices. Therefore, the challenge is to bridge this gap between DNN complexity and resource constraints on edge devices while minimizing the overall latency of the underlying application.
- **Who is the main target audiences?** - Target audiences include i) edge device manufacturers whose goal is to develop low-cost easy-to-handle energy efficient edge infrastructure and ii) cloud-edge network designers and operators whose goal is to reduce energy, bandwidth requirements and latency in operation. The results from this project will attract investments from multinationals like Microsoft, Google, Analog Devices, Airbus, Decawave and Intel.
- **Who else is already addressing the problem, and why is there an opportunity?** - State-of-the-art compression approaches[1] can accommodate AI on edge for lower resource consumption, but at the cost of sacrificing the value (in terms of accuracy). While split computing can preserve accuracy, recent works have either focused on bandwidth-specific splitting or relied on offline profiling of DNN layers, which is energy inefficient and intolerable at runtime[2]. Hence, the question remains on how to adapt to rapidly changing resources at the edge with respect to time and space while preserving the quality of service for end users.

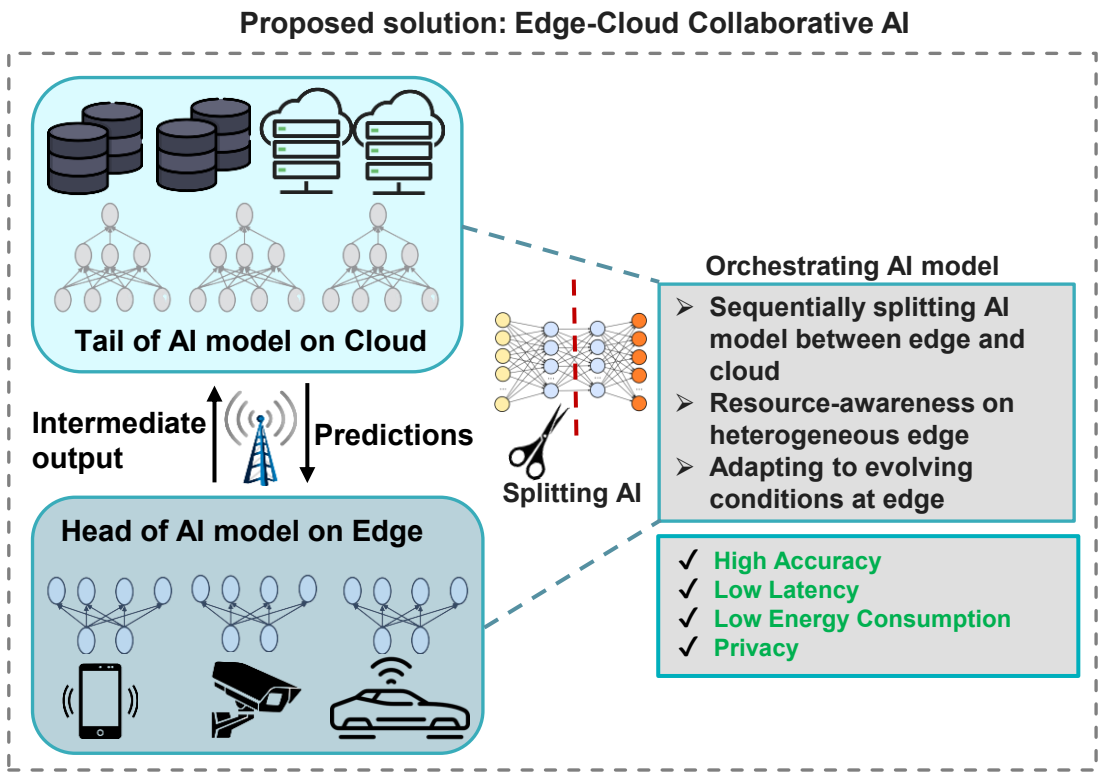
[1]Mishra, R., Gupta, H.P. and Dutta, T., 2020. A survey on deep neural network compression: Challenges, overview, and solutions. *arXiv preprint* arXiv:2010.03954.
[2]Bajić, I.V., Lin, W. and Tian, Y., 2021, June. Collaborative intelligence: Challenges and opportunities. In Proc. of *ICASSP* 2021-2021

THE SOLUTION (1)

- **Technology** - This project will encompass an intelligent split computing-based solution applied to AI (deep neural network) models for complex computer vision application deployments on IoT. The purpose of splitting AI models sequentially across a continuum of edge and cloud is to meet the resource constraints at the edge (by delegating minimum computations to edge) while fulfilling the requirements of ultra-low latency applications (<1ms). Consequently, edge devices will be capable of taking on concurrent tasks and increasing their standby time.
- **Differentiator** - Recent approaches to split computing are static and require re-configuration of the AI model across edge and cloud when the resources change at the run time. This iterative process is cumbersome and can not be tolerated in latency-critical applications. The proposed solution will be intelligent, proactive, and aware of dynamic resources between edge and cloud. For example, network bandwidth may vary intermittently across different locations between urban and rural areas. Therefore, the proposed solution will ensure smooth service quality by identifying a model's optimal split point at run-time without requiring iterative re-profiling.
- **Development** - This solution can be further developed by translating the simulations towards a real test-bed. This solution will be promoted for implementation as part of the Smart Waterford initiative for different application use cases. The energy-harvesting testbed planned at Tyndall National Institute, Ireland, can further be used to validate the framework developed in this project.
- **Size** - The project outcomes can address approximately 25 Billion Euros of the total addressable market (TAM), 6.25 Billion Euros worth of serviceable available market (SAM) and 2.5 Billion Euros of the serviceable obtainable market (SOM).

THE SOLUTION (2)





NGI ENRICHERS TRANSATLANTIC

MUHAMMAD ZAWISH, PHD CANDIDATE, SETU, WATERFORD, IRELAND

Bio:

Muhammad Zawish is a 4th year PhD Candidate at the Walton Institute, SETU, Waterford, Ireland. His research is focused on improving the energy and computational efficiency of AI models in the context of IoT. So far, he have published his PhD research in high-quality peer-reviewed IEEE venues, as listed below. His research has been cited more than 600 times. Based on his research, he received best presentation award at IEEE ComSoc Event at Georgia Tech. He is a student member of IEEE Communication Society and also serve as a volunteer/reviewer in top IEEE/ACM venues like IEEE WCM, IEEE TGCN, IEEE TII, ACM e-Energy, ACM COMPASS, AAAI, IEEE Globecom, etc.

- **Zawish, M**., Ashraf, N., Ansari, R.I. and Davy, S., 2022. Energy-aware AI-driven Framework for Edge Computing-based IoT Applications. *IEEE Internet of Things Journal*.
- **Zawish, M.**, Ashraf, N., Ansari, R.I., Davy, S., Qureshi, H.K., Aslam, N. and Hassan, S.A., 2022. Toward On-Device AI and Blockchain for 6G-Enabled Agricultural Supply Chain Management. *IEEE Internet of Things Magazine*, 5(2), pp.160-166.
- **Zawish, M.**, Abraham, L., Dev, K. and Davy, S., 2022, December. Towards Resource-aware DNN Partitioning for Edge Devices with Heterogeneous Resources. In GLOBECOM 2022-2022 IEEE Global Communications Conference (pp. 5649-5655). IEEE.
- **Zawish, M.,** Davy, S. and Abraham, L., 2024. Complexity-Driven Model Compression for Resource-constrained Deep Learning on Edge. IEEE Transactions on Artificial Intelligence.

NGI ENRICHERS TRANSATLANTIC

THE TEAM

Dr Deirdre Kilbane, Director of Research, Walton Institute, SETU, Ireland

Dr Indrakshi Dey, Head of Division, Programmable Autonomous Systems (PAS), Walton Institute, SETU, Ireland

Dr Lizy Abraham, Head of Division, Emerging Networks Lab, Walton Institute, SETU, Ireland

Dr Steven Davy, Research Centre Manager, Centre for Sustainable Digital Technologies, Technological University Dublin, Ireland

Dr Flavio Esposito, Associate Professor at Dept. of Computer Science at Saint Louis University, USA

THE HOST ORGANIZATION

The **Saint Louis University Department** of **Computer Science** is committed to the development and study of computing technologies for the greater good of humanity.Dr Muhammad Zawish had a chance to collaborate with Prof. Flavio during his NGI program and leveraged his expertise not only in computer networks but also in academic literature analysis and writing technical articles. He also had the opportunity to present among 100+ MS and PhD students of Dept. of CS at Saint Louis University

SAINT LOUIS UNIVERSITY™

Walton Institute PhD Student Presents on Sustainable AI at Saint Louis University, USA

NGI ENRICHERS TRANSATLANTIC

THE KEY RESULTS (1)

- **Engagement, Discussions and Networking:** Worked closely with host professor in SLU to discuss the literature review and find new ideas related to proposed project. This involved ad-hoc meetings with one-to-one discussion with professor, and group meetings with masters and PhD students of the Networks Research Group to identify state-of-the-art for potential collaboration. Apart from host institute, I also got a chance to attend IEEE ComSoc School Series at Georgia Tech Research Institute, which involved special networking sessions with peers and professionals working on the NGI related research and developments.
- **Scientific Development:** The idea of AI model distribution along with compression was investigated, in particular, the feature pruning scheme was used to obtain the lightweight AI models' output. The proposed feature pruning scheme was not included the in initial proposal and it was outcome of literature review and discussions with host professor on how to improve the efficiency further. This approach is now being validated for different splitting scenarios.

THE KEY RESULTS (2)

- **Skill Development:** Through rigorous discussions with my host professor, who is an expert academician with wealth of experience in writing, publishing, reviewing and presenting in IEEE / ACM conferences, I gained important insights into critical thinking and improved my ability to write, read, and present in academic settings. Moreover, through the fellowship, I gained access to new resources and equipment for experimenting the proposed methodology around deep learning model splitting / distribution and compression.
- **Presentation and Dissemination:** Got a chance to win the travel grant to attend IEEE ComSoc School Series at Georgia Tech Research Institute. The school series was a captivating experience, packed with enlightening talks and engaging discussions on Next Generation Cloud Communications. One of the highlights was the poster presentation competition, where I had the chance to showcase my work on energy-efficient AI. The competition was fierce, but I was thrilled to receive the Best Presentation Award from IEEE ComSoc Atlanta, which was a fulfilling experience. I did some blog posts and news articles related to this:

  I. https://www.vistamilk.ie/researcher-muhammad-zawish-takes-on-an-ngi-enrichers-transatlantic-fellowship/

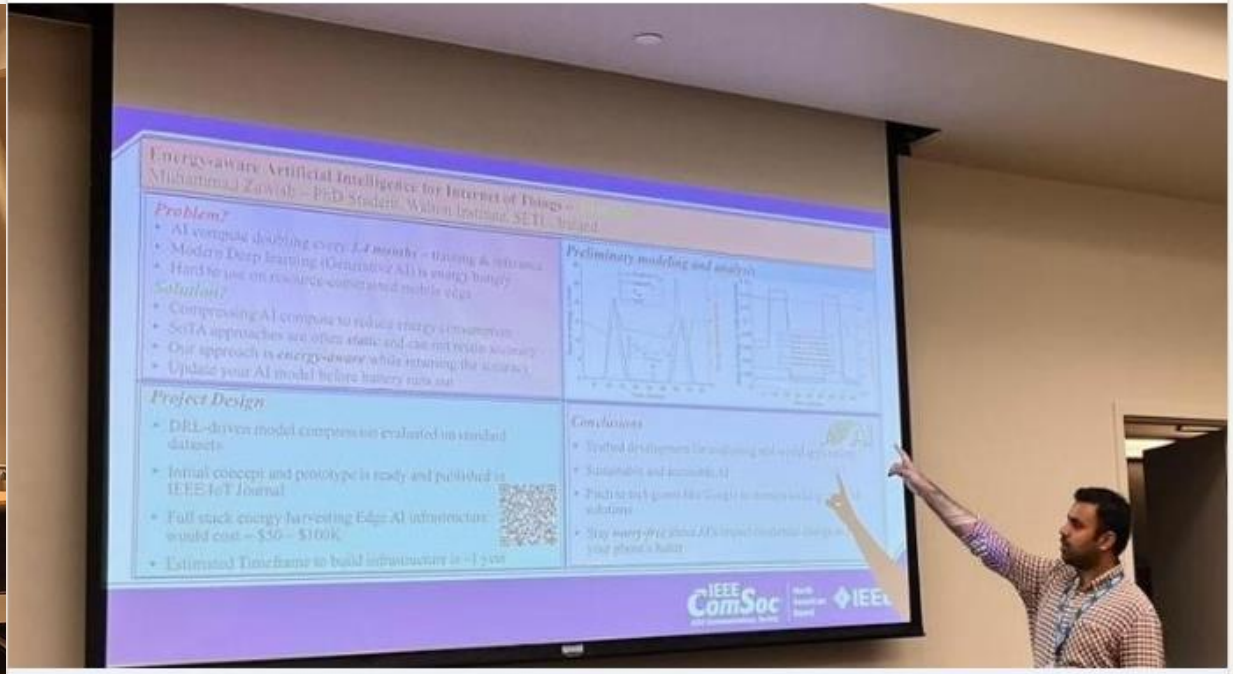
  II. https://waltoninstitute.ie/news-and-events/news/walton-institute-phd-student-presents-on-sustainable-ai-at-saint-louis-university-usa

  III. https://waltoninstitute.ie/news-and-events/news/walton-institute-phd-student-wins-prestigious-ieee-comsoc-award

THE KEY RESULTS (3)

Best Presentation Award during IEEE ComSoc event on Next Generation Cloud Computing @ Georgia Tech

Thanks to Workshop on Pitching during NGI Bootcamp



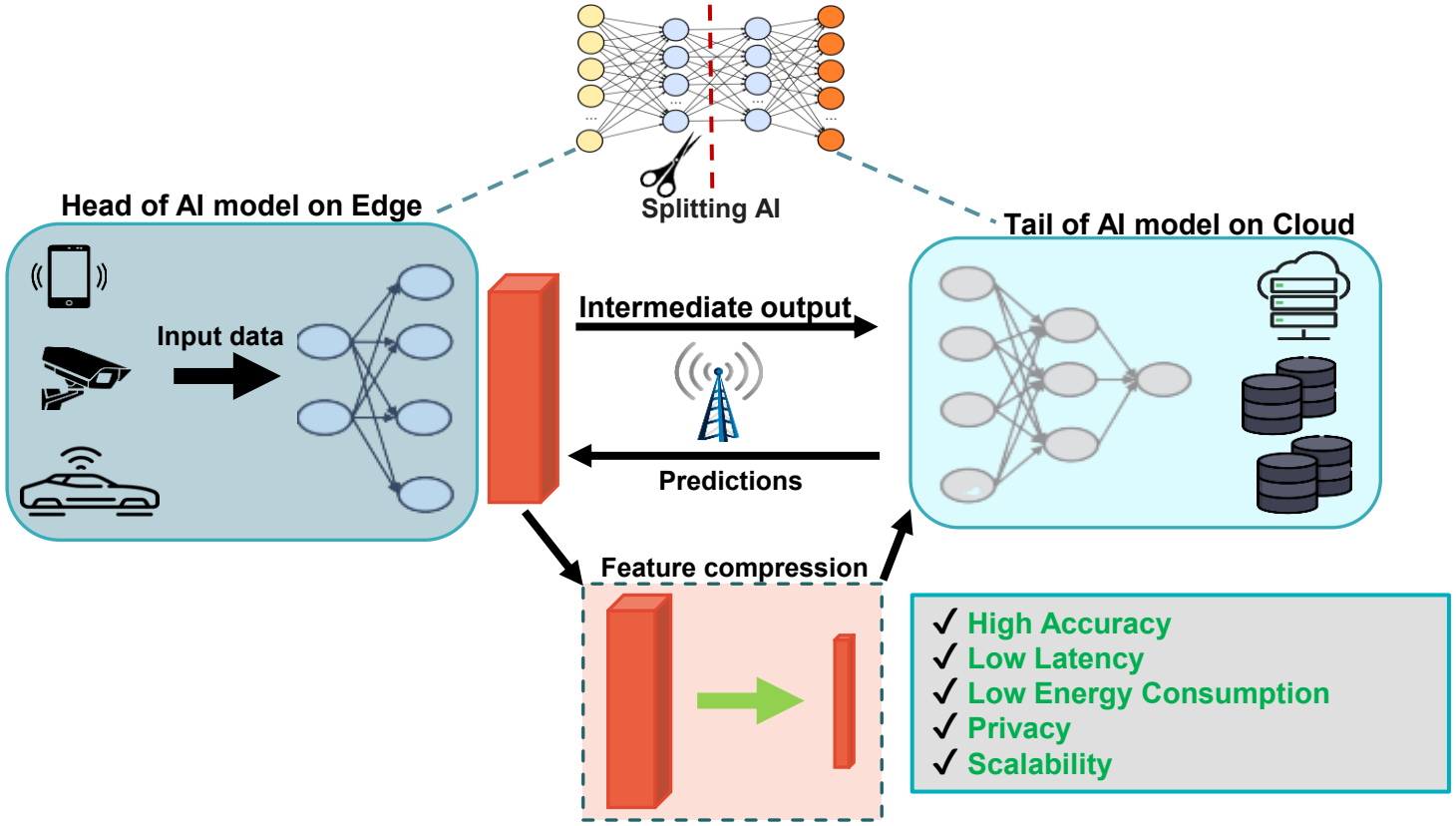
Walton Institute PhD Student wins Prestigious IEEE ComSoc Award

waltoninstitute.ie • 1 min read

THE IMPLEMENTATION

- Implementation strategy – In future, most massive IoT networks will be designed based on delay and throughput constraints, leaving the complexity and energy issue to the hardware. However, the energy dimension of using such hardware is completely ignored or marginally addressed. For the first time, this project will consider energy and complexity-aware (elastic) computing from resource perspective.

- The feature compression element was not part of the initial proposal plan. It was included during the expedition while collaborating with host professor. The idea for this compression is to reduce the data transmission load on bandwidth-limited networks. This will be implemented to find out the optimal split point for low latency and energy efficient AI applications



NGI ENRICHERS TRANSATLANTIC

THE EXPECTED IMPACT

HUMAN-CENTRIC AI: THE PROJECT IS TARGETED ON FOLLOWING IMPACTS:

- **Data Privacy and Security – processing sensitive information locally, reducing the risk of data exposure during transmission.**
- **Cost Reduction – Reduced compute load on edge devices ensures AI execution even on low-cost devices.**
- **Green & Sustainable AI – reduced energy consumption with reduced data transmission.**

The project will embrace an open access policy for its scientific publications in compliance with Horizon Europe recommendations (art. 29.2 of the Model Grant Agreement), all publications will be made available in a timely manner via openly accessible repositories. Our dissemination plan will combine Green/Gold strategies, like, IEEE/ACM journals, which generally allow open access of accepted manuscripts without embargo periods and extra costs. Zenodo (https://zenodo.org/) will be used as the preferred open platform for publication.

Open-source software e.g., ns3, Python, TensorFlow /PyTorch and release of software through open GitHub platform will be used. Datasets generated within the project will be openly released. The relevant datasets will be stored and possibly released on SETU Waterford Libraries Open Access Repository platform, which allows the long-term archival of any data format according to the FAIR (Findable, Accessible, Interoperable, Reusable) principles, permitting to set the most appropriate license.

THE LESSONS LEARNED

- **Any bad or good “surprises”?**

  A positive surprise was the rigorous and collaborative research environment that welcomed me. I encountered minor logistical challenges, such as adapting to the different work culture and understanding the local transport infrastructure for daily commute to my host institute, which as around 45 mins. walking distance to me.

- **Any challenges, personally and professionally**

  Personally, adjusting to a new social and cultural setting of US presented some initial challenges. Professionally, integrating into ongoing research projects and aligning my contributions with the project's goals demanded flexibility and effective communication.

- **Impact of those lessons learned**

  Enhanced my ability to navigate cultural diversity and work effectively in a different academic setting has broadened my perspectives. Learning to adapt to unforeseen circumstances and finding common ground with colleagues from diverse backgrounds.

Muhammad Zawish

PhD Candidate at the Walton Institute, SETU, Waterford, Ireland

Muhammad Zawish

muhammad.zawish@waltoninstitute.ie

presentation video

https://waltoninstitute.ie/
Google scholar Muhammad Zawish

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Improving Fuzzing Through Symbolic Execution

Simone Zerbini
Italy

Track
Open Ideas - USA

Host Organization
Arizona State University

Researcher (scientific/ technical/engineering)

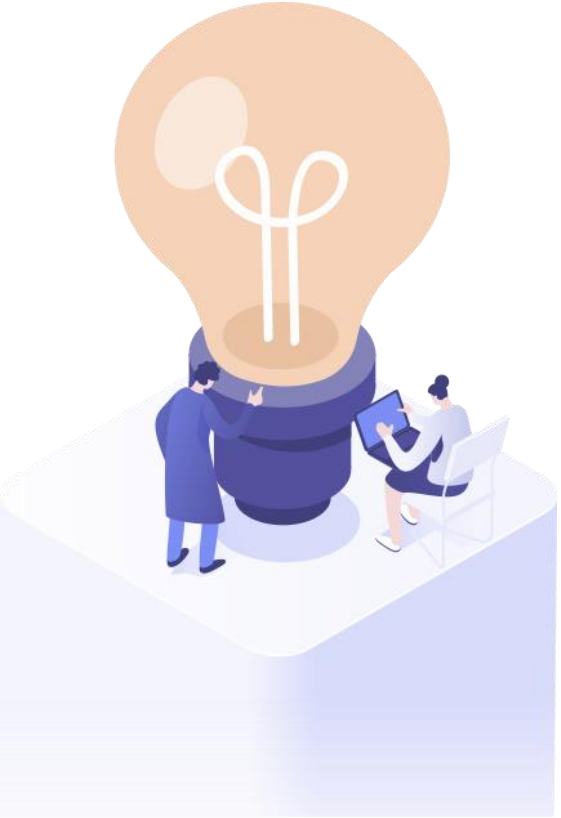
NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

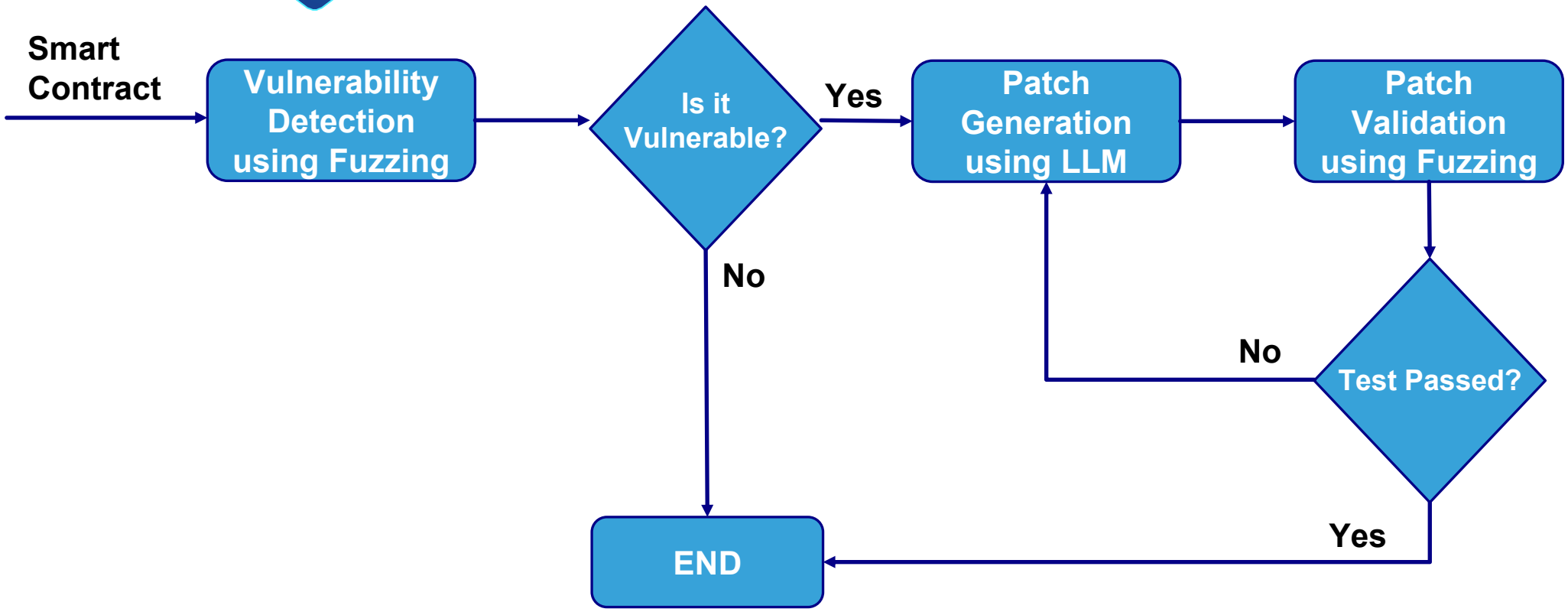
- Smart Contracts are a fast-growing technology.
- They are essential for managing cryptocurrency.
- A vulnerable Smart Contract can result in the loss of millions of dollars.
- The goal is to provide developers with a tool that can help them create more secure Smart Contracts.
- Several solutions have been proposed in the literature but, as we have shown in the first phase of our work, most of these solutions are not ready to be used in a production environment.

THE SOLUTION

- Design and implementation of a tool that exploits fuzzing to compare the functionality of two distinct smart contracts.
- In particular, it checks whether the behaviour of 2 contracts is the same.
- This comes in quite useful in automatic repair applications, where it is wanted to verify that the automatically generated patch does not compromise the contract's original functionality.
- Leverage an LLM to generate patches for vulnerable contracts and paired it with our tool to validate the generated patch.
- The resulting pipeline is the first to leverage fuzzing to validate an automatically generated smart contracts patch.



THE SOLUTION (2)



SIMONE ZERBINI, RESEARCH ASSISTANT UNIVERSITÀ DEGLI STUDI DI PADOVA

Bio:

- 2017-2020. Bachelor Degree in Computer Engineering, University of Padova, 108/110
- 2020-2022. Master Degree in Cybersecurity, University of Padova, 110/110
- 2023-present. Research fellow, University of Padova. Currently I am working on an Android security project: “Virtualization-Based Malwares: Can We Defend Against Them?”

THE TEAM

Dragan Boscovic, He is the director of ASU's Blockchain Research Lab and is the technical director of ASU's Center for Assured and Scalable Data Engineering.Boscovic, a research professor in the School of Computer Information and Decision Systems Engineering, has experience in numerical electromagnetics, wireless systems and IP networks, hardware and software architectures, blockchain data structures and data analytics.He the CEO of VizLore, LLC, an information technology and services company focusing on smart cities, smart energy/grid and smart health applications. He served as a Motorola research director for nearly 20 years. A Motorola research director for nearly 20 years, Boscovic has amassed 22 patents and published papers on diverse topics, such as data analytics for mobile services, consumer-centric mHealth and eHealth solutions and autonomic information and communications technology networks.

Eleonora Losiouk, is an Assistant Professor at the University of Padua (Italy), working in the SPRITZ Group led by Prof. Mauro Conti. In 2018, she obtained her Ph.D. in Bioengineering and Bioinformatics from the University of Pavia (Italy). She has been a Visiting Fellow at EPFL in 2017. In 2020, she received the Seal of Excellence for her Marie Skłodowska-Curie individual project proposal and was awarded a Fulbright Fellowship for visiting ICSI, Berkeley (USA). Her main research interests regard the security and privacy evaluation of the Android Operating System.

Sahil Kharya is a seasoned Full-Stack Developer with a profound passion for software development and blockchain technology. Holding an M.S. in Software Engineering from Arizona State University and a B.Tech. in Computer Science Engineering from JECRC University, Sahil brings a diverse skill set and a solid academic foundation to the tech table. His journey in the tech industry began as a Founding Software Engineer at CogniSaaS, where he demonstrated proficiency in software architecture design and development. Venturing into blockchain development, he has delved into decentralized applications and smart contracts, seamlessly merging traditional software development with cutting-edge blockchain advancements. Throughout his career, Sahil has thrived on tackling challenging projects and solving complex problems.

THE HOST ORGANIZATION

Arizona State University-Blockchain Research Lab

The ASU Blockchain Research Lab's mission is to advance the research and development of blockchain-based technologies for use in Business, Finance, Economics, Mathematics, Computer Science, and all other areas of potential impact.

Since the Lab's creation in early 2017, it have partnered with dozens of industry leaders to provide blockchain backed solutions for real-world problems. In Spring of 2019, the lab was recognized at the NuCypher + CoinList Spring Hackathon by winning the Community Choice Award.

THE KEY RESULTS (1)

- Collection of state-of-the-art tools and datasets.
- Performance evaluation of the state-of-the-art highlighting relevant limitations, such as: the inability to analyze interacting smart contracts, or the inability to start the analysis from a specific contract state.
- Design of a new solution that leverages fuzzing and LLM to detect vulnerabilities in smart contracts and then propose a possible fix, thus accelerating the software sanitization process.

THE KEY RESULTS (2)

- Implementation of the differential fuzzing tool, which leverages fuzzing to compare the functionality of 2 smart contracts
- Implementation of the pipeline that leverages the differential fuzzing tool and an LLM to generate patches for vulnerable smart contracts
- Evaluation of the solution

THE KEY RESULTS (3)

- Presentation of the results at the WEB3SEC Workshop
- Strengthening research collaboration with the ASU:
  - Project project still ongoing and presents multiple opportunities for continuation
  - Start of a new project with the research group at the University of Padova in collaboration with a research group from Arizona State University, thanks to the expedition

THE IMPLEMENTATION

- Completion of the evaluation and comparison of the tool with other state-of-the-art solutions.
- Collection and analyze of the data obtained.
- Writing of a paper regarding the tool and the results obtained.
- Following the many limitations identified in existing fuzzing tools, beginning of a work on a new smart contract fuzzing tool that mitigates these limitations.

THE EXPECTED IMPACT

- The goal is to publish a paper and make the solution available in open source.
- Smart Contract developers are able to take advantage of it to create more secure contracts.
- Contribution to the growth of blockchain-based technologies, which find use in many fields, through more secure Smart Contracts.

THE LESSONS LEARNED

- Even if a tool comes with a great paper that was published at a prestigious conference, it does not mean that it will have a good documentation or that it will not contain annoying bugs.
- In fact, a large portion of the time spent on the project was taken up by fixing and setting up tools that should have been ready to use and represent the state-of-the-art.

Simone Zerbini

Research assistant at Università degli studi di Padova

Simone Zerbini

simone.zerbini@unipd.it

NGI_midterm_video.mp4

https://blockchain.asu.edu/

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Gov-Smart – Blockchain-based Trustless Governance Model

Alexandru Panait
Romania

Track
NGI Enrichers Bootcamp & Immersion – USA

Host Organization
Arizona State University

Innovator

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

- Current governance systems often lack transparency and accountability.
- Citizen participation is limited, and trust in institutions is declining.
- Decision-making processes are opaque and bureaucratic.
- Traditional models rely too much on individuals, increasing the risk of errors and abuse of power.

THE SOLUTION

- Gov-Smart proposes a blockchain-based Trustless Governance Model.
- It eliminates dependence on individual trust by embedding transparency and control in the system.
- Citizens can participate in decisions and track actions in real time.
- The solution uses verifiable data and smart contracts to ensure fairness and efficiency.
- It promotes a shift toward systemic trust and citizen empowerment.

ALEXANDRU PANAIT, MANAGER AT AI PROFESSIONAL SOFTWARE SOLUTION

Bio:

- Entrepreneur and software solution manager based in Romania
- Specialised in blockchain technology and digital governance
- Founder of Gov-Smart, a platform focused on citizen-centric governance
- Participated in NGI Enrichers Immersion Programme at Arizona State University
- Interested in building trust through technology and policy innovation

THE TEAM

- Gov-Smart team led by Ionut Alexandru Panait
- Collaborated with faculty and researchers at Arizona State University
- Multidisciplinary approach combining tech, policy, and governance
- Supported by local partners and civic innovation labs

THE HOST ORGANIZATION

Arizona State University

Arizona State University is a public research university in the United States.

It is known for its innovation-driven academic ecosystem and civic tech initiatives.

The institution offers support to entrepreneurs working on social impact and governance. Alexandru was hosted by the School for the Future of Innovation in Society.

THE KEY RESULTS

- White paper on Trustless Governance model drafted and shared
- Initial pilot of Gov-Smart platform launched
- Positive feedback from institutional stakeholders
- Early user testing conducted with engagement metrics collected
- Partnerships initiated in North America and Europe

THE IMPLEMENTATION

- Gov-Smart platform developed using blockchain infrastructure
- Smart contracts ensure rule enforcement and citizen interaction
- Public dashboard created for transparency and feedback
- Deployed in a pilot phase with real user testing
- Adaptive design to accommodate regulatory environments

THE EXPECTED IMPACT

- Increased citizen participation in governance
- Reduced bureaucracy and enhanced service delivery
- Model scalable to different policy areas and geographies
- Demonstrates how digital tools can restore trust in institutions

THE LESSONS LEARNED

- Technological trust can outperform human-based trust in governance
- Early collaboration with users and institutions is key
- Blockchain adoption in public services requires clear communication
- International exposure improves model adaptability

Alexandru Panait

Manager at AI Professional Software Solution

Alexandru Panait

(N/A)

Profile

Link

198

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Continuous Monitoring and Detection of Bridge and Road Damages via Smartphone Sensors and Artificial Intelligence under Big Data

Alireza Entezami
Italy

Researcher (scientific/ technical/engineering)

Track
Open Ideas

Host Organization
MITACS

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Problem Definition:

Current infrastructure monitoring solutions are expensive, hard to scale, and lack real-time adaptability. Transportation agencies and urban planners need a cost-effective, scalable solution for monitoring bridges and roads.

Target Audience:

- Transportation agencies.
- Urban planners.
- Civil engineering researchers.

Competition:

Existing solutions rely on costly fixed sensors or satellite-only data. Our approach, using smartphone sensors and AI, offers a more affordable, adaptable solution.

YOUR SOLUTION (1)

Technology:

Smartphone sensors, satellite images, and AI for real-time infrastructure monitoring.

Differentiator:

Combines affordable smartphone tech with AI for accurate, scalable monitoring.

Competitive Advantage:

- Cost-effective: Uses widely available smartphones for data collection.
- Scalable: Can be deployed across a wide geographic area with minimal infrastructure.
- Real-time: Delivers continuous updates on infrastructure health and detects damage early.
- **Opportunity and Size:**
  Growing demand for cost-effective monitoring, especially in developing regions and urban infrastructure projects.

YOUR SOLUTION (2)

1. **Data Collection:**
   - Smartphone MEMS accelerometers are used to measure structural vibrations
   - Satellite imagery is integrated for broader monitoring of infrastructure.
2. **Data Processing:**
   - AI-based models analyze the vibration data and satellite images in real-time, detecting any potential structural damages.
   - A hybrid AI model normalizes the data to adjust for environmental factors
3. **Alerts and Monitoring:**
   - Real-time alerts are provided to infrastructure managers for early detection of damages.
   - Continuous data flow ensures up-to-date monitoring without requiring expensive sensor installations.

ALIREZA ENTEZAMI, ASSISTANT PROFESSOR POLITECNICO DI MILANO

Bio and Achievements/Successes:

I specialize in structural health monitoring (SHM) using AI, remote sensing, and machine learning. My focus is on developing scalable monitoring solutions for bridges and infrastructure using smartphone sensors, SAR, and AI. I hold two PhDs with honors, and have published over 49 journal papers, 2 monographs, and 7 book chapters.

Relevant Publications extracted from my NGI project:

- **Published journal Papers and conferences:**
- Published in Engineering Structures (Q1 - Elsevier) with DOI: 10.1016/j.engstruct.2024.118722
- Published in Mechanical Systems and Signal Processing (Q1 - Elsevier) with DOI: 10.1016/j.ymssp.2024.111984.
- Published in Computer-Aided Civil and Infrastructure Engineering (Q1 - Wiley) with DOI: 10.1111/mice.13387.
- Published in Structural Health Monitoring (Q1 - Sage) with DOI: 10.1177/14759217241309075
- Published in Measurement (Q1 - Elsevier) with DOI 10.1016/j.measurement.2024.116567
- Submitted to SEMC (Cape Town), SPIE (Vancouver), and EVACES (Porto) conferences for 2025.

Honors and/or Prizes:

Awarded the NGI Enrichers Fellowship under the EU Horizon Europe Research Programme.

NGI ENRICHERS TRANSATLANTIC

THE TEAM / EXPERTISE

Prof. Stefano Mariani
Full Professor, Politecnico di Milano
Expert in structural dynamics and AI integration in SHM.

- **Prof. Carlo De Michele**

Full Professor, Politecnico di Milano
Specialist in civil and environmental engineering, contributing to SHM and infrastructure resilience.

- **Prof. Ursula Eicker**

Canada Research Chair, Concordia University
Leader in smart cities and sustainable energy. Supports project collaboration.

Host Organization

- **Mitacs Canada**

Facilitates transatlantic collaboration and industry connections.

YOUR HOST ORGANIZATION

Mitacs Canada

Mitacs is a Canadian non-profit organization that fosters research and innovation by connecting academic researchers with industry partners. Through various programs, Mitacs facilitates collaboration between academic institutions and private-sector organizations, promoting innovation in fields like AI, smart cities, and infrastructure monitoring.

NGI Experience

Mitacs is actively involved in fostering transatlantic collaborations under the NGI Enrichers Fellowship Program, enabling researchers to connect with industry leaders and address global challenges in infrastructure monitoring and smart city development.

KEY RESULTS (1)

1. Development/advancement of innovative technologies:

- Created hybrid AI models combining smartphone sensors and satellite images for real-time SHM.

2. Testing technologies:

- Field testing of SAR-extracted bridge displacements under various environmental conditions. Demonstrated the system's reliability for real-world infrastructure monitoring.

3. Sound Scientific Validation:

- Published five journal papers in high-impact Q1 journals as follows and submitted a journal paper in the Structure and Infrastructure Engineering journal with ID NSIE-2024-0463.

_Engineering Structures (Q1 - Elsevier); DOI: 10.1016/j.engstruct.2024.118722
_Mechanical Systems and Signal Processing (Q1 - Elsevier); DOI: 10.1016/j.ymssp.2024.111984
_Computer-Aided Civil and Infrastructure Engineering (Q1 - Wiley); DOI: 10.1111/mice.13387
_Structural Health Monitoring (Q1 - Sage); DOI: 10.1177/14759217241309075
_Measurement (Q1 - Elsevier); DOI: 10.1016/j.measurement.2024.116567

4. Advancing standards:

- Establishing new benchmarks for cost-effective, scalable SHM solutions in intelligent transportation systems using AI.

KEY RESULTS (2)

Strengthening Collaboration and Partnerships:

1. **Strengthening research collaboration with the US/Canada:**
   - Enhanced partnerships with Mitacs Canada and various Canadian academic institutions for joint SHM projects.
2. **Building solid connections in Europe and the US/Canada:**
   - Established partnerships with academic and industry partners across Europe and Canada, ensuring scalability and future research opportunities.
3. **Accelerated engagements with R&D partners:**
   - Collaborations with key infrastructure maintenance companies for future pilot projects and commercialization of SHM technology.
4. **Strengthening innovation collaboration:**
   - Ongoing projects with Mitacs and European partners to develop cutting-edge technologies for smart infrastructure.

KEY RESULTS (3)

Additional Impact and Future Plans:

1. **Fundraising:**
   - Pursuing EU and Canadian grants to support future developments and scaling of SHM solutions.
2. **Expanding collaboration within NGI:**
   - Collaborating with NGI community members to integrate IoT and big data analytics into SHM systems.
3. **Paper submission and conference participation:**
   - Submitted a journal paper in the Structure and Infrastructure Engineering (Taylor&Francis) with ID NSIE-2024-0463
   - Submitted three abstracts to international conferences: SEMC, SPIE, and EVACES.
   - Presented research findings and strengthened visibility within the SHM and AI communities.
4. **Commercialization:**
   - Developing a business plan to establish a start-up focused on AI-driven infrastructure monitoring solutions.

IMPLEMENTATION

How would you implement your findings?

1. **Further Field Testing:**
   - Conduct additional field tests using AI models on diverse infrastructure types.
   - Collaborate with Mitacs Canada to scale pilot tests and gather more extensive data.
2. **Development of a Mobile App:**
   - Begin development of a user-friendly mobile application for real-time SHM.
   - Test the app's functionality with local transportation agencies in Canada and US.
3. **Refinement of AI Algorithms:**
   - Refine the hybrid AI models based on feedback and test results to improve accuracy in detecting damage under varying environmental conditions.
4. **Building Partnerships:**
   - Strengthen collaborations with industry partners to prepare for the commercialization of the SHM technology.

EXPECTED IMPACT

Expected Impact:

1. Sustainability: The solution contributes to more sustainable infrastructure by enabling early detection of structural damage, leading to timely repairs and minimizing environmental impact.
2. Data Privacy and Security: By leveraging secure data protocols, the system ensures that all information collected from smartphone sensors and satellite images is protected and used responsibly.
3. Equity and Inclusion: The project offers low-cost solutions for infrastructure monitoring, making cutting-edge technology accessible to developing regions and underfunded municipalities.
4. Green IT: The AI-powered solution uses energy-efficient algorithms and reduces the need for extensive physical sensors, contributing to a more eco-friendly monitoring system.
5. Resiliency and Cooperation: The project enhances infrastructure resilience by preventing major damage, while fostering cooperation between European and North American research institutions.

LESSONS LEARNED

Lessons Learned:

- What I wished I had known prior: The complexity of integrating real-time AI models with smartphone sensor data was more challenging than expected, requiring more time to fine-tune algorithms.
- Surprises: A positive surprise was how effectively smartphone sensors could detect small structural anomalies, proving their value for low-cost monitoring.
- Challenges: Managing data quality from various sources (e.g., satellites and smartphones) was more difficult than anticipated, leading to delays in processing.
- Impact: These lessons helped improve the project's data processing workflows and informed decisions about how to better manage sensor calibration for future field tests.

Alireza Entezami

Assistant Professor at Politecnico di Milano

Alireza Entezami

Alireza.entezami@polimi.it

Video

https://www.mitacs.ca/

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Intelligent Decision-Making with Data Fusion and Predictive Analytics for Multi-Sensor Environments

Dror Jacoby
Israel

Researcher (scientific/ technical/engineering)

Track
Challenges, Paired Teams

Host Organization
Columbia University

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Our project transforms wireless signals into real-time sensors, addressing environmental sensing challenges in communication and meteorology.

- **Communication Solutions** Global networks, from advanced 5G technologies by major players such as Qualcomm, Huawei, and Ericsson to smaller-scale innovations, drive the development of Next-Generation Networks (NGNs). However, **weather impact**, particularly on high-frequency links, remains a significant challenge, requiring smart, proactive solutions to ensure reliable performance and resilience.

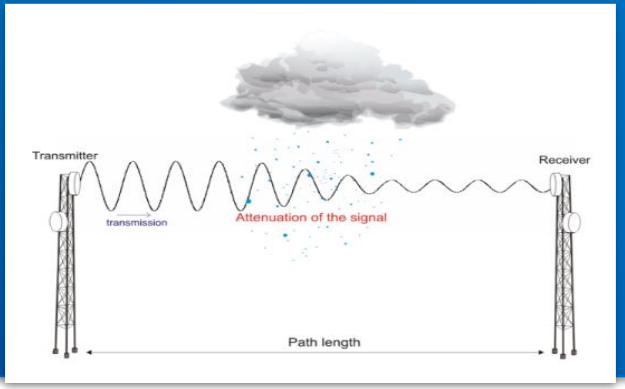
- **NGI Sensing:** Transform communication systems into high-resolution environmental sensors, improving forecasting, optimizing operations, and enhancing public safety. Their real-time capabilities enable smarter urban management and proactive responses to environmental challenges.

Google Research-DeepMind:
Nowcasting the next hour of rain

DeepMind Research: Nowcasting Worldwide

THE PROBLEM :TECHNOLOGY

FROM WIRELESS LINKS TO COMMUNICATION AND SENSING APPLICATIONS



Networking Solutions.
Improving Communication through weather-aware systems.

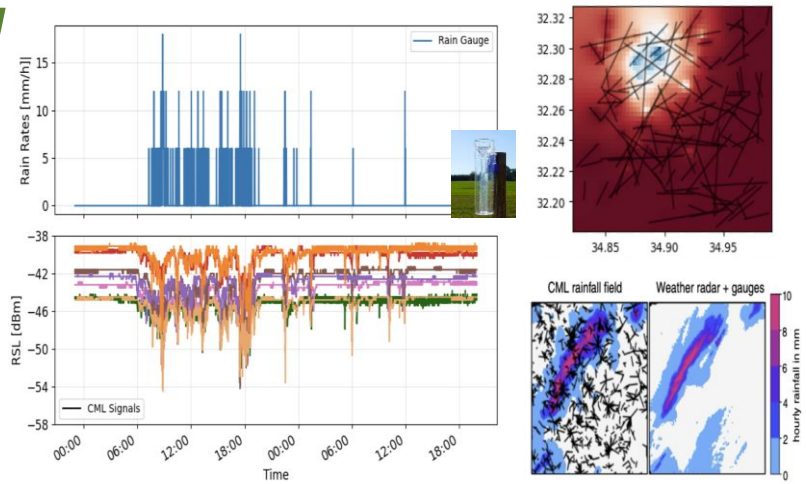
Impact Fields

- Telecommunications
- Network Infrastructure
- NGI Development
- Autonomous Vehicles

Enviormental Monitoring

Network Failures

Precipitation Sensing.
Wireless Networks as Sustainable Multi-Sensor Systems.



Impact Fields

- Disaster Management
- Urban Planning
- Transportation
- Public Health
- Climate Adaptation
- Energy Management

Network Operators, Equipment Providers (e.g., Qualcomm, Ericsson, Huawei), **Non-Profit NGI Developers** (e.g., NYC Mesh), **Autonomous Vehicle Industry** (e.g., Tesla, Waymo)

Organizations

Meteorology Services (e.g., NOAA in the US, ECMWF in Europe), **Insurance Companies, Agricultural Agencies** (e.g., USDA in the US, EFSA in Europe, FAO globally)

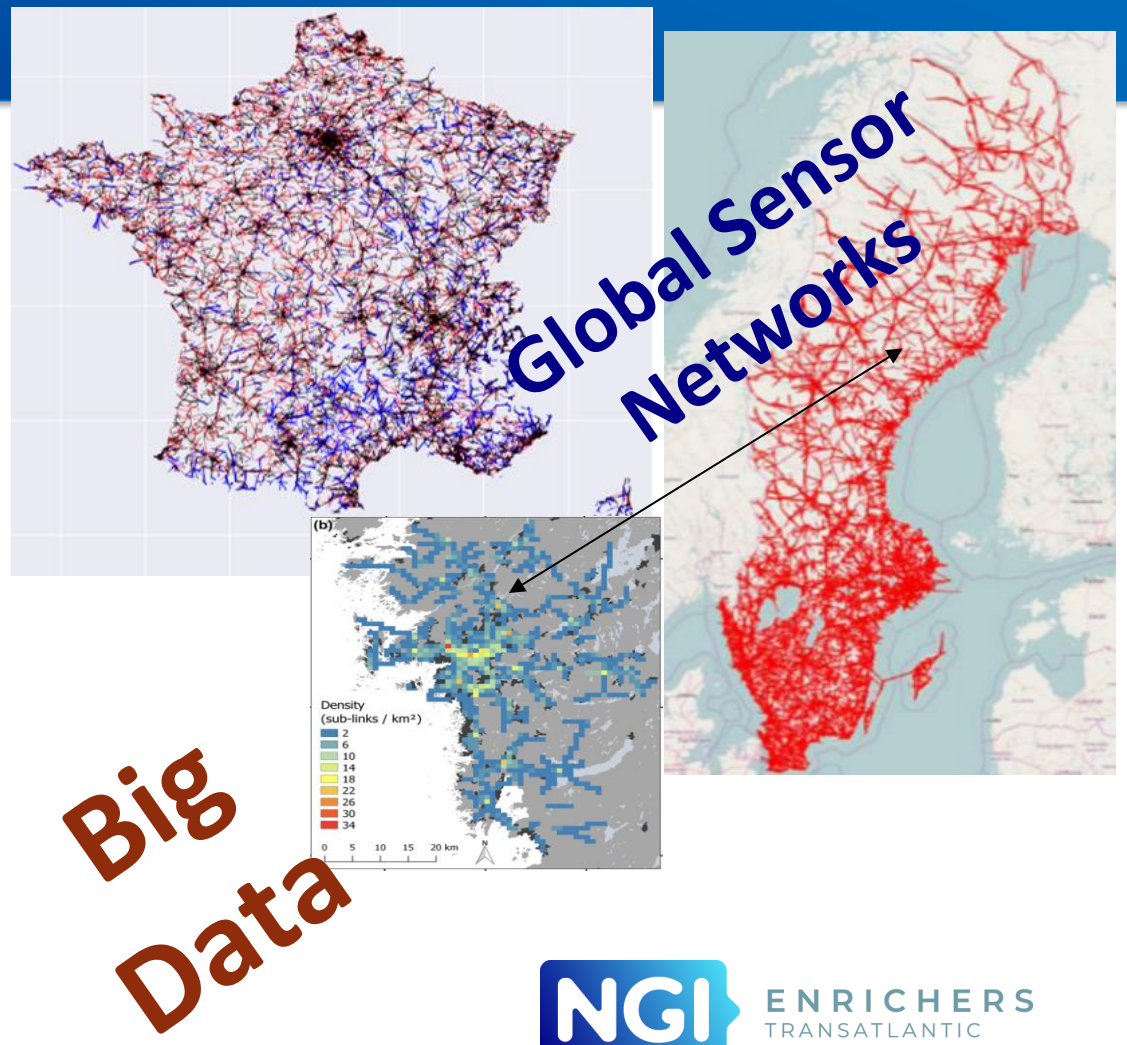
NGI ENRICHERS TRANSATLANTIC

ISAC: Integrated Sensing and Communication

BACKGROUND ,MOTIVATION, POTENTIAL

Communication Networks as Sensors

Opportunities: Harnessing big data, global scalability, and sustainable green solutions to revolutionize environmental sensing.
Challenges: Reliance on providers, voluntary participation, and privacy concerns.
Initiative: OpenSense - COST Action unites experts, network owners, and end-users to create a leading global community for opportunistic sensing innovation.



OpenSense

https://opensenseaction.eu/

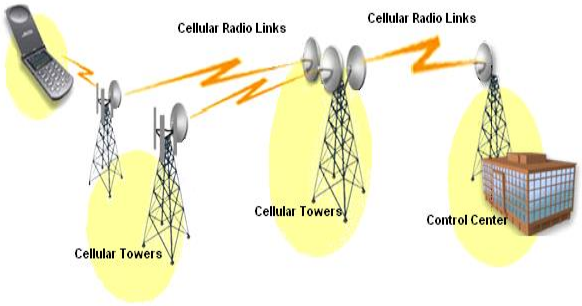
NGI ENRICHERS TRANSATLANTIC

OUR UNIQUENESS:
UNLOCKING POTENTIAL WITH NGNS AND NGI SENSORS

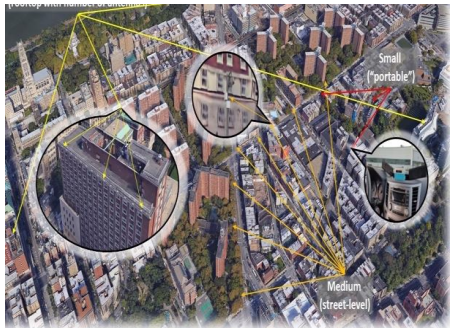
Innovative Features.
Integration of advanced 5G technologies and smart-city systems as real-time sensors networks.

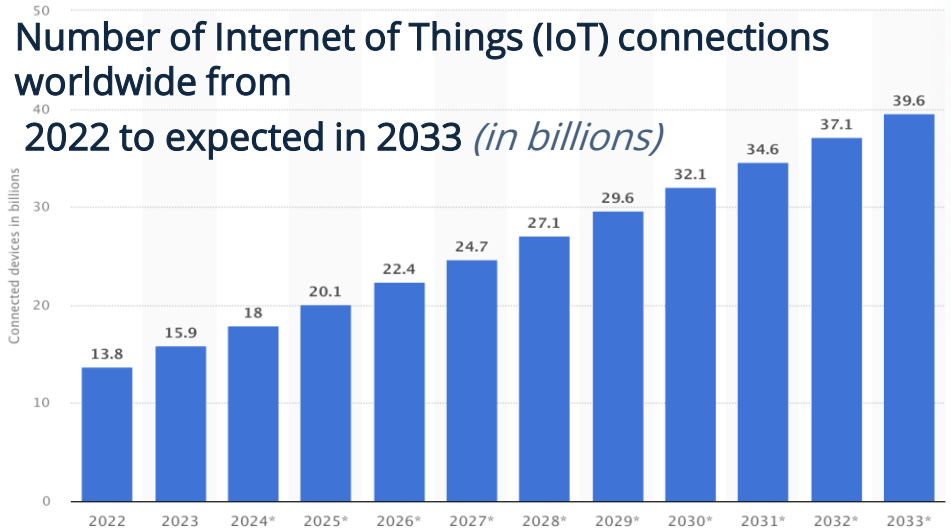
Unmatched Opportunities.
- High sampling rates (~sec.).
- Extensive coverage.
- Operations in higher frequency bands unlocking new potential and research fields and innovative applications.

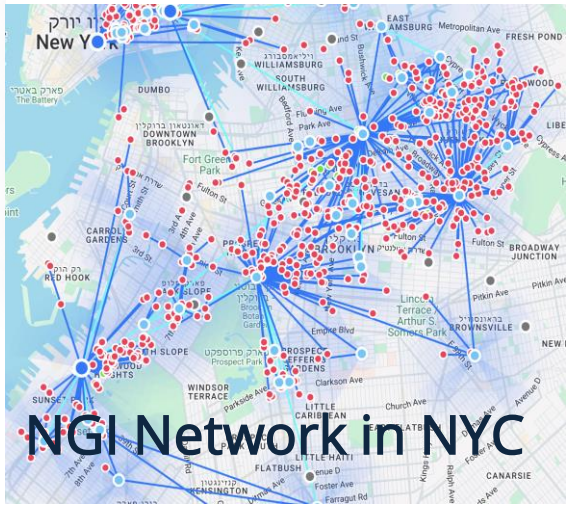
Up to 4G Cellular Networks



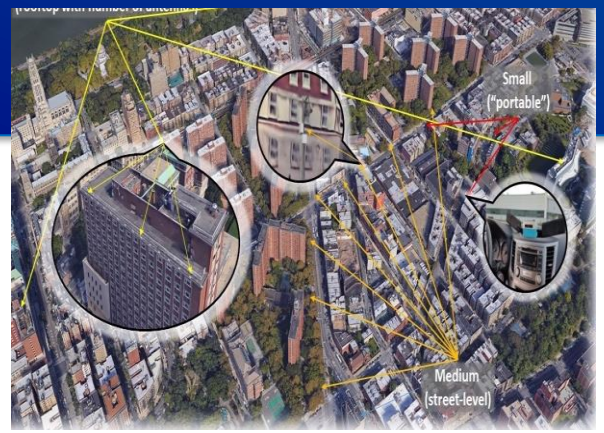
New Generation Networks







OUR PROBLEM & SOLUTION



Data Collection from sensing network: Aggregated data from sensor networks for centralized information.

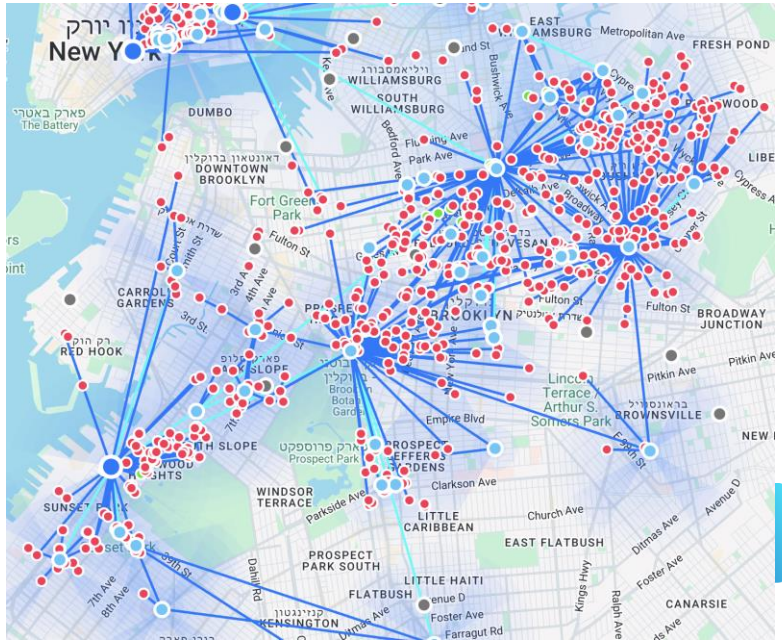
Data Fusion Layer: Deep-learning techniques to merge dataset from various sources.`

Proactive Algorithms: Utilizes real-time data for proactive intelligent decision-making.

Application Level: Network Slicing Autonomous Cars , Proactive Routing, Disaster Management

New Sensors in Town:

Transforming communication networks by leveraging in-city, high-resolution opportunistic sensors to revolutionize smart environmental sensing, with a specific emphasis on NGNs.



NYCMesh: NGI Network in Brooklyn, New York City

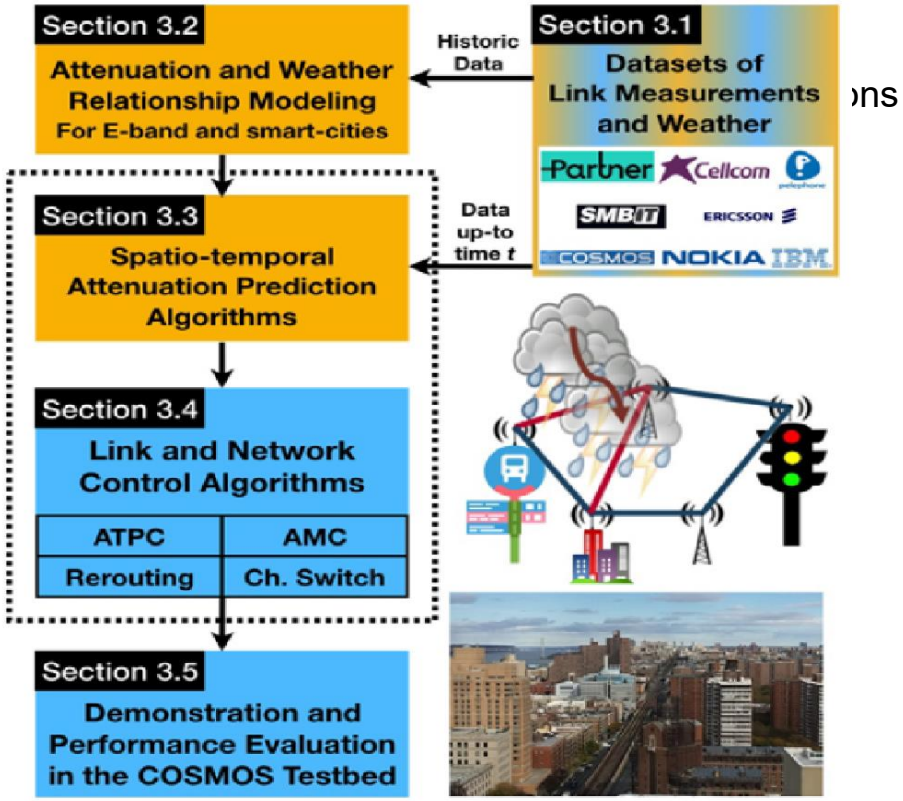
ENRICHERS TRANSATLANTIC

OUR SOLUTIONS: NGI SENSORS

We create a pipeline to collection, manage, store and use for applications for real-time applications from operating NGI Network Collaboration in NYC.

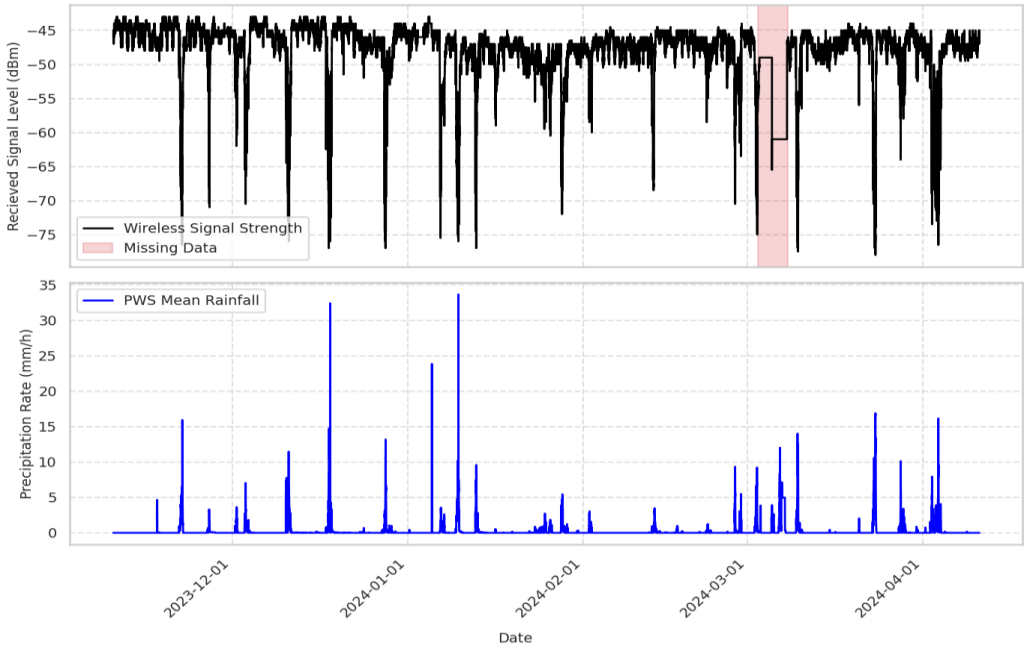
COMMUNICATION.

Proactive Management System for Slicing and Admission Control Decisions



SENSING.

High-Resolutions Meteorological Sensing



NGI ENRICHERS TRANSATLANTIC

DROR JACOBY, PHD STUDENT
TEL AVIV UNIVERSITY

Dror Jacoby
PhD Student
Tel Aviv University

Bio and Achievements

Master of Science from Tel Aviv University with honors (magna cum laude).

- **PhD supervised by Prof. Hagit Messer (Tel Aviv University) and Prof. Gil Zussman (Columbia University). NGI research led to stronger partnerships between research labs and universities, enabling joint supervision on the PhD studies and collaborative studies**

Relevant Publications/Projects/Results

- **Collaboration with Industry and NGI Operators: Partnered with NYC Mesh, a non-profit organization, to collect data and innovate NGN applications.**
- **Algorithmic Paper: Submitted to a Tier-A conference in November 2024, showcasing competitive advancements using NYC Mesh data from collaborative research between two labs.**
- **Dataset Paper: Current work focuses on publishing a unique dataset as part of an Open Data Initiative, highlighting sensing applications tied to NGN innovations.**

NGI ENRICHERS TRANSATLANTIC

OUR TEAM

Our team aims to collaborate between the Cellular Environmental Monitoring (CellEnMon) research lab at TAU, led by **Hagit Messer**, which focuses on the opportunistic sensing of the environment using cellular measurements, and the Wireless and Mobile Networking (WiMNet) Lab at CU, led by **Gil Zussman**, which addresses the design and performance evaluation of wireless networks.

Founders/Mentors.

Hagit Messer.
Prof. Messer, a Life Fellow of IEEE and Professor of Electrical Engineering at TAU, is renowned for her groundbreaking contributions to environmental sensing using wireless networks. Recipient of the 2024 IEEE Medal for Environmental and Safety Technologies, she has held leadership roles, including VP for Research and Developmen, Chief Scientist of Israel and lead the Cellenmon Lab Lab in TAU.

Gil Zussman Kenneth Brayer Professor of Electrical Engineering, Chair of the Department of Electrical Engineering, and Affiliated Faculty in the Department of Computer Science at Columbia University.
Gil is a Life Fellow of IEEE, he has received numerous awards, including the NSF CAREER Award, Fulbright Fellowship, and multiple Best Paper Awards. Prof. Zussman has served on technical program committees for leading conferences like IEEE INFOCOM and ACM MobiHoc and directs the Wireless and Mobile Networking (WiMNet) Lab in CU..

Research Members.

1. **Jonathan Ostrometzky(TAU)** is a team leader at the Cellenmon Lab, alongside Hagit Messer. He is also a lecturer at TAU and has received various honors and awards for his teaching and research achievements. After completing his PostDoc at Columbia University, he served as the Acting Head of the Digital Sciences for High-Tech program at TAU. Jonathan specializes in statistical signal processing, estimation theory, environmental monitoring, and wireless network resilience.
2. **Igor Kadota(NWU)** is a Postdoctoral Research Scientist at CU, with research interests in network modeling, scheduling algorithms, machine learning, and wireless systems. He has received several grants and awards, including an NSF SII-NRDZ grant and the LATinE Trailblazers in Engineering Fellowship.

3. **Shuyue Yu (CU)** is a Ph.D. student in CS at CU, co-advised by Prof. Ethan Katz-Basset and Prof. Gil Zussman. Her research interests include networked and distributed systems, IoT, network algorithms, information theory, security, and privacy. Shuyue has work experience as a software engineer intern at Microsoft and a data science intern at RivetAI, Inc. She has received a Summer Undergraduate Research Fellowship from Caltech in 2020.

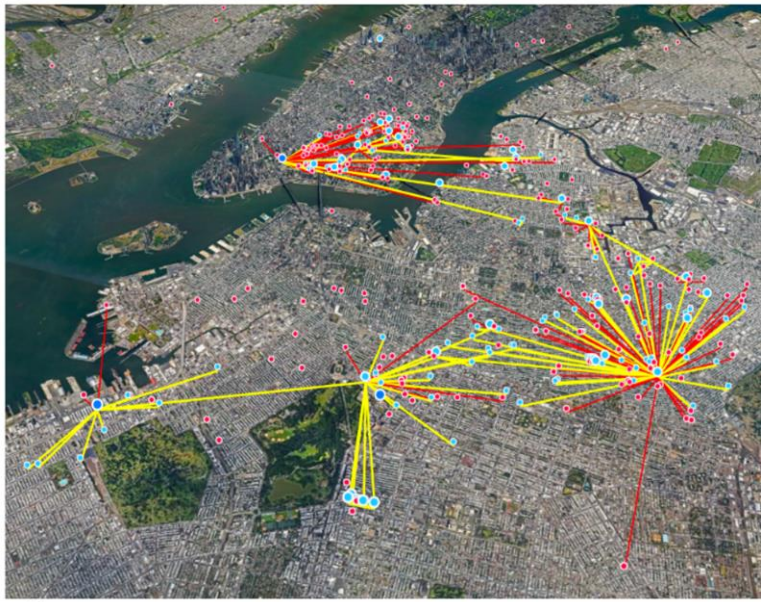
HOST ORGANIZATION

WiMNet at Columbia University. The Wireless and Mobile Networking Lab (WiMNet) at CU is dedicated to advancing wireless networking technologies and applications, and is home to a city-scale advanced wireless testbed as part of the NSF PAWR COSMOS project, which allows for real-world experimentation on next-generation wireless technologies and applications. I am highly motivated to collaborate with Wimnet for several reasons:

- **Experts:** The WiMNet Lab at Columbia University offers the opportunity to work with leading experts at the forefront of development and innovation in the communication and algorithmic fields, with a focus on NGI technologies.
- **Unique Datasets:** WiMNet and CellEnMon labs access diverse and unique datasets, including experimental and commercial wireless networks in various regions. This includes smart cities and in-city links in Israel and NYC, as well as the advanced COSMOS Testbed. The datasets' diversity is a valuable resource for evaluating algorithms and methodologies in different environments.
- **Knowledge Merging:** By combining both labs knowledge and experience, our collaboration can expand both expertise and develop novel solutions that address real-world challenges in NGI and wireless communication fields.
- **Partnership & Collaboration:** WiMNet and CellEnMon have a history of strong and productive research collaboration resulting in patents and beneficial research products, providing a solid foundation for continued success in driving innovation in NGI technologies.

KEY RESULTS (1)

NYC Mesh	
Type	Data
Location	New York, NY
Current status	Development
Commercial?	No
Website	nycmesh.net
ASN	395853
Peering policy	Open



➢ **Academic and Semi-Industry Collaborations**

- Collaboration with innovative NGI operators in NYC.
  - Installation within Columbia University.
  - Collaborative data sharing.
  - Joint research for future applications.

➢ **Data and Algorithmic Development**

- **Product I:** Collection and real-time management systems for developaing ISAC applications.
- **Product II:** Submission of algorithmic paper on slice management control (Confidential Review).
- **Product III:** Upcoming publication of unique database from opportunistic sensors over NYC.

Future Plan: Expand collaboration to industry leaders and relevant organizations, leveraging research outcomes to drive real-time opportunistic data applications and advance NGN (5G and beyond) technologies.
Advancements and Goals: Develop real-time algorithms for NGN slicing in weather-aware systems, implement high-frequency sensing (above 60 GHz) in urban environments, and publicly share datasets to foster industry and academic collaboration.

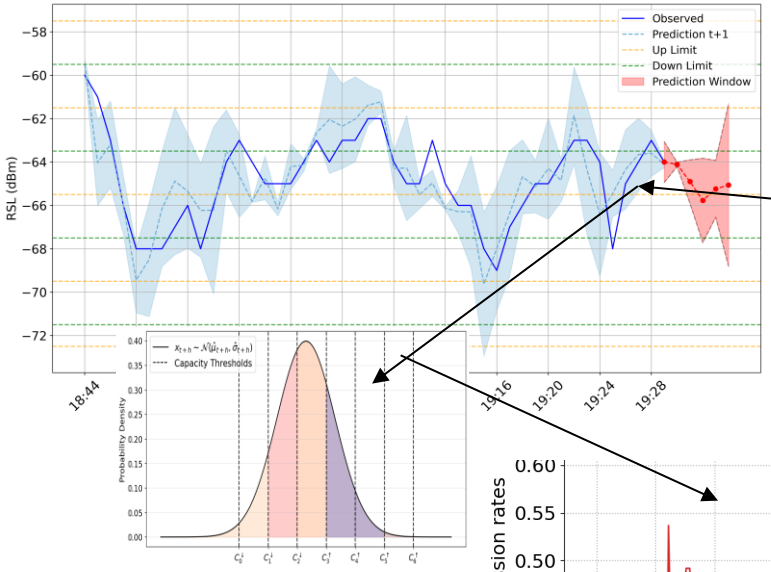
NGI ENRICHERS TRANSATLANTIC

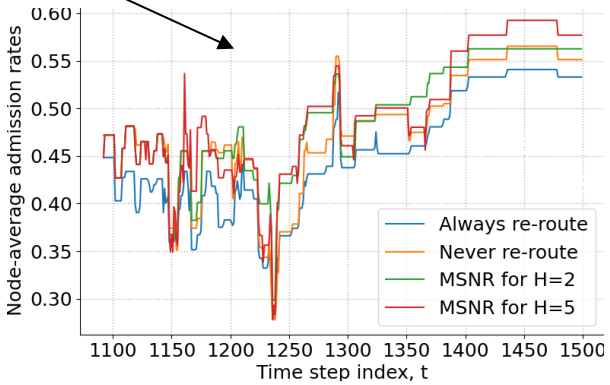
KEY RESULTS (2): NGI SENSORS

We created a pipeline to collection, manage, store and use for applications for real-time applications from operating NGI Network Collaboration in NYC.

COMMUNICATION/ALGORITHMIC.

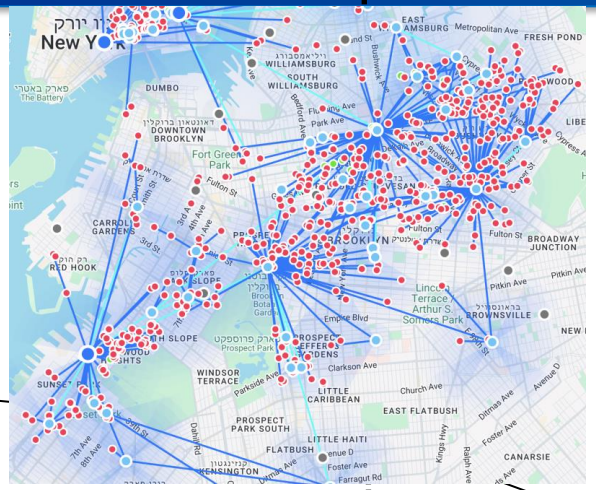
Proactive Management System with Risk Management Control **(Study Under Review)**



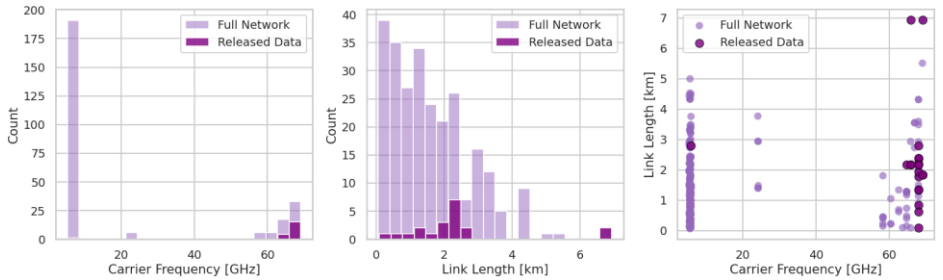


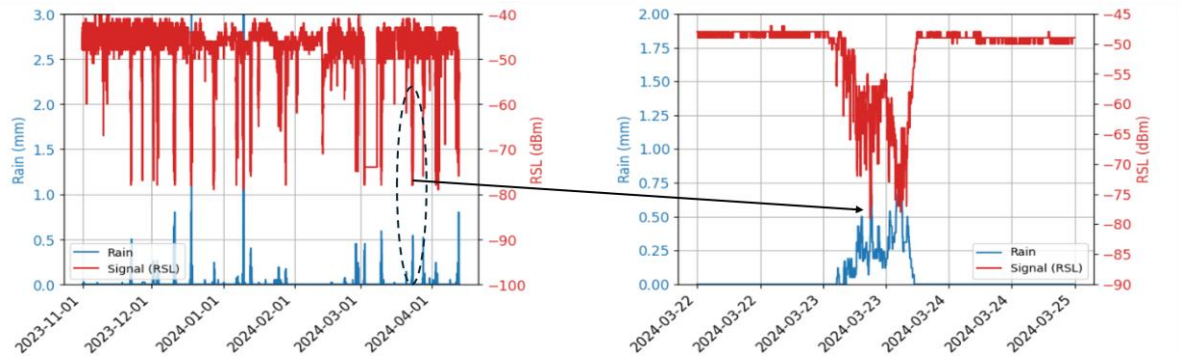
224

SENSING/DATASET



High-Resolutions Meteorological Sensing





ADVANCING NGN RESEARCH

- **Collaborative Advancements:**
  Strengthening partnerships with NGN operators (e.g., NYC Mesh) and industry leaders to test and scale real-time sensor networks. Collaborating with meteorological agencies to drive environmental sensing innovations for urban and disaster management.

Innovative Applications

- **Human-Centric Approach:**
  Leveraging communication networks for dual-use sensing to minimize infrastructure needs, enhance sustainability, and advance ISAC methodologies for real-time rainfall sensing and proactive disaster management.
- **Impact and Motivation:**
  Bridging NGN advancements with environmental sensing to tackle societal challenges. Publishing urban sensing datasets and fostering collaboration among NGN operators, industry leaders, and meteorological services for scalable, impactful solutions.

INNOVATIVE APPLICATIONS

We explore the potential of our work to drive impactful innovations across practical industries and fields, bridging advanced NGN technologies with real-world applications

- **Formula 1:** Precision weather-aware systems to optimize race strategies and safety in dynamic conditions :Formula1-Real-Time Rain Sensing
- **In-City Real-Time Monitoring**: Enhancing urban management through high-frequency NGN sensors for traffic, weather, and safety applications :Smart-City Sensing Solutions
- **Smart Mobility:** Autonomous vehicle support with real-time environmental sensing for safe navigation.
- **Disaster Management:** Proactive systems for rainfall detection and urban flood warnings using opportunistic networks :Flash Flood Sensing

EXPECTED IMPACT

- **Global Real-Time Sensing:** Leveraging big data and worldwide opportunistic sensor networks for sustainable, real-time environmental monitoring.
- **Sustainability & Green Innovation:** Advancing green IT solutions to reduce infrastructure needs while promoting sustainable practices.
- **Resiliency & Collaboration:** Strengthening global cooperation for scalable, secure, and user-focused sensing applications.

Dror Jacoby

PhD Student at Tel Aviv University

Dror Jacoby

drorjacoby@mail.tau.ac.il

Video

https://cellenmonlab.tau.ac.il

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

AI for Onboarding SMEs / UMBC

Fernando Gómez
Spain

CEO (non-technical)

Track
AI / EdTech

Host Organization
University of Maryland Baltimore County &
Embry-Riddle Aeronautical University

229

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (I)

Problem Statement:

- Inefficient and generic onboarding processes in SMEs.
- Prolonged onboarding times and increased costs.
- Lack of engagement and retention among new hires.
- Inclusivity challenges for individuals with diverse abilities

Data & Statistics:

- More than 50% SME haven't a structured onboarding process (Micro SME 90%) DELOITTE
- Turnover rate of up to 25% for new hires in their first year
- Average cost-per-hire is $4,425 (SHRM)
- 55% of companies don't measure the effectiveness of their onboarding programs

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (II)

Identification of the Need:

- Research and consultations with SMEs reveal key pain points.
- Need for personalized, efficient, and inclusive onboarding solutions.

Target Audiences:

- SMEs looking to improve their onboarding processes.
- New hires seeking tailored and engaging onboarding experiences.
- HR managers aiming for streamlined and efficient onboarding.
- Individuals with disabilities requiring inclusive onboarding practices.

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (III)

Current Solutions:

- Traditional HR software with limited personalization.
- Generic learning management systems (LMS).
- Emerging AI-driven HR solutions lacking comprehensive onboarding focus.

Opportunity:

- Unique approach with AI-driven personalized onboarding.
- Addressing efficiency gaps and inclusivity needs.
- Meeting market demand for innovative onboarding solutions in SMEs.

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (I)

AI-powered: Our solution uses Artificial Intelligence to personalize the onboarding process for each individual.

Adaptive learning: The system adapts to the individual's previous experience and knowledge to optimize the learning process.

Company-specific content: Companies can provide their own videos or use videos from YouTube to train their new employees.

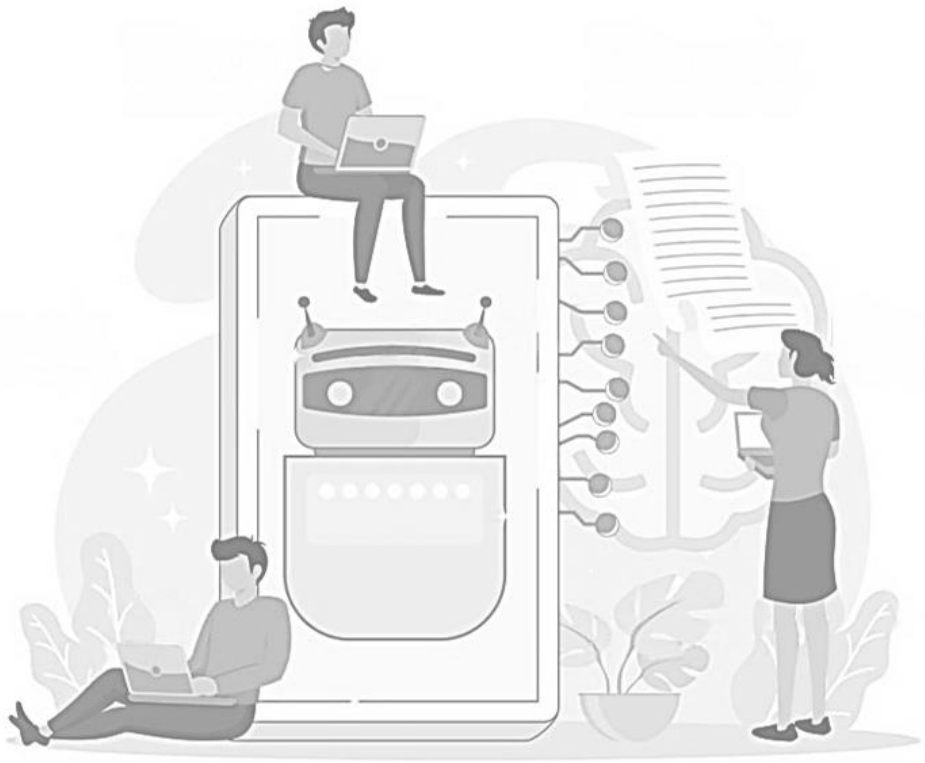
Human-centric: Our solution considers the human factor, taking into account the individual's needs and preferences to ensure an optimal onboarding experience.

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (II)

AI-powered:

- Uses AI to analyze CVs and job positions.
- Personality test: The Big Five Personality Test
- Adapts training materials based on individual skills and experiences.
- Supports various content formats: videos, audios, PDFs, presentations.



NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (III)

Differentiator:

- Personalized training for each employee.
- Efficient onboarding, reducing time and costs.
- Inclusive, adapting to diverse learning styles and abilities.

Competitive Advantage:

- Significant cost savings compared to traditional methods.
- Higher employee retention and satisfaction rates.
- Scalable solution for various SME needs.

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (2)

NEXT STEPS:

Testing and Validation:

We plan to initiate the testing phase by involving five companies in demo versions and pilot programs of the developed system. This phase will include applying the system in real-world onboarding processes, such as those at Training Experience. These tests are designed to gather critical insights into the system's functionality and user experience, which will inform further refinements and enhancements.

Market Expansion and Collaboration:

After the testing phase, we aim to expand our market presence by evaluating the system in the EU, US and Canadian markets. Our goal is to gather positive feedback on its

Areas of Expertise: Artificial Intelligence, Cyber-Physical Systems

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (3)

Additionally, we plan to strengthen research and innovation collaborations with ERAU and UMBC, which will lay the foundation for future partnerships and allow us to adapt the product to meet local needs effectively.

Also we will seek new grants, such as those offered by the NGI initiative, INNOVATeiC-CV, or other Spanish funding programs like CDTI's NEOTEC. These grants would support the development of a system designed to create onboarding programs specifically tailored for micro and small enterprises, which often lack formal onboarding processes. This initiative addresses a significant gap, as many small businesses do not have the resources or expertise to implement effective onboarding, leading to potential inefficiencies and

Areas of Expertise: Artificial Intelligence, Cyber-Physical Systems

NGI ENRICHERS TRANSATLANTIC

IMPLEMENTATION

Conduct Pilot Testing: Begin testing the developed system with the five selected companies to gather real-world data and feedback.

Iterate and Improve: Use insights from the pilot tests to make necessary refinements and improvements to the system's functionality.

Market Evaluation: Expand testing to the US and Canadian markets, gathering data on performance and adaptability in different environments.

Seek Additional Funding: Apply for new grants such as NGI, INNOVATeiC-CV, and NEOTEC to support further development, particularly focusing on creating tailored onboarding solutions for micro and small enterprises.

Strengthen Collaborations: Enhance partnerships with research institutions and innovation networks to support ongoing development and market integration.

Prepare for Broader Rollout: Based on the results, plan a broader market launch, including potential commercialization strategies and scaling efforts.

NGI ENRICHERS TRANSATLANTIC

EXPECTED IMPACT

By implementing our findings in the AI-driven onboarding system, we will impact the project in the following human-centric NGI-relevant domains:

Autonomy: The system empowers companies to independently manage onboarding processes.

Data Privacy and Protection: Ensuring robust data security and sovereignty in handling sensitive employee and company information.

Digitalization: Streamlining onboarding by digitizing workflows, enhancing efficiency.

Inclusion and Diversity: Offering customizable solutions that accommodate diverse needs, promoting equity.

User Experience: Providing a seamless, user-friendly interface that enhances the onboarding experience.

These enhancements will increase productivity and integration within companies.

NGI ENRICHERS TRANSATLANTIC

LESSONS LEARNED

Looking back, we wish we had anticipated te rapid pace at w hich AI t echnolog ies evolve, as t his sig nificant ly im pact ed our project tim eline. A notable surprise w as the constant influx of new ideas and capabilit ies from the evolving AI, which required us to repeatedly revise and reprogram our prototype, ult im at ely extending the project by five m onths. This challeng e, though fru st rat ing at t im es, taug ht us t he im portance of flexibilit y and adaptability in t ech develop m ent. The experience has m ade us bet ter prepared for fut ure project s, w here we can apply t hese lesson s to m anag e dynam ic chang es m ore effect ively.

NGI ENRICHERS TRANSATLANTIC

Fernando Gómez

CEO at TrainingExperience.org

Fernando Gómez

F.GOMEZ@TRAININGEXPERIENCE.ORG

Video

Trainingexperience

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Driving Innovation in 6G Wireless Technologies: The OpenAirInterface Approach

Florian Kaltenberger
Austria

Associate Professor / Project Leader

Track
AI / 6G Wireless

Host Organization
Institute for the Wireless Internet of Things, Northeastern University (Boston, MA, USA)

242

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

ORIGINALITY AND TECHNICAL QUALITY OF THE IDEA

Mobile communication networks are a cornerstone of our society and our industry.

Operators are moving towards **open, programmable and virtualized network deployments**

AI/ML driven optimization has been added to **5G** as an **afterthought**

6G will be the first mobile standard to **natively support AI/ML**

Proliferation of **open-source** in mobile communications

Innovating, building, deploying, and optimizing these networks is costly

Existing open-source solutions lack maturity and strong community support

WHOM AM I?

EXCELLENCE

Florian Kaltenberger

- PhD from Vienna University of Technology (2007)
- Associate Professor at EURECOM
- Visiting Professor at Northeastern University
- Developer, architect, and manager of OpenAirInterface project
- Special Advisor to the OpenAirInterface Software Alliance
- Father and husband

My mission:

- **Establish OpenAirInterface as the open-source reference implementation for 5G and 6G systems**
- **Community building to foster development of OpenAirInterface**

EURECOM
Sophia Antipolis

OPEN AIR INTERFACE

NGI ENRICHERS TRANSATLANTIC

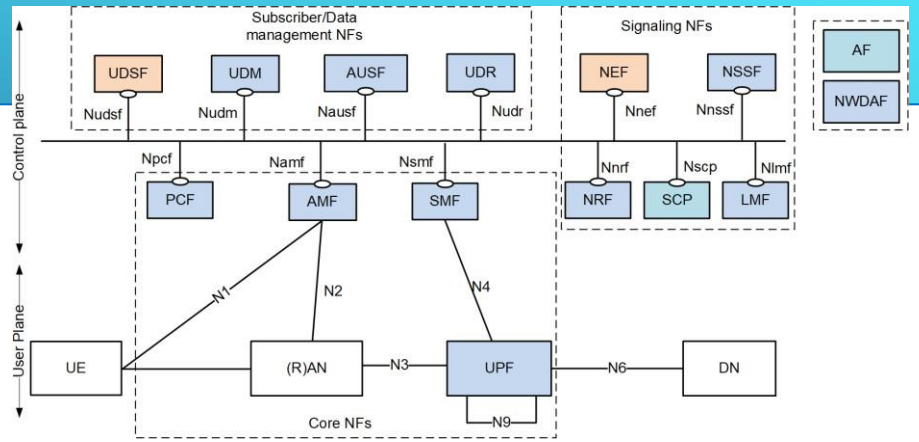
What is OpenAirInterface?

- Open-source software implementing End-to- end 3GPP and O-RAN-compliant 4G/5G Radio Access and Core Network
- Running on commodity x86/ARM hardware or cloud infrastructures interfacing with SDR or commercial radios
- Augmented by RAN control, operation &

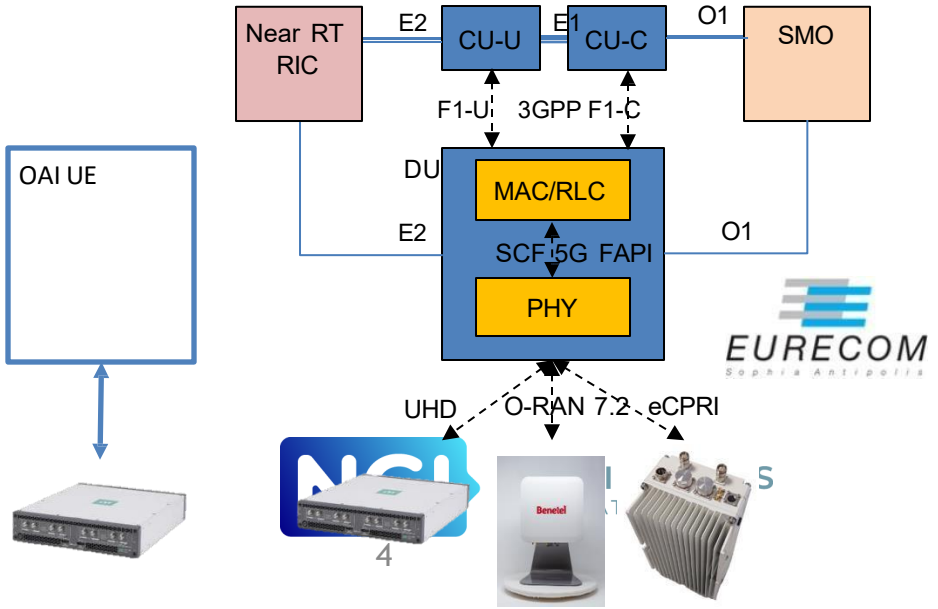
  -maintenance (RIC and OAM) software
- The OAI public license is based on Apache

  -2.0 but allows patent owners to contribute and keep their patents under 3GPP FRAND rules
- Community driven development supported by the OpenAirInterface Software Alliance and its strategic members

Core Network



Radio Access Network



MY HOST ORGANIZATION

Institute for the Wireless Internet of Things
at Northeastern University

Institute for the Wireless Internet of Things

- at Northeastern University (Boston, Massachusets)

Lead: Prof Tommaso Melodia

Facilities

- The Colosseum, world's largest wireless emulator,
- X5G and Arena testbeds
- O-RAN Testing and Integration center

Early supporter of OpenAirInterface community in the United States

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (1) - TECHNICAL

OpenAirInterface code stability and feature improvements

Joint O-RAN and OAI workshop November 2023

- More than 100 participants from academia and industry

Development of X5G testbed

- An Open, Programmable, Multi-vendor 5G O-RAN Testbed

Integration of Colosseum testbed in OAI CI/CT/CD pipelines

- Automated Testing History of OAI performance

Strategic white paper: "Driving Innovation in 6G Wireless Technologies: The OpenAirInterface Approach" [1]

KEY RESULTS (2) - STRATEGICAL

Creation of OAI Foundation

- 501(c)(3) non-profit organization
- Collaborate with local stakeholders and address the specific needs of the North American community

Established a deep partnership between EURECOM and Northeastern University

- Memorandum of Understanding signed October 2024
- Development of research collaborations, student exchange and Double degree program

KEY RESULTS (3) - PUBLICATIONS

1. R. Mundlamuri, R. Gangula, F. Kaltenberger, R. Knopp, 5G NR position- ing with OpenAirInterface: Tools and methodologies, in: 20th Wireless On- demand Network Systems and Services Conference (WONS 2025), Hinter- tux, Austria, 2025.
2. A. Malik, M. Ahadi, F. Kaltenberger, K. Warnke, N. T. Thinh, N. Bouknana, C. Thienot, G. Onche, S. Arora, From concept to reality: 5G positioning with open-source implementation of UL-TDoA in OpenAirInterface (2024). arXiv:2409.05217. URL https://arxiv.org/abs/2409.05217
3. R. Mundlamuri, R. Gangula, F. Kaltenberger, R. Knopp, Novel round trip time estimation in 5G NR, in: 2024 IEEE Global Communications Confer- ence: Wireless Communications (Globecom 2024 WC), Cape Town, South Africa, 2024.
4. R. Gangula, A. Lacava, M. Polese, S. D'Oro, L. Bonati, F. Kaltenberger, P. Johari, T. Melodia, Listen-While-Talking: toward dApp-Based Real-Time spectrum sharing in O-RAN, in: 2024 IEEE Military Communications Con- ference (MILCOM 2024), Washington, USA, 2024, p. 2.
5. D. Villa, I. Khan, F. Kaltenberger, N. Hedberg, R. Soares da Silva, A. Kelkar, C. Dick, S. Basagni, J. M. Jornet, T. Melodia, M. Polese, D. Kout- sonikolas, An open, programmable, multi-vendor 5G O-RAN testbed with NVIDIA ARC and OpenAirInterface, in: INFOCOM 2024, 2nd IEEE Work- shop on Next-generation Open and Programmable Radio Access Networks (NG-OPERA), Vancouver, Canada, 2024.
6. R. Mundlamuri, S. Badran, R. Gangula, F. Kaltenberger, J. M. Jornet, T. Melodia, 5G over terahertz using OpenAirInterface, in: 19th Wireless On-demand Network systems and Services Conference (WONS 2024), Cha- monix, France, 2024.
7. D. Villa, I. Khan, F. Kaltenberger, N. Hedberg, R. Soares da Silva, S. Max- enti, L. Bonati, A. Kelkar, C. Dick, E. Baena, J. M. Jornet, T. Melodia, M. Polese, D. Koutsonikolas, X5G: An open, programmable, multi-vendor, end-to-end, private 5G O-RAN testbed with NVIDIA ARC and OpenAirIn- terface, Submitted to ArXiV (Jun. 2024). URL https://arxiv.org/abs/2406.15935
8. R. Gangula, T. Melodia, R. Mundlamuri, F. Kaltenberger, Round trip time estimation utilizing cyclic shift of uplink reference signal, Submitted to ArXiV (Oct. 2024). URL https://arxiv.org/abs/2410.04528
9. F. Kaltenberger, T. Melodia, I. Ghauri, M. Polese, R. Knopp, T. T. Nguyen, S. Velumani, D. Villa, L. Bonati, R. Schmidt, S. Arora, M. Irazabal, N. Nikaein, Driving innovation in 6G wireless technologies: The OpenAir- Interface approach, Submitted to ArXiV, 17 December 2024 (2024). URL https://arxiv.org/abs/2412.13295

CONCLUSIONS

This sabbatical has been a boost for my career

Created long lasting relationship with host university

Created long lasting structures to support technical work

Enlarged and improved community of collaborators

NGI enrichers has been the kick-starter for all of this

Florian Kaltenberger

Associate Professor / Project Leader

Florian Kaltenberger

FLORIAN.KALTENBERGER@EURECOM.FR

Video

(N/A)

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

MAGOS – Touch the Intangible

Greg Agriopoulos
Greece

CEO of Quanta & QualiaFounder of MAGOS

Track
XR / Human-Computer Interaction
Host Organization
Mason Enterprise CenterFairfax, Virginia, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Present the problem:

Virtual world has been evolved significantly the last years especially in training and education applications.

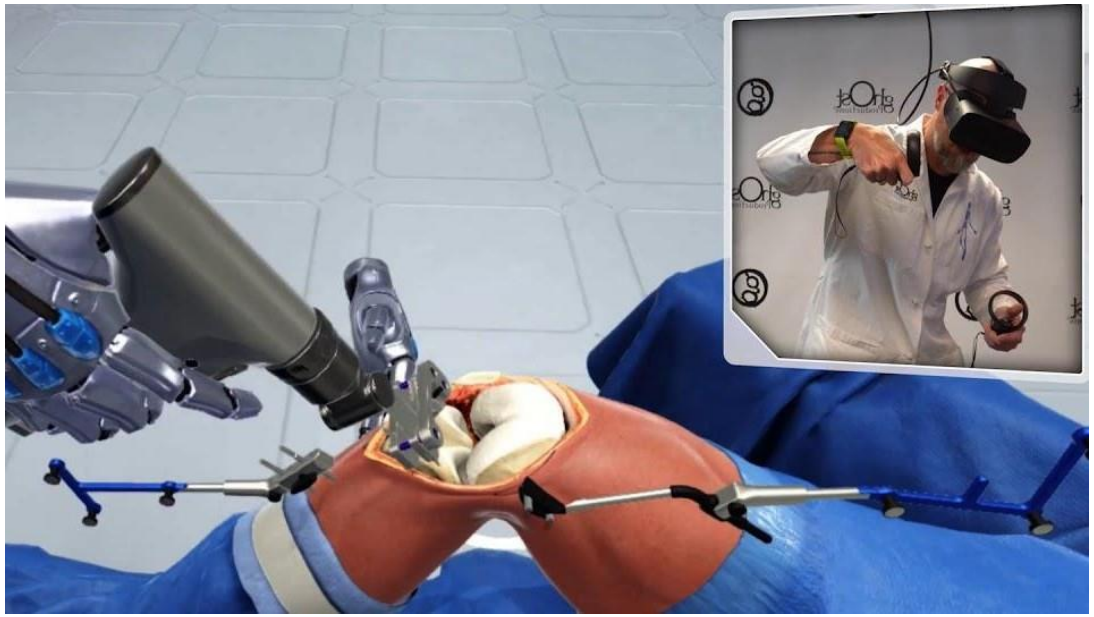
The current head mounted displays can provide great outcome for vision and audio senses thanks to the significant hardware and software impovements but it doesn't happen the same with touch sense. This is because current VR controllers don't provide a natural interaction via user's hands and fingers impacting significant users' immersion.

Even with these limitations, VR training drove a 76% increase in learning effectiveness over traditional methods and, also, employees can be trained 4 times faster in VR courses than in classrooms, based on last year surveys.

Who is the main target audiences? – Research centers | Medical organizations (clinics) – Aerospace companies (pilot/engineers training)

Who else is already addressing the problem,– haptX (US), Senseglove (NL), Manus (NL), TeslaSuit (UK)

and why is there an opportunity? Because current solutions cannot solve the problem due to technology limitations.



NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (1)

Technology, differentiator, competitive advantage, opportunity (and size).

We learn by doing and when it comes to do things in a natural way, nothing can compete the human hand. So, in order to bring touch sense in digital world we had to integrate the human hand, which is a complex articulated system.

For that reason, we introduce Magos: a solution that enables touch sense inside virtual world improving the whole UX, enabling users to interact via their fingers just like in real life. Magos can realistically simulate in a meaningful way all key aspects of real touch, thank to its software and hardware components that are under three main pillars: Finger tracking, Tactile and Kinaesthetic feedback.
As a result, Magos can push the boundaries of realism in VR, increasing even more the learning effectiveness over traditional methods and at the same time minimizing the training time needed.

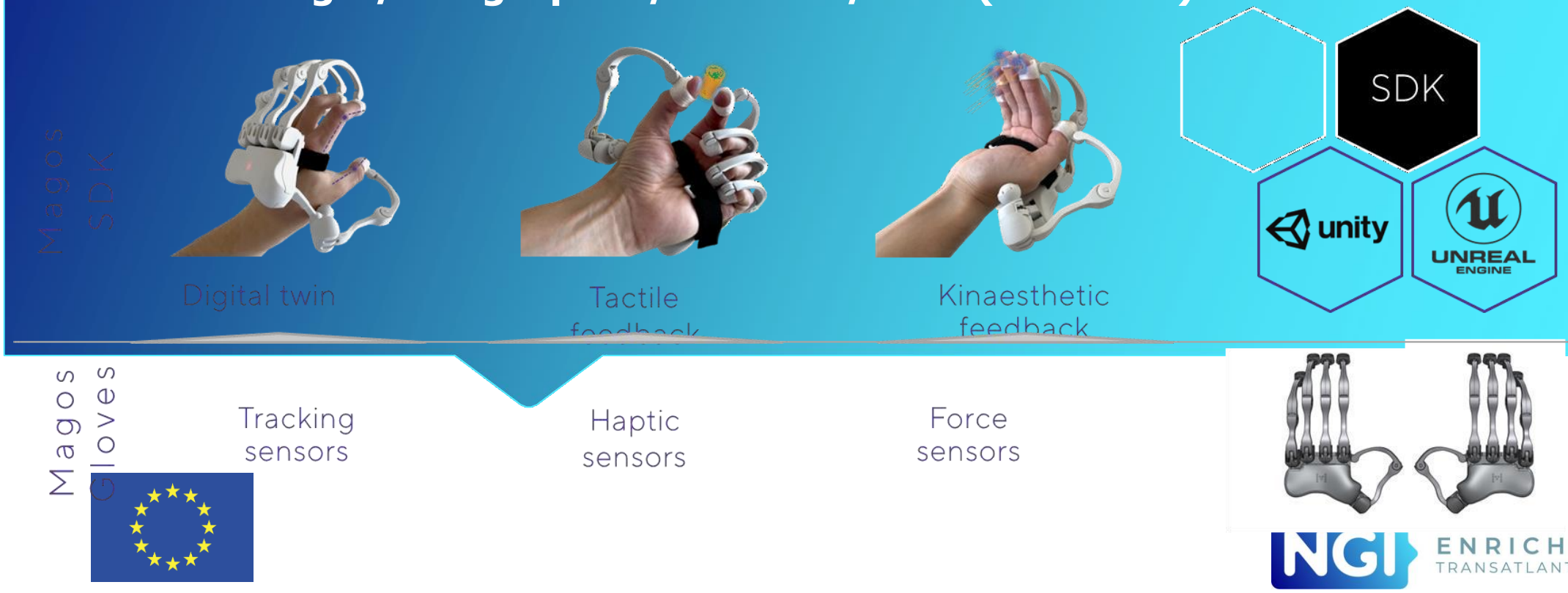
Competition, regular VR controllers are are not so easy to use and, and they cannot provide a realistic interaction. On the other hand, the limited VR haptic gloves in the market are better in the performance (vs the controllers), but they are harder to use. They are really complicated. Just for the basic stuff users have a hard time figuring out how to use them. Well, we didn't want to do either of these things. What we wanted to do was make a leapfrog product that is way easier to use than any similar device and provide the best performance in terms of touch sense simulation. Now, we are improving the software (finger tracking accuracy) and the industrial design of the solution in order to reach as soon as possible (next 6 months) the 1st commercial version.

Our goal is to substitute the VR controllers for Virtual Training and simulation – which is 25% of Global VR headsets market share, close to $2B euros 2024 and it projected to reach almost the amount of $25B by 2026 with 28% CARG.

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (2)

Technical design / infographic / scheme / data (if needed)



NGI ENRICHERS TRANSATLANTIC

GREG AGRIOPOULOS, CEO, QUANTA & QUALIA

Bio and achievements/successes

Deep tech entrepreneur | tech visionary – 13y exp in ICT project-contract management, innovation, entrepreneurship | CEO & founder at Magos

List any relevant publications/products/projects/results related to NGI - 1)"Industrial Impact Award" in the conference ISM 2021 (2) "Exploitation of Industry 4.0 Technologies Award" by Elevate Greece!

Past Projects:

List any relevant honors and/or prizes related to NGI– award during NGI Oscars event 2022 (project Magos)

NGI ENRICHERS TRANSATLANTIC

THE TEAM / EXPERTISE

Other Founders, support team, mentors and advisors - names, titles, achievements +including host organization contact

NGI ENRICHERS TRANSATLANTIC

HOST ORGANIZATION:

MASON ENTERPRISE CENTER

Background: Business development service in Fairfax, Virginia

Context: Linked with George Mason University but also with other stakeholders in the Virginia state

Department: Mason Enterprise Center

NGI experience: -

KEY RESULTS (1)

The goal of the project was:

1. Analyze the customer feedback (from the USA market) on Magos solution
2. Participate in XR related events
3. Business development
4. Interact with investors

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (2)

Demonstrations:

Feb 2024:

GMU's Center for Adaptive Brain-Body Interactions and GMU's nursing school

March-April 2024:

George Mason University:

- Felipe Veiga -Assistant professor in the Department of Electrical and Computer Engineering,
- Craig Yu-Associate Professor,Computer Science | Design Computing&eXtended Reality (DCXR)
- Yotam Gingold -Associate Professor, Computer Science | Creativity and Graphics Lab (CraGL)
- Vivian Genaro Motti - Assistant Professor at Dep. of Information Sciences and Technology

Old Dominion University:

Michel Audette, Ph.D. Associate Professor

George Washington University:

Dr. Hurriyet Ok, Senior Research Fellow at Cyber Security and Privacy Research Institute (CSPRI)

MIT:

- Media Labs: Cody Paige Director of the Space Exploration Initiative
- Lincoln Labs: Brian S. Baum, Ph.D. - Technical Staff Research Director, STRIVE Center - Human Health & Performance Systems

Medical training schools

- Eastern Virginia Medical Center in Norfolk, Virginia (Linkedin post)
- Virginia Commonwealth University: Josh Blubaugh-Assistant Director of the Clinical Learning Center, James Thomas - Director of Motor Control Lab (MCL), Brent Fagg - Assistant Director for Innovation, Jay Diener-Brazelle-Senior Supervisor, School of Medicine
- Penn Medicine, University of Pennsylvania Health System (Linkedin post)
- School of Nursing at George Mason University (Linkedin post)

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (2)

- Accelerated contacts/engagements with investors, VCs
- Accelerated business partnerships for Magos solution
- Accelerated contacts/engagements with R&D partners for future collaborations
- Tested and validated the solution – receive feedback for improvement
- Analyzed the value of the solution in the medical/surgical training and simulation sector
- Receive feedback from stakeholders

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (3)

- Conference attendance with demo:
  - 02 Nov 2023 Participated in Accelerate investor conference, discuss with stakeholders (VC, large companies)
  - 06 April 2024 - Harvard MA, USA during Event: HarvardXR XRxAI
- Analyzed the Startup establishment in the USA – location and ecosystem analysis
- Establish commercial collaboration with 2 U.S.A. customers (research groups in George Mason University)

NGI ENRICHERS TRANSATLANTIC

IMPLEMENTATION

How would you implement your findings? Next 6-month steps (nonconfidential)

- Officially launch the 1st commercial version
- Start marketing/branding campaign
- Reach 300 sales in 2024
- Participate in a large expo (CES, MIT hack, AWE)
- Attract investors
- Establish USA headquarters

NGI ENRICHERS TRANSATLANTIC

EXPECTED IMPACT

From the implementation of your findings, how are you going to impact your project and impact the world? Especially on the Human-centric NGI-relevant following domains:

Autonomy, Cooperation, Data privacy and sovereignty, Data protection, Digitalization, Diversity, Equity, Green IT & Respect for the environment, Inclusion, Interoperability, Lifelong learning, Openness, Resiliency, Security, Social participation, Sustainability, Transparency, User's Rights, User's Experience, Other.

- Received feedback from the solution demos and build a roadmap for improvements of the solution.
- Performed several demos
- Analysed the product/market fit in medical, academic, industrial 5.0 sectors
- Strengthening research collaboration with the US
- Strengthening innovation collaboration with the US
- Accelerated contacts/engagements with investors, VCs
- Accelerated business partnerships for developed technologies/solutions
- Fundraising (proposals to public organisations) - indicate, in the US/Canada or Europe
- Expanding collaboration within the NGI community
- Conference attendance with paper/poster/ proceedings

NGI ENRICHERS TRANSATLANTIC

LESSONS LEARNED

Business with USA entities has different approach than EU

In the USA easy to get 1st level of interest – harder to reach the sales level

Would like to explore other market segments than Healthcare

GREG AGRIOPOULOS

CEO of Quanta & QualiaFounder of MAGOS

GREG AGRIOPOULOS

GAGRIOPOULOS@THEMAGOS.COM

Video

(N/A)

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

DATAMI – Visualize, Share, Edit, Contribute: Produce decentralized open data as inclusive digital commons

Julien Paris
France

Developer & Co-founder of multi.coopCreator of Datami

Track
Open Data / Digital Commons
Host Organization
Concordia University, Montreal, Canada

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Open data could be an signifficant lever for civic society and make the information they produce become strong digital commons... but for now this remains an unsolved challenge

Grassroot organisations still have diffficulties sharing or maintaining their open data

At a local level small or grassroot organisations have an important role in raising public awareness about topics of public interest (environment, social equality, urbanism, health…).

Despite this, local institutions or small associations are refrained in sharing the data they gather about a territory or a field of expertise due to a **structural lack of means or technical skills**. Keeping up to date their data implies improving inclusiveness in the process of building such data toward their communities.

Open data produced locally are in that sense potential true decentralized digital commons. However existing tools are not designed for this kind of organisations, resulting in invisibilizing important knowledge of public interest.

- *Target audiences*
  Close the digital gap between the citizen and local public structures, NGOs, associations...

  Small organisations produce or may even publish raw datasets of public interest, but a gap remains between local data producers and their publics : a raw dataset may not be intelligible enough for a broad range of users ; open data may also need interoperability, curation or grassroot contributions to stay up to date so they could be useful for other application domains.

- *Benchmark*
  The persistence of cultural, economical, and technical complexities

  Even if some open source solutions exists to help building datasets - and even if some national or regional entities provide platforms to publish open data - publishing datasets is only a first step. The tools to produce open data in the simplest way are mostly proprietary, or designed for administrations or professionals : small civic organisations must cope with restricted resources, need of sovereignty over their data, simplicity, communicability, and end users with limited technical background.

THE PROBLEM

Decolonizing Light:Design and Implementation of a Community Science Low-Cost Air Quality Monitoring Network in Kahnawà:ke

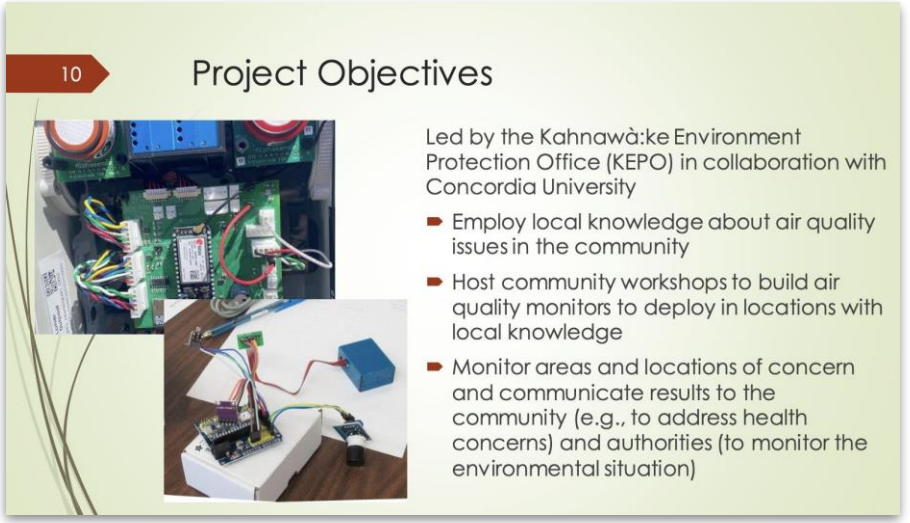
The air pollutants data collected by the research team and the local community encounters many requirement :

Goals :

- Addressing societal and environmental issues
- Improving availability of data in immediate living environments
- Greater engagement of the community at large
- Support scientific inquiry (while recognizing and evaluating challenges related to the employed technology)
- Effort to overcome obstacles related to governance and exclusion from decision making

Requirements :

- The upstream data produced locally must be archived for security and reuses (portability)
- The data should be visualized in "real time" to inform citizen
- All the data infrastructure must be independently managed by the community / KEPO
- In the long run data should be compatible with EMSA digital tools.
- Data models could evolve during the research project
- Open source and sovereign environments / infrastructure.

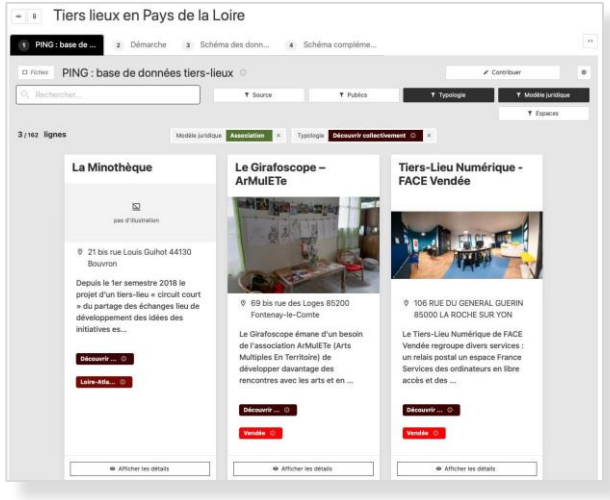


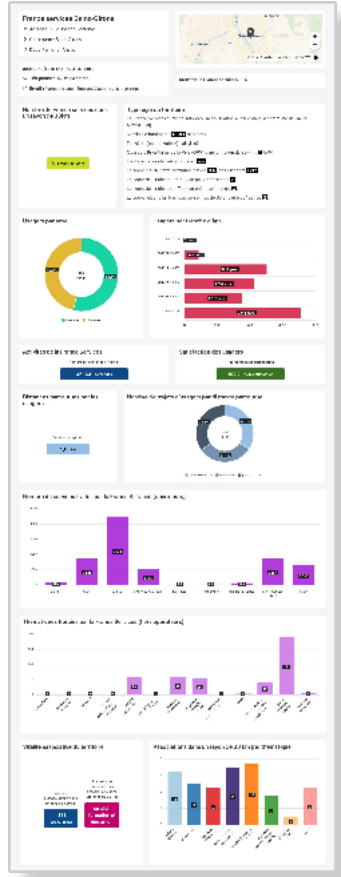
NGI ENRICHERS TRANSATLANTIC

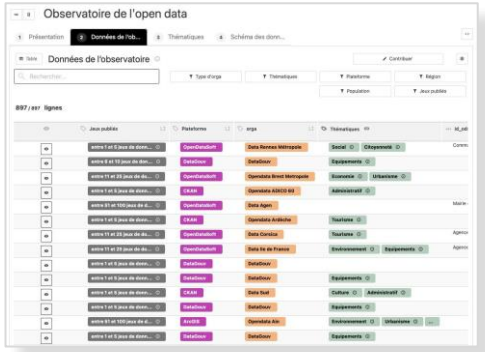
YOUR SOLUTION (1)

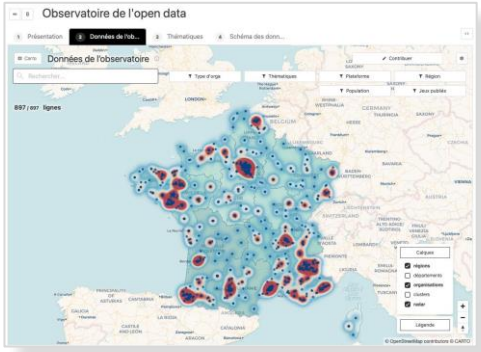
Datami /open source tool for open data

VISUALIZE
SHARE
EDIT
CONTRIBUTE









Produce open data as digital commons

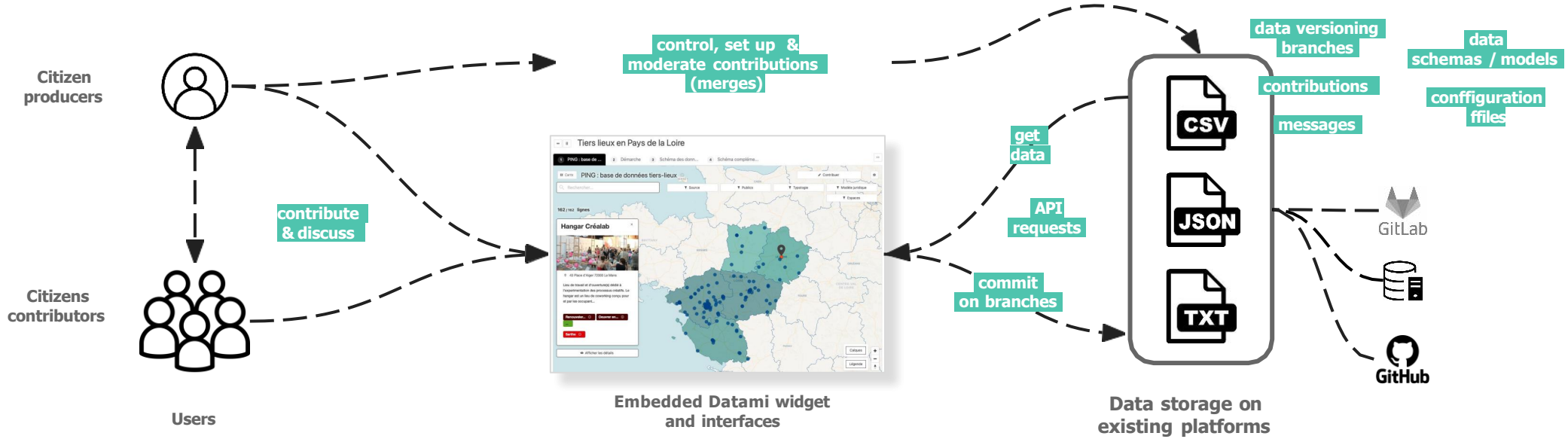
https://datami.multi.coop

YOUR SOLUTION (2)
Datami / principles & interfaces

Datami is technically an interface between citizen and Git features, to build a bridge between citizen and local open data producers

Datami provides an open source solution and intuitive interfaces to make open data intelligible and simplify the contributive process.

Storage and contributions to open data by citizen - and their moderation by the producers - are supported by existing services such as Gitlab or other external APIs.



YOUR SOLUTION (3)
Datami /implementations proposals for the KEPO project

Main strategies for data management

We imagined several strategies regarding the data management. Each of these strategies accounts for pros and cons, but all suppose the existence of an online repository.

Option A

Mainly focuses on data archiving, using scripts at the level of the local server to export data sets onto standard and reusable files batches.

Pros : light in terms of development.

Cons : doesn't resolve visualisation requirements. Requires a autonomous forge (Gitlab). Maintainability.

Option B

Use Datami back-office and widgets to export data sets, archive and visualize them.

Pros : light in terms of development, helps structuring and homogenize data sets for archiving, uploading, open data, and visualisation.

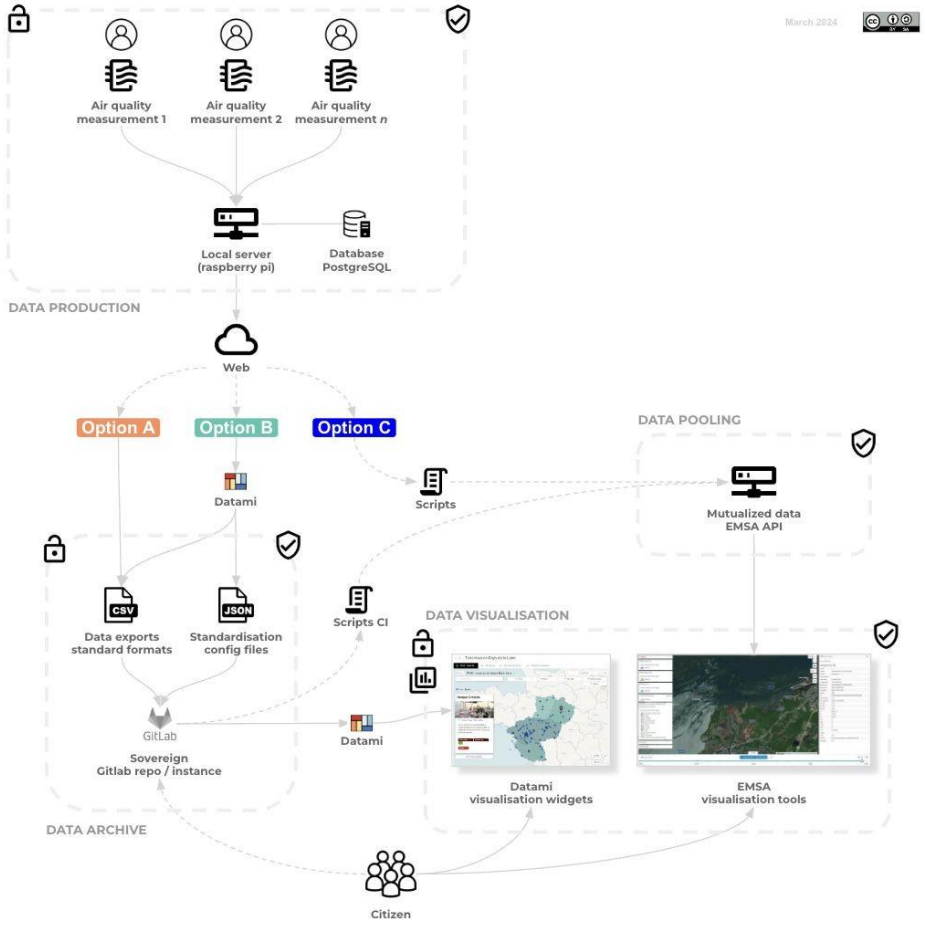
Cons : some light developments to anticipate (connectors and automation)

Option C

Additional scripts to upload directly from local server to EMSA API.

Pros : no need for intermediary data archiving.

Cons : compatibility and accessibility of data sets. Custom developments and maintainability. Risky in terms of archiving.



Julien PARIS, developer, co-founder multi.coop

I'm co-founder of multi, a french digital cooperative

I believe in decentralized organisation, collective intelligence, grassroot ideas, and in developing open source solutions for more resilient democracies.

I'm an architect in designing software & a self-taught developer

I consider data visualisation and software development at the crossroads of the several paths I took in my career :
architecture, design, sociology, cultural industries, engineering.

I'm the creator & developer of awarded projects

- HydroViz (Ministry of Environment competition, laureate #2 in 2017, visualization of groundwater pollutants)
- Social Connect (CGET/Etalab 2018)
- Datami (laureate France Relance 2022).
- DatamiPro / DatamiPods (NGI Search / NGI 0 Commons 2024-2025)

NGI ENRICHERS TRANSATLANTIC

THE TEAM /EXPERTISE

Founders & Support Team

- Julien Paris : Founder of Multi, creator of Datami, expert in decentralized data spaces (ActivityPods/Solid), specialist in open data valorization and visualization.
- Multi Team : Developers contributing to Datami and open data solutions.

Host Organization Contact

- Tanja Tajmel
  Associate Professor, Concordia University
  Email: tanja.tajmel@concordia.ca

Mentors & Advisors

- ActivityPods Team: Technical mentors for integrating decentralized data systems using Solid and ActivityPub.
- NGI Enrichers Program Advisors: Supporting Datami's international development and strategic alignment.
- Open North NGO: Partner organization offering guidance in cultural industries data valorization.

NGI ENRICHERS TRANSATLANTIC

YOUR HOST ORGANIZATION

Concordia is a Canadian university known for its interdisciplinary research and community engagement.

Concordia University hosts the "Decolonizing Light" project, focusing on community science and sustainability in collaboration with Kahnawà:ke.

Department: Individualized Programs (INDI), fostering interdisciplinary approaches in science, technology, and society.

First collaboration with NGI through the Datami project, advancing open science initiatives and community-driven data solutions.

KEY RESULTS (1)

Due to several unforeseen challenges encountered during the implementation of Datami for the Decolonizing Light project, we made the decision to pivot in order to ensure the project's long-term success.

Key factors contributing to this shift included delays in the project timeline, the lack of online configuration interfaces to avoid custom developments, the specificities of data processing that were unique to the researchers' needs, political complexity of the project's governance, and the understandable limited responsiveness from the multiple research project's stakeholders.

These challenges, while important learning experiences, hindered our ability to effectively implement Datami within the scope of the research project as we had planned it firsthand.

However, during our expedition we organized many organisations within the universities (Concordia and Montreal university libraries) or NGOs (Open North, Sensorica) pushing for stronger open data / open science policies.

These meetings allowed us to shed more light on the practical and legal constraints of open science in Canada.

In light of these obstacles, we chose to apply for a new grant to further develop Datami into a scalable open sourced SaaS platform, so our solution could be more easily used independently by researchers or local communities, without custom developments.

This pivot allows us to reffine the business model, start to build out the necessary technical infrastructure, and ultimately create a autonomous solution that can better serve a wide range of users, including those concerning open science.

KEY RESULTS (2) - Project

Findings	Outputs	Outcomes	Expected Results by Expedition's End
- Pre-validation of Datami's adaptability to open science use cases through AQMN project engagement.	- Secured research team agreement to test Datami for air quality data visualization.	- Broader recognition for Datami on international stages.	- Finalize and test digital tools for AQMN with KEPO.
- Identified technical and UX challenges in deploying Datami in a new cultural and environmental context.	- Meeting with univ. librarians campaigning for stronger open science policy - Accessed AQMN raw datasets for analysis and future tool integration.	- Better understanding of the open science / open data constraints at federal or labs levels. - Strengthened potential for partnerships in Canada and beyond.	- Present results and discuss next steps for Datami's open source project.
- Recognize our technical solution still implied too much custom developments in the case of the Concordia research project to be easily set in place.	- Stop inefficient intents to adapt the Datami tool as it is. - Pivot in our initial business model, iterate and invent new open technologies as Proof Of Concept	- POC of DatamiPro, online configuration platform for Datami - New grant from NGI Search (C123,000) to develop DatamiPro and refine its business model.	- Develop a clearer roadmap for DatamiPro's technical and business challenges, plus new R&D independent funding.

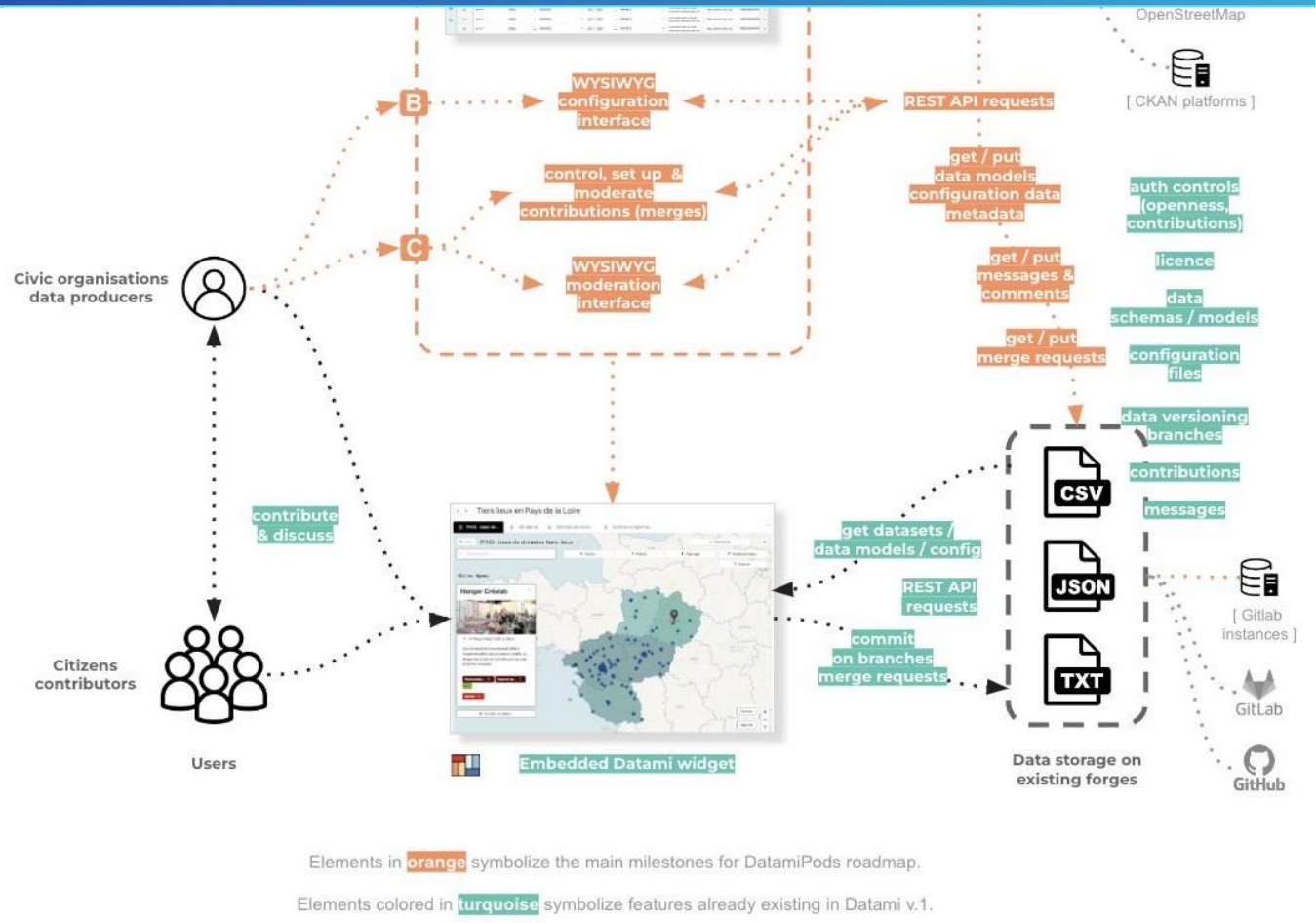
KEY RESULTS (3) - Personal

Findings	Outputs	Outcomes	Expected Results by Expedition's End
- Gained deeper insights into cultural dynamics of open science and community-led projects.	- Face-to-face meetings with researchers, university librarians	- Enhanced understanding of balancing technical, organizational, and personal priorities.	- Build connections with Canadian academic and NGO partners for future collaborations.
- Recognized the importance of balancing technical, organizational, and personal priorities in long-term projects.	- Necessity to work two/three jobs at the same time during the expedition : clients and missions in France (ADEME), NGI Enrichers expedition in Canada, and responsibilities in the Multi cooperative as general manager	- Gradually transfer missions with French clients to other colleagues in Multi (finalized at mid-expedition) - Hand over general manager title to a new associate in Multi - Re-focus on DatamiPro project and its "seed" funding challenges more than on its technical aspects	- Ability to refocus on only one project with meaning, economical, ethical, design and technical challenges : DatamiPro - Ability to fund a full-time team on the Datami/DatamiPro project instead of resting on one-people shoulders

IMPLEMENTATION (I)

Technical Reffinements

- **Finalize the development of DatamiPro**, focusing on user interfaces and backend improvements identified during the expedition.
- **Advance the integration of Datami with ActivityPods** for decentralized and interoperable data management.
- **Test and validate DatamiPro** in a pilot deployment with NGOs datasets and user feedbacks.

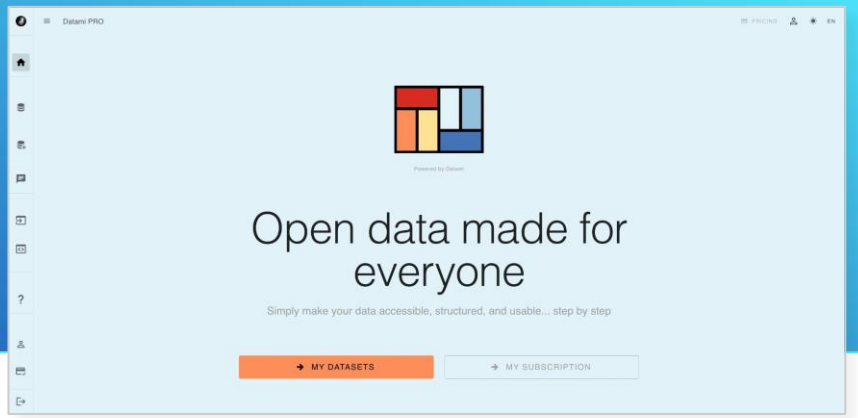


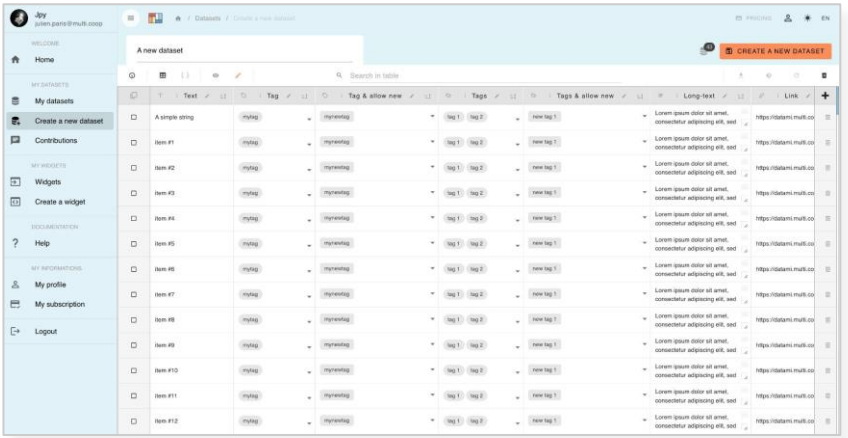
IMPLEMENTATION (2)

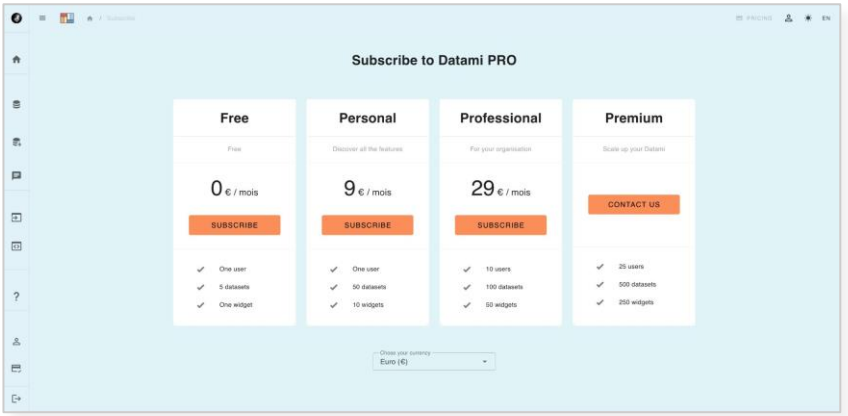
The project we designed for Datami v.2 (aka DatamiPro) aims to develop user-friendly and intuitive tools and interfaces, so grassroot organisations with limited resources could transform their data into open standards, **directly and autonomously from a platform** : append models & metadata, version-control it, open or close for contributions with merge request / peer-review principle… **all of it for people without any need for technical skills.**

We intend to make Datami v.2 the open source tool to accompany, step-by-step, civic organisations in opening their datasets

- Autonomous data and contributions management (with peer-review)
- Step-by-step data opening process
- Upload structured & enriched datasets to forges (Github, Gitlab…) and to open data platforms (CKAN)
- Autonomous configuration of Datami widgets
- Multilingual for internationalization
- Subscriptions plans for every need and type of organisation
- 100% open-sourced and decentralized, based on ActivityPub and Solid standards
- Repository







IMPLEMENTATION (3)

Partnership strengthening

- Engage with ActivityPods development team and community to align Datami's roadmap with their goals :a decentralized infrastructure for open data management.

Funding and business development

- Explore opportunities in Canada and Europe to sustain and scale the project.
- Develop a business case for DatamiPro, targeting partnerships with NGOs, local governments, and open science initiatives.

Product testing and standardization

- Conduct a broader pilot test with Canadian and European stakeholders to refine Datami's features.
- Ensure compliance with FAIR data principles and standards to strengthen its appeal to scientific communities

Knowledge sharing and community engagement

- Share findings and open solutions with the NGI/NLNet communities, European and Canadian partners to foster collaborations.
- Organize workshops or webinars to demonstrate DatamiPro's capabilities and gather stakeholder feedback.

EXPECTED IMPACT

Autonomy & data sovereignty

- Empower communities and local governments to own, manage, and visualize their data with DatamiPro / DatamiPods tools, fostering independence and local decision-making.

Interoperability & transparency

- Advance standards for open science, ensuring seamless data sharing and transparent access across diverse platforms and stakeholders.

Resiliency & user experience

- Design adaptable and user-friendly tools that can address the dynamic needs of diverse communities and datasets.

Data privacy, protection & security

- Integrate decentralized frameworks like ActivityPods to ensure secure, decentralized, private, and user-controlled data management.

Equity & social participation

- Prioritize community-driven projects, ensuring equitable access to digital tools for underrepresented groups in science and policymaking.

Global impact vision:

- Democratizing access to data visualization and valorization tools for social good.
- Establishing an business model independent of private equity for inclusive and sustainable innovation in open science and digital commons.

LESSONS LEARNED

What I wished I had known prior:

- The complexity of engaging with university teams remotely and the slower pace of response in academic projects.
- The significant personal and professional toll of **balancing multiple commitments** across two continents, and as developer, innovator, and enterprise manager.
- Practical details about managing dual living arrangements (e.g., rental overlaps in France and Canada).

Bad surprises:

- **Delays** in the Concordia project's governance and access to datasets, which strongly impacted project timelines.
- **The logistical strain** of maintaining a base in France while living in Canada. Let's also mention the french government dissolution in summer '24, which implied a lot of rethinking our business dependency to government funding of open source projects.

Good surprises:

- **The strong interest** in Datami from Canadian partners and the recognition of its potential in open science despite its current state.
- **Building unexpected relationships** with NGOs and open data communities in Canada.
- **Securing NGI grants** during this period, which brought renewed momentum and resources to the project.

Challenges (personal & professional):

- **Personal**: Adjusting to cultural and environmental differences, managing isolation, and balancing family life with professional demands.
- **Professional**: Delayed responses, and the need to reprioritize tasks on short notice.

Impact of lessons learned:

- **Resilience**: Strengthened ability to adapt to unforeseen circumstances and maintain focus and creativity despite challenges.
- **Collaboration**: Improved strategies for engaging with international teams and aligning expectations.
- **Growth**: Enhanced understanding of global perspectives in open science and digital commons, enriching the vision for Datami.
- **Preparation**: Insights to better plan future expeditions, including clearer agreements with host organizations and proactive logistical planning.

Julien Paris

Developer & Co-founder of multi.coop

(N/A)

julien.paris@multi.coop

Video

Datami

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Strategic Foresight for Advanced Responsible AI

Katalin Feher
Hungary

Associate Professor at Ludovika University of Public ServiceNGI Visiting Professor

Track
Responsible AI / Policy & Foresight

Host Organization
Concordia University, Montreal, Canada

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM IN RESPONSIBLE AI FUTURES

Problem statement

Rapid AI governance challenges responsible and explainable future tech design.

Identification of the problem

- Lack of strategic foresight based on cross-industrial expertise
- Outdated terminology and reduced public trust

Benchmarking competition

- Concepts of “AI for Good” and “Co-intelligence” (UN, big consultancy)
- The challenge of societal and sustainable uncertainties

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM SOLVED

Being resolved

Strategic foresight in an independent AI knowledge hub

Target audiences & relevant stakeholders

- Tech industry leaders
- AI policymakers
- Responsible AI experts
- World organizations & global NGOs in AI for good
- AI (policy) think tanks
- AI research institutes
- AI regulatory bodies
- AI ethics committees
- Governing AI consultants & AI policy advisors
- Human rights advocates
- International AI research consortiums
- Data privacy regulators
- Academic programs and journals in AI
- Technology advisory boards
- International academic societies in AI
- AI research funding bodies
- AI governance forums
- AI literacy policymakers
- Innovation managers
- Business strategists
- Tech journalists
- Ethicists and AI activists

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION

CROSS-INDUSTRIAL & IMPLEMENTATION-READY STRATEGIC FORESIGHT FOR ADVANCED RAI

Differentiator
Independent & human-centric research method and dissemination

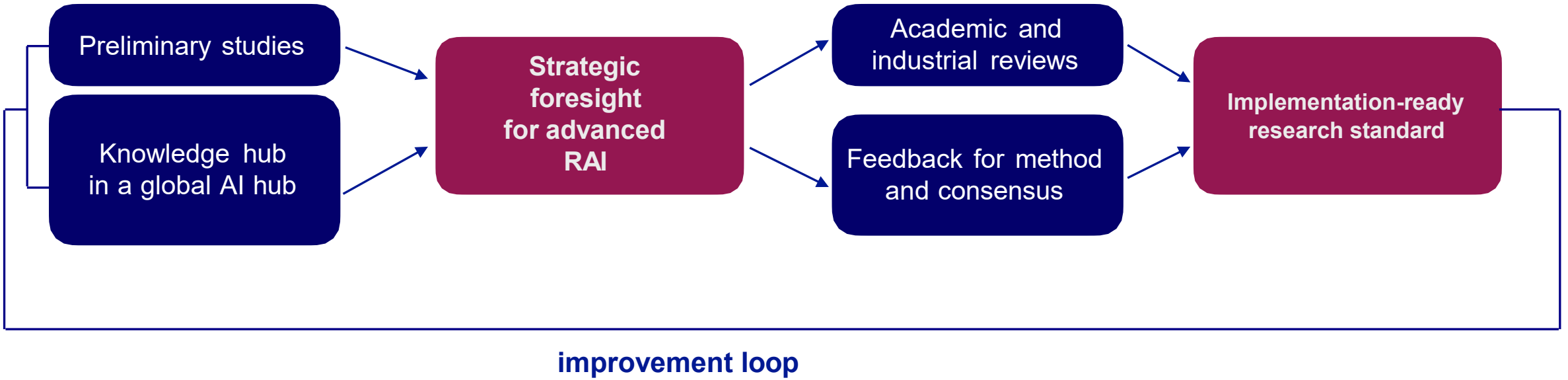
Competitive advantage
Comprehensive insights for business-societal values and sustainability

Opportunity
Systematic RAI assessment and policymaking

Best timing for a new RAI research initiative
EU AI Act (EU), White House Executive Order (US), AI Safety Summit, AISS (UK)

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION



KATALIN FEHER (SHE/HER)

ASSOCIATE PROFESSOR AT LUDOVIKA UNIVERSITY OF PUBLIC SERVICE

CV highlights

- New York University - Future of Rights and Governance Program, Fellow
- European Innovation Council, External Expert
- Horizon Europe MSCA, External Expert
- ECREA Mediatization, Co-Chair
- Fulbright Alumna and two-time MIT EmTech Scholar
- KOME Journal (Q2), Member of the journal editorial board
- Expertise: policy for science and technology, research in human-centric AI
- Research: generative AI, AI media, RAI, socio-technical systems, agentic AI

NGI ENRICHERS TRANSATLANTIC

KATALIN FEHER (SHE/HER)
ASSOCIATE PROFESSOR AT LUDOVIKA UNIVERSITY OF PUBLIC SERVICE

Academic Qualifications
- Habilitation in Philosophy
- PhD in Communication and Media Studies

Professional Qualification
- MIT: Policy for Science and Technology

Experience
- Research & course developments: 4 continents, 15 countries
- Keynote at leading scientific and industrial conferences in Europe and North America
- 160+ scientific publications (including D1-Q1 papers and monographs)
- Coalition for Independent Technology Researchers Washington D.C., member
- University of Southern California Media As SocioTechnical Systems, member
- Hungarian Academy of Sciences, member (Public Body & Business Administration Committee)

THE TEAM / EXPERTISE

The core team

Katalin Feher, PI, NGI Visiting Professor
Fenwick McKelvey, Host, AI2 co-director
Lindsey Rogers, Advisor
Robert Marinov, PhD student

The knowledge hub: 150 experts

BigTech, big consulting, research and ethics centers, universities, NGOs, among others Amazon, Google, Microsoft, Meta, Gartner, PwC, McKinsey, Mastercard, Netflix, MILA, Ivado, McGill, ServiceNow, HumanFirst

Supporting team: AI2

NGI Support

Dr. Andrea Degen
Mentor

Svetlana Klessova
Director, R&I, GAC

Fahima Sadaoui-Ramos
NGI Enrichers Project Director

Théo Lefèvre
G.A.C. Consultant Innovation

NGI ENRICHERS TRANSATLANTIC

YOUR HOST ORGANIZATION

Université Concordia University

Applied AI Institute

Research center collaborating with businesses, civil society, and governments

Background

- Montreal = global AI Hub
- $2,4 billion investment for Canada's AI sector in 2024, announced in Montreal

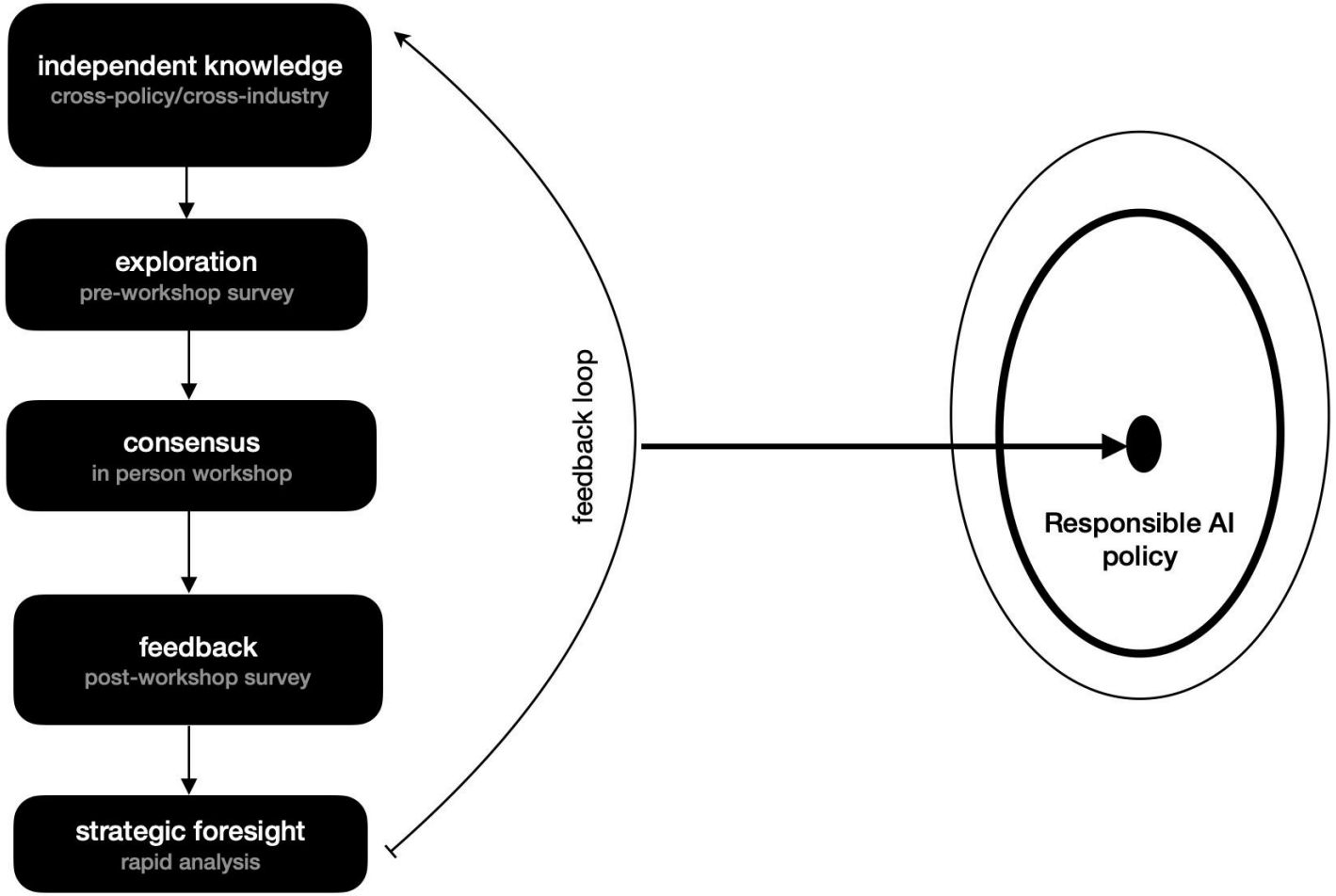
NGI ENRICHERS TRANSATLANTIC

KEY RESULTS

MAIN COMPONENTS	THE ORIGINAL PITCH	THE REAL EXPEDITION
establishment	cross-disciplinary knowledge hub	cross-industrial knowledge hub
key topics	AI-driven media	responsible AI
research	strategic foresight	strategic foresight
method	horizon scanning or backcasting	horizon scanning
implementation strategy	policy research	implementation-ready research standard
long-term motivation	EU-CA policy research	generative AI focus
outputs	academic journal papers, social media	academic journal papers, social media monograph, keynotes, interview, science comm

NGI ENRICHERS TRANSATLANTIC

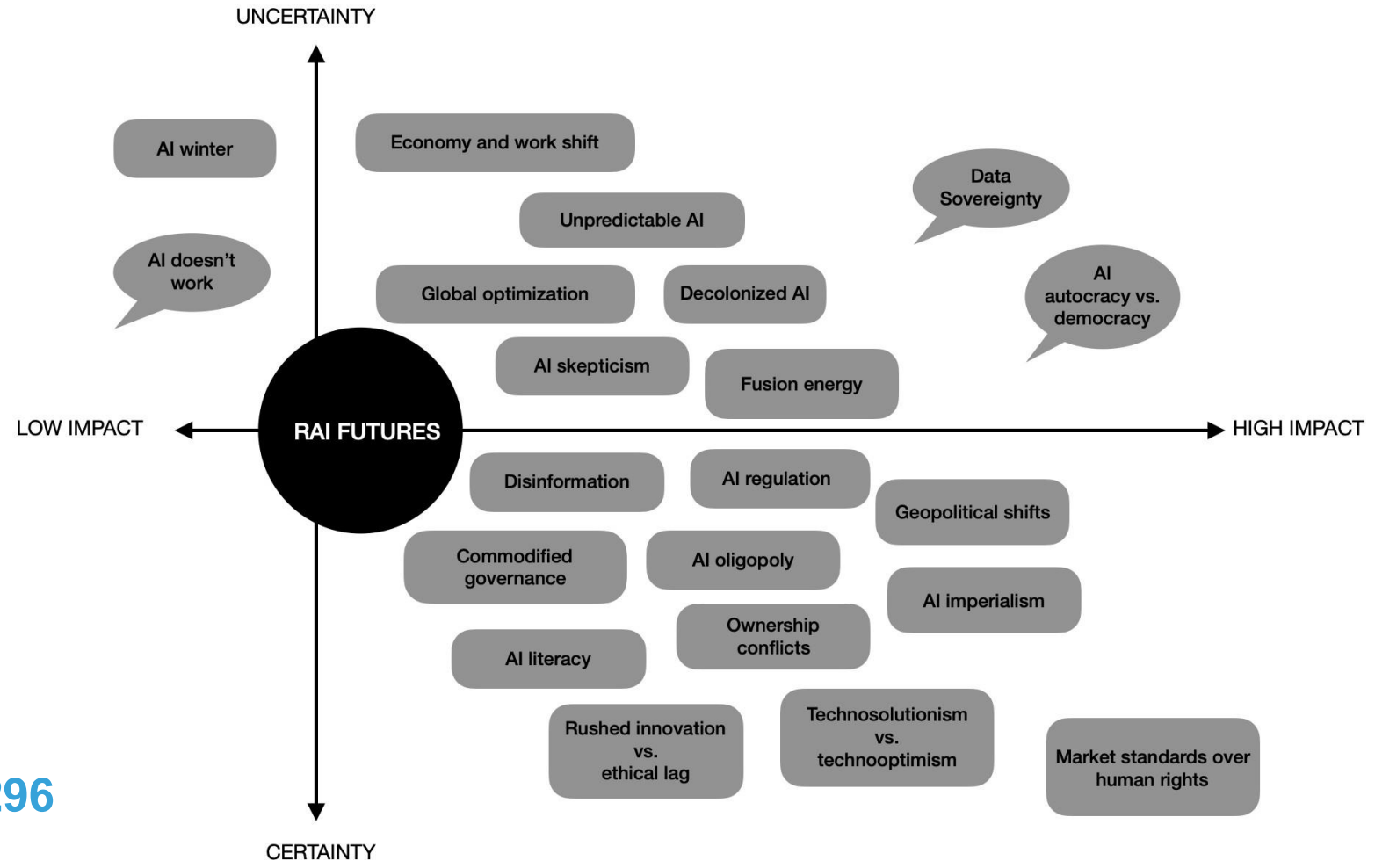
KEY RESULTS - IMPLEMENTATION-READY STRATEGIC FORESIGHT



NGI ENRICHERS TRANSATLANTIC

Feher et al. (2025) Minds and Machines

KEY RESULTS - CONSENSUS MAP OF RAI FUTURES



NGI ENRICHERS TRANSATLANTIC

Feher et al. (2025) Minds and Machines

KEY RESULTS - OUTPUTS

1 monograph by Routledge

4 published academic papers (D1-Q1)

- Feher, K., Vicsek, L. & Deuze, M. (2024) Modeling AI Trust for 2050: perspectives from media and info-communication experts. AI & Society
- Köves, A., Feher, K., Vicsek, L. et al. (2024) Entangled AI: artificial intelligence that serves the future. AI & Society
- Feher, K. (2024). Exploring AI media. Definitions, conceptual model, research agenda. Journal of Media Business Studies, 1–24.
- Feher, K. (2024). Minna Ruckenstein, The Feel of Algorithms. International Journal of Communication, 18, 3.

3 academic papers before publication (Q1)

- Feher, K., Mckelvey, F., Rodgers, L., Marinov, R. N. (2025): Strategic Foresight in AI Governance: The Archer Model for Responsible AI Futures
- McKelvey, Feher, K. (2025) Responsible AI Principles, Canadian Journal of Communication
- Feher, K. & Demeter, M. (2025) The Next Academic Paradigm Shift by ChatGPT Video Influencers. PNAS

2 keynotes: World Summit AI (CA & EU, 4000+ participants)

6 conference & workshop talks (1750+ participants)

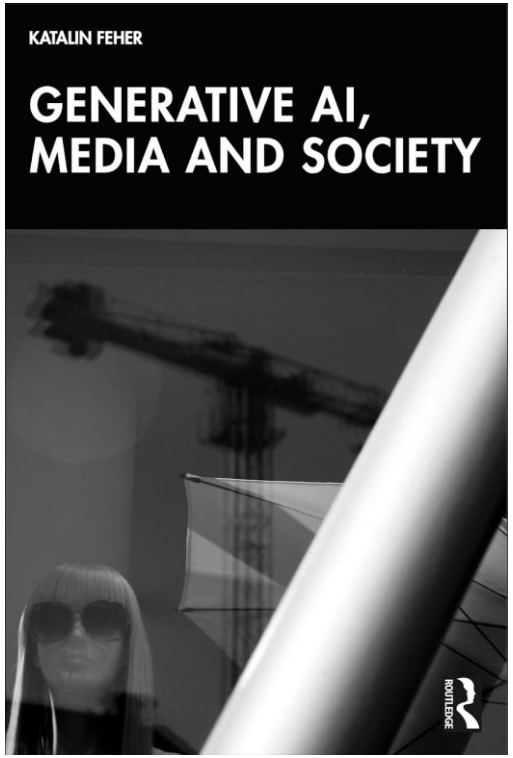
- 2 at Concordia: Interdisciplinary AI & Milieux (app 120 par[cipants)
- 2 for Hungarian diplomacy at the Science and Technology Conference in Toronto and Scien[fic Club in Montreal (app 150 par[cipants)
- 2 in Hungary: Hungarian Academy of Sciences, Digital Hungary Conference; 1 in Slovenia ECREA 2025

6 Media outputs (150 000+ social media impressions #NGI)

- Concordia interview
- 5 blog posts:medium.com (2), aimediaresearch.com (3)

1 Research Report: Concordia & NGI

3 Science communication for 3-18-year-old kids (150+, CA-HU)



Taylor & Francis ROUTLEDGE

USC

World Summit AI

Université Concordia University

MILIEUX institute for arts · culture · technology

Medium

Springer

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS - MEDIA GALLERY

Concordia

Future students Current students Alumni & friends Parents Faculty & staff Media

Applied AI Institute

ABOUT THE INSTITUTE INITIATIVES PEOPLE RESEARCH NEWS & EVENTS FR

Concordia University / Research / Applied AI Institute

Concordia's Applied AI Institute hosts AI media scholar Katalin Fehér

The professor of social communication aims to establish a knowledge hub focused on responsible artificial intelligence

April 12, 2024 | By Maya Lach-Aidelbaum

Katalin Fehér: "I love that the scope of the Applied AI Institute includes a focus on human-centric AI."

Renowned artificial intelligence media scholar Katalin Fehér is a new visiting professor at Concordia's Applied AI Institute. The recent appointment comes via the European Union's Next Generation Internet (NGI) Transatlantic Fellowship Program.

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS - UPSKILLING & NETWORKING

Conference activities during the 3 months

- MIT EmTech, Boston

- Harvard University, Leading with AI
- Stanford: California Summit on Generative AI
- United Nations AI for Good Global Summit

- Federal Congress, Montreal
- Ivado & University of Montreal: AI & Quantum, Montreal
- McGill's EduGenAI Conference, Montreal

Upskilling

- Google HQ: GenAI UpSkilling Workshop, Montreal
- MIT - Certificate on Policy for Science and Technology

UNITED NATIONS

OpenAI

McGill

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS - INDICATORS & FUNDING PLANS

Fulfilled indicators

- Improved North American-EU research collaboration
- Expanded R&I partner engagement
- Integrated social sciences perspectives

Funding

- Consortium-based EU-CA research grant (Concordia & MILA)

IMPLEMENTATION: IN THE NEXT 6 MONTHS

In progress

- Implementation Guidelines for the Davos Conference 2025
- Submitted proposals: Google & Open AI (AI VPs)
- Dissemination for industry, academia, and the public

Standard

- Exploring an ISO standard option for RAI

Validation process

- Scientific validation: global release of the book, articles
- Industrial validation: keynotes, panel discussions
- Policy validation: NATO & EU expert panels

NGI ENRICHERS TRANSATLANTIC

BONUS: UNITED NATIONS - OSPOS FOR GOOD

UNITED NATIONS HQ, NEW YORK

- OSPOs for open source and AI futures on July 9-10, 2024
- Side event organized by the Linux Foundation at Microsoft HQ, July 11, 2024
- NGI representative: Pearse.O'Donohue, NGI Director
- NGI-granted participation - thank you note





NGI ENRICHERS TRANSATLANTIC

EXPECTED IMPACT

Strategic Pillars for Transatlantic RAI Collaboration

- Aligns RAI standards for transatlantic policy coherence
- Creates foresight-driven RAI frameworks for EU-US-CA
- Promotes joint research on ethical AI governance
- Advances RAI policy with shared transatlantic guidelines
- Improves cross-border strategic foresight collaborations for RAI

LESSONS LEARNED

I wish I had known

- First visiting professor at a new institute
- Specific Interest: RAI in CA

Lessons

- First visits require time for mutual learning
- Collaborative approaches enhance long-term productivity

Katalin Feher

Associate Professor at Ludovika University of Public ServiceNGI Visiting Professor

Katalin Ferer

FEHER.KATALIN@UNI-NKE.HU

Video

(N/A)

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Robust X-HAUL Management Based on Uncertainty-Aware ML

Nicola Di Cicco
Italy

PhD Candidate at Politecnico di Milano

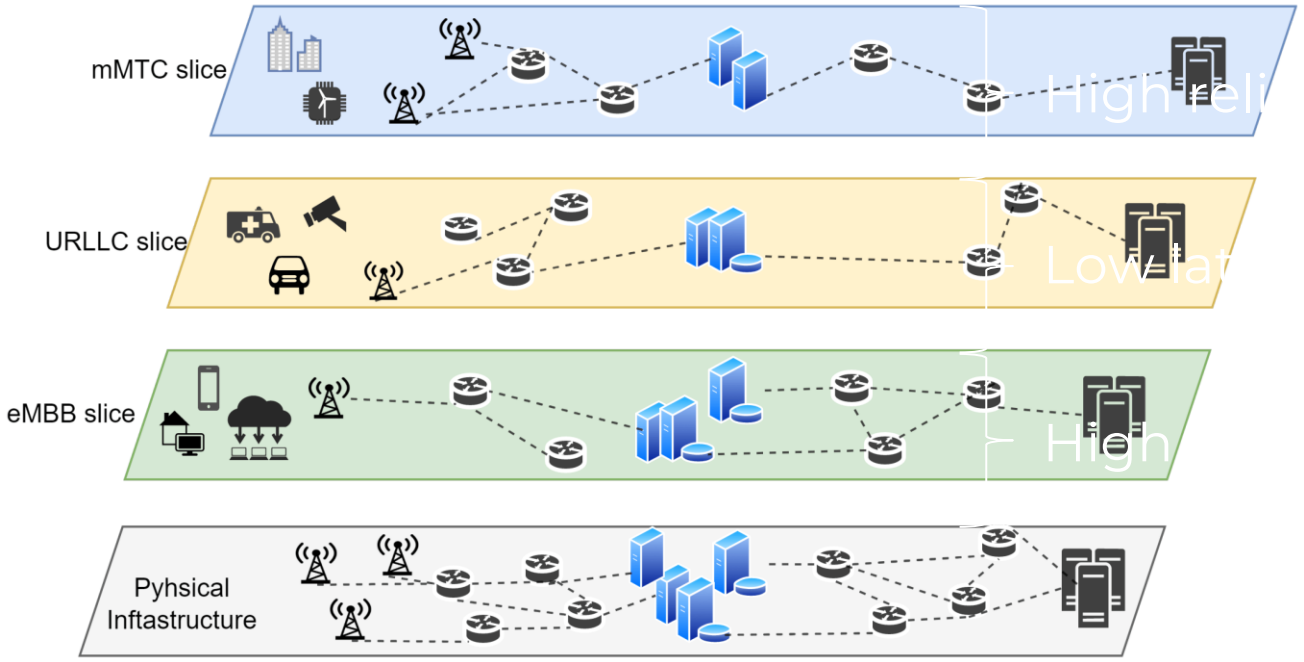
Track
AI / 5G & Network Optimisation

Host Organization
Columbia University, New York City, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (1)

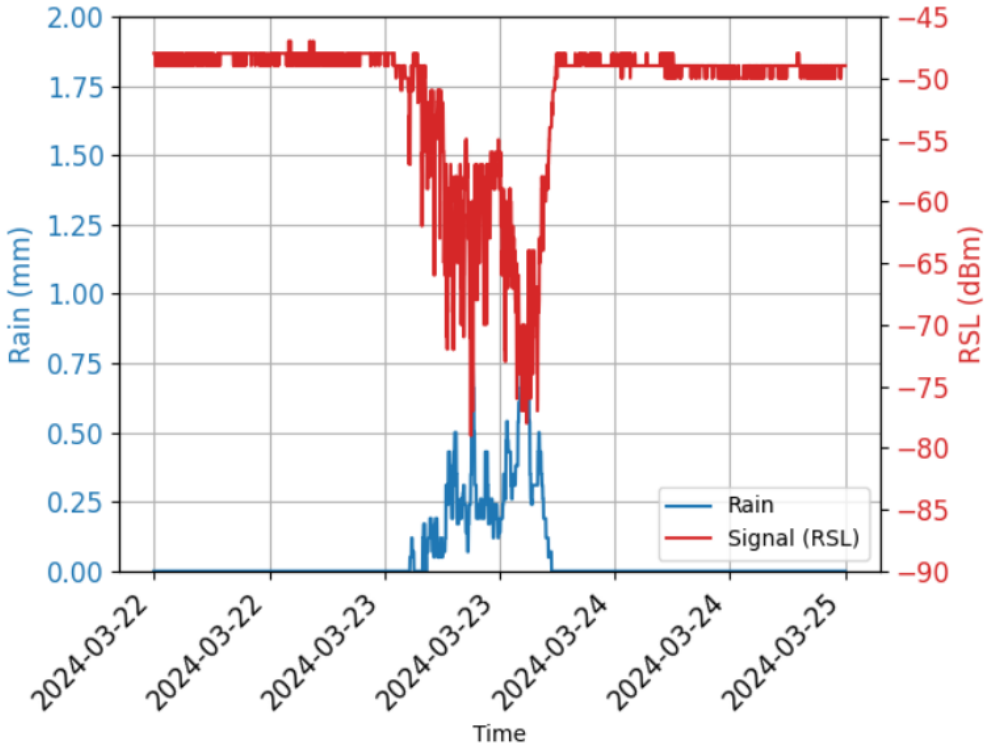
- **5G network slicing** allows network operators to lease their physical resources via service-aware virtualized networks, thus expanding customer support capabilities



THE PROBLEM (2)

- **mmWave radio links**
  sensitive to bad weather conditions, resulting in high system margins
- We want to **maximize the operator's revenue**

- **Main target audiences**
  - 5G network operators dealing with service-differentiated slicing
  - Networking research community seeking large-scale datasets
- **Current solutions and opportunities**
  SotA network slicing algorithms:
  - Do not consider variable link capacities
  - Do not attempt to exploit statistical patterns of weather events



THE SOLUTION

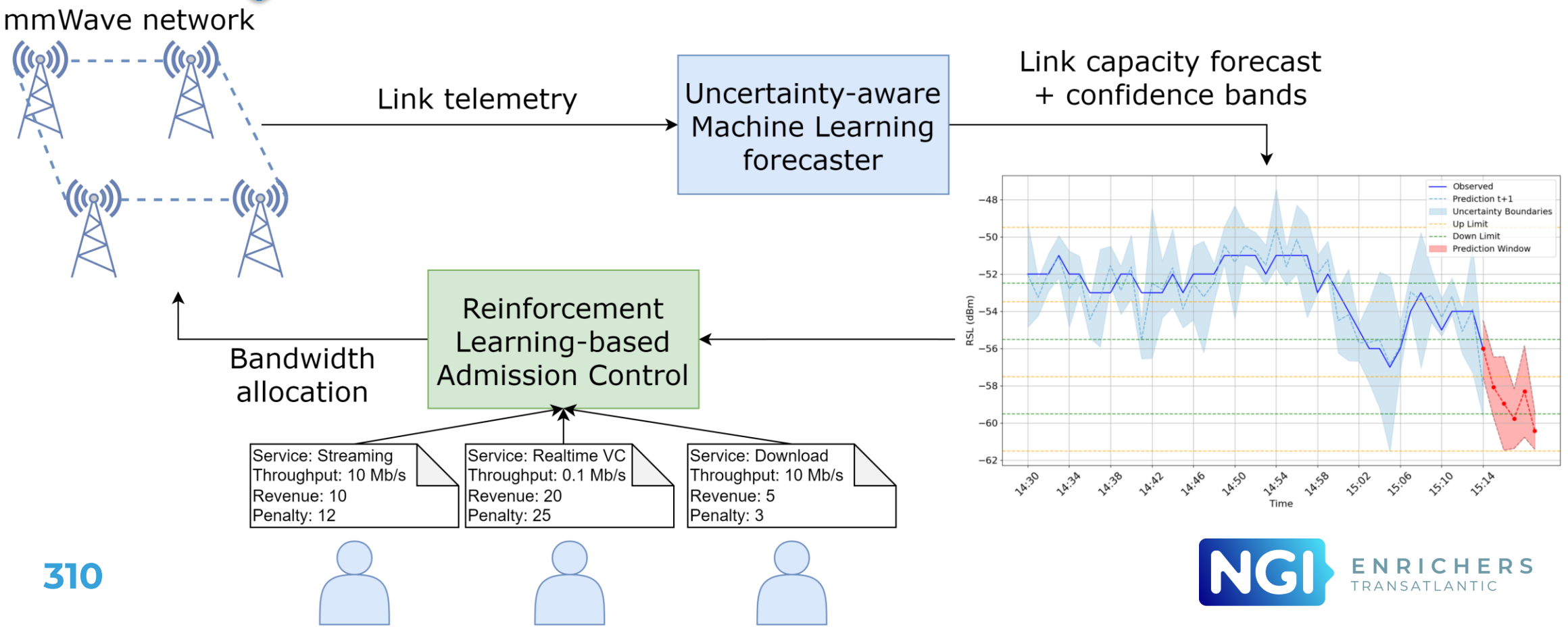
Technology – integration between Machine Learning uncertainty quantification and Reinforcement Learning

- A Machine Learning model predicts how the radio channel will evolve, providing both a prediction and an uncertainty estimation
- A Reinforcement Learning algorithm learns how to optimally allocate the network's resources in the long term given the uncertain predictions

Differentiator – current network slicing algorithms assume the channel capacity to be constant, and cannot be trivially adapted to a mmWave network

Opportunity – operators have made significant investments in 5G frequencies, including mmWave, thus solutions aiding monetization are always sought for

SYSTEM ARCHITECTURE



NGI ENRICHERS TRANSATLANTIC

NICOLA DI CICCO
PHD CANDIDATE @ POLITECNICO DI MILANO

Bio - I am an Operations Research and Machine Learning enthusiast. In my research lab @ PoliMi I am contributing to multiple research projects, including collaborations with partners from the industry

My experience with NGI

- I specialize in network optimization and data science
- My work was published in top conferences (e.g., IEEE INFOCOM) and journals (e.g., IEEE Transactions). I have one pending patent

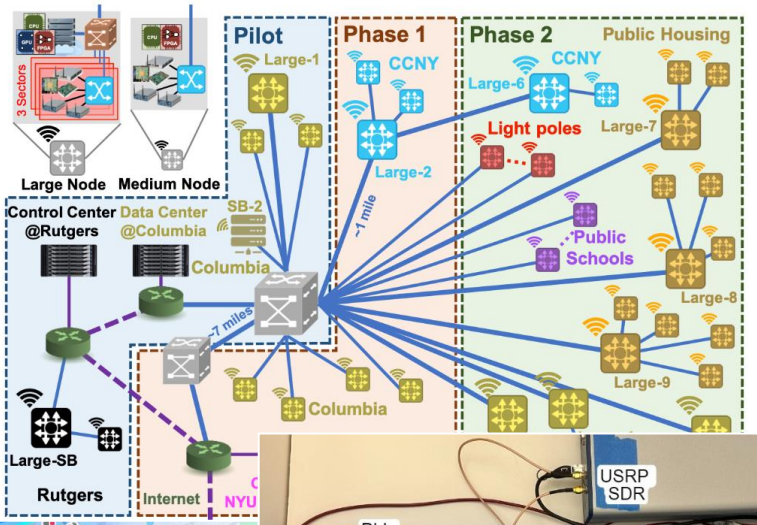
Achievements as an NGI researcher

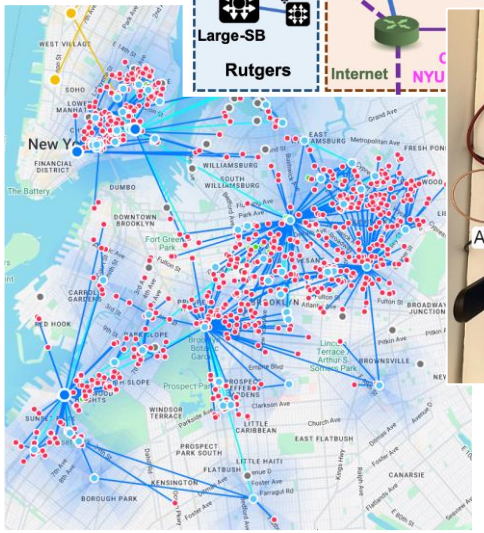
- Ph.D. fellowship (ranked 1st) in Telecomm. Eng. @ PoliMi, 2021
- Two fellowships (best student of the M.Sc. In Telecomm. Eng., 2nd best student in all of Engineering) @ UniBo, 2020-2021

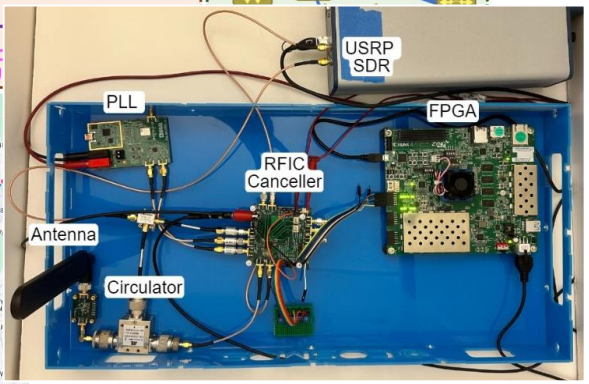
WIMNET LAB @ COLUMBIA UNIVERSITY

Center of excellence in wireless networks research

- **PAWR COSMOS X-Haul Testbed**
  - City-scale integrated fiber-wireless testbed
- **Full-Duplex Radios**
  - Full-stack: from design to fabrication
- **Collaboration with New York City Mesh**
  - Real-time monitoring of mmWave links







NGI ENRICHERS TRANSATLANTIC

THE TEAM

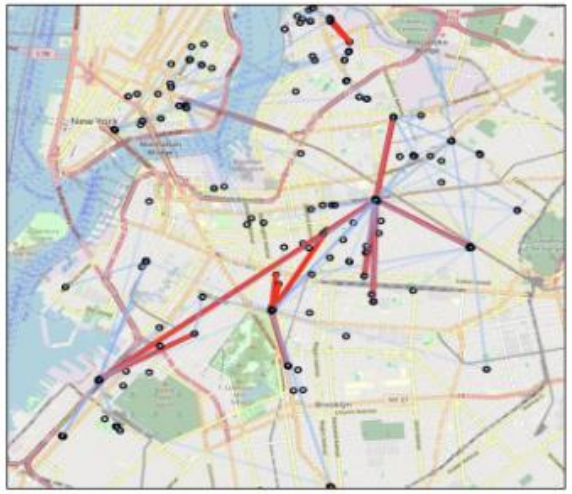
Our team comprises professors and young scientists from top institutions, covering a broad spectrum of technical and project management skills

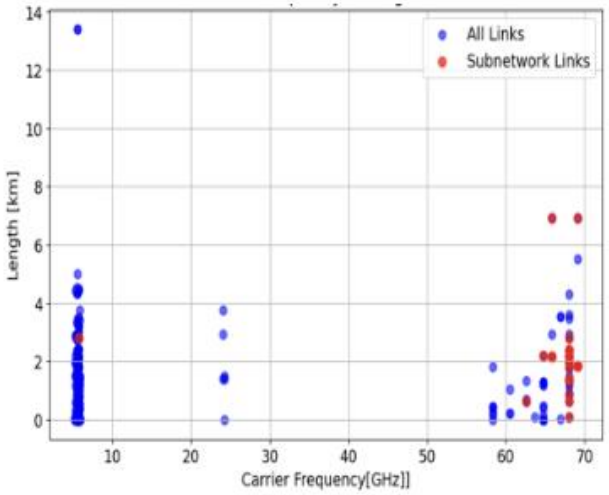
- **Gil Zussman – Full Prof. @ Columbia University, IEEE Fellow** for “For contributions to the design of wireless network systems.” Co-principal investigator of COSMOS , a city-scale wireless network testbed in the upper Manhattan area.
- **Igor Kadota – Assistant Prof. @ Northwestern University.** Expert in wireless network optimization, algorithm design, and information theory
- **Dror Jacoby – PhD Student @ Tel Aviv University.** Expert in Machine Learning, time-series forecasting and wireless channel modeling
- **Shuyue Yu – PhD Student @ Columbia University.** Expert in network measurement, internet data analysis, and design of network algorithms

LARGE-SCALE MEASUREMENT CAMPAIGN

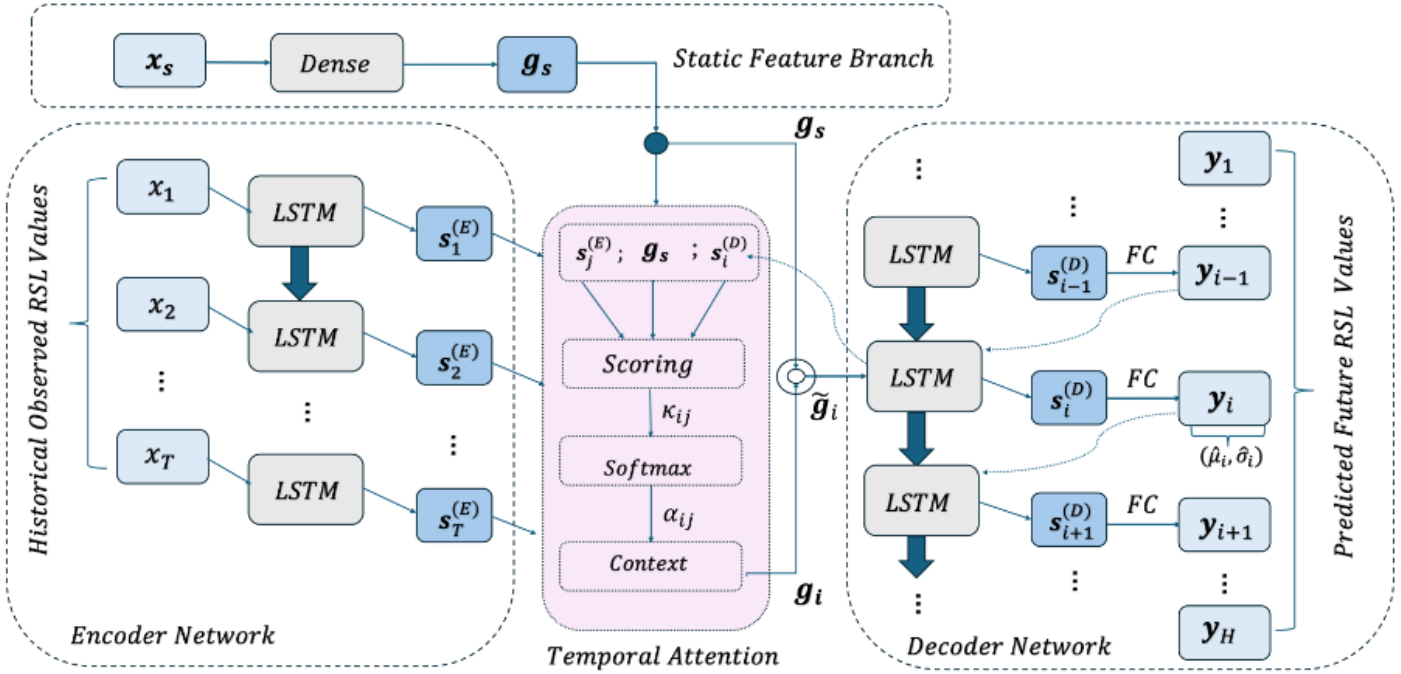
- **Link telemetry data** from Apr. 2023 and currently ongoing, comprising multiple weather events, e.g., rain, snow, and sleet
- **Network traffic data** comprising 520 residential units and multiple differentiated services (video streaming, teleconference, file download, …)

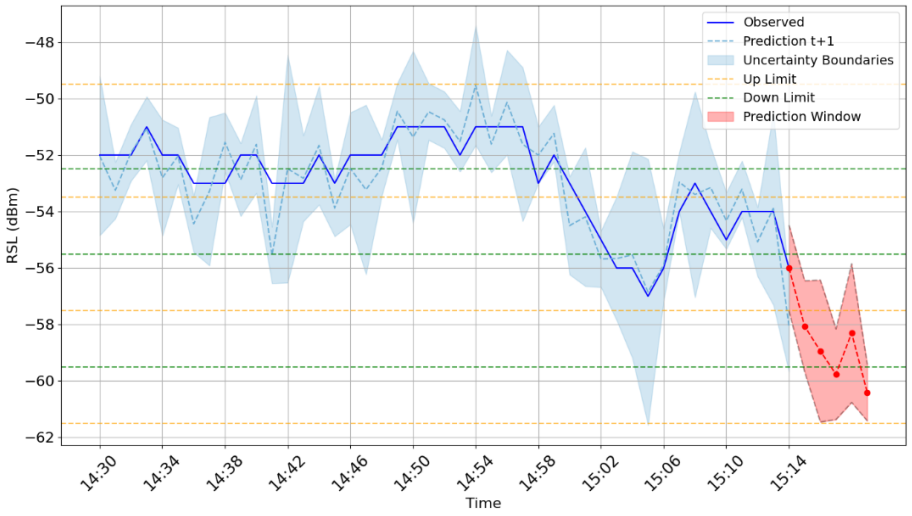
- **We will make our data open once our submitted papers (joint EU and US authorship) are accepted for publication**





UNCERTAINTY-AWARE CHANNEL FORECASTING

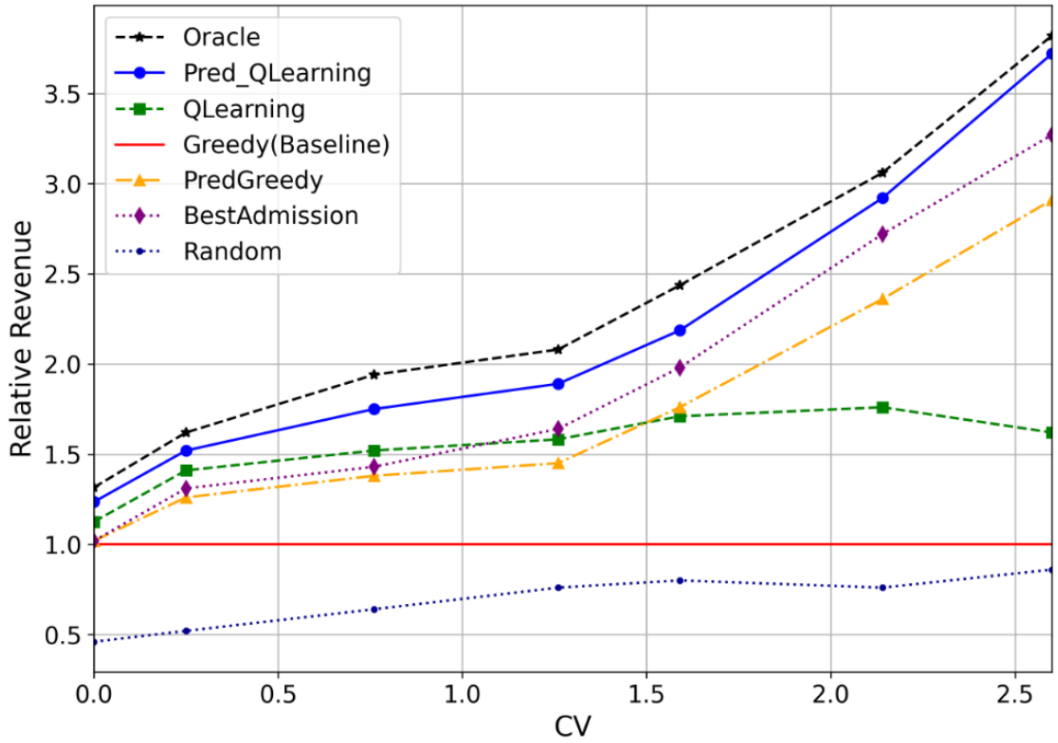




NGI ENRICHERS TRANSATLANTIC

PERFORMANCE EVALUATION

- e.g., Baselined Slice Revenue vs. Coefficient of Variation (CV) of the links' throughput
- **Pred_QLearning** outperforms the baseline by **up to 3.5x** when the link is highly unstable
  - i.e., our algorithm can model and take advantage of the channel dynamics
- **Our solution closely approaches the theoretically highest achievable revenue**



IMPLEMENTATION – NEXT 6-MONTH STEPS

- **Months 1-2:**
  - e.g., as an Open-RAN xApp running in the Real-Time RIC
- **Months 2-4:**
  - e.g., capturing transient congestion, end-to-end service latency, application-level throughput, etc.
- **Months 4-6:**
  - e.g., joint admission control, (re-)routing and spectrum assignment in mixed fiber-wireless X-Haul networks

EXPECTED IMPACT

- **Uncertainty-aware Machine Learning.** We quantitatively demonstrated that uncertainty quantification in Machine Learning (i.e., “knowing what you don’t know”) is necessary for informed decision-making. We expect this to become a hot topic in the near future, as the topic of reliable AI becomes more central.
- **Openness.** The data we collected to support this research will be made public. To the best of our knowledge, these are the first publicly available datasets of their kind. We hope the research community at large will find them useful
- **User’s Experience.** Our solution makes use of advanced Machine Learning algorithms to ultimately improve the Quality-of-Service provided to the user. We expect to see similar applications of ML/AI in next-generation networks

LESSONS LEARNED

- Six months seem a lot of time for a project… but they are not!
- Ideas are cheap; commitment and execution are what matters
  - Technical challenges might not be completely predictable
  - In a data-driven project, real data may contradict expectations
- … finding housing in the US was almost as difficult as the project!

- Some lessons learned…
  - Time flies: have a workflow that allows you to iterate fast your ideas
  - In the face of ambiguity, commit and push on what you think is sound…
  - … but don’t feel too attached – be ready to pivot when things do not work

Nicola Di Cicco

PhD Candidate at Politecnico di Milano

Nicola Di Cicco

nicola.dicicco@polimi.it

Video

Nicola Di Cicco

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

Secure, Privacy-Aware, Low-Code Platform for XR Content Creation and Publishing

Soumya Kanti Datta
Inde

CEO of Digiotouch

Track
XR / Cybersecurity
Host Organization
Arizona State University, Arizona, USA

321

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

- **The problem**
  - High cost of XR app and content development
    - Typically consumes 6+ months
    - Requires highly specialized skills and software licenses
    - Return on investment not guaranteed
  - Current app development platforms are not security, privacy aware
- It prevents XR ecosystem from being mainstream.

- **Target Audience**
  - Primary
    - XR app developers
    - XR technology, platform developers
    - Innovators, entrepreneurs
    - Investor & VC
  - Secondary
    - End-users (public/private businesses, Govt., Individuals)
    - Data owners

- **Competitors**
  - Start-ups like https://xr.plus/ and https://immersiveweb.dev/
    - But such platforms lack security, privacy, and cost of dev remains high as a result.
- **Differentiators**
  - Cybersecurity natively built
  - Strong focus on data privacy and trust

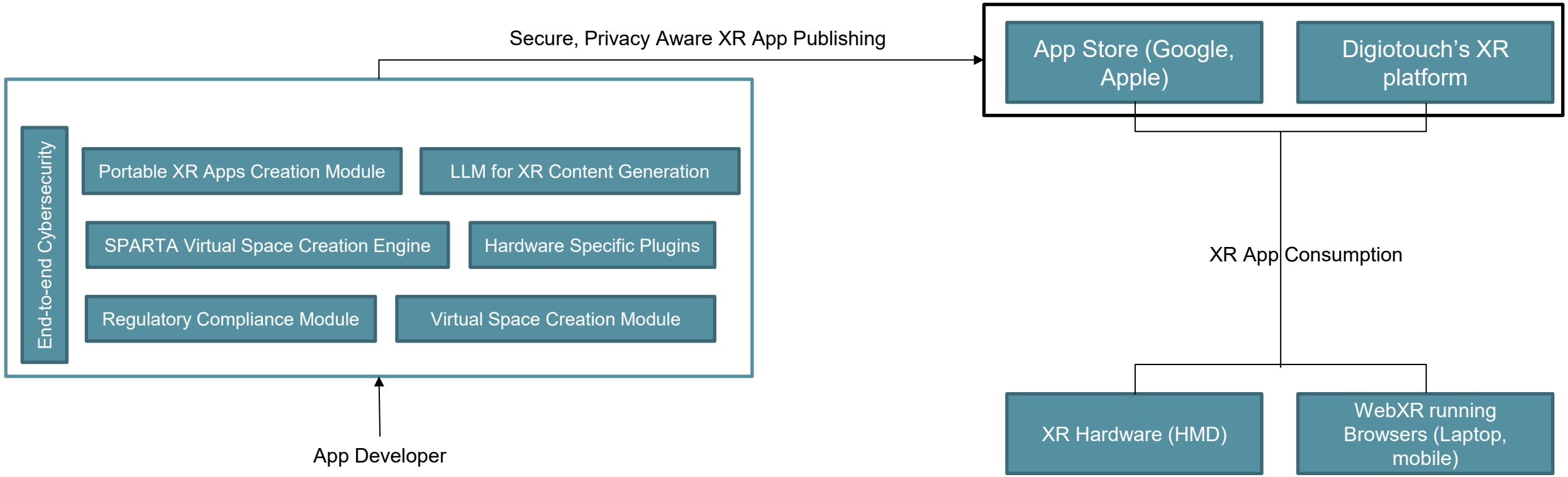
NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (1)

- **Technology**
  - Low-code platform allowing development of virtual spaces within days.
  - Built using WebXR, an industry standard ensuring interoperability with XR devices and ecosystems.
  - Platform compliant with European regulations like GDPR for data privacy.
  - End-to-end cybersecurity for the resulting XR app.

- **Further development**
  - Cybersecurity, privacy assessment and implementation
  - Stronger integration of popular engines – Unity, Unreal, Ethereal.
  - Evolve into a no-code platform.
  - Support Web, iOS, and Android XR app development
  - Personalised, full-body avatar development for XR games.

YOUR SOLUTION (2)



NGI ENRICHERS TRANSATLANTIC

SOUMYA KANTI DATTA, CEO DIGIOTOUCH

12+ years of experience in AI, Cloud, and XR

4M+ € raised

Currently leading 2 H2020 and 7 HE projects in Digiotouch around Dataspaces, trustworthy AI, Blockchain standardisation

Received 4 IEEE awards for technical innovations on IoT

IEEE Senior Member

THE TEAM / EXPERTISE

- **Debolina Paul** – COO of Digiotouch; Resp. for biz dev in Europe; MBA in Marketing and Project Management from France; 5+ years of international experience; Previously at Amadeus, Salomon
- **Harshal Parekh** – Full-stack soft dev with XR expertise; MS from Carnegie Mellon Univ; 5+ years of international exp; Previously worked at Visa.
- **Ken Pope** – Start-up mentor; 50+ years of international exp; Currently assisting Digiotouch with private investment raising in Europe.
- Host Organisation – Dragan Boscovic, ASU, USA (dragan.boscovic@asu.edu)

HOST ORGANIZATION – ARIZONA STATE UNIVERSITY

Host – Prof. Dragan Boscovic, Department of Information Systems and director of Arizona State University's Blockchain Research Lab.

Recognized for his expertise in digital asset management, consensus protocols, and trustless information systems, with a focus on distributed information system performance evaluation. He excels in developing strategies and driving growth, investments, and innovation in areas like digital twins, tokenomics, and ML/AI and IoT solutions.

His background includes nearly 20 years as a research executive at Motorola. Boscovic has secured 24 patents.

KEY RESULTS (1)

- Public release of upPE-T VR app, which integrates the cybersecurity, privacy principles.
  - Extension is being planned with the LLM powered contents.
- Validated the architecture
- Showed it as a part of a Trade Mission – SelectUSA 2024.
  - Soumya was a part of the official French Delegation traveling to the USA. It was organized by the USA Embassy in Paris, France.

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (2)

- Strengthening research collaboration with the US/Canada – ASU and Univ of Victoria, British Columbia.
- Building solid connections and partnerships in Europe and in the US/Canada – at-least 50 new connections for potential partnership
- Accelerated contacts/engagements with investors, VCs – engaged with 3 VCs in SelectUSA 2024.
- Accelerated contacts/engagements with R&D partners for future collaborations – Currently in discussion with ASU accelerators
- Accelerated business partnerships for developed technologies/solutions – potential discussion with a few accelerators for business partnerships (target topic – XR for customer engagement)

KEY RESULTS (3)

Fundraising grants - ~700K Euros in Europe (Estonia and France)

- Expanding collaboration within the NGI community – Currently exploring
- Technical integration of developed methods into upPE-T VR
- Paper submission for further publication – under preparation for EUCNC 2024
- Startup establishment – US Expansion is being considered, to be pursued after VC fund raising.

IMPLEMENTATION

Timeline – next 12-18 months

- **Working on a Go-To Market Strategy**
- **Preparing for fund raising from private sources (VCs/PEs)**
- **To be followed by a pricing strategy implementation and hiring developers (AI and XR)**

EXPECTED IMPACT

Technology sovereignty

- **Cybersecurity and data privacy for XR**
- **Access to LLMs for XR content creation**

New business and revenue stream for Digiotouch

LESSONS LEARNED

Execution at-speed is a must

Fundraising insights from entrepreneurs who shifted from Europe to the USA

Choice of a state for incorporation matters

IP licensing is crucial and must be dealt with right from the beginning of USA subsidiary/HQ creation

Soumya Kanti Datta

CEO of Digiotouch

Soumya Kanti Datta

soumya@digiotouch.com

Video

(N/A)

334

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

SplendoHealth – Redefining Cardiorespiratory Fitness Testing with an Innovative Assessment Software Platform

Tessa Wagenaar
Netherlands

Machine Learning ResearcherData Scientist at SplendoHealth

Track
HealthTech / AI
Host Organization
Temple University, Philadelphia, Pennsylvania, USA
335

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Traditional Healthcare CRF Assessments

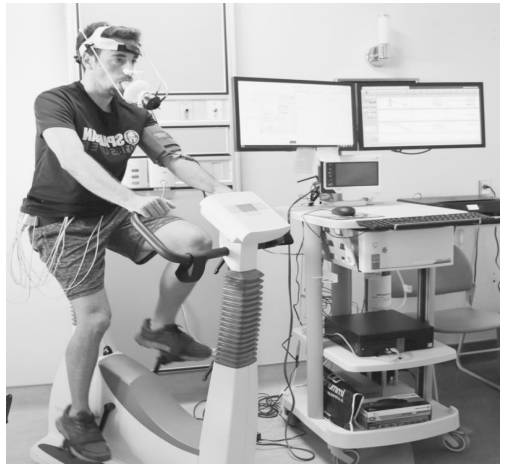
Cardiopulmonary Exercise Test (CPET)

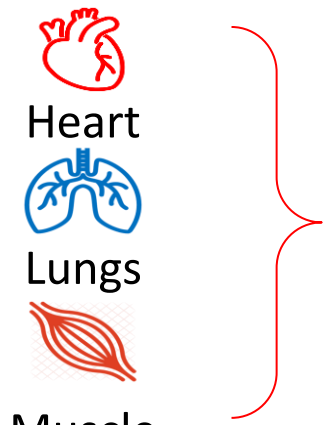
- Dedicated lab/hospital setting
- Dedicated trained technicians
- Time (travel + assessment/person = 2+ hours)

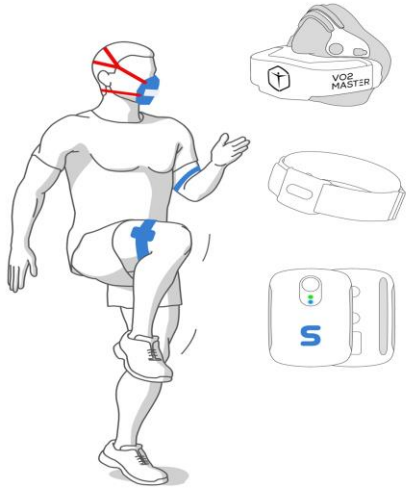
Or non-quantifiable data by using questionnaires

YOUR SOLUTION - Validated SaaS Platform

SplendoHealth is a validated SaaS platform that leverages select wearable tech to make Cardiorespiratory Fitness/VO2 max assessments affordable & accessible.







Published validation study:

Molinger, J, Kittipibul, V, Gray, J. et al. Feasibility of a Novel Augmented 6-Minute Incremental Step Test: A Simplified Cardiorespiratory Fitness Assessment Tool. JACC Adv. 2024 Aug, 3 (8) . https://doi.org/10.1016/j.jacadv.2024.101079

YOUR SOLUTION - SplendoHealth Assessments

SplendoHealth is a validated SaaS platform that leverages select wearable tech to make Cardiorespiratory Fitness/VO2 max assessments affordable & accessible.

Six-Minute Incremental Step Test (6MIST)

Heart

Lungs

Muscle

One-Minute All Out Airbike Test (1MAO)

Duke University School of Medicine

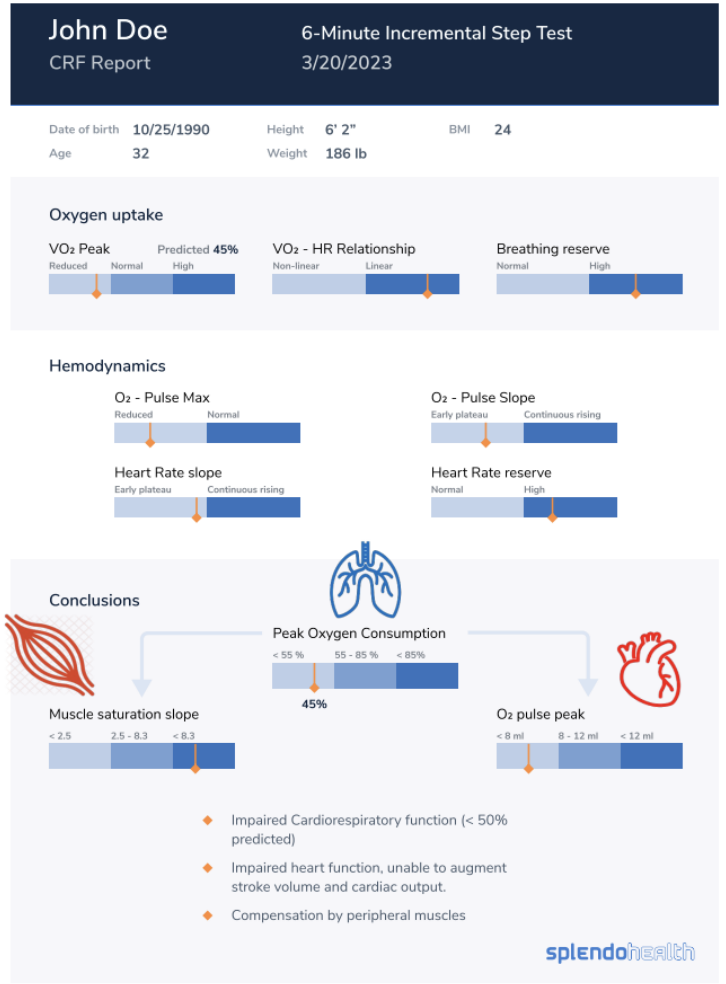
UFC PERFORMANCE INSTITUTE

YOUR SOLUTION - Competitive Advantage

Splendo Health will create the world's largest CRF dataset by translating physiological strengths & limitations of an individual's heart, lungs & muscle.

Data that drives actionable metrics for:

- Clinical risk stratification
- Longevity
- Lifestyle optimisation
- Performance optimisation



MY PROFILE: Tessa Wagenaar, ML Researcher

About me:

Tessa Wagenaar MSc, Artificial intelligence
Data Scientist at Splendo since 2021

Experience and achievements:

- VASCOVID
  - Already 4 publications in collaboration with Parc Tauli, ICFO and Polimi
- HeartAssess
  - Collaboration with RadboudUMC
- Master's Thesis at Dutch Cancer Institute (NKI)
- Selected for Roche Continents 2018 (100 top talented students)
- VHTO

NGI ENRICHERS TRANSATLANTIC

THE TEAM / EXPERTISE

Leadership Team

Luc Demarteau CEO
Over 20 years experience in developing cutting edge technologies for several industries.

Jeroen Molinger CSO
Over 20 years experience in clinical physiology & research.

Tijl Houtbeckers CTO
Over 20 years experience in software architecture and development, including mobile apps and scalable cloud systems.

Joost van Sandick CPO
Experience in product development and design for several startups and new product initiatives.

Medical Advisory Board

Marat Fudim
Advanced Heart Failure Specialist & Cardiologist at Duke University.

David Macleod
Director of Human Pharmacology and Physiology Lab at Duke University.

John Whittle
Perioperative care & Anesthesiology at University College London.

NGI ENRICHERS TRANSATLANTIC

YOUR HOST ORGANIZATION

Temple University

- ENRICH in the USA
- Temple SBDC
- Temple Health

ENRICH
EUROPEAN NETWORK OF RESEARCH AND INNOVATION CENTRES AND HUBS, USA

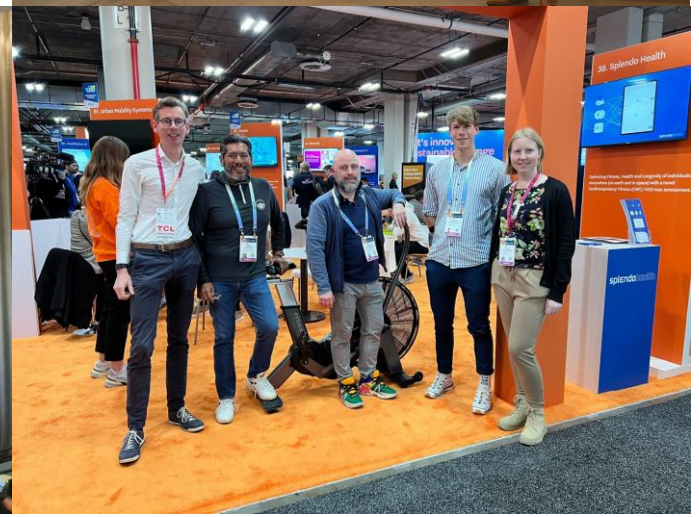
SBDC
PENNSYLVANIA
Small Business Development Center
Temple University
Helping businesses start, grow, and prosper.

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (1)

Technology Demonstrations & Development

- Demonstration at the Temple I-Nest
- CES 2024
- Soft Launch Q1 2024
- FBI-HRT technology demonstration



KEY RESULTS (2)

Grants & Market Research

- Regional NSF I-Corps Propelus program
  - Interviewed 15 potential customers
  - Test product hypotheses
- Pitching competitions:
  - Attended Mid-Atlantic Diamond Ventures
  - Won Silicon Valley Funding Summit pitching competition
  - Pitched on stage at CES 2024
  - Humans in Space pitching finalist

KEY RESULTS (3)

Building relationships & Collaboration in the US

- Get in contact with new VCs, Angel Investors and Customers
  - Jean Luc Blakborn (Maximum Ventures) -> reseller
  - Assault fitness -> Hardware partner
  - Customer relations (DoD, FirstHealth and others)
  - Research contacts, Brian Schilling (UNLV)
- Collaboration with Temple University
  - Applied for Innowwide grant Call 3

What is next

Next steps

- Setting up reseller agreement
- Onboarding new customers
- Apply for FDA 510k approval
- Ongoing development of the platform
  - Guided by interviews from I-Corps program
  - Metabolic Profile reporting

EXPECTED IMPACT

Health Equity

- Democratizing CRF assessments
- Shorter testing time
- Better user experience for doctors and patients
- Personalized care

Tessa Wagenaar

Machine Learning ResearcherData Scientist at SplendoHealth

Tessa Wagenaar

tessa@splendo.com

Video

(N/A)

348

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.

FINQUP – AI-Driven Automation for Financial Services

Dime Galapchev
North Macedonia

CEO & CTO, FinqUPAI engineer and entrepreneur

Track
AI / Business Automation / Fintech

Host Organization
Temple University, Philadelphia, Pennsylvania, USA

349

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

The AI Implementation Gap

Businesses struggle to adopt meaningful AI-driven automation due to:

- **Fragmented Tools:** AI solutions work in silos, lacking integration across departments.
- **Decision Paralysis:** Too many tools, no clear path to ROI-focused automation.
- **Missing Ecosystem:** No unified platform connecting business needs with tailored, scalable AI solutions.

TARGET AUDIENCES

1) **Asset Management Firms**
   Needing streamlined onboarding, compliance, and portfolio reporting
2) **Insurance Companies**
   Managing high volumes of claims and customer service with legacy systems
3) **Transportation & Logistics Providers**
   Looking to optimize fleet operations, dispatch, and support channels
4) I**ndustry Verticals (Cross-Sector)**
   Any organization aiming to automate workflows and reduce manual processes

FINQUP SOLUTION (1)

Core Technology Architecture: Finqup leverages a modular dual-engine architecture:

- **Medium Engines (Input/Output):** Handle voice, document, API, chat, email, SMS, video, and image processing
- **Tinker Engines (Analysis):** Provide conversation analysis, financial reporting, claims processing, fraud detection, knowledge management, and decision support

Competitive Advantages:

1. **Marketplace + Factory Model:** Unlike traditional software vendors, we offer both ready-to-deploy solutions and custom development capability
2. **Department-First Design:** Focus on creating complete AI departments rather than individual tools
3. **Interconnected Architecture:** Our engines communicate seamlessly to create true digital offices
4. **Co-Development Model:** Risk-sharing approach that validates market fit while distributing development costs
5. **Industry-Specific Solutions:** Pre-built department solutions for Asset Management, Insurance, Transportation, Logistics, and Recruitment

FINQUP SOLUTION (2)

FINQUP AI Ecosystem Architecture

1. **Input Layer** gathers data from Voice, Docs, APIs, and Chat.
2. **Processing Layer** includes analysis, decision, knowledge, and compliance engines.
3. **Output Layer** delivers department solutions like customer service and onboarding.
4. **Integration Layer** creates an interconnected AI digital office for automation.
5. **Ecosystem** connects users, marketplace, pioneers, and engineers for collaboration.

Dime Galapcev, CEO FINQUP

Bio and Achievements: Dime Galapchev combines extensive experience as a network and AI engineer with proven business leadership in the fintech and insurtech sectors. His technical expertise spans voice technology, natural language processing, and secure integration frameworks, while his business acumen has led to significant achievements in AI automation for financial services.

Key Accomplishments:

- Successfully led FinqUP's transformation from European insurance AI platform to global business automation infrastructure
- Developed proprietary Medium and Tinker engine architecture enabling seamless AI department integration
- Established strategic partnerships with major technology providers and academic institutions
- Created the industry's first systematic approach to building interconnected AI digital offices

THE TEAM /EXPERTISE

Core Team:

- **Dime Galapchev** – CEO & CTO AI engeneer
- **Igor Madzov** – Co-founder & Chief Innovation Officer 15 years in building High Growth Startups and one exit
- **Toni Peshev** - CFO 15 years experience in Acounting and Finance
- **Martina Naumovska** - VP of Engineering with 10 years managing scalable tech teams
- **Osler Hudson** - Head of Growth 8 years Sales of Financial and Insure tech products in US and EU
- **Development team** 6 developers, 1 Designer, 1 Project and 1 Account Manager

Strategic Advisors:

- **Klime Popovski – Insurance Expert Vienna Insurance Group, VP EERIA**
- **Boban Popevski – Compliance Expert, Financial Regulator, Illinois**
- **Suzana Tunteva – Investment Expert Founder of Fakturtrust (SEE)**
- **Ethan Mayers – Serial Entrepreneur and Tech expert , US Market Strategy**

YOUR HOST ORGANIZATION

HOST Organization Temple University Department: Risk Management and Insurance

Academic research collaboration and US market validation Experience: Temple University's Risk Management program provided crucial insights into US insurance industry requirements and regulatory landscape.

Impact:

- Supported positioning for Des Moines Insurtech Accelerator
- Built case for establishing a US sales presence and pilot partnerships
- Provided credibility with academic and regulatory partners in Iowa and Philadelphia

KEY RESULTS (1)

Development/Advancement of Innovative Technologies:

Technology Readiness Level Advancement:

- Advanced our Medium and Tinker engine architecture from TRL 6 (technology demonstrated) to TRL 8 (system complete and qualified)
- Developed US-specific conversation flows and compliance modules
- Created demonstration environment specifically optimized for US insurance use cases

Testing Technologies (Demo/Pilot):

- Successfully conducted live demonstrations for 5 US insurance carriers
- Implemented pilot testing environment with 2 mid-size insurance providers
- Validated cross-system integration capabilities with major US insurance platforms
- Demonstrated 90% cost reduction potential through comprehensive automation

Testing Technologies on the US Market:

- Engaged directly with 8 potential insurance clients across property & casualty, health, and life insurance verticals
- Conducted market validation sessions with 3 insurance brokerages
- Received positive validation from Holmes Murphy Global Insurtech Accelerator
- Confirmed product-market fit for US insurance automation needs

KEY RESULTS (2)

Strengthening Innovation Collaboration with the US:

- Established formal partnership framework with Temple University Risk Management program
- Initiated joint research project on AI implementation in insurance operations
- Created ongoing collaboration model for EU-US academic partnerships
- Developed shared intellectual property framework for future innovations

Building Solid Connections and Partnerships:

- Established relationships with 5 key insurance industry stakeholders in Philadelphia region
- Connected with 3 technology integration partners for US market entry
- Joined Philadelphia insurance innovation ecosystem through multiple networking events
- Created strategic partnership pipeline with 7 potential distribution partners

Accelerated Contacts/Engagements with Investors:

- Engaged with 4 US-based VC firms specializing in insurtech and AI automation
- Received initial interest from 2 funds for potential seed round participation
- Developed US-focused investment materials highlighting market opportunity
- Established connections with angel investors through Temple University network

KEY RESULTS (3)

Accelerated Business Partnerships:

- Initiated integration discussions with 3 major US insurance technology platforms
- Established pilot program framework with 2 insurance carriers
- Created partnership model for co-development with US companies
- Developed channel strategy leveraging established insurance technology distributors

Reinforced Integration of Social Sciences and Humanities:

- Incorporated behavioral analysis components into AI conversation systems
- Developed cultural adaptation frameworks for cross-cultural insurance interactions
- Enhanced user experience design based on American customer service expectations
- Integrated ethical AI principles into all US market development activities

IMPLEMENTATION

Months 1–2

- Launch pilots with 2 US insurance partners
- Finalize integrations & set up Philly operations

Months 2–3

- Activate sales with 8 prospects
- Sign 3 tech partners & begin US hiring

Months 3–4

- Optimize AI based on pilot feedback
- Expand into health & P&C verticals
  Enhance compliance per state laws

Months 4–6

- Launch US marketing & prep Series A
- Build scalable support & success teams

Partnerships & Expansion

- Deepen Temple collaboration
- Sign distribution & co-dev deals

- Enter NY, Boston & start West Coast setup

EXPECTED IMPACT

Finqup empowers businesses with fully autonomous AI departments that reduce reliance on third-party vendors and enhance control through customizable, self-managing systems. Built with privacy-by-design principles, our architecture ensures complete data sovereignty and secure, encrypted communication across departments. By connecting previously siloed digital tools, we enable true digital transformation—not just digitization—while our support for over 145 languages and cultural adaptation fosters inclusion and accessibility across global markets.

Our Medium and Tinker engine architecture is built for interoperability, integrating seamlessly with any existing tech stack while upholding enterprise-grade security and regulatory transparency. Each AI decision is explainable and auditable, ensuring clarity and trust in automation. Fabrica's automation boosts sustainability by eliminating redundant processes and reducing energy use, all while improving user experience through intuitive interfaces. By automating the routine, we free human talent to engage in high-value, creative, and socially meaningful work—ensuring technology elevates human potential, not replaces it.

LESSONS LEARNED

What We Learned

- *Regulatory complexity* in the US varies by state—future expansion needs dedicated compliance research early.
- *Academic partnerships* build trust but require long lead times—start 6+ months ahead.
- *Business dev needs focus*—balancing tech and growth requires dedicated resources.

Positive Surprises

- Strong *market interest* in full AI automation validated our integrated approach.
- Our *European AI tech* adapted well to US needs—proof of scalable architecture.
- Cultural immersion boosted our understanding of US *communication and business norms*.

Dime Galapchev

CEO & CTO, FinqUPAI engineer and entrepreneur

Dime Galapchev

Galapchev@ffinqup.com

(N/A)

www.ffinqup.com / Profile

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

The NGI Enrichers project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement 101070125.