NEXT GENERATION INTERNET

SUCCESS STORY BOOK

Part #3

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

Chiara Masiero Sgrinzatto – Italy - Speculative Design and Participatory AI for Human-Centric Futures

Emilio Paolini – Italy - Adaptive Edge-AI Deployment in NextG Wireless Networks

Guillem López-Paradís – Spain - Data Center Hyperloop (DHL)

Matt Murtagh – Ireland - End-to-End FAIR AI for Global Development: Human-Centered Interfaces, Multilingual Datasets, and Policy-Aligned Models

Nuria Pastor Hernández – Spain - Vitalera – AI-Powered Remote Health Monitoring for Chronic Care

2023 NGI ENRICHERS

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

René Krikke – Netherlands - PRIDE – Privacy, Resilience & Integrations for Decentralized Ecosystems

Zoran Nasteski – North Macedonia - Decentralized Identity & Digital Trust for Human-Centric Internet for Decentralized Ecosystems

Gabriele Sacco – Italy - EXCEPTIONAL AI – Reasoning with Exceptions

Maurizio Ferrari Dacrema – Italy - MLQCG – Machine Learning for Quantum Circuit Generation

Robert Heinecke - Data-driven environmental resilience

Mustafa Ergen - LlmIT – Telco LLM in Edge Networks

Speculative Design and Participatory AI for Human-Centric Futures

Chiara Masiero Sgrinzatto
Italy

PhD Student in Design Sciences

Track
Design Futures / Responsible AI / Society

Host Organization
Georgia Institute of Technology, Atlanta, Georgia, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (1.1)

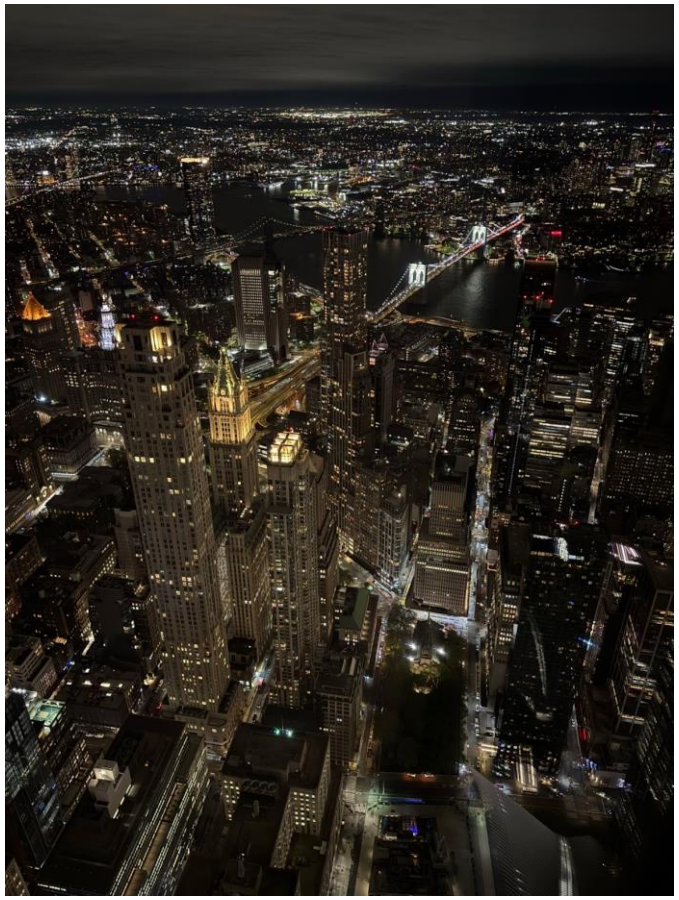
Today, panoramas' artists are experimenting with generative AI to solve geometric and mathematical problems in drawing interesting 360° immersive representations of spaces. Today, around 2,000 panoramas' artists are experimenting solutions for drawing by using generative AI. Moreover, the International Panorama Council (IPC) counts around 400 researchers and scholars who are also investigating and supporting the advancement in the sector.

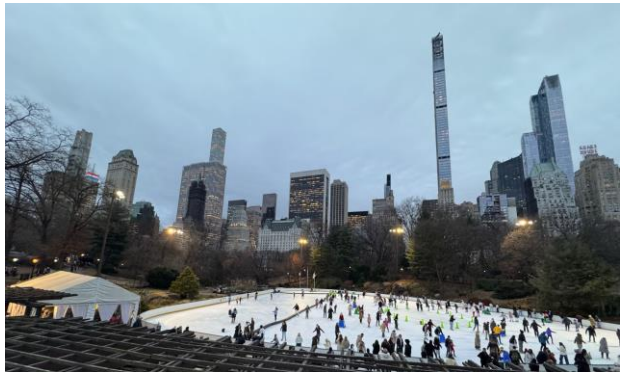
Therefore, the project *See the Invisible* uses specific content to train and improve the performance of the AI in complementing humans when drawing panoramas. It is designed and implemented by Chiara Masiero Sgrinzatto and the M-Cube Foundation and in collaboration with the New York Institute of Technology School of architecture and Design to tackle this need through a concrete application in the real world.

In our world and throughout history, certain cities have acquired a powerful mythological allure that has transformed them into "eternal cities" — icons of the past, pride of the present, and simulacra of themselves in the future. In these cities, "facts and events" have occurred and continue to take shape, though invisible to the naked eye, yet with the potential to reveal these places in a different light — beyond the perception of the physical senses. "Mythical cities" — and their competitive advantage — can be better understood by putting on a new pair of glasses, capable of revealing the "magic" of things, events, and stories tied to those places: intangible elements that surpass the boundaries of time.

The photographic portrait of New York — the "Big Apple," but also "Gotham," "The City That Never Sleeps," "Empire City," "The Melting Pot," "Broadway Capital of the World," or the "Concrete Jungle" — includes reflections on the "American Dream" that has helped define the city as the ultimate destination for those seeking to fulfill their dreams. It is seen as a "land of opportunity," often unexpected, a place where one can feel "at the center of the world." It is also the cradle of musical genres like Jazz, Hip Hop, and Rap — a city of music and energy, home to names ranging from Maria Callas to Lady Gaga, from Tupac Shakur to Jay-Z. Home to countless fictional characters and superheroes, New York embodies the entire street style imagination — from hoodies and sneakers to leather jackets — symbols of specific subcultures and historical moments. It is the stage for career-driven men and women in tailored suits stepping out of offices and the Stock Exchange, as well as for everyone wearing the iconic outfits from *Sex and the City*.

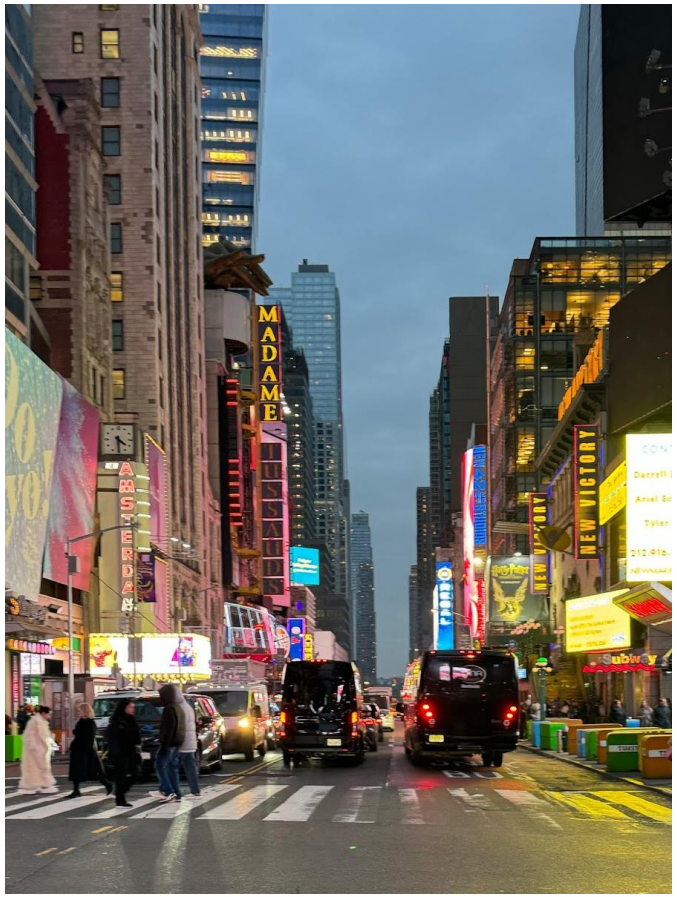
THE PROBLEM (1.2)

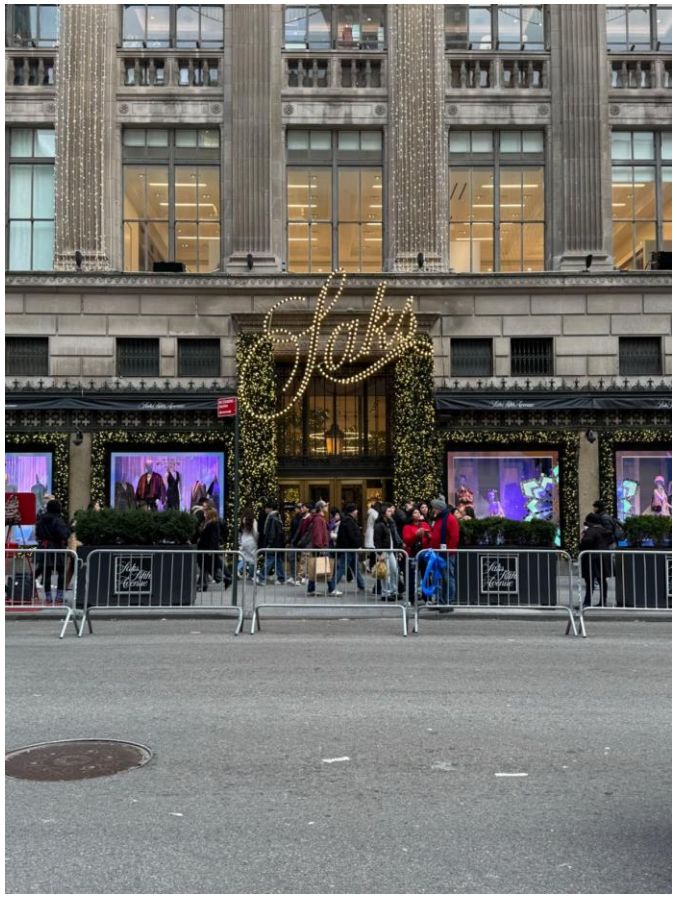




NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (1.3)





NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (2.1)

The project operates across two dimensions: a cultural/sociological one and a technological one.
Research conducted in archives, libraries, and live contexts has allowed an exploration of the origins, characteristics, and public perception of the iconic nature of places, starting from New York, with the aim of creating a model to be subsequently applied to other cities such as London, Paris, Rome, Tokyo, and Venice. This has laid the groundwork for the exploration and assessment that the M-Cube Foundation is conducting on the impact that Modern Mythology has on places, content, and narratives, generating a powerful and complex circular relationship among these elements.

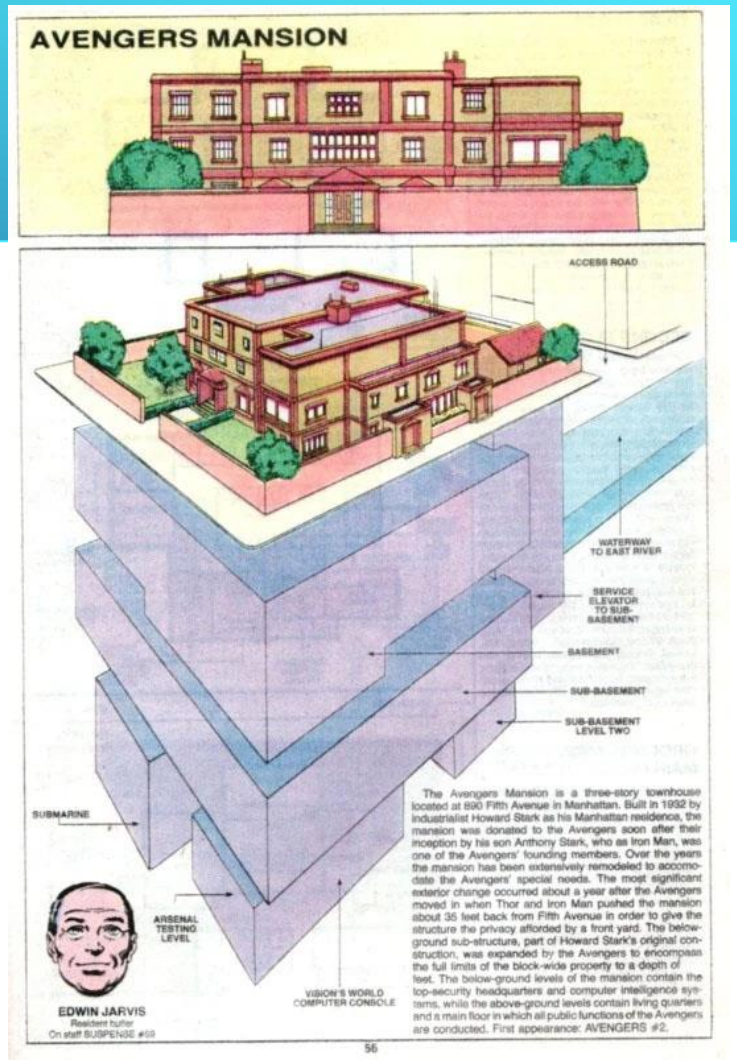
See the Invisible is analyzing two alternative hypotheses:

1. Eternal cities are such because they are formed by multiple mythological layers that influence the perception of both residents and visitors. In other words, myth is intrinsic to these places due to their richness of meaning.

2. Artists, designers, and communicators, attracted by the allure of these contexts, have created a “magic bubble” through films, comics, theater, literature, music, and video games. These works have added new narrative layers to the cities, elevating them to the status of myth. In this second case, myth becomes a narrative superstructure through which we recognize and interpret the city (Eberhard 2021).

The project combines the 360° panoramas hand-drawn by Chiara Masiero Sgrinzatto with the generative and immersive AI algorithms developed by NYIT to explore the collaboration between humans and machines in addressing, understanding, and representing complex subjects such as the interaction between places and myth.

THE PROBLEM (2.2)



NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (3.1)

See the Invisible represents a multi-perspective and multidisciplinary opportunity, and has enabled:

- the researchers' perspective on cities through historical, narrative, and iconographic memory
- the artist's direct vision of key city locations through the creation of hand-drawn panoramas—thus allowing conscious inclusion or exclusion of elements from the scene
- listening to the voices of communities spanning six generations (Silent Generation [1928-1945], Baby Boomers [1946-1964], Generation X [1965-1980], Millennials [1981-1996], Generation Z [1997-2012], Generation Alpha [2013 onward]) to understand—through their eyes—what "myth" means
- the discovery of a machine-mediated vision, developed through training and fine-tuning with selected keywords, visual and textual content, and a set of positive and negative prompts used to define a baseline framework
- a further phase of community engagement and feedback, this time bringing people into the immersive narrative generated by the artist and researchers through exhibitions.

Between November 2024 and June 2025, New York was the first target city.

See the Invisible's targets include: Artists, Designers and Professionals, Academic researchers and scholars, Youth and young adults, Creative and Cultural Industries, Urban planners and Architects, Public administrations and local stakeholders.

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM (3.2)

ARTISTS AND RESEARCHERS:

- **Creators and XR professionals**

The project proposes a hybrid workflow to enhance spatial representation through panorama drawing and generative AI. This workflow opens up new ways to create engaging content and allows for the development of dynamic, explorable environments for use in cultural projects, educational experiences, and branded content.

- **Designers and Innovators**

Integrating different immersive imagery technologies could create new opportunities and transform how professionals work in various industrie**s**, including entertainment, gaming, architecture, and design. They leverage immersive visuals to rapidly prototype ideas, communicate spatial concepts, and craft narratives.

- **Researchers and Educators**

The combination of human drawing and generative AI offers valuable tools for researchers and software developers working in immersive fields by improving spherical geometry and style optimization. Educators and analysts could also benefit by using intuitive spatial data visualization to enhance communication of complex ideas and support more immersive and interactive forms of knowledge dissemination.

THE PROBLEM (3.3)

STAKEHOLDERS:

- **Development of new models for strategic storytelling**
The project explores the intersection of culture, technology, and narrative, offering companies across various sectors an innovative model to tell their identity, history, and business model in a fresh and engaging way.
This kind of communication is well-suited for use in events, conferences, and presentations.

- **Multigenerational engagement**
By analyzing the perceptions of iconic/mythical elements across six generations, companies can develop more effective marketing and communication strategies capable of reaching a diverse audience.

- **Technological innovation**
The integration of hand-drawn cityscapes with generative and immersive artificial intelligence algorithms showcases how art and technology can work together to create engaging experiences. This opens up new possibilities for the design of content, products, and services.

THE PROBLEM (3.4)

PUBLIC BODIES & INSTITUTIONS:

- **Urban planning, regeneration, and territorial enhancement**
See the Invisible helps uncover the mythological layers that influence how cities are perceived — including key points of interest and their potential for transformation. In the long term, it could support public administrations in planning urban interventions that are more attuned to intangible cultural heritage, thereby enhancing the identity and appeal of places.

- **Civic participation and inclusion**
The project serves as an example and offers a strategy to promote the involvement of local communities in the narration and reinterpretation of urban spaces, encouraging participatory and inclusive processes in the management of territory.

- **Cultural and educational policies**
The outputs of *See the Invisible* can help inform cultural and educational policies that recognize and value contemporary "mythological" narratives as tools to strengthen the sense of belonging to a place and promote social cohesion — including among those who were not born there.

THE PROBLEM (3.5)

COMMUNITIES:

See the Invisible is a human centered project and it includes individuals and communities since the very beginning.

- **Data harvest - bottom-up approach**
People from the different generations have been engaged to know more about their perception of NYC as a mythic city and of their interests in the Modern Mythology field. The questionnaire and interview already provided useful data for the research and the AI training and they are now ready and improved on the field to be applied in the new cities in PHASE 2.

- **Discovery and Learning**
The outputs of *See the Invisible*, especially the exhibition + edutainment sessions, the book and the catalogue will allow people to interact more and more with the public, including children and elderly people.

- **Professional training**
The project will address professionals from the panoramic sector but also from the Creative Industries and other sectors to better understand how to approach technologies and content production in a new way, in the age of the AI. In-presence professional training could be proposed during the exhibition's period in NYC, Berlin, Cordoba (Argentina) and Auckland (New Zealand).

- **Impaired people**
Special attention will be paid to make See the Invisible's products and installations accessible to all. Some content will be transferred in Braille and audio for blind people, videos will be subtitled for deaf users.

YOUR SOLUTION (1.1)

In *See the Invisible*, the concept of myth is syncretic, encompassing both visions distant in time and others extremely contemporary; the perspectives of great philosophers and thinkers throughout history as well as those of ordinary individuals in today's societies.

Concerning the technology, the project adopted:

Immersive panoramas - hand-made equirectangular drawing for places: this phase has included:

- identification of n.12 specific places in the city (still visible today) + n.4 special elements
- on site drawing
- archive investigation to collect historical materials related to places (not visible anymore today)
- reconstruction drawing
- post-production process
- perspectives' variation process (e.g. different projections and views about the same place)

YOUR SOLUTION (1.2)

Immersive panoramas - AI-generated drawing for Modern Mythology: the AI has been responsible for

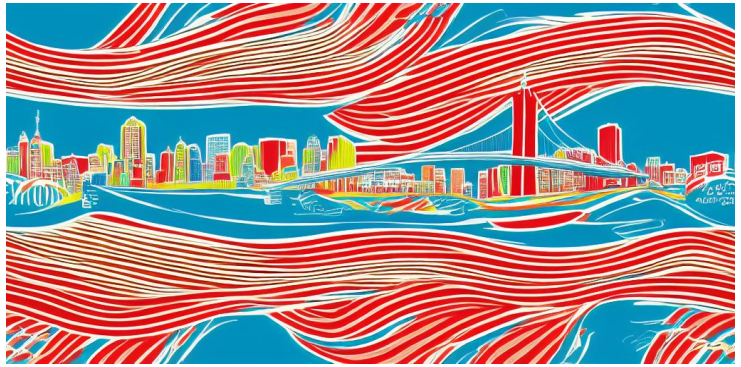
•drawing the “invisible” layer of Mythology, where the magic took shape in the mind of the artists and designers

•it was trained with:

- **Available datasets**: these included photos from the physical places in the city, the historical materials from archives and libraries, content concerning Modern Mythology from specialistic databases and hand-drawn panoramas. A deep analysis will be done in collaboration with Fondazione M-Cube professionals.
- **Knowledge about objects from Scientists, Artists, Curators, Experts, Professionals**: individuals regularly handling content related to cities and to Modern Mythology are naturally the most interesting ones to put together scientific and cultural content and data. To do that, a custom designed and implemented architecture will enable additional information coming from the experts.
- **Knowledge about objects from thematic Communities**: in parallel, fan and passionate communities can bring in interesting popular stories and content about Myth cities which are interesting to respond to different audiences or to mix more technical content with amusing ones and make the conversation more interesting and warm. To do that, a collaboration with different communities will be established. Collected content will be first verified by experts and curators before the first machine learning session.

A further investigation was conducted through questionnaires administered to over 100 people belonging to the six living generations in 2025, spanning Italy and the United States with a specific focus on New York and its places, provided further insights into the perception of myth. Interviewees were asked whether they considered NYC a Mythical City / Eternal City, what characteristics made it so or—if not—which other cities they perceived in this way; when these myths originated; which places, elements, people, events, or specific situations contributed to creating this vision. Additionally, they were asked to identify a character, work, or figure from the realms of Modern Mythology (comics, games, music, cinema, fashion, sports) that was inspired by the city and found a place within it; whether the city itself could generate myths and how.

YOUR SOLUTION (1.3)



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YOUR SOLUTION (1.4)

Places and Myths

Regarding the places referred to as “myths,” 12 urban contexts and 4 symbolic elements have been represented: Brooklyn Bridge - Rockefeller Center - Empire State Building - Macy's - Chrysler Building - Grand Central Terminal - Flushing Meadows-Corona Park - Statue of Liberty - World Trade Center - Plaza Hotel - Central Park - Times Square - Flatiron Building - Metropolitan Museum of Art - Frick Collection
Additional Iconic elements: Yellow taxi – subway - billboards – sirens

Through research and collected feedback, approximately 30 elements from Modern Mythology have been identified.

Brooklyn Bridge: The Death of Gwen Stacy (Spider-Man), Brooklyn Chewing Gums

Rockefeller Center: Christmas Tree and Ice Skating Rink

Empire State Building: King Kong, Independence Day, Percy Jackson & the Olympians: The Lightning Thief

Macy’s: Andy Warhol's Shopping Mall, Macy's Thanksgiving Parade

Chrysler Building: Thierry Mugler's Fashion Shooting

Grand Central Terminal: North by Northwest

Flushing Meadows-Corona Park: Men in Black

Statue of Liberty: Planet of the Apes

World Trade Center: 9/11

Plaza Hotel: Home Alone 2: Lost in New York

Central Park: Marathon Man

Times Square: New Year's Eve, Broadway's Musicals

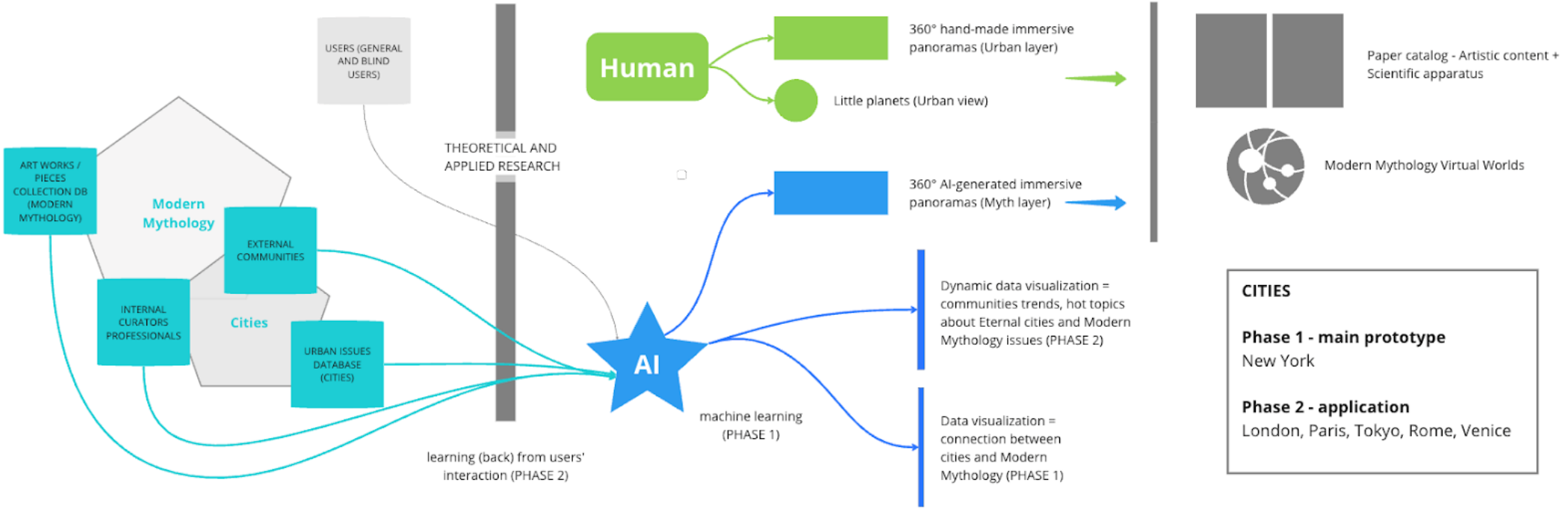
Flatiron Building: Daily Bugle in Spider-Man Movie

Metropolitan Museum of Art: The MET Gala

Frick Collection: Avengers Mansion

The project has the potential to empower artists, educators, urban planners, designers, and cultural curators to engage with spatial storytelling in more intuitive, narrative-driven ways. The project's advantage lies in its methodological flexibility, which governs its ability to create enhanced content that is technically precise and emotionally engaging. As immersive technologies become key to industries such as education, entertainment, architecture, and cultural heritage, See the Invisible is positioned at the intersection of creativity and innovation. It offers a replicable model with broad relevance and impact across diverse sectors.

YOUR SOLUTION (2.1)



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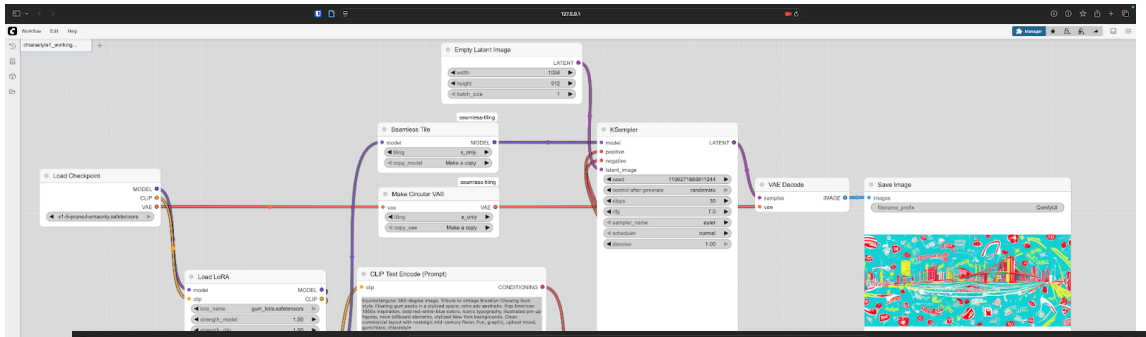
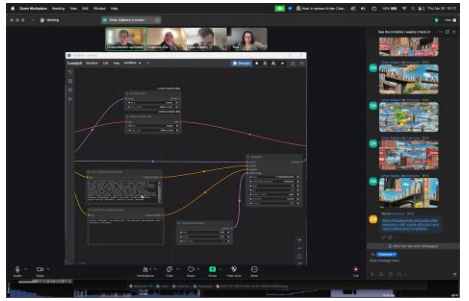
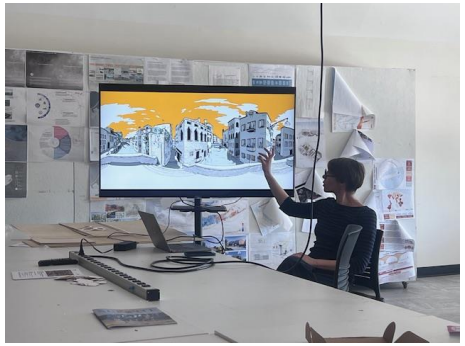
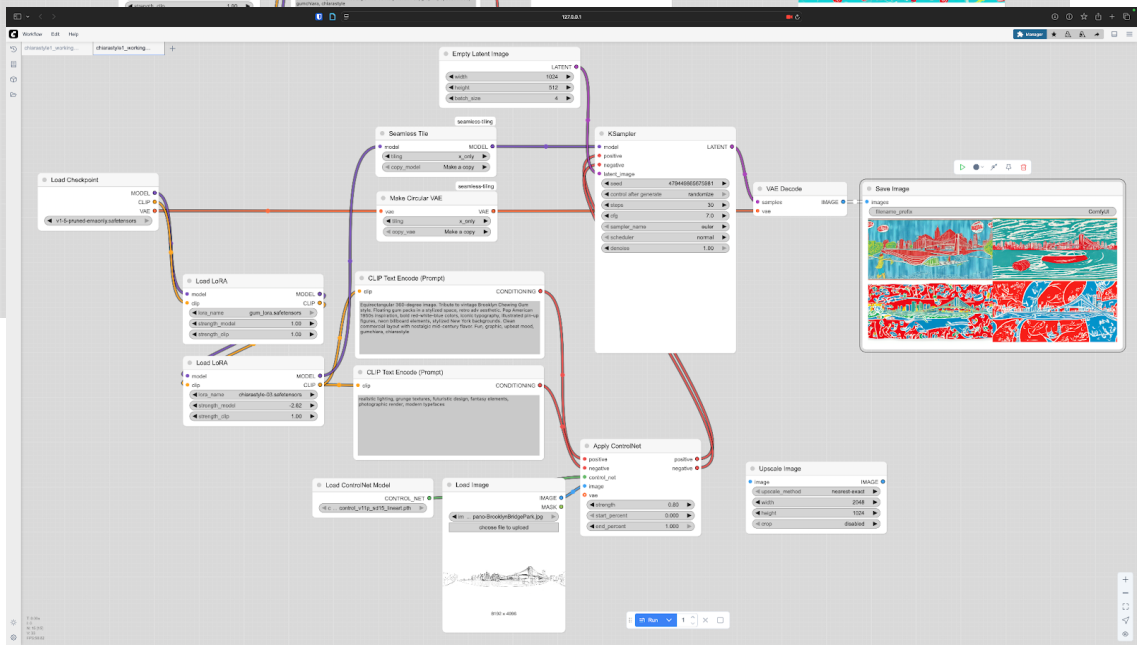
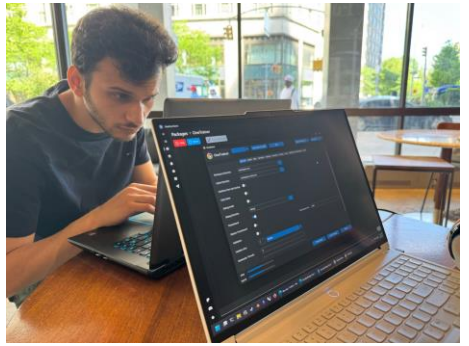
YOUR SOLUTION (2.2)











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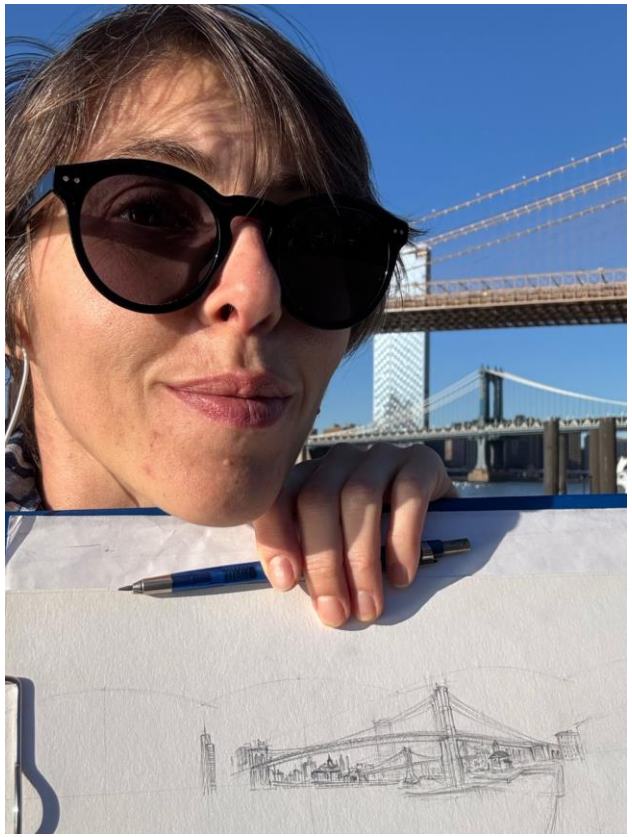
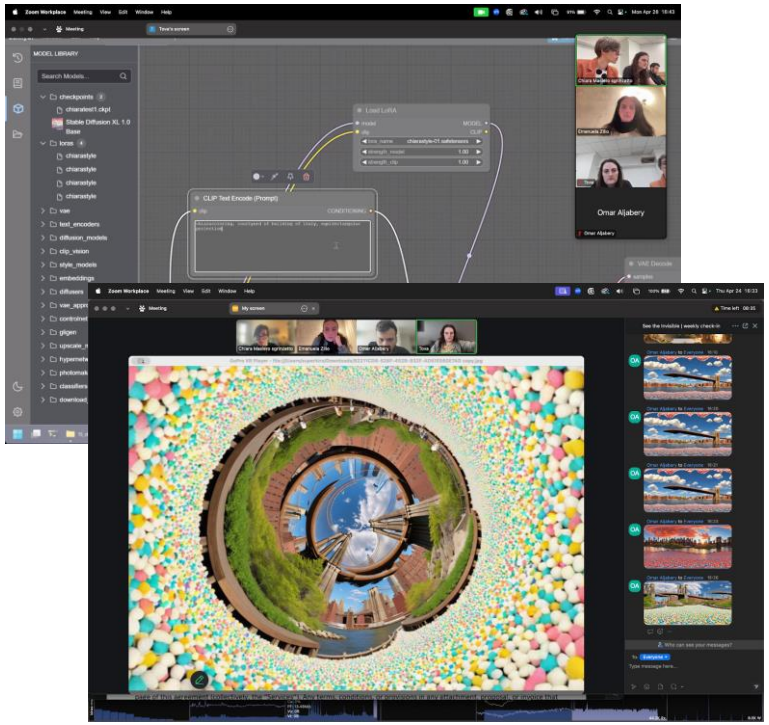
YOUR SOLUTION (2.3)





NGI ENRICHERS TRANSATLANTIC

CHIARA MASIERO SGRINZATTO, PHD STUDENT, RESEARCH COLLABORATOR CIAC / FONDAZIONE MCUBE

Chiara Masiero Sgrinzatto

Fondazione M-Cube
Universidade Aberta and Universidade do Algarve (PT) - CIAC

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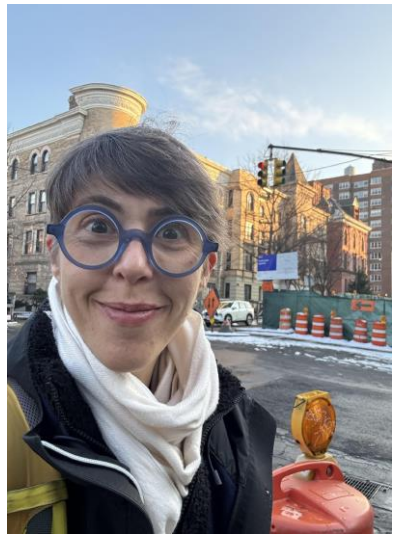
cms@fondazionemcube.it

Chiara is a visual designer based in Venice, Italy.
Architect specializing in Visual Arts, her work is focused on the representation of environments through immersive hand-made drawing. She has been working in the VR industry for over a decade, creating photo, video, illustrated 360° content for many clients and institutions worldwide including the European Union, La Biennale di Venezia, the Italian Ministry of Culture,Venice World Expo Committee, the Guggenheim Collection, Ricoh Japan and USA, The World War II Foundation.
She has planned and coordinated the Media Design course at IED Venezia and taught in the same school. She also collaborates with panoramic photography manufacturers on equipment beta-testing and specialized software houses on the design of immersive interfaces. She is a PhD student in Digital Media-Art at the University of Algarve and Aberta University and a research collaborator of CIAC – Research Center of Arts and Communication (PT)



FONDAZIONE MCUBE

M-Cube Foundation
The M-Cube Foundation was established in Turin in May 2022 with the aim of preserving the vast heritage of objects related to Modern Mythology, starting with the enhancement and public sharing of the Modina Collection. At the same time, it positions itself as a new model of cultural enterprise—a space for the creation of new professional roles and innovative businesses capable of recognizing, with vision, the power of Culture and of new languages, including technological ones.
The Foundation works with content drawn from the imagination of six generations, with the goal of rekindling curiosity for knowledge, promoting identification with the positive values embodied by contemporary myths and icons, and harnessing the energy and potential for grassroots change and the growth that can be triggered by the large communities that move within these worlds with passion and spontaneity.
The Foundation includes among its members professionals from across Italy and from a variety of sectors: education and culture, European project design, technology and innovation, events and entertainment, management services, entrepreneurship, and business management. To date, the M-Cube Foundation collaborates +100 public and private partners, both nationally and internationally.

RELEVANT PUBLICATIONS/PRODUCTS/PROJECTS/RESULTS RELATED TO NGI

KUI 2025 Remixing analog and digital - https://kui2025.htw-berlin.de
Berlin – September 25-26, 2025

•DEMO (prototype exhibition) - Masiero Sgrinzatto C., Zilio E., “Crafting Immersive Showcases Hybrid Tools for Phygital Storytelling MultipliCity and See the Invisible”

•SHORT PAPER - Zilio E., Masiero Sgrinzatto C., “Cities as Emotional-Cognitive Constructs. Panoramic view to access Myth, Memory, and Meaning”

SiGraDi 2025 META RESPONSIVE APPROACHES - https://sigradi.org/sigradi2025
Cordoba (Argentina) – November 21-23, 2025

•PAPER - Zilio E., Masiero Sgrinzatto C.,“See the Invisible: Using Generative AI to Represent Mythical Layers in Immersive Panoramas, while understanding more about “Eternal cities””

•DEMO (advanced prototype exhibition) - Masiero Sgrinzatto C., Zilio E., “See the Invisible”

GDI 2025 Green + Digital + Intelligent Built Environments - https://www.gdi2025.com
Auckland (New Zealand) – December 1-3, 2025

•PAPER - Zilio E., Masiero Sgrinzatto C., “See the Invisible. How generative-AI can support panoramas artists to represent spaces in a deeper way, while understanding more about “Eternal cities””.

•DEMO (advanced prototype exhibition) - Masiero Sgrinzatto C., Zilio E., “See the Invisible”

NGI ENRICHERS TRANSATLANTIC

RELEVANT PUBLICATIONS/PRODUCTS/PROJECTS/RESULTS RELATED TO NGI

NYC – February 2026

•PUBLIC EXHIBITION
Masiero Sgrinzatto C., Zilio E. - M-Cube Foundation, in collaboration with the Istituto Italiano di Cultura of NY + NYIT

Berlin – March 2026

•PUBLIC EXHIBITION
Masiero Sgrinzatto C., Zilio E. - M-Cube Foundation, in collaboration with the Istituto Italiano di Cultura of Berlin + HTW-Berlin

The pop-up exhibition lasts 3-5 days, coinciding with a conference or other event.
The exhibition can be set up in a large hall or in a venue with multiple rooms and corridors. Estimated setup and teardown time: 1 day before the event + 1 day after the event.

THE TEAM / EXPERTISE (1)

Emanuela Zilio

Fondazione M-Cube

HTW Berlin - Hochschule für Technik und Wirtschaft Berlin

Berlin (DE)

ez@fondazionemcube.it

Emanuela's educational background spans the humanities (Bachelor's degree in Contemporary History, EUROMASTERS' degree in European Politics, Policies and Societies) and technical-scientific disciplines (PhD in Visual and Interactive Languages of New Media).

In 2024 she teaches and coordinates project development for the M-Cube Foundation (of which she is vice-president) in the field of Modern Mythology at HTW Berlin - Hochschule für Technik und Wirtschaft Berlin, the Politecnico of Milan and the University of Turin. She also collaborates with Dreiform and DNXT GmbH on the development of new softwares dedicated to addressing the mis-match in the Culture and Creative Industries' labor market, in particular concerning the definition of the new professions of today and tomorrow.

From 2016 to 2018 she held the role of additional representative of EUSALP Action Group 1 - *to develop an effective research and innovation ecosystem*.

She has been Researcher for the University of Milan (2014-2018), External Researcher for Princeton University (USA) (2005-2006), Lecturer for the courses in Applied Informatics and History of Italian Political Parties and Media at the University of Siena (2003-2007), Coordinator and Lecturer for the Masters of ARSNOVA - Academy of Multimedia Arts of Siena (2001-2007).

In 2020, together with nine partners, she is among the creators of the VISO A VISO Community Cooperative in Ostana (Cuneo, Italy), a reality that takes over the revival of the entire Alpine village. In 2020, as well as in 2019, her research projects were selected by the Organisation for Economic Cooperation and Development (OECD) as case studies for the Summer Academy on Cultural and Creative Industries and Local Development.

THE TEAM / EXPERTISE (2)

Fabrizio Modina

Fondazione M-Cube
Università degli Studi di Torino, Fondazione M-Cube

Turin (IT)

fm@fondazionemcube.it

Fabrizio Modina is an artist working at the same time as teacher of fashion design and historian of Modern Mythology, a subject he teaches at the Politecnico of Milan and at the University of Turin. As collector and expert on Sci-fi and japanese animation, has participated in the creation of the exhibitions *Watch Me Move!* at the Barbican Art Gallery in London and *Things from Another World* at the National Cinema Museum in Turin for which he also co-curated *Manga Impact, the world of Japanese Animation*.
He was among the scientific committees of the exhibitions *Kyoto-Tokyo, from Samurais to Manga* at Grimaldi Forum in the Principality of Monaco and *Japan: from Samurai to Mazinger* at Casa dei Carraresi in Treviso, Italy. He also worked on *Female Warriors from the Rising Sun* for the Museum of Oriental Art in Turin, *Lady Diana, a free spirit* at Venaria Royal Palace and *Guerre Stellari Play*, event-exhibition on the history of Star Wars, at Vittoriano Complex, Rome. Some of his most recent works are the exhibitions *Manga Heroes* for the National Archaeological Museum of Naples and *Robot - The Human Project at* MUDEC, Milan, *The Myth of Superheroes* for Comic-Con Museum of San Diego, U.S.A. and *Superheroes* for NRW Forum, Düsseldorf, Germany.
His first book, *Super Robot Files 1963/1978*, which brings together the encyclopedic information about the world of the steel giants of japanese animation, has become sold out in the first five months of sales and was shortly followed by the chapters two and three. From 2022 he's the promoter and President of the M-Cube Foundation in Turin.

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THE TEAM / EXPERTISE (3)

Alessandro Melis

New York Institute of Technology
amelis@nyit.edu

Alessandro Melis is the inaugural IDC Foundation Endowed Chair and Professor at the School of Architecture and Design. In 2021, he served as curator of the Italian Pavilion at the Venice Biennale. Alessandro was appointed Italian Design Ambassador (ADI - Ministry of Foreign Affairs) in 2021 (Paris) and in 2022 (New York and Washington). Previously, he was Director of the International Cluster for Sustainable Cities at the University of Portsmouth, Director of Postgraduate Engagement at the University of Auckland, co-director of the TPAI program at the University of Applied Arts Vienna, visiting professor at Anhalt University in Dessau, Politecnico di Torino, University of Perugia, and honorary fellow at the University of Edinburgh. The significance of his research contributions is evidenced by over 200 publications, numerous citations in popular publications, and lectures at institutions such as the University of Cambridge, MoMA, China Academy of Art, and TEDx. Among his recent monographs are Alessandro Melis. Utopic Real World, Invention Drawings, published by D Editore, and Heliopolis 21, published by Skira Editore.
He is principal investigator and transnational coordinator in international research projects, including the interdisciplinary CRUNCH project: Climate Resilient Urban Nexus Choices: Operationalizing the Food-Water-Energy Nexus, which involves urban laboratories in Gdansk, Miami, Taiwan, Eindhoven, Uppsala, and Southend-on-Sea.

The development of the AI model proposed by See the Invisible was carried out in collaboration with Omar Aljabery and Tova Gold, research assistants in the MS in Architecture, Computational Technologies program at NYIT.

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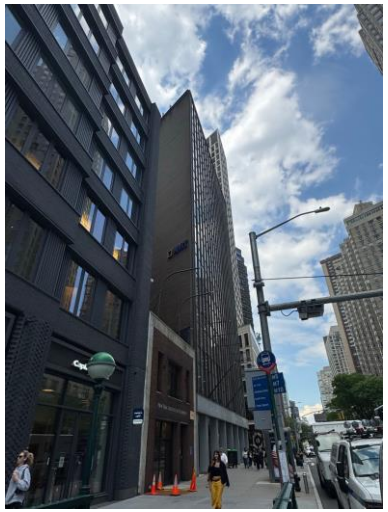
YOUR HOST ORGANIZATION

New York Institute of Technology. School of Architecture and Design
Throughout history, New York Tech implemented emerging technologies in classrooms and research labs. This approach graduates professionals who solve problems using the latest tools and sets apart the instruction we provide within the New York metropolitan region and the world. A multidisciplinary culture of innovation and entrepreneurship thrives at New York Tech. From a diverse student body to a faculty expert, meet the individuals uncovering new knowledge that makes society a better place for all.

The six schools and colleges of NYIT offer undergraduate, graduate, and professional degree programs in disciplines such as computer science, data science and cybersecurity, biology, health professions and medicine, architecture and design, engineering, information technology and digital technologies, management, energy, and sustainability. NYIT is a nonprofit, independent higher education institution, founded in 1955, with nearly 8,000 students from around the world.



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KEY RESULTS (1.1)

See the Invisible has begun producing a series of tangible and intangible outputs over recent months and has planned a progressive development schedule for the coming months.

Research and analysis: Research work through archives, libraries, and questionnaires/interviews has gathered valuable data on the construction of "mythical cities" and the two-way identity relationship between these cities and the actors moving within them: individuals and communities, companies, and public institutions. Whether New York is the city of cinema or cinema tells and creates the New York we seek and visit appears to be a positive-sum dynamic. The collected data formed the foundation for analytical activities by researchers, machine learning processes for the AI used, and paved the way for a series of publications in international scientific journals.
Research is an ongoing process in this project, supporting the creation of new datasets for AI and further analytical steps.

Immersive panoramas: The analog component is a particularly significant output of this project. In NYC, Chiara Masiero Sgrinzatto hand-drew XX immersive 360° panoramas representing places perceived as iconic and emblematic of the city's collective imagination. The panoramas are available in paper format and, via QR codes/links, open a connected virtual dimension that contains details and can integrate interactive points to explore specific content in depth.

Myths: The work mapping and analyzing myths present in NYC has brought to light an important set of assets linked not only to the territory but also to the companies and institutions operating there. Approximately 30 main myths related to the city have been identified, including primary myths from Modern Mythology (cinema and television, comics, music, theater, literature, fashion, sports) and complementary myths (horizontal, e.g., yellow cabs, or from other sectors, e.g., food & drinks).

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KEY RESULTS (1.2)

Generative AI model: Work at NYIT enabled the creation and training of an AI model designed to generate additional content beyond the hand-drawn panoramas and to make such content available in a mathematically correct equirectangular format, overlayable with other panoramas and with possible connection points among different content. The model is ready to be applied not only to various locations in NY but also to other cities in future project phases and new themes.
The model comes with a user manual for future applications.

Prototype city: The first chapter of this project (Nov 2024–Jun 2025) implemented the *See the Invisible* application for the city of NY, serving as a visible and functioning prototype to be applied to subsequent cities. The prototype includes: 16 hand-drawn panoramic boards on paper created live by Chiara Masiero Sgrinzatto; 16 derived immersive spherical digital environments; 30 AI-generated digital equirectangular images and corresponding 360° environments; a catalog and a book, both in paper and digital formats; a selection of scientific articles and conference presentations; and this exhibition.

Catalog: Designed for outreach and artistic purposes, the catalog accompanies the exhibition, telling the story of the city, its myths, and the connected actors from a different, phygital perspective.

Book & Papers: Scientific in nature, the book collects multidisciplinary content closely connected to the various fields addressed by this project, including architectural and urban impact, communication and strategic communication, and social impact.

Exhibition: Designed to be itinerant and available for setup at public or private events where companies or institutions wish to present themselves in a new way, starting from their close relationship and influence with the city. The exhibition can be accompanied by edutainment and professional training activities.

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KEY RESULTS (2)

See the Invisible has already allowed to establish interesting collaborations with:

- HTW-Berlin (Germany)
- Universidade Aberta de Lisboa / Algarve (Portugal)
- Istituto Italiano di Cultura NY (USA)
- Istituto Italiano di Cultura Berlino (Germany)
- Camera di Commercio Italiana a NY (USA)
- Auckland University of Technology (New Zealand)
- Ibero-American Society of Digital Graphics (SIGraDi)

The accelerated contact and engagement with R&D partners and business partners opened the possibility for:

1. Presenting of *See the Invisible*'s research outcomes and prototype at the **conference GDI 2025** (1-3 Dec 2025), sharing the work on generative and computational design, AI-assisted generative tools workflows and XR technologies for immersive spatial experiences; meet other academics, industry leaders, and practitioners to explore and transfer cutting-edge research and transformative practices shaping the future of built environments.

Organize one in-presence intensive workshop for researchers and students about *M-Cube* and *See the Invisible* to present the two projects and to create the opportunity for co-design sessions about sustainable construction and advanced structural systems to smart cities and digital transformation; and technological tools and workflows for urban design and spatial representation.

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KEY RESULTS (3.1)

1.Start a collaboration in the direction to submit **a project proposal for a Horizon grant** which could include researchers from the NYIT, the AUT and the FMC.
Researchers from the USA, Canada or New Zealand who do not reside and work in institutions in the EU/AC are also eligible for funding.
The Horizon grant will create the opportunity to meet and connect a number of partners which are already collaborating with FMC, such as GLOWEE (Australia, France), Studio Schwitalla (Germany), Ricehouse (IT) and Matters of Activity (Germany), with the researchers and professionals at NYIT and AUT concerning advanced innovation in design, construction, and sustainable development.

2.Start the brainstorming for a new Camps
The preliminary phase includes the combined work of all partners in order to learn from their knowledge, experience and formats. This will allow co-design and implement a shared solid functioning model for workshops to be opened to participants in 2026.

1. Winter - New Zealand / Australia (2 months)
2. Spring - United States (2 months)
3. Summer - Berlin (2 months)
4. Autumn - Turin (2 months)

The Camp will address professionals from different sectors (e.g., Architecture, Design, Art, Biology, Engineering, Anthropology, Modern Mythology) and Communities (e.g., Youth)
At least one researcher from NYIT, AUT and FMC joins all research steps.

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KEY RESULTS (3.2)

5. **Produce dissemination content and strategies** to declare and share the importance of co-design through natural elements and interdisciplinary approaches in order to address today's challenges in building sustainability. That affects social and economic models, and has at their core the recognition of man as a fully integrated part of nature's cycles.

6. Publish n.3 new papers on *See the Invisible* and present them in relevant conferences.

KUI 2025 Remixing analog and digital - https://kui2025.htw-berlin.de
Berlin – September 25-26, 2025
Zilio E., Masiero Sgrinzatto C., “Cities as Emotional-Cognitive Constructs. Panoramic view to access Myth, Memory, and Meaning”

SiGraDi 2025 META RESPONSIVE APPROACHES - https://sigradi.org/sigradi2025
Cordoba (Argentina) – November 21-23, 2025
Zilio E., Masiero Sgrinzatto C.,“See the Invisible: Using Generative AI to Represent Mythical Layers in Immersive Panoramas, while understanding more about “Eternal cities””

GDI 2025 Green + Digital + Intelligent Built Environments - https://www.gdi2025.com
Auckland (New Zealand) – December 1-3, 2025
Zilio E., Masiero Sgrinzatto C., “See the Invisible. How generative-AI can support panoramas artists to represent spaces in a deeper way, while understanding more about “Eternal cities””.

IMPLEMENTATION

See the Invisible focuses on a number of cities which are considered “eternal cities” because of specific reasons and topics. New York City is comics, cinema, Brooklyn Bridge, Empire State Building, but also the city of dreams, ambition, and reinvention. The prototype developed here will be applied in next months to other “myth cities” such as: London - Pop and Rock music; Paris - Fashion, Eiffel Tower, but also romance, elegance, and artistic soul; Tokyo - Manga, animation; Rome - city of Gods, layers and layers of history, mythical typos (e.g. gladiators, emperors, but also empire, faith, and timelessness); Wellington in New Zealand - Maori tradition, Tolkien LotR filming locations, etc).

This will be functional to further software’s improvement and for the production of exhibitions, publications and learning for M-Cube Foundation's users in the medium-long run.

Concerning the technology transfer, the plan enters into the broader plan for marketing made by the Fondazione M-Cube. This will include the possibility to disseminate the product through its network, the use of the tools in professional training programs, the application of human+machine generated panoramas to different content.

EXPECTED IMPACT

The project adds to the architect and urban perspective, a sociological and anthropological approach to assess people's perceptions of the Eternal Cities and their mythical status. The work combines **360-degree hand-drawn panoramas and immersive generative AI algorithms to explore human-machine collaboration in engaging, understanding, and representing complex subjects**.

Actually, the way a city is perceived, both by its own citizens and by the global public, directly influences its economic vitality. This work is highlighting how Myth-making is *instrumental* and not just symbolic, and can empower local businesses and reshape urban economies.
A city's myth also fuels the **imagination economy**: film, media, and gaming use cities as “characters”, virtual tourism and immersive experiences grow around iconic narratives, AI, XR, and digital art now extend these myths into new dimensions

This intangible economy generates very tangible revenues.

LESSONS LEARNED

Timing of the expedition and the American academia could not match.

The weather in NYC is unexpectable. If you are doing a drawing campaign on location using paper, be prepared for showers and always have clips to secure your sheet for the wind!

The city has offered invaluable opportunities to watch and experience cutting edge immersive installations and edutainment content, both mainstream and experimental.

I had a teaching gig, where I learned much more than I taught.

Chiara Masiero Sgrinzatto

PhD Student in Design Sciences

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

Adaptive Edge-AI Deployment in NextG Wireless Networks

Emilio Paolini
Italy

Assistant Professor / Researcher in AI acceleration through network infrastructure

Track
AI / Wireless Networks / Edge Computing

Host Organization
Saint Louis University (SLU), Louis, Missouri, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

AI designed to learn from many separate devices (like smartphones) isn't built to cope well with everyday wireless networks that frequently get overloaded with data or have unreliable connections, leading to performance issues

Target audiences include (i) network service providers and (ii) network operators that face the dual challenge of ensuring energy efficiency and minimizing latency in edge AI deployments

Current AI solutions struggle in real-world NextGeneration (NextG) Wireless environments because they often use **fixed methods** that can't adjust to changing hardware or effectively handle network issues like data bottlenecks and varying device capabilities

The **opportunity** is to create AI models that can **adapt in real-time** to the constantly changing hardware, resources, and network conditions found in NextG base stations

This involves designing solutions that understand and leverage the 5G network architecture and can distribute data processing tasks more effectively

THE SOLUTION: FLAG

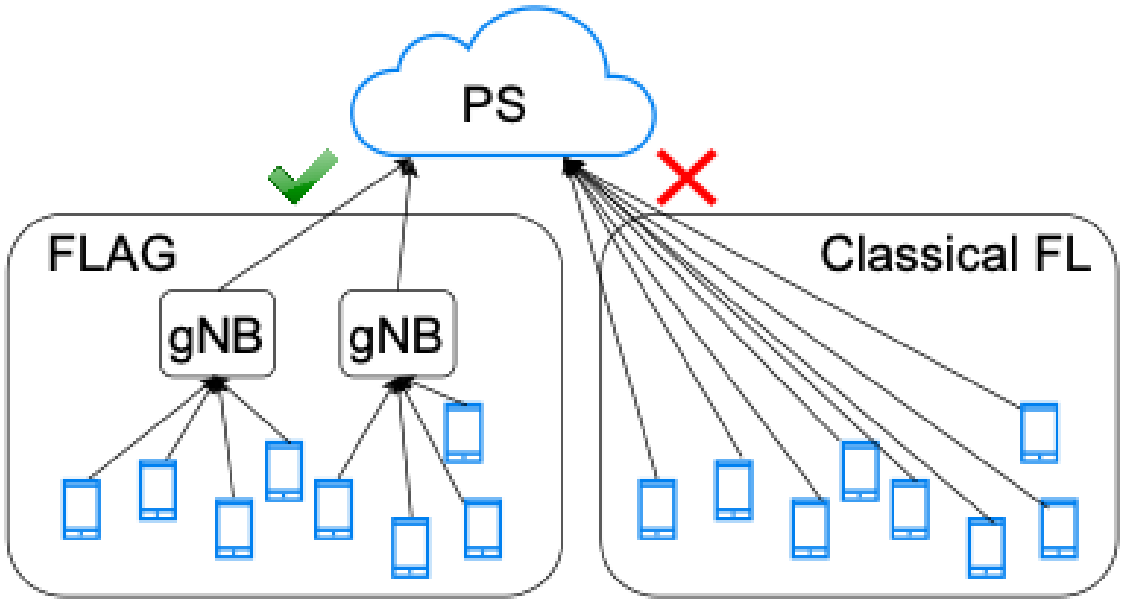
Technology: FLAG intelligently processes AI learning updates directly within 5G base stations using smart device grouping, data loss correction, and quick timers

Differentiator: it enhances edge AI performance on wireless networks **without changes to user devices or central servers**, by uniquely using these base stations to reduce data bottlenecks

Competitive advantage: it makes **AI training up to 5.1 times faster**, using less network data, and ensuring high accuracy even with imperfect data transmission

Opportunity: to enable efficient and adaptable AI across all future NextG wireless networks, allowing network operators to offer more responsive and energy- efficient services to a vast user base

THE SOLUTION: FLAG



Scaling FL is possible by relying on the **underlying network infrastructure**

FLAG proposes an aggregation mechanism at the 5G base stations to deliver Line Rate Training and reduce the bandwidth bottlenecks

EMILIO PAOLINI ASSISTANT PROFESSOR @ SCUOLA SUPERIORE SANT'ANNA (SSSA)

I'm an assistant Professor at Scuola Superiore Sant'Anna, Pisa, Italy. My research i s focused on **accelerating AI models** using the **network infrastructure**, especially in the context of NextG wireless networks. So far, I have published my research i n high-quality peer-reviewed journals and conferences.

2 key publications supported by NGI:

Flecto: Cross-Layer Adaptive Congestion Control with Reinforcement Learning. It addresses the pressing need for smarter congestion control mechanisms in next-generation networks. @ HPSR 2025

FLAG: Accelerating Federated Learning in Wireless Networks with In-Network Aggregation (EuroSys '26 Submission). This system enables collaborative AI model training across many devices to be significantly faster and more reliable over wireless networks by processing data directly within the 5G network infrastructure

NGI ENRICHERS TRANSATLANTIC

THE TEAM /EXPERTISE

Dr. Piero Castoldi

Full Professor and Director of TeCIP Institute @ Scuola Superiore Sant'Anna

Dr. Luca Valcarenghi

Full Professor of Telecommunications, (TeCIP) at Scuola Superiore Sant'Anna

Dr. Flavio Esposito

Associate Professor at Saint Louis University, Computer Science Department

Emilio Paolini

Assistant Professor @ Scuola Superiore Sant'Anna

Wireless Expertise

Network Management Expertise

NGI ENRICHERS TRANSATLANTIC

THE HOST ORGANIZATION

Selected Host Organization: Saint Louis University (SLU), Missouri, USA

Host contact: Dr. Flavio Esposito, Associate Professor in Computer Science

The selection of SLU, and Dr. Esposito in particular, was based on the **strong synergy** between my research focus on AI in NextG networks and his established expertise.

This collaboration provided an **invaluable opportunity** to benefit from his insights on enhancing AI energy efficiency and reducing latency within networked systems

The environment at SLU facilitated merging my knowledge of optimizing AI with Dr. Esposito's network management expertise, directly contributing to advancing the practical deployment of edge AI

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (I)

Technology Advancement & Scientific Validation

The core FLAG system, with its In-Network Aggregation (INA), Partial-Contribution Correction (PCC), and Client Grouping mechanisms, was tested and refined

Initial performance expectations were **largely confirmed** and, in some test cases on the new distributed setup, even slightly surpassed expectations, especially when dealing with diverse client data and network behaviors

A major outcome was the establishment of the foundational joint testbed between Scuola Superiore Sant'Anna and Saint Louis University, with the initial phase completed faster than anticipated

This enabled early-stage deployment and preliminary testing of FLAG components in a more realistic, transatlantic distributed environment

KEY RESULTS (2)

Collaboration, Partnerships & Ecosystem Engagement

The 5-month expedition at Saint Louis University has transformed the planned collaboration with Dr. Flavio Esposito and his team into a deeply synergistic research partnership. The **intensity of daily interaction** and joint problem-solving far exceeded my initial expectations for a visiting fellowship

As a direct outcome, we have formulated concrete plans to co-author at least two more joint papers and are exploring **co-supervision opportunities** for students

We plan to submit a joint SSSA-SLU grant proposal to an international funding agency by early 2026, building on the successes of this expedition

KEY RESULTS (3)

Dissemination, Future Strategy & NGI Impact Engagement

A key achievement during the expedition was the successful submission of FLAG paper to the prestigious (A) EuroSys conference

NGI Enrichers has been pivotal in building a strong EU-US research bridge. We have had initial discussions with SLU about the possibility of a reciprocal "mirrored fellowship" visit for one of their researchers to SSSA

In the near future, the goal is to secure Postdoctoral funding, such as the MSCA Postdoctoral Fellowship (Global), to advance this line of research in Europe, further strengthened through collaboration with the US.

We have started drafting a position paper advocating for a standardized framework for describing AI requirements and dynamic capabilities at NextG base stations, aiming to contribute to future industry best practices

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IMPLEMENTATION

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

- Prepare and submit publications based on expedition and joint testbed findings
- Continue iterative development and refinement of the FLAG framework based on testbed results
- Possibly, release FLAG as an open-source projects on GitHub
- Continue to work on standardizing descriptions of AI needs and base station capabilities

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:

- Enable dynamic, adaptive, and efficient edge AI deployment across diverse and runtime-instantiated NextG network hardware
- Validate FLAG's performance and adaptability across various use-cases on the real-world joint testbed
- FLAG significantly reduces communication overhead, prioritizing minimal environmental impact, ensuring digital communication advancements align with societal well-being and sustainable development goals
- The broader vision includes photonic-accelerated AI, further targeting energy consumption reduction.

LESSONS LEARNED

- The environment significantly accelerated the refinement of the FLAG architecture and spurred new research ideas at a pace difficult to achieve through remote interactions alone
- Successfully navigating initial technical and cultural adjustments significantly enhanced my problem-solving agility and professional resilience in new settings
- This NGI Enrichers experience has profoundly shaped my approach to collaborative research and equipped me with skills for future international projects, directly benefiting my ongoing contributions to the NGI vision

Emilio Paolini

Assistant Professor / Researcher in AI acceleration through network infrastructure

Emilio Paolini

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(N/A)

ResearchGate

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

Data Center Hyperloop (DHL)

Guillem López-Paradís
Spain

PhD Student at Barcelona Supercomputing Center (BSC) and UPC

Track
AI / Data Infrastructure / Green IT

Host Organization
University of California, Santa Barbara, California, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Accelerate data movement of emerging massive datasets (for AI, Big Data, Genomics) in the data centre.

The **problem** has been highlighted by companies like **Meta** with the emergence of **petabyte-scale** datasets for machine learning models

The **main target** are data centres providers/facilities that work at this data scale (e.g. Meta)

The current **solution** relies on fiber optics, which, while offering **flexibility**, comes with high **energy costs** and reduced performance efficiency

YOUR SOLUTION (1)

Technology

- DHL uses small magnetic levitated trains to transport commodity SSDs.

Differentiator

- Change the paradigm for data movement: from the current “copy and paste approach” to our called “embodied data movement”. First to exploit the unparalleled density of SSDs.

Advantage

- DHL is faster (600x) and more energy efficient (400x).

Size

- The data centre network market is estimated at US$ 20Billions (2022) and expected to grow to US$ 60B in 2030.

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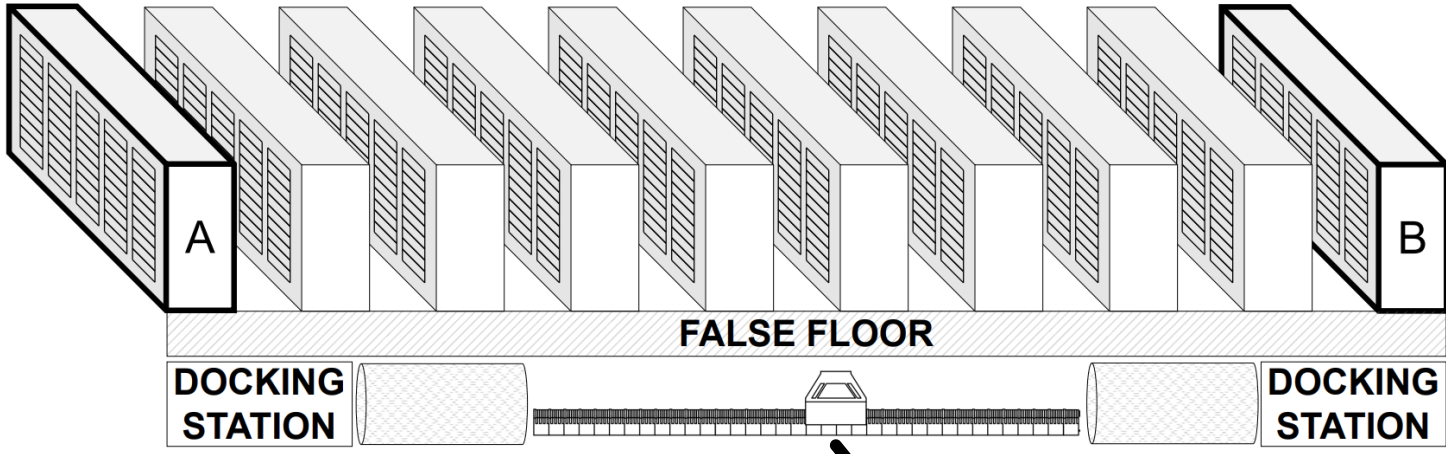
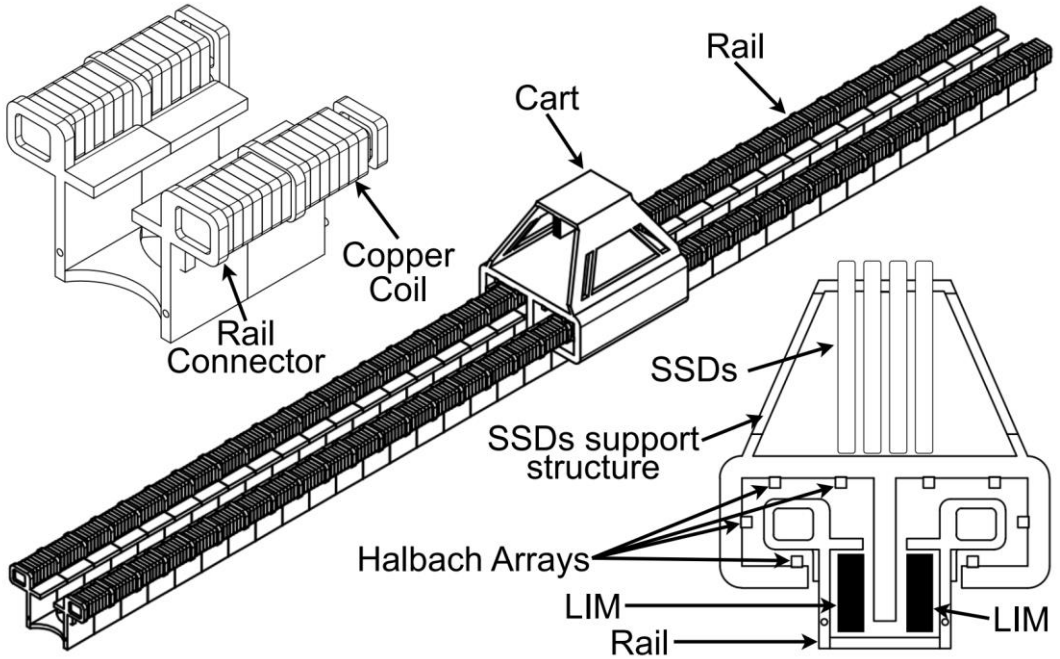
YOUR SOLUTION (2)





Data Center Hyperloop (DHL)

NGI ENRICHERS TRANSATLANTIC

GUILLEM LOPEZ-PARADIS, PHD STUDENT BARCELONA SUPERCOMPUTING CENTER

Bio and achievements/successes

- 4th year PhD student at BSC and UPC with successful collaborations both from industry (Arm, Xilinx) and academia (UCSB, HM)
- Different papers at international conferences and participated in EU projects

Relevant publications/products/projects/results related to NGI

- **Main author of the seminal** article **introducing DHL**. **Accepted** at the **premier** Computer Architecture **conference** (ISCA 2024)

Relevant honors and/or prizes related to NGI

- Obtained competitive **grants** (>90K€), **2nd** Prize in “PhD Thesis in 4 min” **contest** . Participated in **competitive programs** by **Google** (GSoC), many (>15) **international hackathons**; most prestigious **startup program** for undergrads in Spain

THE TEAM / EXPERTISE

Other Founders, support team, mentors and advisors

BSC & UPC

- **Guillem López** (myself): Team Leader
- **Adrià Armejach**: Comp. Arch Expert
- **Miquel Moretó**: Comp. Arch Expert

UNICAN

- **Enrique Vallejo**: Network Expert

UCSB

- **Rachel Jiang, Yarwin Liu, Forrest Zhou, Yuchen Liu:** undergraduate students
- **Jonathan Balkind:** Professor & Advisor
- **In the past:** Isaac Hair, Sid Kannan, Parker Murray, Roman Rabbat, Alex Lopes, Rory Zahedi, Winston Zuo

YOUR HOST ORGANIZATION

Background, context, department, NGI experience

- The selected organization has been **UC Santa Barbara (UCSB)**
- Started a collaboration with Jonathan Balkind (UCSB) since GSoC* 2021.
- Research visit of 4 months during 2022-2023.
- During the visit, the DHL was born. In less than a year, a research article was accepted at the best conference in Computer Architecture (ISCA).
- Perfect environment with an impressive team.
- NGI expedition has been in the ArchLab advised by Jonathan Balkind

*GSoC: Google Summer of Code. Competitive program (17% acceptance) similar to a summer internship

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KEY RESULTS (1)

First Findings, Outputs, and Outcomes of your expedition on your project

- We have researched on the **DHL's bottlenecks and needs to enable the next 1000x improvement** on efficiency and performance
  - Optical connectors to improve life longevity and bandwidth at the docking station
  - Better materials for the card
  - Switch scheme and different topologies
  - Regenerative braking
  - API development and DHL simulator

KEY RESULTS (2)

Participated in the regional program ZAP & BOOM from I-CORPS (NSF)

- **We did 20 Interviews with industry and academia**
  - Google, Microsoft, NVIDIA, WD, different AI companies, UCSB, BSC
- We learned about how to bring the **idea into a product**
- We received excellent **positive and negative feedback about DHL**
- We got **invited** to apply **for the national program I-CORPS**

KEY RESULTS (3)

Thanks to the fellowship, **the collaboration BSC-UCSB is stronger:**

- Two MSc students from UCSB will come to BSC in the fall
- A short visit from a PhD student from UCSB in the fall

The **expedition has been successful** by e.g. exploring the commercialization potential of the idea and addressing technical bottlenecks in the DHL project. However, it has **not yet resulted in any published outcomes**, which differs from our initial expectations. Nonetheless, the experience has **significantly contributed to my growth as a researcher,** particularly through the opportunity to lead a group of four undergraduate students.

IMPLEMENTATION

Next 6-month steps

- We plan to continue working on the DHL simulator and the API demo to understand how it can be better integrated in a data centre
- We plan to continue the research in the technical topics explored in this expedition (switch, topologies, regenerative braking, optical connectors)
- We are preparing the I-CORPS submission
- We are seeking funding to create a prototype

EXPECTED IMPACT

- **Cooperation**: the collaboration USA-Europe is fundamental, being DHL a technology created thanks to both parties. In addition, there is a new collaboration and expected internships in the fall.

- **Green IT & Respect for the environment, Sustainability:** DHL aims to improve energy efficiency by 400x targeting crucial applications such as ML.

LESSONS LEARNED

- **6 months expeditions are not that long!**
  - Time flies, bureaucracy takes time, and the time to adapt to a new place is not trivial.
- **Managing students can be very rewarding**
- **Housing is a global problem and is hard to find a good place for short periods**
- **Health Insurance scheme can be very complex**
- **Cultural exchanges can be both good and bad, but definitely needed to any individual to grow both personally and professionally**

Guillem López-Paradís

PhD Student at Barcelona Supercomputing Center (BSC) and UPC

Guillem López-Paradís

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(N/A)

GoogleScholar

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End-to-End FAIR AI for Global Development: Human-Centered Interfaces, Multilingual Datasets, and Policy-Aligned Models

Matt Murtagh
Ireland

PhD Researcher at Trinity College Dublin/ Lead Developer of Athena

Track
AI / FAIR Data / International Development

Host Organization
Pennsylvania State University, Pennsylvania, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

- Massive gaps in AI accessibility, representation, and actionable evidence for low-resource and vulnerable populations.
- Existing AI models and datasets focus on resource-rich languages, highly instrumented regions, and short-term benchmarks.
- Policymakers, NGOs, researchers, and humanitarian agencies lack scalable tools for evidence generation in data-scarce settings.
- Existing efforts are fragmented (limited long-tail language coverage, narrow evaluation pipelines, limited cross-domain integration), creating an opportunity for unified FAIR AI infrastructure.

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (1)

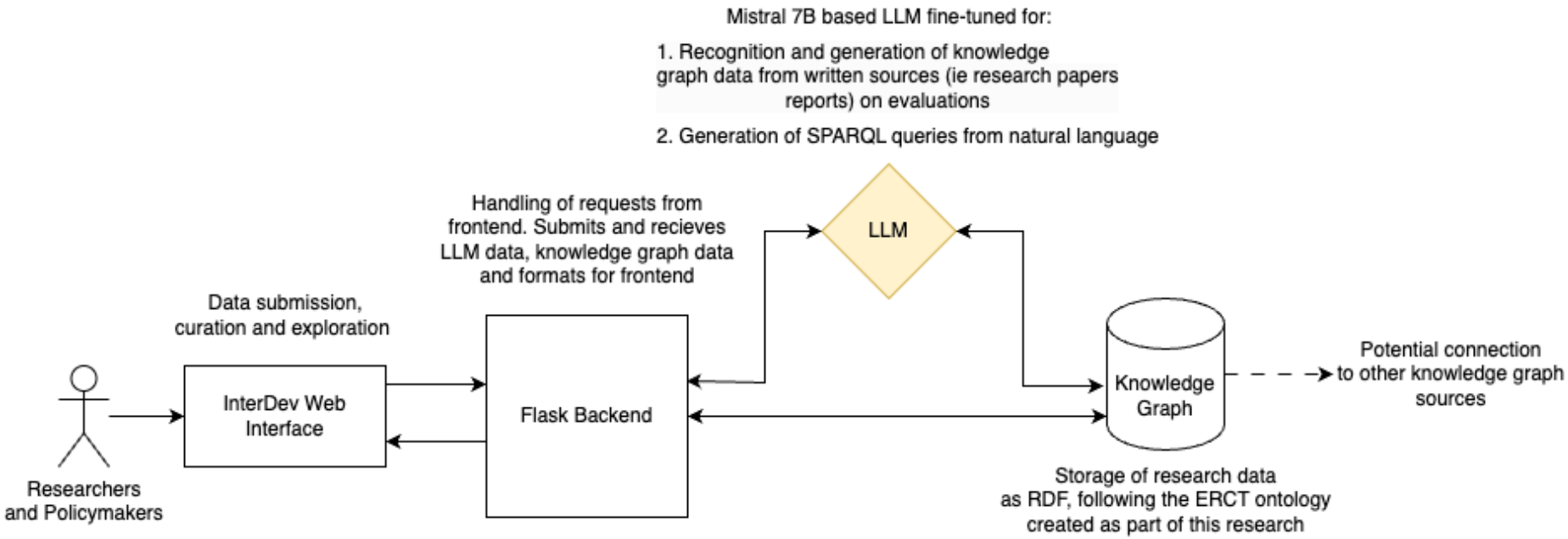
We develop modular, cross-domain FAIR AI systems that integrate human-centered interfaces, multilingual datasets, and policy-aligned models to serve underrepresented contexts in international development.

- **Combine graph reasoning, geospatial modeling, and behavioral testing into one scalable pipeline.**
- **Broader infrastructure supports multilingual disinformation detection, fact verification, and efficient knowledge querying across low-resource settings.**
- **Large unmet global demand for scalable AI solutions addressing data gaps in displacement, health, education, and public governance.**

NGI ENRICHERS TRANSATLANTIC

YOUR SOLUTION (2)

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



FIRST & LAST NAME, POSITION
CURRENT ORGANIZATION

PhD Researcher at Trinity College Dublin and Visiting Researcher at Penn State (PIKE Lab and ACS Lab).

Lead developer of Athena (LLM-powered public-domain media curation system, IST521 Outreach Prize winner, UIST 2025 submission under review).

Co-lead of UNified Model for predicting education outcomes in displaced populations (UNHCR-OECD Datathon winner, IFMS 2025 invitee).

Contributor to BLUFF (100K multilingual disinformation dataset), CORRECT+ (knowledge-augmented fact-checking pipeline, AAAI 2025 planned submission), SPARQLStack (efficient SPARQL query generation, submitted to ISWC 2025).

Researcher at Irish AI Advisory Council (July 2025 -)

NGI ENRICHERS TRANSATLANTIC

THE TEAM / EXPERTISE

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

Prof Dongwon Lee
Penn State

Prof Frank Ritter
Penn State

Prof Declan O'Sullivan
Trinity College Dublin

NGI ENRICHERS TRANSATLANTIC

YOUR HOST ORGANIZATION

Host Organization – Penn State University

Host lab: **PIKE Lab** (Principal Investigator: Prof. Dongwon Lee) and **ACS Lab** (Principal Investigator: Prof. Frank Ritter), College of Information Sciences and Technology (IST), Penn State University

Focus areas: Knowledge graphs, AI fact-checking, scientific claim verification, multilingual misinformation, and scalable FAIR AI systems.

Highly collaborative, active labs with publications in major venues such as AAAI, ACL and EMNLP

KEY RESULTS (1)

Advancing AI Infrastructure Across Domains

Developed *Athena Public Domain Literature Agent* (HCI search interface combining LLMs and graph metadata)

- 30% faster task completion vs. baseline
- Winner of Fred Loomis Outreach Prize (IST521)

Developed ***UNified Model*** (policy-aligned ML for displaced children)

- Predict displaced children education outcomes in data sparse regions (Iraq, Uganda)
- Winner: UNHCR-OECD Datathon, IFMS 2025 invited presentation

KEY RESULTS (2)

New Open Benchmarks and Scientific Contributions

BLUFF Dataset (Disinformation Benchmark)

- 100,000 samples across 66 languages (20 high-resource, 46 long-tail)
- Planned submission: Transactions of the ACL

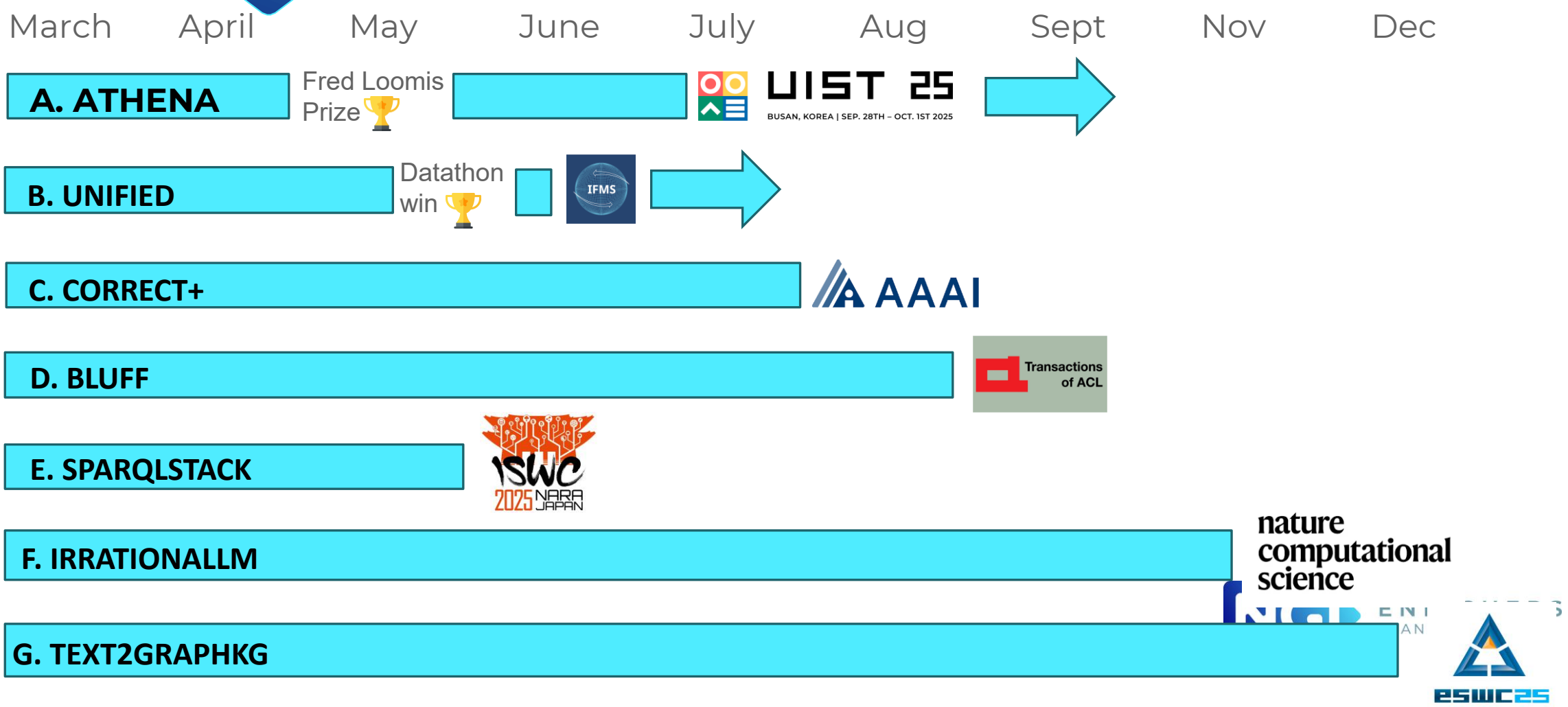
CORRECT+ (Fact-Checking with Knowledge Graphs)

- Extends scientific claim verification by integrating ConceptNet subgraph embeddings
- Planned submission: AAAI 2025

Established durable connections with Penn State PIKE Lab, APCS Lab, ADAPT Centre, UNHCR, OECD,

NGI ENRICHERS TRANSATLANTIC

IMPLEMENTATION – SUBMISSION SCHEDULE



EXPECTED IMPACT

Advancing Human-Centered AI for Global Development

Equity and Inclusion: Enable underserved populations by addressing data gaps for displaced children, low-resource languages, and vulnerable communities.

Openness and Interoperability: Release FAIR datasets (BLUFF, UNified), open-source codebases, and reproducible evaluation pipelines.

Policy Transparency and Social Participation: Support evidence-based policymaking (UNHCR, OECD) by making invisible populations visible in education, protection, and humanitarian data.

Sustainability and Resilience: Deliver compute-efficient architectures (SPARQLStack, UNified) that reduce AI costs while ensuring scalable deployment in resource-constrained settings.

NGI ENRICHERS TRANSATLANTIC

LESSONS LEARNED

What I wish I knew: The scale of cross-disciplinary integration required to translate technical models into actionable policy tools, the key differences in structure in US labs vs EU labs

Surprises: High demand from policy stakeholders (UNHCR, OECD) for simple, explainable models rather than complex architectures.

Challenges: Balancing technical depth across domains (HCI, geospatial ML, fact-checking, behavioral experiments) while maintaining clear communication for non-technical audiences.

Impact: Sharpened my ability to design modular, interpretable systems that bridge scientific rigor and real-world applicability; expanded my transatlantic network into active policy domains.

Matt Murtagh

PhD Researcher at Trinity College Dublin/ Lead Developer of Athena

Matt Murtagh

mmurtagh@tcd.ie

(N/A)

(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.

Vitalera – AI-Powered Remote Health Monitoring for Chronic Care

Nuria Pastor Hernández
Spain

CEO and Co-founder of Vitalera

Track
Digital Health / AI / Remote Monitoring
Host Organization
Temple University, Philadelphia, Pennsylvania, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Problem Being Solved: with chronic diseases driving **70% of healthcare costs** and global spending set to **surpass $47 trillion by 2030**, while a **10 million healthcare worker shortage looms**, the elderly and chronic care crisis is spiraling out of control—those who **fail to act now will be left behind in a collapsing system.**

How It's Identified: *Seen in hospitals, clinical research and clinics.*

For Whom / Audience: *Clinics, pharma, MedTech firms*

Who's Doing This: *Current Health, Philips, etc.*

Why There's Opportunity: **U.S. digital health market is poised for rapid expansion, projected to grow from approximately $180 billion in 2024 to over $860 billion by 2035, reflecting an annual growth rate of around 15%.** This growth is driven by increasing demand for scalable healthcare solutions, widespread adoption of interoperable electronic health records (EHRs), and regulatory incentives supporting digital transformation. National initiatives focused on value-based care, telehealth reimbursement, and patient data accessibility are positioning the U.S. as a global leader in digital health innovation.

vitalera NGI ENRICHERS TRANSATLANTIC

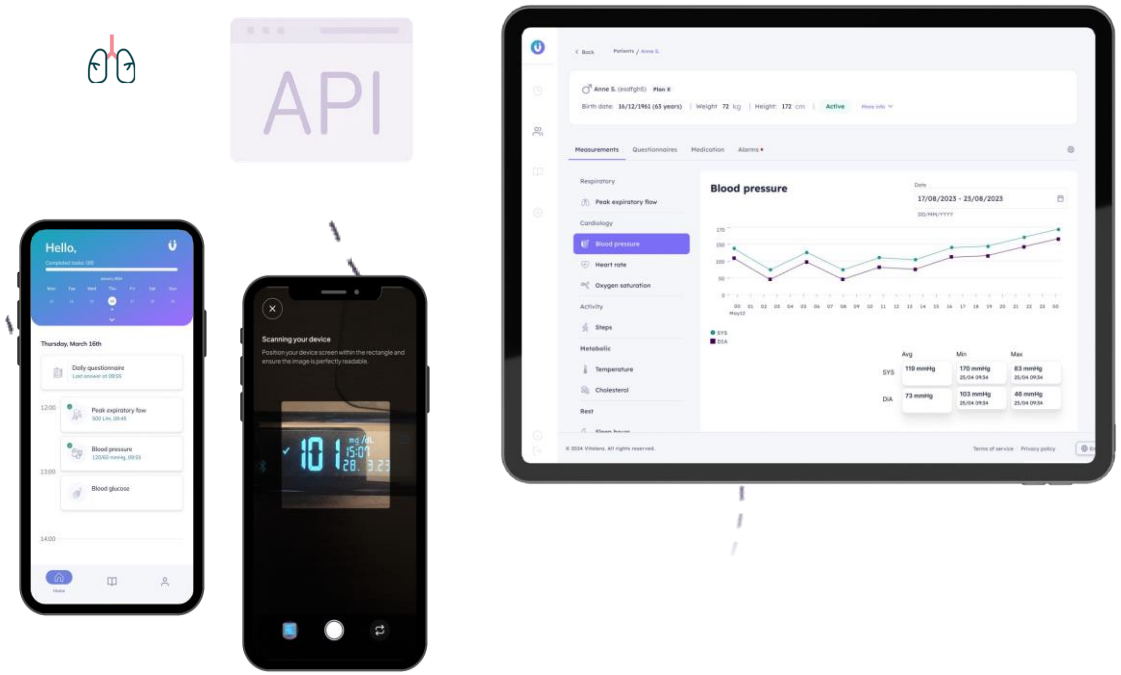
YOUR SOLUTION

Technology: ***AI-powered remote monitoring***
*v*italera uses AI to track health data from patients in real time, integrates with wearables and medical devices, and supports clinical workflows. with **vitalera,** care becomes **proactive, preventive, and seamless**—guiding patients across their journey and **optimizing healthcare professionals' time and reach.**

Differentiator:*Flexible, modular, disease-agnostic*
Unlike single-purpose tools, Vitalera works across conditions, adapts to client needs, and is easy to deploy in various settings.

Competitive Advantage: ***Interoperability + accessible cost***
It connects with existing systems, scales fast, and is affordable for both public and private healthcare sectors.

Opportunity (and Size) *Chronic care & RWE market → $200B+*
The digital health and real-world evidence markets are growing rapidly. Vitalera fits into both with a scalable B2B2C model.



vitalera NGI ENRICHERS TRANSATLANTIC

OUR SOLUTION:

Also:

- **Android & iOS SDK** for third party apps to integrate with Bluetooth devices
- **REST API** to use all our features in third party systems

vitalera NGI ENRICHERS TRANSATLANTIC

TEAM

Nuria Pastor Hernández

Digital Health Executive with over 10 years of international experience.

As CEO and Co-founder of Vitalera, she has scaled the company to 30+ healthcare organizations, secured €3.3M in funding, and led its U.S. expansion in 2024.

She holds advanced degrees in psychology and health research and is a graduate of Stanford's Scale-Up program.

vitalera NGI ENRICHERS TRANSATLANTIC

THE TEAM / EXPERTISE

Management
Backend
Frontend
Agile
Native SDK
Data Science
Regulatory
Project Management
+4 externals

vitalera

NGI ENRICHERS TRANSATLANTIC

YOUR HOST ORGANIZATION

NSF: I-Corp program

Temple University

vitalera NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (1)

Re-defining the Business Model to Enable Strategic Data Collection

Medtech Partnership Focus

We aim to transition toward a data-driven business model by leveraging partnerships in the MedTech space. Initial collaborations include:

- **Lifevit**: Partnered for integration of vital signs monitoring.
- **SleepO2**: Partnership under discussion or exploration for sleep and oximetry tracking.
- Other medtech companies.

Key Result 1: Launch pilot data collection integration with Lifevit and SleepO2 devices by Q3 2025.
Key Result 2: Define data monetization framework (anonymized health insights or AI training datasets) by end of Q2 2025.
Key Result 3: Establish at least 2 commercial agreements based on the new data-driven model by Q4 2025.

KEY RESULTS (2)

Healthcare Provider Validation

We have made significant strides in validating the solution and business model with clinical stakeholders:

- **Validated by 103 healthcare professionals** across the U.S. (Philadelphia, South Carolina, Boston) through feedback sessions and testing.
- **Interviewed 7 hospitals/clinics** for deep insights into remote care workflows, pain points, and integration needs.
- **Conducted exploratory conversations** with additional healthcare providers across different states to gather systemic feedback.

Key Result 4: Achieve formal letters of interest (LOIs) or pilot commitments from 3 of the 7 hospitals/clinics by Q3 2025.
Key Result 5: Document and publish a white paper on clinical validation results by Q3 2025.

KEY RESULTS (3)

Explore Adjacent Market: Virtual Nursing

A promising adjacent market is **Virtual Nursing**, especially in the context of U.S. nurse shortages and cost-driven care redesign:

- Identified strong interest from providers in leveraging virtual nurses for chronic care management, triage, and post-discharge monitoring.

- Early market research suggests increasing demand for remote workforce models that could pair with our solution.

Key Result 6: Launch a pilot program with a virtual nursing partner or service provider by Q4 2025.
Key Result 7: Validate business case and operational feasibility with at least one healthcare payer or insurer.

IMPLEMENTATION

🛠️ 6-Month Implementation Plan (Nonconfidential)

1. Business Model Execution (Months 1–3)

- Launch commercial pilots with MedTech partners (Lifevit, SleepO2) to validate data-driven value.
- Develop and test commercial offers tied to device integration and insights generation.

2. Healthcare Provider Pilots (Months 2–5)

- Activate pilots with 2–3 hospitals/clinics from the validated pool.
- Co-design monitoring protocols and gather clinical/user feedback.
- Publish initial results to support scaling and commercial discussions.

3. Virtual Nursing Exploration (Months 4–6)

- Assess operational feasibility and potential partners.
- Run a small-scale pilot combining virtual nursing with our monitoring system.

vitalera NGI ENRICHERS TRANSATLANTIC

IMPACT

	vitalera's impact
Cooperation	Building cross-continental collaborations (EU–US) with hospitals, MedTech, and academic partners (e.g., Temple University, Lifevit, SleepO2).
Data Privacy & Sovereignty	Data resides under user/provider control. Vitalera ensures full compliance with GDPR and HIPAA for ethical, secure data handling.
Data Protection	End-to-end encryption, secure APIs, consent layers, and role-based access controls reinforce system resilience and trust.
Digitalization	AI-powered remote monitoring and modular platforms improve clinical workflows, enable proactive care, and reduce provider burden.
Diversity	Inclusive design for multiple chronic conditions and adaptable UI/UX across populations with varied health literacy.
Equity	Expanding access to underserved communities through scalable mobile solutions and affordable business models.
Interoperability	Seamless HL7/FHIR integration and SDKs for third-party platforms, ensuring smooth collaboration across digital ecosystems.

LESSONS LEARNED: Validation of Different Markets

🇺🇸 United States – Clinical & Commercial Readiness

- **Validated by 103 healthcare professionals** (Philadelphia, Boston, South Carolina) through structured testing and feedback.
- **7 hospitals/clinics interviewed** to understand workflows, pain points, and integration readiness.
- **Key Result**: Targeting **3 pilot LOIs** by Q3 2025.
- Strong momentum in **Virtual Nursing** with interest in chronic care, triage, and post-discharge support.

🇪🇸 Spain – Strategic Growth Potential with an industrial partner (medtech)

- Digital health market projected to grow **from €7.4B (2024) to €62B (2035)**.
- Fully aligned with EU priorities: **interoperability, EHRs, and data sharing**.
- Leverage local partnerships and regulatory familiarity for pilot expansion.

🇪🇺 Broader Europe – Cross-border Expansion

- Ongoing connections via **NGI community** and research alliances.
- Participated in co-creation with clinicians and patient groups in Spain, Belgium, and Germany.
- **90%+ interest** from health professionals and patients to adopt remote monitoring tools.

vitalera NGI ENRICHERS TRANSATLANTIC

Nuria Pastor Hernández

CEO and Co-founder of Vitalera

Nuria Pastor Hernández

nuria.pastor@vitalera.io

(N/A)

(N/A)

NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

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PRIDE – Privacy, Resilience & Integrations for Decentralized Ecosystems

René Krikke
Netherlands

Director, Mr. Probot Ltd. ;
Entrepreneur in Business & IT

Track

Cybersecurity / Decentralized AI / Smart Contracts

Host Organization

Arizona State University, Arizona, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Need: address security and data/financial control issues, e.g. related to hacks and ecosystem/vendor lock-in, in decentralized AI and smart contract ecosystems.

Stakeholders & target audience: EU and US/Canadian innovators, entities like the Superintelligence Alliance (that we may compete or actually collaborate with), organizations prioritizing data privacy and security, users of smart contracts, EU stakeholders promoting self-sovereignty.

Opportunity: differentiate through local LLM functions, (more) human-centric automation, contributions to decentralized AI ecosystems, interoperability, and prioritizing Transatlantic if not universal solutions.

PROPOSED SOLUTION (1)

- Take the “Fuzzinator” NGI Enrichers project + the concept of an AI-based contract (Generator &) Validator, and create usable tooling
- Interoperability/compatibility: Unigrid/Cosmos/Hyperledger/Ethereum
- Differentiators: human-centric technology/innovations (*), collaboration & strategic partnerships, reciprocity (**), and (DAO) Governance
- Trillion-and-beyond overall market potential in (Cyber) Security and DLT overall

(*) 1) Use LOCAL AI/LLMS 2) Ensure ‘Human in/on the loop’

(**) concept/research ‘DLT for AI / Decentralized AI’, proposal/s e.g. dAIEDGE

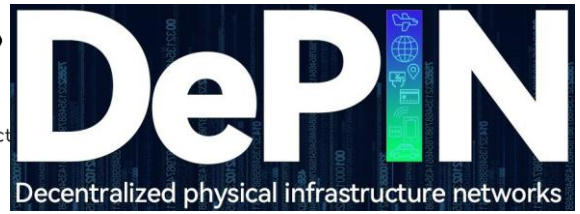
PROPOSED SOLUTION (2)

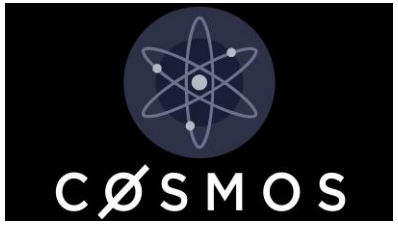
LLLM: "LOCAL LARGE LANGUAGE MODEL" (E.G. MISTRAL/LLAMA VIA OLLAMA/LMSTUDIO)

DLLM: "DECENTRALIZED LARGE LANGUAGE MODEL" (FEASIBILITY STUDY)

LLLM

1B. Tests





3A. DLLM (Concept)

2. Integrations

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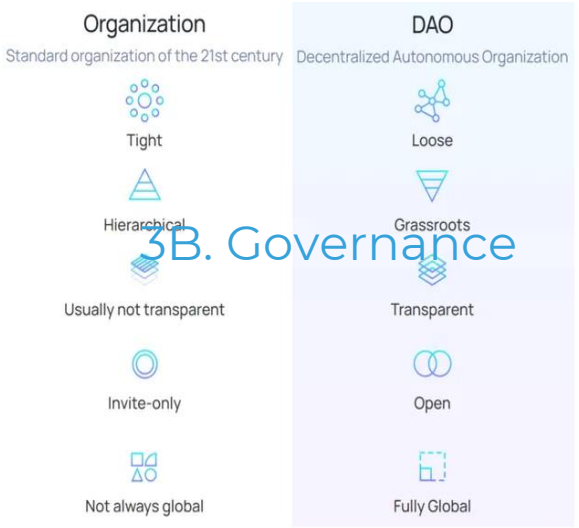
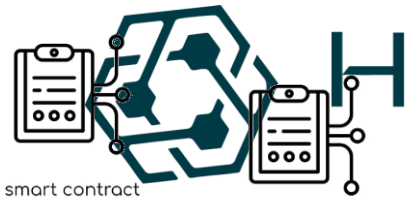
LLLM



3B. Governance



Hyperledger FOUNDATION

smart contract

¿

(L)LLM

1A. Generation & Validation (tool)

101

NGI ENRICHERS TRANSATLANTIC

FIRST & LAST NAME, POSITION
CURRENT ORGANIZATION

Entrepreneur with 2 decades of professional experience in Business & IT, specializing in Process, Project, Service & Change Management. Self-funded, but open to additional ventures, projects & financing.

Blockchain Executive with extensive background in International Business e.g. in (IT) Systems Administration, Tourism, Education, Sustainable Development, Learning & Collaboration, and Human Technology.

Continuously improving organizational & digital systems, together with partners all around the world. Always looking to create ever better outcomes for society, overall.

THE TEAM / EXPERTISE

Here are only a few of the fantastic people I worked & aim to work with:

Dragan Boscovic (HO contact) - Clinical Professor, AI, IoT & DLT expert

Nikola Radic – Software Engineer, 'PRIDE' Technical Lead, coded Tooling

Zoran Nasteki - Global Entrepreneur & Champion of Decentralization

Adam Waldenberg – Founder & CTO @Unigrid, Webhosting & Coding Expert

Simone Zerbini - Cyber Security Analyst, 'Fuzzinator' NGI Enrichers Fellow

Danny Robles – CEO & Founder @Intentify, IT System (UI/UX) Design Lead

Kostas Georgiou – CTO @Missionware, Senior (Security) SW Engineering

HOST ORGANIZATION: ARIZONA STATE

"The PRIDE project addressed an 'Open Challenge' at & with Arizona State University (ASU), with the institue matching perfectly with Fellow René Krikke in Cybersecurity, Data Sovereignty, Decentralized Internet, Trust, Web 3.0, AI, Digital Commons, Cloud & Edge, and Digitalization. Combined expertise had a positive impact on advancing combinations of Blockchain & LLM, especially via the *W.P. Carey Business School* and the *Arizona Blockchain Applied Research Center*, with Dragan Boscovic's contributions making a major difference, in particular, and significant (exploratory) work being done with others at ASU, including data experts Joseph Cazier, Tam McCreless, and AI specialist Jennifer Werner.

No less than 8 (!) Enrichers have worked with/at ASU since 2021, fostering long-term Transatlantic frameworks for Next Generation Internet technologies, including innovative combinations of AI & Distributed Ledger Technology (DLT).

KEY RESULTS (1) – ENHANCED LLM & AI

Intensive networking efforts: clarifying and verifying concepts and priorities, cross-referenced with market demand. There is a need for "Decentralized AI". Priority: validate and work out such concepts further.

Went from TRL1-2 (principles and concept) up to TRL4 with the development of a (Local) LLM-based tool that generates and validates smart contracts through an iterative design, development, and testing process.

Still requires further validation and maturation, but has proven its value as a lab-validated proof of concept.

KEY RESULTS (2) – TOOLING, CONCEPTS, CYSEC

While the specific integration of fuzzing techniques is still being worked on, they key element of LLM-based smart contract quality control (and thereby security) has been realized, and even enriched with LLM-based smart contract generation.

The concept of developing Blockchain/DLT based Distributed/Decentralized Artificial Intelligence (LLM) capabilities has -at least preliminarily- been proven to align with market demand and to be viable technically, though this does involve a very high level of complexity and a host of constraints. Likewise, creating a Distributed Autonomous Organization that integrates these aspects AND pragmatically addresses regulatory concerns requires significant follow up work.

Synergies between the ‘PRIDE tooling’ and Unigrid, Cosmos, and Polkadot ecosystems in terms of decentralized network capabilities, "sharded" resource management, and DePIN capabilities.

KEY RESULTS (3) - PARTNERSHIPS

We have made significant progress in building creating relationships and building (early) strategic partnerships, thereby creating new opportunities, and clarifying priorities to maximize the impact of the PRIDE project results.

We prioritize finding new and further developing existing collaborations with US and EU experts via organizations like ASU, NGI, Gaia-X, EBSI, and others to ensure optimal transatlantic connections for innovation and maximize mutual impact on respective societies.

More clear startup potential will be identified, let alone realized through the development of business plans, creation of perfected pitch decks, general networking, and approaching venture capital funds and other investors.

NGI ENRICHERS TRANSATLANTIC

KEY RESULTS (4) – OPEN & HUMAN-CENTRIC

Used, and contributed to, open science and especially open source tools. Remained ‘open’ both in terms of knowledge & ideas as well as tooling. No sales/licensing approach envisioned (as of yet), and any possible appropriation determined based on additional project results, feasibility, and ongoing negotiations.

The PRIDE project also successfully adopted a multidisciplinary and human-centric approach, the latter mostly by its focus on using Local LLMs, which have proven to be effective, though still in need of significant further development, in particular performance-wise. A more human-centric e.g. decentralized (and quite feasibly sharded) storage and compute resource exchange (e.g. the Unigrid) network also still retains significant potential for future development, though Unigrid itself had to be scoped pretty much entirely out of the PRIDE project due to unforeseen technical and organizational complications.

KEY RESULTS (5) – OVERALL PROGRESS

Stakeholders remain keen to benefit from associated (Transatlantic and broader) network effects by generating new business, funding, and job opportunities.

Concrete opportunity remains to commercialize our outputs by offering services related to such open insights & developments, e.g. by way of a startup or platform offering "Resilience & Integration Systems as a Service." Specific -initial- business plans are still being worked out, and more explicit engagement with regulators will facilitate compliance, leading to even larger societal impact.

Brainstorming and negotiations on public/private collaborations with a range of broad stakeholders and partners are ongoing; developed & developing high-quality project proposals for funding, and even 1 project funded already (NGI Trustchain).

IMPLEMENTATION

Next steps to implement the findings:

- **Ongoing: use public e.g. EU programs to innovate (FOSS tech) further**
- **3-6 months: develop Ready-to-Market tooling (e.g. UX/UI, fuzzing QA)**
- **4-6+ months: define concrete ('contract automation' & security/audit) services e.g. for (multi-party) Service Level Management (SLM)**
- **4-5 months: confirm exact (initial) target audience & feasible revenue (TAM) and target market/s (at least EU, feasibly US and/or Canada) → prep startup**
- **5-6+ months: find investors & launch startup/s**

EXPECTED IMPACT

- Easier to improve smart contract security and general quality and combat/resolve issues related to hacks and centralization/fragmentation
- Benefit (EU / US / Canadian) individuals, organizations, EU stakeholders, and innovators with resilient, human-centric automation solutions
- Promote self-sovereignty & autonomy in applying AI and general cloud infrastructure capabilities while enhancing the Transatlantic partnership
- More secure DLT and decentralized AI solutions for users, and increased interoperability between different systems and networks
- The ‘NGI Alumni group’ helps BUIDL a brilliant (EU / Transatlantic) future

LESSONS LEARNED

Complexity: the massive challenge of integrating LLMs (let alone local ones, which are amazing, but still need to mature) and decentralized networks led to delays and scope changes. Also, the sheer amount of resources that even Local models require is not be underestimated.

The value of human & our Transatlantic connections: working closely with stakeholders validated the need for human technology, and helped us identify opportunities & issues early on, and to adapt accordingly.

Flexibility: being able to pivot/adjust, and continuously improve is crucial. I wish I had known about Unigrid constraints earlier, but at least we managed to deal with them well, achieving project goals. The experience confirmed the need for 'it can always be better', e.g. by way of continuous learning.

René Krikke

Director, Mr. Probot Ltd. ; Entrepreneur in Business & IT

René Krikke

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NGI ENRICHERS TRANSATLANTIC

Keep engaged with our NGI Fellows !

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Decentralized Identity & Digital Trust for Human-Centric Internet for Decentralized Ecosystems

Zoran Nasteski
North Macedonia

Co-Founder & CEO of QX Ventures
Entrepreneur and Deep-tech researcher

Track
Decentralized Identity / Blockchain / Human-Centric Digital Trust

Host Organization
Arizona State University, Arizona, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Addressing the Crisis of Trust in Digital Interactions

Problem Definition:
Centralized digital platforms increasingly compromise user privacy, eroding trust and negatively impacting brand loyalty and consumer engagement. Additionally, regulatory fragmentation such as GDPR compliance challenges further complicate seamless digital interactions and data management.

Target Audience & Stakeholders:
- **Consumers:** Seeking increased control and security over personal data, more meaningful interactions, and enhanced privacy protection.
- **Brands and Cities:** Struggling with declining consumer trust and loyalty, leading to significant revenue loss and ineffective customer engagement.

Current Solutions & Limitations:
- **Centralized Advertising Platforms:** Monetize user attention, neglecting consumer privacy and control, thus exacerbating distrust.
- **Existing Blockchain Solutions:** Typically fail to meet EU-US regulatory standards (e.g., GDPR), lack seamless interoperability, and present high complexity and poor user experience, limiting widespread adoption.

Opportunity:
There is a clear market need and opportunity to explore a dedicated, transatlantic blockchain solution, specifically tailored to restore consumer trust, enhance privacy compliance, and foster meaningful, human-centric digital interactions across Europe and the US.

NOMINATED PROOF-OF-STAKE BLOCKCHAIN

A Human-Centric, Nominated Proof-of-Stake Blockchain

Technology & Approach:

- Exploration of an innovative Nominated Proof-of-Stake (NPoS) blockchain architecture.
- Research into Decentralized Identities (DID) and Self-Sovereign Identity (SSI) frameworks for privacy-focused user data management.
- Transatlantic academic collaboration with ASU's blockchain and technology researchers.

Competitive Advantages & Differentiators:

- Focused specifically on the transatlantic context (EU-US), bridging regulatory compliance like GDPR.
- Human-centric design validated through academic research (IEEE-ICBC publication).
- Strategic partnerships and research collaborations, notably with Arizona State University and regional innovation ecosystems (SRP, J. Orin Edson Institute).

Market Opportunity & Size:

- Addressing a significant portion of a growing trust-based blockchain market projected at €60 billion by 2028.
- Offering tangible and scalable pathways for enterprises, cities, and consumers across Europe and North America.

NOMINATED PROOF-OF-STAKE BLOCKCHAIN

A Human-Centric, Nominated Proof-of-Stake Blockchain

Blockchain Architecture:

- Nominated Proof-of-Stake (NPoS) mechanism for enhanced scalability, security, and energy efficiency.
- Decentralized Identity (DID) and Self-Sovereign Identity (SSI) frameworks integrated for secure user data control and compliance (GDPR/eIDAS).

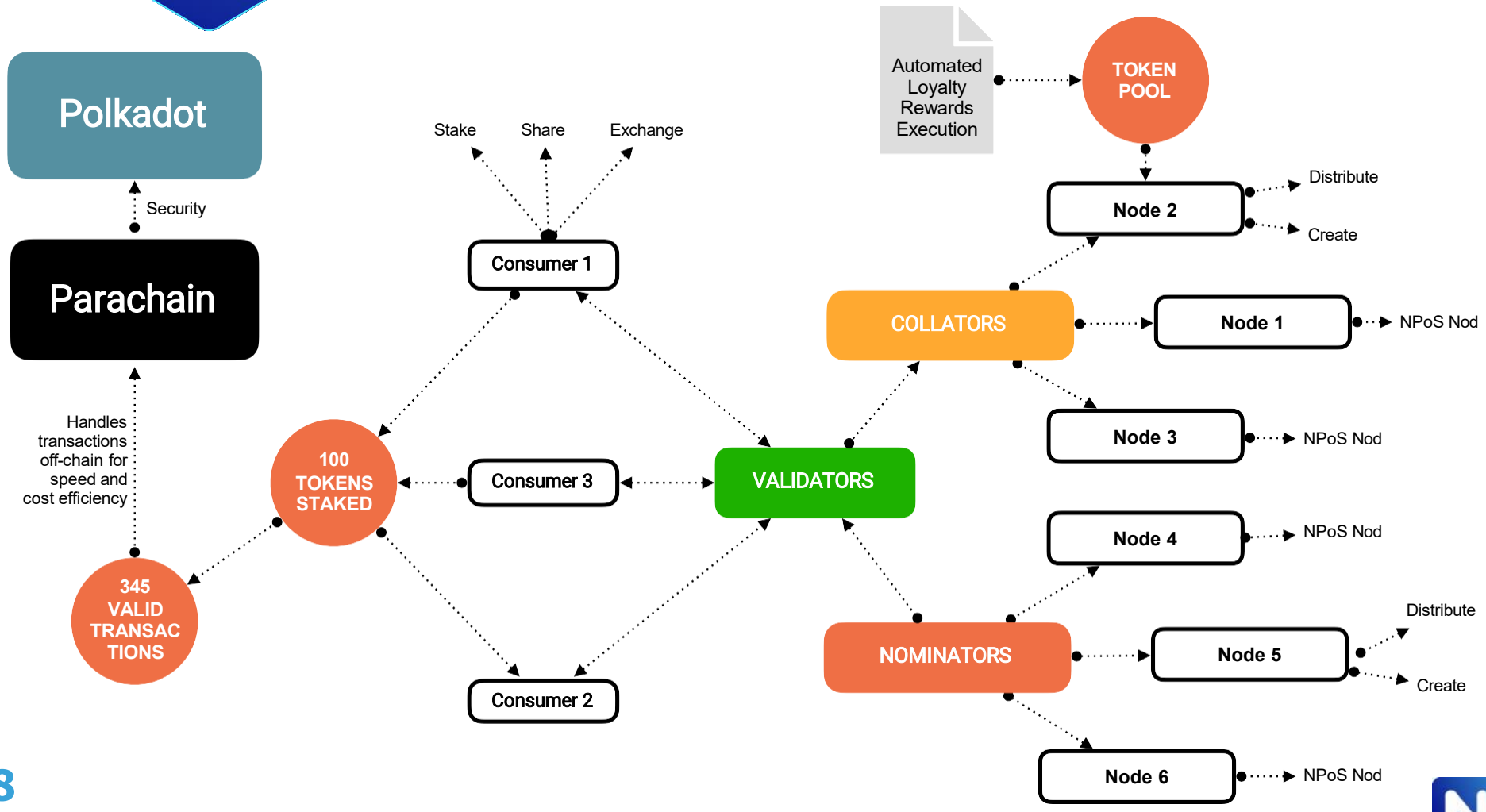
Key Technical Components:

- Ethereum Layer 2 scalability for high transaction throughput and minimal fees.
- Privacy Enhancing Technologies (PETs) including Zero-Knowledge Proofs (ZKPs) for secure, verifiable interactions.
- Interoperability designed explicitly for transatlantic compliance and seamless integration with existing enterprise infrastructures.

•**Collaborative Development:**

- Jointly researched and validated with blockchain researchers, PhD candidates, and technology experts at Arizona State University.
- Human-centric methodologies, validated academically through the IEEE-ICBC publication, ensuring intuitive usability and robust adoption pathways.

CONCEPTUAL TECH DESIGN DIAGRAM



ZORAN NASTESKI

An award-winning tech entrepreneur and innovator, currently leading QX Ventures–a company specializing in blockchain, decentralized identity, and consumer-centric digital solutions. With 15+ years of international experience in digital product development, business scaling, and innovation management, Zoran has successfully secured funding from prominent investors such as CDP Italy, Startup Wise Guys, Startupbootcamp, EBRD, and NGI.

He is a recognized participant in global entrepreneurship programs, notably the Global Entrepreneurship Summit (GES) and Young Transatlantic Innovation Leaders Initiative (YTILI), through which he connected with industry leaders and strengthened his international network. Driven by innovation and social impact, Zoran notably led a student initiative raising significant funding to support children in need of critical surgeries.

NGI-Related Achievements:

- **Publication:** Co-authored and published a research paper at the IEEE-ICBC conference in Pisa, exploring a human-centric approach to blockchain technology.
- **Awards and Recognition:**
  - Finalist at the SRP Small Business Academy at Arizona State University (ASU), selected among the top five startups out of 68.
  - Secured 120.000€ under NGI TrustChain for development of QXChain - Nominated Proof-of-Stake Blockchain.
  - Selected to present as a success story at the NGI Enrichers final event in Davos.

THE TEAM / EXPERTISE

Zoran Nasteski (Chief Executive)

Expertise: Go to market; Business Development; Product Design, Management

Zoran is a visionary tech entrepreneur and deep tech researcher with 15+ years of experience in product management, design, marketing, and growth hacking. He has secured funding from top European investors and established a strong network within the tech community. With a competitive spirit and data-driven decision-making, Zoran excels in high-pressure environments. Passionate about creating and building, he is driven to make a positive impact in the tech industry.

Hristijan Jankulovski (Chief Architect)

Expertise: Python; API; Algorithmic AI/ML; Blockchain; Product Ownership

With an MS in Computer Science from the University of Ljubljana and a decade of hands-on development experience, Hristijan has navigated the startup landscape, crafting solutions that range from compact tools to intricate enterprise architectures. He has seamlessly operated as a one-person powerhouse and leader, steering full-scale development teams.

Teodor Bogoeski (Chief Blockchain)

Expertise: Tokenometrics; Solidity; Cryptobraphy; Python; Blockchain

A deep tech creator and entrepreneur who revels in challenging norms and pushing boundaries. With an innate grasp of decentralised innovation and Web3, Teo brings a fresh perspective to the European tech ecosystem. Drawing from 7 years of startup experience, international hackathon victories and awards and with an impressive track record of transforming ideas into market-ready products.

HOSTED BY:
ARIZONA STATE UNIVERSITY (ASU)

Background & Context:

W. P. Carey School of Business at Arizona State University (ASU), particularly the Department of Information Systems, is globally recognized for its strong commitment to business innovation, digital transformation, and interdisciplinary technology research. The school is well-known for its pioneering work in blockchain, decentralized identity frameworks, cybersecurity, and digital innovation management.

NGI Experience & Alignment:

W. P. Carey actively participates in cutting-edge research and practical applications of blockchain technology, particularly through dedicated research labs and innovation initiatives led by experts such as Professor Dragan Boscovic. The school's emphasis on human-centric design, ethical technology development, and regulatory alignment (including GDPR/eIDAS compliance) perfectly matches NGI Enrichers' mission to foster inclusive, sustainable, and innovative transatlantic collaboration.

Value of Fellowship at ASU:

- Enabled advanced academic exploration and research into Nominated Proof-of-Stake blockchain and Decentralized Identity (SSI/DID) concepts.
- Facilitated robust connections within Arizona's entrepreneurial ecosystem, including critical engagements at the J. Orin Edson Entrepreneurship + Innovation Institute.
- Provided valuable mentorship, notably by Professor Dragan Boscovic, enhancing the fellowship's transatlantic impact, strengthening academic and business networks, and supporting the successful development of concrete research outcomes and practical use cases.

KEY RESULTS (1)

(Technology Development and Validation)

Development of Innovative Technologies (TRL advancement)

- Initiated and significantly progressed the white paper detailing a Nominated Proof-of-Stake (NPoS) blockchain solution, advancing its Technology Readiness Level (TRL) through rigorous academic collaboration with ASU.

Scientific Validation

- Successfully co-authored and published a scientific paper at the IEEE-ICBC conference in Pisa, academically validating a human-centric approach to decentralized blockchain technology, thereby strengthening the scientific foundation of the project.

Testing and Piloting Technologies

- Conducted preliminary exploration and user-centric tests, validating blockchain technology concepts within controlled scenarios, laying foundational insights for future pilot projects and real-world deployment.

KEY RESULTS (2)

(Collaboration and Strategic Partnerships)

Strengthening Research Collaborations (US)

- Established extensive collaborative relationships with over 10 blockchain and computer science researchers, PhD candidates, and professors at ASU's W. P. Carey Department of Information Systems, enhancing academic rigor and transatlantic research connections.

Strengthening Innovation Collaboration (US)

- Actively participated in innovation-driven ecosystems such as the J. Orin Edson Entrepreneurship + Innovation Institute and Venture Café Phoenix, substantially increasing interactions, exchanging ideas, and cultivating a vibrant innovation network.

Building Solid Partnerships (EU-US)

- Developed strong connections and initiated discussions for future collaborations and pilot deployments with prominent entities, notably Salt River Project (SRP) and ASU's procurement teams.

Accelerated Investor and VC Engagement (US/EU)

- Initiated strategic discussions with venture capital and accelerator programs including Plug and Play Arizona, CDP Italy, and America's Seed Fund, setting a clear trajectory for future investment and growth.

KEY RESULTS (3)

(Funding, Community Engagement, and Recognition)

Fundraising (EU/US)

- Successfully submitted and secured a €120,000 project grant under NGI TrustChain Open Call 5, collaboratively developed with NGI Enrichers peers and awarded for blockchain technology development, emphasizing cross-project synergies.

Expanding Collaboration within the NGI Community

- Significantly expanded collaboration and networking within the broader NGI community, notably through active participation, exchange of best practices, and integration of feedback received from the NGI Enrichers consortium.

Startup Establishment (US)

- Prepared incorporation plans and secured a strategic late-stage female co-founder based in the US, laying solid groundwork for the establishment of an Arizona-based C-Corporation, thereby significantly advancing business operations and market entry strategies.

Conference Attendance and Dissemination

- Presented research findings and technological insights at key academic and industry events, notably the IEEE-ICBC conference, and selected as a finalist at the SRP Small Business Academy, significantly increasing visibility, recognition, and credibility.

Recognition and Validation at NGI Enrichers Final Event

- Voted and selected as a success story by an anonymous jury and audience at the NGI Enrichers final event, leading to an invitation to present at Davos, showcasing significant recognition of the project's impact and potential.

IMPLEMENTATION

Finalization and Dissemination of Research:

- Finalize and disseminate the QX Chain white paper by the end of 2025, detailing comprehensive research insights into Nominated Proof-of-Stake (NPoS), Decentralized Identity (SSI/DID), and human-centric blockchain technology.
- Submit and publish findings in relevant academic and blockchain-focused industry journals and conferences.

Establish US Presence and Incorporation:

- Initiate the formal process to incorporate an Arizona-based C-Corporation, laying the groundwork for a robust transatlantic business presence.
- Finalize and formalize the strategic partnership with the identified late-stage female co-founder to enhance leadership diversity and local market expertise.

Pilot Projects and Technology Validation:

- Initiate and conduct structured pilot projects in collaboration with regional entities (SRP and ASU procurement teams), validating technological effectiveness, scalability, and usability in real-world environments.

Strategic Fundraising and Investor Engagement:

- Continue ongoing engagements with potential investors, accelerators, and venture capital firms (Plug and Play Arizona, America's Seed Fund, CDP Italy) to secure essential early-stage investment, capitalizing on the strategic groundwork already laid.

Expand and Strengthen Academic and Innovation Network:

- Deepen collaboration with ASU's J. Orin Edson Entrepreneurship + Innovation Institute and W. P. Carey School of Business to sustain innovation-driven partnerships and talent recruitment.
- Continue active participation and networking at Venture Café Phoenix, reinforcing local and international innovation relationships.

EXPECTED IMPACT

Human-Centric Technology Development

- Advance digital inclusivity and consumer empowerment by enabling secure and user-friendly decentralized identities (SSI/DID).
- Promote autonomy, data privacy, and user rights by offering users transparent control over personal data through intuitive blockchain-based solutions.

Transatlantic Cooperation and Innovation

- Strengthen EU-US collaboration by creating sustainable academic and commercial partnerships, fostering ongoing knowledge exchange and technological co-development.
- Contribute significantly to a shared innovation ecosystem, enhancing collaboration and communication between European and North American blockchain communities.

Sustainable Economic and Social Impact

- Create high-quality, ethically-aligned job opportunities in blockchain, digital identity management, and decentralized technologies, notably targeting diverse talent and empowering workers.
- Enable sustainable growth by facilitating scalable, green blockchain technology adoption, addressing environmental sustainability through reduced energy consumption inherent to Nominated Proof-of-Stake.

Impact on Digital Economy and Market

- Improve competitiveness of enterprises and local governments by reducing reliance on centralized digital platforms, enhancing transparency, and fostering trust.
- Directly contribute to a projected €60 billion trust-based blockchain economy by 2028, promoting equitable and sustainable economic interactions across the transatlantic market.

Long-term Global Impact

- Support global digital transformation by aligning with core European ethical values, ensuring transparency, privacy, and user-centered technology solutions.
- Demonstrate the transformative potential of decentralized identity technologies for consumer engagement, privacy protection, and robust regulatory compliance (GDPR/ eIDAS).

LESSONS LEARNED

Contextual Relevance is Essential

- Deeply understanding users' real-world contexts and needs significantly enhances technology adoption and effectiveness. Contextual inquiries and ethnographic studies at ASU revealed practical insights, highlighting the importance of aligning decentralized identity solutions with tangible user experiences.

Human-Centric Approach Drives Engagement

- Implementing a user-centric methodology is vital. Clear and intuitive interfaces combined with targeted real-world applications were more effective than purely technical blockchain advantages. IEEE-ICBC publication reinforced the importance of usability, trust, and accessibility in blockchain innovation.

Strategic Partnerships Enable Growth

- Building a strong transatlantic network, academic collaboration, and meaningful strategic partnerships were critical outcomes. Ongoing engagement with ASU, J. Orin Edson Entrepreneurship + Innovation Institute, and Venture Café Phoenix provided invaluable insights, validation, and support.

Inclusive Leadership is a Competitive Advantage

- Actively seeking diverse and inclusive leadership–such as recruiting a US-based female co-founder–strengthened project innovation, credibility, and adaptability. This approach proved crucial for sustainable long-term business and technological success.

Continuous Engagement and Iteration are Crucial

- Regular interactions with stakeholders and the innovation ecosystem significantly improved the project's strategic direction, increased credibility, and ensured responsiveness to user needs and market realities.

Zoran Nasteski

Co-Founder & CEO of QX Ventures / Entrepreneur and Deep-tech researcher

Zoran Nasteski

zoran@qx.ventures

(N/A)

(N/A)

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

EXCEPTIONAL AI – Reasoning with Exceptions

Gabriele Sacco
Italy

PhD student in Computer Science

Track
Artificial Intelligence / Cognitive Science / Logic

Host Organization
University of Toronto, Ontario, Canada

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THE PROBLEM - KNOWLEDGE AND EXCEPTIONS

- **Defeasible reasoning** is that kind of reasoning where **exceptions** are tolerated
  - In **common sense** contexts, humans normally carry on this kind of reasoning
  - For a more natural and fruitful cooperation between artificial agents and humans, we would like defeasible reasoning to be one of the abilities of **artificial intelligence** (AI)
  - For an artificial agent to carry out defeasible reasoning, it should be able to accept exceptions to what it knows.
- **Knowledge Representation (KR) is the field studying how to model what an agent knows**
  - This representation is modelled through **logical** languages
  - Classical logic is not able to accept exceptions
- **The problems:**
  - How should defeasible reasoning be **understood**?
  - How is it possible to represent formally knowledge that tolerates **exceptions**?
  - What should be the **desirable** way to model defeasible reasoning?

PROPOSED SOLUTION - LOOKING TO PHILOSOPHY AND COGNITIVE SCIENCES

- A **multidisciplinary** approach which aims at using the results coming from philosophy and cognitive sciences for analysing and developing the formal models

  Given that the aim is to model an ability peculiar of humans, it is important to understand that ability and how humans can realise it

  - Defining what **exceptions** are

    Through a focus on the notion of **exception**, I want to give an ontological account of **defeasibility** in order to develop the tools and the framework for a comparison of the different approaches and make clear their **ontological commitments**

  - Considering how **humans** deal with exceptions

    Using the results coming from the **psychology of reasoning**, I want to extract those feature that are desirable for defeasible reasoning artificially reproduced. These **desiderata** should be those that are needed foreseeing the **interaction** between humans and artificial agents.

  - Developing a **formal model** for representing knowledge tolerating exceptions

    In the context of **DLs**, I want to develop a **formal representation** of defeasible reasoning that **considers** the desiderata emerging from the human way of doing defeasible reasoning and the framework emerged from the philosophical analysis of exceptions and so defeasibility.

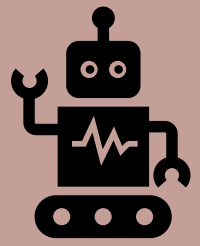
PROPOSED SOLUTION ILLUSTRATION

PHILOSOPHY

Defining exceptions:

- Always relative to a generalisation
- Related to *generics*, *ceteris paribus laws* and *quantification*

ARTIFICIAL INTELLIGENCE



- Description Logics
- Non-monotonic logic
- Automated reasoning

Features of defeasible reasoning:

- Dependance from previous knowledge
- Both qualitative and quantitative

COGNITIVE SCIENCES

GABRIELE SACCO, PH.D. STUDENT

FREE UNIVERSITY OF BOZEN-BOLZANO AND FONDAZIONE BRUNO KESSLER

Personal statement:

I am a Ph.D. student in Computer Science at the University of Bozen-Bolzano and Fondazione Bruno Kessler (FBK), a research institute in Trento, Italy.
With my supervisors Dr. Loris Bozzato, Prof. Oliver Kutz and Luciano Serafini, I am working on exploiting results on defeasible reasoning and related phenomena coming from philosophy and cognitive sciences to develop formal systems which are able to deal with knowledge which may have exceptions.

Education:

- **Current position:** Ph.D. student in Computer Science at University of Bozen-Bolzano and Fondazione Bruno Kessler (FBK),
- Master's degree in Philosophy at the University of Trento (grade: 110/110 with honours)
- Bachelor's degree in Philosophy at the University of Trento (grade: 110/110 with honours)

Relevant Publications:

- Sacco, G., Bozzato, L. & Kutz, O. (2024). Know Your Exceptions. In C. Trojahn, D. Porello and P.P.F. Barcelos (Eds.), Formal Ontology in Information Systems - Proceedings of the 14th International Conference (FOIS 2024), Enschede, The Netherlands, July 2024. Frontiers in Artificial Intelligence and Applications (Vol. 394, pp. 254–267). IOS Press. doi:10.3233/FAIA241312.
- Sacco, G.; Bozzato, L.; and Kutz, O. 2023. Generics in defeasible reasoning: Exceptionality, gradability and content sensitivity. In Proceedings of the 9th Joint Ontology Workshops 2023, Sherbrooke, Québec, Canada, July 19-20, 2023, volume 3637 of CEUR Workshop Proceedings. CEUR-WS.org
- Sacco, G.; Bozzato, L.; and Kutz, O. 2023. Defeasible reasoning with prototype descriptions: First steps. In Proceedings of the 36th International Workshop on Description Logics (DL 2023), volume 3515 of CEUR Workshop Proceedings. CEUR-WS.org.

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MY RESEARCH TEAM

Loris Bozzato

Position: *researcher*
Project role: *supervisor*
Interests: *knowledge representation and reasoning*
Affiliation: Università dell'Insubria
Scholar: link

Oliver Kutz

Position: *associate professor*
Project role: *supervisor*
Interests: *cognitive artificial intelligence and applied ontology*
Affiliation: Free University of Bozen-Bolzano
Scholar: link

Luciano Serafini

Position: *head of unit*
Project role: *supervisor*
Interests: *knowledge representation and reasoning*
Affiliation: Fondazione Bruno Kessler
Scholar: link

Michael Gruninger

Position: *professor*
Project role: international *host*
Interests: *ontologies, semantic web and mathematical logic*
Affiliation: University of Toronto
Scholar: link

NGI ENRICHERS TRANSATLANTIC

HOST ORGANIZATION: UNIVERSITY OF TORONTO

I have chosen the **University of Toronto** as my host organization because

- **Professor Gruninger** is a leading scientist in the applied ontology community and past president of *The International Association for Ontology and its Applications*
- He is an expert in the fields of **mathematical logic** and **knowledge representation**, which are key topics for my project
- Professor Gruninger's work on developing models for manufacturing and enterprise engineering is a great example of **multidisciplinary research** across logic, ontology and engineering.
- His interest on the application of ontological theories to real world contexts, where exceptions dealing is a crucial skill helpded me in individuating interesting and important **use cases** for my project.
- The opportunity to study and do research at **one of the best universities** in the world will have a strongly beneficial impact on my career
- Going to **Canada** and collaborating with other researchers opened important opportunities for my future

KEY RESULTS: PAPER SUBMISSION

The investigation of the application of defeasible reasoning and non-monotonic logics to a specific applied ontology led to the submission of the paper *Non-Monotonic Generalisation of an Ontology* written with *Loris Bozzato, Michael Grüninger and Oliver Kutz* to the workshop **CAOS: Cognition And OntologieS**.

This paper is understood as a first step in a more general line of research aimed at exploring and defining the **non-monotonic generalisation of ontologies**.

KEY RESULTS: CONFERENCE ATTENDANCE

The acceptance of the paper would mean its **presentation** at the workshop, which is organised at the *11th edition of the Joint Ontology Workshops (JOWO)* held at the *15th International Conference on Formal Ontology in Information Systems (FOIS 2025)* in Catania, Italy (8-12 September 2025).

This will allow me to discuss the results obtained during my mission with other experts attending the workshop, but also to interact with leading figures in applied ontology coming to the main conference.

KEY RESULTS: STRENGTHENED COLLABORATION WITH THE HOST

The mission set the basis for a **long-term collaboration** on the original topic of *non-monotonic generalisation of an ontology*, which combines the fields of defeasible reasoning and applied ontology.

The aim is to develop further the results obtained so far to get a conference paper and finally a journal paper.

WHAT'S NEXT?

Next 6 months:

- Start of the writing of the thesis
- Attendance at *the Joint Ontology Workshops (JOWO)* held at the *15th International Conference on Formal Ontology in Information Systems (FOIS 2025)* in Catania, Italy (8-12 September 2025)
- Further work on the *non-monotonic generalisation of ontologies*

EXPECTED IMPACT

- Since exceptions are common in the human experience of the world, making AI able to deal with them would make it more **resilient**
- A symbolic approach to uncertainty, which means **transparency** on how the system works and **explainability** of the results reached
- Developing an ontological account of exceptions and individuating desiderata for formal systems modelling defeasible reasoning will give the tools for testing and evaluating those systems, granting **security** when deployed in the real world
- Exceptions are common in human interaction, so it is important to make AI able to deal with them in a way that is also **understandable** for humans

LESSONS LEARNED

- I experienced firsthand how working in academia is working in a **community** beyond borders

- I could have exploited the time of my stay in Toronto better, having more **precise plans** before my departure
  - Therefore, I learned that a good preparation before the start of the mission is key to gaining the maximum from experiences like this, especially with more dialogue with the host before the department

Gabriele Sacco

PhD student in Computer Science

Gabriele Sacco

gsacco@fbk.eu

(N/A)

Google Scholar

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MLQCG – Machine Learning for Quantum Circuit Generation

Maurizio Ferrari Dacrema
Italy

Assistant Professor (RTDa) at Politecnico di Milano

Track
Quantum Computing / Machine Learning / State Preparation

Host Organization
Fermilab, Batavia, Illinois, USA

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THE PROBLEM

Research Question: Quantum computing (QC) algorithms often assume the input data has already been encoded in a specific quantum state. This step requires to design a tailored sequence of operations that accounts for hardware constraints and imperfections.

Opportunity: Constructing efficient state preparation circuits is computationally demanding and typically relies on heuristic or manual methods. The opportunity lies in leveraging machine learning to discover not only effective, but also minimal sets of quantum operations, reducing circuit depth and mitigating the impact of noise.

Target Audience: Developing compact and optimized state preparation strategies supports researchers and practitioners working to apply quantum computing in real-world scenarios where noise and scalability are critical concerns.

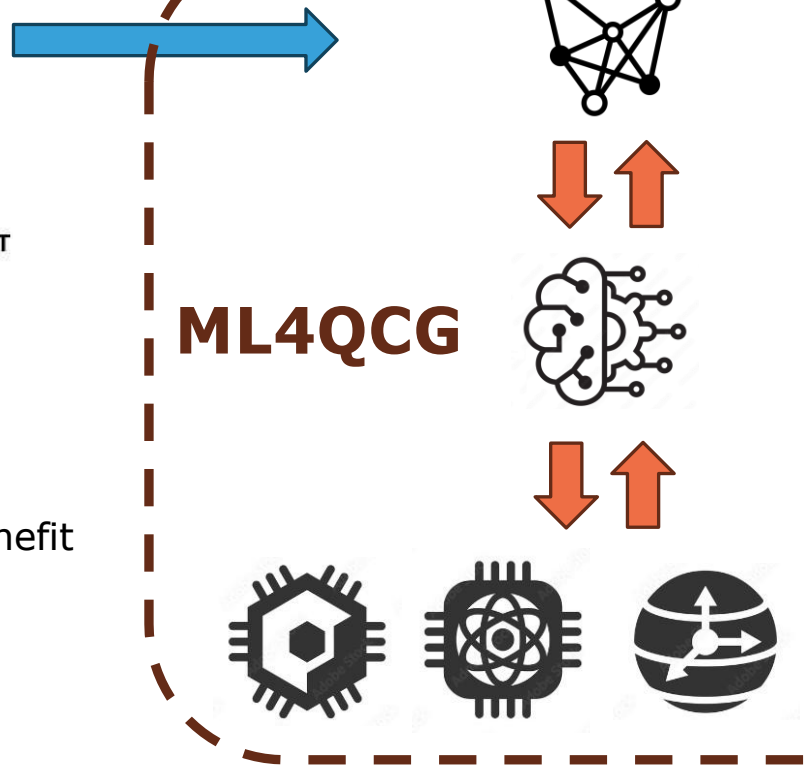
MLQCG

- This project applies **machine learning principles** to improve quantum state preparation for **bosonic quantum computers** developed at Fermilab.
- It enables **hardware-tailored circuits** with fewer operations, reducing noise without sacrificing accuracy.
- The method has been validated on complex states **beyond current hardware capabilities**.
- As quantum computing scales, efficient circuit design is a **key enabler**.
- The project also strengthens **EU-US collaboration** on quantum technologies.

MLQCG

Application

Many applications could benefit from quantum computing



Quantum Algorithm

- Abstract from quantum hardware
- Requires input data encoded as quantum states

Intelligence Layer

- Finds the right sequence of operations
- Optimizes accuracy and scalability

Quantum Computer Technology

- Different sources of error
- Different available operations

MAURIZIO FERRARI DACREMA, RESEARCHER POLITECNICO DI MILANO

Assistant Professor (Researcher/RTDa) at Politecnico di Milano

Academic Career:

- 2023-today, **Assistant Professor**, Politecnico di Milano
- 2023-today, **Researcher**, National Centre for HPC, Big Data and Quantum Computing
- 2020-23, **Research Assistant**, Politecnico di Milano
- 2016-20, **PhD with honours** in Information Technology at Politecnico di Milano
- 2019, **Visiting Researcher** at Alpen-Adria-Universität Klagenfurt, Austria

Publications and Impact:

- More than **70 peer-reviewed publications** in international conferences and journals, most of them on NGI topics, with more than 1800 citations
- Participation to **6 EU Horizon 2020 projects** (1 as WP co-leader), and technical responsible of **2 industrial projects**

THE TEAM / EXPERTISE

- I am part of the **Quantum Computing Lab at Politecnico di Milano**, composed of 10 Professors, 1Assistant Professor, and 7 PhD students.
- The lab is coordinated by **Paolo Cremonesi**. He is Full Professor and co-director of the quantum computing activities at the Italian National Centre for HPC, Big Data, and Quantum Computing (ICSC).

- Fermilab SQMS Contact: **Silvia Zorzetti**

YOUR HOST ORGANIZATION: FERMILAB

- This project lies at the intersection of quantum computing and computer science, and calls for the development of novel, **cutting-edge methods**.
- Advancing quantum technologies demands close **collaboration between physicists and computer scientists**.
- Fermilab's strong expertise in quantum hardware and algorithms aligns well with my computer science background.
- The expedition also offered a valuable opportunity to initiate **long-term collaborations** between Fermilab and Politecnico di Milano.

KEY RESULTS (1)

The project focused on a specific state preparation protocol (SNAP-Displacement), leading to a deeper understanding of its internal structure.

A first key result is that **naïve parameter reduction methods offer limited benefits**. While **exploiting the structure of quantum operations**, rather than simply reducing their number, can lead **to significantly better outcomes**.

A second key result is the identification of structured phase layouts that **substantially reduce the number of quantum operations required**, enhancing both scalability and noise mitigation.

KEY RESULTS (2)

The project validated the structure of the SNAP-Displacement protocol and showed that structured phase arrangements offer **clear advantages over naïve parameter reduction**.

Key outcomes include:

- Successful testing on simulated systems **beyond current hardware capabilities**.
- Development of a strategy to **balance accuracy and circuit complexity** through multi-objective optimization.

Work is ongoing to extend the approach to noisy conditions, with the goal of improving robustness and guiding future adaptive strategies.

KEY RESULTS (3)

The fellowship helped move the project **beyond the proof-of-concept stage** and laid the groundwork for **future developments**.

Collaboration between Politecnico di Milano and Fermilab was key to aligning the research with real hardware constraints, and further joint research is anticipated.

The work is expected to continue beyond the expedition, as originally planned.

A **joint publication** based on the project outcomes is planned, with contributions from both institutions.

IMPLEMENTATION

Over the next six months, I will **extend the methods** to noisy quantum systems.

This will enable the evaluation of strategies for **automatically adapting** circuit parameters based on noise levels, an important step toward practical deployment.

In parallel, the software will be refined and **released as open-source as part of a publication,** to support broader adoption and foster collaboration.

EXPECTED IMPACT

Developing methods able to overcome some of the complexity of quantum computing aims to **lower the entry barriers** for this highly innovative field, which is currently only accessible by a limited number of highly specialized experts, often **disconnected** between communities.

Making the field more accessible can empower researchers and practitioners **of different backgrounds** to contribute to and benefit from quantum computing, which is particularly important considering how QC has significant applications in **industry**, **security** and in the **sustainability** goals of the tech industry. Furthermore, through open-access tools, this project promotes a collaborative approach that aims to **accelerate** technological advancements.

LESSONS LEARNED

These types of projects require navigating **two complex fields**, physics and machine learning, and finding a **shared technical language** is challenging.

I learned that once communication is established, collaboration can become **highly productive and rewarding**.

I was positively surprised by the openness of colleagues at Fermilab and by the discovery of **many areas** where a machine learning researcher can **contribute**.

This experience reinforced how **essential interdisciplinary collaboration** is, and it taught me a lot, both technically and professionally.

Maurizio Ferrari Dacrema

Assistant Professor (RTDa) at Politecnico di Milano

Maurizio Ferrari Dacrema

maurizio.ferrari@polimi.it

(N/A)

Github

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Data-driven environmental resilience

Robert Heinecke
Germany

Founder & CEO, Breeze Technologies

Track
Smart Cities / Environmental Intelligence
Host Organization
East Carolina University, Greenville, North Carolina, USA

NGI ENRICHERS TRANSATLANTIC

THE PROBLEM

Many cities have started deploying air quality and other environmental sensors. Other sources, like AirNow.gov and NASA's TEMPO are also available.

- **However:** Nothing is done with data. Communities are struggling to translate environmental data into action.
- This project is targeted **communities that have already embarked on their smart community journey**, have had first successes in data collection, and are now looking at leveraging collected data.
- Various vendors from the US, EU and other markets are already providing solutions to collect air quality and environmental data, but none of them are focusing on **turning that data into action** for **community members and decision makers**.

YOUR SOLUTION (1)

Breeze Technologies' Environmental Intelligence Suite enables communities to collect environmental data and turn it into action.

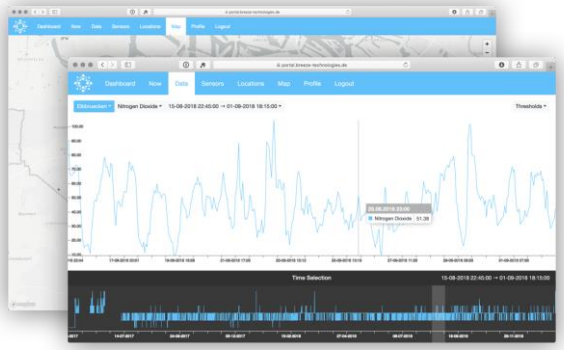
- The solution consists of environmental IoT sensors (focused on air quality) and the Environmental Intelligence Cloud (EIC), a SaaS platform that translates environmental data into actionable intelligence and enables communities to engage their citizens on the data.
- The EIC uses AI to **recommend the most impactful clean air actions** from a catalogue of more than 3,500 measures, based in collected data and community metadata. This approach is unique on a global scale.
- We are now focusing on **citizen engagement**, by providing air quality forecasts and community advice, e.g. when to avoid outdoor activities.

YOUR SOLUTION (2)

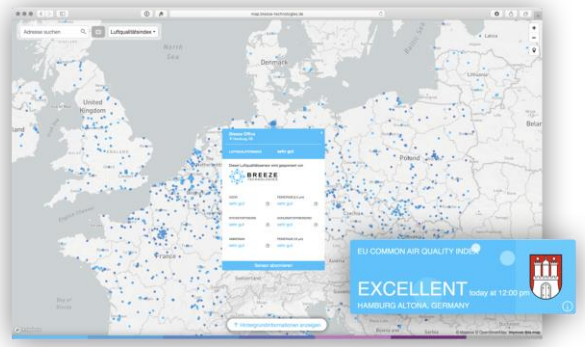
The Environmental Intelligence Suite is a vertically integrated (but open) solution to monitor, analyze, act upon and communicate environmental data.

Hyperlocal environmental sensors detect air pollution, noise and other environmental parameters

Note: Other sensors can be integrated as well



The Environmental Intelligence Cloud provides dashboards, aggregation, analytics and recommendations



Different civic engagement tools like a citizen portal, widgets, digital signage apps and similar enable community members to inform and protect themselves

NGI ENRICHERS TRANSATLANTIC

ROBERT HEINECKE, FOUNDER & CEO BREEZE TECHNOLOGIES

Forbes 30 Under 30, Capital 40 Under 40, Young Green Tech Entrepreneur of the Year // B.Sc. Computer Science, M.Sc. IT Management & Consulting

Founded Breeze Technologies in 2015, since then responsible for overall company leadership and strategy, business development, marketing and product management

Built a company with 50+ governmental clients world-wide, reached profitability

Advisor of UrbanAI, a French NGO working on AI in city management / previously advised the German Association for Electric Mobility

EU Climate Pact Ambassador

Regularly publishing on smart city and (social) entrepreneurship, guest lectures on air pollution abatement at various universities

THE TEAM / EXPERTISE

I am supported by a diverse team of environmental scientists, hardware & software engineering experts, and smart city leaders:

- **Haris Sefo, Head of Research @Breeze Technologies** – 12+ years experience in environmental research, ongoing PhD @HafenCity University on air quality management
- Various other team members of Breeze Technologies, e.g. software engineers with NASA certification for working with environmental datasets
- **Support** from NVIDIA (on AI), Microsoft (on social entrepreneurship), Google (on building scalable infrastructure), and various other partners
- Regional **US support** via VIPC and the Stafford IoT testbed, Roanoke Regional Partnership, Loudoun County Virginia Economic Development, and other partners

YOUR HOST ORGANIZATION

Center for IOT Engineering and Innovation – East Carolina University US

- **Selected challenge:** Smart City Applications
  - Local cities and communities are looking for smart city solutions to test and implement
  - The Center for IoT Engineering and Innovation (CIEI) is already working on IoT-based solutions to address environmental, health and other challenges with 14+ projects in the region and therefore a perfect partner to conduct innovation activities and investigations in the region
  - Current activities of CIEI also include conducting investigations of air quality monitoring solutions – these research activities will be a perfect fit for conducting research into this field

KEY RESULTS (1)

I have researched the environmental data strategies of 20 US cities through direct interviews, product feedback discussions, demos and additional web research.

This supported:

- Testing our technologies in the US market (demos, leading to pilots, gathering feedback)
- Gathering intelligence to adapt product and marketing materials to US market realities.
- Created additional leads for market entry.
- Accelerated US market entry.

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KEY RESULTS (2)

Through the study, I analyzed 20 US cities regarding their collection and use of air quality data: awareness, collection, usage, (public) sharing, …

- I have identified 5 high potential cities that are starting to work on or are planning to work on air quality data. Those will be targeted with dedicated sales/marketing activities to position Breeze Technologies as the best vendor to support them.
- 2 cities are already deploying sensors with us.
- We have agreed on a channel partnership with a local sales representative/company.
- **I.e. all goals of the NGI program were fulfilled.**

KEY RESULTS (3)

Key findings from the study:

- About half of US smart communities (i.e. communities with existing implementations of smart city technologies) are working on air quality data.
- US cities have higher awareness of existing datasets on air quality, such as space data, compared to EU/German cities.
- The market of “only” air quality data collection is saturated. The “next big thing” is leveraging the collected air quality datasets to improve decision making processes in the administration and/or the quality of live of community members.

IMPLEMENTATION

Based on the findings of the study, we will:

- Adapt marketing materials to better fit the market need in the US.
- Apply for panel discussions/presentations on US smart city conferences.
- We are already implementing two showcase/reference projects in the region with more in the pipeline.

EXPECTED IMPACT

Based on the results, we plan to public more on this topic:

- Publish white paper on current air quality technology trends in the US.
- Publish a self-assessment tool for cities to help them understand how their current efforts compare to other cities in the US and world-wide.
- This will support **Digitalization** and **Sustainability** for smart communities in the US.

LESSONS LEARNED

Lessons learned:

- Wording is different in the US: what is called “smart city“ in Europe is called „smart community“ in the US.
- Getting in touch with smart city managers is more difficult than in Europe – they are often not as reactive through tools like LinkedIn. Warm introductions are often needed.
- Cities themselves publish comparatively less on what they are doing in the smart cities field than e.g. cities in Germany. Better sources for information are direct interviews or press/media articles.

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LlmIT – Telco LLM in Edge Networks

Mustafa Ergen
Türkiye

Founder & CEO of Ambeent Inc.

Track
AI / Telecommunications / LLMs
Host Organization
EAEC, Silicon Valley, California, USA

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Problem

Increased need for automation requires nearby resources

Existing broadband architecture was not designed to cope with high-density consumption.

Need: Automation for support call cost optimization has a valid business case for CSPs and Enterprises. To truly enable this, two technologies need to be fused to enable full automation and self-healing: end-user data with customer data.

Today, **general LLMs aren't familiar with telecom specifics like** data plans, router resets, or troubleshooting specific network issues **and** are trained on massive amounts of data scraped from the internet.

Target customers: Ambeent will operate a SaaS business model with a monthly subscription fee. The target customers are (1) ISPs like ATT and Verizon who require services for seamless installation, monitoring, and troubleshooting, (2) enterprises who promote work-from-home, (3) managed service providers like CapGemini, ServiceNow, Acronis who offer performance services to their SME clients and (4) OTT platforms like Meta, Apple, Netflix, Hulu, and Disney.

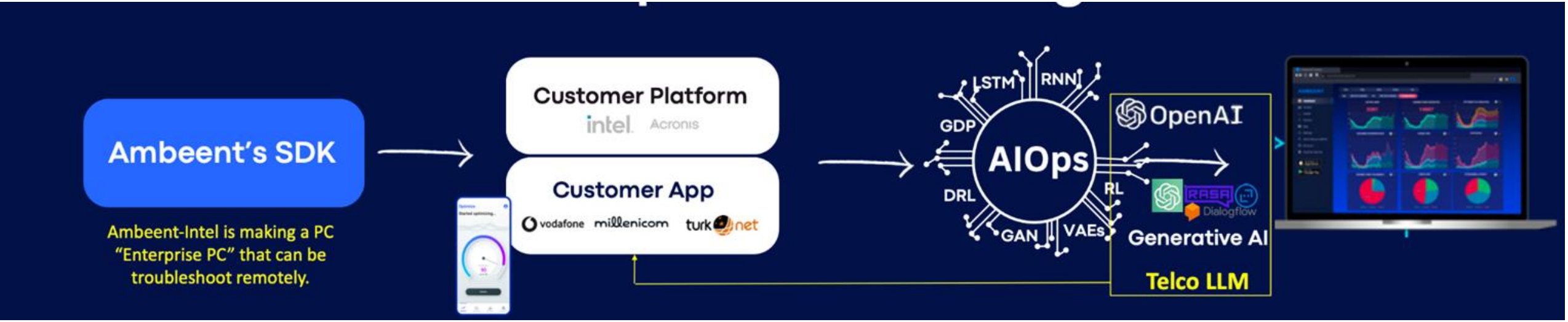
Telco LLM is a new area of research and development.

Solution

LlmIT is a telco LLM for self-healing

Towards an autonomous call center operation

Ambeent is developing LLM-powered centralized cloud-based network management and analytics platform LlmIT with intelligent virtual assistants and chatbots that offers real-time network monitoring, optimization, troubleshooting, automatic spectrum management, and personalized customer interaction enhancing the overall wireless quality of service (QoS).



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Mustafa Ergen, Founder

About me

Dr. Mustafa Ergen, PhD (CEO & PI) is the founder of Ambeent Inc. He is the current Chief Technology Adviser of Turk Telekom, the largest telecommunications company in Turkey. He is the co-founder of Wichorus (later acquired by Tellabs for $200M) and a founding board member of the 5G Association of Europe. Dr. Ergen has over 50+ publications and 50+ issued patents.

THE TEAM / EXPERTISE

EXCELLENCE

Our team for this project

Fatih Tuysuz, PhD, is the Research Lead at Ambeent Inc. He holds a doctoral degree from Gebze Technic University.

Tuncay Cil, MS, is a Chief Monetization Officer at Ambeent Inc. He earned an MS from Yale University and is part of various networking startups and corporations as an executive.

Humprey Polanen, JD, is the Chief Business Development Officer at Ambeent Inc. He earned a JD from Harvard Law School. He was the Board Chair and CEO of Deep Medicine Acquisition Corp.

Isa Yeter, is the Engineering Lead at Ambeent Inc.

HOST ORGANIZATION

EAEC (European American Enterprise Council) is a transatlantic business development organization that fosters innovation, commercialization, and international collaboration between Europe and North America. As the host of the NGI Enricher program, EAEC acts as the strategic bridge connecting European Next Generation Internet (NGI) innovators with the North American market by providing soft landing support, partnership facilitation, mentorship, and market access services. Through its extensive network of industry leaders, investors, and public sector stakeholders, EAEC enables NGI startups and researchers to scale their technologies and forge sustainable global impact.

KEY RESULTS (1)

Successfully enabled NGI (Next-Generation Internet) integration across major industry stakeholders including Netflix, Comcast, Cisco, and OpenSignal, with ecosystem support from the EchoStar Group (Sling, Boost Mobile, OnStar, HughesNet, and Dish Network), positioning EAEC as a central enabler in the next-gen connectivity landscape.

KEY RESULTS (2)

Strengthened research collaboration with UC Berkeley and Stanford.

Deepened innovation ties with Silicon Valley startups like BrainBse

Built solid partnerships with EchoStar and Netflix

Accelerated engagements with investors and VCs in San Francisco like Nimb Partners

Engaged with R&D partners like Telecom Infra Project, Open RAN Alliance, and NGI community

Advanced business partnerships with ISPs (Comcast, Sling, BoostMobile) and OTT platforms (Meta and Netflix)

Reinforced integration of social sciences & humanities through human-centric AI design principles

Initiated joint publications and conference contributions with EU and US researchers

KEY RESULTS (3)

- When deployed **LlmIT**, a telecom-specific LLM platform, enabling user-centric and location-aware network management — will result in an **80–100% improvement in broadband performance**, **25% reduction in ISP complaint calls**, and **50% faster ticket resolution** through automated spectrum allocation, real-time diagnostics, proactive troubleshooting, and natural language customer support.

IMPLEMENTATION

Over the next six months, we will focus on finalizing the MVP of our telecom-specific LLM platform, LlmIT, and initiating pilot deployments with selected ISPs and enterprises in both the US and Europe.

We will formalize ongoing R&D collaborations with partners such as UC Berkeley, EAEC, and members of the Telecom Infra Project, while pursuing joint grant applications and academic publications.

On the business front, we aim to launch a fundraising campaign targeting VCs in Silicon Valley and EU, and establish commercial pilot agreements with MSPs, OTT providers, and telecom vendors. Additionally, we will deepen the integration of social sciences and humanities into our design process, ensuring our AI systems align with NGI principles such as privacy, inclusion, and transparency.

EXPECTED IMPACT

The implementation of our findings through LlmIT will drive a transformative shift toward intelligent, human-centric network infrastructure. By enabling self-healing, AI-powered telecom systems, LlmIT reduces reliance on manual operations and enhances autonomy for ISPs and enterprises. Its cloud-native, modular design promotes interoperability, resiliency, and energy efficiency, supporting Green IT principles through optimized resource allocation.

LlmIT upholds data privacy and sovereignty, aligning with GDPR and global standards, while fostering cross-border collaboration between Europe, the US, and Canada. The platform democratizes access to advanced network capabilities, supporting equity, inclusion, and lifelong learning through multilingual natural language interaction and user-friendly design.

By integrating insights from social sciences, LlmIT ensures ethical, transparent, and responsible AI deployment, contributing to a secure, sustainable, and participatory digital ecosystem. Ultimately, the project catalyzes widespread AI adoption in telecom, advancing the EU's vision for a trusted, inclusive, and intelligent digital future.

LESSONS LEARNED

One key lesson we learned was the importance of early and proactive engagement with local ecosystems—especially legal, regulatory, and investor networks—in both North America and Europe.

We initially underestimated the time required to establish trust and momentum in these environments, which affected the pacing of some collaborations and fundraising discussions. A pleasant surprise, however, was the openness and receptiveness of North American partners, particularly in academic and innovation circles, who quickly recognized the value of our telecom-specific LLM approach and provided meaningful feedback and connections.

Professionally, managing cross-border collaboration across time zones and differing business cultures required greater adaptability and communication effort than anticipated, while personally it emphasized the importance of having resilient, mission-aligned teams. These experiences have sharpened our strategic approach—placing more emphasis on stakeholder alignment, cultural context, and scalable engagement frameworks—which will directly enhance our future market entry, R&D collaborations, and product positioning.

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