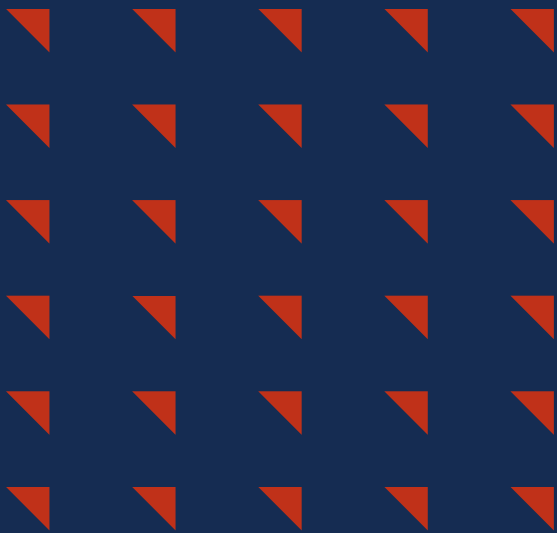


Singular Logic<sup>™</sup>



R&D  
Annual  
Report

2024

# 2024

## Overview

**6**

New Projects  
Launched

---

**2+**

Million Euros  
Funding Raised

---

**15+**

Representations  
in Major Events

---

**4**

Research  
Prototypes

---

**13**

Research  
Publications

---



# R&D and Innovation



# Preface



With major accomplishments, 2024 was a landmark year for our department. Our work has contributed towards emerging data platforms and innovating applications. Our team has grown with 4 new researchers who contributed to new research areas, including smart agriculture, AI and robotics. We had a dynamic presence in major EU events, such as the Smart Cities Expo World Congress 2024 and the Sustainable Places 2024, while we continuously worked in aligning our strategic roadmap to better connect our R&D efforts with our company's ambitions towards supporting digital transformation for the public and private sectors.

## 2024

As 2024 comes to an end, 16 ongoing research and development projects are making contributions in application fields including energy, buildings, smart agriculture, and climate resilience. Our contributions to the projects for 2024, included the development of research prototypes and applications in these areas, together with major dissemination and communication activities, reaching over 15 representations in major EU events and 13 publications in conferences and journals. In addition, as part of our activities in industry-academia networks, we host 4 PhD students and visiting researchers of various levels, working on research topics relevant to data technologies, video streaming and AI.

## 2025

For the year 2025, a significant goal is to establish further the research streams towards the use of data, AI, robotics and AR/VR technologies for the development of innovative applications. This will create opportunities for the development of new services, as well as for the enhancement of our collaboration with academic institutions and other researchers. By actively engaging in and contributing with our project outcomes to significant events in the fields of data, artificial intelligence, climatic resilience, and sustainable development, we hope to continue and intensify our dissemination and communication efforts in accordance with our strategic goals.

# The R&D and Innovation Team



Dr. Stamatia Rizou  
RnD Manager



George Lagogiannis  
Innovation & R&D  
Senior Executive



Iasonas Sotiropoulos  
Software Engineer



Dr. Ioannis Karvelas  
Senior Scientific  
Project Manager



Antonia Vronti  
Project Manager



Vaso Kontou  
Project Manager



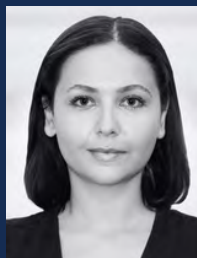
Dr. Sotirios Aspragkathos  
Software Engineer



Athanasios Papanikolaou  
Junior Software Engineer



Moatasim Mahmoud  
Software Engineer  
PhD Candidate



Havva Uyar  
PhD Candidate



Rahool Dembani  
PhD Candidate



Mandeep Singh  
Software Engineer  
PhD Candidate



# Our Projects

## Application Domains



Energy



Buildings



Climate Resilience



Agriculture



Smart Cities

## Technologies



Data



Artificial  
Intelligence



Automation &  
Control



Virtual & Augmented  
Reality

# Projects' Progress



## INHERIT

### Next Generation Solutions for Sustainable, Inclusive, Resource-efficient and Resilient Cultural Heritage



10/2023 - 03/2027



€ 4.999.937



[www.inheritproject.eu](http://www.inheritproject.eu)

The INHERIT project aims to co-design, develop, demonstrate, validate, and replicate next-generation solutions for sustainable, inclusive, resource-efficient, and resilient cultural heritage buildings. During the last year, the INHERIT project has made significant progress, including the release of the first version of the assessment tool, which aims to evaluate cultural heritage (CH) buildings' sustainability and energy efficiency. SingularLogic has also developed an initial version of a tool designed to monitor indoor crowd levels, enhancing the management and preservation of CH sites. Additionally, our team has actively engaged in various workshops, webinars, and events, such as SUSTAINABLE PLACES and the NEB Satellite event, to share insights, gather feedback, and promote collaboration in the fields of cultural heritage and energy efficiency.

## BUILDSPACE

### Enabling Innovative Space-driven Services for Energy Efficient Buildings and Climate Resilient Cities



02/2023 - 01/2026



€ 2.632.367



[www.buildspaceproject.eu](http://www.buildspaceproject.eu)

BUILDSPACE is a project that aims to provide innovative services for energy-efficient buildings and climate-resilient cities. Dedicated to this project, SingularLogic has designed, implemented and delivered the BUILDSPACE core platform that enables access to heterogeneous data, including terrestrial data from buildings, aerial imaging from drones equipped with thermal cameras, and location-annotated data from satellite services. The platform integrates well-known open-source components alongside custom components developed by our team. This combination aims to leverage proven technologies while introducing innovative solutions, promoting state-of-the-art techniques for enhanced functionality and performance. SingularLogic provided a unified RESTful API that facilitates access to data resources within the BUILDSPACE ecosystem, as well as data from Copernicus services. In addition, it also offered a user-friendly web interface that consumed this API for seamless data exploration and interaction. To further assist the standardization of the data consumption, SingularLogic provided a Python client, empowering users to efficiently integrate the API into their workflows and services.

## SRI-ENACT

### Co-creating Tools and Services for Smart Readiness Indicator Uptake



12/2022 - 05/2025



€ 1.992.708



[www.srienact.eu](http://www.srienact.eu)

SRI-ENACT aims to facilitate the Smart Readiness Indicator (SRI) uptake in Europe by engaging stakeholders in the co-creation of national-tailored SRI implementations and the development of the SRI-ENACT toolkit, encompassing SRI assessment and decision support tools for smartness upgrades. In 2024, we provided technical support for our SRI assessment tool, which is currently used by more than 50 assessors in the context of the pilot operations of the project, leading to several refinements and features extensions. Another important highlight has been the signing of the Memorandum of Understanding with the sister projects to support the national test phase of SRI in Greece, paving the way for a significant collective impact of the Greek SRI Cluster.

# Projects' Progress



## POWERYOUTH

### Empowering youth for energy community actions



01/2024 - 12/2026



€ 1.449.997



[POWERYOUTH - SingularLogic](#)

POWERYOUTH project aims to empower young people to play an active role towards the energy transition. Coordinated by SingularLogic, the project officially launched in February 2024. Key submissions in 2024 include: D1.1 Project Management and Data Management, D1.4 Updated Extract of the Project Data from the LIFE KPI Webtool, D1.2 Technical Progress Report, D2.1 Submission of the 1st POWERYOUTH Toolkit. In addition to these important deliverables, four key milestones were successfully achieved, marking significant progress towards the project's overall goals. In 2024 the team not only achieved the successful coordination and submission of key deliverables but also prepared and conducted impactful co-creation workshops. These workshops were integral in the development of the PARTICIPATE tool, a dynamic platform designed by SingularLogic to facilitate youth engagement in energy community projects, encouraging young people to actively shape and lead energy initiatives. The year also marked a strong start for dissemination efforts, with POWERYOUTH being represented by SingularLogic's team at several European events and hosting youth-focused energy sessions. These activities marked a significant step towards the project's visibility and vision and laid a strong foundation for the next year.

## DATAWiSE

### Intelligent and Sustainable Building Management powered by Cross-Sectoral Lifecycle



06/2024 - 08/2027



€ 4.991.148



<https://datawise-project.eu/>

The DATAWiSE project is aimed at developing a platform infrastructure that will collect and integrate data from multiple sources that will in turn feed data analytics-centered services related to building energy efficiency and management. Since the project's start in the summer of 2024, an intense semester has passed, during which preparatory tasks related to management and context definition have taken place. SingularLogic has been at the forefront of WP3 as a WP leader, while also leading tasks for the definition of the user requirements, the establishment of the Board of Lighthouse Customers, the development of the Smart Readiness Assessment Tool, and the identification of synergies and collaborations with other project initiatives. SingularLogic has already submitted a deliverable for the Board of Lighthouse Customers and another deliverable for the definition of the user requirements has been submitted for internal review. Our team has also successfully organized and conducted multiple dissemination and co-creation events both online and physically during the first six months.

## CLIMRES

### Leadership for Climate-resilient Buildings



06/2024 - 05/2027



€ 5.827.262



<https://climres.eu/>

CLIMRES aims to foster a 'Leadership for Climate Resilient Buildings', by addressing the identification of buildings' vulnerabilities and improving their resilience in disruptive events and altered conditions caused by climate change. The project is coordinated by SingularLogic and kicked off in June 2024. Since its beginning the project has achieved progress mainly to the stakeholders requirements, co-creation and solutions specifications, but also towards its rest research pillars (i.e. Vulnerability Analysis & Impact Assessment and Building Resilience). SingularLogic is participating in the co-creation procedure and has kicked off the design of the data management platform and the tactical and operation level solutions services towards fire resilience and smart evacuation use cases.



# Projects' Progress



## AGRIDATAVALUE

### Smart Farm and Agri-environmental Big Data Space



02/2023 - 01/2029



€ 7.145.500



[www.agridatavalue.eu](http://www.agridatavalue.eu)

The AgriDataValue project aims to develop an innovative, federated Agri-Data Space that fosters trust and confidence in agri-environment AI technology through decentralised data management, real-time edge processing, and traceable business models. Over the past year, SingularLogic has made contributions across multiple areas of the project. In the Drone Data Toolbox, the conceptual architecture was finalised, and a drone and multispectral camera were selected. While the development of the toolbox components, including APIs and extractors, is in its initial stages, the groundwork has been laid to ensure steady progress. For the encryption module, SingularLogic designed, developed, and delivered its initial version, including its two core components: the EM Core and EM API. Additionally, in the Access Control System, an OIDC Keycloak instance was deployed and configured to manage user identities within the ADV ecosystem. Beyond these technical advancements, SingularLogic has also taken a leading role in monitoring the digital transformation landscape in agriculture as part of the project's impact-creation activities.

## ENTRUST

### Next Generation of Trustworthy Agri-Data Management



01/2023 - 12/2026



€ 2.705.392



[www.entrustdn.eu](http://www.entrustdn.eu)

The EnTrust project is a doctoral network aiming to develop a new generation of Data Executives equipped to advance fair, transparent, and trusted data-sharing practices in the agri-data value chain. SingularLogic hosts two doctoral candidates researching data value assessment in agriculture and privacy-preserving technologies for secure data sharing. This year, SingularLogic's work resulted in the publication of five scientific papers in conferences and journals, with an additional five papers submitted and currently under review. SingularLogic also hosted a doctoral candidate for a secondment to enhance collaboration and will host another next year. Looking ahead, SingularLogic will continue to contribute to the EnTrust project by advancing innovative solutions, producing high-quality research, and fostering approaches that enhance trust and maximise value in the agri-data ecosystem.

## ATLANTIS

### Improved resilience of Critical Infrastructures Against Large scale transNational and systemic risks



10/2022 - 09/2025



€ 9.998.535



[www.atlantis-horizon.eu](http://www.atlantis-horizon.eu)

ATLANTIS seeks to improve the resilience and security of critical infrastructures across the EU by focusing on systemic resilience against significant natural disasters and complex attacks that might disrupt essential societal functions. In the second year of the project, SingularLogic developed a traceable communication framework for Critical Infrastructures utilizing inter-DLT technologies. Furthermore, SingularLogic took part in the cross-domain large-scale pilot in health, logistics/supply chain, and border control.

# Projects' Progress



## EMPOWER

### Uptake of new generation AI Powered Investigative tools for LEAs



05/2023 - 04/2026



€ 2.296.848



<https://transgero.eu/empower/>

EMPOWER is tasked with the refinement of eight AI-powered forensic tools that will be brought to TRL 8, enabling their uptake by European Law Enforcement Agencies. SingularLogic is leading WP4 in the project, which deals with the data collection for training and testing of the AI tools, the development of front-end capabilities, and the deployment of the tools for testing. Our team is also responsible for developing the front-end for two of the tools and for setting up a dedicated GPU-enabled server for the training of tools using Federated Learning. So far, the first iteration of the front-end has been delivered to the partners and a deliverable on the data collection has been submitted. The project is expected to be successfully finished in the coming months.

## RESPECT

### Secure and Privacy-preserving Indoor Robotics for Healthcare Environments



05/2021 - 04/2024



€ 1.094.800



[www.project-respect.eu](http://www.project-respect.eu)

The objectives of the RESPECT project have been the design and development concrete defense strategies to ensure secure, safe, resilient and privacy-preserving operation of indoor mobile robotics solutions for logistic applications in healthcare environments. In the past year, we have published the results of our work on the analysis of various attack models in multi-robot fleets in a simulation environment, utilizing the MQTT protocol. In addition, our team has hosted the final event of the project with distinguished guests from the robotics research community in Greece.

## 6G-ICARUS

### Research Collaboration and Mobility for Beyond 5G Future Wireless Networks



03/2024 - 02/2028



€ 501.400



[www.6gicarus.eu](http://www.6gicarus.eu)

The 6GICARUS project aims to investigate, combine, and improve on current technologies in order to address numerous obstacles that 6G networks will face in order to define the future wireless networks (FWNs). SingularLogic's role within 6GICARUS, involves the exploitation of multiple parallel communication streams to increase data rates and optimize end-to-end quality of service (QoS) through advanced multi-connectivity for 6G mobile communications. SingularLogic also leads the dissemination, exploitation, communication, standardization, and IPR in the project. In this scope, SingularLogic works on maximizing the impact and outreach of the project results and outcomes and manages and monitors the project training and standardization activities.

# Projects' Progress



## RECOMBINE

### Research Collaboration and Mobility for Beyond 5G Future Wireless Networks



01/2020 - 06/2025



€ 478.400



[www.recombine-project.eu](http://www.recombine-project.eu)

RECOMBINE is a staff exchange programme for future wireless networks and beyond 5G technologies. The highlight of 2024 has been the publication of our paper "Towards 5G/6G Data Harmonization Through NLP and Semantic Web Technologies", which received an Excellent Paper Award in the "Oral Papers - Young Scientist" category at IEEE 5G/6G ATOMS 2024.

## MOTOR5G

### MObility and Training fOR beyond 5G Ecosystems



11/2019 - 01/2025



€ 3.979.000



[www.motor5g.eu](http://www.motor5g.eu)

The MOTOR5G project is an innovative training network that aims to train skilled young researchers for the advancement of 5G networks and beyond. SingularLogic hosts an early-stage researcher focusing on 360° video streaming. This year, SingularLogic has achieved significant advancements in 360° video streaming. Our work on applying deep learning for viewport prediction has yielded notable results in improving proactive streaming of 360° videos. We have implemented a comprehensive and efficient framework for multi-users 360° video streaming, improving the delivered perceptual quality. This year, our work within the MOTOR5G project has led to the publication of four scientific papers in accredited conferences and journals. Towards the end of the year, we conducted a set of experiments on 360° video quality assessment that will be disseminated in the early months of 2025.

## ENFORCE

### Empower citizens to join Forces with public authorities in protecting the Environment



09/2024 - 08/2028



€ 6.365.498



[www.join-enforce.eu](http://www.join-enforce.eu)

ENFORCE will develop a pan-European collaboration and knowledge hub based on the Living Lab principles to become the open innovation framework for all European actors for environmental compliance assurance. The ENFORCE "Living Lab" will co-create sustainable mechanisms to increase Environmental Compliance through Citizens and Innovation (ECCI) and to address the culture and variable barriers around environmental reporting, auditing and compliance. ENFORCE kicked off in September 2024. SingularLogic is leading the Data Management of the information handled during the Case Studies of the project. Hence, the company will be leading the development of the ENFORCE Plaza Toolkit which will rely on micro-service-oriented and event-driven system architecture as well as on open standards and Data Spaces principles to allow trustworthy data sharing and support the automation of processing workflows. During the 4 months, SingularLogic is coordinating the collection of service descriptions and the identification of user requirements, that will result in proper design and development of the Plaza tools.

# Projects' Progress



## ENHANCE

**Enabling One Health Coastal Management through advanced AI over Marine Copernicus and citizen science data**



12/2024 - 11/2027



€ 1.701.375



Under Development

SingularLogic coordinates the ENHANCE project that Kicked off on the 4th and 5th of December 2024, in Athens, Greece. ENHANCE will leverage Copernicus Marine Service to monitor marine biodiversity and coastal water preserving at-risk ecosystems. The project will adopt an One Health approach encompassing services for the impact assessment of water quality in biodiversity, public health, and the environment and will be validated in two case studies in the Mediterranean; on Barcelona's urban beach and Pagasitikos Gulf.

## MaaS AI

**Agile Manufacturing as a Service through AI Autonomous Agents**



11/2019 - 01/2025



€ 6.999.228



N/A

The MaaS AI project aims to create a comprehensive digital system to automate and facilitate interactions between suppliers of manufacturing systems (Providers) and manufacturing companies (Consumers) in a Manufacturing-as-a-Service (MaaS) ecosystem, in an agile, efficient and transparent manner. SingularLogic is leading the implementation viewpoint architecture, that describes, technically, the different component of the MaaS AI framework. Additionally, SingularLogic will develop the blockchain integration as well as smart contracts for the ecosystem. Finally, SingularLogic will lead the evaluation of the technologies developed for the project.

# Insights



## Data Management Platform

Effective data management and sharing are crucial for organizations to collaborate, innovate and exchange knowledge. However, achieving this requires more than just storing and accessing data. It demands robustness, security, interoperability, high availability and ease-to-use. To address these needs, we developed the Data Management Platform, a cross-projects tool that can be customized and tailored to the specific needs of a project.

At its core, the platform provides a robust and secure, unified RESTful API that enables users to easily manage their data and access publicly available Copernicus resources. All data resources are stored in S3 buckets, following the state-of-the-art in data storage and ensuring high availability and scalability. To enhance the security of the platform, OpenID Connect authentication (Keycloak) has been implemented, providing a secure way to manage user identities. To further enhance the platform's usability and to standardize data management workflows, we have developed and published a Python client (CorePlatPy) that interacts directly with the API. CorePlatPy simplifies the integration of the platform to external systems in a great extent, promoting users to incorporate the platform's capabilities to other workflows, research pipelines and applications with minimal effort. In addition to its powerful API, the platform integrates a well-known open-source data portal (CKAN), serving as the user interface for seamless interaction. This integration not only offers an intuitive and feature-rich frontend for data discoverability and sharing but also ensures alignment with widely adopted standards. Our API extends its functionality by providing access to Copernicus services, allowing users to enrich their datasets with valuable Earth observation data for climate resilience, environmental monitoring, and other key domains.

The Data Management platform is deployed using a cloud-native architecture, leveraging Kubernetes for scalability, resilience, and efficient resource management. The system uses containerized microservices, enabling independent scaling and updates. All developed components are publicly available, promoting reusability and collaboration within the broader community. By providing a standardized and scalable data management platform we aim to enable organizations to optimize their workflows, enhance innovation, and maximize impact with minimal effort.

**Iasonas Sotiropoulos**  
Software Engineer at SingularLogic



Find more about the research and experiments in the Publications Page at [13].

# Smart Agriculture

Smart agriculture integrates advanced technologies, such as IoT, AI, and data analytics, to revolutionise farming practices. This transformation relies heavily on the effective utilisation and sharing of agricultural data. While the potential is immense, realising these benefits requires addressing numerous challenges, including data privacy, governance, ownership, and valuation. At SingularLogic, our research within the EnTrust project focuses on two critical areas: assessing the value of agricultural data and developing privacy-preserving mechanisms to safeguard sensitive information. These efforts contribute to building a trusted and efficient agri-data ecosystem, fostering innovation and sustainability in the sector.

One of our research topics investigates data value in agriculture, highlighting the shift from rudimentary data usage to advanced analytics that position data as a strategic enabler for informed decision-making and innovation. Our study underscores the multifaceted value of agricultural data, which varies across stakeholders, such as farmers, agribusinesses, and policymakers. For instance, farmers may prioritise operational efficiency, while agribusinesses might focus on market positioning or sustainability goals. The research reveals that the value of data lies in the benefits derived from its application, raising critical questions about the equitable distribution of these benefits among stakeholders. Additionally, it identifies significant gaps in existing frameworks for data valuation, particularly in understanding how value evolves with reuse and how to continuously assess and maximise data's value. Future work will focus on developing methodologies to guide stakeholders in measuring, characterising, and unlocking the value of their data, ensuring that agricultural data becomes a catalyst for competitive advantage and operational excellence.



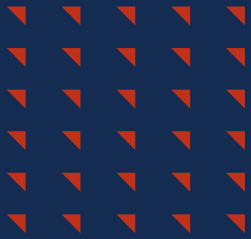
Our second area of research addresses privacy-preserving data sharing, focusing on Federated Learning (FL) as a transformative solution for secure and collaborative data analysis. FL enables decentralised model training without sharing raw data, ensuring privacy while maintaining the utility of the models. By employing advanced techniques such as homomorphic encryption, secure multi-party computation, and differential privacy, we demonstrated how sensitive agricultural data, such as yield predictions and pest management information, can be analysed securely. While the benefits are significant, challenges such as data heterogeneity, limited rural connectivity, and the complexity of implementing secure frameworks persist. Our research highlights the need for scalable and agriculture-specific solutions to address these challenges, enabling broader adoption of privacy-preserving technologies across the sector.

Together, these research efforts mark a significant stride towards unlocking the full potential of smart agriculture. By addressing critical aspects of data value and privacy, our work lays the foundation for a trusted and inclusive agri-data ecosystem. This ecosystem empowers stakeholders across the agricultural value chain to leverage data for informed decision-making, enhanced innovation, and sustainable practices.

**Havva Uyar**  
PhD Candidate at SingularLogic

Find more about the research and experiments in the Publications Page at [1] [2] [3] [4] [5].

# MOTOR5G Adaptive 360° Video Streaming



360° videos and virtual reality (VR) are among the defining applications for a new era of immersive multimedia technologies. However, streaming high-quality 360° videos constitutes a challenge for service providers and network operators, especially in multi-user scenarios. The massive data rates and the unique features of omnidirectional videos necessitate the development of novel streaming techniques. In the context of the MOTOR5G project, we have created an optimized framework for enhancing the quality of multi-user 360° video transmission. Significant improvements have been made by employing deep-learning-based viewport prediction and by utilizing information about important parts of the videos.

On a parallel research direction, we have completed a set of extensive experiments and analysis on the quality assessment of Ultra-High-Definition (UHD). The rapid evolution of digital media applications has seen associated increases in video content resolutions and display technologies to provide sceneries with exceptional sharpness and clarity.

This transformed the visual experience of users by offering 4K (3840 x 2160 pixels) UHD resolution and beyond. However, the high data rates concerning 4K video streaming have amplified the role of video compression, making it essential to reduce both the network and the storage requirements to reasonable levels. Within the research activities of the MOTOR5G project, we performed a subjective assessment of video quality, specifically focusing on individual codec's compression efficiency. Using video sequences of various content and bitrates levels, we compared the most widely used video codecs (AVC/H.264, and HEVC/H.265) in line with the emerging ones (VVC/H.266, and AV1). Moreover, we conducted a correlation analysis, comparing the resulting mean opinion scores (MOS) to different objective video quality assessment (VQA) metrics to evaluate their performance when applied to UHD Videos.

**Moatasim Mahmoud**  
Software Engineer at SingularLogic  
PhD Candidate

Find more about the research and experiments in the Publications Page at [6] [7] [9] [10].

# Co-Design Workshops: Shaping Innovation through Collaboration

SingularLogic has been at the forefront of collaborative project development leading several co-design workshops. These workshops are a cornerstone of our approach, fostering meaningful engagement with stakeholders to ensure that the solutions developed meet real-world needs effectively. Among the projects benefiting from this approach are INHERIT, POWERYOUTH, DATAWISE, AgriDataValue, and MOTOR5G.

Co-design workshops are a participatory method that brings together various stakeholders—ranging from project beneficiaries and domain experts to end-users—to collaborate in the ideation, design, and validation of innovative solutions. These sessions aim to refine ideas, prioritize features, and validate designs by leveraging collective expertise.

SingularLogic enhances the collaborative experience by incorporating tools like MIRO and Mentimeter. Through the use of these tools, we provide a dynamic platform for brainstorming, visually mapping solutions, and organizing participant input. We also facilitate real-time polling, idea prioritization, and interactive feedback collection during discussions. This combination ensures an inclusive and structured process where participants contribute to shaping features and refining designs based on their unique perspectives.

The co-design workshops led by our R&D team emphasized collaboration, ensuring that every stakeholder's voice is heard and valued. The integration of interactive tools enhances the feedback process, allowing for real-time idea sharing, refinement, and prioritization. By incorporating diverse perspectives early in the project lifecycle, these workshops minimize design flaws and enhance user acceptance. The success of the aforementioned projects underscores the effectiveness of this approach.

As our team continues to lead and contribute to projects, the role of co-design workshops remains central to its mission. With the power of interactive tools, these sessions not only foster innovation but also strengthen relationships among stakeholders, creating a collaborative ecosystem that drives progress.

**Antonia Vronti, Vaso Kontou**  
Project Managers at SingularLogic





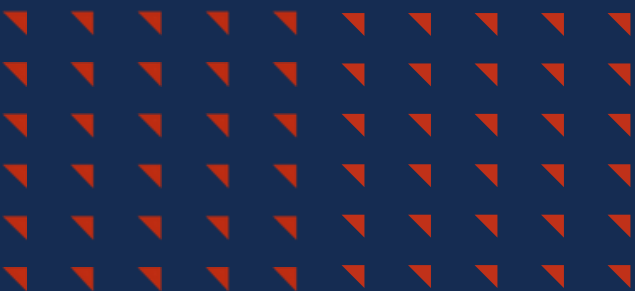
# Building a Private Blockchain Network

Blockchain is a transformative technology that enables the secure, decentralized storage and exchange of data. At its core, a blockchain is a distributed ledger system where data is recorded in blocks and linked sequentially to form an immutable chain. Unlike traditional centralized systems, blockchain operates on a peer-to-peer network, ensuring transparency, security, and resilience by eliminating the need for intermediaries. Originally designed as the foundation for cryptocurrencies like Bitcoin, blockchain technology has evolved far beyond its origins. It now powers diverse applications across industries such as finance, healthcare, supply chain, and more, offering innovative solutions for trust, transparency, and efficiency in complex systems.

As part of our R&D activities, we developed a private blockchain network hosted on a private virtual machine. We carefully selected all of the components we used for our network, so they would meet our requirements. Specifically, for technologies selected, Ethereum emerged as the preferred choice due to its robust programmability and strong community support, making it an ideal platform for the implementation of smart contracts. The MetaMask wallet was chosen to provide users with an intuitive interface for interacting with the blockchain and conducting transactions. The Hyperledger Besu client was utilized as the blockchain client, owing to its flexibility in supporting custom consensus mechanisms, including Proof of Authority. Lastly, BlockScout was used as the blockchain explorer, offering compatibility with the Besu client and enabling the team to monitor blockchain activity effectively.

Currently we are developing and executing smart contracts based on use cases inspired by real world case studies. Working on blockchain development provides profound insights into the capabilities and potential of decentralized technologies to reshape the digital landscape. Beyond the technical knowledge gained—such as mastering cryptographic algorithms, consensus mechanisms, and smart contract design—there is a deeper understanding of how blockchain can promote trust, transparency, and efficiency across industries. Moving forward, exploring new opportunities to harness blockchain's versatility and expand its use cases will be key to driving innovation and unlocking its full potential.

**Athanasios Papanikolaou**  
Software Engineer at SingularLogic



# Dissemination

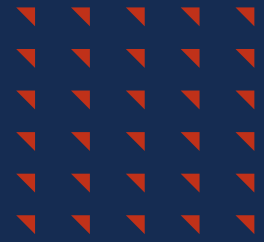
SingularLogic's Research & Development and Innovation Team maintained a dynamic presence throughout 2024, actively participating in over 29 high-profile events and hosting more than five key gatherings, including Kick-off meetings, project events, and training weeks. This robust engagement facilitated meaningful exchanges of ideas, insights, and expertise with industry leaders, innovators, policymakers, and researchers.

Notable contributions were made in the domains of energy efficiency and smart, resilient cities. SingularLogic showcased its expertise at major events such as ENLIT Europe with the SRI-ENACT project and Smart City Expo World Congress 2024 with BUILDSPACE. Additionally, the team hosted booths at prominent forums like SUSTAINABLE PLACES 2024 and the ADRA Forum 2024.

SingularLogic's commitment to innovation and industry collaboration was further demonstrated through invitations to deliver presentations at the KTH Royal Institute of Technology and the User Consultation Platform 2024, where the latter was hosted by the European Commission. These engagements underscore our role as a thought leader in advancing cutting-edge solutions and fostering meaningful partnerships.



# EXHIBITIONS AND SPEAKING ENGAGEMENTS AT KEY EVENTS



## **Innovent Forum 2024**

Larissa, Greece, February 2024

## **Scaling Sustainability in the Peloponnese Region**

Tripoli, Greece, May 2024

## **Smart Readiness Indicator Event - SRI- ENACT Pilot Phase in Greece**

Thessaloniki, Greece, September 2024

## **User Consultation Platform 2024**

Online, October 2024

## **Brainstorming event of TALLHEDA project**

Athens, Greece, December 2024

## **Energy Community Contractor's Day**

Brussels, Belgium, March 2024

## **European Youth Event**

Berlin, Germany, April 2024

## **Sustainable Places 2024 (SP24)/BUILT4PEOPLE Multistakeholder Forum**

Luxembourg, Luxembourg, September 2024

## **Netcon Seminar of the Division of Decision and Control Systems (DCS)**

Stockholm, Sweden, September 2024

## **2nd Joint Event on the Smart Readiness Indicator**

Brussels, Belgium, October 2024

## **European Big Data Value Forum (EBDVF2024)**

Budapest, Hungary, October 2024

## **ENLIT Europe 2024**

Milan, Italy, October 2024

## **Smart City Expo World Congress 2024 (SCEWC)**

Barcelona, Spain, November 2024

## **AI, Data, Robotics Forum (ADRF) 2024**

Eindhoven, The Netherlands, November 2024

## **YES-Europe Annual Conference 2024**

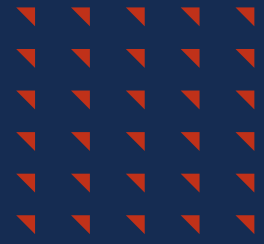
Leuven, Belgium, November 2024

## **BUILT4PEOPLE Clustering Event**

Brussels, Belgium, November 2024



# CONFERENCES



## **SEMANTiCS2024 Conference**

“Ontology-based Dataset Discovery in the BUILDSPACE Data Management Platform”

## **ATOMS 2024 Conference**

“Towards 5G/6G Data Harmonization through NLP and Semantic Web Technologies” won the Excellent Paper Award in the Oral Papers - Young Scientist category.

“Optimized Tile Quality Selection in 360° Video.”

## **AgEng2024 Conference**

“Data-Driven Solutions for Farmer Empowerment in Smart Agriculture: Challenges and Opportunities”

“Can we leverage data sharing benefits to increase the adoption of smart farming technologies?”

“Shaping the agricultural future: Engaging stakeholder feedback for the development of agricultural robotic solutions.”

## **IMISC2024 Conference**

“The Role of Platforms in Agricultural Data Value Creation.”

## **32nd Mediterranean Conference of Control & Automation**

“Exploring Resilient Operation of Multi-Robot Fleet in Various Attack Scenarios”

## **PACET 2024 Conference**

“A Comparative Analysis of Viewing Prediction Techniques for 360° Video Streaming Applications”

## **EGU24 Conference**

“Enabling seamless integration of Copernicus and in-situ data”

# PROJECT MEETINGS

**5+** Organised by  
SingularLogic R&D Team



**POWERYOUTH** Kick-off Meeting, February 2024

**RESPECT** Final Event, April 2024

**CLIMRES** Kick-off Meeting, June 2024

**ENTRUST** T3 MSCA Training Week, November 2024

**ENHANCE** Kick-off Meeting, December 2024



**10+** Project  
Meetings



**DATAWiSE** Kick-off Meeting,  
June 2024

**BUILDPSACE** Plenary & Review Meeting,  
October 2024

**ENFORCE** Kick-off Meeting,  
September 2024

**ATLANTIS** General Assembly,  
November 2024

**INHERIT** Plenary Meeting,  
November 2024

**DATAWiSE** Technical Meeting,  
November 2024

**MaaSai** Kick-off Meeting,  
December 2024

**SRI-ENACT** Plenary Meeting,  
October 2024

**AgriDataValue** Plenary Meeting,  
March 2024

**ENTRUST** T2 Training Week,  
April 2024

# 2024

## Publications

[1]

Uyar, H., Karvelas, I., Rizou, S., & Fountas, S. (2024). Data value creation in agriculture: A review. *Computers and Electronics in Agriculture*, 227, 109602. <https://doi.org/10.1016/j.compag.2024.109602>

[2]

Uyar, H., Karvelas, I., Sullivan, C., Rizou, S., & Fountas, S. (2024). Data-Driven Solutions for Farmer Empowerment in Smart Agriculture: Challenges and Opportunities. *Agricultural Engineering challenges in existing and new agroecosystems (AgEng2024)*, Athens, Greece. <https://doi.org/10.5281/zenodo.12723689>

[3]

Sullivan, C., Gemtou, M., Anastasiou, E., Uyar, H., & Fountas, S. (2024). Can we leverage data sharing benefits to increase the adoption of smart farming technologies?. *Agricultural Engineering challenges in existing and new agroecosystems (AgEng2024)*, Athens, Greece. <https://doi.org/10.5281/zenodo.13919849>

[4]

Papantonatou, M.-Z., Papadopoulos, G., Uyar, H., Van Evert, F., & Fountas, S. (2024). Shaping the agricultural future: Engaging stakeholder feedback for the development of agricultural robotic solutions. *Agricultural Engineering challenges in existing and new agroecosystems (AgEng2024)*, Greece. <https://doi.org/10.5281/zenodo.13919526>

[5]

Uyar, H., Rizou, S., & Fountas, S. (2024). The Role of Platforms in Agricultural Data Value Creation. *Uygulamalı Mühendislik Ve Tarım Dergisi*, 1(2), 1-8.

[6]

Mahmoud, M., Rizou, S., Panayides, A. S., Lazaridis, P. I., Kantartzis, N. V., Karagiannidis, G. K., & Zaharis, Z. D. (2024, March). A Comparative Analysis of Viewing Prediction Techniques for 360° Video Streaming Applications. In *2024 Panhellenic Conference on Electronics & Telecommunications (PACET)* (pp. 1-4). IEEE. [https://www.researchgate.net/publication/379485793\\_A\\_Comparative\\_Analysis\\_of\\_Viewing\\_Prediction\\_Techniques\\_for\\_360\\_Video\\_Streaming\\_Applications](https://www.researchgate.net/publication/379485793_A_Comparative_Analysis_of_Viewing_Prediction_Techniques_for_360_Video_Streaming_Applications)

# 2024 Publications

[7]

Mahmoud, M., Rizou, S., Panayides, A. S., Lazaridis, P. I., Kantartzis, N. V., Karagiannidis, G. K., Poulkov, V., & Zaharis, Z. D. (2024). Optimized Tile Quality Selection in 360° Video Streaming. In *Advanced Topics on Measurement and Simulation (ATOMS)*. IEEE. <https://www.researchgate.net/publication/383819204> Optimized Tile Quality Selection in 360 Video Streaming

[8]

Singh, M., Mahmoud, M., Rizou, S., Zaharis, Z. D., Lazaridis, P. I., Poulkov, V., & Wu, W. (2024). Towards 5G/6G Data Harmonization through NLP and Semantic Web Technologies. In *Advanced Topics on Measurement and Simulation (ATOMS)*. IEEE. <https://www.researchgate.net/publication/383823276> Towards 5G6G Data Harmonization through NLP and Semantic Web Technologies 1 st Mandeep Singh

[9]

Valiandi, I., Mahmoud, M., Rizou, S., & Panayides, A. S. (2024). Subjective and Objective VQA of Video Codecs for UHD Video Streaming. In *2024 9th International Conference on Frontiers of Signal Processing (ICFSP 2024)*. IEEE. <https://www.researchgate.net/publication/387049594> Subjective and Objective VQA of Video Codecs for UHD Video Streaming

[10]

Mahmoud, M., Rizou, S., Panayides, A. S., Lazaridis, P. I., Kantartzis, N. V., Karagiannidis, G. K., & Zaharis, Z. D. " Optimized Tile Quality Selection in Multi-user 360° Video Streaming." *IEEE ComSoc Journal* (2024). <https://ieeexplore.ieee.org/abstract/document/10753298>

[11]

A. Papanikolaou, I. Sotiropoulos, S. Rizou, F. Fraile, R. Julia and N. Ramdani, "Exploring Resilient Operation of Multi-Robot Fleet in Various Attack Scenarios," 2024 32nd Mediterranean Conference on Control and Automation (MED), Chania - Crete, Greece, 2024. [Exploring Resilient Operation of Multi-Robot Fleet in Various Attack Scenarios | IEEE Conference Publication | IEEE Xplore](#)



# 2024

## Publications

[12]

Avgerinos, N. et al. (2024). Innovative Digital Forensic and Investigation Tools for Law Enforcement: The EMPOWER & TRACY Approach. In: Maglogiannis, I., Iliadis, L., Karydis, I., Papaleonidas, A., Chochliouros, I. (eds) Artificial Intelligence Applications and Innovations. AIAI 2024 IFIP WG 12.5 International Workshops. AIAI 2024. IFIP Advances in Information and Communication Technology, vol 715. Springer, Cham. [https://doi.org/10.1007/978-3-031-63227-3\\_6](https://doi.org/10.1007/978-3-031-63227-3_6)

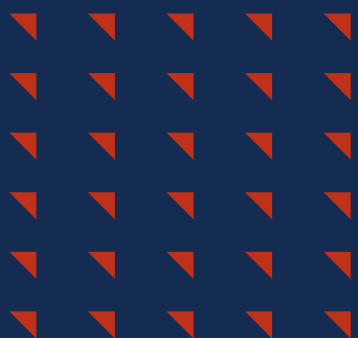
[13]

Sotiropoulos, I., Karvelas, I., Rizou, S., Marinakis, V., & Vakaj, E. (2024). Ontology-based Dataset Discovery in the BUILDSPACE Data Management Platform. In E. Vakaj, S. Iranmanesh, S. Rizou, N. Mihindukulasooriya, S. Tiwari, F. Ortiz-Rodríguez, & R. McGranaghan (Eds.), Proceedings of the 3rd International Workshop on Natural Language Processing for Knowledge Graph Creation co-located with 20th International Conference on Semantic Systems (SEMANTICS 2024), Amsterdam, The Netherlands, September 17, 2024 (Vol. 3874, pp. 112-117). CEUR-WS.org. <https://ceur-ws.org/Vol-3874/paper8.pdf>

# 2024

## Annual Report

# R&D and Innovation



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