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Executive Summary

This final deliverable (D9.2) of the YADES project presents a comprehensive account of the outreach activities and exploitation plan implemented throughout the project's lifecycle. Building upon the strategic framework outlined in D9.1, this document reflects the project's efforts to ensure the effective dissemination, communication, and exploitation of research outcomes across a wide spectrum of stakeholders—from academia and industry to public authorities and civil society.

The report details how YADES established a clear and recognisable brand identity, developed targeted communication strategies, and deployed diverse tools such as a project website, social media platforms, posters, leaflets, and public events. Four summer schools, multiple workshops, peer-reviewed publications, and final public events ensured the project's visibility and stakeholder engagement across Europe. Although some quantitative KPIs—such as social media follower counts—were not fully met, the strategic redirection of resources and focus on quality over quantity ensured that key messages reached relevant audiences effectively.

The exploitation section outlines the identification and potential use of Key Exploitable Results (KERs), including research methodologies, technological tools, and training materials. The consortium also established pathways for future research and policy development through strengthened academic-industry collaborations. Overall, this deliverable demonstrates that YADES not only achieved its core outreach and communication goals but also laid the groundwork for long-term impact and sustainability beyond the project's formal conclusion.

1. Introduction

YADES (full title: “Improved Resilience and Sustainable Reconstruction of Cultural Heritage Areas to cope with Climate Change and Other Hazards based on Innovative Algorithms and Modelling Tools”) is a research and innovation staff exchange project funded under the EU Horizon 2020 Marie Skłodowska-Curie RISE programme. The project commenced on 1 April 2020 and concluded on 31 March 2025. Coordinated by the National Technical University of Athens (NTUA), YADES brought together a consortium of academic institutions, research centers, and industry partners across Europe to tackle the pressing issue of protecting Cultural Heritage (CH) sites from the increasing risks posed by climate change and natural hazards. Historic areas and monuments are vulnerable to gradual climatic stress (e.g. temperature, humidity, air pollution) as well as extreme events like earthquakes, landslides, floods, and other. Damage to these heritage sites can have significant adverse impacts on economies, politics, and societies, making their resilience and sustainable reconstruction a priority.

YADES aims to train a network of fellows on the field of the resilience of Cultural Heritage areas and historic cities against Climate Change and other types of hazards.

Topic of Climate Change has gained immense importance in the past few years as irreputable evidence proved its effect on Global warming and life on Earth in general. Architectural cultural heritage is extremely susceptible to harsh changes in environment, thus actions and projects directed at preserving these artifacts are of great importance, as they will help retain the source of identity, as well as empower local communities and vulnerable groups.

By training a network of fellows YADES strives not only to increase resilience of cultural heritage cites to climate change, but also to strengthen collaboration between institutions and countries.

Key characteristic of the project:

Consortium: 10 partners from 6 countries
Duration: 60 months
Total budget: 1.9 Mln. Euro
Structure: 9 Work Packages

The objectives of YADES were accordingly multi-faceted and interdisciplinary, aiming to advance both scientific understanding and practical tools for CH resilience.

Key objectives included:

(1) Quantification of climatic, hydrological and atmospheric stressors on selected historic areas – using state-of-the-art climate modeling to produce high-resolution scenarios and risk

(2) Multi-hazard modeling, addressing combinations of hazards (e.g. cascading events like heavy rain leading to landslides) to evaluate compound risk
(3) Improved prediction of structural and geotechnical safety risks for heritage structures by integrating structural health monitoring data with advanced simulation.
(4) Environmental and material monitoring techniques to diagnose deterioration in materials and structures, including novel sensing and remote imaging approaches;
(5) Development of a Cultural Heritage Resilience Assessment Platform (CHRAP) and an associated decision-support system, to enable stakeholders (including local authorities and communities) to assess risks and explore mitigation strategies interactively;
(6) Capacity building and network development, by training a cohort of researchers (through staff exchanges and summer schools) and fostering an international, multidisciplinary network in the domain of CH
(7) Guidelines and best practices, culminating in a Handbook of recommendations for enhancing the resilience and sustainable reconstruction of historic areas.

Through these objectives, YADES set out not only to push the scientific state-of-the-art but also to produce tangible tools and knowledge that can support policymakers, engineers, and conservation practitioners in safeguarding cultural heritage against climate-related and other hazards.

2. Dissemination activities

Dissemination, communication, and exploitation activities, including proper and careful management of IPR and data, are essential to ensure the successful achievement of the project objectives.

YADES project was developing in the new world, where COVID-19 outbreaks shape socio-economic strategies of entire countries. Such unpredictable and turbulent environment is rarely favourable to such research projects as YADES.

2.1 Objectives

The dissemination strategy focused on producing a set of dissemination actions that will support the commercialization stage of the project. Thus, dissemination strategy objectives must be set in a way that will help create a solid base for the final stage of the project.

The main objectives of the dissemination and communication strategy were:

(1) **Define a clear and distinctive brand identity** for YADES that will be consistent online and offline, and it will represent the cornerstone values of the project
(2) **Ensure broad visibility of YADES work** and disseminate its results towards the targeted stakeholder groups so as to effectively promote the YADES offering for large uptake

(3) **Facilitate the exploitation of YADES outcomes** for the partners, together and individually and for the overall research communities by promoting the development of innovative solutions based on YADES for effective socio-economic impact creation
(4) **Ensure broad visibility and promotion of YADES,** beyond the programme borders via a strategic and operational coordination of the specific communities through dedicated efforts embracing all target stakeholders
(5) **Support the sustainability of YADES** beyond the project lifetime.

By creating a dissemination strategy, that will maximize exploitation of YADES research, it was expected to increase community and end-user awareness, generate demand for CHRAP and DSS, and encourage inter-project collaboration.

The plan for dissemination and communication was successfully executed on several fronts in YADES. Strong distinctive brand identity developed from the early beginning including the creation of logo templates, leaflets, posters, site.

This branding was consistently upheld through online and offline mediums for project recognition. The project set up a website for its dissemination. It also created activities on social media platforms, like, LinkedIn, Facebook and Twitter/X.

YADES's visibility was additionally enhanced through branded materials, and conference presentations.

The project partners reached out to different stakeholders like researchers, city planners, SMEs, and cultural heritage institutions. Both dissemination and exploitation activities were closely aligned with each other, particularly the final event and summer. While no formal exploitation agreements were entered into in the course of the project, groundwork was laid for subsequent research and possible exploitation.

2.2 Channels and Tools

A proper toolkit is essential for a successful dissemination strategy. Proper toolkit will help consider the preferences needs, characteristics and interests of end target audiences.

Tools

In the framework of this research, the following tools will were considered as the base of dissemination strategy:

- Stakeholder mapping tool
- Dissemination plan
- Communication plan

Stakeholder mapping tool will was used to identify target audiences of this project. Identifying groups of individuals and organizations that will benefit from the outcomes of this research is essential for successful dissemination strategy.

Dissemination plan explains how outcomes of the project were shared with the stakeholders, relevant institutions, and individuals. All these actions ensured that the project results will be used. Dissemination plan identified the purpose of dissemination, message, audience, method, and timing.

Communication plan in the framework of this project was considered a separate tool from dissemination plan, because general public was identified as one of the most stakeholders' groups.

Channels

Proper dissemination channels are as important as appropriate tools for success of dissemination strategy. In the framework of this project, there were 3 major channels groups:

- Mass media
- Personal contacts
- Information service systems
- Training and educational programs

Mass media - refers to a diverse array of media technologies that reach a large audience via mass communication and include a variety of outlets. In the framework of the project, the following outlets of mass media were considered:

- **Internet media**: social media platforms, e-mail, website
- **Print media**: magazines and/or newspapers, leaflets, posters

Personal contacts – personal connections and word-of-mouth communication remain among the most effective communication forms as it was performed from ancient times. Creating engaging and memorable communication on other dissemination channels, ensured favourable word-of-mouth communication with storytelling elements, which helped disseminate project results even further.

Information service systems – is a configuration of technology and organizational networks designed to deliver services that satisfy customers' needs, wants, or aspirations, which include online data bases and information referral centres. Scientific publications produced during the project are uploaded to repositories and published in scientific journals. Repositories and scientific journal content outlines help disseminate research outcomes to scientific communities and thus should be considered dissemination channels.

Training and educational programs –have been a significant dissemination strategy. These include pre-service and in-service. Pre-service educational programs are also referred to as professional preparation programs. Inservice refers to education provided on the job in the form of induction training, apprenticeships, and short-term workshops or courses. Both offer

vehicles for getting new knowledge into practice.[1] During the framework of the project the following activities will be considered:

- Seminars
- Workshops
- Summer schools

2.3 Target audiences

Identifying the target audiences was an essential step to draw up an effective and impactful dissemination strategy for the YADES project. Due to the project's interdisciplinary and multicultural nature, communication efforts had to take into consideration not only the sectoral origin of audiences – public authorities, domain specialists, academia, general public – but also the cultural and regional context in which the respective audiences operate.

According to the model supported by Horizon Europe (see Figure 1 Model supported by the Horizon Europe), projects results in targeted outputs (data, policy recommendations, software, training materials etc.) for four main stakeholder groups (research community, policy makers, industry, and civil society). This is known as the Quadruple Helix. While this model will facilitate knowledge transfer and stakeholder engagement, it will be far from sufficient for a project like YADES. YADES requires an even wider and more integrated approach. This was the reason for YADES to adopt the Quintuple Helix Innovation Model, which includes the "natural environment" as a fifth helix.

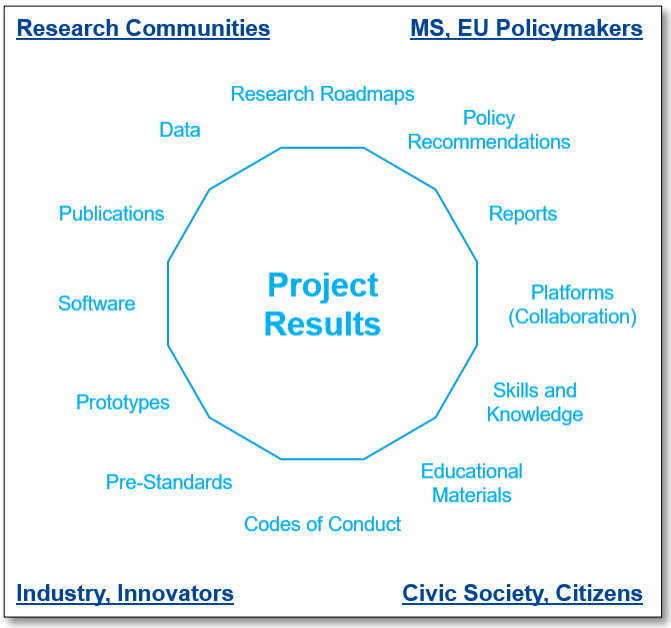

Figure 1 Model supported by the Horizon Europe

[1] Chapter V: Information Channels & Dissemination Strategies (tamucc.edu)

Quintuple Helix Innovation Model is an evolution of the Quadruple Helix, which is the accepted norm. The inclusive model meant that the dissemination strategy surpassed standard stakeholder categories by including the environment, in line with the wider goal of Horizon Europe for social relevance and sustainable impact. By taking inputs from academia, industry, public, civil society and environment, YADES framed its message and outreach activities in an appropriate manner that fixed relevance, inclusivity and long term result.

The project highlighted how environmental aspects are not just background issues but central to the problems being solved and the long-term viability of those solutions. If we don't integrate an environmental dimension into YADES results' distribution and exploitation, these results would likely be out of touch with the ecological challenges faced by heritage preservation efforts. While the Horizon Europe model can provide a strong basis, YADES improved on this model to be more suitable to the complexity and interdisciplinary nature of resilience of cultural heritage in the Anthropocene.

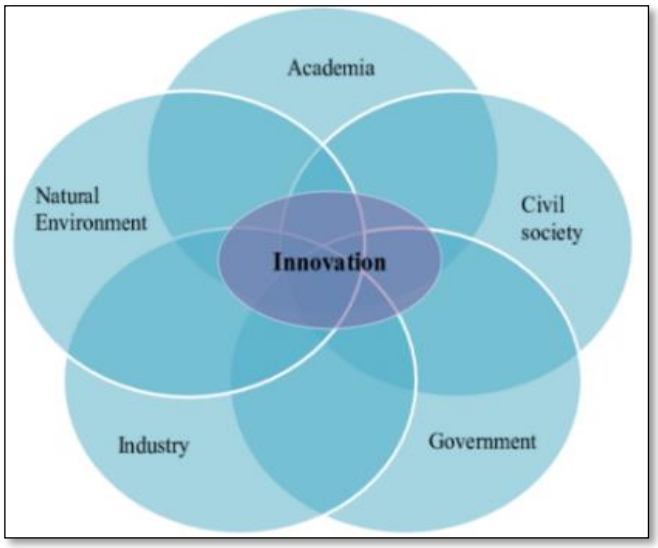

Figure 2 Quintuple Helix Innovation Model

Drawing on the Quintuple Helix Innovation Model, YADES' target audiences were identified in a structured and strategic way to ensure that no stone is left unturned in engaging with all sectors of society that matter for the project. The proposal that combined academia, government, industry, civil society and environment created a multi-dimensional model that helped the consortium to coordinate the dissemination activities within the larger ecosystem of cultural heritage resilience. The choice to concentrate on these groups was based on the idea that each helix plays a specific function in the validation and uptake of the YADES outcomes.

Academia	Universities
	Research communities
Civil Society	General public
	Local communities
	History enthusiasts
Government	Public Authorities (EU and National)
	Regulation bodies
Industry	Risk Assessment and specialized companies
	Sensor Manufacturers
	Scanning, Photonics & Optoelectronics SMEs
	Meteorological organisations

Table 1 YADES Target audiences

Research community and universities were our focus for the academia-world. These two were chosen due to them being knowledge creators while also being multipliers through education. It was essential to engage with civil society, local communities, and enthusiasts of history in order to raise public awareness, to gain grassroots support and to ensure social relevance. The industry segment was determined due to its ability to use the methodologies and technologies of YADES. This includes risk assessment firms, sensor and scanning equipment manufacturers, meteorological organisations, etc. These stakeholders were chosen not only for their technical competencies but also their capacity to commercialize and implement project innovations, which opens up possibilities for sustainable exploitation for public good.

2.4 Measurement

Edward Seykota famously stated, “If you can’t measure it, you probably can’t manage it. Things you measure tend to improve.” For a complex and multidisciplinary project like YADES, this principle proved especially relevant. From the outset, a structured KPI system was established to guide and monitor the effectiveness of dissemination activities. This system enabled the project’s dissemination team to track progress against predefined objectives, identify underperforming areas early, and implement corrective actions to enhance visibility, stakeholder engagement, and overall impact.

Throughout the project, the KPI framework served as both a strategic and operational tool. It facilitated the continuous evaluation of communication outputs—such as social media reach, website traffic, event participation, and publication metrics—and supported data-informed decision-making. For example, while initial targets for social media engagement proved overly ambitious, monitoring allowed the team to shift focus to more impactful channels like LinkedIn, where project content consistently reached over 3,000 viewers annually. Likewise, the KPI system helped highlight the success of scientific dissemination through conferences and publications, as well as the effectiveness of training activities delivered via four international summer schools. The following table presents a consolidated

overview of YADES dissemination activities, measured against their respective indicators, to provide a transparent and comprehensive assessment of the project's outreach performance.

Activity	Description	KPI	Outcome
Creation of recognisable brand identity	Development of the YADES brand: To ensure the impact of the project YADES will develop an EU wide recognisable brand that visually translates the project idea and concept in all outreach materials and events.	• project logo • brand guidelines • YADES templates • illustrations • graphics	Brand identity was successfully developed by M20 and applied consistently across all communication materials, ensuring a coherent and professional image throughout the project.
Communication kit	Leaflets and posters to be produced until M18. This material will be distributed at congresses, workshops, exhibitions, and important events. e-Newsletters will be sent to the YADES stakeholder network and to relevant initiatives (H2020 and beyond). A Video to present the main objectives and target outcomes of YADES will be produced in the early stages of the project. A video will be also produced to showcase our proposed YEADES solution in the various events.	• 2 leaflets, • 1 poster, • 2 animation videos	Communication kit exceeded initial targets with 2 posters, branded notebooks and pens produced in addition to planned materials, enhancing project visibility at events and meetings.
Dedicated project and code websites	Launch and maintenance of the YADES website in M5. Its main target is to create an accessible public platform for disseminating of deliverables, open access publications, presentations, newsletter issues etc. Interactivity and updated content will attract attention and repeated visits. In addition, a GitHub4 open software development site will be created to attract research community participation and long-term engagement in the creation of the SG simulator interfaces and the CHRAP engine.	• 1 website (10 000 visitors/year)	Project website was launched and maintained at www.yades-project.eu, averaging 830 visitors per year.
Social media channels	Social media will be used to reach the target audience frequently and cost-efficiently, and to strengthen	Active YADES: • ResearchGate (min 200 followers)	ResearchGate accounts were deactivated by the platform in early 2022.

	the stakeholders' network. Project information and its concept will also be disseminated through the partners' existing social networking pages as well as the H2020 social media accounts.	• LinkedIn (min 200 followers) • Facebook (min 200 followers) • Twitter (min 200 followers) • 6 announcements in H2020 social media sites. • minimum 150 posts/year	LinkedIn became the main dissemination channel with 135 followers and 3,205 annual reach, indicating effective audience targeting. Facebook (22 followers) and Twitter/X (12 followers) showed limited engagement; thus, the team shifted focus away from Twitter due to declining relevance, ethical concerns, and changes in platform governance.
Conference presentations	YADES will have presentations and demos in relevant international conferences and other events. We will also organise special sessions and other project events at well-known transport conferences.	• 3 presentations/year • 10 presentations in total	7 conference and workshop presentations were delivered, complemented by 4 Summer Schools, meeting the target of 10 total presentations and ensuring strong academic and professional visibility.
Peer-reviewed publications	Effort will be made to publish papers in well-respected and highly rated peer-reviewed journals. The publications will cover several project fields of work. Particular effort will be made to secure Open Access (OA) to all interested persons, mainly through the project website but also through respective OA repositories such as OpenAIRE.	• 10 publications in scientific ISI journals	A total of 9 scientific journal publications, 7 conference proceedings, and 3 additional publications were produced, closely aligning with the initial KPI and demonstrating strong academic output.
Demo events	YADES puts emphasis on "actively-educating" the communities and relevant organisations about the need for additional advanced research to cover their requirements through demonstration.	• 1 online session • 3 Pilot demonstrations followed by training to the users. • Training package • 50 non-specialist attendees	The 4th Summer School in Kalamata (Jan 2025) included pilot demonstrations and training for on-site participants. While no online session was held for pilot demonstrations, the event successfully engaged non-specialist

			attendees and fulfilled the training objectives.
Final event	A conference will be organised at the end of the project to demonstrate to a large number of stakeholders the system developed, and results achieved.	• 1 YADES conference (more than 80 participants in total) • Conference proceedings and report	The Final Event was held on 27 March 2025 at the History Museum of the National and Kapodistrian University of Athens.

Table 2 Dissemination and Communication KPIs

While YADES successfully met or exceeded the majority of its dissemination and communication KPIs, a few targets were not fully achieved due to a combination of external constraints and strategic realignment based on project-specific conditions and audience behavior.

The original KPI of 10,000 visitors per year for project website proved overly ambitious given the niche scope of the project and its specialized target audience. YADES focused on quality over quantity, ensuring that the website served as a robust, well-structured information hub for relevant stakeholders. Despite lower traffic volumes, the site achieved high engagement among targeted groups, such as researchers, institutional partners, and trainees.

While LinkedIn showed strong engagement with 135 followers and over 3,200 annual reach, platforms like Facebook (22 followers) and Twitter/X (12 followers) underperformed. Early in the project, ResearchGate accounts were deactivated by the platform (early 2022), limiting outreach in that space. In addition, due to changes in Twitter's governance, ethical concerns, and reduced relevance within the European research community, the dissemination team strategically deprioritized Twitter/X and shifted focus to more effective platforms like LinkedIn , which better aligned with the project's academic and policy-oriented audiences.

The project YADES was quite successful and visible to the stakeholders, even though a few KPIs were not achieved. On the contrary implementing the project provided an opportunity to adapt communication means, showing flexibility and responiveness. Where quantitative targets were weak, qualitative results shone through – YADES achieved high visibility impact through strategic events participation, meaningful partnerships, well-received trainings and effective presence on valuable platforms namely in LinkedIn. These efforts ensured that the key messages, results, and innovations of the project reached the right audiences, and spurred engagement, dialogue, and opportunities to collaborate and connect well beyond the metrics.

2.5 Dissemination efforts

The YADES dissemination strategy was built to reflect the project's wide societal, institutional and technical scope. The planned dissemination activities were structured to interact with the targeted stakeholders through certain actions, which would enable them to experience the multi-dimensional challenge of heritage resilience in their environmental, social and technological context. The Quintuple Helix Innovation Model served as the justification

for this structure since communication must be wide but also relevant to different actors involved in the heritage, policy, research, or commercial players in the field.

To bring a better relationship with public authorities and policymakers direct engagement was carried out through workshop organisation, presentation to high-level bodies like the Council of Europe and UNESCO, targeting ministries, regulatory agencies, etc. The aim of these efforts was to mainstream YADES results for future policies and decisions. The dissemination which will target civil society and cultural organisations will promote awareness about, participation in, and support for the protection of historic cities. The research strategy called for the scientific community to ensure high visibility through publication in high-impact journals, open-access, and major international conferences. This way, all stakeholders received the required information structured in line with their interests and their ability to act.

Scientific publications

Scientific conferences provided essential platforms to showcase project outcomes, exchange knowledge, and foster collaboration with industry, academia, and policy representatives. YADES academic partners focused on scientific dissemination, targeting high-impact journals and conferences to ensure that the research generated under YADES reached a wide and specialized audience. The list of scientific publications can be found in the table below.

Publication type	Title	Authors	Title of the Journal/Proc./Book
Article in Journal	A Risk-based Evaluation of Direct Displacement-based Design	Luke van der Burg; Mohsen Kohrangi; Paolo Bazzurro; Dimitrios Vamvatsikos	Bulletin of Earthquake Engineering
Article in Journal	Human and Spatial Synergies: the case of Pafos 2017 European Capital of Culture	Evanthia Dova, Angeliki Sivitanidou, Julia-Nerantzia Tzortzi	Urbanistica Journal
Article in Journal	Renaturing Historical Centres. The Role of Private Space in Milan's Green Infrastrucutres	Julia Nerantzia TZORTZI, Maria Stella LUX	AGATHÓN | International Journal of Architecture, Art and Design
Article in Journal	Sustainable Strategies for Urban and Landscape Regeneration Related to Agri-Cultural Heritage in the Urban-Periphery of South Milan, Sustainability	Tzortzi J. N., Guaita L. and Kouzoupi A.	Sustainability Journal
Article in Journal	On the Exploration of Automatic Building Extraction from RGB Satellite Images Using Deep Learning Architectures Based on U-Net	Anastasios Temenos, Nikos Temenos, Anastasios Doulamis and Nikolaos Doulamis	Technologies MDPI press

Article in Journal	Interpretable Deep Learning Framework for Land Use and Land Cover Classification in Remote Sensing Using SHAP	A. Temenos, N. Temenos, M. Kaselimi, A. Doulamis and N. Doulamis	IEEE Geoscience and Remote Sensing Letters
Article in Journal	A Prototype Machine Learning Tool Aiming to Support 3D Crowdsourced Cadastral Surveying of Self-Made Cities	Chryssy Potsiou; Nikolaos Doulamis; Nikolaos Bakalos; Maria Gkeli; Charalabos Ioannidis; Selena Markouizou	Land
Article in Journal	The Landscape Design Proposal for the New Archeological Museum of Cyprus	Julia Nerantzia Tzortzi	Land, 2024
Article in Journal	Design guidelines for healing gardens in the general hospital	Quying Wang, Julia Nerantzia Tzortzi	Frontiers in Public Health, 2023
Other	"GREENWAY NETWORK PROPOSAL AS NATURE-BASED SOLUTION IN LIMASSOL, CYPRUS. A systematic reuse of residual areas inside the cultural heritage city centre"	Nerantzia (Julia) TZORTZI, Maria Stella LUX, Apollonios TSIATINIS	N-AERUS 2021 - 20th international conference - How to plan in a world of uncertainty?
Other	A city under the landscape: the case study of Matera	Maria Stella LUX	Scientific conference: Symposium Under the Landscape
Other	Green heritage, green history and green planning	Julia Nerantzia TZORTZI, Maria Stella LUX	The Faro Convention Implementation. Heritage Communities as Commons: Relationships, Participation, and Well-being in a Shared Multidisciplinary Perspective
Publication in Conference proceedings/Workshop	"Active citizenship to link Urban Green Infrastructure stategy and Cultural Heritage preservation in the response to Climate Change"	Maria Stella LUX, Julia Nerantzia TZORTZI	PARTECIPATORY LAB Scientific Conference: Participatory Design: City, Environment and Climate Change. Experiences, Challenges and Potentials
Publication in Conference proceedings/Workshop	Re-starting from cultural heritage to design the resilience of historical urban centres	Julia Nerantzia TZORTZI, Maria Stella LUX	
Publication in Conference proceedings/Workshop	ADAPTIVECONVOLUTIONALLYENCHANCEDBI-DIRECTIONALLSTMNETWORKS	Nikolaos Bakalos, Ioannis Rallis, Nikolaos Doulamis, Anastasios Doulamis, Athanasios	IEEE International Conference on Image Processing (ICIP)

	FORCHOREOGRAPHIC-MODELING	Voulodimos, Eftychios Protopapadakis	
Publication in Conference proceedings/Workshop	Evaluating the feasibility of fast game development using open source tools and AI algorithms	Ioannis Kavouras, Ioannis Rallis, Anastasios Doulamis, and Nikolaos Doulamis	Novel & Intelligence Digital Systems
Publication in Conference proceedings/Workshop	Evaluating the effectiveness of Unsupervised and Supervised techniques for identifying deteriorations on Cultural Heritage monuments using hyper-spectral imagery	Nikolaos Chrysogonos, Ioannis N. Tzortzis, Charalampos Zafeiropoulos, Anastasios Doulamis, and Nikolaos Doulamis	3rd International Conference TMM-CH Transdisciplinary Multispectral Modelling and Cooperation for the Preservation of Cultural Heritage
Publication in Conference proceedings/Workshop	Improved Resilience and Sustainable Reconstruction of Cultural Heritage Areas to cope with Climate Change and Other Hazards based on Innovative Algorithms and Modelling Tools	Labropoulos, Kyriakos; Zafeiropoulos , Charalampos; Zafeiropoulos , Charalampos; Rallis , Ioannis; Doulamis , Anastasios; Doulamis , Nikolaos; Moropoulou , Antonia	2nd International Conference, TMM_CH 2021
Publication in Conference proceedings/Workshop	Automatic Inspection of Cultural Monuments Using Deep and Tensor-Based Learning on Hyperspectral Imagery	Tzortzis, Ioannis N.; Rallis, Ioannis; Makantasis, Konstantinos; Doulamis, Anastasios; Doulamis, Nikolaos; Voulodimos, Athanasios	2022 IEEE International Conference on Image Processing (ICIP)

Table 3 YADES scientific publications

In line with the obligations set out in the Grant Agreement, the YADES consortium has ensured open access to all peer-reviewed scientific publications arising from the project's results. This commitment guarantees that publications are freely and publicly accessible online, enabling wide dissemination of the knowledge generated. All publications include the required metadata, such as references to "Marie Skłodowska-Curie Actions," the YADES project name, acronym, and grant number, as well as the publication date, embargo details (if applicable), and a persistent identifier to ensure traceability and compliance with Horizon 2020 open science guidelines.

To support coordination and transparency, a structured publication procedure was implemented across the consortium. Once a partner prepares a publication for submission, they inform the Dissemination Manager, who then circulates key details—title, authorship, contact information of the lead author, intended journal or platform, and repository link—to all partners. Consortium members were given 30 days to review and submit any justified objections or remarks. Upon final publication, the article is registered on the Funding &

Tenders Portal. In parallel, consortium partners continuously explore new opportunities for dissemination, and the list of publication and outreach channels is regularly updated to reflect emerging avenues for impact.

Conferences and workshops

Scientific conferences and workshops played an important role in the dissemination of YADES research outcomes. Participation in these events not only enhanced the visibility of the project but also facilitated valuable feedback, networking, and opportunities for future collaboration. The following section presents key conferences and workshops where YADES partners presented their work and contributed to advancing the dialogue on cultural heritage resilience and climate adaptation.

N-AERUS 2021: How to plan in a world of uncertainty?

Project partner POLIMI participated in the international conference "N-AERUS 2021: How to plan in a world of uncertainty?" on 4th – 6th of February 2021. This event brought together scholars, practitioners, and policymakers to discuss innovative approaches to urban planning and resilience in the face of complex global challenges, such as climate change and socio-environmental risks.

Conference video can be found here: https://www.youtube.com/watch?v=F86LleSLd-U

YADES project was represented in this conference in a form of an abstract "Greenway Network Proposal As Nature-Based Solution In Limmassol, Cyprus". Abstract was published in the abstract book, and can be found here: https://n-aerus.net/documents/6/Naerus_2021_-_book_of_abstracts-final.pdf

During the conference, the work of GMCY and the broader YADES initiative was formally acknowledged, highlighting the interdisciplinary contribution of the project to sustainable urban planning and heritage protection. The project presented by POLIMI received special mention for integrating nature-based solutions within the framework of cultural heritage

resilience, exemplifying the application of YADES research in real-world urban contexts.

Figure 3 N-AERUS 2021international conference

EuroGEO workshop 2021

The EuroGEO Workshop 2021, held from 20th to 23rd September, brought together stakeholders from across Europe to explore Earth Observation (EO)-based solutions supporting the objectives of the European Green Deal. Organized under the framework of the Group on Earth Observations (GEO), the event served as a key platform for discussing how EO technologies can drive sustainable development, enhance environmental monitoring, and support climate resilience across multiple sectors.

During this high-level event, the partnership between the HARMONIA and YADES projects was highlighted as an example of inter-project collaboration focused on advancing urban resilience through data-driven methodologies. The mention of YADES in this context emphasized the project's contribution to EO-based approaches for assessing and mitigating climate-related risks in cultural heritage areas. It also reinforced the value of cross-project synergies, showcasing how coordinated efforts within the Horizon 2020 ecosystem can amplify impact and support the broader policy objectives of the European Commission. The visibility of YADES at EuroGEO 2021 further positioned the project within an influential network of stakeholders working at the intersection of geospatial technologies, urban planning, and environmental protection.

Figure 4 Harmonia presentation in EuroGEO workshop 2021

Engineering Seismology & Seismic Hazard Assessment

Between February and May 2021, project partner NTUA (National Technical University of Athens) organized a comprehensive series of online lectures titled “Engineering Seismology & Seismic Hazard Assessment”, aimed at graduate students and early-stage researchers. This initiative was part of the broader effort to disseminate YADES-related scientific knowledge and build capacity in key thematic areas linked to the project’s objectives, particularly in understanding and modelling seismic risks affecting cultural heritage structures.

The lecture series was designed to provide in-depth technical training on methodologies relevant to engineering seismology, including seismic hazard analysis, site effects, and probabilistic risk assessment—topics central to the resilience framework developed within YADES. The sessions were well-received by the academic community, drawing significant participation and positive feedback from students and faculty alike. To ensure wider accessibility and support continued learning beyond the classroom, all recorded lectures were made publicly available on YouTube through NTUA’s official channel. This open-access approach contributed to the long-term educational legacy of YADES and reinforced its commitment to knowledge sharing within and beyond the consortium.

Online lectures can be found here:
https://www.youtube.com/playlist?list=PL4U0jHLUYO6JcwHAEVuEMvSqNiwnGlNZ2

Figure 5 Engineering seismology online lectures. Participants

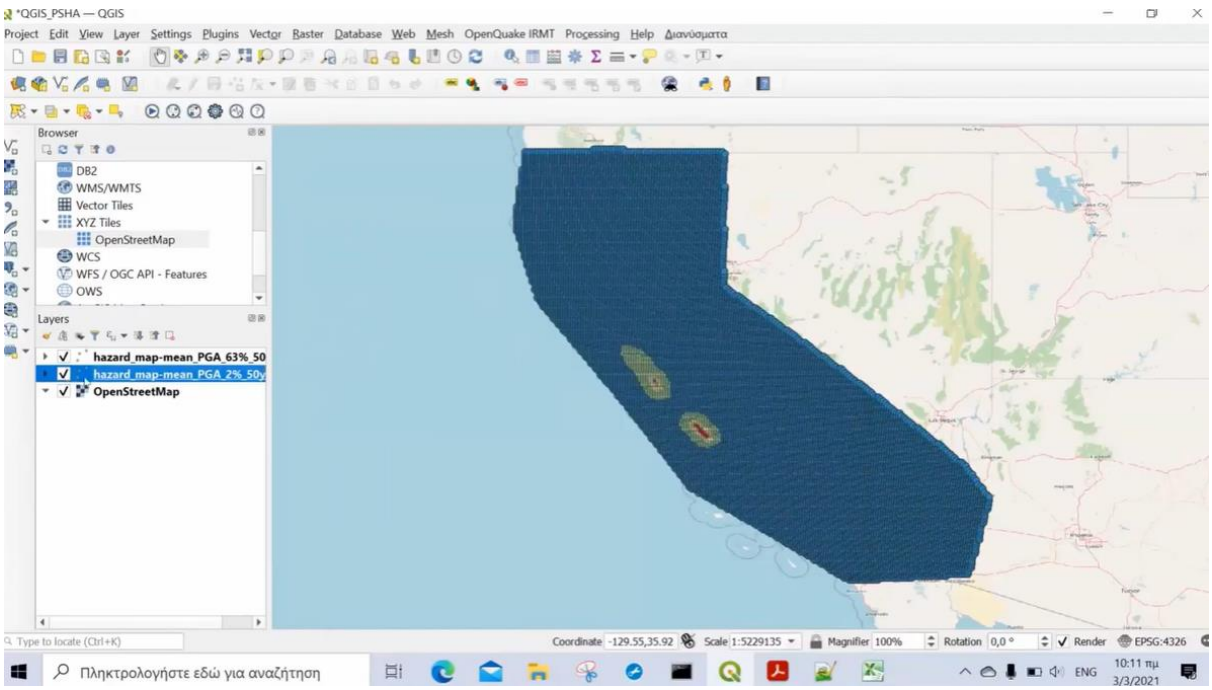

Figure 6 Engineering seismology online lectures. Content example

3rd International Conference TMM_CH

At the 3rd International Conference TMM_CH, held from 20–23 March 2023 at the Eugenides Foundation in Athens, Greece, Charalampos Zafeiropoulos, a PhD candidate from NTUA, represented the YADES project with a presentation titled “Evaluating the Effectiveness

of Unsupervised and Supervised Techniques for Identifying Deteriorations on Cultural Heritage Monuments Using Hyper-Spectral Imagery." This high-profile conference brought together interdisciplinary experts focused on cultural heritage preservation, particularly in contexts affected by conflict, and emphasized the role of culture in promoting mutual understanding and peace.

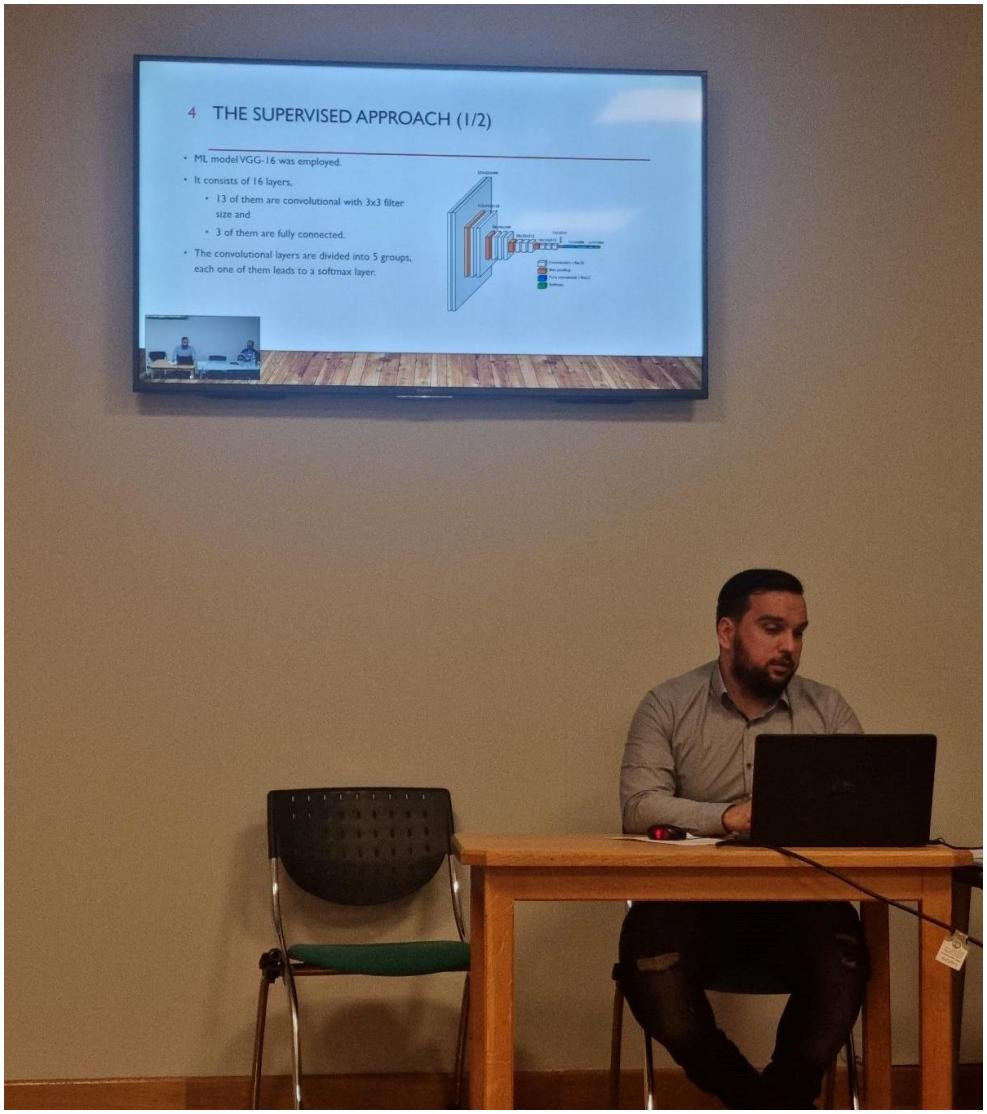

Table 4 Presentation at International Conference TMM_CH

Zafeiropoulos's presentation highlighted research undertaken within the YADES framework, focusing on the comparative application of machine learning techniques—both supervised and unsupervised—for detecting material deterioration in cultural heritage structures. Leveraging hyperspectral imagery, the study demonstrated how advanced remote sensing and data analysis tools can support early intervention strategies for monument conservation. The presentation was well-received by the scientific community and contributed to advancing the dialogue on integrating artificial intelligence and Earth Observation technologies in heritage risk assessment. The conference provided an important dissemination

opportunity to position YADES at the intersection of technological innovation, cultural heritage protection, and peace-building through science.

Next level for Insurance SME segment: climate change & physical risks

The "Next Level for Insurance SME Segment: Climate Change & Physical Risks" webinar was held on 24th November 2022. The webinar aimed to shed light on the increasing incidences of extreme weather events and their potential economic impact on Italian companies, with the statistic that one out of three companies is exposed to potential losses due to natural phenomena.

Figure 7 Next level for Insurance SME segment: climate change & physical risks

One of the keynote speakers at the event was Mario Martina, the Director of the Weather-Related Risks Department at RED. Mario participated in the section titled "Natural risks in Italy: the riskiness of Italian companies and expected losses: the CRIF-RED analytical study," where he provided insights into the climate-related risks faced by Italian companies and potential losses, underscoring the importance of data-driven decision making in managing these risks. The presentation of the CRIF-RED study's evidence and analytical methodologies was a notable highlight of the event. This study was created with the valuable contribution of QBE Italia and the patronage of the Italian Insurtech Association (IIA). Mario Martina's participation was a critical part of the discussion, contributing to a deeper understanding of the intersection between climate change, physical risks, and the insurance sector.

Catastrophe risk modelling in real life: Pacific Islands and the Caribbean

YADES project's partners RED and NTUA co-organized an online seminar titled "Catastrophe Risk Modelling in Real Life: Pacific Islands and the Caribbean" on 27 October 2021. This event was designed specifically for catastrophe risk modellers, researchers and

post-graduate students interested in applying theoretical models to real world scenarios in areas with high exposure to natural hazards. The seminar examined the use of advanced risk assessment methodologies, most of which are relevant to YADES, in geographic and climatic sensitive locations like Pacific Islands and Caribbean.

During the recent seminar, participants were informed about the practicalities of catastrophe modelling, including adapting models to local contexts, incorporating climate data, and the socio-economic aspects of disaster risk. In order to reach everyone and share knowledge beyond the event, the seminar was made available on YouTube after the event was over. This method matched the commitment of YADES to open learning, as well as the diffusion of insights.

Online seminar can be found here: https://www.youtube.com/watch?v=zTX_kxuMZtw

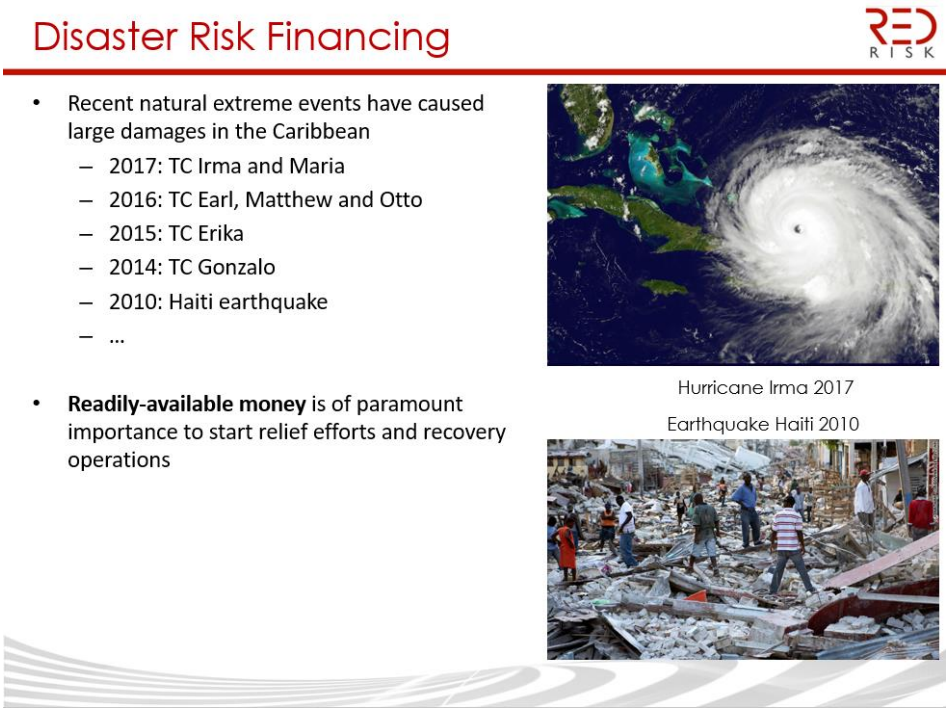

Figure 8 Catastrophe risk modeling in real life seminar

The Changing Cities conference

At the 5th edition of the Changing Cities conference, Maria Stella Lux from POLIMI, together with Prof. Julia Nerantzia Tzortzi (Georgi), presented their research contribution titled "Re-starting from Cultural Heritage to Design the Resilience of Historical Urban Centres." The presentation was delivered as part of a special session dedicated to historical centres, chaired by Prof. Diana Babalis. This session explored innovative approaches to urban resilience in the face of challenges such as pandemics and environmental stressors. Their work, supported by the YADES MSCA RISE Project, emphasized the critical role of cultural heritage as a

foundation for designing resilient, adaptive urban environments. The conference provided an excellent platform for knowledge exchange and interdisciplinary dialogue, aligning closely with YADES objectives of integrating heritage preservation with sustainable urban planning.

Figure 9 Presentation at The Changing cities conference

Partecipatory Lab Conference

Maria Stella Lux, representing project partner POLIMI, actively participated in the Participatory LAB Conference, held from 19–21 November 2021. The event gathered a wide array of urban planning professionals, academics, and stakeholders focused on climate adaptation through participatory spatial and environmental design. On the first day, during a session dedicated to “Green infrastructure and participatory design,” she presented her ongoing research developed within the YADES MSCA RISE Project.

Figure 10 Presentation at the Partecipatory Lab Conference

Her presentation focused on the integration of green infrastructure into urban areas with cultural heritage value. This contribution explored the potential of nature-based solutions (NBS) in enhancing the resilience of historical cityscapes, aligning closely with YADES' mission to protect cultural heritage from environmental and climate-related risks. The session sparked valuable exchanges among European project representatives and emphasized the importance of local participation in shaping greener, healthier urban environments.

Figure 11 Women Leaders Taking Action for Greener and Healthier Cities at Partecipatory Lab Conference

The event also featured an inspiring plenary session titled "Women Leaders Taking Action for Greener and Healthier Cities", further highlighting the growing role of female leadership in sustainability and urban resilience—topics that resonate with YADES' cross-sectoral and

inclusive approach. Maria's involvement underscored how YADES contributes not only to scientific knowledge but also to policy and practice in the realms of sustainable and participatory urban transformation.'

RISKADAPT Workshop

The achievements of the YADES project were presented by Antti Hellsten from the Finnish Meteorological Institute at the RISKADAPT Workshop on "Risk Assessment of Structures under Climate Change", held on October 23, 2024, at the National Technical University of Athens (NTUA). The event was organized by ERRA and delivered in a hybrid format, with live broadcasting via Telegram by GRT.

The workshop brought together experts and researchers from several European projects, including YADES MSCA RISE, RISKADAPT, PLOTO, MIRACA, and ICARIA, to address the growing challenges posed by climate change on infrastructure resilience. The discussions focused on material degradation, structural risk assessments, and innovative adaptation strategies. YADES was featured for its contribution to cultural heritage risk modelling and its integration of climate data into resilience planning. The event provided a valuable opportunity to exchange knowledge across disciplines and reinforced the project's role in shaping sustainable, climate-adaptive infrastructure policies and practices.

Figure 12 RISKADAPT Workshop

YADES Summer Schools

The YADES project utilized Summer Schools as efficient practices for capacity building, knowledge sharing, and the dissemination of results. We have held successful Summer Schools in each project year. The four international Summer Schools brought together early-stage researchers, professionals, public authorities and other stakeholders across Europe and beyond. Summer Schools are designed as immersive educational experiences. The exploration of interdisciplinary themes linked to the YADES project and its concerns (impact of climate change on cultural heritage, monitoring technology, risk assessment model, and approaches to urban resilience, etc.) in a structured space. Through lectures, workshops, field visits, and hands-on demonstrations, participants acquired practical knowledge of the tools and methodology developed by the project.

In addition to training, the Summer Schools served as a meeting point for dialogue and networking between academia, industry and the public sector. The engaging format helped in learning from each other and demonstrated the practical application of YADES research.

The Summer Schools aided the project's sustainability goal by training a new generation of professionals who can continue to further heritage resilience. They reinforced YADES educational legacy, extended the outreach beyond the consortium, and laid the groundwork for potential future exploitation and policy integration actions.

YADES 1st Summer school

In order to disseminate the YADES results to a diverse, multidisciplinary audience, the YADES Training School took place on 2 October 021 in conjunction with the International Conference on Novelties in Intelligent Digital Systems (NIDS21). The purpose of the training school is to teach advanced use of digital technologies to detect and prevent risk on Cultural Heritage sites, monuments and historic cities. The event was organised to connect theoretical ingenuity to practical implementation via a multi-actor engagement of participants from diverse backgrounds (PhD students, researchers, policy makers, SME representatives).

Detailed programme can be found here: https://nids2021.iis-international.org/wp-content/uploads/2021/09/NiDS-2021-Program.pdf

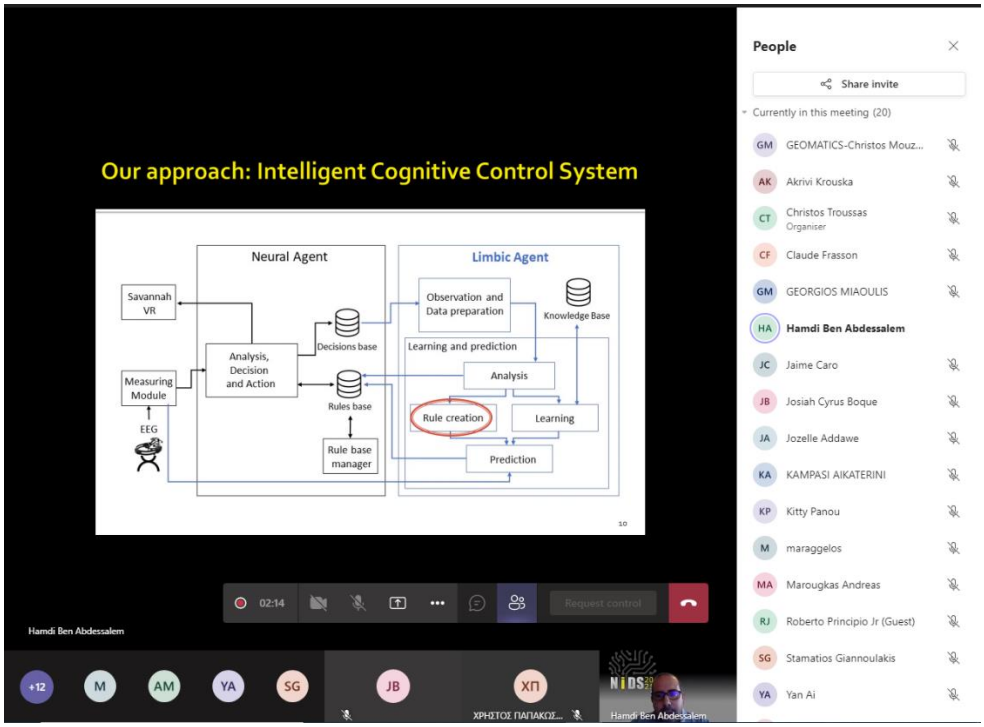

Figure 13 YADES 1st training school. Content and participant list

For wide accessibility and maximum outreach, the training was offered free-of-cost to both registered and non-registered participants of the NIDS21. The capacities-building sessions were led by experts and focused on various important topics such as impacts of climate change on heritage, risk detection using machine learning, and urban resilience through remote sensing and bathymetric mapping. By joining forces with NIDS21, the YADES Training School was able to leverage an international platform to build capacity, share project tools and methodologies and dialogue among sectors. The event has contributed to one of YADES' objectives; knowledge transfer and skill upgrading for the future innovation of cultural heritage protection.

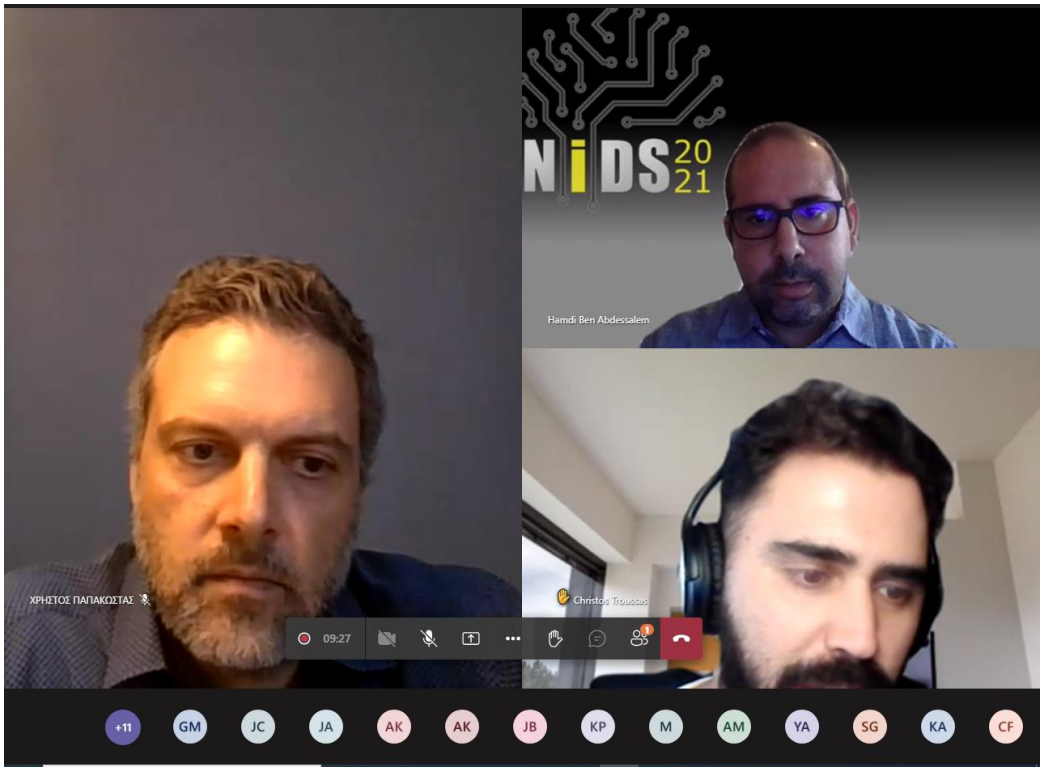

Figure 14 YADES 1st training school. Speakers

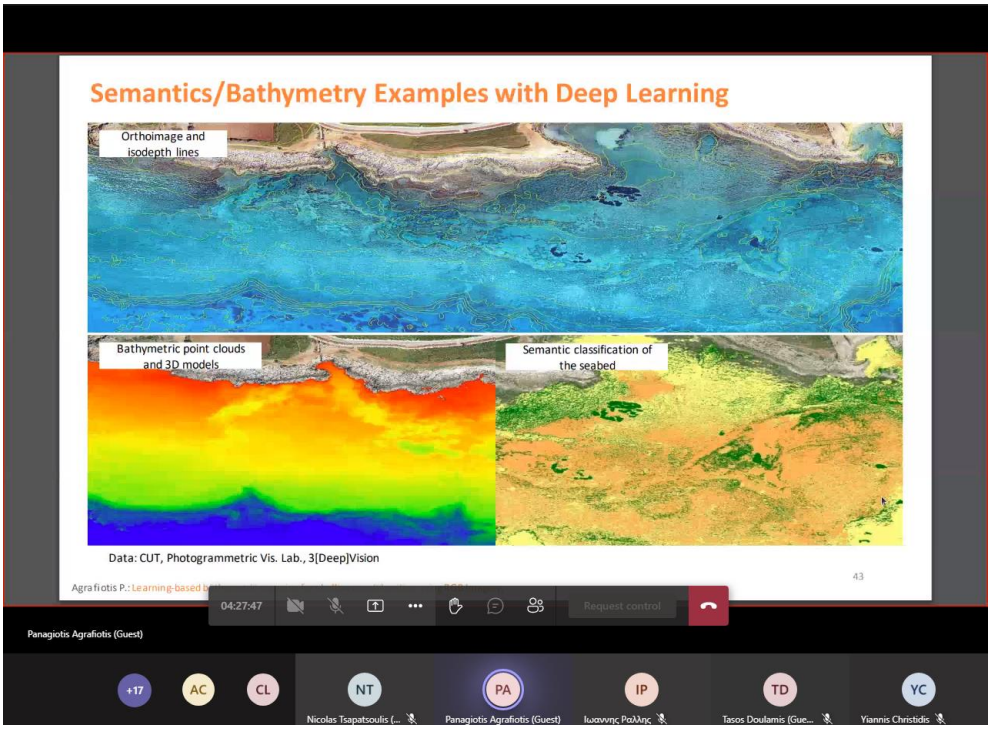

Figure 15 YADES 1st training school. Content

YADES 2nd Summer school

The YADES Second Summer School at Politecnico di Milano took place on 30-31 May 2022. It offered a hybrid format where a limited number of people could attend in-person at the POLIMI Campus Leonardo or follow it online via Webex.

Figure 16 YADES 2nd Summer School POLIMI Campus

This arrangement allowed many people to participate from different parts of Europe and beyond. The aim audience for the event consisted of professors, researchers, PhD candidates, policy-makers, and professionals interested in Cultural Heritage risk assessment, resilience, and sustainable reconstruction.

Figure 17 YADES 2nd Summer School Poster

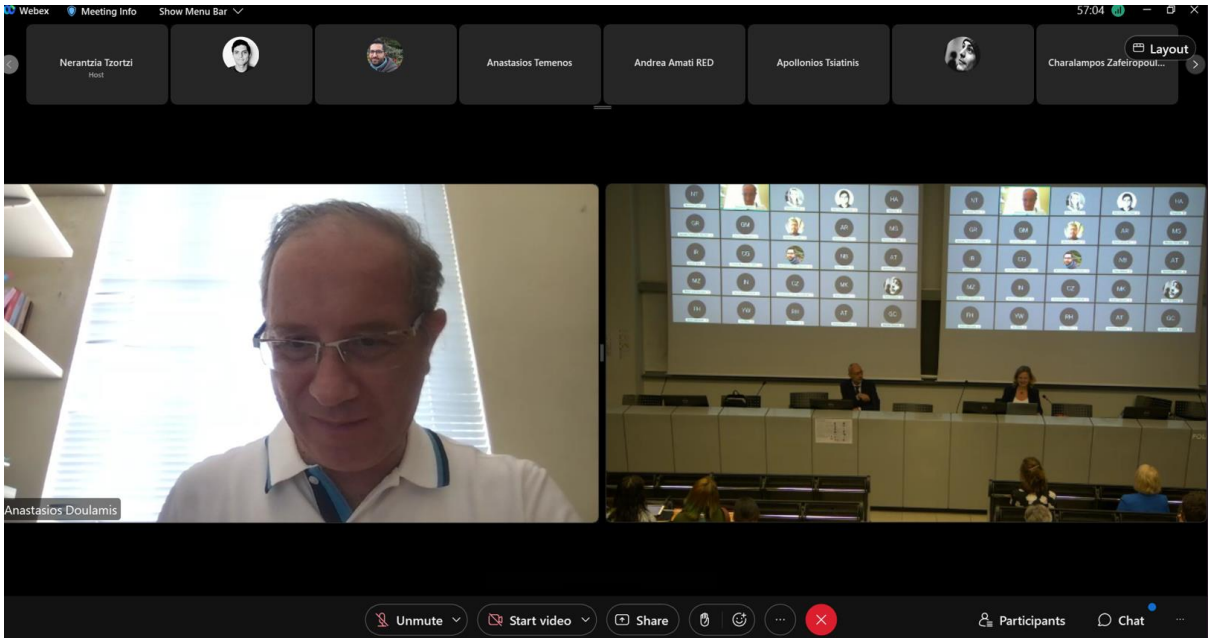

Figure 18 YADES 2nd Summer School Opening

Under the theme "Identification of Methods for Cultural Heritage Risks Assessment", the Summer School provided a rich interdisciplinary agenda combining theory, policy and practice.

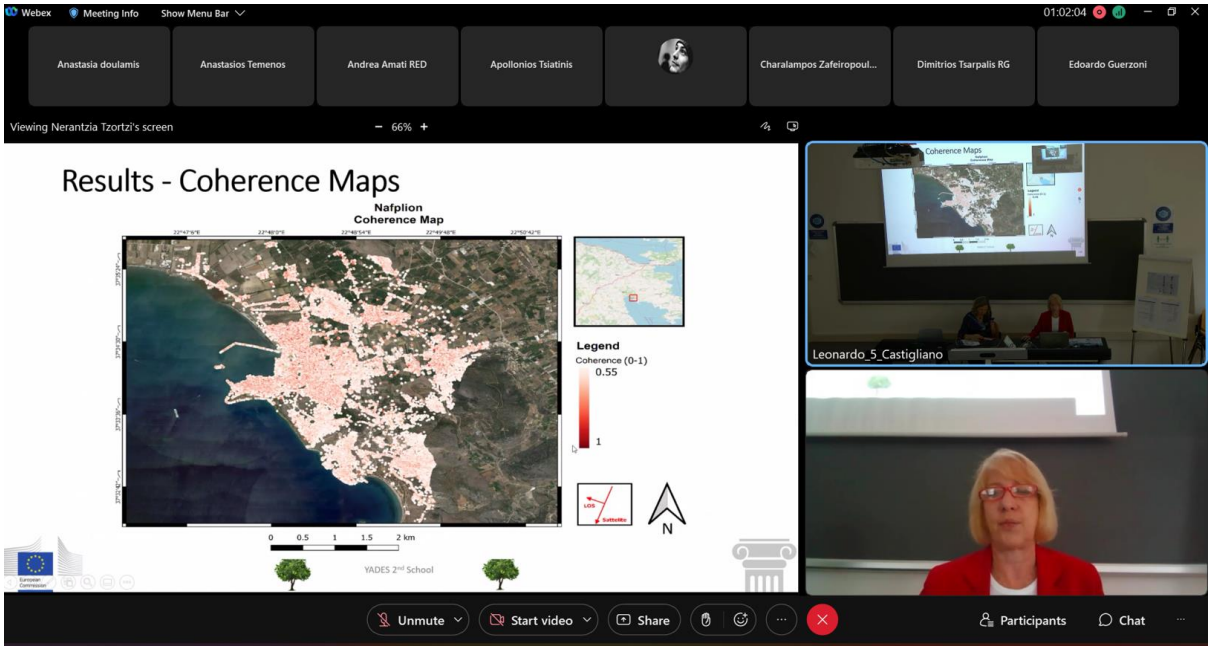

Figure 19 YADES 2nd Summer School First day

On the first day, the group of researchers visited sites around Milan, including the headquarters of POLIMI. There were opening speeches, followed by key-notes from experts such as Maguelonne Déjeant-Pons (Council of Europe), Adam White (Royal Chartered Landscape Institute), and Prof. Federico Bucci (POLIMI-UNESCO Chair). They explored the relationships between landscape, cultural heritage, and urban resilience, showcasing discussion topics that included the reconstruction of Berlin aka the Berlin Process, and the role of Mantova in its heritage in programming in academia.

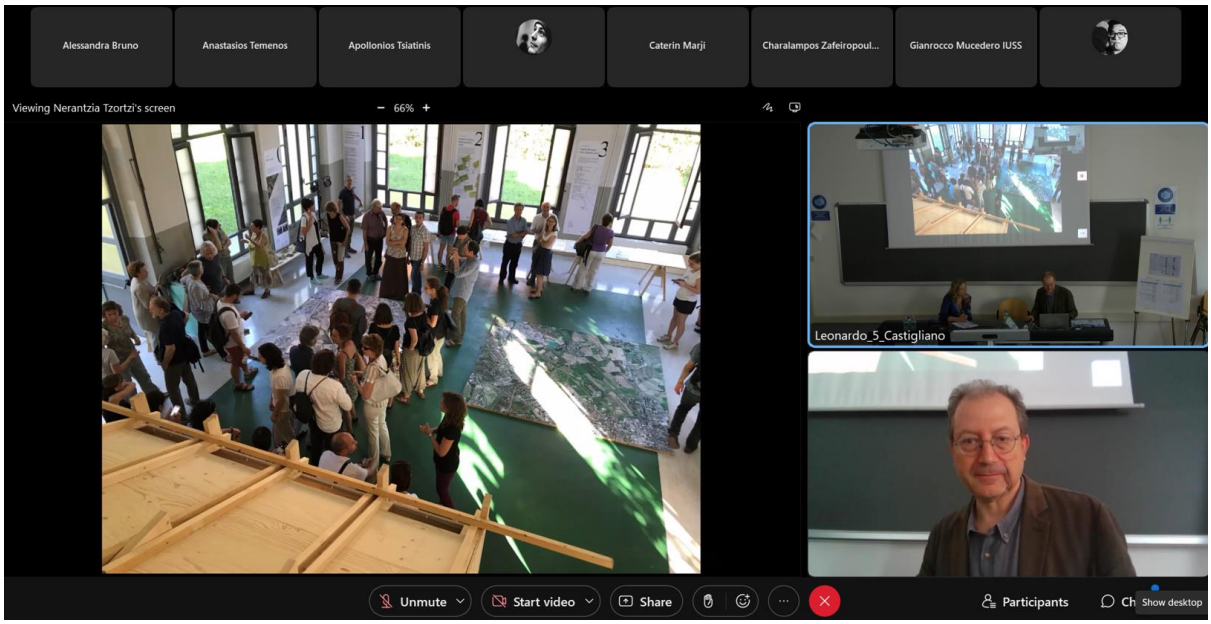

Figure 20 YADES 2nd Summer School Networking opportunities

Day two was a good deal more technical, with a more notional sequence of training seminars and case studies. The reported to GEM for the following three projects: GEOSYSTEMS HELLAS (the Earth Observation modelling), Resilience Guard GmbH (socioeconomic modelling of urban heritage areas), and NTUA (risk assessment methodologies).

Figure 21 YADES 2nd Summer School 2nd day

The afternoon sessions focused on urban agriculture and nature-based solutions with historical urban landscapes, which ended with a student focus group and an award-winning green infrastructure case study. Participants strengthened their understanding of climate change and development challenges facing our heritage while the Summer School helped YADES showcase its inclusive and multidisciplinary approach to resilience, which includes data modelling, embedding in policies and engaging communities.

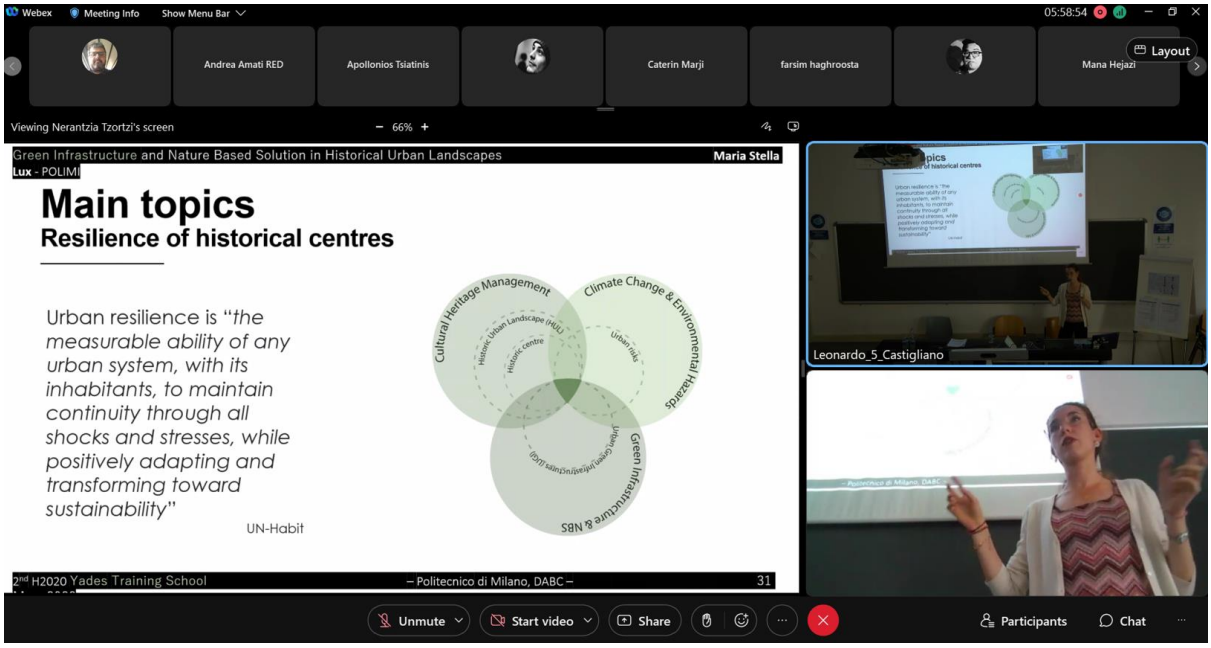

Figure 22 YADES 2nd Summer School Second day

With over 40 students selected to attend in person and an additional number joining online, the event successfully contributed to the project's aims to build capacity and enhance transnational dialogue on Cultural Heritage resilience.

YADES 3rd Summer school

On 29–30 May 2023, the YADES 3rd Summer School and Conference took place in Milan. The hybrid-format event, organized by the Politecnico di Milano and the Riccardo Catella Foundation, was attended in-person and remotely in compliance with the project values of inclusion, accessibility and interdisciplinarity.

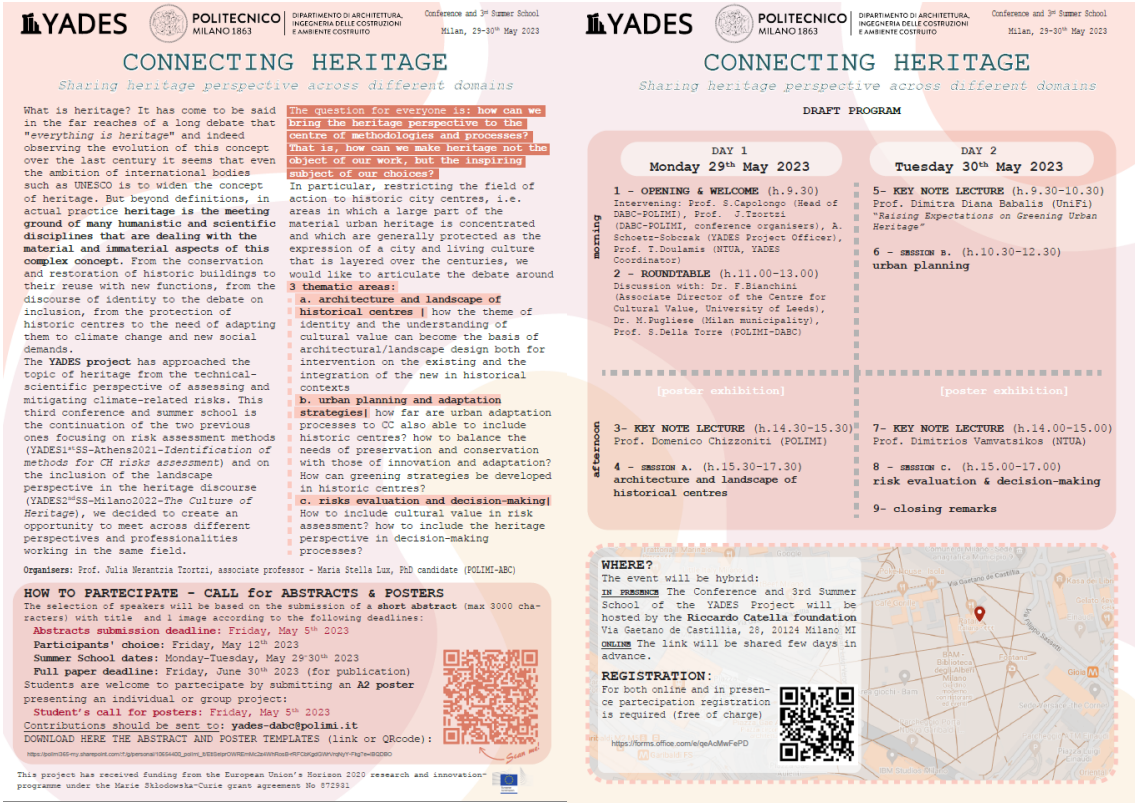

Figure 23 YADES 3rd Summer School poster

The approach of the event on the theme – 'Connecting Heritage: Sharing Heritage Perspectives in Different Domains' showcased the project's strategic objective to initiate dialogue across different disciplines and stakeholders engaged in cultural heritage management and climate change resilience. Instead of treating heritage as an isolated or stagnant entity, the theme highlighted its function as an active link between the fields of architecture, urban planning, environmental sciences, and social policy. The Summer School organizers hoped through conversations across these domains, we can glean how the cultural value can inform and enhance climate adaptation responses, resilience planning, and sustainable development. This integrative approach highlights YADES' broader ambition to situate heritage not merely as an object of safeguard but as a catalyst for innovation and collaborative transformation in contemporary urban environments.

Figure 24 YADES 3rd Summer School

The third Summer School builds on the first two YADES schools, which tackled methods for risk assessment (Athens, 2021) and the cultural and landscape dimen-sions of heritage (Milan, 2022). The 2023 edition broadened the conversation even more by looking at how heritage can become the main lens of decision-making and urban planning. The programme focused on three themes: architecture and landscape of historic centres, urban planning and climate change adaptation strategies and risk evaluation and decision-making for the cultural value.

Figure 25 YADES 3rd Summer School Opening

The first day began with welcoming words from Prof. S. Capolongo (DABC Head, PO-LIMI), Prof. J. Tzortzi (organiser), Alexandra Schoetz-Sobczak (YADES Project Officer), and Prof. T. Doulamis (NTUA, YADES Coordinator). It was also marked by a high-level roundtable featuring speakers from the Centre for Cultural Value (University of Leeds), the Municipality of Milan and CNR-ISCP. Professor Domenico Chizzoniti (POLIMI), the Keynote Speaker, led the first thematic session on architectural and landscape dimension of heritage spaces.

Figure 26 YADES 3rd Summer School Discussion with Remote participants

On the second day, the programme continued with keynote lectures geust speakers Prof. Dimitra Diana Babalis of the University of Florence discussed greening urban heritage and Prof. Dimitrios Vamvatsikos of NTUA was delivered a talk on the structural risk assessment. The sessions discussed how adaptive urban planning can integrate heritage and how the cultural value of heritage can influence technical risk modelling and policy development. The event ended with a poster display of student projects and a reflective discussion on the way forward.

Figure 27 YADES 2nd Summer School participants

The third YADES Summer School was overall successful in bring together academia, public institutions, and professionals over how heritage can be repositioned not only as an object of preservation but also as a principle of guidance to create climate-resilient and culturally inclusive urban futures.

YADES 4th Summer school

In January 11–12, 2025, the 4th YADES Summer School convened in the Navarino Environmental Observatory, Pylos, Messinia, Greece. The event, held in a hybrid format for both physical and remote participation, marked the culmination of YADES training activities focusing on cultural heritage, environmental and digital sciences.

Saturday 11/01/2025		
Schedule	**Lecture Title**	**Presenter**
11:00-11:30	School Opening	All
11:30-12:30	Living in Mediterranean cities in the context of climate change	NKUA
12:30-13:15	The dynamical downscaling of climate and atmospheric impact	FMI
13:15-15:30	Lunch Break	
15:30-16:00	Cultural Heritage monitoring with multi-type remote sensing	GEOMATICS
16:00-16:30	Connecting heritage: summing up 2 years of landscape and heritage investigations	POLIMI
16:30-17:00	Introduction to Messenian Cultural Heritage: Bridging the gap between archaeology and the physical sciences	Dr Vayia V. Panagiotidis (UNI PELOPONNESE)
17:00-17:30	Seismic performance of the temple of Aphaia in Aegina island, Greece	Prof. Vamvatsikos
20:00-22:00	Dinner	All

Sunday 12/01/2025		
Schedule	**Lecture Title**	**Presenter**
10:30-12:30	Visit to local sites (if weather permits otherwise demonstration of software and hardware tools)	All
12:30-14:30	Lunch Break	
14:30-15:00	Machine learning	NTUA
15:00-15:30	A semi-quantitative multi-hazard risk assessment framework for European coastal urban areas	RED SPA

YADES has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 872931.

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Figure 28 YADES 4th Summer School Agenga

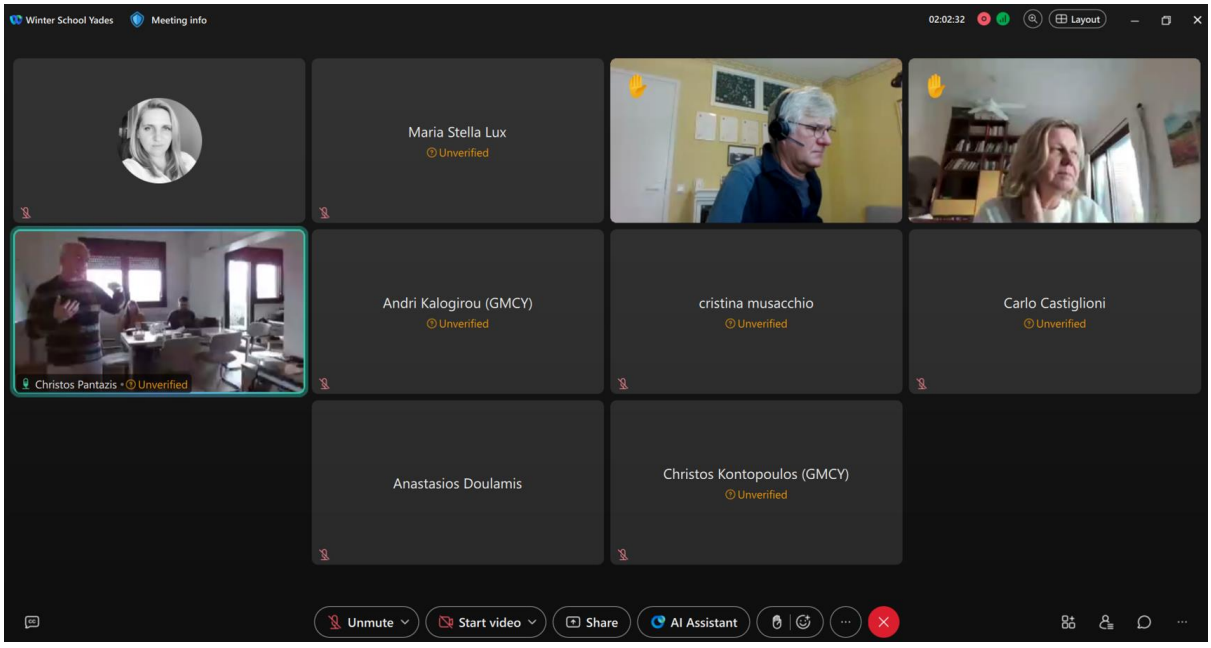

Figure 29 YADES 3rd Summer School Hybrid format

A solid mix of academic speeches, technical presentations and practical involvement was delivered in the two-day programme. The first day held an opening session followed by a lecture by NKUA on the difficulties of living in Mediterranean cities under changing climate conditions.

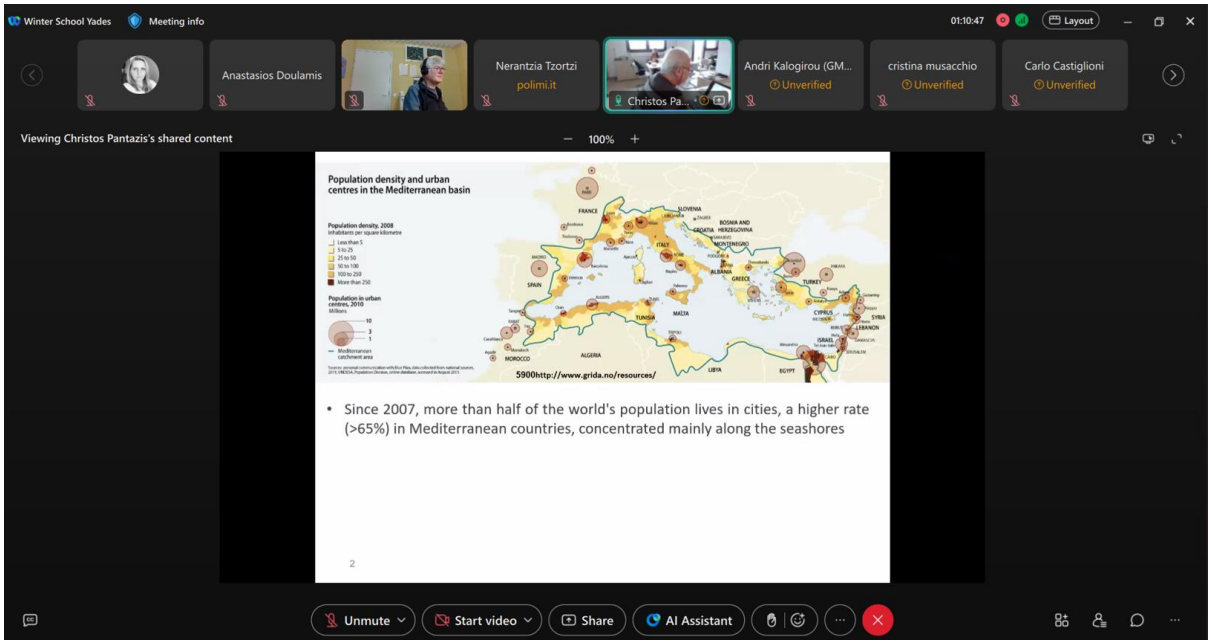

Figure 30 YADES 4th Summer School NKUA presentation

The Finnish Meteorological Institute (FMI) presented on dynamical downscaling and atmospheric impact modelling. Also, GEOMATICS led a session on remote sensing technologies monitoring cultural heritage. The POLIMI platform walked us through two years of research on landscape and heritage and set up the stage for Dr Vayia V. Panagiotidis's interesting session on the bridging of archaeology to physical science through an interdisciplinary study. The day ended with a case study on the seismic performance of the Temple of Aphaia by Prof. Vamvatsikos (NTUA).

Figure 31 YADES 4th Summer School

On the second day, participants will either be taken on a guided visit to nearby heritage sites (weather permitting), or shown a demonstration of useful software and hardware tools developed in the project. The afternoon technical presentations feature an NTUA presentation on the application of machine learning in the analysis of risks of cultural heritage. This is followed by the last lecture of the day by RED SPA on a semi-quantitative multi-hazard risk framework for European coastal urban areas.

YADES Final Event

The final event showcase of YADES was on March 27, 2025, in the location of the History Museum of the National and Kapodistrian University of Athens, in Plaka, Athens.

Figure 32 YADES Final Event Venue

The program commenced with a welcome session followed by a detailed presentation on YADES given by Project Coordinator, Prof. Nikolaos Doulamis (NTUA). Emmanouel Varvarigos, Vice Rector of NTUA, made the opening remarks which set the stage for the overall research strategy of the university. There was a keynote by Prof. Dimitrios Vamvatsikos on the PLOTO EU project, stressing the synergies with YADES with respect to infrastructure risk and sustainability.

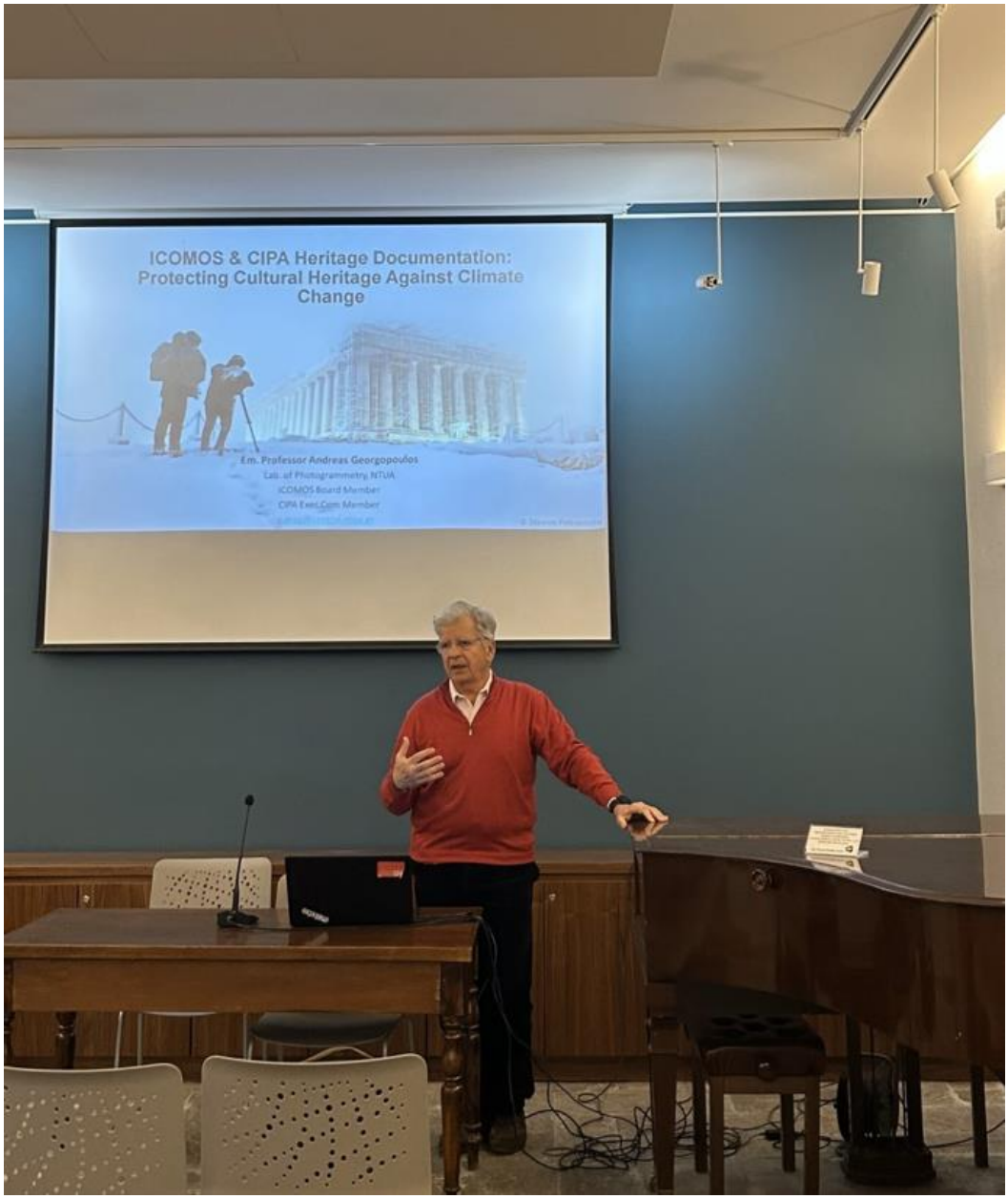

Figure 33 YADES Final Event

Subsequent sessions had a variety of themes related to project. NTUA specialists introduced the "AI Factories" project, which investigates artificial intelligence's function in cultural heritage. During the event, Prof. Charalampos Ioannidis of the Democritus University of Thrace presented the TRIQUETRA projects and their contribution to climate change and heritage. In addition, Dr Ettore Fagà introduced innovative insurance models for the protection of

heritage. The afternoon session was a mix of case studies and technical presentations including, Maria Stella Lux (POLIMI) on sustainable development in UNESCO heritage landscapes, Prof. Andreas Georgopulos (NTUA/CIPA) on documentation of heritage for climate resilience, and Dr. Jukka Pekka Keskinen (FMI) on advanced climate modelling techniques.

Figure 34 YADES Final Event Presenters

Moreover, TRIQUETRA Knowledge Base Platform by GEOMATICS introduced. Prof. Panagiotis Nastos (NKUA) talked about climate change and cultural heritage. The day ended with an anticipatory session by Athanasios Yamas (Meltic Baltic) on the exploitation of YADES results with an explanation of strategies to sustain impact after the project conclusion.

To end the event, participants from the consortium reflected on the project which will ensure the transfer of knowledge.

3. Communication activities

The YADES communication strategy is a complementary element of the overall dissemination and outreach strategy of the project, aiming at promoting the vision of the project, its results and long-term impact to a wide range of stakeholders. The approach was guided by the principle that effective communication must go beyond simple information-sharing and instead foster trust, engagement, and empowerment across academia, industry, public authorities and society at large. YADES aimed to create dynamic project communications throughout the life of the project using data-driven insights for audience segmentation and targeted messaging.

From the start, the consortium took a phased and structured approach. We began with stakeholder sentiment analysis and continued with iterative engagement through digital channels, events, and direct outreach. Monitoring sentiment and analyzing media to identify relevant audiences and perceptions was at the core of this strategy. This initial analysis conducted by communication lead Metis Baltic had 250000 data points from traditional and digital media alike. The analysis result shows that there is a sizable opportunity space as 46% of the audiences observed were disengaged/neutral while 37% showed positive sentiment towards advanced technologies in cultural heritage and 17% were wary/sceptical. The insight from this information helped us create messaging strategies capable of addressing specific concerns and using existing interest.

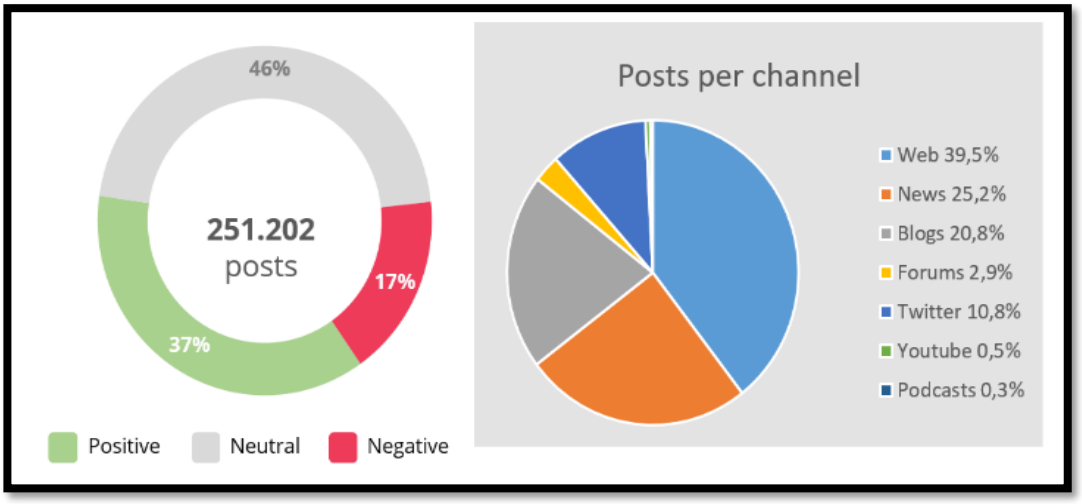

Figure 35 Sentiment Analysis

YADES focused on long-term relationships and trust-building. The project sought to position itself not only as a technological player but also as a trustworthy and transparent cultural heritage and climate resilience player. Moreover, it aimed at empowering its ecosystem, professionals, researchers, public officials and community representatives with relevant, accessible and actionable information.

3.1 Brand identity

For the scientific community and the general public to recognise YADES as a valuable and trustworthy project, it was important to establish a clear visual identity for the initiative. In a landscape filled with projects funded by the EU that all vie for attention, the project stood out using consistent branding with a meaningful message that helped engage stakeholders and communicate its mission of protecting cultural heritage from climate change. With this in mind, the project produced a common visual identity; i.e., project logos, colors, typography, design templates, and brand guidelines shared among the consortium to guarantee consistent and professional internal and external communication.

Figure 36 YADES logo

The YADES logo was carefully designed within the framework of the project, while highlighting its two pillars: cultural heritage and climate change.

The image has stylized set of columns reminiscent of the Greek antiquity, an age of great having great architectural prowess. One of the columns appears unfinished, subtly reminding us of the vulnerability of heritage. The black colour in the logo is indicative of carbon dioxide (CO_2), a major greenhouse gas responsible for climate change. So, we have visual statements and text both on these lines, associated with the climate change crisis.

3.2 Project website

The YADES project website was designed to achieve the project communication objectives, enhance the visibility of the project, and provide access to them as easily, and user-friendly as possible. The website was designed deliberately clean and simple because we want users to have a good first impression. The site will load quickly, is highly usable and has a professional look. To maintain clarity, accessibility, and inclusivity for all users of the website,

including those with limited internet connection and/or accessibility issues, intrusive design features have been avoided, such as pop-ups and background music or movement.

Adhering to the colour palette of the project, a website is designed with a YADES visual identity. The main body of text used sans-serif fonts to enable better readability. The emphasis used serif fonts so that there was some visual engagement through contrast.

The dissemination and outreach lead, Metis Baltic, centrally curates the website contents, although all partners in the consortium were welcome to send updates on research findings, events and news items. The homepage was specifically designed with a brief introduction and image to give an overview of the project and encourage the audience to further investigate the content. The site includes the EU emblem and the funding statement as per Horizon 2020 communication rules as required by the Grant Agreement in order to showcase the European dimension of the project.

Project website can be found at https://YADES-project.eu/.

Project website has the following structure (corresponding with top menu tabs):

- Home
- Project
- Newsroom
- Contact
- Cloud Management Platform

Links to the available social media accounts are incorporated at the top menu of the website, to ensure seamless transition between the platforms.

Home tab is the website's landing page (illustration below) with all the main information about the project, and its main goal is to grab attention and facilitate further browsing. A lot of time and effort was dedicated to choosing the main illustration for the website. Illustration had bridge climate change and natural heritage, as well not be subject to copyright restrictions. The dark and cloudy sky in the chosen picture associates with climate change and its negative impact on weather patterns around the world.

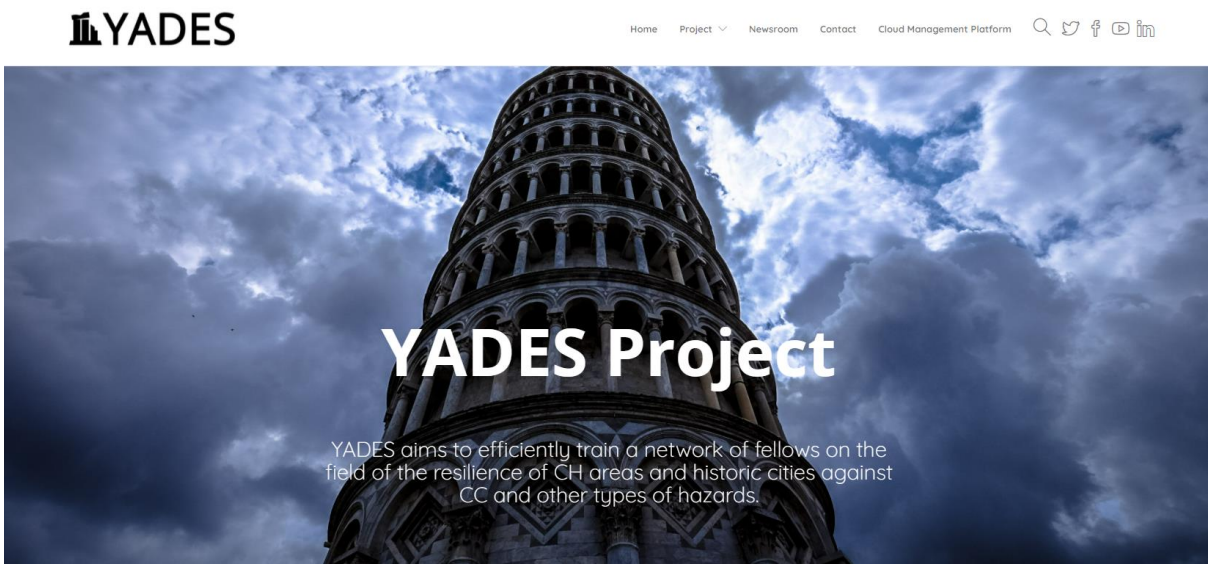

Figure 37 YADES website main page

Home page also include important project information such as objectives, key statistic, social media links and funding acknowledgement.

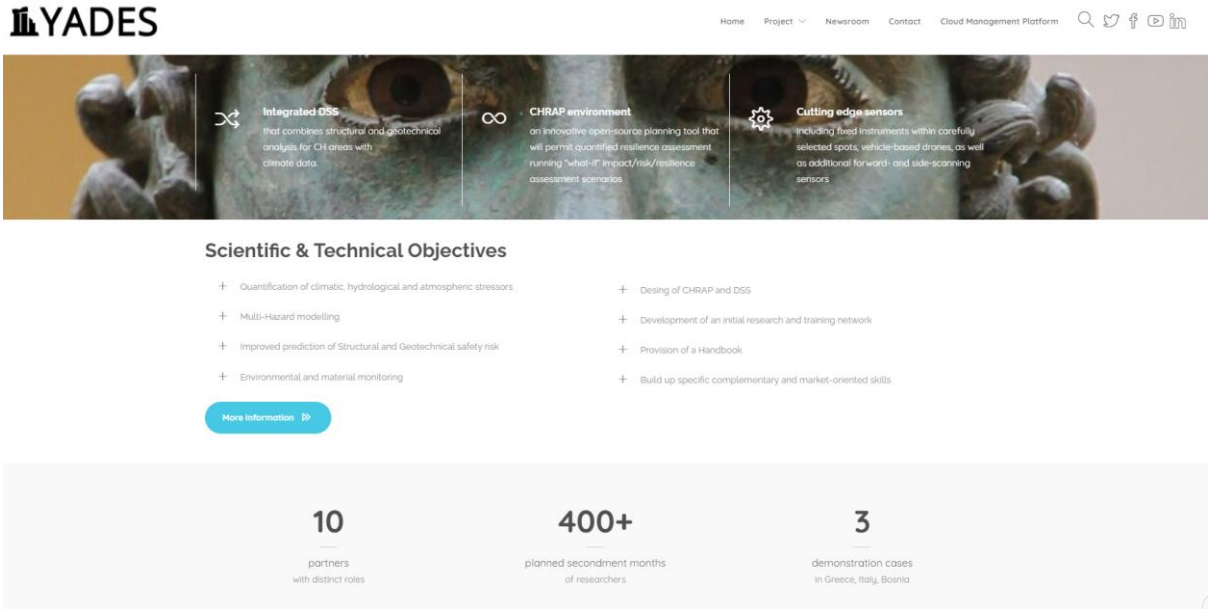

Figure 38 YADES website main page objectives and main statistics

Project tab houses detailed information about YADES project, its objectives challenges and motivation behind it. Consortium partners and other relevant projects can also be found under this tab.

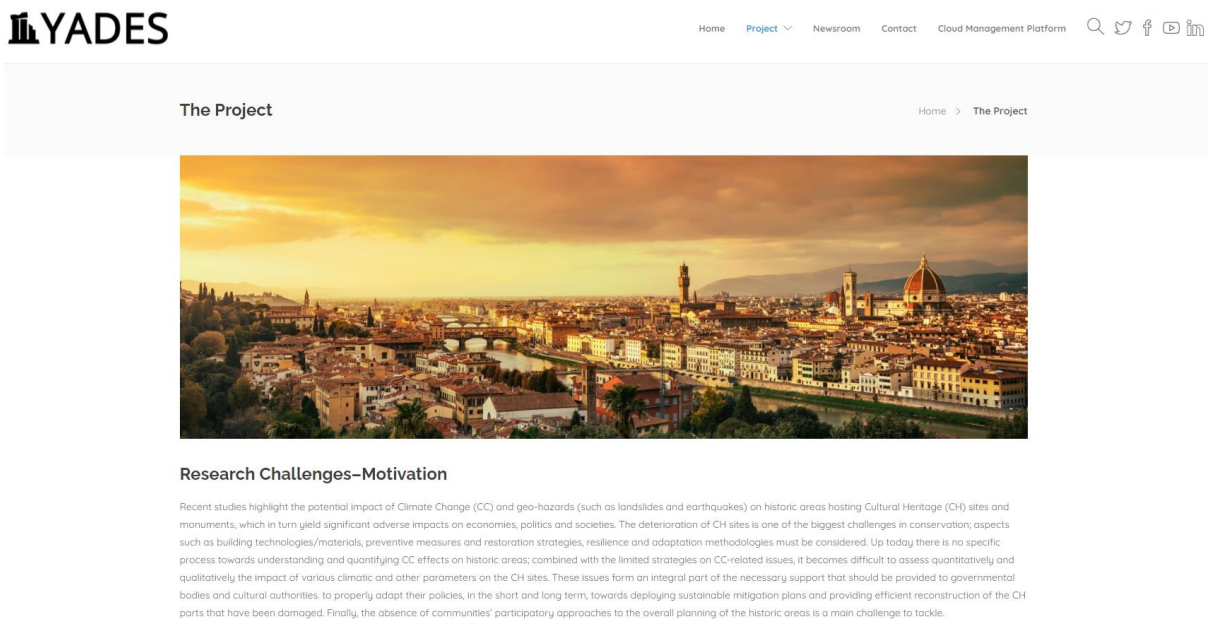

Figure 39 Research motivation in Project tab of YADES website

Disclosing the motivation behind the research is very important to every project, as it helps for potential stakeholders relate to research subject and see the real-world benefits. Which becomes even more critical in commercialization and exploitation stages of the project.

Project consortium is depicted in the project tab as well. Having a listing of reputable and well established in research field partners, is vital for the project, as their reputation "overflows" to the project, thus increasing its credibility.

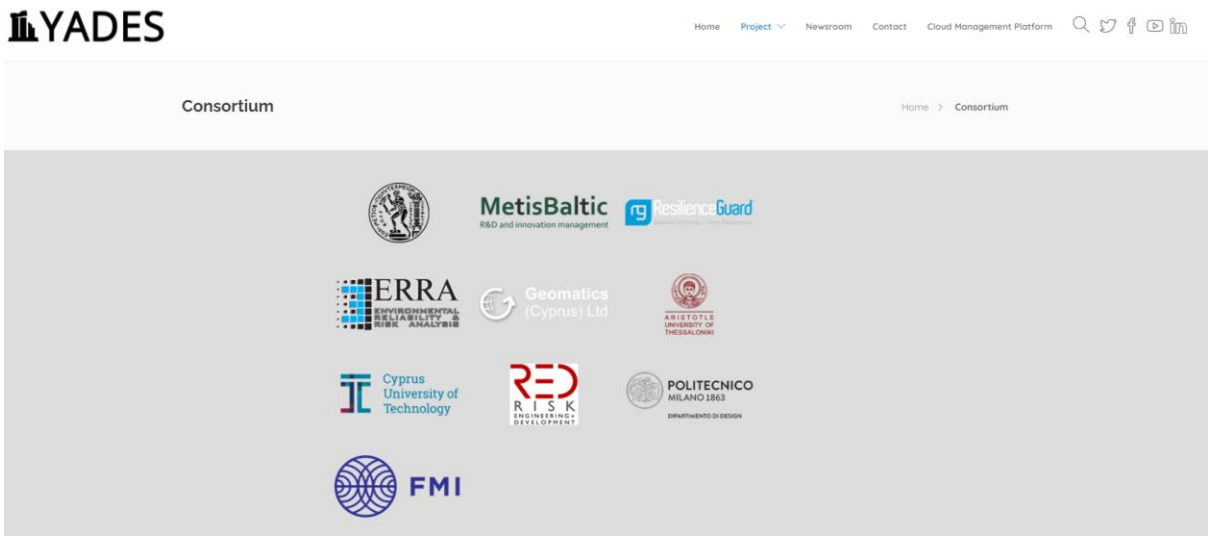

Figure 40 Consortium partner list in Project tab of YADES website

Newsroom tab will house all important updates related to the project. Its biggest developments and achievements

Contact tab is very important for seamless communication between potential stakeholders or projects interested in collaboration and YADES consortium. The primary contact for YADES project is the project coordinator - National Technical University of Athens. Project coordinator will deal with income inquiries or if need be, transfer them to appropriate partners.

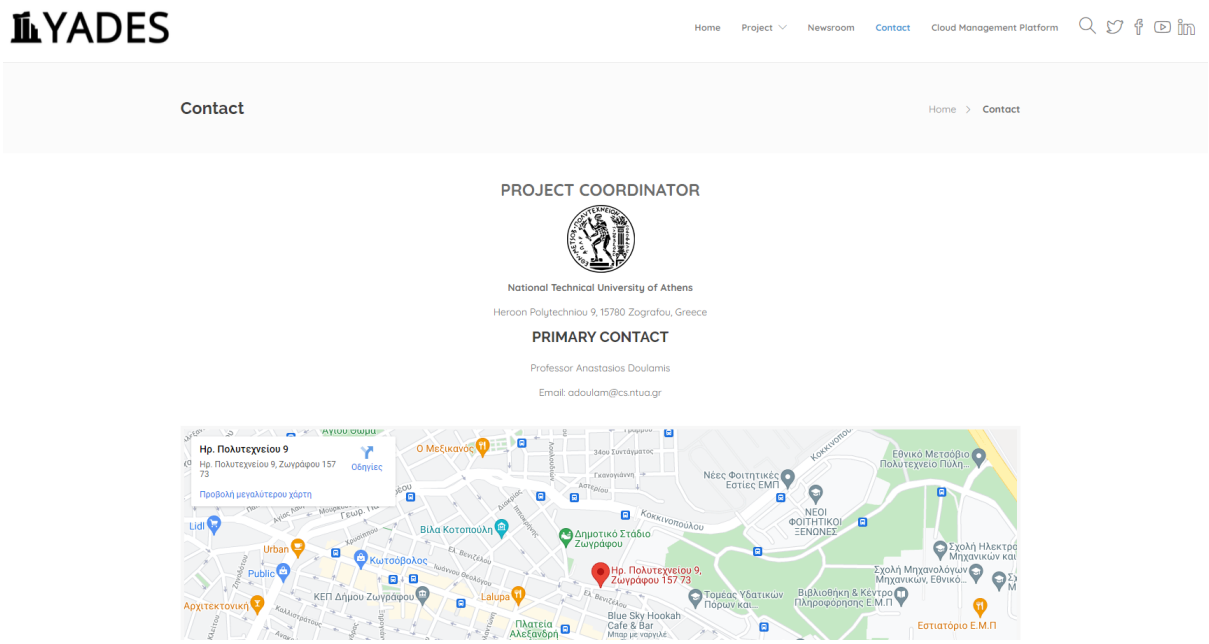

Figure 41 Contact tab on YADES website

Cloud Management Platform is an internal system for consortium members. Password and username are required for logging in. Partners use platform for storing and organising documents and files associated with the project. Having all files and documents in one platform, increases collaboration between partners and speeds up their work.

3.3 Social media communication

Since it is now a direct and effective way to communicate with the general public and non-scientific communities, social media has formed part of the YADES communication strategy.

To maintain a consistent message across all social media channels and have a greater influence a communication plan is established. As the posts were done beforehand, so we proofread them and checked them through editors. When appropriate, hashtags and tagging of profiles are used to reach a broader audience, relevant initiatives and wider online communities. Visual content was really important in this regard, as experts claim that humans can process images in the brain more rapidly than text.

The project has customised the post formats and messaging styles keeping in mind the different audiences of the various channels. The adaptive process principle of YADES made it possible to convey messages to different stakeholders in a more effective manner. Users of different platforms react to messages in different ways. By adapting the tone, length and focus of the messages accordingly, YADES is able to generate more and more responses. In general, social media significantly helped to build the digital presence of the project, promote transparency and drive interest in YADES results.

Facebook

As of October 2021, Facebook (Meta) has about 2.2 billion active users, making it one of the most popular social media platforms in the world. Sociolinguists analyze the meanings produced by way a language is spoken or the implication behind the language. According to the YADES project, through Facebook, the project disseminates information in a more familiar conversational style. They also reach non-specialists and raise awareness of cultural heritage and climate resilience.

Due to its strong sharing, commenting and reacting ability, the project can communicate directly with users and get insight into what users like or dislike. Moreover, the project can reach out to new audiences too. Because it is informal, it is not suitable for the software message. However, due to YADES, it can help in creating interesting messages regarding the software's objective for a common man understanding.

YADES benefitted from a dedicated account on Facebook over the life of the project, as part of its overall strategy for wider public outreach. YADES recognized that Facebook is the best platform to reach a diverse and non-specialised audience. Hence, they used Facebook to share updates, event announcements, visual material, and general information about the project and its impacts. Posts were created in an eye-catching way and accessible, often with relevant images or infographics to enhance visibility and spark comments. By the end of the project, the number of followers reached 22. This platform worked as an extension of communication. Therefore, it helps to build a steady online presence and helps to create visibility for the project.

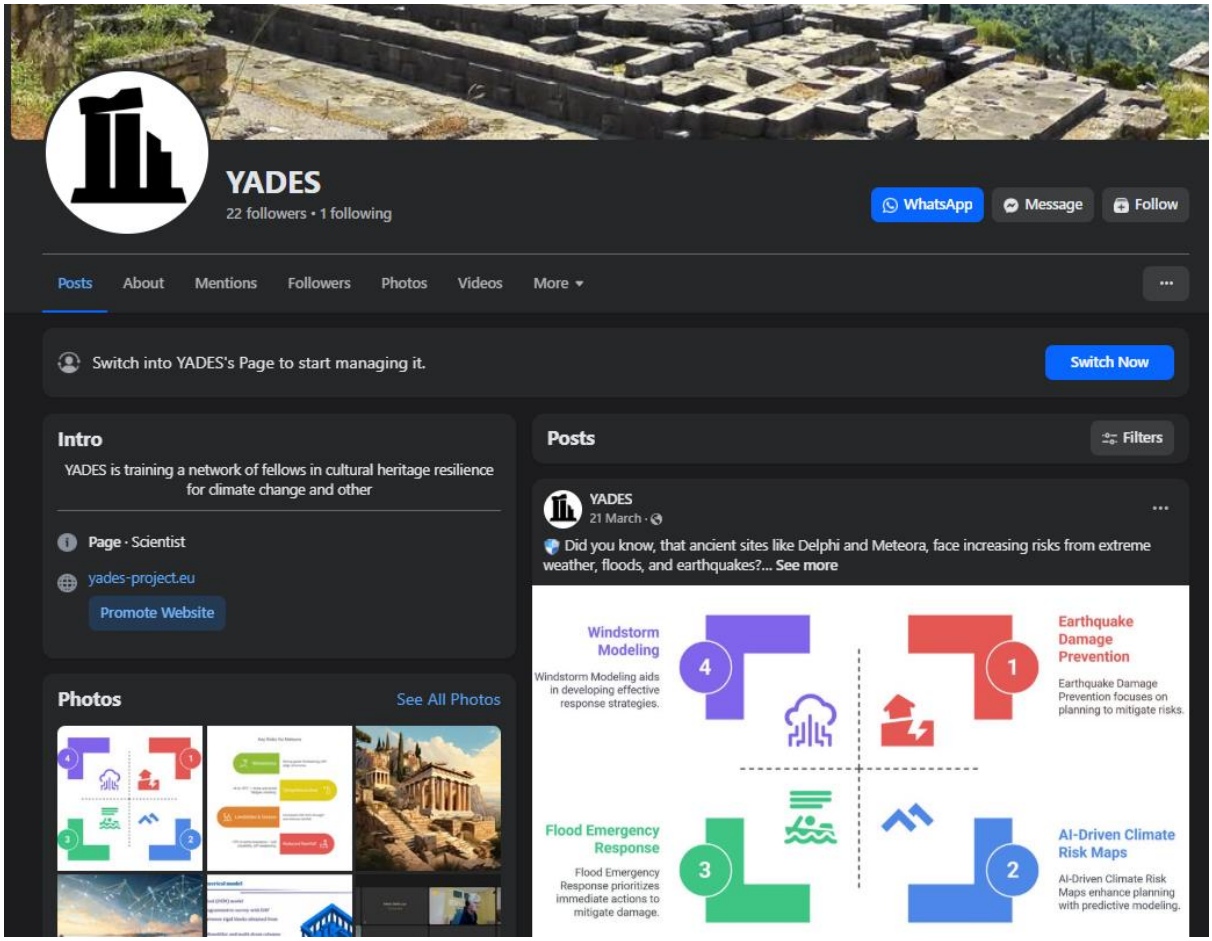

Figure 42 YADES Facebook account

The Facebook content may not have drawn many followers, but it was still valuable in furthering communications goals, providing a storehouse of information that the public could tap into for basic information. New summer schools, conferences, seminars and public lectures were continuously announced, so anybody, even those who were not necessarily involved in its academic or professional operations, could be updated and participate in the project. The project team acknowledged that Facebook reached a more limited audience than a more professional service like LinkedIn. However, the team believed that a Facebook presence would help make issues of cultural heritage and climate resilience more accessible to a wider audience.

LinkedIn

As a worldwide platform for professional networking, LinkedIn was chosen as one of the main social media for YADES project. Since it could reach a wide base of reef managers, researchers, policy makers, technology experts from various industries, it was well-suited to share project updates, promote events and facilitate discussions in scientific and business communities. With 675 million users worldwide, LinkedIn gives the consortium direct access

to relevant stakeholders actively working in cultural heritage, climate resilience, environmental technologies, and digital innovation.

The professional nature and layout of the platform facilitated the circulation of more serious content, including research findings, peer-reviewed articles and conference presentations. Furthermore, it enabled the consortium to establish and sustain a credible digital identity. Utilizing the networking tools offered by LinkedIn, YADES enhanced visibility in relevant areas, integrated with relevant European initiatives, and contacted potential partners and end-users for research and innovation outputs.

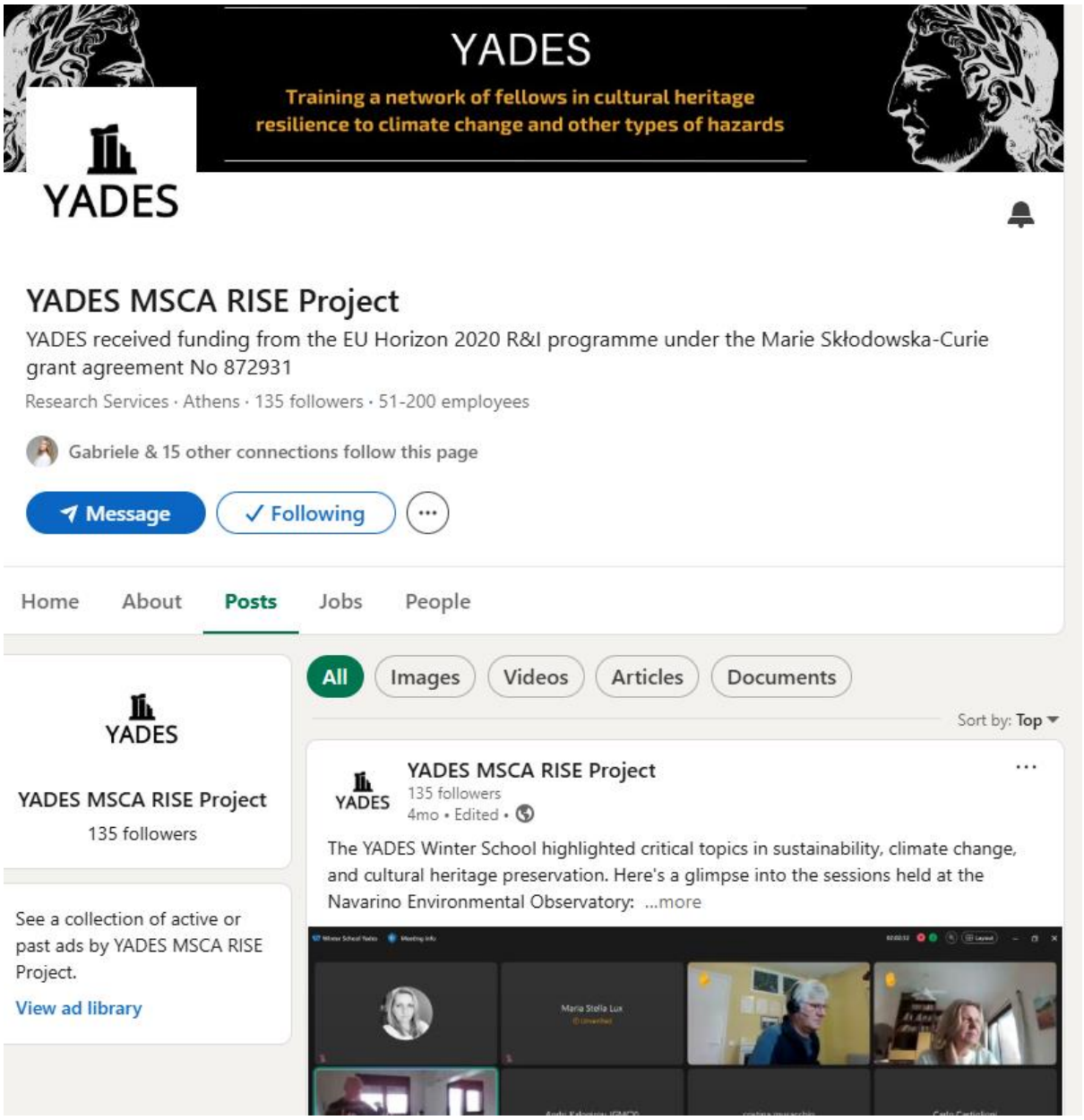

Figure 43 YADES LinkedIn account

Over the course of the project, LinkedIn was used internally by YADES. This was useful for creating a professional image on the internet. Moreover, it was also leveraged for the communication of the project's activities to researchers, industry and public sector audiences.

The YADES LinkedIn page had 135 followers at the end of the project. Though a little short of the original goal of 200, the platform managed to reach over 3,200 on a yearly basis. This means that it was moving in circulation with the audience.

The YADES communication team regularly published project news, event announcements, partner highlights, and research achievements in the YADES LinkedIn profile to maintain an active communication channel where stakeholders can follow the project. Content was customized to LinkedIn's tone of voice and hashtags with institutional tags/was utilized for enhanced visibility and relevancy. While the follower count was lower than expected, the performance of posts indicates that these were seen and engaged with by the key target groups for the project dissemination and stakeholder engagement.

Twitter

X (formerly Twitter) has always been considered a real-time communication channel. The value of X is speed, reach and relevance to the research, innovation and policy communities. In the past, EU-funded initiatives have utilized the platform to post updates, tag people and organizations, share information, and join in on ongoing conversations on issues such as climate change, cultural heritage and digital transformation. Thanks to the platform's brevity and strong culture of tagging, hashtagging and sharing.

In the beginning, the YADES project created an account on Twitter/X to exploit this communication environment for wider contacts. Nevertheless, as management, content moderation policies and trust of this mechanism moved from one end to another, potential deviations of the platform from the project communication value originated, along with ethical dilemmas of using the public space. Due to the change in politics and ethics of the platform and the lower reach and engagement metrics of institutional accounts, the YADES consortium decided to shift its communication to more effective and value-consistent platforms.

The YADES communication team decided to voluntarily cease its active use of Twitter/X and rather divert resources to LinkedIn and Facebook, to which the content could better respect its audience in a more professional and consistent environment. Consequently, project messaging remained relevant to the targeted communities following subsequent actions to move the target community from the outreach's integrity.

ResearchGate

ResearchGate is a popular academic networking site used by researchers to share publications, share knowledge and connect with peers in their fields. The upload of your scholarly article, project description, citation counts, and more, is available in these scientific communities. For EU-funded projects like YADES, ResearchGate was typically useful to

enhance the visibility of research outputs and facilitate collaboration with and engagement of target scholarly audiences.

To kick off the project, YADES created a ResearchGate account to share scientific publications, enhance project credibility, and support open access. In early 2023, however, ResearchGate changed its policies and requirements that led to the deactivation of project-related pages like the YADES profile. This unforeseen change, not controlled by the consortium, significantly reduced the value of the platform for structured project communication and outreach.

3.4 Promotional material

The YADES project communication and visibility strategy relied on promotional materials. They act as tools to project an image and identity of the project in front of various stakeholders. Because of the cross-sector and multi-disciplinary outreach of YADES, which incorporates cultural heritage and climate resilience through advanced digital technologies, promotional content that is both visually compelling and informative was necessary to ensure the project could be accessible and engaging to different target audiences. Promotional materials were created for conferences, public events, online communication, stakeholder meetings, etc., to further enhance the project's visibility and to promote its recognition.

When exposed to customers, promotional items not only make your project visible to shoppers; it can also help you project the right image in the long run.

Material including posters, leaflets and branded stationery gave a brief overview of the project and its goals. At the same time all of it respected the YADES logo and colours. These materials served an informative & aspirational purpose. By doing this, professionalism was expressed and dialogue promoted leaving a lasting impact on collaborators, policymakers and event-goers. Most importantly, in bridging the gap between technical research outputs and the broader public, they translated complex content into formats suitable for non-specialist audiences.

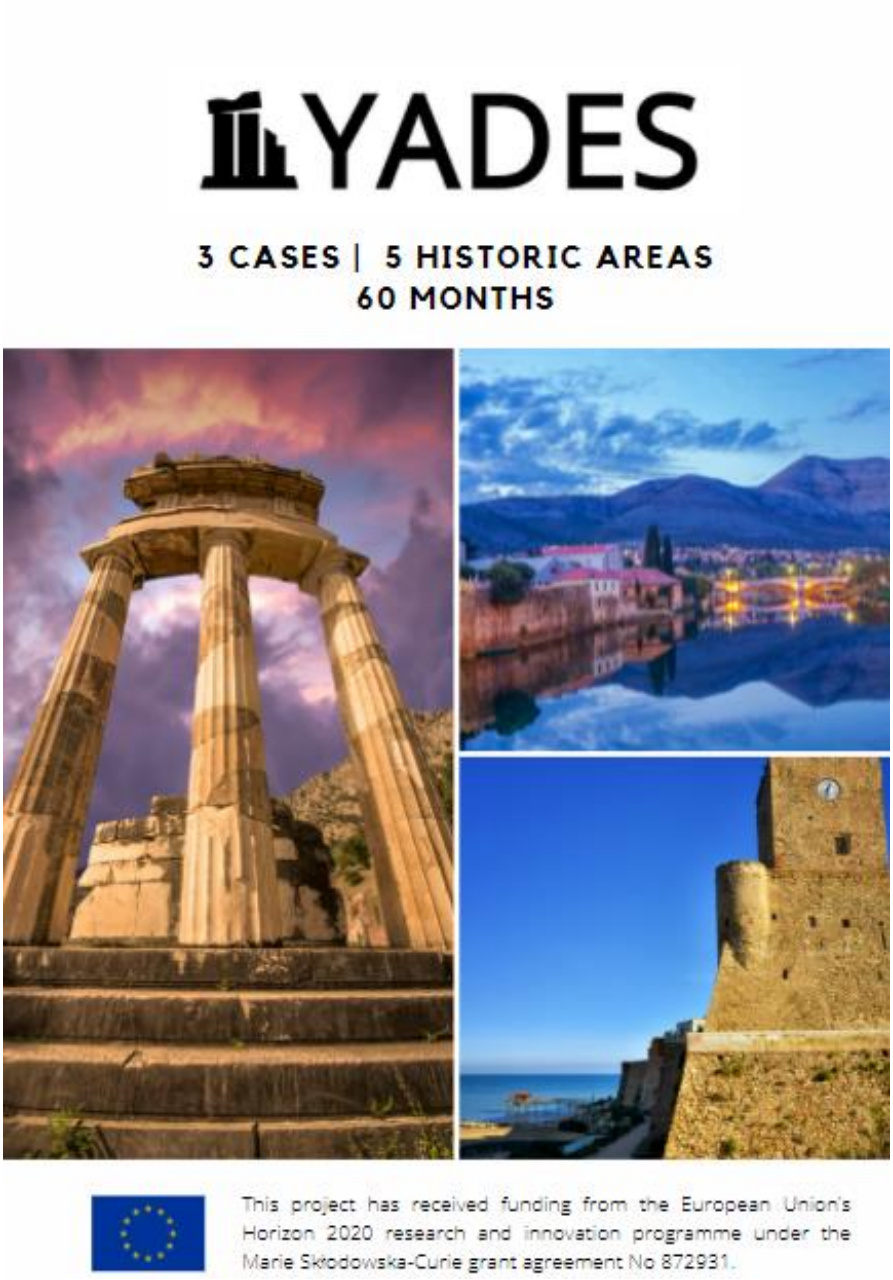

Figure 44 YADES poster 1

The two official YADES posters served as key visual tools in the project's communication and outreach efforts. Both posters were designed to highlight different aspects of the project while maintaining a consistent visual identity aligned with the overall branding strategy. The first poster emphasised the geographical and cultural breadth of the project through a collage of heritage sites from the five historic areas under study, supported by the tagline “3 Cases | 5 Historic Areas | 60 Months.”

Figure 45 YADES poster 2

The second poster focused on the scientific core of YADES, featuring the iconic Parthenon and the message "Measuring Environment Effect on Cultural Monuments," along with key project metrics such as the number of partners and secondment months. Both posters included the required EU funding acknowledgement and emblem, ensuring compliance with Horizon 2020 visibility rules. Widely used at conferences, workshops, and summer schools, these posters effectively conveyed the project's mission and scope, supporting both awareness-building and stakeholder engagement.

Figure 46 YADES Leaflets and pens

The YADES project produced a series of professionally designed leaflets as part of its promotional material package, aimed at increasing awareness and understanding of the project among a wide range of stakeholders. The leaflets featured the project logo, core message—"Empowering Resilience of Cultural Heritage Against Climate Change and Geo-Hazards"—and key facts, such as the number of cases, historic areas, and project duration. Visually engaging and informative, the leaflets combined concise textual content with high-quality imagery of heritage architecture to effectively communicate the project's objectives and scope. Distributed at events, conferences, and meetings, these materials served as a quick-reference tool for both specialist and non-specialist audiences, reinforcing the YADES brand and enhancing its visibility across Europe. The accompanying YADES-branded pens further complemented the leaflets, providing a cohesive and professional presentation package.

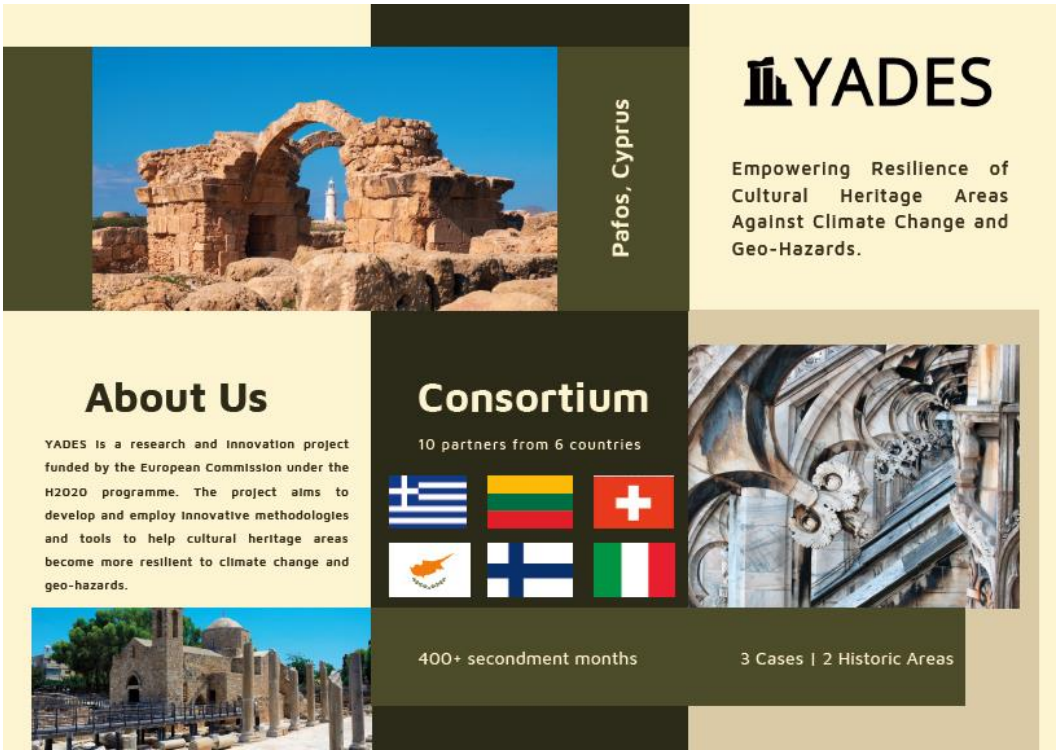

Figure 47 YADES leaflet side A

Figure 48 YADES Leaflet side B

Figure 49 YADES notebook with pen

The YADES project has created notebooks and pens featuring the project logo as part of its promotional materials and branding. At events and conferences, training schools and meetings, distribution of these items increases project visibility and provides participants with a physical reminder of the project. Sustainable materials and minimalist design reflect the professional identity of YADES and the sustainable standards of the project. The notebooks and pens were homogeneously functional and aesthetic which helped build a strong, identifiable brand and strengthened stakeholder engagement through everyday use.

3.5 Communication requirements

All communication activities that were glad in the YADES project took place in accordance with the communication obligations of the Grant Agreement. As per the Horizon 2020 and Marie Skłodowska-Curie Actions Requirements, all communication output, including those

digital and tangible (including social media posts, presentations, posters, websites and printed publications, etc.) must acknowledge European Union funding and intrusion of disclaimer text.

In particular, all communication products displayed the EU emblem and the relevant funding statement. The EU emblem was given appropriate prominence to ensure it is easily visible and used in compliance with guidelines, when used together with the YADES or partner logos.

4. Exploitation plan

The YADES project has an exploitation plan so that all developments, technologies, methodologies, and tools created throughout the YADES project have an impact after the end of the project.

The goal of the plan will be to turn the project into something useful in the world and a contribution to policy and/or the market and/or society rooted in the Horizon 2020 MSCA-RISE scheme. This means working with partners to make sure they can gain from project results both on their own and together as a group. Furthermore, it also means setting up the stage for new research work.

The YADES exploitation strategy is based on the strong interdisciplinarity of the project. It draws on expertise from academia, engineering, climate modelling, heritage preservation, urban planning and data science. It uses a grounded understanding of stakeholder needs, market possibilities, and policy relevance to focus on identifying Key Exploitable Results (KERs), assessing their values, and mapping out pathways for future utilization.

4.1 Key Exploitable Results (KERs)

YADES project outcomes and innovations have other potential uses beyond the project scope, which may help different organizations.

KER 1: Cultural Heritage Resilience Assessment Platform (CHRAP)

A software platform for risk assessment of cultural heritage sites integrated. This Tool incorporates the different models and tools that have been developed in YADES (climate downscaling, hazard simulation, structural assessment, etc.) and provides a common framework to assess the vulnerabilities of a given heritage site under multiple climate and hazard scenarios. The application also includes a Decision Support System that can visualize risks on maps and enable scenarios analysis to plan interventions.

The platform is jointly owned by NTUA and the technical partners FMU and POLIMI who will developed climate modules and architectural component, respectively. The platform is currently a prototype and will be further developed in follow-up research.

Over the longer term, CHRAP could be commercialized for use as decision-support software for heritage authorities and consultants or made available as an open-access tool for the research community and site managers.

At the moment, the strategy for exploitation is to validate and improve the platform through further case studies and consider the deployment at heritage sites or integration into existing heritage management systems.

KER 2: Multi-Hazard Risk Assessment Framework and Methodologies

A set of methodologies that evaluate the combined effects of climate change and multiple hazards on cultural heritage structures. This entails new methodologies for probabilistic multi-hazard scenario creation, a description of how gradual climate stresses lead to material degradation, and cascading hazard analysis (e.g. how an earthquake might cause a structural weakness from climate weakening).

The models were primarily developed by the academic partners who will primarily hold ownership. FMI (climate modeling) and CUT (risk analysis) are also contributors to the models.

YADES findings are significantly relevant to policies and standards. For instance, YADES findings can provide input to the updating of building codes and guidelines for historical structure.

The goal of the project was to advise the regulatory framework (Eurocode provisions on climatic actions on structures). Thus, one route for exploitation will be through standardisation bodies and policymakers.

The methods themselves are indirectly commercially exploitable. Engineering firms and consultancies can use some of the advanced methods to enhance their risk assessment service for cultural assets, thus improving the quality of assessments offered to clients.

KER 3: YADES Data Repository & Knowledge Base

A carefully selected collection of information, findings from case studies, and effective methods for CH resilience. Throughout the project, a large amount of data was collected and generated: climate model outputs for different areas, sensors data on monitoring heritage structures, lab tests on material degradation, etc.

In addition, YADES documented best practices–such as how to conduct on-site risk surveys, how to engage local communities in resilience planning. This has been organized into a knowledge base that is accessible and which can be used by others to build on.

Ownership of data is shared by the consortium. Certain datasets will be solely owned by the partner who created them, as per the data management plan and open access requirements..

Much of the data and findings are available on request, enabling other scholars or local authorities to learn from YADES case studies. The risk mapping can serve as a useful reference for regional authorities in relation to their climate adaptation plans. The knowledge base also acts as an ingredient for educational materials - YADES deliverables and collected knowledge will go into guidebooks or training modules.

KER 4: Trained Expert Network and Human Capital

YADES has provided expertise to the network comprising researchers, professionals, and seconded personnel. Although not a conventional "result" in a concrete sense, the consortium considers the strengthened human capital to be a valuable outcome.

Throughout YADES, many early stage and experienced researchers shared knowledge through secondments. Also, more than 100 people engaged in YADES training events (summer schools, workshops). These individuals now carry the YADES know-how across various organizations.

This is a decentralized asset – each partner “owns” the capacity built in their staff. For example, the METIS secondment to NTUA learned real-time risk assessment and took that skill back to the YADES project, whereas the POLIMI student who has taken all the summer schools developed a distinctive interdisciplinary view on heritage and climate risks.

The personal relationships and skills developed will be exploited as members of the network continue in their careers. Some of YADES alumni have already taken up roles which influence practice or research.

Essentially, this KER guarantees the multiplication of impacts of YADES through individuals who will be the multipliers of the project’s approach in different sectors. The consortium may also formalise this network via a LinkedIn group or association to ensure the exchange of opportunities and know-how after the project ends.

To sum up, YADES has pinpointed these essential outcomes for actions to be undertaken. Some results (e.g., the platform and methodologies) lend themselves to further scientific and potentially commercial development; however, others (e.g., the network) are geared more by capacity building and policy influence. They are among the objectives to enhance the resilience of cultural heritage.

There are no patent rights to these results which allows anyone to use or change the results since there were no patented inventions generated in the project. This open approach maximizes the likelihood of utilization.

4.2 Exploitation Pathways

The different results from YADES will be exploited along different paths due to various nature of results and interest of the consortium members. In general, the routes of exploitation can be classified broadly as commercial application, scientific and academic use, and policy or societal uptake. These are not mutually exclusive as an overall exploitation strategy often contains some elements of all three for a project like YADES.

Commercial and Industrial Exploitation.

Despite the fact that YADES had a reluctance towards immediate commercialization, the project was inherently a research project. The most visible is the risk assessment platform (CHRAP) and its tools. This platform has the potential to develop into a commercially viable product or service.

For instance, a software company or a start-up (possibly spun out of a partner university or by METIS Baltic) could take YADES as a prototype and develop a user-friendly software package for risk management of cultural heritage. Operators of heritage sites, consulting engineering firms and insurance companies (which need to assess risk to insured heritage assets) might be potential customers for such a tool.

Hence, there is a window of opportunity. METIS can take this route as partner in charge of dissemination and commercialization. METIS gained in-depth learning of the secondments on YADES methodologies so now they can transform this knowledge into consulting services or software for clients (e.g. climate risk audits for museums or historic city centres).

The industry could additionally take some technical components from YADES. The remote sensing techniques and ML algorithms for detecting deterioration on monuments have value on the heritage tech market – companies that produce monitoring equipment or GIS software might use these algorithms to improve their product. Since YADES did not patent these innovations, they are available for free for anyone. In other words, a smart company could use them (with due credit or partnership with the inventors). Partner organizations of YADES could benefit from working with such companies as expert advisors or through licensing, should it become relevant.

It is important to note that the repository that exists in the heritage sector for commercial exploitation is not a very large one, for both the market is small and funding is often public, there is growing interest in the mechanism of technology for heritage. YADES outputs could find uses in related fields like urban planning, civil engineering or climate services. This is an exploitation strategy worth further development. For instance, city planners could be offered the climate downscaling models as service (not necessarily for heritage but urban climate adaptation in general).

All in all, the consortium, through new project collaboration with industry or expert consultancy, will keep watch for and pursue opportunities where YADES know-how is able to respond to an identified commercial need. Any moves in this respect will take sustainability and ethics into accounts.

Scientific and Academic Exploitation.

The scientific route is already a natural route for the exploitation of YADES results. The project resulted in several peer-reviewed publications, which are, in themselves, vehicles of exploitation. The 9 journal articles and 7 conference papers enabled the methodologies (e.g., multi-hazard risk framework, climate modelling techniques, structural assessment results) to be documented so that researchers from all the world can utilise them. Publications will continue to be cited and will be used in future research. The academic partners intend to write more papers after the project is over, including potentially a high-level summary paper covering the interdisciplinary nature of YADES.

The YADES results used in education and training must also be mentioned in academic exploitation. YADES content is already incorporated into courses and thesis topics by university partners (NTUA, POLIMI, etc.). The datasets and tools are also being made available for academic exercises. The educational use is an important type of exploitation. It ensures knowledge transfer to the next generation, which will innovate on the YADES techniques.

The project partners will also leverage their improved research capabilities. As a result of YADES, consortium members furthered their expertise in slightly related areas (e.g. engineers learned about climate science, and vice versa). With these new skills, they will be able to undertake more exciting and interdisciplinary research in future. New joint papers and proposals are already being discussed; these would not have been possible if YADES had not

created common ground across disciplines. Overall, YADES's scientific exploitation is solid and active. The project's legacy in the research arena is assured through the papers and activity that it generated as well as through ongoing research and educational activity.

Policy and Societal Exploitation.

One of the motivations of YADES is to ensure better decisions and policies to protect cultural heritage under climate change. So, exploitation in the policy space is a major pathway. Though policy influence may take time, YADES have produced specific inputs that can be picked up by policymakers and heritage authorities. One example is the project's findings on how extreme weather and seismic events can compound damage to historic buildings. That information could be used to push for climate risk assessment to be included in heritage plans. The YADES partners have connections with cultural heritage authorities and YADES recommendations will be submitted to these bodies.

YADES also aspired to boost community awareness of cultural heritage through their social impact. While direct outreach to the public was relatively modest, the exploitation plan does see partners engaging in local community meetings and exhibitions.

An important part of exploitation is ensuring sustainability of project results in a societal context. YADES has ensured that its outputs (data, tools, publications) are open which means civil society or interested citizens have access. For example, an IT-savvy heritage lover may create visualizations or apps in order to further spread the knowledge by using YADES data. The project's unrestricted access will maximize the benefit to society. The project partners remain available as a resource.

To conclude, YADES exploitation strategy is multi-faceted. Commercial exploitation can yield gains in tools and services over the long term; scientific exploitation is underway through publications and new research; and the policy/societal exploitation will take place as results are delivered to decision-makers and communities. The consortium has intentionally placed the outputs from the project on publicly-accessible collaborative platforms (academic journals, open data, public events) in order to encourage uptake.

5. Conclusions

The YADES project has implemented a comprehensive outreach and exploitation strategy, ensuring that its research outcomes were effectively communicated, shared, and prepared for long-term use. Through a structured plan, the consortium engaged with a wide spectrum of stakeholders, raised awareness about the project's objectives, and fostered active collaboration across sectors. Communication and dissemination activities—including visual identity development, website and social media presence, participation in international events, and the organisation of summer schools—helped position YADES as a recognised initiative in the field of cultural heritage resilience and climate adaptation.

Equally important, the exploitation component of the project focused on identifying and maximising the value of Key Exploitable Results (KERs). By building strong academic, institutional, and industrial connections, and by providing clear pathways for future use of developed tools and knowledge, YADES has laid a solid foundation for continued impact. While not all quantitative targets were fully reached, the qualitative outcomes demonstrate a high level of engagement, innovation, and potential for future scaling. This final deliverable reflects the consortium's commitment to ensuring the sustainability of YADES outcomes and their integration into ongoing research, policy-making, and commercial innovation.