European Heritage Awards / Europa Nostra Awards (2026)
1752-Research 2. Research

AWbwoKxD

AI and New Technologies for the Prevention and Management of Natural Disaster and Fires in Movable and Immovable Cultural Heritage

Entry details

General information

Main country of application: Spain

Author(s) of the research project

Pilar Ortiz Calderón

Type: Applied research/Pilot studies

Brief description of the project

FENIX drives research in Artificial Intelligence, Best Management Practices, Geographic Information Systems, and Information and Communication Technologies to protect cultural heritage (CH) from multiple risks. FENIX provides an innovative digital *toolkit* that supports decision-making and trains local governments and heritage managers through emergency drills, enhancing preventive conservation and strengthening emergency preparedness.

Faced with increasing threats to historic cities, monuments, and artworks, FENIX combines advanced technologies with risk management strategies, testing its tolos in real-world settings such as the Antequera Dolmens Site (UNESCO World Heritage) and other historic buildings in Antequera, Valencia, and Madrid, which serve as living laboratories.

Start date of the project: 2020-06-01

Completion date of the project	2025-07-31
Website(s) of the project/nominee	FENIX: https://www.upo.es/investiga/art-risk-en/proyecto-fenix/index.html FENIX4: https://www.upo.es/investiga/art-risk-en/proyecto-fenix-40/
Facebook page of the project, if any	https://www.facebook.com/Art-Risk-565029900326090/
Twitter page of the project, if any	@ProyectoArtRisk
Instagram page of the project, if any	@patrimoniomedioambienteupo
Does the site or heritage in question have national/regional/ local cultural heritage designation or protection status in its country?	Yes

If yes, please specify:

> The World Heritage Committee inscribed Antequera Dolmens Site (Spain), on UNESCO World Heritage List (Istanbul, Turkey, 15 July 2016, 40th session of the World Heritage Committee).
>
> Law 16/1985 on Spanish Historical Heritage allows immovable properties of historical, artistic, archaeological, scientific, or technical value to be declared Assets of Cultural Interest (BIC), and permits the generic declaration of certain elements without an individual administrative file:
>
> Antequera City Museum (MVCA), located in the Nájera Palace declared BIC (Asset of Cultural Heritage). Antequera (Málaga), Spain (Law 16/1985 25th June Spanish Historical Heritage).
>
> Municipal Historical Archive. Antequera (Málaga) Spain. (Law 16/1985 25th June on Spanish Historical Heritage).
>
> Valencia Museum, BIC (Decree 474/1962, 1st March. BOE nº 59 May 09, 1962).
>
> San Zoilo Municipal Library (Antequera), located in the former Monastery of San Zoilo, declared a Cultural Heritage Site (BIC) by Decree of 17th May, 1973 (BOE No. 134, 5th June, 1973).
>
> Royal Tapestry Factory, Madrid (Spain). (Decree 80/2006, 19th October, BOE nº 253, October 24, 2006).
>
> Medieval rammed-earth fortifications in Andalusia, (LAW 16/1985, 25th June, on Spanish Historical Heritage).
>
> Iglesia de San Alberto, Law 14/2007 26th November, regulating historical heritage and the declaration of Assets of Cultural Interest (BIC).
>
> Monasterio de San Jerónimo, Law 14/2007 of 26th November, regulating historical heritage and the declaration of Assets of Cultural Interest (BIC).

Is the research project focused on a tangible or intangible heritage included on the UNESCO World Heritage List, either as an individual site or as part of a larger World Heritage site? If so, please specify which one.

> FENIX focuses on tangible heritage. Use historic buildings as living laboratories to test its innovative toolkit. It trains heritage professionals and boosts resilience against risks, ensuring better protection and management of CH. One of the key living laboratories is the Antequera Dolmens Site, included on the UNESCO World Heritage List.

Is the research focused on a designated European Heritage Label site? If so, please specify which one.

> NO

If relevant, is the site/heritage accessible to the public?	Yes

What steps have been taken to ensure that the site / project is inclusive and accessible to as wide an audience as possible?

> Fenix uses CH as living laboratories for risk preparedness, with open-access tools and guidelines for everyone, training local leaders, and fostering collaboration among heritage institutions and civil associations.

Contact details

Name of the entrant	Prof. PhD - Pilar Ortiz
Entrant's position	Principal investigator of FENIX. Full Professor of the Faculty of Experimental Science in Pablo de Olavide University. Seville, Spain
Organisation of the entrant	Pablo de Olavide University (UPO), Spain
Address of the entrant	Carretera de Utrera, Km1. 41013. Sevilla (Spain)
Email address of the entrant	mportcal@upo.es
Please confirm entrant's email	mportcal@upo.es
Additional email addresses	

> sanitar@upo.es

Telephone of the entrant (fixed line)	+34954217179
Telephone of the entrant (mobile number)	+34677409671
Website of the entrant	https://investiga.upo.es/investigadores/158761/detalle
Name of the owner	Prof. PhD - Pilar Ortiz
Owner's position	Principal investigator of FENIX/FENIX 4.0
Organisation of the owner	Pablo de Olavide University (UPO), Spain
Email address of the owner	mportcal@upo.es
Name of the project leader	Prof. PhD - Pilar Ortiz
Project leader's position	Principal investigator of FENIX

Organisation of the project leader	Pablo de Olavide University (UPO), Spain
Email of the project leader	mportcal@upo.es
Telephone of the project leader	+34677409671

Other relevant participants

Other relevant participants

University Pablo de Olavide (UPO, Seville, Spain)

PhD. Pilar Ortiz, Full Professor. Roles in FENIX: Principal Investigator: 1-10

PhD. Rocío Ortiz, Full Professor. Roles in FENIX: 1-10

PhD. Mónica Moreno, Post-Doc researcher. Roles in FENIX: 1-10

PhD. Victor Bañuls, Full Professor. Roles in FENIX: 4

PhD. Dolores Segura, Associate Professor. Roles in FENIX: 4

Dª. Laura Toro, phD student researcher. Roles in FENIX: 4, 7, 8, 9, 10

Msc. Andrea Gil, phD student. Roles in FENIX: 4, 7, 8

Dª. Laura Ramos, phD student. Roles in FENIX: 7

PhD. Macarena Tejada. Full Professor. Roles in FENIX: 5.

D. Rafel Barea Hidalgo. Technician. Roles in FENIX: 1, 5

Institut Valencià de Conservació, Restauració i Investigació (IVCR+i, Valencia España)

PhD. Gemma Mª Contreras Roles in FENIX: 4, 7, 8, 9, 10

PhD. Inmaculada Chuliá, Roles in FENIX: 4, 8, 9

D. Ignacio Catalán, Roles in FENIX: 4, 8, 9

Regional Ministry of Heritage and Sport, Regional Government of Andalusia

PhD. Aurora Villalobos, Roles in FENIX: 7, 8, 9, 10

Dña. Paula Montilla Gómez, Roles in FENIX: 7, 8, 9, 10

Andalusian Institute of Cultural Heritage (Seville, Spain)

PhD. Mª Auxiliadora Gómez-Morón, Roles in FENIX: 8, 9

PhD. Marta Sameño, Roles in FENIX: 9

Council of Antequera

Civil Protection of the City Council of Antequera FENIX: 8, 9, 10

D. Julio Maqueda Macías, Civil Protection Officer of Antequera. Roles in FENIX 8, 9, 10

MISSION TRACK (Spain)

D. Jaime del Palacio. Roles in FENIX: 4, 8

University of Seville (US, Seville, Spain)

PhD. Daniel Cagigas, Full Professor. Roles in FENIX: 3, 5, 7, 10

PhD. Juan Manuel Macías Bernal, Full Professor. Roles in FENIX: 3, 7, 10

PhD. María Ángeles Garrido Vizuete, Full Professor. Roles in FENIX: 3, 7, 10

PhD. María Josefa Chávez de Diego, Full Professor. Roles in FENIX: 3, 7, 10

PhD. Isabel González Díez, Full Professor. Roles in FENIX: 7

PhD. Maria Arjonilla, Full Professor. Roles in FENIX: 8

Arts University, (ISA, Cuba)

PhD. Ana Cepero, Full Professor. Roles in FENIX: 2, 9

MSc. Dahimi Abreu, Full Professor. Roles in FENIX: 2, 8,9

MSc. Betzaida Rodríguez, Full Professor. Roles in FENIX: 2

Fire Foundation and Chief of the Cuenca Fire Department (Spain)

D. Pablo Muñoz del Olmo, President, Roles in FENIX: 7, 8, 9

University of Cauca (Colombia)

PhD. Isabel Turbay, Associate professor. Roles in FENIX: 2, 3, 9

Catholic University of Cuenca (Ecuador)

PhD. Cisne Aguirre, Full Professor: Role: 2

Restaurika (Méjico)

MSc. Cinthia Selene Vázquez, Roles in FENIX: 7, 9

Collaborators. Roles 7, 8 & 9:

D. Pablo González Tornel, Museum of Fine Arts of Valencia (Spain). D. Manuel Jesús Barón Rios (Mayor-President City Council of Antequera, Málaga, (Spain). D. Manuel Romero Pérez, Museum of Antequera MVCA, Málaga, (Spain). D. José Escalante Jimenez, Historic Archive of Antequera (AA). D. Narciso Conde, Municipal Library (Antequera). D: David Artacho Valencia, Head of the Brotherhood of “La Seráfica, Venerable, Ilustre y Muy Antigua Archicofradía de Nuestro Padre Jesús Nazareno de la Sangre, Santo Cristo Verde y Nuestra Señora de la Santa Vera-Cruz "ESTUDIANTES", Antequera, Málaga (Spain). Dª. María del Carmen Mora Antequera Dolmen Site of Antequera, Málaga (Spain). D. Alejandro Klecker, director off Royal Tapestry Factory, Madrid (Spain). D. Manuel Infante del IES Pintor José María Fernández, Antequera (Spain). Dª Cristina Morales, director Elderly Care Home San Juan de Dios, Antequera (Spain). Inmaculada Ruiz, Principal of Nuestra Señora del Loreto School; Dª Lourdes Moreno Aragón, Prinicpal of CEIP Félix Rodríguez de la Fuente (Antequera).

Valencia (Spain): Valencian Regional Government Firefighters. Valencian Agency for Security and Emergency Response. Municipal Technical Office of Civil Protection of Valencia. Valencia City Council. Valencia Local Police. Citizen Protection Area, Delegation of the Government of the Valencian Community. Heritage Unit of the National Police Corps (assigned to the Valencian Community AVSRE). Basic Health Unit, SAMU, Ministry of Health. Valencian Institute of Public Safety and Emergencies, IVASPE. Valencian Institute of Occupational Safety and Health, INVASSAT. Department of Justice.

Antequera, Málaga (Spain): Civil Protection Volunteers, Municipal Psychologists Corps, Primary Care Emergency Service (SUAP), Local Police, National Police, Antequera Firefighters, Provincial Firefighters Consortium of Málaga (CPB), Red Cross, North Málaga Health Area.

Spanish Military Emergency Unit (UME). Official College of Doctors and Graduates in Fine Arts of Seville (COLBAA). National Film Archive of Spain, Ministry of Culture and Sports of the Regional Government of Andalusia, Málaga Secretariat of Culture, Almería Secretariat of Culture, Government Subdelegation/Civil Protection of Málaga, Archeological site Cástulo, Archeological site Baelo Claudia, Archaeological Museum of Córdoba, Museum of Jaén, Museum of Arts and Traditions of Seville, National School of Civil Protection, Directorate General of Civil Protection and Emergencies, Galileo Galilei Secondary School, Córdoba Firefighters, Archive of the Indies of Seville, Ministry of the Presidency of the Regional Government of Andalusia. Government Subdelegation of Granada. Civil Protection of Granada.

Roles in the project:

1. Design and validation of the Model & Software "Terra Inspector" for vulnerability assessment in in rammed earth walls in historical centers.
2. Design and Validation of Model of Vulnerability Assessment in Churches. Model for earthquakes.
3. Improvement of Model & software Art-Risk 3 for Churches and World Heritage Site.
4. Design and validation of the Model & Software "FENIX" of emergency preparedness and response, and post-emergency conservation activities.
5. Design and validation of the Model & Software "ATLAS" of climate change risk assessment using Satellite resources.
6. Design and validation of Resilience Models based on the Analytical Hierachy Process (AHP).
7. Dissemination & Social media management.
8. Active participation in emergency drills.
9. Observer in drills.
10. Management

Concise summary

Concise summary

The FENIX approach (projects Fenix and Fenix 4) provides a comprehensive risk management strategy for CH through the development and test of a digital toolkit called FENIX, that include protocols and five digital tools designed to evaluate, document, and manage risks before, during, and after emergencies (Terra Inspector, Art-Risk 1, Art-Risk 3, Fenix 4 and Atlas).

The FENIX toolkit enables significant advances in the protection and conservation of CH, combining Geographic Information Systems (GIS), Artificial Intelligence (AI), Information and Communication Technologies (ICT), and Good Management Practices to train and support local governments and heritage managers in emergency preparedness, prioritizing response strategies and preventive conservation during emergency interventions in CH.

The development of the FENIX toolkit required an interdisciplinary team of restorers, conservators, architects, engineers, historians, geographers, chemists, biologists, mathematicians, and other specialists. Communication across disciplines was fostered through methods that facilitated knowledge exchange and consensus building. One

of the most innovative contributions of FENIX lies in the incorporation of collaborative methodologies, including AHP (used to prioritize alternatives based on multiple criteria) combined with DELPHI (a structured process for reaching expert consensus). These methodologies have enabled the integration of CH specialized knowledge into the development of risk-response protocols. The implementation of this approach has led to the creation of conceptual models that constitute the foundation of the FENIX toolkit, allowing for the joint integration of climatic, environmental, structural, conservation, and social factors that shape disasters affecting CH.

The inter-institutional and collaborative approach is a cornerstone of the FENIX projects, bringing exceptional value by fostering collaboration with professionals from the Antequera Dolmens Site (UNESCO World Heritage Site), as well as leading museums and cultural institutions in Antequera, Madrid, and Valencia at national level, and partners in Italy and Latin America on an international scale. This broad and strategic collaboration has enhanced the functionality and usability of the toolkit, allowing them to be rigorously tested in real-world scenarios with public stakeholders through emergency drills at numerous historic sites. By engaging both specialists and the public in risk management protocols, FENIX not only strengthens the protection and conservation of CH but also promotes knowledge transfer, capacity building, and inclusive participation across local, national, and international contexts.

FENIX [PID2019-107257RB-I00] was funded by MICIU/AEI/10.13039/501100011033) with 24.400,00 €, and FENIX 4.0 [PDC2022-133157-I00] was funded by MCIN/AEI/10.13039/501100011033 and by Unión Europea NextGenerationEU/ PRTR fundings with €143,750.00

Objectives, methodology and context

Aims and objectives of the research project.

The main objective of FENIX is to support the risk assessment and management of emergencies affecting CH. To achieve this, five digital tools have been developed by Pablo de Olavide University (UPO), Seville University (US), Valencian Institute of Conservation (IVCR+I), and MissionTrack Enterprise. These tools support safeguard plans, improve communication, and ensure proper documentation during risk situations.

To this end, the following sub-objectives were set:

1. Develop a cooperation framework to standardize protocols for the coordination of interdisciplinary teams, Civil Pro
2. Develop and implement the FENIX Toolkit to assess risk and design safeguard plans, using previous tools (ART-RISK1 and ART-RISK3, Europa Nostra Award 2021) together with new tools: TERRA INSPECTOR, FENIX 4 and ATLAS.
3. Design and implement a best-practices workflow to utilize the developed tools for preparing emergency safeguarding plans.

Validate the FENIX risk management model and digital tools in collaboration with multiple heritage organizations, and testing their capacity to address real-world challenges in: Antequera Dolmens Site (UNESCO Word Heritage) (March 2025), Museum of Fine Arts of Valencia (July 2022), the Museum and Archive of Antequera (November 2022), the Royal Tapestry Factory (February 2023), the Monastery of San Zoilo (including the municipal library and church, Antequera, November 2023).

Foster stakeholder engagement by providing training for civil society, security authorities, and potential stakeholders in the application of the developed models, tools, and lessons learned

Design didactic and educational models that promote youth engagement in risk management.

Surrounding context in which the project was undertaken, both locally and nationally, and in terms of the state of the field at the time of conducting the research.

The 2019 fire at Notre Dame Cathedral in Paris highlighted the urgent need for CH sites to be prepared for emergencies. The event underscored the importance of proactive planning, risk assessment, and interdisciplinary

coordination to protect cultural heritage before, during, and after disasters. It became clear that safeguarding cultural heritage requires systematic tools and methodologies to anticipate and respond effectively to crises.

In Spain, the FENIX project was implemented in Valencia, Andalusia, and Madrid, areas with rich cultural assets and active heritage management programs. In recent years, these locations have experienced multiple emergencies caused by DANAs, fires or earthquake swarms, resulting in various types of damage to cultural sites and collections. Among them, Valencia suffered the most significant impacts, illustrating the pressing need for improved preparedness and emergency management. This context emphasized the necessity for applied conservation research aimed at enhancing the resilience of cultural assets and minimizing damage during emergencies.

At the international level, Latin American countries face frequent risks such as earthquakes, creating a demand for effective risk management tools. Building on prior collaborations, FENIX has leveraged this network to disseminate its models and adapt them to different cultural and environmental contexts, fostering knowledge exchange.

Approach and methodology used for the project as well as reproducibility of the approach.

FENIX provides an integrated framework for risk analysis and management before, during, and after emergencies. It builds on two previous Art-Risk models: ART-RISK 1, which assesses vulnerability and conservation status, and ART-RISK 3, which evaluates risk in churchs (EUROPA NOSTRA AWARD 2021). These two tools are complemented by Terra Inspector (IBUPRO2024-014) designed to assess vulnerability in historic cities with earthen walls, and ATLAS (IPRUPO2023-010), which maps climate hazards and areas affected using satellite big data. Finally, FENIX 4 employs ICT to facilitate communication among specialists during emergencies, document decisions and rescue activities, and track the transfer of artworks, supporting coordination and traceability in a georeferenced platform.

The toolkit validation methodology includes:

1. Training in the use of the FENIX model and tools at CH sites: 2 museums, 1 archive, 2 churches, 1 monastery, 1 historic factory, 1 archeological site and 1 library.
2. Testing the tools' capacity to solve problems and minimize damage during earthquake and fire drills at various CH sites used as living laboratories.
3. Inclusion of over 2000 participants in CH protection activities, including civil protection, emergency services, healthcare personnel, police, military, psychologists, conservators, heritage managers, as well as the public, with special awareness for youth and the elderly.

Stages of implementation of the project

FENIX stages are Planning, Execution, Validation, and Dissemination, all of which have been completed. During Planning, the risk analysis model was defined, a set of five digital tools was developed, and three pilot sites were selected: Antequera Dolmens site, the Royal Tapestry Factory, and the Museum of Fine Arts of Valencia. In the Execution stage, training activities were conducted with over 2000 participants, and emergency drills were carried out at the pilot sites to test the FENIX toolkit. The Validation stage, developed in parallel with the execution, involved analyzing drill results using AHP and Delphi methods, refining the tools, and conducting additional drills in four heritage buildings, demonstrating the project's ability to generate change. In dissemination, the five tools, a best practices guide, and 16 scientific publications were released. FENIX network now supports five active projects replicating its model nationally and internationally.

Problems encountered and justification for the decisions taken to overcome these problems, both before and during the project.

During the FENIX project, several challenges were identified in managing risks at CH sites. Many sites lacked standardized models or basic knowledge of emergency safeguarding plans, making it difficult to implement comprehensive risk assessments. Initially, engaging these sites was challenging, as most had never developed CH safeguarding plans or applied risk evaluation in practice.
Another challenge was limited access to hazard mapping and specialist knowledge. To overcome this, satellite

imagery and a cloud-based tool (ATLAS) were developed to automate identification of hazard changes.
Coordinating multidisciplinary teams—including conservators, architects, firefighters, police, army, and healthcare personnel—required a common language and standardized protocols. To solve this, FENIX developed models and workflows for risk assessment and emergency response applicable across different cultural contexts. Besides, interdisciplinary training sessions established a shared vocabulary, defined roles and command structures, implemented action protocols for each emergency phase, and trained participants in best practices for heritage handling and rescue. These decisions ensured knowledge gaps were closed, coordination improved, and accessible, standardized tools supported comprehensive CH risk management.
The lack of consensus among specialists was addressed with multi-criteria techniques such as AHP and Delphi, enabling agreement on risk understanding, mitigation priorities, and areas needing further research.

European significance

European significance of the project/initiative/nominee.

European CH is frequently threatened by floods, fires, and earthquakes, making FENIX's focus on preventive conservation, rescue, safeguarding, and resilience essential across diverse landscapes, cultural expressions, and cultural heritage assets. By promoting self-sustainable and resilient heritage policies, FENIX prepares for emergencies caused by natural events or climate change. UNESCO World Heritage Sites, such as the Antequera Dolmens Site, provide expertise and resources to lead these efforts and act as hubs for knowledge transfer in risk management.
Beyond protecting monuments and objects, FENIX envisions CH sites as active nodes for building safer, more resilient, and livable cities. By strengthening collaboration between specialists, volunteers, civil protection and young people in the protection of cultural heritage, FENIX reinforces European identity by promoting shared values of history, culture, and resilience in the face of common risks.

Results and impact

Summary of the main results achieved and knowledge that has been gained. List the ways that the project/initiative contributes to the preservation and/or enhancement of the historical, cultural, environmental, educational and/or social values of the heritage in question. Mention the project's impact on conservation policy and practice, if any.

Its main outcome is a comprehensive toolkit comprising a model and digital tools—TERRA INSPECTOR, Art-risk 1, Art-Risk 3, FENIX 4 and ATLAS—designed for risk assessment, preventive conservation, emergency response, management, communication, and training. These tools enhance the resilience of CH sites, optimize emergency operations, and facilitate standardized protocols for interdisciplinary teams.
FENIX developed Spain's first emergency safeguarding-plan in Antequera Dolmen Site (UNESCO World Heritage), created in collaboration with regional museums and archaeological managers across Andalusia. Seven emergency drills, involving over 650 experts from civil protection, restoration, archaeology, architecture, and other disciplines, validated this model. The drills allowed CH organizations to develop safeguarding plans, train volunteers and emergency teams, and foster coordination and communication across sectors. Additionally, over 350 professionals received formal training, while approximately 1000 children and teenagers participated in outreach activities, as well as 60 elders. Two educational games, based on playful activities and learning models, were also developed to promote awareness of CH risk among school and university students.
FENIX has contributed to scientific knowledge through two PhD theses: Isabel Turbay on seismic vulnerability in churches (Colombia, Guatemala) and Mónica Moreno on risk assessment in fortified historical cities. Best-practice guidelines for CH rescue documentation, based on FENIX-4 model, were published in multiple languages (Spanish/English/French/Italian/Portugues) (https://www.upo.es/cms1/export/sites/upo/investiga/art- risk/proyecto-fenix/resultados/Documentos/chulia-moreno-guia-buenas-practicas-gestion-elementos-patrimoniales- fenix-ivcri-upo_EN.pdf) along with a collaborative book with the Andalusian Institute for Cultural Heritage (https://www.juntadeandalucia.es/organismos/iaph/servicios/publicaciones/detalle/495724.html). Additionally, it generated 16 scientific publications.

> FENIX directly impacts conservation policy awarness and practice by providing validated models and tools that have been applied in real emergencies, such as the DANA floods in Valencia (2024). By integrating preventive conservation, risk assessment, emergency preparedness, and public engagement, FENIX strengthens the historical, cultural, educational, and social value of CH sites, while fostering a European culture of resilience and collaborative stewardship.

Aspects of the project that can be considered innovative within its area or field.

> FENIX is innovative in CH risk management, an emerging field, by proposing a cross-sectoral approach and analytical methods that integrate the perspectives of the public, Civil Protection specialists, architects and conservators. This enables the development of a model for risk data collection in CH, fostering discussion, joint decision-making, and consensus among experts and society.
>
> It introduces pioneering digital tools: ATLAS, to map climate hazards and affected areas using satellite imagery and big data; and FENIX 4, which facilitates communication and documentation during crises, georeferenced artwork rescue routes, and monitors actions in real time during emergencies.
>
> Innovation also extends to education and social participation. Two educational games were developed to teach students about risks and CH protection, promoting awareness and engagement from an early age.
> Overall, interdisciplinary risk management, advanced digital tools, and public education make FENIX a pioneering model for safeguarding of cultural heritage against both natural and human-made risks.

Steps taken to reach people who have not previously interacted with the site/project. This might include youth, local communities, non-traditional audiences, people with disabilities, etc.

> FENIX actively involves children and teenagers as future stewards of CH. Four schools participated in emergency drills (2022, 2023, 2025), gaining awareness and hands-on experience in protecting heritage sites.
> Two youth role-playing games tested at the 2025 Science Fair taught near 100 participants to act as conservators and mobilize institutional and community resources to prevent fires in museums, archives, and churches.
>
> FENIX also involved non-traditional audiences in developed training activities, including civil protection bodies such as firefighters, police, army, and healthcare workers. Additionally, professional restorers from the Official College of Doctors and Graduates in Fine Arts, along with MSc students in Heritage Science, joined handling and triage teams during emergency drills. More than 650 specialists participate in these activities.
> Finally, emergency drill in Antequera Dolmen Site (2025) also included a nursing home, where 60 elders with low mobility were included in the drills as persons with high vulnerability.

Environmental, social, and economic sustainability of the project (e.g. contribution to climate action and environmental protection; measures to ensure long-term financial sustainability or future viability; benefits for people and communities, where relevant).

> Climate change is dramatically increasing the frequency and intensity of floods, fires, and other natural hazards worldwide, creating significant and often irreversible risks for CH. Historic buildings, archaeological sites, archives, libraries, churches, and museums face not only material loss but also the erosion of collective memory and identity as consequence of disasters. The FENIX model and its suite of digital tools provide a proactive approach to these challenges, enabling cultural institutions and communities to anticipate and prepare for emergencies, thereby minimizing damage and promoting sustainability by reducing risk before a disaster occurs rather than relying solely on reactive measures.
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> Beyond physical preservation, FENIX also fosters social sustainability by strengthening citizens' attachment to their local environment and reinforcing collective values, traditions, and cultural identity. By integrating heritage safeguarding into community practices, the model ensures that CH remains a living part of society, whose protection contributes to social cohesion, intergenerational engagement, and civic responsibility. Proper preservation of CH and improved resilience help maintain the unique characteristics of each society, while promoting diversity, respect, and intercultural dialogue.

A key aspect of the FENIX approach is the active participation of citizens and professionals in risk management. Through educational activities, emergency drills, and hands-on training for experts and the general public—especially teenagers—FENIX cultivates a culture of preparedness. Participants learn to assess risks, implement emergency protocols, and protect monuments as well as rescue artworks and artifacts through simulated earthquake, flood, and fire scenarios. These activities not only enhance technical skills but also foster a shared sense of responsibility, helping to build resilient historic cities where heritage is integrated into urban and social planning.

Finally, FENIX contributes to long-term sustainable management of CH through collaborations such as the Sustainable Heritage Tourism Management System (https://www.ceipatrimonio.com/certificado-cei-patrimonio-en-turismo- patrimonial-sostenible/) and the "Book of Sustainability in Cultural Heritage," edited by the Spanish Government. In both initiatives, UPO recommended the integration of CH emergency response and risk assessment models to improve resilience and sustainability. Moreover, an agreement has been reached with the Regional Ministry of Cultural Heritage to continue collaborating on these initiatives over the next five years. FENIX has also submitted a formal recommendation to the new Cultural Heritage Law of Andalusia, advocating for the inclusion of explicit provisions that require museums and cultural sites to have a comprehensive risk management plan for their collections.

Dissemination of the project's results and knowledge gained and any outreach or educational activities.

FENIX received broad media coverage (TV,radio,press, and social media) especially in emergency-drills with active participation of regional and local government for CH and Civil Protection.

Four videos of emergency-drill are published online at UPOTv for specialist and the public (https://upotv.upo.es/video/6862305dabe3c6fb068b456d).

Scientific dissemination included participation in 12-congress, organization of 1-international conference, 16-papers, 2- books and 1-chapter.

4-participation of courses for National School of Civil Protection and firefighters.

35-training activities and meetings were held with CH centers and Universities (Italy,France,Norway,Colombia,Peru,Ecuador,Cuba,Marroco,Egypt,..).

Outreach activities involved over near 1000 students, participating in European Researchers' Night (2023,2024 and 2025), and International Day of Women and Girls in Science (2023,2024 and 2025), the fair of Science (2025). The museum emergency drill (2023) was awarded by AMMA.

FENIX was also showcased at 3 key CH fairs at Seville (2023), Malaga (2023 and 2024), and Medina del Campo (2024).

Transferability of the initiative to other contexts and its scalability potential.

Five CH Sites have used FENIX model in their emergency safeguard plans: Antequera Dolmens Site (World Heritage), Royal Tapestry Factory, Municipal Museum, Archive, and Library of Antequera.

FENIX toolKit is applied in five new funded projects in progress: one in Spain, two in Ecuador, one in Peru, and one European initiative (Spain, Italy, France). The Spanish project, "STEM at the Service of Art", engages teenagers and adults over 60, raising awareness of science and digital tools in heritage protection. FENIX guides risk assessment and resilience initiatives In Ecuador and Peru project, while the European ATLAS project links heritage and green spaces to prepare historic cities for climate change.

Training and drills using the Art-Risk ToolKit strengthen decision-making and emergency response. 4-agreement has been signed to transfer the initiative to civil-society and government in future. Currently, FENIX result demonstrates transferability and scalability, fostering preparedness and leadership in CH protection worldwide

Interim or Final Evaluation Report

PDF	N2085158-EVALUACION DE LA... (207 KiB download)

Costs of the project/initiative

Costs of the project (in euro), financial and management arrangements, funding partners and/or the type of funding.

> FENIX (PID2019-107257RB-I00) Artificial Intelligence and new technologies applied to prevention and management of fires and natural disasters in movable and immovable Cultural Heritage. Ministry of Science and Innovation 24.200 €. 24 organizations.
>
> FENIX4.0 (PDC2022-133157-I00) Feasibility analysis and end-user testing of prevention and disaster management apps for the protection of movable and immovable cultural heritage in the event of fires or natural disasters. Ministry of Science and Innovation and next generation EU funds:143,750.00. €. 35 organizations.
>
> The overall project budgets covered model development, outreach, studies, and emergency drills. Funds were used to hire technicians and specialists, purchase drill materials, subcontract services, cover researcher travel and per diem, and provide training. No expenses were incurred for contracted permanent staff and equipment

Funding provided by the European Union or the EEA/Norway Grants (including programme, year and amount of the Grant), if any.

> FENIX 4.0 (PDC2022-133157-I00), Feasibility analysis and end-user testing of apps for the prevention and management of fires or natural disasters aimed at the conservation of movable and immovable cultural heritage, led by Pablo de Olavide University (UPO), funded by the European Union's Next Generation funds through the Ministry of Science and Innovation, within the framework of the Spanish Government’s Recovery, Transformation and Resilience Plan. Next generation funds:143,750.00. €.

Short CV of research author(s)

Short CVs of the author(s)

> Pilar Ortiz Calderón Calderón is PhD in Chemistry, Full Professor and was Dean of the Faculty of Experimental Science in Pablo de Olavide University (Seville, Spain).
>
> Her research and teaching experience has been focused on the diagnosis, preservation and conservation of Cultural Heritage (CH) since a point of view of a Chemist expert in heritage science and environmental management. She has collaborated in this research in Spain with museums and cultural institutions, such as the Valencian Institute of Conservation and Restoration (IVCR + i), Andalusian Institute of Historical Heritage (IAPH), Cádiz Museum, Écija Museum, Science Museum of Granada, etc. to develop new methods for diagnosis and risk assessment in CH. Additionally, She has collaborated in CH issues in several countries, i.e., the United Kingdom; Belgium, Italy, Romania, Greece, Norway,Romania, Cuba, Peru, Colombia, Panama, Ecuador, etc.
>
> She has participated in more than 30 national and international projects, contracts and agreements funded by the Union European, Ministry, Autonomous Communities and public/private organizations/ companies, and has been the Principal Investigator (PI) in 20 of those projects, what has mean funds of 2.195.251€ for UPO from European, national and regional projects for diagnosis, conservation, risks and vulnerability assessment of CH.
> She has worked in the University of Amberes (Belgium) as assistant lecturer (12 months), invited professor (6

months) at the University of Oxford (UK), invited researcher (12 months) at ENEA, Frascati (Roma, Italy) and Visiting Professor (6 months) at University Cà Foscari (Venezia, Italy).

Editor of 1 international book, three special issue of journals and 2 Nationals books regarding the issue of FENIX. Opening and leadership of important research lines: Lasers techniques for in situ diagnosis in CH materials, non-destructive techniques for diagnosis of CH, risk and vulnerability assessment and artificial intelligence to the preventive conservation and respond to emergency in CH. In these lines, She has directed 5 Phd Thesis with Cum Laude and 4 with International mention, and 24 master's degree projects, collaborated with CH organizations and private companies (Research Aprorca, Ecomimesis, Mission Track, etc).

Scientific Director of a Museum Exhibition: Science Window: The Hidden Face of Historical Heritage: Risks and Vulnerability. Granada Science Park. Junta of Andalusia. Science Window: Live Science: 6 Months, 2014.
5 awards: 1) Second European Reach OUT award 2015 granted by EMRS (European Material Research Society) for the dissemination of research results to all audiences at the Science Park Science Park in Granada. 2) EUROPA NOSTRA international award 2021 for research in cultural heritage conservation for the ART-RISK project. 3) Accesit of the EXPONE awards in 2023 in conservation of the association of museologists and museographers of Andalusia, for the multiple drill of the museum and Archive of Antequera (Malaga). 4) two Awards UPO to the business idea for the project CH-Alert and Sanit-Arte. CH-alert is the basis of ART-RISK and FENIX, while Sanit-Arte is a research service provided at UPO.

Organizing committee of 12 International or National Congress.
Currently, member of the Andalusian Historical Heritage Council and the Steering Committee of the Campus of International Excellence of Natural and Cultural Heritage. She has been member of Excellency Campus of UPO in environment change, and has been Dean and vicedean of the faculty of Experimental Sciences at UPO and member of ACCUA board. Auditor of the University of the Basque Autonomous Community in matters of Quality.
Evaluator at Belgium, Spanish and regional research projects.

Publication assessment according Scival (Scopus, Benchmarking the Scholarly Output) following DORA declaration: Scholarly Output: 79 (TOTAL), 43 (JCR), 51 (JCR+SCOPUS), 17 (JCR Q1), 26 Q1 of all types of publications, FWCI (Field-Weighted Citation Impact, excluded Self-citations: 1,25, what means 25% over the mean of citation of my field these years, 26% of my Publications in Top 10% Journal Percentiles by CiteScore (In top 10% of Scopus Sources), 10,3 Average citations per paper (Web of Science) from 82 Citing Countries.

The interdisciplinary team of researchers involved in FENIX is mainly composed by conservators and restorers (UPO, IVCR+I, IAPH, COLBAA, MVCA, Antequera Townhall), architects and engineers (UPO, US), biologists (UPO, IAPH), mathemathics, chemists (UPO, IAPH), archaeologists (UPO), and historians (UPO), working in conjunction with MISSION-TRACK enterprise and emergency response institutions to design, test, and validate safeguarding and emergency response models.

In Valencia, Spain, institutions involved include the Valencian Regional Government Firefighters, Municipal Technical Office of Civil Protection, Valencia City Council, Valencia Local Police, Citizen Protection Area of the Delegation of the Government of the Valencian Community, Heritage Unit of the National Police Corps, Basic Health Unit, Ministry of Health, IVASPE, INVASSAT, and the Department of Justice.

In Antequera, Málaga, participants include Civil Protection Volunteers, Municipal Psychologists Corps, Primary Care Emergency Service (SUAP), Local and National Police, Antequera Fire Station, Provincial Firefighters Consortium of Málaga (CPB), Red Cross, and the North Málaga Health Area.

Other Spanish institutions involved are the Spanish Military Emergency Unit (UME), the Official College of Doctors and Graduates in Fine Arts of Seville (COLBAA), the National Film Archive of Spain, the Andalusian Institute of Historical Heritage, the Ministry of Culture and Sports of the Andalusian Regional Government, the Secretariats of Culture of Málaga and Almería, the Government Subdelegations and Civil Protection of Málaga and Granada, archaeological sites such as C.A. Cástulo and C.A. Baelo Claudia, museums including the Archaeological Museum of Córdoba, the Museum of Jaén, and the Museum of Arts and Traditions of Seville, the National School of Civil Protection, the Directorate General of Civil Protection and Emergencies, Galileo Galilei Secondary School, Córdoba

> Firefighters, the Archive of the Indies of Seville, and the Ministry of the Presidency of the Andalusian Regional Government.
>
> For the dissemination to young people, collaboration was carried out with several schools in Antequera, including Nuestra Señora del Loreto School (MVCA drill), Félix Rodríguez de la Fuente School (San Zolio drill), and IES Pintor Fernández (CADA drill). Students from IES Galileo Galilei in Córdoba also participated in the CADA drill. Internationally, restoration companies and specialists in the conservation and restoration of artwork from FUP (Colombia), Restaurika (Mexico), and ISA (Cuba) have also collaborated in FENIX

Additional information

How would winning the European Heritage Award / Europa Nostra Award benefit you, your project and/or your organisation?

> FENIX spirit has always been to develop an interdisciplinary methodology for managing the safeguarding of Cultural Heritage in risk situations. Obtaining the EUROPA NOSTRA awards is not only a recognition of our achievements; It is also a quality seal of an institution that brings together more than 400 organizations that actively work for the conservation of European heritage. Besides, winning this award will bring the project's achievements to a wider audience.

In case this submission is the winner of the Grand Prix, what will the monetary award be used for?

> The monetary award will be used for a simulation in Andalucia where a complete neighpourhood in a historic city will be afected and training for small historic towns where the training of volunteers is crucial to rescue artworks and CH artefacts afected by floods and fires due to climate change.

In case this submission is the winner of the Grand Prix, who will be the recipient of the monetary award?

> Universidad Pablo de Olavide will be the recipient of the monetary award.

How did you find out about the European Heritage Awards / Europa Nostra Awards?	Europa Nostra website
Is this the first time that this entry has been submitted to the European Heritage Awards / Europa Nostra Awards?	Yes
On a scale of 1-10, how satisfied are you with this online submission form?	✓ 10
By submitting your data, photographs and other material to the European Heritage Awards / Europa Nostra Awards you agree to the processing and sharing of your data in accordance with Europa Nostra's Privacy Policy. Please check the box to indicate you agree with the Privacy Policy.	✓

Log in to european-heritage.awardsplatform.com to see complete entry attachments.



1_Emergency dr... 1.9 MiB



2_Coordinating ... 70 KiB



3_Triaje during ... 2.4 MiB



4_Evacuation M... 266 KiB



5_Efebo Rescue... 1.7 MiB



6_Evacuation of... 569 KiB



7_Students in e... 2.2 MiB



8_Use of Fenix... 1.7 MiB



9_Stabilizing arc... 135 KiB



10_Initial Inspec...28 KiB



11_Trainig emer...240 KiB



12_Triage.jpeg 173 KiB



13_Meeting eva... 96 KiB



14_Report Feni... 608 KiB



15_CM Dissemi... 116 KiB



16_Science caff... 2.1 MiB



17_Emergency t...241 KiB



18_Science Fair....350 KiB



19_Trainig in Fe... 164 KiB



20_In situ inspe... 386 KiB



21_Evaluation i... 424 KiB



22_Trainig stud... 145 KiB



23_Conference.j...755 KiB



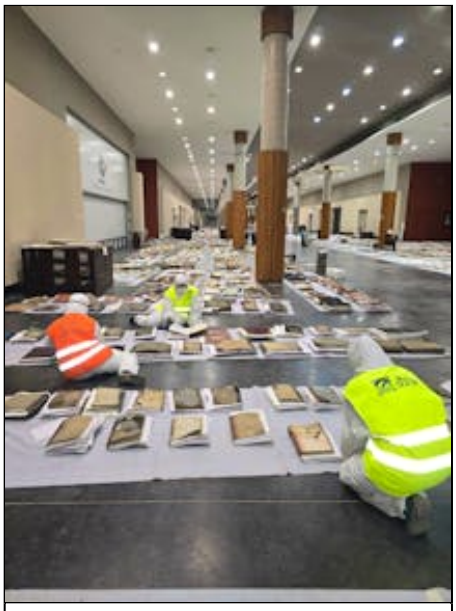
24_ArtRisk4 Dis... 505 KiB



25_Partipation ... 1.3 MiB



26_Map of Eme... 2.3 MiB



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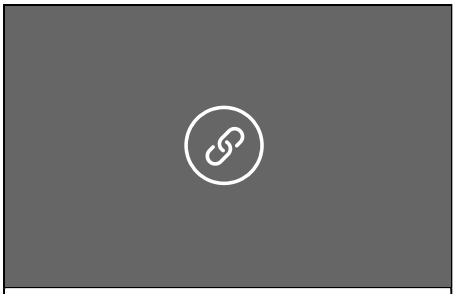

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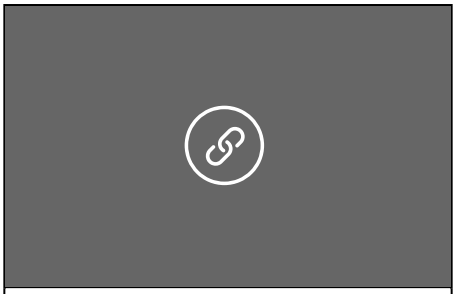

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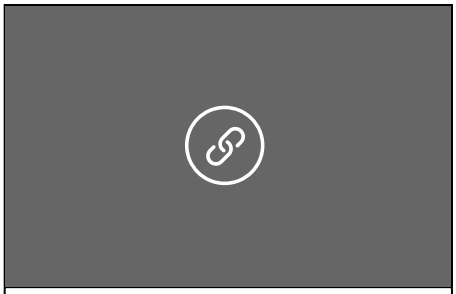

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