



# SIRMA

STRENGTHENING INFRASTRUCTURE RISK  
MANAGEMENT IN THE ATLANTIC AREA

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STRENGTHENING INFRASTRUCTURE RISK MANAGEMENT  
IN THE ATLANTIC AREA

JOSÉ C. MATOS  
UNIVERSITY OF MINHO (PORTUGAL)



**Interreg**  
**Atlantic Area**  
European Regional Development Fund



EUROPEAN UNION

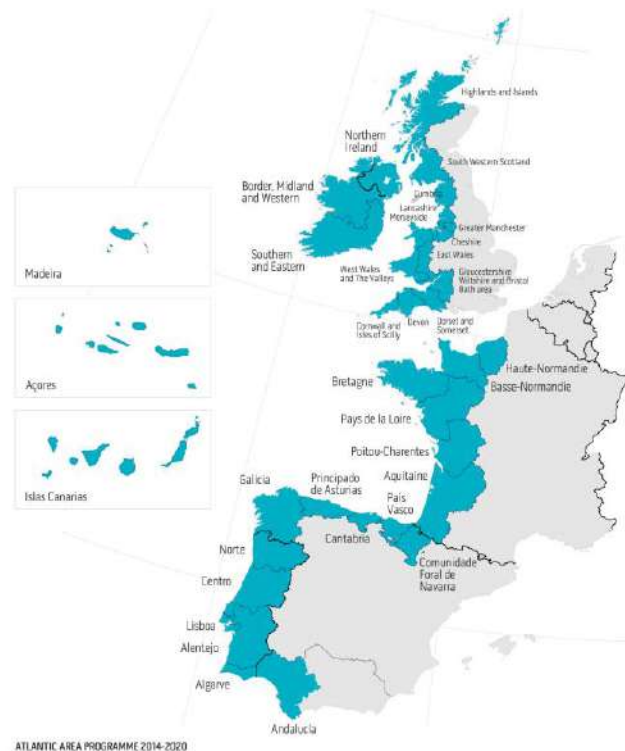
# SUMMARY



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- Most of the transportation of people and goods in Atlantic Area is made through rail and road. The performance of this infrastructure is directly affected by extreme natural events and by the strong corrosion processes that result from proximity to the Atlantic Ocean.
- SIRMA project aims to develop a robust framework for the management and mitigation of such risks, by implementing immediate, medium and long-term measures, thus increasing the resilience of transportation infrastructure.
- This project will address the transportation infrastructures by developing a systematic methodology for risk-based prevention and management; developing a real-time process to monitor the condition of transportation infrastructure.



Entity	Position	Country	Region
Universidade do Minho	Lead partner	Portugal	Norte
University College Dublin	Partner	Ireland	Southern and Eastern
Universidade de Vigo	Partner	Spain	Galicia
Université de Nantes	Partner	France	Pays-de-la-Loire
University of Surrey	Partner	UK	South East England
AZVI, SA	Partner	Spain	Andalucía (Huelva, Cádiz and Sevilla)
Iarnród Éireann	Partner	Ireland	Southern and Eastern
Infraestruturas de Portugal, SA	Partner	Portugal	Lisboa
The University of Birmingham	Partner	UK	Northern Ireland
Queen's University Belfast	Associated partner	UK	West Midlands



Universidade do Minho



UNIVERSIDADE DE VIGO



UNIVERSITÉ DE NANTES



UNIVERSITY OF SURREY



QUEEN'S UNIVERSITY BELFAST

# ACTIVITIES

Number	Activity name	Partner responsible
WP 0	Preparation	Universidade do Minho
WP 1	Coordination	Universidade do Minho
WP 2	Communication	Universidade de Vigo
WP 3	Capitalization	Universidade do Minho
WP 4	Climate Change & Natural Hazards in Atlantic Area	Université de Nantes
WP 5	Instrumenting Transportation Infrastructures for Extreme Natural Hazards	University College Dublin
WP 6	Risk & Resilience-Based Decision-Making procedure for Transportation Infrastructure	Universidade do Minho
WP 7	Test Bed	Iarnród Éireann

Start Date

02/04/2019

End Date

30/09/2022



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## WP1 to WP3

COORDINATION, COMMUNICATION, CAPITALIZATION

# PARTNERS / ACTIONS

Number	Activity name	Partner responsible
WP 1	Coordination Steering Committee including all partners representative Monthly meetings Progress reports (6)	Universidade do Minho & all
WP 2	Communication Communication plan Advisory Board Website and social networks Workshops	Universidade de Vigo & all
WP 3	Capitalization Reports on: <ul style="list-style-type: none"><li>- good practices benchmarking resilience to risks</li><li>- standardization needs</li><li>- good practices for dissemination and capitalization</li></ul> Technology transfer / capacity building events (5)	Universidade do Minho & all



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## WP4

CLIMATE CHANGE & NATURAL HAZARDS IN ATLANTIC AREA

## DELIVERABLES:

- Database containing climate change indicators under different scenarios for each selected location that will be freely available at the project website.
- Predictive models for non interceptable events necessary to evaluate the vulnerability/consequences of build infrastructure subjected to non interceptable events.
- Framework to assess the vulnerability and failure consequences on transportation infrastructure depending on the infrastructure location and climate change scenarios (required to WP6).

## RESULTS:

- A freely available database of climate change indicators that could be used in the future by anyone for estimating vulnerability of transportation infrastructure at different Atlantic regions.
- Increased capacity to predict extreme events through the developed algorithm, based on a given infrastructure asset location and climate change scenarios.





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## WP5

INSTRUMENTING TRANSPORTATION INFRASTRUCTURES FOR  
EXTREME NATURAL HAZARDS



## DELIVERABLES:

- Repository of Instrumentation Design for a Range of Deployment Scenarios, including the development of two reports, a numerical & experimental repository, a guideline.
- Creation of a demonstrative numerical benchmark, including the development of a numerical repository on developed algorithms, software tools for bespoke SHM and feature of interest extraction, report of algorithm performance, guidelines for implementation on WP7.

## RESULTS:

- Customizable climate-aware instrumentation able to quantify information level & accuracy for WP6 framework.
- A guideline to allow infrastructure owners to deploy commercial monitoring with benchmarked performance.
- A novel software suite in portable and scalable climate-aware infrastructure monitoring for Atlantic Area type hazards.



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## WP6

RISK & RESILIENCE-BASED DECISION-MAKING PROCEDURE FOR  
TRANSPORTATION INFRASTRUCTURE

## DELIVERABLES:

- Risk-based predictive model (algorithm) for transportation infrastructures. (includes the climate change effects on the impact and return period of extreme events – WP4).
- Relational database with a list of risk mitigation measures for transportation infrastructures, their effects and costs.
- Framework (user-friendly software) for multi-criteria decision-making, i.e., by maximizing resilience and minimizing the risk mitigation measures costs.

## RESULTS:

- Forecasting of transportation infrastructure performance to multiple hazards in Atlantic Area, comprising the likelihood of such extreme events and their impact in the infrastructures.
- Database with the most relevant risk mitigation measures, including their description, when should be used, with what time frequency, effects and costs (direct and indirect).



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## WP7

TEST BED

## DELIVERABLES:

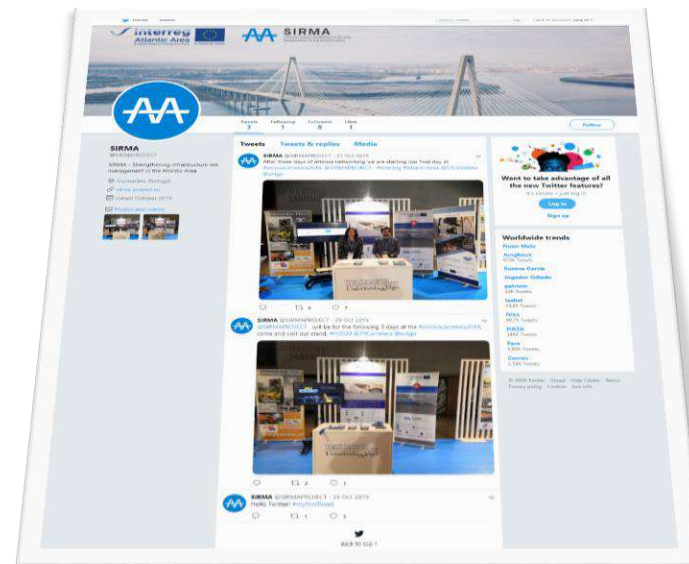


- A risk-based model and decision-making system integrating a set of historical and existing data from the road and railway infrastructure networks (test beds in Portugal and Ireland/North Ireland).
- The models developed in WP6 will be validated, also integrating innovative indicators obtained from the sensor system developed at WP5

## RESULTS:

- Improvement of risk based model and decision-making system.
- Integration of a set of historical and existing data from the road / railway infrastructure networks (test beds in Portugal and Ireland/North Ireland) will allow the validation of developed tool

# SOCIAL NETWORKS



**SIRMA-PROJECT.EU**

**@SIRMAPROJECT**



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SIRMA@SIRMA-PROJECT.EU  
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# THANKS FOR YOUR ATTENTION

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