



# COST Action TU I402

## Quantifying the Value of Structural Health Monitoring





The Action

Scientific focus

Working groups

Target groups / end users

Expected results

Innovation Committee

The network

The Resources



COST is supported by the EU Framework Programme Horizon 2020

## SCIENTIFIC FOCUS

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- Towards to the information needed for quantifying the value of SHM
- Development of the theoretical framework of Bayesian decision making
- Development of computational tools for the implementation of the framework
- Processing of information required about SHM technologies and structural performance of interest
- Demonstration of the applicability of the framework based on case a set of studies

## WORKING GROUPS

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WG1: Theoretical Framework

WG2: SHM Strategies and Structural Performance

WG3: Methods and Tools

WG6: Dissemination

WG4: Case Study Portfolio

WG5: Development of Guidelines

- **WG1** - Mathematical framework of Value of Information (VoI) analysis
- **WG2** - Selection of suitable SHM strategies
- **WG3** - Guidelines on the use of available methods and tools for harvesting the VoI
- **WG4** - Case studies highlighting combinations of feasible SHM techniques
- **WG5** - Guideline documents to facilitate the implementation of developed principles/methods
- **WG6** - Activities to ensure the public diffusion of the progresses and results of the Action

## TARGET GROUPS / END USERS

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- Representatives of the construction and infrastructure industry
- Structural engineers and builders
- Relevant European and national associations and confederations
- Authorities and policy makers at regional and European levels
- Research community, relevant standardization bodies and code writers
- Teachers, lecturers and students of structural design, engineering and architectural schools

## EXPECTED RESULTS



- A chapter to the Probabilistic Model Code of the JCSS
- A library of tools/algorithms for support of the quantification of the Value of SHM
- A guideline on the quantification of the Value of SHM with detailed examples
- A homepage with presentations, written material and information about the Action and participants
- A set of dissemination activities such as training courses, workshops and special sessions at international conferences.

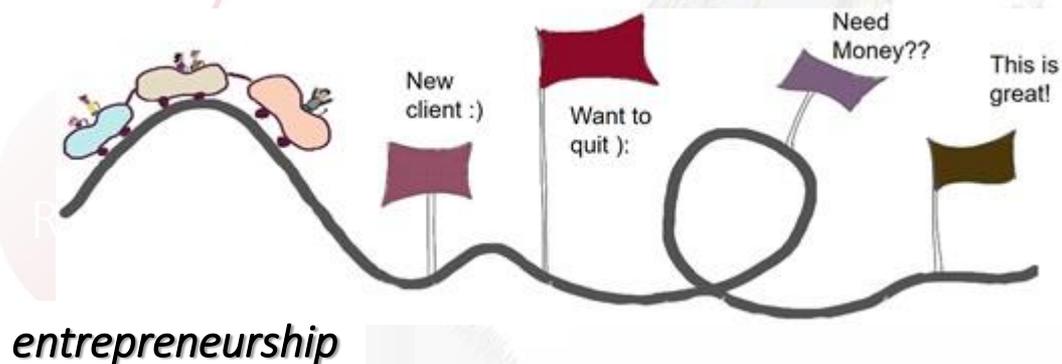
INNOVATION COMMITTEE

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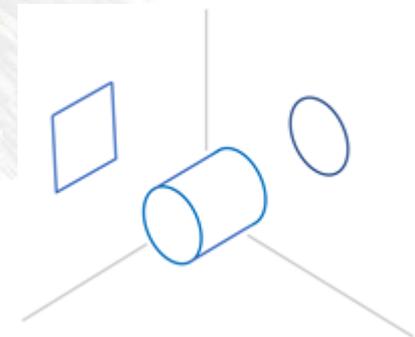
*innovation*

×	○	×
×	○	×
○	×	○

- Innovation holds a pivotal position within the COST Action TU1402
- Mission to foster engagement between academia and industry
- Focus on (i) innovation, (ii) entrepreneurship and (iii) dissemination



*entrepreneurship*



*dissemination*

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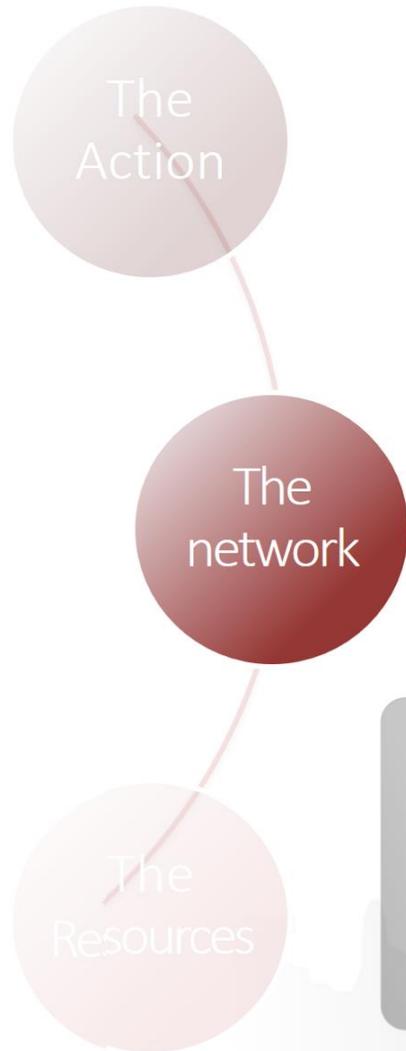
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- Steering Committee
- Management Committee
- Advisory board
- Short Term Scientific Mission
- International observers and experts



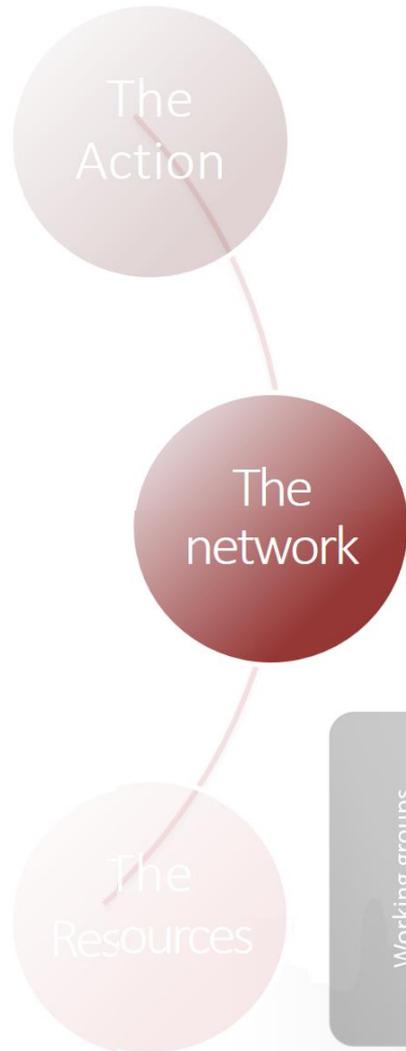
## MANAGEMENT COMMITTEE

- Responsible for the coordination, implementation, and management of the Action's activities
- Supervising the appropriate allocation and use of the COST funding in order to achieve the Action's objectives.



## STEERING COMMITTEE

- Responsible for the operation of the COST Action
- Prepares decisions for the Management Committee
- Composed by the Chair, Vice Chair and Scientific Chair of the Action, as well by the Working Group Leaders and Innovation Committee Leader



## STEERING COMMITTEE

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Action Chair:  
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## ADVISORY BOARD

- Formed by representatives of infrastructure owners and operators and senior industrial managers.
- The function is to advise the Steering Committee focussing on industrial challenges in conjunction with the Action objectives and the Action impact.



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## ADVISORY BOARD

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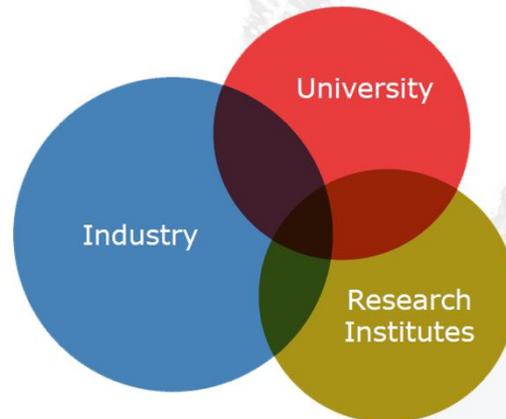
[ibk@cowi.dk](mailto:ibk@cowi.dk)

## SHORT SCIENTIFIC MISSION

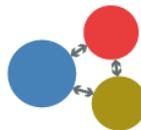
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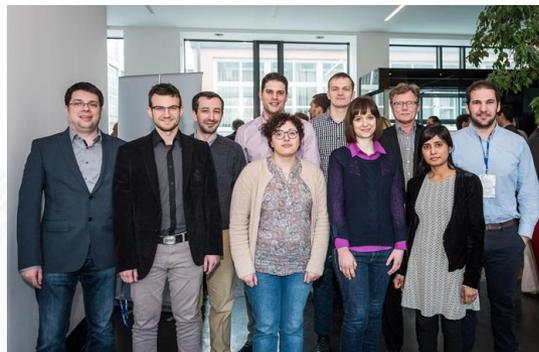
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**CROSS-OVER**



Conventional  
Collaboration



- Supporting mobility, strengthening networks and fostering collaborations
- Promote mobility
- To facilitate innovation
- To enable knowledge transfer / sharing and exploitation
- To facilitate the sharing of new techniques / data between partners.
- To promote networks that last overtime
- To increase the participation of SME's
- To demonstrate / increase the TRL of technologies and software (TRL 4 - 7).

## INTERNATIONAL OBSERVERS & EXPERTS

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- People that serve the COST Action with their expertise outside of COST countries

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- Journal and conference papers
- Reports
- Glossary
- Action documents
- Photo and videos

### Scientific papers



### COST Action Reports



### Glossary



### Pictures and Videos



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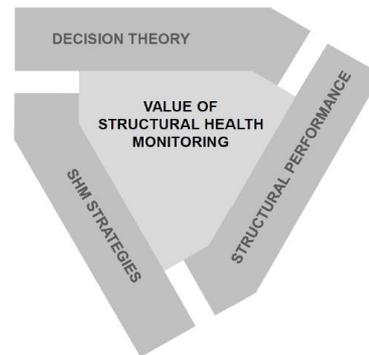
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## Workshop on Quantifying the Value of Structural Health Monitoring

Proceedings of the 1st Workshop, 04.-05.05.2015, DTU, Denmark

COST Action TU1402: Quantifying the Value of Structural Health Monitoring



Editor: Sebastian Thöns, September 2015

**cost**  
EUROPEAN COOPERATION  
IN SCIENCE AND TECHNOLOGY

ISBN: 978-8-77-877426-2  
DTU Civil Engineering Report: R-336

- Report of the [8. workshop of COST Action TU1402: Framework and Categorization for Value of Information Analysis.](#)
- Proceedings of the [7. joint workshop of COST TU 1402, COST TU 1406 and IABSE WC1.](#)
- Report of the [6. workshop, COST Action TU1402 Strategy: 2017 and 2018.](#)
- Proceedings of the [5. workshop](#) (login required).
- Proceedings of the [3. and 4. workshop](#) (login required).
- Proceedings of the [1. workshop](#). ISBN: 978-8-77-877426-2, DTU Civil Engineering Report: R-336.

## Glossary

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Download the glossary as [PDF file](#).

### A

**Acoustic emission:** **non-destructive** passive method of **monitoring** which makes use of the elastic energy released when a material undergoes a change at the atomic scale, such as plastic deformation or cracking. Piezoelectric sensors attached to the surface of the structure detect the surface waves caused by these events and produce a voltage output. Signals which reach any sensor with amplitude greater than a user defined **threshold** are recorded and subsequently stored on an AE acquisition system. [7]

**Adverse state:** State in which a **performance criterion** is not met.

**Asset management:** broadly defined, refers to any system that monitors and maintains things of value to an entity or group. It may apply to both tangible assets such as buildings and to intangible concepts such as intellectual property and goodwill. Asset management is a systematic process of operating, maintaining, upgrading, and disposing of assets cost-effectively. Alternative views of asset management in the engineering environment are: The practice of managing assets to achieve the greatest return (particularly useful for productive assets such as plant and equipment), and the process of **monitoring** and maintaining facilities systems, with the objective of providing the best possible service to users (appropriate for public infrastructure assets). [5]

**Availability:** The probability that a component or system is functioning at a time  $t$ .

### B

**Bayesian decision theory:** is based upon **Utility** theory [11] and is formulated in reference [8]. It represents a probabilistic framework to quantify the **utility** and decision attributes (such as costs, benefits, consequences for human safety). It is differentiated between a prior, posterior, pre-posterior and a Value of information analysis.

**Bayesian updating:** takes basis in the Bayes theorem.

**Benefit:** A benefit constitutes a decision attribute associated with a gain.

### C

**Capacity:** ability of a member or a component, or a cross-section of a structure to action without mechanical **failure** e.g. bending resistance, buckling resistance, available ductility. (IRIS-CEN modified).

**Condition assessment:** the process of reviewing information gathered about the current condition of structure or its components, its service environment and general circumstances, allowing a prognosis to be made of current and future performance, taking account of active deterioration processes and actual damage and, if appropriate, predictions of potential future deterioration processes and future damage.

**Condition monitoring:** **damage identification** in rotating and reciprocating machinery [3].

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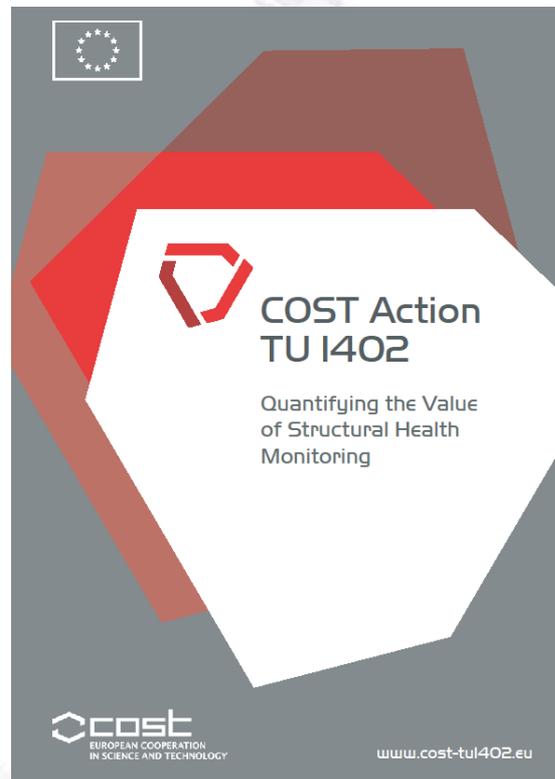
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## [Action Brochure](#)

### Action Working Documents

- COST Action TU1402 participant area for [collaboration and document exchange](#).
- Documents related to meetings can be found on the particular page of the [events](#).
- A list of participants with e-mail addresses can be found on the COST Action cloud drive [here](#). (Login required)

### General Action Documents

- COST TU1402 [Memorandum of Understanding](#)

PHOTOS & VIDEOS

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[And many more...](#)



Thank you for your attention

<http://www.cost-tu1402.eu/>

