TU1406: Quality Specifications for Roadway Bridges, Standardization at a European Level (BridgeSpec)

Start date: 16 April 2015

José Matos
TU1406 MC1, COST Office, Brussels, 16 April 2015
AGENDA

16/04/2015

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   – Grant Holder
   – Vice Chair
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1. Background

The OECD noted that by 2030 “… a larger effort will need to be directed towards maintenance and upgrading of existing infrastructures and to getting infrastructures to work more efficiently”

“… it is therefore extremely important for countries to prioritize their budget expenditures in this topic by improving the way infrastructures are being managed.”

[OECD, 2007]

Chart showing expected condition development without enhanced maintenance.
1. Background

Decay Process

Public Demands

Efficient Management

Limited Resources

Public Expectations
1. Background

- Visual Inspection
- Monitoring System
- Performance Indicator
- Performance Goal
- Quality Control Plan

NDT Testing

Performance Indicator

Quality Control Plan
1. Background

- Technical Indicators
- Environmental Indicators
- Others

<table>
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<th>Criteria</th>
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<tr>
<td>Component</td>
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<td>Structure</td>
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Life phases:
- Realization
- Utilization
- Life End

- Raw material acquisition
- Material acquisition and production
- Design Optimization
- Production
- Construction
- Operation
- Maintenance and repair
- Renovation and rebuilding
- Demounting and demolition
- Recycling

bridge network
1. Background

A Bridge Management System is used to store the quality control plans of the bridge network. Some systems also store the developed maintenance actions costs and effects. In order to predict the bridge performance with time, advanced models are used. An optimization algorithm may be used to find the best maintenance strategy. [Ministry of Ontario, 2014]
2. Reasons for the Action

- **Denmark** – DANBRO (DANish Bridges and Roads)
- **Finland** – FinnRABMS (Finnish National Roads Administration Bridge Management System)
- **Italy** – SAMOA (Surveillance, Auscultation and Maintenance of Structures)
- **Netherlands** – DISC
- **Sweden** – BMS
- **United Kingdom**
  - STEG (Structures REGister);
  - HiSMIS (Highway Structures Management Information System)
  - SMIS (Structures Management Information System)
  - BRIDGEMAN (BRIDGE MANagement system)
  - COSMOS (Computerized System for the Management Of Structures)
## 2. Reasons for the Action

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*Source: [Cost](https://cost.eu)*
2. Reasons for the Action

A similar problem was addressed in the past for pavements. It was solved through COST 354 – Performance Indicators for Road Pavements (http://cost354.zag.si/).

The main objective of the Action is the definition of an uniform European performance indicators for road pavements taking the needs of road users and road operators into account.
2. Reasons for the Action

There is a **REAL NEED** to standardize the quality assessment of roadway bridges at an European Level
3. General Information

Thank you and welcome aboard!

- The 28 EU Member States
- EU Candidate Countries
  - former Yugoslav Republic of Macedonia
  - Iceland
  - Republic of Serbia
  - Turkey
- Other Countries
  - Bosnia and Herzegovina
  - Norway
  - Switzerland
- COST Cooperating State
  - Israel
3. General Information

COST Policies

- Inclusiveness
- Early Stage Researchers (less than 8 years after PhD)
- Gender Balance
4. Election

Chair:
Jose Matos (PT)
COST Action TU 1406 Proposer

Jose Matos
Professor
Minho University, Portugal
jmatos@civil.uminho.pt
4. Election

Grant Holder:
Usually coincides with Chair Institution

Minho University (PT)

Scientific Representative:
Grant Holder MC member
Jose Matos
FSAC (common value) = 15% of Scientific Expenditure

170.000,00€ (overall budget) = 147.826,00€ + 22.174,00€

FSAC – Financial and Scientific Administration and Cooperation
(secretariat, non-eligible VAT, general expenses)

Use online COST Action management tool: e-COST
4. Election

Vice-Chair:
Joan Casas (SP)
COST Action TU 1406 Proponent

Joan Casas
Professor
Catalunya Technical University, Spain
joan.ramon.casas@upc.edu
## 5. Horizontal Roles

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
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</thead>
</table>
| WG1: Performance Indicators | Leader: Alfred Strauss (AT)  
Vice Leader: TBA         |
| WG2: Performance Goals    | Leader: Irina Stipanovic (NL)  
Vice Leader: TBA         |
| WG3: Quality Control Plan | Leader: Rade Hajdin (SB)  
Vice Leader: TBA         |
| WG4: Case Study           | Leader: TBA  
Vice Leader: TBA         |
| WG5: Standardization      | Leader: TBA  
Vice Leader: TBA         |
| WG6: Dissemination        | Leader: TBA  
Vice Leader: TBA         |

**COST Policies:** Inclusiveness, ESR, Gender Balance (+ Representability)
## 5. Horizontal Roles

<table>
<thead>
<tr>
<th>Position</th>
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<tr>
<td>General Secretariat</td>
<td>Eleni Chatzi (CH)</td>
</tr>
<tr>
<td>STSM</td>
<td>Leader: Jan Bien (PL) Vice Leader: TBA</td>
</tr>
<tr>
<td>Monitoring &amp; Evaluation</td>
<td>Leader: Raffaele Landolfo (IT) Vice Leader: TBA</td>
</tr>
<tr>
<td>Innovation</td>
<td>Leader: Andre Orcesi (FR) Vice Leader: TBA</td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td>Leader: Kenneth Gavin (IR) Vice Leader: TBA</td>
</tr>
<tr>
<td>Website Institution</td>
<td>Minho University</td>
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</tbody>
</table>

**COST Policies:** Inclusiveness, ESR, Gender Balance ( + Representability )
5. Horizontal Roles

Management Committee
Including:
- MC Chair
- MC Vice-Chair
- WG’s Leaders and Vice-Leaders
- General Secretariat
- STSM Leader and Vice-Leader
- M&E Leader and Vice-Leader
- Innovation Leader and Vice-Leader
- R&D Leader and Vice-Leader

Core Group
- MC Chair
- MC Vice-Chair
- WG’s Leaders
- General Secretariat
- STSM Leader
- M&E Leader
- Innovation Leader
- R&D Leader

Advisory Board
- Industry/Owners/Operators
- External Advisors (MC Observers)

MC Observers
- Dan Frangopol (USA)
- Mitsuyoshi Akiyama (JP)
- Colin Caprani (AUS)
- Matias Valenzuela (CHL)
- Hans Beushauser (ZA)

An MC Observer per Continent
5. Horizontal Roles

- Core Group Duties
  - Steer the COST Action on behalf of the MC
  - Manage matters of urgency sanctioned by the MC
  - Coordinate and manage COST Action day-to-day activities
  - Approve and select STSM candidates (strategic decision of the MC)
  - Allocate approved funds
  - Establish flat rates for lodging according to destination country
  - Organize matters in connection with forthcoming MC meetings

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*Please note that the diagram visually represents the core group's duties and roles within the COST Action framework.*

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*Source: EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY*
5. Horizontal Roles

STSM Duties

- Prepare and disseminate the assessment criteria
- Scientific Assessment of applications
- Circulate the applications to the assessment panel
- Inform the MC about decisions
- Manage formalities for the issue of the grant
- Elaborate internal STSM reports
5. Horizontal Roles

Monitoring & Evaluation Duties

- Monitor both implementation and coordination
- Propose urgent measures and a contingency plan, when needed
- Verify the level of achievement of objectives, milestones and deliverables
- Provide feedback and advice to the MC
- Consider/decide performance related measures
- Elaborate monitoring and evaluation internal reports
5. Horizontal Roles

**Innovation Duties**

- Gather information on innovative industry activities
- Evaluate potential use of innovative industry activities
- Establish contact with industry, owners and operators
- Provide feedback and advice to the MC
- Elaborate internal innovative reports
- Introduce novelties on developed tasks according to state of art
- Ensure information exchange
5. Horizontal Roles

Research & Development

Duties

- Ensure joint proposals for HORIZON 2020
- Liaison with national and international committees
- Liaison with national and international R&D rolling projects
- Identify potential applications for joint proposals
- Elaborate internal R&D reports
- Ensure national proposals
5. Horizontal Roles

Other Agreements

- E-voting (7 days, except Summer/Easter)
- Active scientific participation of MC members in WGs and workshops
- Time limit for accepting e-COST invitations (two weeks)
6. Expansion

COST Countries

- Action represented countries
- Missing Countries
  - Lithuania
  - Romania
  - Turkey
6. Expansion

Near Neighbour Countries

- Armenia
- Azerbaijan
- Belarus
- Belarus
- Montenegro
- Moldova
- Morocco
- Tunisia
- Algeria
- Lybia
- Egypt
- Jordan
- Lebanon
- Syrian
- Georgia
- Ukraine
- Russia

COST Countries

NN Countries
6. Expansion

International Partner Countries

- USA
- Japan
- Australia
- Chile
- South Africa

COST Countries

International Partner Countries (MC Observers)
7. Objectives and Benefits

Aim

The main objective of the Action is to

**develop a guideline for the establishment of QC plans in roadway bridges**

by integrating the most recent knowledge on performance assessment procedures with the adoption of specific goals. This guideline will focus on bridge maintenance and life-cycle performance at two levels: (i) performance indicators, (ii) performance goals.

- Developing a state-of-art report
- Creation of a database
- Incorporation of sustainable indicators
7. Objectives and Benefits

Objectives

(i) Systematize knowledge on QC plans for bridges, which will help to achieve a state-of-art report that includes performance indicators and respective goals;

(ii) Collect and contribute to up-to-date knowledge on performance indicators, including technical, environmental, economic and social indicators;

(iii) Establish a wide set of quality specifications through the definition of performance goals, aiming to assure an expected performance level;

(iv) Develop detailed examples for practicing engineers on the assessment of performance indicators as well as in the establishment of performance goals, to be integrated in the developed guideline;
7. Objectives and Benefits

Objectives

(v) Create a database from COST countries with performance indicator values and respective goals, that can be useful for future purposes;

(vi) Develop a webpage with information about the Action and its participants, as well as, video-streaming from presentations at training schools, workshops and conferences, e-lectures, written material (e.g. technical reports), etc.;

(vii) Support the development of technical/scientific committees;

(viii) Disseminate activities, such as Short-Term Scientific Missions (STSM), training schools and other teaching activities (e.g. e-lectures), for practicing engineers and researchers, regular workshops, a conference and special sessions at international conferences.
7. Objectives and Benefits

Impact

Economic and societal
- New jobs associated to new quality control services (equipment, software, consultancy, ...)
- Improved economic efficiency and, at same time, user satisfaction regarding the quality of the provided service

Environmental/Sustainability
- Improve ecological footprint of bridge structures (maintenance, life-cycle cost)
- Enhanced management of risks to individuals, environment and economy

Well-being of general public

On the research community
- Better perception of real practice problems through an improved cooperation between research community and practicing engineers (sustainability, life-cycle analysis)
- Improvement on research developments and practical procedures regarding bridge asset management in European countries
8. Work and Budget Plan

Deliverables

WG1: Performance indicators
- Report of Performance Indicators (incorporating new indicators)

WG2: Performance goals
- Report of Performance Goals (incorporating new indicators)

WG3: Establishment of a QC plan
- Recommendations for the Establishment of a QC plan (with detailed examples for practicing engineers)

WG4: Implementation in a Case Study
- Database from Benchmarking (from COST countries)

WG5: Drafting of guideline / recommendations
- Guideline for the Establishment of a QC plan
8. Work and Budget Plan

Scientific Program

WG5. Drafting of guidelines/recommendations

Existing documentation (format and content)

Document preparation

Easy to use document

WG4. Implementation in a case study

Benchmarking

Validation

Discussion

WG1. Performance indicators

Technical indicators

Environmental indicators

Others

WG2. Performance goals

Technical goals

Environmental goals

Others

WG3. Establishment of a QC plan

Bayesian nets

Procedure to develop a QC plan for a single bridge
8. Work and Budget Plan

Networking

- Performance Indicators
- Establishment of a QC plan
- Performance Goals
8. Work and Budget Plan

Group priorities

WG1. Performance indicators
   a) Technical indicators
   b) Environmental indicators
   c) Other indicators

WG2. Performance goals
   a) Technical goals
   b) Environmental goals
   c) Other goals

WG3. Establishment of a QC plan
   a) Survey of European roadway QC plans
   b) Procedures for the establishment of a QC plan

WG4. Implementation in a Case Study
   a) Selection of case studies
   b) Benchmarking
   c) Application of a QC plan

WG5. Drafting of guideline / recommendations
   a) Standardized performance indicators
   b) Standardized goals
   c) Standardized QC plan

WG6. Knowledge dissemination
8. Work and Budget Plan

Engagement strategy for WG members

- Online form calling for experts in view of the objectives of each WG (MC members should also fill the form)

- Discussion of the form among MC members until 30th April 2015 (WG leaders should send to General Secretariat a set of technical questions)

- MC Members disseminate nationwide (standard email to be approved until 30th April 2015)

- Dissemination starts on the 15th May 2015 (until 14th May 2016)

GOOGLE FORM
(coordination assured by the General Secretariat)
# 8. Work and Budget Plan

## General plan of the Action

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</table>

**General Principles:**

- MC and CG meetings will take place every 6 months (same or sequential days)
- One workshop per year (end of each year)
- One training school per year (end of each year except for the first)
- STSMs occur through the entire project
- WG meeting dates coincide with workshops and MC meetings (to reduce costs)
# 8. Work and Budget Plan

## General plan of the Action

<table>
<thead>
<tr>
<th>WG</th>
<th>Technical indicators</th>
<th>Environmental indicators</th>
<th>Other indicators</th>
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**NOTE:** The table above outlines the work and budget plan for the Action, detailing the technical, environmental, and other indicators, goals, and plans for each Working Group (WG) across the four years (Year 1 to Year 4). The symbols (x) indicate the planned progress for each quarter (Q1 to Q4).
# 8. Work and Budget Plan

## Milestones

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</table>

- **M1**: WG1 – Performance indicators
  Elaborate a report of performance indicators

- **M2**: WG2 – Performance goals
  Elaborate a report of performance goals

- **M3**: WG3 – Establishment of a QC plan
  Prepare recommendations for the establishment of Quality Control plan

- **M4**: WG4 – Implementation in a Case Study
  Prepare database from benchmarking

- **M5**: WG5 – Drafting of guideline/recommendations
  Prepare guideline/recommendations for the establishment of QC plan
# 8. Work and Budget Plan

## Milestones

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</table>

Month 1: All MC, CG and WG leaders assigned (also GP leaders)

Month 3: Initiate Website, Facebook, Youtube, Leaflet/Brochure

Month 12: At least 4 STSMs launched
- Database + Report (Performance Indicators, WG1)
- Workshop
8. Work and Budget Plan

Milestones

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</table>

M1 – Report on performance indicators
- General description
- Assessment methods (e.g. visual inspection, non-destructive tests, monitoring systems, etc.)
- Frequency of assessment
- Obtained values
- General recommendations
- Publication in refereed scientific journal papers (special issue) and in international conferences
- Workshop at the end of this task

M2 – Report on performance goals
- Description of technical, environmental, economic and social factors
- Goals computation methods
- Frequency assessment
- General recommendations
- Publication in refereed scientific journal papers (special issue) and in international conferences
- Workshop/Training School at the end of this task
M3 – Recommendations for the establishment of a QC plan
- Bayesian nets or other heuristic rules (used worldwide)
- Establishment of a procedure for the definition of QC plan for each individual bridge/component
- Publication in refereed scientific journal papers (special issue) and in international conferences
- Workshop/Training School at the end of year 3

M4 – Preparation of a database from benchmarking
- Obtained results will validate the outcomes of WG1, WG2 and WG3
- Publication in refereed scientific journal papers (special issue) and in international conferences
- Conference/Training School at the end of year 4

M5 – Guideline/recommendations
- Development of a new guideline for the establishment of QC plans
- Publication in refereed scientific journal papers (special issue) and in international conferences
- Conference/Training School at the end of this task
8. Work and Budget Plan

Dissemination activities (WG6)

• Website
• Web 2.0 (facebook, youtube)
• Leaflets/Brochure
• Poster/Roll-up
• Workshops/Conferences
• STSM (especially promoted to early-stage researchers)
• Dissemination meetings (e.g. conferences, etc.)
• Training schools
• Close interaction with TV channels, radio stations and online service news
• Journal special issues
• Peer-reviewed articles
• Reports issued by the Action
• E-book
• Guideline and link to standardization
8. Work and Budget Plan

Dissemination rules

• Dissemination strategies in conferences (e.g. COST and TU1406 logo)

• Acknowledgments in papers and reports

• Leaflet/Brochure dissemination within each member’s institution and in all activities in which the members are evolved

• Direct mention of COST involvement in each member’s website, together with links to the COST Action, etc.
### 8. Work and Budget Plan

Specific goals and actions for 1st grant period

<table>
<thead>
<tr>
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<th>Location</th>
<th>Date</th>
<th>LOS</th>
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<tbody>
<tr>
<td>1 Integrated MC + WG meeting IABSE15 - <a href="http://www.iabse.org/geneva2015">www.iabse.org/geneva2015</a></td>
<td>Geneve (CH)</td>
<td>21-22 Sep. 2015</td>
<td>Eleni Chatzi Niels Peter Hoj</td>
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<tr>
<td>2 MC + WG meeting + Workshop</td>
<td>Belgrade (SB)</td>
<td>21-23 Mar. 2016</td>
<td>Rade Hajdin Snezana Markovic</td>
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4 STSM’s should be started
# 8. Work and Budget Plan

## Budget for the 1st Grant Period

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<td>A – COST Networking Tools</td>
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<tr>
<td>A.1 – Meetings</td>
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<tr>
<td>A.2 – Training Schools</td>
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<td>A.3 – Short Term Scientific Missions (STSM)</td>
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<td>A.5 – OERSA</td>
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<td>B – Total Science Expenditure (sum A.1-A.5)</td>
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<tr>
<td>C – FSAC (máx. 15% of B)</td>
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<tr>
<td>D – Total Expenditure (B + C)</td>
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8. Work and Budget Plan

An outlook into upcoming years

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Special Session of COST TU 1406
(invitation to submit abstract – 15th May 2015 - and papers)
8. Work and Budget Plan

An outlook into upcoming years

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Special Session of COST TU 1406
(invitation to submit abstract – 1st June 2015 - and papers)
8. Work and Budget Plan

Scientific goals per WG

Three short presentations:

Alfred Strauss: WG1 – Performance indicators

Irina Stipanovic: WG2 – Performance goals

Rade Hajdin: WG3 – Establishment of a QC plan
9. Any Other Business
10. Closing

Acknowledgments
- COST TU 1406 proponents
- COST TU 1406 MC members
- COST Association

Thank you and see you in Geneve!
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F: +351 253 510 217
E: jmatos@civil.uminho.pt
www.cost.eu/COST_Actions/tud/Actions/TU1406

Brussels, 16.04.2015