



IM-SAFE^{.EU}

IM-SAFE (ref. 958171)

www.IM-safe-project.eu

<https://www.linkedin.com/company/im-safe-project/>

<https://cordis.europa.eu/project/id/958171>



Co-funded by the Horizon 2020
Framework Programme of the European Union

Workshop agenda

| | |
|-------|--|
| 09:00 | Welcome, round table introduction (with camera on) (Elena Scibilia, NTNU) |
| 09:10 | Brief introduction to the IM-SAFE (Diego Allaix, TNO) Brief introduction to WP1 “Trends, best practices and barriers” (Jochen Köhler, NTNU) |
| 09:30 | Overview of participating institutions and current status of maintenance proceedings -Institution overview (+ how many bridges/tunnels) -Current standards and procedures -Issues |
| 09:55 | Discussions/Break-out rooms (Inge Hoff, Jochen Köhler, Daniel Cantero, Diego Allaix) ✓ A bridge/tunnel case with ongoing deterioration is presented ✓ How would you approach this problem? ✓ What decisions do you have to make and what criteria do you use for choosing among different alternatives? ✓ What standards, guidelines and regulations are you following? ✓ How well are the standards, guidelines & other regulations applied? ✓ What type of support do you miss in standards and guidelines for maintenance? Summary of group work |
| 10:45 | PAUSE |
| 11:00 | Roundtable discussions on future needs and benefits of future European standard (Jochen Köhler, NTNU) |
| 11:45 | Follow-up on the engagement of CoP (Diego Allaix, TNO) |
| 11:55 | Closure (Elena Scibilia, NTNU) |

H2020 CSA IM-SAFE workshop hosts

**PEST BARRIERS &
NATIONAL
STAKEHOLDERS
ENGAGEMENT**



Dr. Elena Scibilia

**STANDARDISATION &
MANDATE FOR CEN**



Dr. Diego Lorenzo Allaix

**MONITORING &
SAFETY EVALUATION
CONCRETE BRIDGES**



Prof. Jochen Köhler

**LESSONS LEARNED FROM
PREVIOUS FAILURES
PEST BARRIERS**



Prof. Inge Hoff

**BRIDGE DYNAMICS,
MONITORING AND
BRIDGE WEIGH IN
MOTION**



Ass. prof. Daniel Cantero

**SAFETY ASSESSMENT
OF AGEING BRIDGES**



PhD student Frida Liljefors



Stakeholder engagement

Stakeholders engagement:

IM-SAFE project aim to:

- support the European Commission and the European Committee for Standardization (CEN) in preparing new standards in monitoring for optimal maintenance and safety of transport infrastructure.
- bring together, analyze and improve experiences and working methods from Europe and to create broad support for its use.

1. **Community of Practice (CoP)**, which consists of: representatives of national and regional authorities, public and private infrastructure asset owners and operators, construction and maintenance firms, design and engineering specialists, monitoring technology and ICT providers.

2. **Standardisation Advisory Group (SAG)**, which consists of: European and international representatives from national standardisation bodies, EU and international platforms or umbrella organisations, experts from research institutes and universities.

Importance of stakeholder engagement

1. Improvement of standards for monitoring of constructions
2. EU standards => to be implemented in EU countries
3. Common practise to be included
 - Country specific circumstances to be taken into account
 - Good practise exchange => best practise in standard
4. New developments / innovation to be included
 - Country specific innovation to be taken into account
 - Feasible standards for EU wide implementation

Benefit for stakeholders

Exchange of information (inter)nationally:

- Current practice and approaches,
- Experiments and pilots,
- Barriers for implementation

In order to:

- Improve service level
- Understanding needs of owners, operators, industry
- Start transition to new standards during creation

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Changes in the agenda

Introduction of the bridge and tunnel cases

Splitting in break-out rooms

Break (10 min)

Discussions in break-out rooms

Summary of group work

Round table discussions of future needs and benefits

Follow-up of the engagement of CoP

Closure



**H2020 CSA IM-SAFE
(Grant agreement ID: 958171)**

**Harmonised Transport Infrastructure
Monitoring in Europe
for Optimal Maintenance and Safety**

H2020 CSA IM-SAFE context



JRC SCIENCE FOR POLICY REPORT

Research and innovation in bridge maintenance, inspection and monitoring

A European perspective based on the Transport Research and Innovation Monitoring and Information System (TRIMIS)

Gkourmas, K., Marques Dos Santos, F.L., van Baten, M., Tsikalidis, A., Ortega Hortelano, A., Grosso, M., Hög, G., Pekár, F., 2019.



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Italy

EU rejects claim Genoa bridge collapse linked to its spending rules

European commission rebuffs minister's jibe, saying it has backed infrastructure outlay

Jennifer Rankin in Brussels
Thu 16 Aug 2018 12:07 BST

194

This article is more than 1 year old

▲ The collapsed Morandi Bridge in the port city of Genoa. Photograph: Stefano Rellandini/Reuters

Brussels has dismissed claims by Italy's populist government that spending rules prevented the country from spending enough to keep infrastructure safe, two days after a devastating bridge collapse killed 39 people in Genoa.

Italy's far-right interior minister, **Matteo Salvini**, who is also a deputy minister, has firmly pointed the finger at Brussels over the disaster, wider attention turned towards the company responsible for the bridge.

"Spending that saves lives, jobs and the right to health must not be based on rigid calculations and of rules imposed by Europe," he said on Wednesday. On Thursday I will ask the government to pay for the bridge's reconstruction with public money.

Home / World News /

One year after Genoa tragedy: Are Europe's bridges any safer?

14 Aug, 2019 12:08 / Updated 3 months ago

[Get short URL](#)



Morandi bridge, Genoa © Reuters / Stefano Rellandini

EU COMMISSION ISSUES STUDY ON BRIDGE MAINTENANCE, INSPECTION AND MONITORING

Feb 26, 2019 | Policy News



Europe's aging transport infrastructure needs effective and proactive maintenance in order to continue its safe operation during the entire life cycle. This report focuses on research and innovation (RI&I) in bridge maintenance, inspection and monitoring in Europe in the last quarter of a century. The assessment follows the methodology developed by the European Commission's Transport Research and Information Monitoring and Information System (TRIMIS). The report critically addresses issues and techniques, and also highlights new technological developments and future oriented approaches.

THE IRISH TIMES

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GENOA BRIDGE COLLAPSE / ANALYSIS
ATTEMPT TO LINK THE DISASTER TO EU BUDGET RULES

Genoa bridge collapse: Is the EU to blame for Italy's infrastructure problems?

FROM BOMBING, GENOA

The European Commission has rejected Italian claims that spending constraints imposed from Brussels played a part in the collapse of the Genoa road bridge.

Matteo Salvini, Italy's deputy prime minister, has claimed that EU pressure to cap government budgets has prevented vital infrastructure improvements. His attempt to link the deaths in Genoa to EU budget rules follows months of attacks on Brussels by his party, the League, which has formed Italy's first populist administration in alliance with the anti-establishment Five Star movement.

H2020 CSA IM-SAFE context

Safety risks have become critical in the recent years and manifested in major disasters caused a.o. by structural failures due to maintenance deficiencies.

Optimal maintenance is only possible with the right policies and decisions enabled by **timely and accurate information from monitoring.**

Standardisation in monitoring is a key enabler for optimal maintenance strategies, strengthening or retrofitting measures to be applied for ensuring the **safety of the infrastructure.**

UNITE ITALIANO DI NORMAZIONE

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Home > Catalog > Standards Catalog > ICS > 91 > 91.010 > **UNI/TR 11634:2016**

NOVITA' Occhio alle norme...anche in preview! Cerca la norma, vai nella scheda bibliografica e clicca su per

UNI Standard

Standard Number: UNI/TR 11634:2016
Title: Guidelines for structural health monitoring
ICS: [91.010]
Status: CURRENT
Technical Committees: [Structural engineering]
Start Validity Date: april 28, 2016
End Validity Date:
Summary: The scope of this Technical Report is to define guidelines for the structural health monitoring, identifying the design criteria for structural health monitoring systems, the methods for identification of the state of the structures, on the basis of classes and structural codification for which it is recommended the use of structural health monitoring. This document identifies characteristics and requirements of logical components of the system and methods for data acquisition and data analysis, in addition to methods for identifying damages and materials degradation.

FSV Die FSV Publikationen Veranstaltungen Zulassungen Zertifizierung

RVS Richtlinien & Merkblätter

13 Qualitätsicherung basistischer Erhaltung

13.03 Überwachung, Kontrolle und Prüfung von Kunstbauten

RVS 13.03.01 Monitoring von Brücken und anderen Ingenieurbauwerken
Februar 2012

Beschreibung: Diese Richtlinie ist für das Monitoring von Brücken und anderen Ingenieurbauwerken anzuwenden und richtet sich sowohl an die Erhaltungsausschüsse und Bauherren als auch an die Anbieter von Monitoringssystemen.

Sie beschreiben die Grundlagen für folgende Problemfelder:

- Klassifizierung der Brücken und Bewertung des aktuellen Zustands
- Beurteilung von Tragfähigkeit, Gebrauchstauglichkeit und Dauerhaftigkeit (z.B. in Bezug auf Ermüdung)
- Erstellung von Berichten
- Dringlichkeit der Einleitung von Instandsetzungsmaßnahmen
- Beurteilung von Lebenszykluskosten

Inhaltangabe:

1. Anwendungsbereich
2. Begriffsbestimmungen
3. Allgemeines
4. Ziele und Verfahrensaufbau
5. Konfiguration einer Monitoringanlage (Managementsystem)
6. Messgrößen
7. Aufgabenstellungen und Beispiele
8. Qualifikation des Monitoringpersonals
9. Aufbau: Engineering des Monitorings in das Lebenszyklusmanagement
10. Angeführte Normen und Literatur
11. Zusätzlich zu beachtende Normen und Literatur

Seiten: 20

Ausgabedatum: 1. Februar 2012

Verfasser: Von IM-VIT zur Anwendung empfohlener

Arbeitsausschuss: B017 Überwachung, Kontrolle und Prüfung von Brücken und anderen Ingenieurbauwerken

SAMCO SAMCO Final Report 2006
F08a Guideline for the Assessment of Existing Structures

F08a
Guideline for the Assessment of Existing Structures

Dir. u. Prof. Dr. W. Rücker, Dipl.-Ing. F. Hüh, Dipl.-Ing. R. Rohmann
Federal Institute of Materials Research and Testing (BAM),
Division VII.2 Buildings and Structures
Unter den Eichen 87, 12205 Berlin, Germany

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GB 50982-2014
Translated English of Chinese Standard: GB50982-2014
www.ChineseStandard.net
Sales@ChineseStandard.net

UDC

GB

NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

P **GB 50982-2014**

Technical code for monitoring
of building and bridge structures
建筑与桥梁结构监测技术规范

Issued on: October 09, 2014 Implemented on: August 01, 2015
Issued by: Ministry of Housing and Urban-Rural Development of PRC;
General Administration of Quality Supervision, Inspection
and Quarantine of the People's Republic of China.

www.ChineseStandard.net Page 1 of 64

GB 50982-2014

Foreword

In accordance with the requirements of the Announcement of Ministry of Housing and Urban-Rural Development on the Printing and Issuing of the 2011 Engineering Construction Standard and the Amendment Plan (JGJ88-2011) [2011] No. 17), the code compilation group compiled this code after making extensive investigation, carefully summarizing the practical experience, making reference to the relevant international standards and advanced foreign standards, AND collecting extensive comments.

The main technical contents of word specification are: 1. General Provisions; 2. Terms and Symbols; 3. Basic Requirements; 4. Monitoring Methods; 5. Highway Building and Structure; 6. Long-span Spatial Structures; 7. Bridge Structures; and 8. Other structures.

The provisions of in this code which are marked in bold are mandatory provisions AND must be strictly implemented.

As for this Code, the Ministry of Housing and Urban-Rural Development is responsible for the interpretation of the mandatory provisions, AND the China Academy of Building Research is responsible for the interpretation of specific technical contents. Any comments or recommendations in the implementation of this standard please send to the China Academy of Building Research (Address: No.30 Beisuanhuan East Road, Beijing 100013, China).

The main drafting organizations of this code:

China Academy of Building Research
Hainan Construction Engineering Co., Ltd.
The participating drafting organizations of this code:
Chongqing University
Beijing Industry University
Tonghua University
Beijing Institute of Architectural Design Co., Ltd.
Anup Engineering Consulting (Shanghai) Co., Ltd.
CCCC Highway Planning and Design Institute Co., Ltd.
Yunnan Earthquake Engineering Research Institute

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H2020 CSA IM-SAFE scope

- IM-SAFE covers **bridges, tunnels and other large infrastructures on the road and railway networks.**

H2020 CSA IM-SAFE aim

- **To support the European Commission and the European Committee for Standardization (CEN) in preparing new standards in monitoring for optimal maintenance and safety of transport infrastructure based on a comprehensive insight into :**
 - trends & challenges,
 - PEST barriers,
 - best practices,
 - technology & knowledge developments
- **To achieve broad acceptance for new standardization**
- **To enable public authorities and industries to contribute to standardization, roll-out, and implementation**

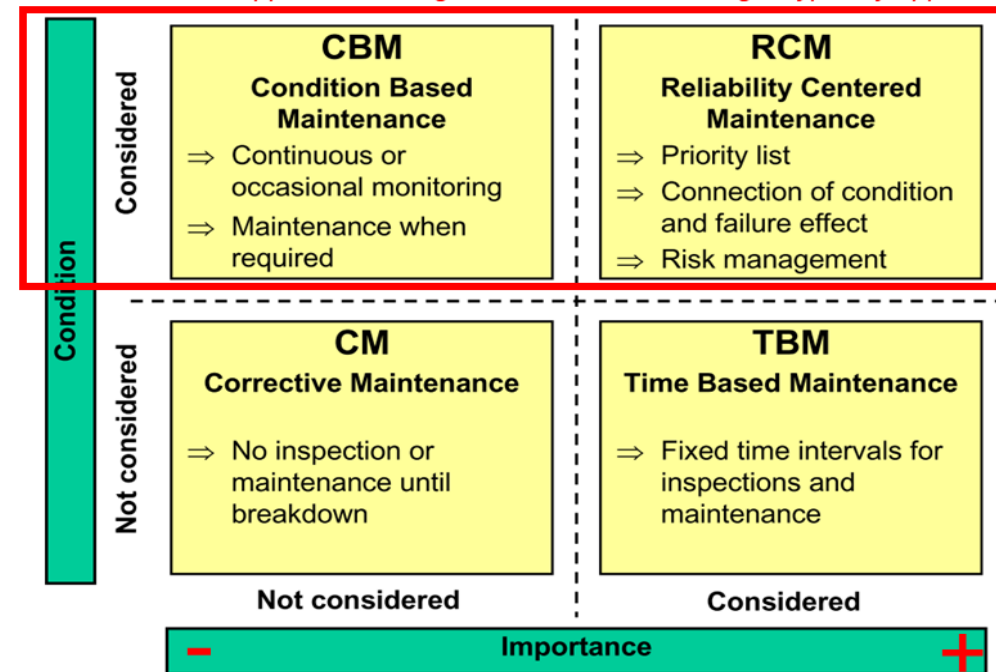
H2020 CSA IM-SAFE objectives

- › To enable transition from corrective and time-based maintenance approaches **towards the condition-based and risk-based approaches**



- › To standardize **principles & requirements** for:
 - **structural monitoring**
 - **safety assessment taking into account inspections, monitoring and testing**
 - **data-informed decision-making in condition-based and risk-based maintenance**
- ❖ To benefit from digital transformation

Context in which application of digital twins and monitoring is typically applied



H2020 CSA IM-SAFE results

- **Input for mandate for CEN incl.:**
 - **further amendment to the existing EU standards** on safety assessment taking into account inspections, monitoring and testing
 - **new standard on structural monitoring**
 - **new standard for condition-based and risk-based maintenance of transport infrastructures**
- **Background for provisions :**
 - review of national guidelines and standards in all EU and international research activities related to monitoring, data-informed safety assessment and condition- and risk-based maintenance
 - evaluation of the PEST barriers & state-of-practice in inspection, monitoring, testing, diagnostics, data-informed safety assessment, risk management and decision-making with regard to maintenance
 - evaluation of the needs of standardization for enabling digital solutions for monitoring and data analytics
 - technical background to the mandate
- Plan of **approach for the execution** of the mandate by CEN



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Overview of
participating
institutions and
current status
of maintenance
proceedings

Norway

- Statens Vegvesen
- BaneNOR
- Trøndelag County Council
- Nordland County Council
- Innlandet County Council

Finland

- Finish Transport Infrastructure Agency

Sweden

- Trafikverket

Denmark

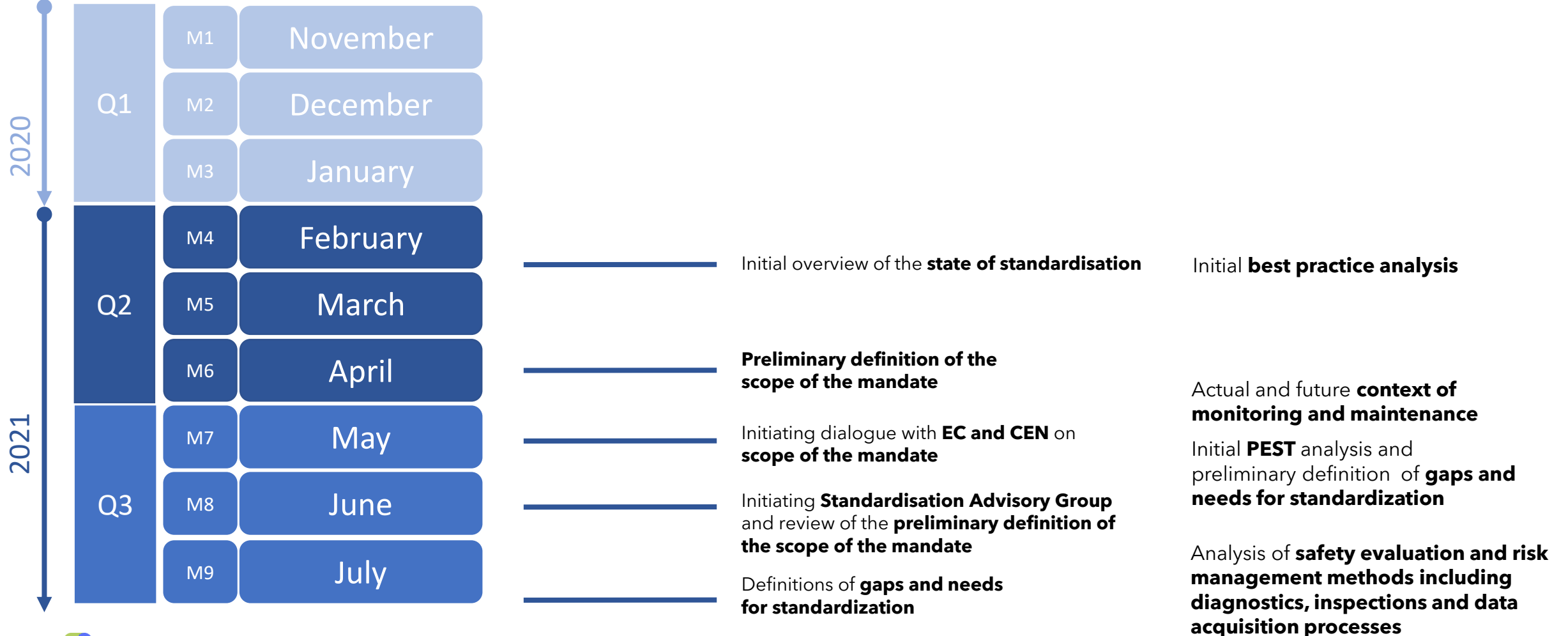
- The Danish Road Directorate



Follow-up activities IM-SAFE CoP

H2020 CSA IM-SAFE CoP

Timeline of project activities



2021

2022

| | | |
|----|-----|-----------|
| Q4 | M10 | August |
| | M11 | September |
| | M12 | October |
| Q5 | M13 | November |
| | M14 | December |
| | M15 | January |
| Q6 | M16 | February |
| | M17 | March |
| | M18 | April |
| Q7 | M19 | May |
| | M20 | June |
| | M21 | July |

Final definition of the **scope of the mandate**

Final overview of the **state of standardization**

Completion of the **first draft input for the mandate**

Review of the **first draft input for the mandate** by **Standardisation Advisory Group**

Discussion of **first draft input for the mandate** with **EC and CEN**

First draft of **technical background material**

2nd review of the **draft input for mandate** by **Standardisation Advisory Group**

Complete draft input for the mandate

Review of the **complete draft input for the mandate** by **Standardisation Advisory Group**

Review of **surveying technologies and diagnostics of structures**

Recommendations to remove the **PEST** barriers

Online **catalogue of best practices** in EU

Guidelines for **data acquisition, processing, and quality assurance**

Review of **AI and Big data analytics**

Analysis of the **minimum maintenance level** and **Condition State Classification** in EU countries

Update of the review of **safety evaluation and risk management methods including diagnostics, inspections and data acquisition processes**

Update of the review of **methodologies and instruments for diagnostics of transport infrastructure**

Online **catalogue of surveying technologies and maintenance methods** in EU

2022

2023

| | | |
|-----|-----|-----------|
| Q8 | M22 | August |
| | M23 | September |
| | M24 | October |
| Q9 | M25 | November |
| | M26 | December |
| | M27 | January |
| Q10 | M28 | February |
| | M29 | March |
| | M30 | April |

Discussion of **complete draft input for the mandate** with **EC and CEN**

2nd review of the **complete draft input for the mandate** by **Standardisation Advisory Group**

Final draft input for mandate and **draft PoA**

Review of the **Final draft input for mandate** and **draft PoA** by **Standardisation Advisory Group**

Guidelines for **adoption plan of new standards**, change management and pilot project setup

Action plan and recommendations for **complementary standardisation in digitalisation**

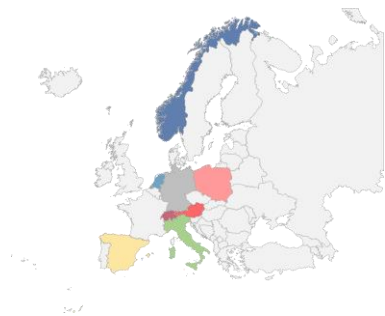
Submission of **final input for mandate** and **PoA**

Final draft of technical background material (new standard on structural monitoring)

Final draft of technical background material (new standard on maintenance and amendment to Eurocodes)

Review of the **final drafts of technical background material** by **Standardisation Advisory Group**

Submission of the **final technical background material**



30.03 – 20.04: CoP meetings in EU countries

20.04 – 20.05: IM-SAFE dialogues with EC en CEN

25.05 – 10.06: IM-SAFE CoP Forum

1.06 – 30.06: IM-SAFE SAG

1.07 – 1.09: National CoP meetings

- Scope of the mandate for CEN





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