This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under Grant Agreement no. 608813

Note on the D1.3 Proceedings of the workshop "Expression of the needs to improve aging management"

Costumer:	European Commission		
Project title:	SafeLife-X Safe Life Extension management of aged infrastructures networks and industrial plants	**Costumer order Nr.:**	Grant Agreement: 608813
		Internal project Nr.:	12049
		Project start:	01/09/2013
		Project end:	31/08/2015
Subproject:		**Applicable codes/standards:**	
Workpackage:	WP1	**Date of order acceptance:**	28/06/2013
Task:	T1.3	**Date of completion:**	
Additional contract info:	Project website: www.safelife-x.eu-vri.eu		
Participants / Distribution:	**Participants in the activity:**	**Distribution (list):**	

Document data:	**Author(s):**	Bastien Caillard, Aleksandar Jovanovic		
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	Status:	Final	**Confidentiality:**	CO
	Keywords:			

Stuttgart, March 6, 2014

1 Proceedings of the workshop

One of the three tangible outcomes of the SafeLife-X project is the proceedings of the thematic workshops organized during the project.

The first workshop **"Expression of the needs to improve aging management"** hosted by EnBW took place on January 9, 2014, in Stuttgart (Germany). It has been jointly organized with the kick-off meeting of the RBIF project (Risk-Based Inspection Framework, FprEN 16286-1:2012 (E). The RBIF project is developed within the CEN Technical Committee (TC) 319 dedicated to maintenance under a special working group dedicated to RBI (WG12).

EU-VRi, in collaboration with its partner WECONEXT, has made chaptered videos of the workshop. These chaptered videos have been put publicly online on the SafeLife-X website (www.safelife-x.eu-vri.eu) and the members of the SafeLife-X platform have been informed via a newsletter.

21 experts in various fields and from different countries attended this event.

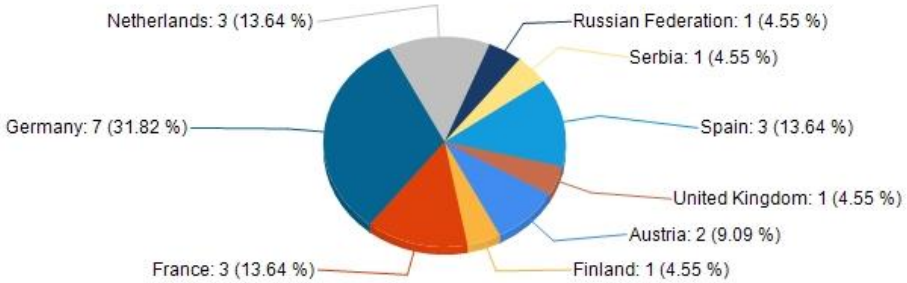


Figure 1: Participants chart

Annex 1 Minutes of the workshop

MINUTES OF THE MEETING

Meeting:	Workshop "Identification of the needs"	**Date:**	09/01/2014
		Start:	14:00
		End:	18:00
Venue:	EnBW Kraftwerke AG Schelmenwasenstr. 15 70567 Stuttgart, Germany		
Meeting Objective(s):	To collect feedback from the experts and to agree on a shared vision on the needs that will structure the other workpackages.		
Project:	SafeLife-X	**Client's Proj. No.**	FP7-NMP-2013-CSA-7-608813
		Internal Proj. No.	12049

Participants / Distribution:	**Participants:**	**Distribution:**
	See Annex 1: List of participants	Participants
	Apologies:	

Document data:	**Author(s):**	B. Caillard & A. Jovanovic with contributions from the particpants				
	Approved by:					
	Pages:	43	**Version:**	0.1	**Date:**	January 31, 2014
	Doc. Nr.:	SafeLife-X_WS01-MoM_v04bc11022014				
	Annexes:	Annex 1: List of Participants Annex 2: Extended Agenda Annex 3: Overview of the SafeLife-X project Annex 4: Overview of the RBIF project Annex 5: Survey results Annex 6: Paper board		**Status:**	Final	

Agenda items as discussed (short form, extended version in Annex 2:):

1. Summary of the RBIF Kick-off meeting
2. Welcome
3. Overview of SafeLife-X
4. Overview of the RBIF project
5. Survey results
6. Partners'point of view on the needs
7. Reports of the groups
8. Wrap-up and conclusion: preliminary consolidated list of needs

Results

1. Summary of the RBIF Kick-off meeting

The partners from the SafeLife-X project have been invited to join the Kick-Off Meeting of RBIF (further information on this project in the point 4 of the minutes).

Frode Wiggen (DNV), presented an historic perspective of RBI Development and Arthur Carlebur (NEN), provided a short description of the Risk Based Inspection Framework project. The consortium of partners supporting the initiative was formed in September 2012. In September 2013, the proposal for a European Normalization for the development of the Risk Based Inspection Framework (RBIF) has been approved within the CEN Technical Committee (TC) 319 dedicated to maintenance.

Aleksandar Jovanovic explained to the RBIF members the possible synergies that RBIF and SafeLife-X could have. All the participants supported the proposal of collaboration.

2. Welcome

Aleksandar Jovanovic welcomed the participants and reminded that the objectives of the workshop are to collect feedback from the experts and to agree on a shared vision on the needs that will structure the other workpackages.

He explained that this workshop has been jointly organized with the kick-off meeting of RBIF with which there are possible synergies.

He explained that the meeting will be recorded by WECONEXT that will create chaptered videos of the meeting in order to disseminate more broadly the results and the knowledge.

Aleksandar Jovanovic then reminded that this core group has to work with an extended group (3rd circle) and that we have to improve the communication so that we can hear their inputs and concerns.

He concluded by thanking EnBW for hosting the meetings in their premises and invited the participants to review the agenda.

3. Overview of SafeLife-X

Bastien Caillard gave a brief overview of the project (see in Annex 3) mainly for the IAB members as well as for the RBIF partners that were able to attend the workshop.
He also explained that 3 deliverables are late, with no critical impact on the project progress:

- D7.1 First list of 2nd and 3rd circles Members, ToR and report of the first meeting (after the KOM)
- D7.2 Report on Communication plan and strategy and implementation with the project Website and leaflets
- D8.1 Meeting planning over the 12 Months of the project

These three deliverables will be submitted by the end of January at the latest.

Aleksandar Jovanovic added that SafeLife-X is a CSA (Coordination and Support Action) and CSA requires strong involvement and pro-activeness.

Decision 1: EU-VRi will submit the D7.1, D7.2 and D8.1 by the mid of February.

4. Overview of the RBIF project

Flor Angela Quintero presented the RBIF project (see in Annex 4).

Summary of the project:
Risk Based Inspection (RBI) for the in-service activities are still not yet harmonized through the EU. International standards for RBI such as API 580/581 are available, however, it is difficult for the European Industries to refer to international standards since they do not have legal standing and they do not address European relates issues. The project proposal for the development of the European Standard RBIF (Risk Based Inspection Framework) supported by ~27 European companies has been accepted in September 2013. The RBIF project will be developed within the CEN Technical Committee (TC) 319 dedicated to maintenance, and with NEN (Dutch Standard Body) holding the secretariat.

The future development of the European Standard is based on the frame of the CWA (CEN Workshop Agreement) 15740:2008 document, which specifies the essential elements for risk

based assessment of industrial assets according to the RIMAP (Risk-based Inspection and Maintenance Procedures for European Industry) approach. The main purpose of the RIMAP approach enhanced by the current RBIF project, is to ensure that defined and accepted levels of risk related to safety, health, environment and business/production/operation are achieved by using resource-efficient and risk-based (risk-informed) methods of inspection. Standardization of Risk-Based Inspection Procedures concern the following aspects:

- Inspection and its link to maintenance, asset and life management for plants, systems and components;
- Pressure containing equipment and when applicable other types of equipment such as e.g. rotating, electrical, instruments and safety devices;
- Technical and managerial aspects of inspection planning and their application onto overall production and operation;

The RBIF Standard will be primarily, but not exclusively, applicable to oil &gas, petrochemical, chemical, power, and steel industry, but it will be, however limited to non-nuclear applications. The future RBIF Standard will not only help customers on the market to find more "standardized" approaches for decision making but also it will show a more detailed analysis path, compared to other more global solutions.

Alexey Berkovsky was wondering if the CWA and/or the standard will be made available. Aleksandar Jovanovic answered that there are several ways to get into the RBIF activities and drawn a sketch. He explained that there are two options to access to the RBiF activities. Either you go to your national mirror group (official) and you have the voting rights or you become a member of the 3rd circle of SafeLife-X so that you can go to the RBiF meetings as an observer.

Arthur Carlebur added that the access to the meetings of RBiF as an observer through the 3rd circle of SafeLife-X should be an exception.

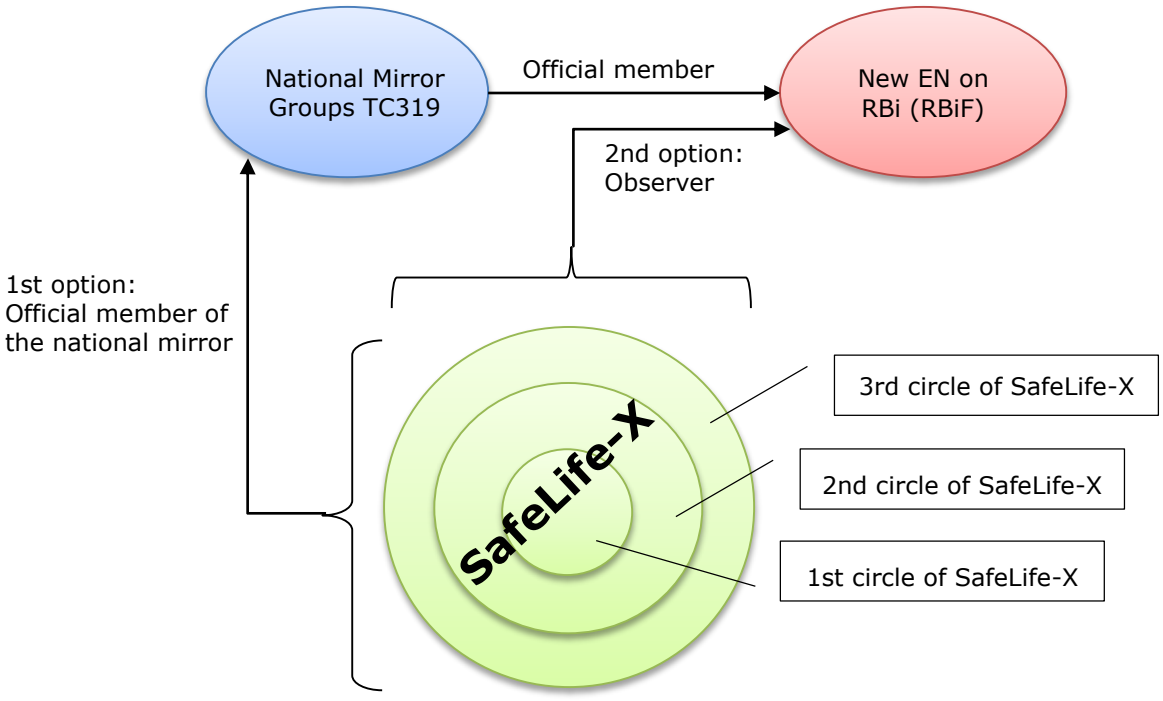


Figure 1: How SafeLife-X can participate in RBiF

1st circle:

Consortium of the project.

2nd Circle:

To ensure that the results gained thanks to the SafeLife-X project become validated and implemented by industry and the authorities, it was decided to create an International Advisory Board (IAB). The IAB with the participation of 25 well known experts, representing various industry sectors from various countries, and various associations and authorities, is an extension of the consortium in terms of skills and geographic distribution.

The IAB shall make a critical review of all project development phases, comment and advise the Steering Committee on the applicability and usefulness of the results achieved within the project. Its main purpose is to include the views and concerns of the experts and decision-makers.

3rd circle:

The 3rd Circle experts will have access to the results and will be consulted during survey and invited for technical workshops. It will help to find a consensus among the community that will be built thanks to this group of experts and it will accelerate the dissemination of the results

Jorg Bareiss, the host of the event, gave a short presentation on the EnBW activities.

5. Survey results

Aleksandar Jovanovic described the results of the survey received so far (see the results in Annex 5). He said that all the countries are well represented and explained that the comments made by the answerers are more valuable than the values themselves. He concluded that we need to get more answers.

To do so he suggested to send the link to all the members of ECTP/reFINE and to encourage them to make comments. Other possible networks will be also used (Mark de Bel, Ton Peters, Anne-Laure Popelin, Rob Schoenmaker, Maria Zalbide, Gaetan Prod'Homme are willing to disseminate the invitation to their networks).

Aleksandar Jovanovic invited the participants to use also the social networks such as Linkedin.

Ton Peters suggested to organize deep interviews of stakeholders of each groups (see point 7).
All the participants agreed and several committed to take care of these interviews for their fields of expertise (Pertti Auerkari, Anne-Laure Popelin, Gaetan Prod'Homme and Sergio Velez)

Aleksandar Jovanovic thanked them for their proposal.

Decision 2: We have to get more answers.

Decision 3: We will organize deep interview of stakeholders.

Action 1: EU-VRi has to ask ECTP/reFINE members to fill in the survey and to encourage them use the "comment" fields by mid of February.

Action 2: All partners are welcome to forward the invitation to his/her network by mid of February.

Action 3: Pertti Auerkari, Anne-Laure Popelin, Gaetan Prod'Homme and Sergio Velez will take care of the interviews for their fields of expertise.

6. Partners'point of view on the needs

Aleksandar Jovanovic explained how this part of the workshop is organized. First four thematic groups have been constituted and have worked separately during ca. 1h30 to identify their TOP 5 needs.

7. Reports of the groups

Then each group presented their conclusion.

- **Energy / Power plants including renewables**

Life(time) extension
For example, the rules and practices are not always clear for recalculating margins or safety factors to deal with uncertainties in loads that aging structures are subjected to . Similarly, significant uncertainties appear in the response to these loads by aging structures, and in the predicted life, when aiming for life extension.

Change of operational mode
For example, the increasing share of unrestricted wind and solar power tends to make the overall electricity supply more fluctuating and increases the fatigue type loading to the rest of the plants in the system, if not fully balanced by e.g. fast responding hydro capacity and spinning reserves. This results in increasing fatigue-related aging in thermal plants, and can also make the previous inspection data and experience (e.g. for RBI) largely redundant.

Dealing with fatigue and creep (more than one mechanisms), and predicting aging for new structures
In general, prediction of aging under the action of single damage (and failure) mechanism is better accommodated in the existing methods, guidelines and standards than with combined action of two or more mechanisms, and this can greatly add to the overall uncertainty of the prediction. The challenge is exacerbated by lacking data from real operation/inspections for new processes/structures/materials at the stage of design and also later until such information has been accumulated.

Improved methods for inspections and monitoring of critical structures/locations
For example, challenges appear for NDT in offshore windmills to inspect deep subsea structures covered with biomass crust and no inspection access from inside. More generally, there is a challenge to link inspection and monitoring data to the governing damage and failure mechanisms for critical structures and locations. Improved (health) monitoring methods and sensors are also needed for critical components that operate under severe environments.

- **Civil structures (bridges, ports…)**

Improve methodologies for assessing the remaining loading capacities of structures and lifetime prediction

Infrastructures are aging; the effective remaining loading capacity is unknown and there are not satisfactory methodologies that allow to assess it. The need to investigate in that direction is considered as primary in this sector. Assessing the remaining loading capabilities will also enable an accurate lifetime prediction.

Methodologies for assessing aging of structure (monitoring tools and guidelines)

Innovative monitoring tools (as early warning monitoring systems, new smart sensing and communication technologies, data collection, processing and aggregation systems) must be developed. Guidelines that, in accordance with the standards, define what are the procedures for assessing the ageing of structures must be defined. The idea is to produce a flow diagram that defines the actions to be taken accordingly to structure performances and deficiencies.

Risk framework to assess structural performances

Ageing of an infrastructure can cause relevant economic (and not only) consequences. This threat must be addressed in a global scale by formulating a complete risk framework.

Innovative and low cost solutions to extend lifetime of structures and related monitoring

Due to cuts on funding, the aging problem must be addressed with innovative and low cost solutions capable to extend the lifetime of the aged structures. Since these solutions are new, their performances must be monitored in order to fully define their behaviour.

"Pattern-type" assessing of structures

Many structures have common characteristics and due to that it is reasonable to assume that they behave similarly. For this reason, the feasibility to define "pattern-type" behaviour must be evaluated. This would allow simplifying monitoring procedures for all the structures that belong to a common "pattern-type"

"Intelligent" design of new structures taking into account future ageing

Ageing occurs to any type of structures and requires upgrade of the structure by means of retrofitting techniques. New structures should be designed in a way to efficiently allow retrofitting that at some point will be necessary due to structural ageing.

- **Chemical/process plants**

Minimal data needed
How to get a reliable, usable and minimal set of data ? Important cost for collecting data : can we reduce information and be reliable ?

Probability of failure developed by causes
not only by equipment…

Combination of failure modes
How to integrate multiples damage mechanisms?

Data sharing
decision methods... ?

Avoid double work done by full integration of ageing management in safety management.

Common risk assessment

Ageing of new structure

- **Networks and horizontal issues (economics, costs, decision making and management, resilience, standardization…)**

Integrated approach

Data/info/systems: €, design, operation, maintenance…

Indicators and benchmarking

Unclear ownership

Who owns risks, profits, benefits, savings… who is motivated?

Broader view on assets

PAS 55 and ISO 55000; aging just one of the factors, aged plants just as "special case" of optimized (4)

"Bucket principle"

Should vs. Can

8. Wrap-up and conclusion: preliminary consolidated list of needs

Aleksandar Jovanovic suggested to go through all the "TOP 5" and see which ones are similar and can be merged before proceeding to a vote.

A round of free discussions on the needs took place between the participants before the vote in order to better understand each of them.

Results of the votes:

1/ Combination of failure modes

2/ Innovative and low cost solutions to extend lifetime of structures and related monitoring

3/"Intelligent" design of new structures taking into account future ageing

4/ Improved methods for inspections and monitoring of critical structures/locations

5/ Several items with the same number of votes:

- Improve methodologies for assessing the remaining loading capacities of structures and lifetime prediction
- Change of operational mode
- Life(time) extension

Decision 4: The needs identified as the "TOP 5" will be added to the survey for the 2nd round

Participants have been invited to make a last comments to conclude the workshop:

- Aleksandar Jovanovic reminder that sharing/communication is really important in CSA, we don't provide solution but support.
  He said that the creation of the "aging community" is very important and that EU-VRi will try to collect as much as possible the profile of the members.
- Ton Peters and Mark de Bel reminded that it will be important to make the interviews of the stakeholders.
- Anne Bosi said that we should push in the direction of the risk assessment of a major event that may affect the aging of the infrastructure.
- Maria Zalbide said that uncertainty and costs are in most of the needs identified. Then we should give more importance to the economical aspects.
- Leire Garmendia said that we should include risk analysis and risk assessment.
- Gaetan Prod'homme said that there are many interesting subjects. Then we have to keep in mind that the project aims at sharing between industries. We have to focus on subject where we will be able to share.
- Mathieu Reimeringer suggested to check the possible synergies.
- Anne-Laure Popelin said that the discussions were really interesting but agreed that the nuclear industry is apart. Indeed she doesn't recognize the nuclear industries in the needs or in the wording.
- Sergio Velez reminded that aging is a process and he said that we should wonder if there is any other factor that affect this process.

- Alexey Berkovsky agreed that we have formulated some true needs but generic. Indeed everyone is facing specific problems. Then we should find the good balance between "generic" and "specific".
- Emeric Svetozar explained that all companies have the same problems but they don't share the solution. USA has developed a common database. Then we should define what data we need and see how to create it as well as how to use it correctly.
- Rob Schoenmaker suggested to further explain the needs so that we can take a better decision.
- Jorg Bareiss agreed and said that he is not sure that everyone has the same understanding of the wording.

Aleksandar Jovanovic thanked again the participants and EnBW for hosting the event and closed the meeting.

Summary of Decisions

Decision 1: EU-VRi will submit the D7.1, D7.2 and D8.1 by the mid of February.

Decision 2: We have to get more answers.

Decision 3: We will organize deep interview of stakeholders.

Decision 4: The needs identified as the "TOP 5" will be added to the survey for the 2nd round

Summary of Actions:

Action 1: EU-VRi has to ask ECTP/reFINE members to fill in the survey and to encourage them use the "comment" fields by mid of February.

Action 2: All partners are welcome to forward the invitation to his/her network by mid of February.

Action 3: Pertti Auerkari, Anne-Laure Popelin, Gaetan Prod'Homme and Sergio Velez will take care of the interviews for their fields of expertise.

Annex 1: List of participants

SafeLife-X
Workshop – Identification of the needs

January 9, 2014
Stuttgart (Germany)

List of signatures

	Last Name	First Name	Company	Signature
1.	Auerkari	Pertti	VTT	
2.	Bareiss	Jörg	EnBW Erneuerbare und Konventionelle Erzeugung AG	
3.	Berkovsky	Alexey	CKTI-Vibroseism	
4.	Bosi	Anna	VCE	
5.	Caillard	Bastien	European Virtual Institute for Integrated Risk Management	
6.	de Bel	Mark	Deltares	
7.	Eremic	Svetozar	NIS-GaspromNeft	
8.	Garmendia	Leire	Tecnalia	
9.	Hoerist	Christian	TUV AUSTRIA Services GmbH	
10.	Jovanovic	Aleksandar	European Virtual Institute for Integrated Risk Management	
11.	Kerkhof	Klaus	Materialprüfungsanstalt Universität Stuttgart (MPA Stutgart)	

12.	Krüger	Markus	MPA Universität Stuttgart	
13.	Peters	Ton	Deltares	
14.	Popelin	Anne-Laure	EDF R&D	
15.	Quintero	Flor Angela	Steinbeis Advanced Risk Technologies	
16.	Reimeringer	Mathieu	INERIS	
17.	Schoenmaker	Rob	Delft University of Technology	
18.	Topalis	Panos	DNV-GL	
19.	Vélez	Sergio	Gamesa	
20.	Zalbide	Maria	Tecnalia	
21.	HUSTA	STEFAN	STEINBEIS ADVANCED RISK TECHNOLOGIES	
22.	PROD'HOMME	Gaëtan	INERIS	
23.				
24.				
25.				
26.				

Annex 2: Agenda (extended version)

13:00 – 14:00	**Lunch**
14:00 – 14:05	**Welcome (A. Jovanovic, EU-VRi)**
14:05 – 14:20	**Overview of SafeLife-X (B. Caillard – A. Jovanovic, EU-VRi)**
14:20 – 14:35	**Overview of RBIF Project (F.A. Quintero – A. Jovanovic, Steinbeis R-Tech)**
14:35 – 14:50	**Survey results (A. Jovanovic, EU-VRi) and discussions**
14:50 – 16:00	**Partners' point of view on the needs (DELPHI-like workshop)**
	Introduction and explanation of the work groups - Energy / Power plants including renewables *moderation: Anne-Laure Popelin* o EDF (Anne-Laure Popelin – Nuclear infrastructures) o EnBW (Jörg Bareiss – Renewable infrastructures) o VTT (Pertti Auerkari - Energy) o R-Tech/ZIRIUS (A. Jovanovic - RBi) - Civil structures (bridges, ports…) *moderation: Anna Bosi* o VCE (Anna Bosi – Aging of civil infrastructures) o Tecnalia (Maria Zalbide - Aging of civil infrastructures) - Chemical/process plants *moderation: Gaetan Prod'homme* o INERIS (Gaetan Prod'homme – Chemical/process plants) - Networks and horizontal issues (economics, costs, decision making and management, resilience, standardization…) *moderation: Ton Peters* o Deltares (Ton Peters - Dutch transport infrastructure) o R-Tech/ZIRIUS (F.-A. Quintero- Aging management and standardization) Other participants are expected to join the groups according to their field of interest and expertise.
16:00 – 16:15	**Break**
16:15 – 17:15	**Reports of the groups (15' for each group)**
17:15 – 18:00	**Wrap-up and conclusion: preliminary consolidated list of needs**
18:00	**End of the meeting**

Annex 3: Overview of the SafeLife-X project

SafeLife-X

Safe Life Extension management of aged infrastructures networks and industrial plants

Bastien Caillard & Aleksandar Jovanovic

Workshop WS01 – Identification of the needs
January 10, 2014, Stuttgart

SafeLife-X overview

- Title: ***Safe Life Extension management of aged infrastructures networks and industrial plants***
- From Sept. 2013 to August 2015
- *…To build cost-effective solutions to handle the problem of infrastructures aging in the next 10 years (2015-2025) by providing specifications for new RDI projects*

Context

- **Infrastructures are vital elements of our economical activities** since they provide the bones and the arteries of the creation of added value in the whole value chain.
- Europe's, infrastructures, networks and industrial plants are **aging**.
- In many cases **utilization beyond the design life is essential** to keep the various utility systems and with them the European system of systems, functional.
- Besides that a demand for better asset management within the various European industrial sectors is obvious **to satisfy the Grand Challenges.**
- The unbalance between **societal and political concerns and the resistance against major infrastructure** development projects has to be closed by safe extension of lifetime of Europe's existing industrial assets and networks.

Objectives

To build cost-effective solutions to handle the problem of infrastructures aging in the next 10 years (2015-2025) by providing specifications for new RDI projects

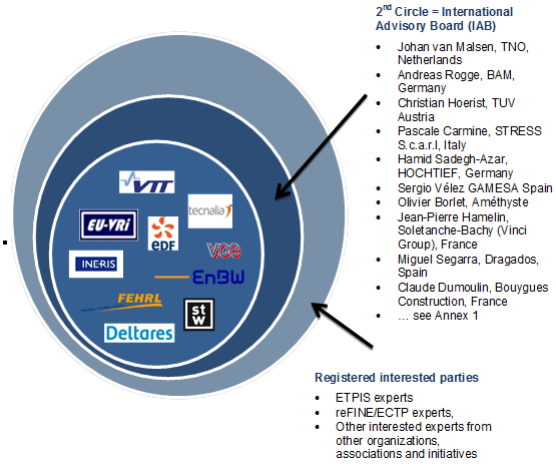
<u>The operational objectives of the project are:</u>

- To improve synergy between several industry sectors
- To identify the good (best) practices
- To define a strategic research agenda (SRA) and an implementation strategy (Roadmap)
- To initiate and develop pre-standards and standards

Concept

SafeLife-X has been initiated by ECTP (reFINE) and ETPIS.

The project has been structured in 3 groups to obtain the maximum of inputs, advices and directions from a wide community (1st, 2nd and 3rd circles).

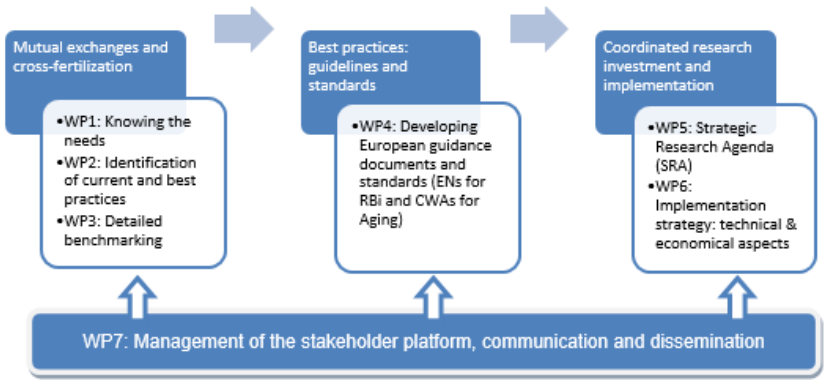


Main outcomes of the project

Tangible outcomes	Intangible outcomes
Proceeding of the thematic workshops	Creation of a "aging" community (active network) with a stakeholder platform
Guidance documents and documentary standards	Cross fertilization and awareness raising about methods and tools to manage aging
Strategic Research Agenda and Roadmap (implementation strategy)	Inform the preparation of new regulation in EU and OECD countries (through the liaison with the OECD working group on Chemical Accidents)

These outcomes will be the features to propose a "New Approach" for aging management.

The 3 steps of the project



International Advisory Board (2nd circle)

- Roberto Arditi, Societa iniziative nazionali autostradali
- Alexey Berkovsky, CKTI-Vibroseism
- Olivier Borlet, Améthyste
- Lennart Brumby, Duale Hochschule Baden-Württemberg
- Claude Dumoulin, Bouygues Construction
- Michael Faber, Danish Technical University
- Antonio José Fernandez Pérez, Iberdrola
- Angel Maria Gutierrez, Naturgas energia grupo
- Jean-Pierre Hamelin, Soletanche-Bachy
- Christian Hoerist, TUV Austria Services GmbH
- Marin Kostov, Risk Engineering LTD
- Gyöngyvér B. Lenkey, Bay Zoltan
- Richard G. Little, International Risk Governance Council
- Wu Meng-Xi
- Livia Pardi, Autostrade per l'Italia
- Carmine Pascale, STRESS
- Andreas Rogge, BAM
- Hamid Sadegh-Azar, HOCHTIEF Solutions AG
- Rob Schoenmaker, TU Delft
- Miguel José Segarra Martinez, Dragados
- Nicolas Thégner, AREVA RMC
- Johan Van Malsen, TNO
- Sergio Velez Oria, Gamesa
- Florian Veyssilier, French ministry of Ecology, Sustainable Development and Energy
- Thierry Yalamas, PHIMECA

Join the platform (3rd circle)

If you want to receive information on **the activities and the events** of SafeLife-X, please register to the platform at the following link:

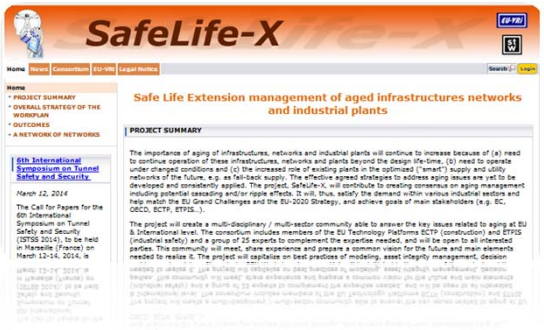
http://www.safelife-x.eu-vri.eu/registration.aspx

Progress

D7.1 - First list of 2nd and 3rd circles Members, ToR and report of the first meeting	About to be submitted
D7.2 - Report on Communication plan and strategy and implementation with the project Website and leaflets	Will be ready foir review next week
D8.1 - Meeting planning over the 12 Months of the project	About to be submitted
D1.1 - Identification of the needs to improve aging management	The survey has been launched The workshop is taking place The literature review started
D1.2 - Mapping of the existing standard and regulations	

Next actions & meetings

- Identification of the current best practices (WP2)
- Benchmarking (WP3)
- Month 7 (March-April 2014):
  - Workshop on technologies of data acquisition and modeling
  - Workshop on definition of the test cases, the approach for the benchmark and the data collection



www.safelife-X.eu-vri.eu

Coordination Team

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Annex 4: Overview of the RBIF project

Risk Based Inspection Framework

History of RBIF

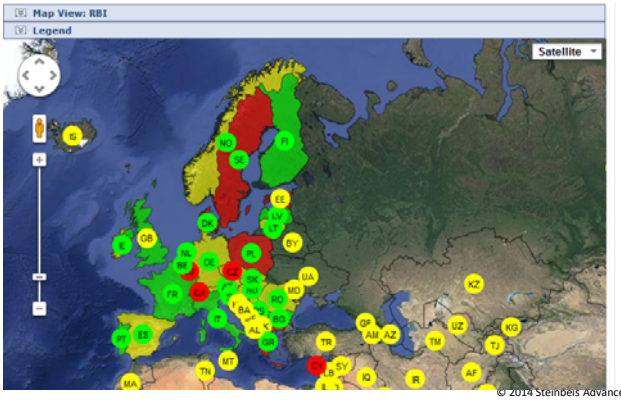
Kick-off meeting of the project

January 9, 2014

EnBW Kraftwerke AG
Schelmenwasenstr. 15
70567 Stuttgart, Germany

RBIF: Risk Based Inspection Framework

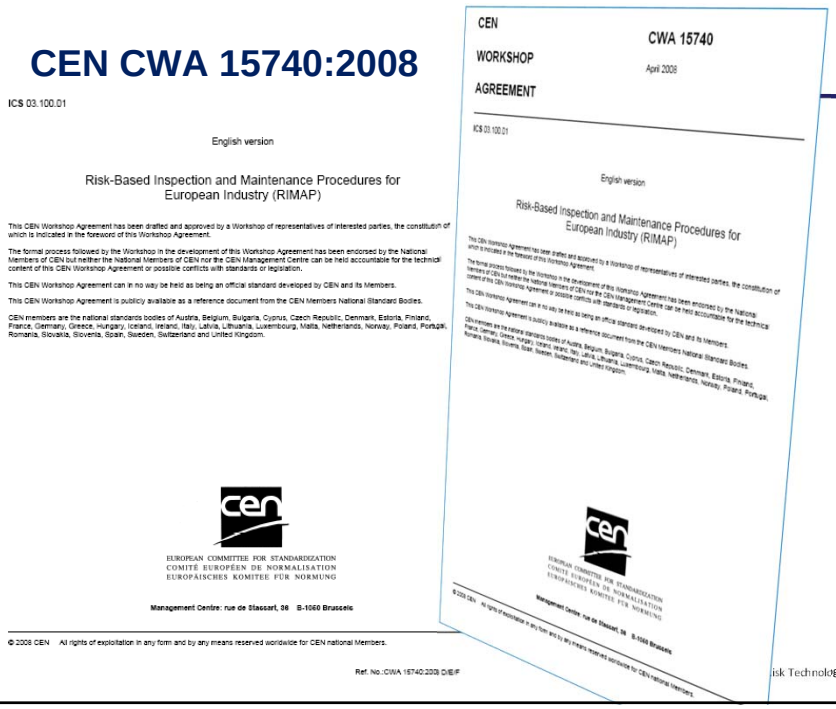
Objective: contribute to the development of the European Standard (EN) for Risk Based Inspection during the in-service activities which are still not harmonized throughout the EU.



RBIF: Risk Based Inspection Framework

The future development of the European Standard (EN) is based on the frame of the **CWA (CEN Workshop Agreement) 15740:2008** which specifies the essential elements for risk based assessment of industrial assets according to the **RIMAP** (Risk-based Inspection and Maintenance Procedures for European Industry) approach

CEN CWA 15740:2008



CEN
WORKSHOP
AGREEMENT

CWA 15740
April 2008

ICS 03.100.01

English version

Risk-Based Inspection and Maintenance Procedures for European Industry (RIMAP)

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

The formal process followed by the Workshop in the development of this Workshop Agreement has been endorsed by the National Members of CEN but neither the National Members of CEN nor the CEN Management Centre can be held accountable for the technical content of this CEN Workshop Agreement or possible conflicts with standards or legislation.

This CEN Workshop Agreement can in no way be held as being an official standard developed by CEN and its Members.

This CEN Workshop Agreement is publicly available as a reference document from the CEN Members National Standard Bodies.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

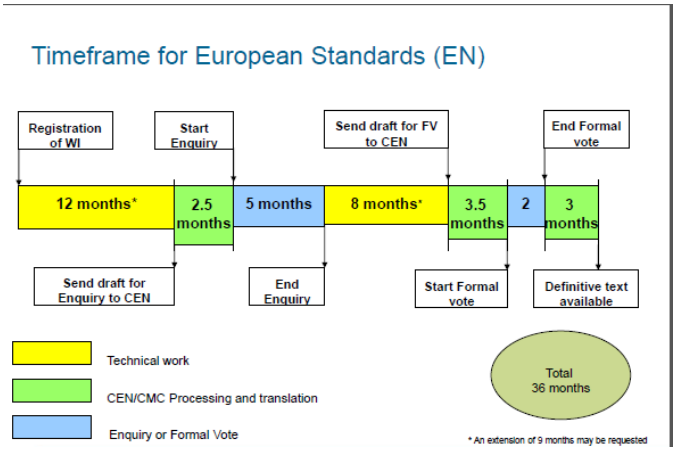
Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No.:CWA 15740:2008 D/E/F

RIMAP → RBIF - EN

- In September 2013, the proposal for a European Normalization for the development of the Risk Based Inspection Framework (RBIF) has been approved within the CEN Technical Committee (TC) 319 dedicated to maintenance.
- The CEN TC have created the Working Group (WG) 12 for the development of the standard and NEN is appointed to be the standard body to hold the secretariat.

Timeframe for European Standards (EN)



Partners financially supporting the proposed new EN

1. Améthyste – France
2. Beijing Municipal Institute of Labor Protection BMILP – China
3. Bayer Technology Services – Germany
4. DEKRA Industrial Oy – Finland
5. Det Norske Veritas (DNV) Maritime, Oil and Gas – Norway
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8. Shell Global Solutions International BV – Netherlands
9. Steinbeis Advanced Risk Technologies – Germany
10. TUV Austria Services GmbH – Austria
11. TÜV SÜD – Germany
12. TUV Rheinland Group – South Africa

Partners in-kind supporting the proposed new EN

1. Air Products Nederland BV – Netherlands
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10. ISIM Timisoara, National R&D Institute of Welding and Materials Testing– Romania
11. Italian Workers' Compensation Authority – Italy
12. Lloyd's Register – Sweden
13. VTT Technical Research Centre of Finland – Finland
14. Vincotte, (R. Coomans) – Belgium

Proposed improvements in the current CWA 15740:2008

1. Alignment of the approach and methodology with those of ISO 31000, ISO 55000, prEN15341, ISO Guides 51 and 73 and new national regulations Define and use Key Performance Indicators (KPI)
2. Inclusion of economic parameters (NPV, CAPEX OPEX, VAR, etc.)
3. Cover Reputation issues
4. The applied principles can be use for statement of (voluntary?) certification
5. Stress in the principles and guidelines. Methodologies and/or tools are in the foreground of the proposed EN

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…..

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Editing Board of the CWA document

#	Section of the document	Editor / Co-Editor(s)
1.	Overall document	A. Jovanovic (R-Tech)/ C. Hörist (TÜV Austria) C. Christoglou (Bayer)
2.	Introductory part (Foreword, Introduction, Acknowledgements, Chapter 1: Scope, Chapter 2: Normative References, Chapter3. Definitions...)	K. Palsämaki (DEKRA)/ M. Renner (R-Tech) F. Wiggen (DNV)
3.	RIMAP Framework (CWA Chapter 4; EN chapter 5)	K. Palsämaki (DEKRA)/ A. Jovanovic (R-Tech)
4.	Initial analysis and planning (CWA Chapter 5.1; EN Chapter 6.2)	C. Hörist (TÜV Austria)/ P. Slangen (Shell)
5.	Data collection and validation (CWA Chapter 5.2; EN Chapter 6.3)	C. Hörist (TÜV Austria)/ A. Jovanovic (R-Tech)
6.	Multilevel risk analysis (CWA Chapter 5.3; EN Chapter 6.4)	J. Bareiß (EnBW)/ A. Jovanovic (R-Tech)
7.	Decision making and action planning (CWA Chapter 5.4; EN Chapter 6.5)	C. Christoglou/ F. Wiggen (DNV)
8.	Execution and reporting (CWA Chapter 5.5; EN Chapter 6.6)	C. Christoglou (Bayer)
9.	Performance review / evergreen phase (Chapter 5.6; EN Chapter 6.7)	P. Slangen (Shell)/ C. Christoglou (Bayer)

Thank you

Annex 5: Preliminary survey results

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SafeLife-X: Identification of the needs related to safe lifetime extension and aging management

In relation with the initiative developed by the EU FP7 project SafeLife-X, you are invited to take part in this survey to **provide information to identify the needs related to safe lifetime extension and aging management**, as expressed by the various stakeholders involved in the project, i.e. the industry from various sectors (construction, transport, energy, industrial plants, pipeline networks…), from service to industry companies dealing with inspection and certification, from public authorities and from research organizations.

We kindly ask you to provide your inputs **by January 3, 2014**.

Don't hesitate to contact us at SafeLifeExtension@eu-vri.eu if you have any question.

Total number of participants in this survey: 37 of 37

include participants not having answered in charts

Country Filter

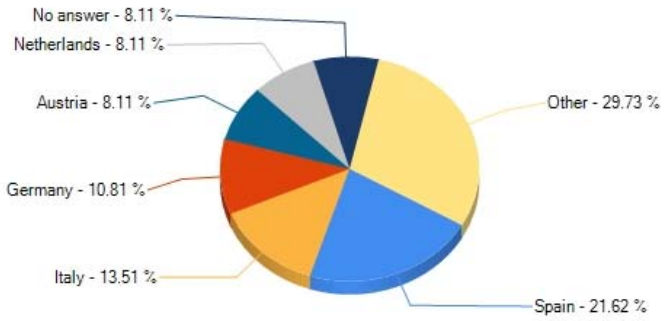
Answer Filter

Filter per Question Answer: None
Show only those that selected:

Answer Time Filter

Display and Chart Options

Apply Filter and Options



Color	Name	Value	Percent
	Spain	8	21.62 %
	Italy	5	13.51 %
	Germany	4	10.81 %
	Austria	3	8.11 %

Color	Name	Value	Percent
	Netherlands	3	8.11 %
	No answer	3	8.11 %
	Other	11	29.73 %

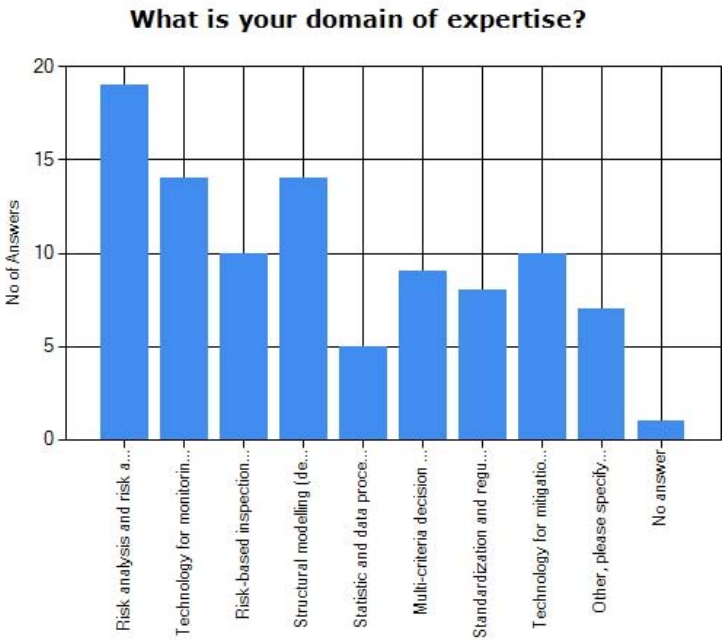
More about your background...

More about your background...

1. What is your domain of expertise?

Total respondents for this question 36 of 37 (97%)
Results

Option	No of answers	Percent
Risk analysis and risk assessment	19	51
Technology for monitoring and sensors, data acquisition	14	38
Risk-based inspection	10	27
Structural modelling (degradation models, structural analysis, engineer tools...)	14	38
Statistic and data processing, including uncertainties	5	14
Multi-criteria decision making	9	24
Standardization and regulation	8	22
Technology for mitigation	10	27
Other, please specify	7	19
No answer	1	3



:

- (1) Civil Engineering
- (18) Economics, LCC, Asset Management
- (24) ENERGY EFFICIENCY
- (26) Asset Management - in general
- (28) life assessment
- (33) Maintenance Management and System Reliability Analysis
- (36) Note- Background is related with in-house capabilities
- (37) highway engineering structures
- (41) Civil Engineer
- (42) REFURBISHMENT

---

2. I am involved in...

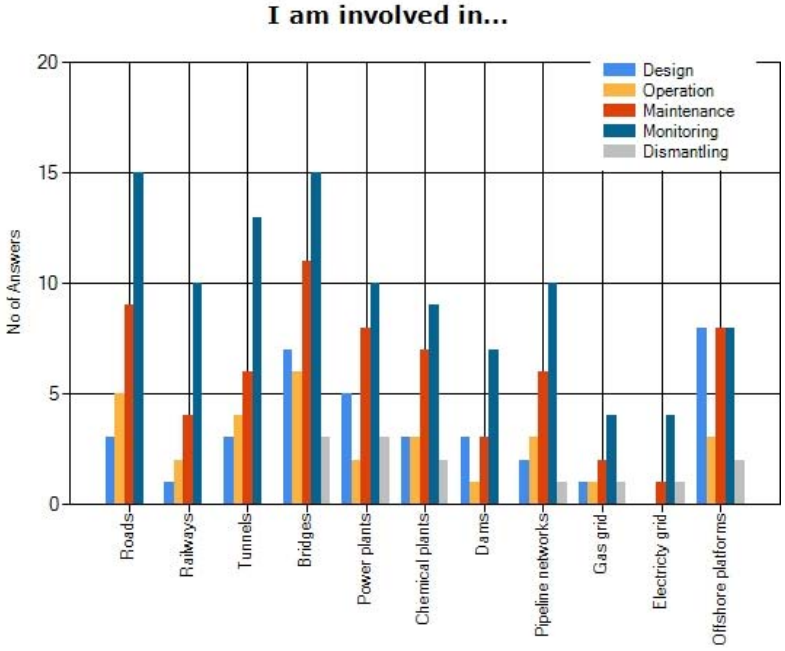
Total answers for this question 31 of 37 (84%)

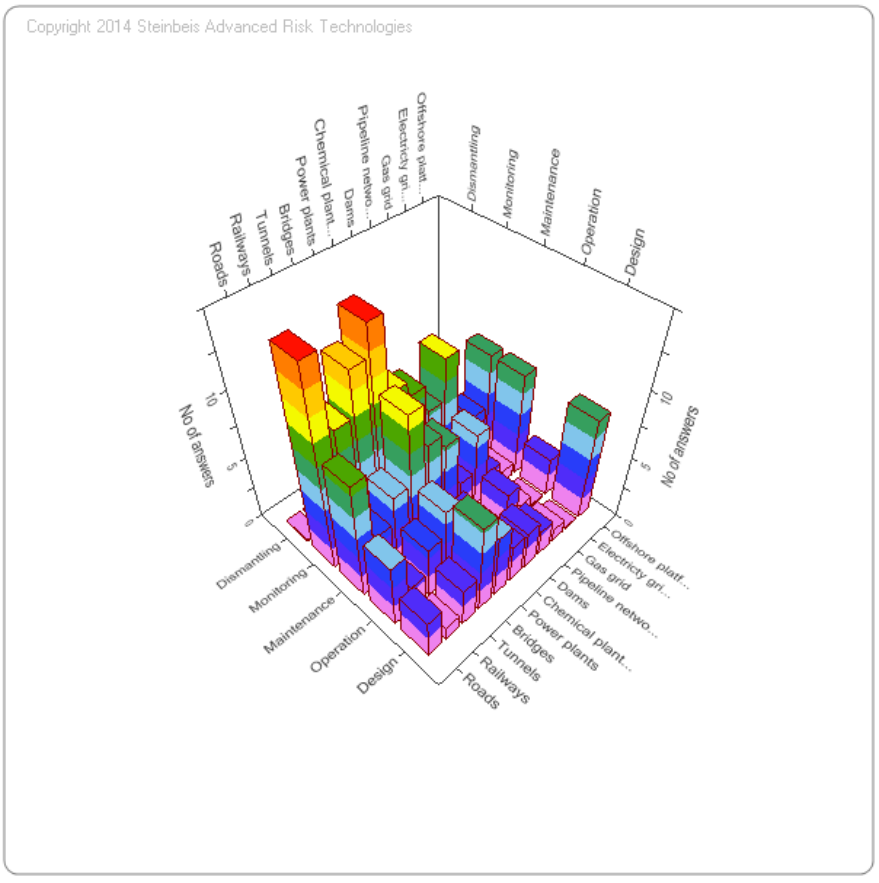
Results

	Design	Operation	Maintenance	Monitoring	Dismantling
Roads	3	5	9	15	0
Railways	1	2	4	10	0
Tunnels	3	4	6	13	0
Bridges	7	6	11	15	3
Power plants	5	2	8	10	3
Chemical plants	3	3	7	9	2
Dams	3	1	3	7	0
Pipeline networks	2	3	6	10	1
Gas grid	1	1	2	4	1
Electricty grid	0	0	1	4	1
Offshore platforms	8	3	8	8	2

Other installation, please specify:

- (2) Education and standardization
- (6) I have spent a good deal of time looking at infrastructure failures, their causes, and approaches to preventing them or mitigating their consequences.
- (24) BUILDING MANAGEMENT SYSTEMS
- (26) Waterways, locks (O&M)
- (31) ALSO Renewable marine energy constructions (In addition, colleagues are involved in tunnels, bridges, electricity grid)
- (33) Wind farms and photovoltaic plants
- (39) Wind energy plants





Identification of the needs

Identification of the needs

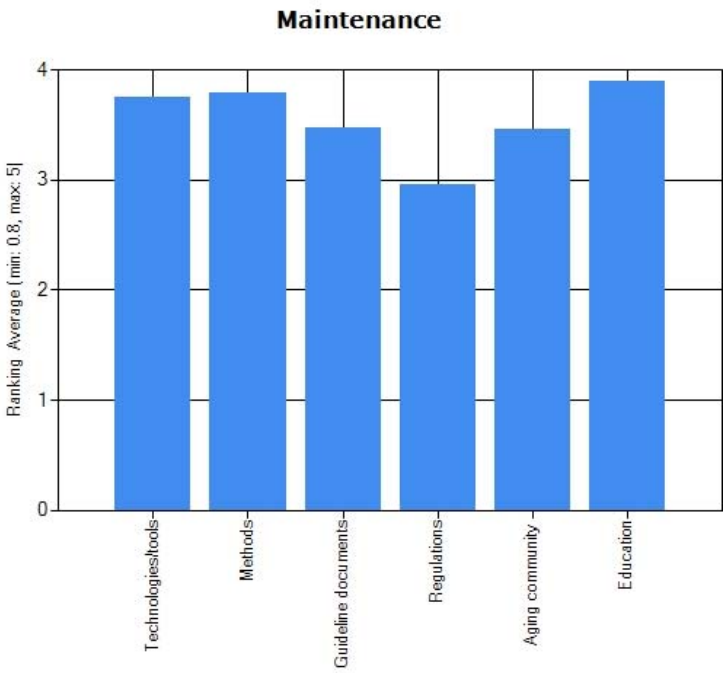
1. Please provide your view on the **needs related to maintenance**:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	

Technologies/tools	1.9	3.75	4.9	- (17) 2 - (22) CMMS, RCM, Risk based tools - (33) We should move towards the implementation of intelligent maintenance systems based on expert systems and data processing from the operating feedback to facilitate the detection, diagnosis and progosis of incipients failures in critical components - (35) 4
Methods	2.7	3.79	4.8	- (17) 4 - (22) Reliability and predictive methods - (33) We should move towards predictive maintenance methods. There are already excellent methods for maintenance management such as RCM - (35) 4
Guideline documents	1.6	3.47	4.9	- (17) 5 - (22) Predictive maintenance gudelines, Risk management guidelines - (33) Documentation of the methods and techniques to be developed - (35) 3
Regulations	0.9	2.96	4.9	- (17) 2 - (22) Risk management - (33) From my point of view, it is not necessary more regulations, only kowledge, training and education - (35) 3
Aging community	0.8	3.46	5	- (17) 2 - (22) Aging databases and new approaches - (33) Areas of interest: degraded component Reliability, aging analysis and life extension methodologies - (35) 3 - (39) Specific maintenance for those areas afected by risk aging
Education	2	3.89	4.9	- (17) 2 - (22) Upgrading and sharing new knowledges on Failure mechanisms - (33) Education for managers on the importance of maintenance and its contribution to business and sustainability - (35) 3



General comment on the needs related to maintenance:

- (22) Predictive strategy and optimal maintenance is cruccial future development
- (28) the focus of needs tends to concentrate on critical issues that move in time, less because of improved solutions, and more because of shifts in processes/production technology
- (33) Replacement of systematic preventive maintenance for predictive maintenance
- (36) ISQ group with about 1500 people in the world maintance is part of the actvities as well as inspection; aging community is inetended as needs to perform training avoiding long term umployment
- (39) Needs on everymatter related to maintenance after design life time expiration

---

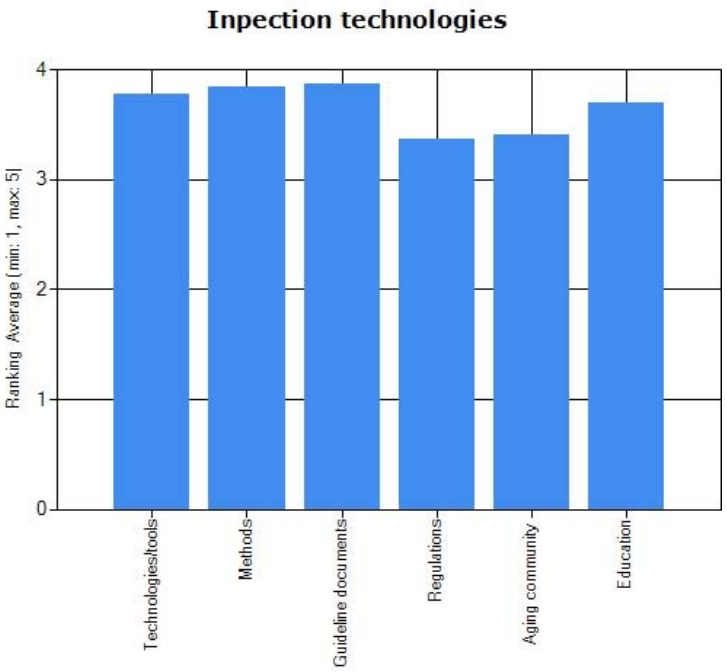
2. Please provide your view on the **needs related to inspection**:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	
Technologies/tools	1	3.78	5	- (17) 3 - (22) RBI and online risk monitoring tools for inspection

				- (33) Predictive Maintenance, Risk based inspection and aging inspection - (35) 5
Methods	2	3.84	5	- (17) 4 - (22) Online risk monitoring method and new techiques for inspection - (33) Methods related to PdM, RBI and aging - (35) 4
Guideline documents	2	3.87	5	- (17) 5 - (22) Failure mechanisms inspection guideline - (33) PdM, RBI and aging analysis - (35) 3
Regulations	1	3.37	5	- (17) 3 - (22) Upgrading present regulations - (35) 3 - (39) Afterlife time design some regulation is to be aplicable to avoid risk situations on structures
Aging community	1	3.41	5	- (17) 2 - (22) Aging databases and new approaches - (33) Aging inspection - (35) 3 - (39) Specific inspections developments
Education	1	3.7	5	- (17) 2 - (22) Europian Failure Knowledge database - (33) PdM, RBI and aging analysis - (35) 3



General comment on the needs related to inspection:

- (22) Establishing European database like American CBS and establishinf European risk monitoring portal (Risk Atlas)
- (28) see comment above
- (33) Inspection oriented to prdeictive maintenance, risk based inspection and aging analysis
- (39) Needs especific on inspection after design life time expiration

---

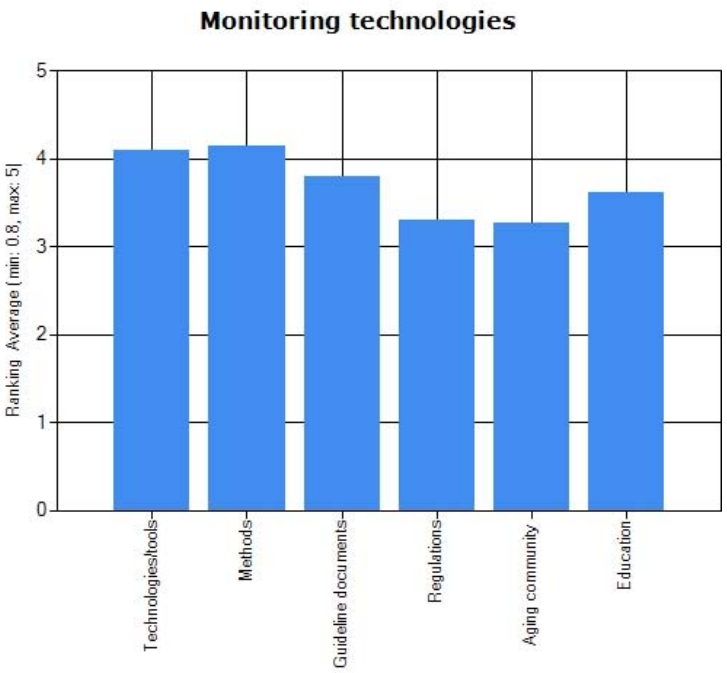
3. Please provide your view on the **needs related to monitoring**:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	
Technologies/tools	1.6	4.1	5	- (17) 5 - (22) Online risk monitoring tools - (35) 5
Methods	1.4	4.14	5	- (17) 5 - (22) Online risk monitoring methods - (35) 5
Guideline documents	1.8	3.8	5	- (17) 4 - (22) Online risk monitoring gudelines - (35) 4

Regulations	1.1	3.3	5	- (17) 3 - (22) Europian risk radar regulation - (35) 3
Aging community	0.8	3.27	5	- (17) 3 - (22) Sharing aging knowledge - (35) 3
Education	1.7	3.61	5	- (17) 3 - (22) Monitoring education upgrade - (35) 3



General comment on the needs related to monitoring:

- (17) new sensors technologies enable an effective "health monitoring" for equipment in stressed conditions (e.g. creep). Decision system based on soft computing (e.g Neural Network) are essential to use information in a smart way.
- (28) see comment above
- (33) It is the base
- (36) Monitoring will be in the future part of the decesion making tools; a special attention must be given to education combining practical experience with new IT tools.
- (39) idem as in previous points

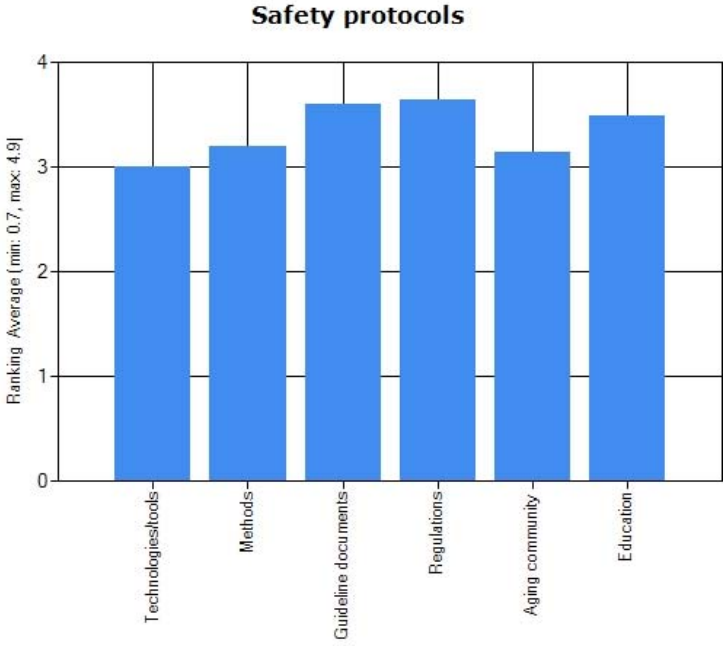
---

4. Please provide your view on the **needs related to safety protocols**:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	
Technologies/tools	0.9	3	4.9	- (17) 2 - (22) Process Safety Management tools - (35) 3
Methods	1.7	3.2	4.8	- (17) 5 - (22) Methods supporting PSM - (35) 3
Guideline documents	1.4	3.6	4.9	- (17) 4 - (22) Gudelines supporting PSM - (35) 3
Regulations	0.7	3.64	4.9	- (17) 2 - (22) PSM like in American standards - (33) The development of a business is a private matter, but safety is a public one - (35) 3
Aging community	0.8	3.14	4.8	- (17) 2 - (22) Organise PSM community - (35) 3
Education	0.8	3.49	4.9	- (17) 2 - (22) Organise training system for PSM best practices - (35) 3



General comment on the needs related to safety protocols:

- (22) PSM is defined in American standards like ANSI/API RP 754 or OGP REPORT NO. 435 needs to be translated to Europe
- (33) I think we should work more on Reliability and Predictive Maintenance, so we will be able to improve Safety
- (36) Safety protocols are needed due the large industrial infrastructures (and others)

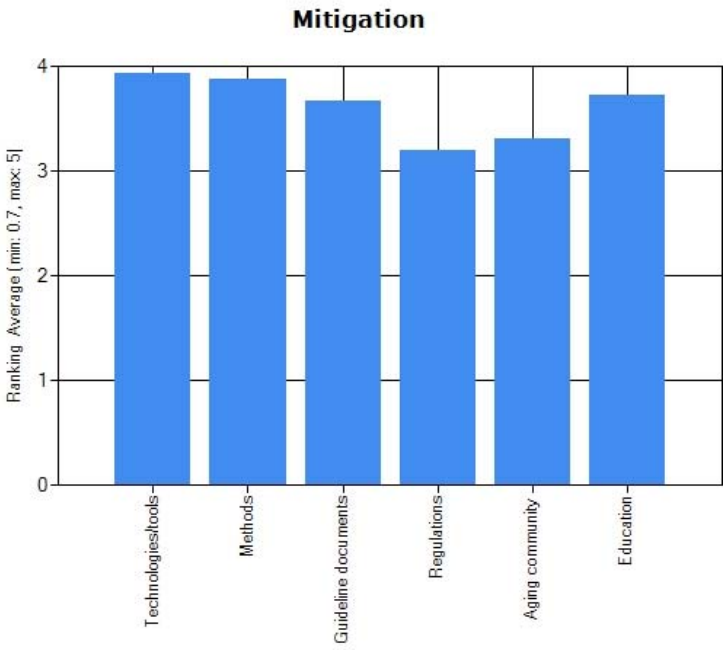
---

5. Please provide your view on the **needs related to mitigation**:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	
Technologies/tools	2	3.94	4.9	- (17) 2 - (22) TBA - (35) 4
Methods	2.6	3.88	5	- (17) 4 - (22) TBA - (35) 4
Guideline documents	2	3.67	5	- (17) 4 - (22) TBA - (35) 4
Regulations	0.7	3.2	5	- (17) 3 - (22) TBA - (35) 4
Aging community	0.9	3.32	4.9	- (17) 2 - (22) TBA - (35) 3
Education	2	3.73	5	- (17) 2 - (22) TBA - (35) 3



General comment on the needs related to mitigation:

- (33) Prevention is better than mitigation
- (36) Probability of failure is impossible to achieve 0%; so, to avoid big disasters and depending on the ciritical effects that can ocurr a eed for mitigation procedures are needed to avoid catastrophic events.

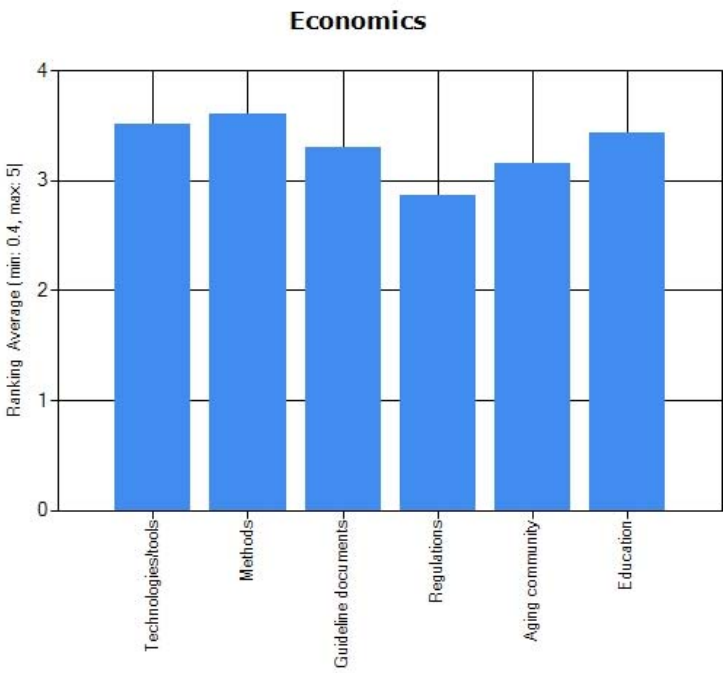
---

6. Please provide your view on the **needs related to economics**:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	
Technologies/tools	1.8	3.51	5	- (17) 1 - (22) TBA - (35) 3
Methods	1.5	3.61	5	- (17) 4 - (22) TBA - (35) 3
Guideline documents	1.3	3.3	4.9	- (17) 3 - (22) TBA - (35) 3
Regulations	0.8	2.86	4.9	- (17) 2 - (22) TBA - (35) 3
Aging community	0.8	3.16	5	- (17) 2 - (22) TBA - (35) 3
Education	0.4	3.43	4.9	- (17) 2 - (22) TBA - (35) 3



General comment on the needs related to economics:

- (36) Economics is a fundamental part of sustainabilty and decision making actions, need a continuos assessment of potential scnenarios

---

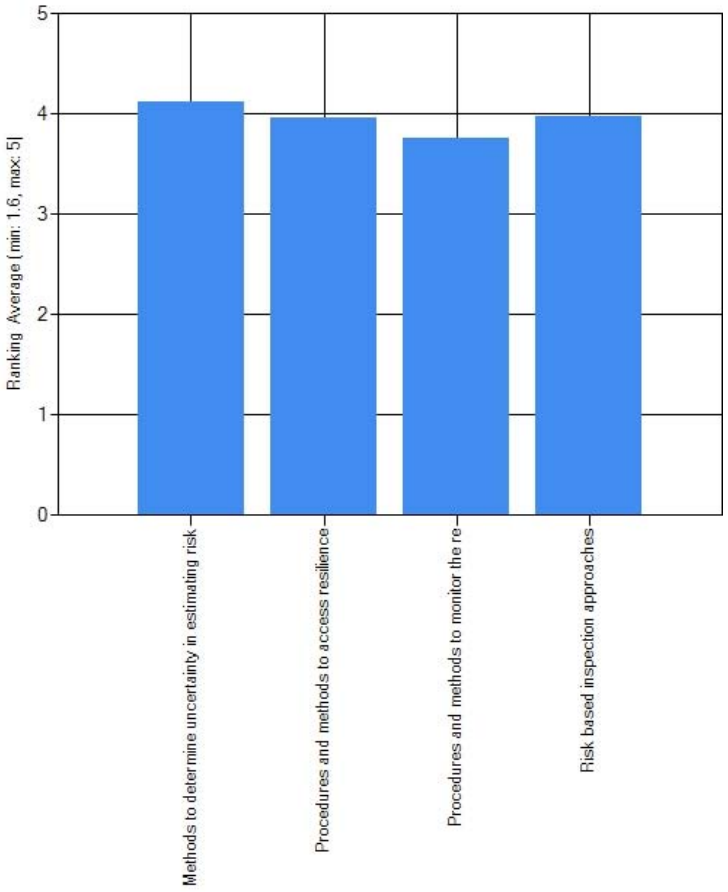
7. Please provide your view on the other needs:
(where 5 means "highly needed")

Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX	
Methods to determine uncertainty in estimating risk	2.8	4.12	4.9	- (17) 3 - (22) Main result - (35) 4
Procedures and methods to access resilience	1.9	3.96	5	- (17) 4 - (22) TBA - (35) 5
Procedures and methods to monitor the resilience	1.8	3.76	5	- (17) 4 - (22) TBA - (35) 5
Risk based inspection approaches	1.6	3.98	5	- (17) 3 - (22) Further developing - (35) 5

Others



General comment on the other needs:

- (26) Identification of right performance indicators that provide leading (not lagging) info about performance of (system of) system(s)
- (36) These activities are complementar to the others referred previously, because one is the need for specific actions covering risk and in another way it is a must to evaluate realistically the feasibilty of those methods.

Enabling technologies

Enabling technologies

1. Please rate the need for the development of these enabling technologies:
(where 5 means "highly needed")

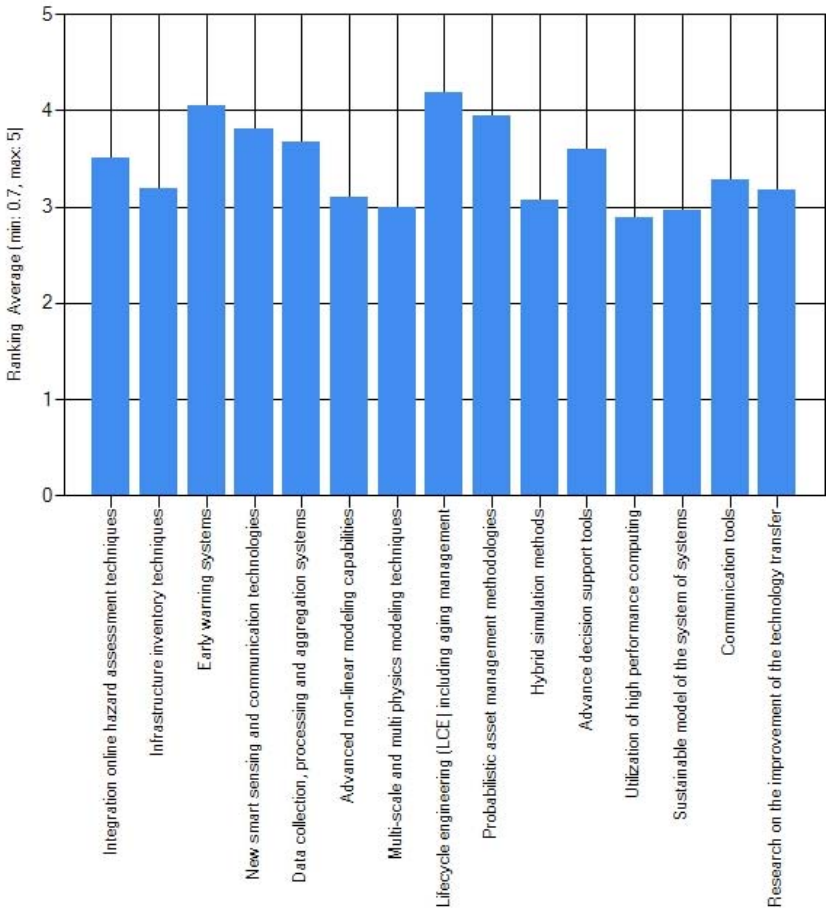
Total answers for this question 37 of 37 (100%)

Results (Min, Max, Average, Average shown on Graph)

	Ranking-MIN	Ranking-AVG	Ranking-MAX
Integration online hazard assessment techniques	0.9	3.51	5
Infrastructure inventory techniques	0.8	3.19	4.9
Early warning systems	2	4.05	5
New smart sensing and communication technologies	1.9	3.81	5
Data collection, processing and aggregation systems	1.7	3.68	5
Advanced non-linear modeling capabilities	0.7	3.09	4.9
Multi-scale and multi physics modeling techniques	1	3	5
Lifecycle engineering (LCE) including aging management	2.5	4.18	5
Probabilistic asset management methodologies	2	3.94	5
Hybrid simulation methods	1	3.07	4.9
Advance decision support tools	1	3.59	5
Utilization of high performance computing	0.9	2.88	4.9
Sustainable model of the system of systems	0.9	2.96	4.9
Communication tools	0.9	3.28	5

Research on the improvement of the technology transfer	0.9	3.18	5

Please rate the need for the development of these



Other, please specify:

- (28) tools & methods to help in reacting quickly (asap) to the technical (infra related) consequences of less technical (political) game change in e.g. energy policies
- (33) Intelligent Maintenance (Predictive Maintenance + Operating data processing + Applications of new technologies + Decision support tools)

Comments

Comments

1. Free comments

Total answers for this question 7 of 37 (19%)

Answers:

(14) One important challenge is to improve methods for predicting remaining useful life combining physical degardation models with probabilistic risk models

(19) none

(22) SafeLife-X: Identification of the needs related to safe lifetime extension and aging management is very good initiative and very important for industry

(31) I am highly interested to follow the project results!
Best Regards
Erland Johnson

(33) I think t is not only necessary to identify the needs, but prioritize them.

I consider that the identification of needs must be always related to more or less specific applications or problems to be solved. It is convenient to select some industrial sectors and specific problems to be solved.

The aim is the identification of problems, the technologies and methods to be applied or developed to solve those problems will come after.

(36)

The overall concepts described in the approach used in this preliminary assessment have the main issues to be studied. However in our opinion must be inserted or at least be part of the investigation to be done.

1. It seems too ambitious to perform a wide number of cases because the complexity of the examples are quite different, e.g., a bridge is very different from a Power Station (including Nuclear) or a Chemical Plant;

2. The exercise could rate the level of risks, based on several occurrences, e.g., economical losses, injuries and fatalities;
3. Historical data could be a preliminary basis to rate the level of risk;
4. The needs of large computing systems and tools/models are also different and realistically with potential application;
5. The dynamic development can change is a short time the role of assets in the production, e.g., energy (in Portugal the spectrum of energy/power resources changed drastically from conventional to renewable power systems introducing new problems not achieved in initial design).

(39) Due to aging (fatigue, corrosion, others..) structures could fall in risk.
Regulate this fact is very convinient from safelife point of view.
To regulate this we need to go throw all Life Cycle phases..
.- design models
.- aging computational modelling
.- monitoring/inspection data adquisition
.- combining computational modells with data adquisition and with probabilistic modells to achieve risk assesments
.- risk assesment regulation for design life cycle ending period
.- regulated conditions for safety continuous operations
.- regulation for auditing continuous operation conditions

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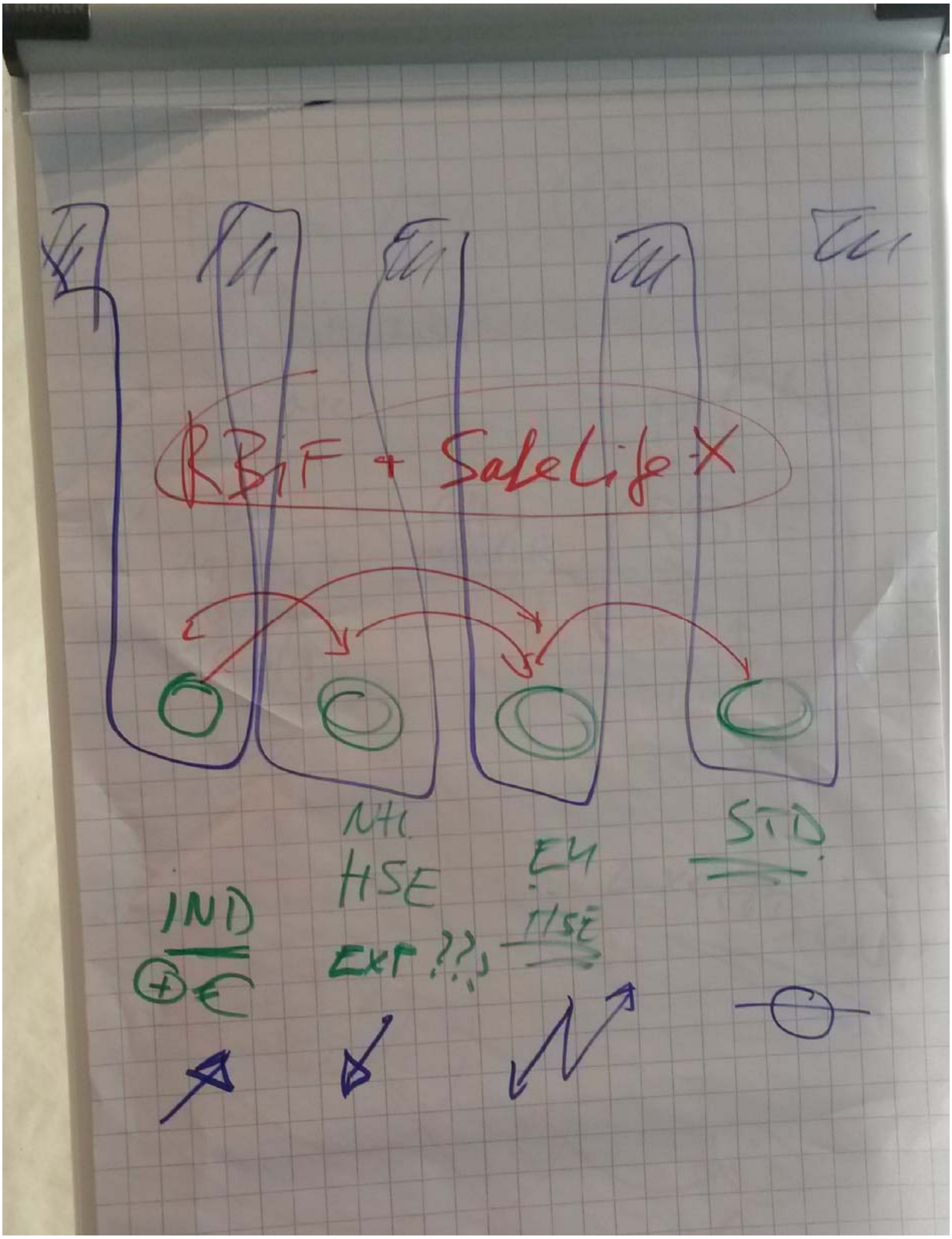
Annex 6: Paper board


RBF + SafeLife X
NHL
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HSE
STD


Person XYZ
application + acc.
Nat. MIRROR Group TC 319
(off.) mandate
prEN
RBIF
observers
WG 12 TC 319
3.
IAB
2.
1.
EXCEPTION!