ESReDA
European Safety, Reliability & Data Association

Newsletter

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ESReDa reflexions: Digital Maintenance

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The study of the digital transformation of maintenance management in the context of industry and infrastructure is highly topical and interesting. According to reports from various institutions (notably the Industrial Internet Consortium), one of the business areas where this transformation is expected to be most significant is maintenance. It is therefore important to analyze why maintenance can benefit from this transformation and how to do it: What are the new technologies and tools with the greatest potential impact on maintenance and why? How can this transformation process be mandated and realized? How will emerging asset management platforms and new intelligent maintenance Apps impact companies? Etc. Further progress in the digitization of maintenance can also be foreseen when an increasing number of systems become interconnected. This will certainly lead to more sophisticated scenarios in which collaboration between assets can play a key role.

As soon as you start to delve into the subject, it is easy to realize that digital transformation is both an organizational challenge and a major technical challenge, and that a strategic planning process is necessary to address it. To develop a digital maintenance strategy for assets, we must understand that existing maintenance plans will need to be analyzed in depth and likely broken down for specific critical systems, often lowering the level of intervention from functional locations, in line with the opportunities highlighted by new technologies and data analytics.

The new digital information flows will require a change in management processes to support decision making. It is necessary to identify the types of asset management decisions and their importance in meeting the objectives set by the organization. The importance of possible improvement in each decision-making process can be estimated by identifying the benefits of improved reporting and decision making and the risks associated with poor decision making caused by poor (non-data-driven) reporting. Different decision-making areas are supported by different asset management systems. Nowadays companies are complementing the original Computer Aided Maintenance Management System (CMMS), with different solutions / Apps to gain more capabilities in the management areas mentioned: EAM (Enterprise Asset Management) to manage asset inventory, configuration and maintenance execution; APM (Asset Performance Management) tools and technologies to reduce corrective maintenance, increase availability and reduce the risk of failure (predictive maintenance tools are usually included in APM system); AIP (Asset Investment Planning) software are made to improve long-term complex strategic and tactical decisions related to CAPEX / OPEX budget allocations and overall asset management planning

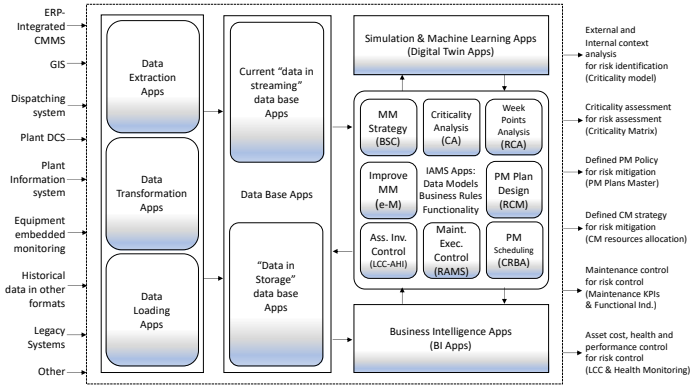


Figure 1. Digital maintenance framework (general schema including DT)

Appropriate lines of action need to be drawn so that the organization can define and control the data model for the management of its assets and can make appropriate use of this data to make its management processes more efficient. Many manufacturers and asset users and managers must prepare for different possible scenarios according to the asset's digital configuration, leading to different maintenance plans and possible management needs. For example, CBM may delay or replace a default maintenance task on some projects, but not all. Similarly, scheduled preventive maintenance may be maintained, but maintenance time may be decreased when using a new technology. To increase asset performance using 4.0 technologies, it is necessary to face new technical problems and challenges: the non-ergodicity of data processes in many assets, the selection of the dimension of the number of data needed to explain their performance, the way to consider and interpret risks, the way to use such risk assessment for dynamic maintenance scheduling, etc. All these lines converge in the development of advanced digital modelling strategies such as Digital Twin (DT). These are giving support a more complete digitisation of the asset and its processes and making possible the interaction of digital assets forming

complex systems (system of systems) and will have and will have an relevant role generating new proposals of maintenance and asset management frameworks that guide the companies for best adaptation to this challenging context. Other hand, in fact, digital maintenance is being a key element in the very development and growth of DT technology.

One of the biggest challenges will be providing people with the right support and training in change management. While the younger generation is familiar with data and computer-based work tools, older employees may be unwilling to change the way they work and often need support. The best algorithms for detection, diagnosis and prognosis will be in vain if maintenance personnel do not change the way they work. At the same time, and to achieve impact, the entire maintenance value chain needs to be addressed; monitoring and predictive analytics represent only the first step. In the new maintenance ecosystem, critical attention must be paid to the ownership of data masters and the possibilities these masters offer for management. Developing analytical capabilities that enable a successful operating model may be a matter of negotiating access to data.

In short, digitalization is changing the way we conceive, develop, and industrialize maintenance. This must be understood as a long, complex, and formal process. A process that must not be implemented all at once, but must be consolidated in a continuous, orderly and secure manner.

This article is an extract from the book "Digital Maintenance Management", published by Springer Verlag in 2022.
Hardcover ISBN: 978-3-030-97659-0 - DOI: https://doi.org/10.1007/978-3-030-97660-6

A few words from the new Honorary President of ESReDA

ESReDA
Honoray President
Jean-François Raffoux

I was born in 1942 and qualified as engineering graduate at Nancy University (Mining college) and then as PHD in Rock Mechanics.

My whole career has been devoted to safety and risks, first for the mining industry and then for other industries (except nuclear) within the French national institute on industrial risks and environmental protection (INERIS) After 10 years at the scientific direction of this institute, I retired in 2005.

Since retirement keep up on this topics within IMdR , a scientific organization for risks mitigation where I am particularly involved in the cindynics approach.

Between 1980 and 1990 I joined EREDA at the invitation of so missed Henri Procaccia, the founder of ESReDA and have been involved in the preparation of the statutes of the association which have been adopted in 1992. I have been elected in the chair of president after Cyp van Rijn and in charge from1992 to 1996.

My memory weakens concerning my modest contribution to the governance of the association but has not weakened in remembering all the benefits and incentive that I gained through contacts, exchange of knowledge and friendly and convivial opportunities across Europe from North to South.

I thank ESREDA BOD and GA to have nominated me as honorary president. This gives me the opportunity to participate to meetings and seminars where I am sure to find occasions to renew my knowledge and to renew contacts within this nice community. I shall also try to do my best to encourage companies and scientific organizations to join ESREDA in order to exchange knowledge and to issue scientific outcomes on an European basis. No doubt that such a collaboration increases our capacity to face risks in a world of increased complexity.

ESReDA NEW MEMBERS

Hana Pačaiová
Technical university of Košice, Slovakia

Technical university of Košice, Slovakia.

Head of the Department of Safety and Quality at Faculty of Mechanical Engineering, Technical University in Košice. She obtained her degree as a professor in 2003 at Technical University of Košice, in the field Safety of technical systems. Her professional orientation is focused on Risk Management, Major Accident Risk Management, Pipeline Integrity Management, Machinery safety, Integrated management systems, Maintenance management (RCM, TPM, RBI). She is a member of many research bodies, e.g., Board member of Slovak Maintenance Society, Board member of Slovak Diagnostic Association, Member of Accreditation commission Slovak National Labor Inspectorate, Member of European Federation of National Maintenance Societies (EFNMS) - Health and Safety Committee. She is also a board member of the national and international conferences (NFU, DIS, AHFE). She is author and co – author of more than 270 papers, includes 22 education books and publication. Her worldwide experience is linked also with international projects e.g., Twinning Adviser in successful project in Czech Republic (Strengthening of Labor Inspection Administration, 2007) and Enlargement Action Plan (New members of Topic Center -

Bilbao, 2005, 2004). She was also task leader for project iNTegRisk (7FP). Her practical experiences are linked with cooperation with industry and several national research and projects granted by European structural funds. In 2021 she obtained certificate CMSE® – Certified Machinery Safety Expert (PILZ).

Hana Pacaiova, as a professor of TUKE is linked with **ULYSSEUS aliance.**
For more info, visit: https://ulysseus.eu/
She is currently involved in two submitted projects:

Call: HORIZON-WIDERA-2022-ERA -01-81 / HORIZON-CSA

Title of the project: Boosting Gender Equality at the Technology and Engineering Universities in Central Europe Through the Implementation of Inclusive GEPs.

Call: KA220-HED-Cooperation partnerships in higher education

Title of the project: Boosting Gender Equality at the Technology and Engineering Universities in Central Europe Through the Implementation of Inclusive GEPs.

Forthcoming ESReDA SEMINARS

The 61st ESReDA Seminar

Micaela Demichela
Politecnico di Torino, Italy

The 61st ESReDA Seminar on Advances in Modelling to Improve Network Resilience

22-23 September 2022, Torino, Italy. 61st ESReDA Seminar

Climate change and the delays in adopting the necessary measures to manage it is increasing the number of disrupting events triggered by natural events. Sudden failures or gradual deterioration of system components due to natural events can bring to malfunctions, loss of containment and disruptions, whole likelihood is going to increase in the next future.

In recent years several methodologies and techniques have been proposed, able to take into account explicitly and in realistic way NaTech events, able to support the decision making in terms of prevention, protection, adaptation and management.

NaTech events have also another dimension to be considered, that is the territorial one, again in terms of prevention, management, and resilience.

The aim of the seminar is thus to discuss the state of the art and on-going developments in the NaTech risk assessment techniques and methodologies and to discuss their strength, weakness, and uncertainties in the assessment of the safety and resilience of complex systems.

Topics
Methodologies and techniques for NaTech risk assessment;
Risk assessment application and decision making;
NaTech risk management;
Uncertainties;
Prevention and protection from NaTech events;
Resilience of infrastructures and equipment;
Resilience of the territories;
Multi risk approaches;
Policies;
Case studies;
Analysis of occurred events;
Data and data sources;
Emergency and crises management models & tools.

Domains (among others):
Power generation & supply
Process industry
Gas & Oil production, storage & transport
ICT networks, data storage & servers
Medical & health care
Transport: rail, road, air and maritime
Supply chain process
Water supply and water works
Land use planning
Nuclear facilities (industrial and research)

The 61st ESReDA seminar will be held in the beautiful city of Torino, on 22-23 September 2022, hosted by Politecnico di Torino, Italy.

Registration form and the practical information package will be made available soon on the ESReDA website. 61st ESReDA Seminar

Past ESReDA SEMINARS

The 60th ESReDA Seminar



Rasa Remenyte-Prescott
Kate Sanderson
John Andrews
Univ. of Nottingham, UK




Christophe Berenguer,
Sylvie Perrier,
Jean-Marc Tacnet
Julien Baroth
Univ.Grenoble Alpes, FR

The 60th ESReDA Seminar on Advances in Modelling to Improve Network Resilience, 4-5/5/2022, Grenoble, France

The seminar has been organized by the University Grenoble Alpes under the Risk@UGA Idex project framework and hosted by Grenoble INP ENSE3. It has been a forum for exploring issues related to engineering resilience against different threats, such as failures of aging infrastructure, natural disasters and climate change, intentional attacks (cyber-security and terrorism), and emerging threats, met by different industries, critical infrastructures and urban settlements. This seminar closed a 3 years project group "Resilience Engineering and Modelling of Networked Infrastructure", managed by the University of Nottingham, particularly J. Andrews and R. Remenyte-Prescott (in the center of the group picture). Contributions have covered a wide range of topics concerning several stakeholders, from practitioners to researchers (industrialists, regulators, safety boards, universities, R&D organisations, engineering contractors and consultants, training specialists) who presented their work in sessions about resilience of Electrical Networks, transport networks and Smart Cities, Infrastructure Networks… Theories, concepts, and experiences of methods for improved network resilience have been discussed. Authors have been invited to present their research and experience and discuss challenges in enhancing resilience through modelling. Papers have been published soon in JRC Technical Notes. The programme and presentations are available on the ESReDA website.

The 59th ESReDA Seminar


Agnieszka Tubis
Wroclaw
Tomasz Nowakowski
Wroclaw University of Science and Technology, Poland

The 59th ESReDA Seminar on Creating Safe and Resilient Logistic Systems
26 October 2021, Wroclaw, Poland

The 59th ESReDA Seminar on Creating Safe and Resilient Logistic Systems took place in Wroclaw on 26th October 2021. The meeting had a remote form and was organized by the Wroclaw University of Science and Technology, which is a long-standing member of ESReDA. The meeting was attended by representatives of both science and business from Poland and selected European countries. The main topic of the seminar were issues concerning creating safe and resilient logistic systems. In the first session there were two key speakers: prof. L Bukowski from WSB University and G. Paunescu from Energy Security and Safety Unit, EU. Both key speakers presented results on recent research problems related to the uncertainty of today's supply chains. Prof. Bukowski presented a lecture on Resilience of complex supply chains: how to ensure continuity of logistic processes in critical situations. Whereas G. Paunescu introduced the seminar participants to Critical supply chains for energy technologies. In the following three sessions, the speakers presented research on the risks associated with the performance of various logistics systems, including Logistics 4.0 systems. Solutions concerning new forms of logistics staff training (based, among others, on virtual reality systems), which are aimed at reducing human errors in operational processes, were also presented.

Abstracts of all the presentations will be made available as post-conference materials of ESReDA.

Project Groups

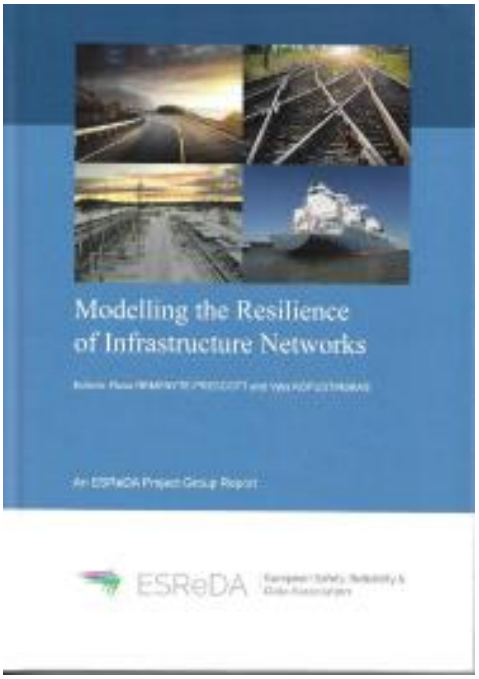
Rasa Remenyte-Prescott
University of Nottingham, UK

John Andrews
University of Nottingham, UK

Project group on Resilience Engineering and Modelling of Networked Infrastructure

Joint Project group Leaders:
– Dr Rasa Remenyte-Prescott, University of Nottingham,
– Professor John Andrews, University of Nottingham.
Project group Secretary – Kate Sanderson, University of Nottingham.

Findings from the project group have been published in a book entitled "Modelling the Resilience of Infrastructure Networks", edited by Rasa Remenyte-Prescott and Vytis Kopustinskas.



This book is a selection of contributions written by members of the Project Group, and concentrates on the themes of transportation and utilities. The papers intend to provide an insight into the state of the art of resilience modelling with a focus on Networked systems. The book is aimed at both an industrial and academic readership with interests in the resilience of engineering systems.

We would like to thank the authors for their contributions to this publication, and our colleagues at DNV for their practical support with printing and distribution.

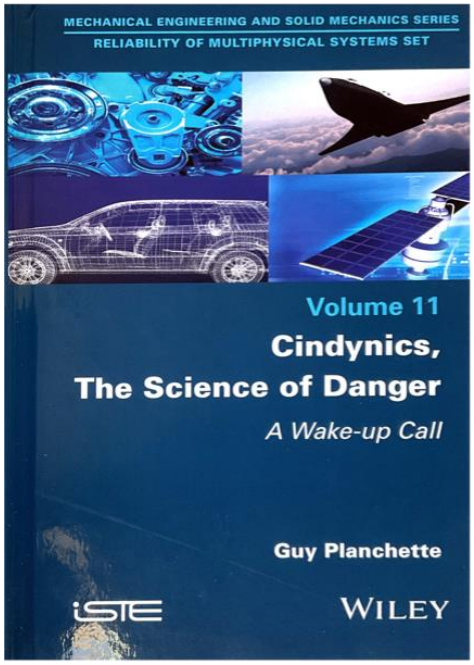
For information on how to purchase a copy please contact ajguillen@us.es ESReDA General Secretary, Antonio J. Guillén (Ingeman, Spain).

ESReDA community recommended books

ESReDA
Honoray President
Jean-François Raffoux

Cindynics, The Science of Danger *A Wake-up Call"*

This book offers a new perspective to uncover the keys to accident and disaster avoidance. Created together with a working group, it presents research and understanding on the root causes of disasters. Indeed, beyond technical failures, human beings are at the heart of organizations, and, through the exchange of data and information, influential relationships inevitably emerge such as conflicts of interest and cooperation.



With examples selected from multiple accidents and disasters, this book demonstrates that analysis of the causal chain that leads to an accident is not sufficient to understand it. The role of operational and managerial actors and the complexities they generate is also explored.

Cindynics, The Science of Danger will develop our capacity to identify gaps, deficits, dissonances, disjunctions, degenerations, and blockages, which are the real dangers in an inevitably evolving activities situations. With an easily understandable approach, this book offers new perspectives in several fields (health, crisis management and conflict resolution).

Guy Planchette has spent his entire career at the Régie Autonome des Transports Parisiens, France and has acquired skills in human resources and risk management. In 2002, he founded the French Institute for Risk Management. »

Forthcoming Conferences & Seminars

Rasa Remenyte-Prescott
University of Nottingham, UK

Special Session ESREL 2022 "Advancements in Resilience Engineering of Critical Infrastructure"
28 August - 1 September 2022, Dublin, Ireland

The ESReDA Project Group on Resilience Engineering and Modelling of Networked Infrastructure and members of the ESRA Technical committee on Critical Infrastructure, will be leading a Special Session at ESREL 2022 (European Conference on Safety and Reliability), Dublin, Ireland 28th August – 1st September 2022.

S.21: Joint ESReDA - ESRA Session on Advancements in Resilience Engineering of Critical Infrastructures. Organised by:

- Giovanni Sansavini (sansavig@ethz.ch), ETHZ, Switzerland, Chair of the ESRA Technical Committee on Critical Infrastructure),
- Rasa Remenyte-Prescott (r.remenyte-prescott@nottingham.ac.uk), University of Nottingham, UK, Lead of ESReDA PG on Resilience Engineering and Modelling of Networked Infrastructure

Motivation: We believe that this topic is important to the field of safety and reliability assessment. Our modern society is dependent on many critical infrastructure systems. These include transport networks (rail, metro, highway, air traffic and shipping routes), utilities (electricity, gas, water) and communications (mobile phone, landline phones, internet). The disruption of such systems can have a big impact on the communities that they serve. The nature of the threats to these systems is also changing and includes failures, especially of ageing infrastructure, natural disasters, the effects of climate change and deliberate acts such as terrorism. Such critical systems need to be resilient and there is a need for knowledge and skills of how to model and assess the resilience of such systems.

Objective: This special session will focus on highlighting and disseminating current state-of-the-art methods and their practical applications in resilience engineering of critical infrastructures. We expect to have contributions for this special session jointly supported by the membership of ESReDA Project Group on Resilience Engineering and Modelling of Networked Infrastructure and by the members of the ESRA Technical committee on Critical Infrastructure.

For more information and to view the Special Session program please visit the ESREL 2022 program website.

Other Conferences and Seminars

WCEAM 2022 – 16th World Congress on Engineering Asset Management.
5-7 Octubre 2022, Sevilla, Spain. More about at the WCEAM 2022 website .

Seville, a city located in southern Spain, will have the pleasure of hosting the 16th World Congress on Engineering Asset Management. WCEAM 2022 will involve experts in the application of techniques to achieve intelligent asset management in an industrial environment. The main premise of the congress' theme is how to integrate intelligence into the asset management, through the management of value, knowledge and risk.

Registration is now open. Please **ask for special price for ESReDA members**.

ESReDA Members, you are kindly invited to contribute to the ESReDA newsletter sharing news, announcement of events, your experiences, ideas, etc. You are supposed to elaborate proposals to create new Project Groups, host ESReDA Seminars or initiate collaborative activities.

ESReDA: European Safety, Reliability & Data Association
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