Recruitment of Doctoral Candidates

BRIDGITISE

Industrial Doctoral Network on **Brid**ge Di**git**al**ise**d Lifecycle Management

MSCA Doctoral Networks 2022

Funded by the European Union

	Consortium member (Legal Entity Short Name)	Country	Dept./Division/Laboratory	Scientist-in-Charge
POLITECNICO MILANO 1863	Politecnico di Milano (POM)	IT	Department of Architecture, Built Environment and Construction Engineering	Prof. Maria Pina Limongelli
NORTH CONSULTING	NORTH Consulting I/S (NOR)	DK	Risk, Resilience and Sustainability Supported Decision Support Across Scales	Prof. Michael Havbro Faber
UNIVERSITY OF TWENTE.	University of Twente (TWE)	NL	Department for Civil Engineering, Management and Engineering	Dr. Irina Stipanovic
de' remi facemmo ali 1990 POLITECNICO DI BARI	Politecnico di Bari (POB)	IT	Dept. of Electrical and Information Engineering	Prof. Nicola Cordeschi

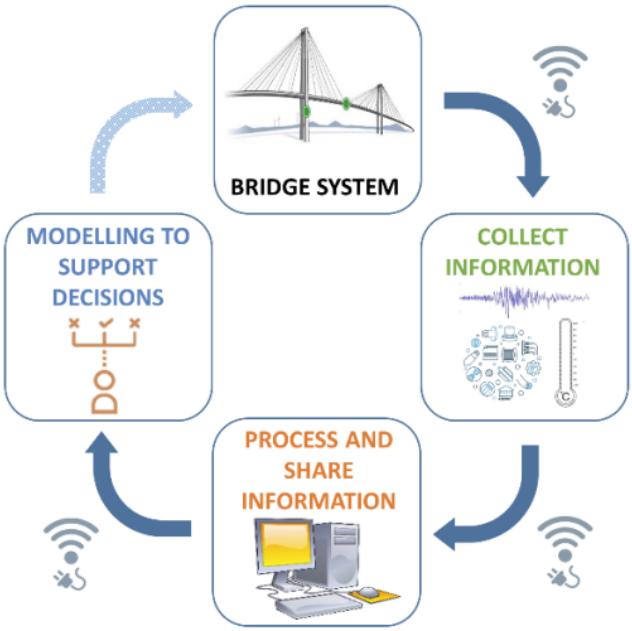
	Consortium member (Legal Entity Short Name)	Country	Dept./Division/Laboratory	Scientist-in-Charge
	Lund University (LUN)	SE	Department of Civil and Environmental Technology	Prof. Sebastian Thöns
	Zavod za gradbeništvo Slovenije (ZAG)	SI	Department of Structures	Dr. Aleš Žnidarič
	Royal Institute of Technology (KTH)	SE	Dept. Structural Engineering and Bridges	Dr. Raid Karoumi
	Sacertis (SAC)	IT	Monitoring & Diagnostics - Engineering Department	Prof. Giuseppe Mancini

	Consortium member (Legal Entity Short Name)	Country	Dept./Division/Laboratory	Scientist-in-Charge
RAMBØLL	Ramboll Denmark A/S (RAM)	DK	Monitoring & Analysis of Existing Structures	Dr. Joan Hee Roldsgaard
cemosa Ingeniería y Control	CEMOSA (CEM)	ES	Research and Innovation Department	Dr. Noemi Jimenez-Redondo
MONITORING SOCOTEC	Socotec Monitoring France (SMF)	FR	R&D Department	Dr. Maxime Tatin
PEDELTA	Pedelta (PED)	ES	Department of Bridge Engineering	Javier Jordán

	Consortium member (Legal Entity Short Name)	Country	Dept./Division/Laboratory	Scientist-in-Charge
	Wölfel (WOL)	DE	R&D Department	Dr. Carsten Ebert
	Cestel (CES)	SI	R&D Department	Matjaž Skobir
	Federal Highway Research Institute (BASt)	DE	Bridges and Structural Technology	Dr. Ing. Matthias Müller
	IBM (IBM)	CH	AI Automation	Dr. Cristiano Malossi

	Consortium member (Legal Entity Short Name)	Country	Dept./Division/Laboratory	Scientist-in-Charge
Tallinn	Tallina Linnaplanermise Amet (TAL)	EE	Urban Planning Department	Martin Karro
ETH zürich	Eidgenössische Technische Hochschule Zürich (ETH)	CH	Urban Planning Department	Dr. Michele Magno
WESTEN BERG	Fred Westenberg (FWE)	NL	Department of Information Technology and Electrical Engineering	Fred Westenberg
exprivia	Exprivia (EXP)	IT	Inspection and monitoring of bridges	Giovanni Melone

	Consortium member (Legal Entity Short Name)	Country	Dept./Division/Laboratory	Scientist-in-Charge
ΕΓΝΑΤΙΑ ΟΔΟΣ Α.Ε.	Egnatia Odos (EOD)	GR	Structures Health Monitoring and Maintenance Unit	Dr. Panaiotis Panetsos
TRE ALTAMIRA	TRE Altamira (TRE)	IT	R&D departement	Dr. Alessio Rucci
BEXEL	Bexel (BEX)	RS	Software development	Igor Osmokrovic
HRVATSKE AUTOCESTE	Croatian Motorways Ltd (HAC)	CR	Department for EU projects and development	Bojan Vivoda



Introduction

Applications are invited for 16 Doctoral Candidates (DCs), funded by the Industrial Doctoral Network on Bridge Digitalized Integrity Management, BRIDGITISE. The network consists of high-profile universities, research institutions and companies located in Italy, Denmark, the Netherlands, Sweden, Slovenia, Spain, Switzerland, Greece, Croatia, France, Germany, and Estonia. The positions have a duration of 3 years, however some of the PhD schools require 4 years of study as indicated in the individual tables below.

Objective of BRIDGITISE

The BRIDGITISE doctoral network focuses on the digitalization of bridge management across the lifecycle through the development of innovative approaches to information management. The basic idea underlying the project is that the achievement of excellence in this field requires the development and validation onsite of innovative technologies for the cost-effective management of bridge information and their use to support decisions relevant to bridge integrity management across the lifecycle. To this aim, a network of 15+1 PhD projects is structured around three main research and training clusters focused on the development and validation of: -innovative low-cost, large scale and automatic technologies, to collect bridge information - Artificial Intelligence and IoT technologies specifically tailored to bridges to process and share information, - digital decision support tools able to manage bridges across their lifecycle. The project will combine the expertise of six universities, one research center, and seventeen industrial companies and end-users who will provide case studies to apply and validate the project results thereby fostering the technological transfer of the research findings. This powerful combination of expertise from industry and academia will introduce the DCs to the topics of the project and add to their inter-sectoral employability, enabling Europe to build world-class competitive capacity in a strategic market. Deliverables of the BRIDGITISE DN will be technology-enhanced training and dissemination tools, international workshops, and Training Schools. Furthermore, an Open platform for sharing data

related to bridge management will be built to develop collaborative and information-sharing skills of the DCs and to increase the impact of the project.

Overview of the doctoral training programme

The training programme is structured into three training levels: Individual, Cluster, Network

- **Individual Training** which consists of supervised research, secondment and local courses in which the DC will have access to research infrastructures, scientific and professional networks, and real-world dataset.
- **Cluster Training level** where the DCs will be confronted with the practical use of practical use of digital tools in the bridge industry and with technical and commercial challenges from concept to realization.
- **Network Level Training** will consist of BRIDGITISE Training Schools that will be developed jointly by academic and industrial partners.
- **Academy-based Transferable Training** which consists of continuous teamwork between the DCs students in which they will develop an ontology for the knowledge domain spanned by the project objectives. This work consists in substantial literature research to identify concepts of relevance for the digitalization of bridge management depending on the context of bridge management at hand.
- **Industry based Transferable Training** in which the DCs will learn approaches, and organizational issues (team dynamics, leadership, conflict management).

Benefits

The Marie Skłodowska-Curie Actions (MSCA) programme offers a highly competitive and attractive salary and working conditions. The successful candidates will receive a gross salary in accordance with the MSCA regulations for doctoral candidates.

Exact gross salary will be confirmed upon appointment (employer costs and other deductions depend on recruiting host): living allowance = €3.400/month (correction factor to be applied per country) + monthly mobility allowance = €600. An additional monthly allowance of €660 is applicable depending on the family situation. The gross salary indicated above is paid for a maximum of 36 months.

Due to difference in the correction factor between the different countries the salary may change when the DCs change beneficiary (1 academic and 1 industrial). The beneficiaries for each project are listed in the tables below. In addition to their individual scientific projects, all fellows will benefit from further continuing education, which includes secondments (internships), a variety of training modules as well as transferable skills courses and active participation in workshops and conferences. Within Bridgitise each recruited researcher will for most projects spend one secondment period at one of the other complementary Beneficiaries or Associated Partners. The planned secondment(s) is shown below for the individual projects.

Eligibility Criteria

Doctoral Candidates must not have been awarded a doctoral degree. Conditions of international mobility requires that researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the first recruiting host organization for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

Recruitment and selection process

All applications must as minimum contain the following:

- Motivation letter (maximum 2 pages)
- CV
- Transcripts of courses and grades (Translated into English if the original document is not issued in English language. Copies of originals must be certified.)

All candidates will be reviewed on the following, however not limited to:

- outstanding academic performance
- research and innovation potential.
- alignment of research interests with BRIDGITISE.
- number and quality of publications.
- language skills.
- independently pursue his/her work.
- collaboration with others

For each project the 5 best rated candidates will be invited for an online interview.

If more than one position is applied for the prioritized list of projects should be given in the motivation letter. Each candidate is allowed to apply to maximum 3 PhD projects.

All candidates must ensure they comply with the overall requirements and with the local requirements of the PhD school in which they will be enrolled (listed in the tables of the individual projects).

All applications must be submitted to the common application platform, link is given HERE

The deadline for applications is the 31 March 2024.

	Consortium member (Legal Entity Short	Requirements for enrolment in the PhD-School
POLITECNICO MILANO 1863	Politecnico di Milano / Politecnico di Bari (POM / POB)	• The candidate must hold a 2nd level Master of Science (120 ECTS + 180 ECTS in a bachelor degree) or equivalent degree. • Candidates who are not in possession of the required qualification at the call closing date may apply but the academic qualifications must be awarded before enrolment. • The candidates must not have a doctoral degree at the date of the enrollment. • The final score obtained for the Master degree must not be lower than C+ in ECTS grading system. • Certified knowledge of English is required if not native speakers.
KTH VETENSKAP OCH KONST / LUNDS UNIVERSITET	Royal Institute of Technology / Lund University (KTH / LUN)	• The candidate must hold a 2nd level Master of Science (120 ECTS + 180 ECTS in a bachelor degree) or equivalent degree with at least 60 credits were awarded in the 2nd level or has acquired substantially equivalent knowledge in some other way. • Mandatory requirement for English equivalent to English B/6
UNIVERSITY OF TWENTE.	University of Twente (TWE)	• Doctoral candidates are required to have attained a Master of science degree or equivalent education. They may only be admitted if their Master degree(s) and further academic record are approved after evaluation. • Doctoral candidates with a non-Dutch qualification and who have not had secondary and tertiary education in English may only be admitted if they have sufficient command of the English language. Official documents with test results are required for this, showing a total band score of 6.5 for an academic IELTS-test or TOEFL via the internet (TOEFL-iBT) of at least 90 or Cambridge CAE-C (CPE).
ETH zürich	Eidgenössische Technische Hochschule Zürich (ETH)	• The admission requirements for a doctorate at ETH Zurich are a Master's degree from a recognized university and excellent academic performance. • The supervisor must endorse the application.

Doctoral Students' individual projects

For each of the 16 PhD projects planned in BRIDGITISE the table below presents: the title of the project, the supervisors of Doctoral Candidate, the host institution/company, and the PhD programme that will enroll the candidate. Unless noted the PhD programme is a 3-year programme. The consortium reserves the right to justify changes under specific circumstances.

CROWD – Mobile crowdsensing and IoT for bridge system identification.

Fellow:	**Host institution:**	**Enrollment in Doctoral degree:**
DC1	POM-EOD (EXP)	POM

Supervisors: M.P. Limongelli (POM), P.F. Giordano (POM), P.Panetsos (EOD)

Objectives: System identification using data collected at a large scale using mobile devices and cloud computing.

Expected results: (1) A validated Bayesian system identification algorithm integrated with (2) an IoT protocol for cloud sharing and computing of crowdsensed information; (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis describing the methodology.

Description: Continuous monitoring systems based on local sensors suffer from scalability issues related to the high investments needed to monitor at network scale. Crowdsensing can significantly reduce large scale monitoring costs and provide large sets of information, more robust to operational and environmental effects. In the last years, several techniques to extract structural information from sensors mounted on vehicles or in smartphones have been proposed. The simultaneous advancements in wireless communication and computing technologies have propelled the use Internet of Things (IoT) and of cloud computing. However, there are still some major research challenges: a) the efficient and reliable transmission of the collected data to a cloud unit for processing; b) the impact of the sensors and carriers (humans and/or vehicles) on the collected data; c) the validation of the approaches on real bridges. The DC will develop a Bayesian system identification approach based on crowdsensed data. The algorithm will be validated first using the finite element model of a monitored bridge made available by EOD and later on the bridge site. During the second year, the DC will develop an IoT information transmission protocol based on a decentralized architecture, to transmit the crowdsensed data to a platform for processing and sharing. The algorithm will be implemented in a smartphone application to enable the collection and transmission of information by the bridge users. A rewarding game will be ideated to incite the bridge users to use the smartphone application. Results will be compared to those provided by the traditional monitoring system installed on the bridge. The same case study and platform of CYBER and DRONES will be used for data processing.

Time plan:

Month	**Institution**	**Country**	**Supervisor(s)**	**Description**
1-15	POM	Italy	Limongelli and Giordano	to develop the Bayesian identification algorithm
16-24	EXP	Italy	Melone	to develop the mobile app and to code the Bayesian algorithm for the IoT platform
25-33	EOD	Greece	Panetsos	to validate the methodology onsite
34-36	POM	Italy	Limongelli	to finalize the PhD thesis

SATELLITE - Integration of InSAR-derived and environmental measurements for anomaly detection

Fellow:	**Host institution:**	**Enrollment in Doctoral degree:**
DC2	TRE–POM (KTH)	POM

Supervisors: A. Rucci (TRE), M.P. Limongelli (POM)

Objectives: Detect anomalies in bridges using InSAR, accounting for local environmental and operational effects.

Expected results: (1) The identification of signatures of specific damage scenarios for selected categories of bridges. (2) An outlier detection method and a machine-learning algorithm to identify signatures in InSAR derived displacement time histories. (3) A PhD thesis describing the architecture and its implementation. (4) Accepted peer-reviewed papers. (5) Successfully defended PhD thesis.

Description: Interferometric Synthetic Aperture Radar (InSAR) monitoring provides millimetric precision information about structural displacements. Their combination with statistical information on other sources of displacement such as weather or traffic, promises to be a key-factor for the detection of anomalies, not yet investigated. SAR techniques have been historically applied to monitor at a large spatial scale. Recent developments in this field enable a higher resolution and cost/benefit ratio compared to traditional topographic survey techniques, for the monitoring of civil infrastructures. In this DC project, the use of InSAR derived information to detect anomalies is investigated. The objective is to identify signatures of specific damage scenarios for selected categories of bridges in InSAR derived displacement time histories. To this aim finite element (FE) simulations will be carried out during the secondment at KTH, using the numerical models of real bridges to simulate specified damage scenarios. The numerical responses will be translated into equivalent signals to simulate the noisy measurement that would be acquired by the satellite along the line-of sight (LOS). The labelled LOS equivalent signals will be then used to a twofold aim. Under the supervision of POM a computationally efficient data driven algorithm based on outliers detection will be developed accounting for the influence of environmental variability. Further to this, during the secondment at KTH and later, under the supervision of TRE, the numerical results will be used to train a supervised Artificial Neural Network (ANN) that will provide, an InSAR-based damage detection tool. The unsupervised and the ANN damage detection tools will be validated using experimental data and the FE-model provided by RAM during short visits of the DC.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-7	POM	Italy	Limongelli	for training on structural modelling and radar systems
8-12	KTH/RAM	Sweden	Karoumi/Friis	to develop the numerical dataset and the ML algorithm
13-18	POM	Italy	Limongelli	to perform the transformation into SAR geometry
19-36	TRE	Italy	Rucci	for the validation of the detection tool using the ML algorithm and real case studies

DRONES - Automated visual inspections of bridges using Unmanned Aerial Systems and vision-based digital imaging

Fellow:	**Host institution:**	**Enrollment in Doctoral degree:**
DC3	POB–EXP (IBM)	POB

Supervisors: N. Cordeschi (POB), G. Melone (EXP)

Objectives: Optimize Unmanned Aerial Systems-based visual inspections.

Expected results: (1) A novel UAS control and communication architecture for Vision systems optimized in terms of power consumption for data processing and flight time. (2) An AI algorithm, to process in real-time vision data for condition assessment of bridges. (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis describing the methodology.

Description: The joint use of Unmanned Aerial Systems (UASs) and Artificial Intelligence enables automated visual inspection and assessment through the transmission of real-time collected information to ground control centers, thus greatly facilitating fast assessment of inaccessible areas and/or under hostile environmental conditions, without requiring traffic interruptions. The current state of the art proposes limited applications that do not scale with the employment of multiple UASs. The emerging technologies are only recently facing the challenge of connecting UASs with advanced imaging peripherals relying on algorithms that optimize trajectory and communication quality. Indeed, the integration of UASs with open SHM systems is currently limited due to the lack of state of the art solutions and AI models that are able to jointly address drone energy efficiency, advanced imaging peripherals, information streaming over the Internet to cloud integrated services, remote mission design, and real-time control of UASs, that prevent accidents and minimize environmental and telecommunication disturbances factors, e.g., wind, radio interference, low light conditions, optical light reflections, etc. Given the aforementioned technological limitations, this project will develop advanced Artificial Intelligence algorithms for automated visual inspections through the formation of high speed and high-resolution geo-referenced photos. Furthermore, the control operations and the images are transmitted in real-time through the employment of novel communication techniques and protocols, based on the recent novelties of the 5G communication technologies. The combination of these two approaches leads to a comprehensive framework for bridge assessment and damage detection. Validation of the case study made available by EOD and carried out during a short visit.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-18	POB	Italy	Cordeschi	to develop optimization trajectory algorithms and a 5G communication system to handle multiple drones
19-24	IBM	Switzerland	Scheidegger and Malossi	to develop the AI visual inspection algorithm
25-36	EXP	Italy	Melone	to develop the algorithm for image processing

WIM - Advanced Bridge Weigh in Motion (B-WIM) performance using vision-based data and machine learning

Fellow:	**Host institution:**	**Enrollment in Doctoral degree:**
DC4	ZAG – CES (POB, TWE)	POB

Supervisors: A. Žnidarič, A. Anžlin (ZAG), M. Skobir (CES)

Objectives: Leverage vision-based monitoring and machine learning (ML) to enable enforcement-based B-WIM.

Expected results: (1) Labelled database (2) ML classification tool (3) Validated prototype of ML-BWIM system (4) Accepted peer-reviewed papers. (5) Successfully defended PhD thesis.

Description: Prolonging the lifetime of highway bridges based on measured traffic loads is essential for reducing resource exploitation and traffic delays. Financially, this can result in millions of Euros annual savings in maintenance and user costs. Bridge weight in motion systems (B-WIM) can efficiently collect this data, however, their accuracy and reliability do not meet the metrology standard requirements, preventing their use in legal enforcement applications. In this project, a next-generation B-WIM system will be developed leveraging machine learning (ML) technology to process the vast amount of data from different sources (traditional B-WIM, traffic cameras etc.) collected by the industrial supervisor CES. Supported by the expert knowledge of the academic supervisor ZAG, the DC will form data pillars composed of B-WIM measured and processed strain data and synchronized photos acquired by traffic cameras. During the secondment at TWE, a vision-based algorithm will be built to extract vehicle type and dimensions from these photos. Under the supervision of POB, both data pillars will be used to develop a next-level ML classification tool, a prerequisite for a more accurate B-WIM system that will comply with metrology requirements. The ML tool will (i) identify critical aspects in the current B-WIM data processing and (ii), through a sensitivity analysis, recognize data types with the most influential impact on the accuracy and reliability of B-WIM results. Finally, the enriched ML-BWIM will be validated in normal operating conditions under the supervision of CES.

Time plan:

Month	**Institution**	**Country**	**Supervisor(s)**	**Description**
1-9	ZAG	Slovenia	Žnidarič and Anžlin	to build the database
10-12	TWE	Netherlands	Kromanis and Hartmann	to develop the vision-based algorithm
13-18	POB	Italy	Bevilacqua	to develop the classification ML tool and perform the sensitivity analysis
19-36	CES	Slovenia	Skobir	to validate the enriched ML-BWIM on a real case study

EDGE - Edge computing and dense low-cost sensing for early damage detection

Fellow:	**Host institution:**	**Enrollment in Doctoral degree:**
DC5	SAC – KTH (POM)	KTH

Supervisors: G. Mancini and P. Darò (SAC), R. Karoumi (KTH)

Objectives: Develop cost-effective sensors architecture with edge computing capabilities for damage detection.

Expected results: (1) A Decision Support Tool (DST) to optimize the architecture of sensors with edge computing capabilities. (2) A Machine Learning (ML) algorithm for the classification of the considered damage scenarios trained, verified, and validated using laboratory and real data. (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: Damage detection is a key aspect of Structural Health Monitoring (SHM), essential to monitor the time evolution of structural safety. New sensor network architectures, with dense distributions of low-cost sensors, are spreading. The sensor redundancy has the twofold aim to provide a backup in case of sensors nodes failure and to increase the size of the available dataset, thereby reducing uncertainty. Recent developments in edge computing enable the optimization of the sensors' architecture, in terms of minimum consequences associated with false/missing alarms. In this DC project, these possibilities will be exploited for the development of a Decision Support Tool (DST) for the design of network architecture of edge computing sensors, optimized for damage detection. The main barrier in the development of such DSTs, is usually the lack of real-world data needed for their validation. This DC project will benefit from large datasets made available by SAC. Nonlinear finite element (FE) modelling – calibrated using responses collected on real bridges - will produce large sets of data relevant to several damage scenarios. Using this dataset, a machine learning (ML) algorithm for the classification of the considered damage scenarios will be trained, verified, and validated under the supervision of KTH and used to develop the DST. Sensitivity to non-severe damage, accounting for the metrological performances of the sensors, for the impact of environmental conditions, and for the possibility of sensors nodes failures will be investigated to clearly set the limits and benefits provided by the developed DST. The DST will be validated through laboratory testing at POM on a scaled model of reinforced concrete beams and using real data made available by SAC.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-15	KTH[1]	Sweden	Karoumi	to develop the DST
16-33	SAC	Italy	Mancini and Darò	to perform nonlinear FE analysis to the labelled dataset for the training and validation of the DST
34-36	POM	Italy	Cigada	to validate the DST on laboratory and real-world data made available by SAC

[1] PhD programme is 4 years

ROBOT – Robots, such as Boston Dynamics SPOT

Fellow:	**Host institution:**	**Enrollment in Doctoral degree:**
DC6	IBM – ETH (POM)	ETH

Supervisors: C. Malossi & F. Scheidegger (IBM), M. Magno (ETH)

Objectives: Develop cost-effective sensors architecture with edge computing capabilities for damage detection.

Expected results: (1) AI algorithm to process images/videos from robots (2) A PhD thesis describing the methodology. (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: Robots such as SPOT and Unitree A1 have reached outstanding performance in mobility. However, utilization of such devices is still limited in practical visual inspection applications, due to the lack of standardization and automation in processing of images and videos captured with such devices. Our DC will work towards automating the visual inspection pipeline for these robots to be fully operational. While flying drones are great to inspect external open areas, robots are a better fit for internal areas of bridges, which pose an issue w.r.t. space to fly, presence of dust, and weak GPS signal. At IBM the DC will develop AI algorithms to automate the creation of new domain-specific models using the Robots, as well as automate the domain adaptation process. The DC will study how to enforce real-time quality control of the acquired data, suggest actions to improve the acquisition, automate the selection of relevant frames from long sequence of videos and use self-supervised pipelines to build reusable models with nonannotated data. At ETH the DC will port the AI models on the robot and experiment with multi-modal data collection modalities (e.g., infrared, thermal hyperspectral images). At POM the DC will experiment on real applications supporting data acquisition for the development of the models as well as the validation of the results.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-6	ETH[1]	Switzerland	Magno	to establish and evaluate the mobility, perception sensory, computing system, and API layers of the robot
7-32	IBM	Switzerland	Scheidegger	to test the integration between the robot and the computer vision models
33-36	POM	Italy	Cigada	to validate the results of the AI models
10, 21	POM	Italy	Cigada	to acquire sets of multi-modal data

[1] PhD programme is 4-6 years

PLATFORM – An advanced digital platform to integrate SHM data into bridge management

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC7	BEX – ZAG (POM, TAL)	POM

Supervisors: S. Lenart (ZAG), A. Anžlin (ZAG), I. Osmokrovic (BEX)

Objectives: Automatize the integration of continuous monitoring information into Bridge Management Systems (BMS).

Expected results: (1) Proposal for extension of IFC standard to support exchange of SHM information (2) BMM extension for digital BIM

platform (3) a successfully defended PhD thesis on the methodology: (4) accepted peer-reviewed papers.

Description: BrIM relies on inspection-based performance indicators (PIs) to support decisions on management actions. The integration of information from continuous monitoring systems (SHM), together with the possibility to automatize the estimation of the PIs and facilitate. their visualization through bespoke BIM-based platforms, can greatly enhance the support to decision making these indicators can provide However, such advancements are currently hindered on one side by the unavailability of standardized semantic formats (IFC) to incorporate the SHM information into the BIM model, and on the other by the lack of tools to represent the information conveyed by the PIs in a format that facilitates their use by decision-makers. In this project, a dedicated BrIM extension of a digital BIM platform made available by the industrial supervisor BEX will be developed to enable the integration of a proposed IFC standard extension incorporating SHM information. Furthermore, a visual representation of the PIs, for the components or selected portions of the bridge, will be enabled based on integrated SHM data into the BIM model. It will be further enriched by a module to estimate the PIs according to the Slovenian BrIM that the DC will develop under the academic supervisor at ZAG and by an algorithm to estimate vibration-based PIs from ambient vibration that the DC will develop during the secondment at POM. The proposed solution will be validated using both a case study made available by ZAG and a selection of bridges in the Tallin local network for which 3D BIM models and data will be made available by TAL.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-12	BEX	Serbia	Osmokrovic	to develop BMM extension of BIM platform and a tentative IFC standard
13-18	POM	Italy	Limongelli	to develop vibration-based PIs
19-30	ZAG	Slovenia	Lenart	to develop the PIs according to the Slovenian BMM
31-33	TAL	Estonia	Raitviir	To use and modify Tallinn data
34-36	BEX	Serbia	Osmokrovic	to validate and fine-tune the proposed solution on case studies

TWINS: Probabilistic Digital Twins for continuous bridge performance modelling

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC8	NOR – SAC (POM)	POM

Supervisors: M.H. Faber (NOR), G. Mancini (SAC)

Objectives: Develop a probabilistic digital twin model for optimal maintenance management of prestressed concrete bridges.

Expected results: (1) PDT model of the bridge and damage classification model; (2) procedure to identify the optimal maintenance schedule; (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: The multiplicity of possible different and possibly interacting processes contributing or governing deterioration processes in bridges requires systems representations way beyond the deterministic approach where there is only focus on one or two processes and corresponding models. Currently, there is only limited knowledge on indicators and techniques effective to correlate the observable performance of pre-stressed structures with their structural reliability. A Probabilistic Digital Twin (PDT), supported by SHM and semi-big data from observations and monitoring, can provide a novel contribution to solve this issue and may support integrity management with knowledge improved substantially over time. In this project, an approach to build the PDT of a bridge will be developed making use of nonlinear FE-modelling of the effect of the deterioration. SAC will make available the FE model of a pre-stressed bridge under continuous monitoring that exhibits typical deterioration processes. The DC will use the model to simulate the structural responses under deterioration progressing in time. These responses will be used to develop a PDT model of the bridge that will be utilized as a representation of the best available knowledge and applied to generate (Big Data) simulations of very significant numbers of structural performance scenarios over time; including degradation developments of different origins (environmental factors, loading history, etc.), observations (dynamic responses, displacements, etc.) together with noise associated with different monitoring and inspection devices. Based on the established Big Data, classification schemes will then be utilized to identify how observable structural performances relate to different types and levels of degradation. The PDT will be used during the secondment at POM, as a base to model the structural performances of the bridge under given loading and environment scenarios and identify a procedure to develop the optimal maintenance schedule, based on reliability requirements.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-15	SAC	Italy	Mancini	to generate numerical responses for several damage scenarios
16-21	NOR	Denmark	Faber	to develop the PDT model of the bridge and the classification schemes
22-33	POM	Italy	Limongelli	to use the PDT to identify the optimal maintenance schedule
34-36	SAC	Italy	Mancini	to finalize the PhD thesis

CYBER - Advanced and secure identity provisioning and network monitoring for augmented bridge infrastructures

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC9	EXP – POB (EOD)	POB

Supervisors: G. Melone (EXP), G. Boggia (POB)

Objectives: Design and evaluate a platform for the secure storage and sharing of monitoring data among stakeholders.

Expected results: (1) Design, implementation, and performance analysis of a security platform to authenticate and validate bridge maintenance analysis and operations done by automated systems, such as mobile devices (2) Adaptation and validation of the platform for the case study of an existing bridge. (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: High-throughput, real-time, and blockchain technologies enable massive secure communications and data sharing across organizations. Indeed, cybersecurity represents the key enabler for digital chains of trust, ensuring secure communications between all the involved actors in the infrastructure. This allows the application of augmented sensors and communication systems that ensure open SHM systems to operate and collaborate securely. The current state of the art reports several open issues; that limit the broad usage of such security mechanisms, especially in IoT applications. This project will investigate their implementation and integration within an open SHM system, while encompassing authentication and fine-grained access control among peers and information, especially between all the actors involved in bridge monitoring and maintenance. Furthermore, efforts in lightweight cryptography and secure protocols will be researched to securely deliver/receive information to/from constrained devices. To this end, the PhD candidate will (1) study the state of the art in the cybersecurity domain, (2) investigate and validate cybersecurity technology in open SHM systems, (3) design cybersecurity architectures applied to infrastructure monitoring that integrates with an open SHM system, (4) compare conceived solutions with other methodologies through simulations, (5) evaluate the proposed solutions through multiple proofs of concepts, and (6) analyse the performance of conceived solutions and their impact in a real-world SHM scenario using the Greek bridge also used by the DCs CROWD and DRONES.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-15	POB	Italy	Boggia	SoA analysis and design of the security strategy for the IoT cloud computing platform
16-30	EXP	Italy	Melone	to develop the secure platform based on distributed ledger technology
31-33	EOD	Greece	Panetsos	to validate the platform on the bridge used for DC CROWD
34-36	POB	Italy	Boggia	to finalize the PhD thesis

NEURAL - Machine learning for deterioration prediction based on digital information streams

Fellow:	Host institution:	Enrolment in Doctoral degree:
DC10	KTH - PED	KTH

Supervisors: J. Leander (KTH), J. Jordan (PED)

Objectives: Develop prognostic deterioration models based on sensor data and machine learning for service life augmentation.

Expected results: (1) Developed Machine Learning (ML) algorithms for deterioration prediction and possible assemble methods for optimized predictions. (2) Guidelines on how to setup and train the ML tool. (3) Scientific papers on deterioration modelling with ML integrating measured data. (4) Successfully defended PhD thesis.

Description: The project aims at developing a method based on long term monitoring but with small scale systems to predict deterioration phenomena such as corrosion wastage and fatigue. The long-term aim is to create a tool for prolonging the service life of bridges and saving condemned structures. Lack of load-bearing capacity shown by theoretical assessments can often be due to lack of knowledge on the real behaviour of the structure, or overly conservative assumptions. This project will exploit the use of machine learning (ML) to establish metamodels for the interpretation of monitoring data and for the prediction of deterioration, which eventually will lead to a measure of safety (e.g. safety index). Previous research using machine learning have focused typically on damage detection applied to numerical models, simulated damages on laboratory models, and with a few examples on data from real bridges. Examples of data-driven deterioration state prediction for bridges are scarce. Evaluation and validation of several ML algorithms will be conducted in the project to optimize the efficiency of the predictions. The outcome of the project will likely be assembled methods for machine learning combining, e.g., neural networks (NN), support vector machines (SVM), and decision trees (DT), for deterioration prediction. In the second part of the project, the metamodel, developed using numerical data, will be adapted, trained and validated using data collected on real case studies (e.g. HSR Bridge over the Llobregat River, close to Barcelona) the under the supervision of PED.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-18	KTH[1]	Sweden	Leander	to develop and validate, on numerical data, a ML-based metamodel of corrosion and fatigue
19-36	PED	Spain	Jordan	to adapt and validate the ML metamodel for real bridge case studies

[1] PhD programme is 4 years

VISUAL - Augmented reality enhanced bridge condition assessment.

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC11	FWE – TWE (POB)	TWE

Supervisors: F. Westenberg (FWE), R. Kromanis, A Hartmann, I. Stipanovic (TWE)

Objectives: To automatize the execution of visual inspections and the classification and visualization of damages and defects.

Expected results: (1) a validated classification model for bridge defects; (2) a validated augmented reality tool for defect classification; (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: Bridge condition assessment is typically performed through visual inspections that are laborious, and sometimes subjective to an inspector's opinion. Besides, past inspection reports are seldom used/referred to in repeated inspections. In this project, computer vision, machine and deep learning techniques will be used to build an advanced classification model of bridge elements and defects (extent and severity) from a large database of labelled images made available by the industrial supervisor. The model will then be used to develop an augmented reality (AR) tool to be integrated into handheld devices (e.g., smartphones or tablets) or UASs, to support inspections. The AR tool will allow to (i) indicate areas requiring attention (previously detected defects) and, (ii), reveal propagations of previously detected defects. FWE will provide (i) access to a large database of images of bridge defects with descriptions, (ii) guidance on how to read bridge inspection reports and their metadata, and (iii) define the criteria for defect classification. Suring the secondment at POB, the DC will develop a ML-based framework to classify visual inspection information and an AR tool that can be used to overlap real-time computed digital content of collected images (e.g., defect type, severity and extend) on the acquired images. TWE will guide the DC in the validation of the classification model and in the application of the AR tool using real case studies made available by FWE.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-18	FWE	Netherlands	Westenberg	to interpret inspection reports and their metadata, and (iii) to define the criteria for defect classification
19-24	POB	Italy	Bevilacqua	to develop the ML classification algorithm
25-36	TWE[1]	Netherlands	Kromanis, Hartmann, Stipanovic	to validate the classification model and apply the AR tool on real case studies

[1] PhD programme is 4 years

CIRCULAR - Circular life cycle management of bridges

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC12	TWE – CEM (HAC)	TWE

Supervisors: I. Stipanovic, A. Hartmann (TWE), N. Jimenez-Redondo, C. Toribio Diaz (CEM)

Objectives: To develop circularity metrics as decision support tools for sustainable bridge management.

Expected results: (1) Metrics using KPIs for circularity assessment (meso-scale), (2) A decision support tool to optimize life cycle management of bridges enabling the development of different scenarios at the end of service life, and linking existing materials/components with future needs, (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: Europe has the ambitious plan to become climate neutral by 2050, which can be only achieved by scaling up the circular economy from front-runners to the mainstream economic players, such as construction, and more specifically, the bridge sector.

Recycling possibilities for materials, the micro-scale, have been thoroughly researched and predictions for material flow on a city scale, the macro-scale, have been mapped. Yet, the mesoscale, the scale of the construction in general, is scarcely discussed and investigated. Most of the demolished structures are recycled, but downcycled, meaning the material loses value and is primarily used outside the sector. Meso-scale circularity indicators have not been developed yet, because they require to be as detailed as micro-scale indicators, yet need to take into account the design principles and associated standardisation schemes as well. In this project, the DC will develop circularity metrics and a decision support tool (DST) to link demolishing and new projects exploiting digital data about the existing bridges - including geometry, quality and quantity of the existing materials and components Within the period of first 18 months at TWE the DC will perform the analysis of existing Asset Management Platform, will develop innovative mesoscale circularity indicators and metrics for bridges/infrastructure and implement into different life cycle scenarios (from design to the end-of-life scenario, including recycle, upcycle and reuse). The DC will also perform a secondment at HAC to apply and validate the circularity metrics using data from a Croatian bridge stock. In the second part of the PhD (M25-M42), under the supervision of CEM, the DC will develop a decision support tool for circular bridge management and apply it to the case studies from Croatia, Spain and the Netherlands

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-15	TWE[1]	Netherlands	Stipanovic, Hartmann	to develop meso-scale circularity metrics and simulate several different life-cycle scenarios
16-18	HAC	Croatia	Vivoda	to collect data and use them to test the applicability of the circularity metrics
19-36	CEM	Spain	Jimenez-Redondo and Toribio Diaz	to develop and validate the DST for circularity management

[1] PhD programme is 4 years

CODES - Small data becoming big data

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC13	RAM – NOR (POM)	POM

Supervisors: J.H. Roldsgaard (RAM), M.H. Faber (NOR)

Objectives: To develop a methodology to share and integrate monitoring information into bridge design codes.

Expected results: (1) recommendations for reliable and robust online sharing of small data; (2) a validated general probabilistic prediction model of a bridge updated with monitoring information; (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description: The uncertainty affecting the prediction of the structural behavior and loading is normally represented by safety factors in the design codes. These factors do not account for the availability of information. The access to digital information for bridges has increasingly grown in the last decade. This includes both information gained from sensors, but also inspections, as-built information etc. Their availability has significantly enhanced the modelling of the actions (loading) and their effects for different bridge types. Recently, researchers have been focused upon quantifying the uncertainty of monitoring data to be used in the value quantification. However, bridge specific or bridge type-specific information is not used in a broader context or in a more generic well-defined context such as how much the potential reduction in safety factor can be based on monitoring data. Design and asset management of a larger group of bridges with similar properties can take advantage of the knowledge gained from the small pool of bridges, where a detailed understanding of the loading and the load effects has been established. This project will develop a framework to (a) codify and publicly share monitoring information collected from a limited pool of bridges of different types. This will include the adoption of robust and reliable online sampling from multiple sources and clients to improve the quality of the data; (b) the extraction of correlations in the monitoring data gathered from a limited pool of different bridges for the creation of a probabilistic prediction model of a bridge to be used in general; (c) the updating of the probabilistic model using monitored data; d) the identification of the process to use the probabilistic model to update design codes in adapted online versions.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-12	NOR	Denmark	Faber	to develop the probabilistic model
13-18	POLIMI	Italy	Limongelli	to develop the process to integrate SHM information and the Bayesian model updating procedure
19-36	RAM	Denmark	Roldsgaard	to test and validate the framework using real data made available by major public operators (e.g. Sund & Belt-DK, Norwegian Road Directory)

CORROSION - Hybrid modelling of corrosion in reinforced concrete structures using heterogeneous data

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC14	SMF – POM (LUN)	POM

Supervisors: M. Tatin, R. Leclercq (SMF), M.P. Limongelli (POM)

Objectives: To use heterogeneous data sources for multiscale predictive corrosion modelling in RC structures.

Expected results: (1) a hybrid model of corrosion based on Bayesian Probabilistic Networks (BPN); (2) a VoI module to optimize the choice of the monitoring system; (3) validation of the framework and the VoI module using laboratory data; (3) Accepted peer-reviewed papers. (4) A successfully defended PhD thesis on the methodology.

Description:

Corrosion is the main deterioration process affecting reinforced concrete (RC) structures, including bridges. Because of security concerns and maintenance & replacement costs, it has been extensively studied in the past decades. Corrosion involves multiple physical and electrochemical phenomena hence several physics-based models are needed to predict its evolution. Each physics-based model describes one part of the corrosion process e.g., carbonation, chloride ions diffusion, and electrochemical reactions. Besides the lack of comprehensive predictive models of corrosion, approaches to update the model using data from heterogeneous sources are still missing. Usually, data comes from various sources, depending on regulation and on the needs of the asset owner. To fill these gaps, in this individual project, a hybrid modelling approach will be explored combining physics-based models of corrosion with Bayesian Probabilistic Network (BPN) models to integrate data from heterogeneous sources (e.g. visual inspections, core sampling, non-destructive testing (NDT) and embedded sensors). Besides, to optimize the cost-effectiveness of the corrosion monitoring, a module to select the data sources that bring the highest benefits in corrosion maintenance management, a Value of Information (VoI) analysis module will be developed to support the choice of the optimal monitoring system. Because of the cost and time of data collection, in the development phase at POM and LUN the model will be validated using synthetic data. Under the supervision of the industrial supervisor (SMF), the DC will then perform accelerated ageing experiments on RC components and will monitor corrosion with a visual inspection, core sampling, NDT and embedded corrosion sensors. The experimental data will be used for the final validation of the theoretical framework.

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-14	POM	Italy	Limongelli	to develop the BPN model
15-18	LUN	Sweden	Thöns	to develop the VoI module
19-36	SMF	France	Leclerq	to produce laboratory data and validate the models

VALUE - Value quantification of digital information systems for climate change mitigation

Fellow: DC15 **Host institution:** LUN - RAM **Enrollment in Doctoral degree:** LUN

Supervisors: S. Thöns (LUN), T. Friis (RAM)

Objectives: Develop and validate a framework to quantify the value of digital information to mitigate climate change effects.

Expected results: (1) Development of models for life cycle decision scenarios and integrity management procedures. (2) Integration of decision analysis algorithms and quantification of the Value of Information (VoI). (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description:

The difficulty to estimate the return over the investment on digital technologies makes the end-users (e.g. owners and operators of bridge assets) reluctant to invest in such systems. The possibility to quantify the value of tools for the digital management of information (e.g. monitoring systems, BIM and digital twin models, digital platforms) would have a huge impact on the digitalization of bridge asset management and has been investigated in recent research projects. However, the industrial uptake of such methodologies is quite limited and slow due to the complexity of their application that entails multidisciplinary (measurement engineering, structural engineering, cost-benefit analyses) and transdisciplinary (safety quantification, economic impact) knowledge. A further significant challenge consists in the quantification of the benefit provided by digital information systems when approaching important societal challenges. In this project, the DC will develop a methodological framework for the quantification of the value of digital information systems to support decisions to mitigate climate change effects, namely increased risk of unanticipated hazards (e.g. hydraulic hazards). The benefit of several monitoring methods will be compared using data from ongoing projects and a case study under the supervision of the industrial supervisor (RAM). Consecutively, more efficient and climate-change-risk-reducing digital information strategies will be worked out and demonstrated with a prototype (TRL 7).

Time plan:

Month	Institution	Supervisor(s)	Description
1-18	RAM	Friis	Identification of tools for monitoring together with development of models for life cycle decision scenarios and integrity management procedures
19-36	LUN[1]	Thöns	Integration of decision analysis algorithms and quantification of the VoI for the mitigation of climate change effects

[1] PhD programme is 4 years

D-BIM: Building Information Modelling for Decision Support

Fellow:	Host institution:	Enrollment in Doctoral degree:
DC16	WOL – LUN (BASt)	LUN

Supervisors: C. Ebert (WOL), S. Thöns (LUN)

Objectives: Integration of decision analysis in bridge Building Information Modelling (BIM)

Expected results: (1) Development of models for life cycle decision scenarios and integrity management procedures. (2) Integration of decision analysis algorithms in bridge BIM. (3) Accepted peer-reviewed papers. (4) Successfully defended PhD thesis.

Description:

Building information modelling (BIM) and management facilitate the collection and availability of information throughout the life cycle of the built environment. The availability of information by BIM necessitates the integration of the decision modelling to fully benefit from this information as a decision support tool. This DC aims to (1) facilitate the decision analysis and to optimize (cost-effectiveness) the selection of information based on the decision problem at hand; (2) enable the accessibility and availability of the results of decision analysis through digital tools. To this aim, the following tools will be developed in the project (a) models of the life cycle decision scenarios; (b) models of the integrity management procedures, and (c) a building information structure with interfaces to SHM. The interfaces encompass deterioration prediction by machine learning (NEURAL) and measurement data and indicators (DRONES, WIM) as well as digital information systems (VALUE). The enriched BIM model will be validated using case studies made available by BASt, like ZEKISS, BrAssMan, and ROBUST (early warning system with intelligent sensor systems and digital building models, funded by the German Federal Ministry of Education and Research). The validation will lead to the identification of the most efficient integrity management models for relevant decision scenarios and will provide application robustness for the developed prototypic tool (TRL7).

Time plan:

Month	Institution	Country	Supervisor(s)	Description
1-18	WOL	Germany	Ebert	to develop the BIM-SHM interface and model the lifecycle scenarios
19-21	BASt	Germany	Haardt	to validate the BIM model
22-36	LUN[1]	Sweden	Thöns	to integrate and validate the modules for decision analysis into bridge BIM

[1] PhD programme is 4 years

Overview of the host institutions

Politecnico di Milano (POM)

POLIMI is the largest technical university in Italy, with about 40,000 students. Founded in 1863 is ranked 20th by the QS World University Rankings. POLIMI holds a School of Doctoral Programs that coordinates 18 doctorate programs with approximately 1,100 PhD candidates per year with 30% international students. In 2015, PoliMI achieved the European "HR Excellence in Research" Logo (concerning the implementation of the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.)

Prof. Maria Pina Limongelli, (female), associate professor of structural engineering, expert in SHM, has supervised > 20 PhD and MSC students, >120 scientific publications (h-index of 15, and > 980 citations), is associate editor of several scientific journals (EngStruct, Journal of Civil SHM, ASCE Journal Bridge Engineering); and is member with leading roles of international associations and committees (ISHMII, IABSE, JCSS, fib), She leads a team of 10 among Postdocs (3), PhDs (5) and seal of excellence (2) researchers.

Dr Pier Francesco Giordano, (male), postdoc researcher at PoliMI, is an expert in crowdsensing and value of information analysis, has supervised 5 among Master (3) and PhD students (2), >20 scientific publications (h-index of 9 and >240 citations)

Prof Alfredo Cigada, (male), Full Professor of Mechanical and Thermal Measurements; is an expert in innovative measurement systems for SHM; papers >150 h-index of 24, and > 1450 citations); licensed patents: 7 (6 international); and is an associate editor for Experimental Techniques and Sensors. He leads a team of 2 Full Professors, 3 Associate Professors, and around 15 temporary researchers and PhD students; he has directly supervised 19 PhD students, 25 temporary researchers or postdocs and a wide number of MSc students.

North Consulting

North Consulting provides decision support on risk, resilience and sustainability of systems at local, regional and international scales to industry, public authorities and individuals. North Consulting was established in 2019 by its present partners. North Consulting represents a unique international knowledge and experience base for consulting accumulated over more than 30 years and spanning Europe, China, North

and South America. Our services cover risk modelling and management of complex systems subject to uncertainty. This includes 1) risk modeling and management of accidents, natural hazards, terror, fire, and security, 2) optimal safety, risk and resilience informed management of infrastructure systems, organizations and projects, 3) climate change risk assessment and adaptation, 4) quantitative assessments of sustainability and achievement of UN SDGs, and 5) teaching and training of experts and professionals in the domain of risk.

Prof. Michael Havbro Faber (male), full Professor and leader of the research group on Risk, Resilience and Sustainability in the Built Environment at the Department of the Built Environment at Aalborg University, past president of the Joint Committee on Structural Safety, Head of the Joint Committee on the Globe Consensus, main supervisor for 23 finalized PhD students, author of 350+ scientific papers, Google Scholar h-index=47, number of citations>8000, convenor of the revision of ISO2394:2015, member of the Danish Academy of Technical Sciences, member of the Danish Research Council, member of the global WEF network of experts on risk and resilience, past president of CERRA and member of the scientific board of the Federal Institute for Materials Research and Testing (BAM), Berlin.

University of Twente

UNIVERSITY OF TWENTE.

The University of Twente is an entrepreneurial research university in the Netherlands with more than 9000 students and 2500 employees. It is based on three central pillars: education, research, and valorization. The latter refers to the transfer of knowledge commercially and the transfer of innovations to society. Universiteit Twente is participating with the Department of Civil Engineering in BRIDGITISE. The department is positioned at the Faculty of Engineering Technology that has approximately 1800 bachelor's and master's students, 300 employees and 150 PhD candidates. In BRIDGITISE the department will host 2 ESRs.

Dr. Irina Stipanovic (female), Assistant Professor of Life Cycle Management, expert in materials and bridge management, assessment of existing structures, monitoring, service life design, life cycle analysis. She has supervised more than 20 PhD, PDEng and MSc, students, 100+ scientific publications (h-index of 16, and >1000 citations), is a member of international scientific committees (e.g., fib COM 5, RILEM), Vice-President of EuroSTRUCT, member of the scientific board of numerous international conferences, participated in more than 30 European research projects.

Dr. Andreas Hartmann (male), Associate Professor in Infrastructure Management, expert in organization and asset management, procurement,

analysis and simulation of social-technical systems, supervised more than 70 Postdocs, PhD, PDEng and MSc students, >70 scientific publications (h-index of 18, > 1900 citations), editor of construction management and economics, leader and participant of more than 20 national and international research projects.

Dr. Rolands Kromanis (male), Assistant Professor in Engineering Technology, expert in the characterization of bridge response (thermal and static) and applications of computer vision-based technologies. Supervised more than 30 Postdocs, PhDs, PDEng and MSc students, 30+ scientific publications (h-index of 13, >680 citations), member of ISHMII, EuroSTRUCT, Graduate School on Engineering Mechanics.

Politecnico di Bari

Politecnico di Bari (POB) is a research university that focuses its activity upon the studies of Engineering and Architecture. Many faculty members of the POB are top international scientists in several research areas, both traditional engineering ones and innovative ICT ones. Some important numbers: more than 10000 students, 308 ERASMUS outgoing students, 180 PhD students, 88 laboratories, and 5 departments.

Prof. Nicola Cordeschi (male) Telecommunication Assistant Professor (supervised > 50 BSC, MCS and PhD students, h-index of 18, and >1900 citations). He is a member with WP leading roles of international associations and committees and European projects (6G-GOALS). He is regularly involved as a Member of the Technical Program Committee of many prestigious international conferences. He has authored or coauthored over 80 papers, published in premier network journals and conferences.

Prof. Luigi Alfredo Grieco (male) Telecommunication Full Professor (supervised 15 PhD students, h-index of 46, and >14900 citations). He is the Founder Editor in Chief of the Internet Technology Letters Journal (Wiley) and served as EiC of the Transactions on Emerging Telecommunications Technologies (Wiley) and as associate editor of the IEEE Transactions on Vehicular Technology

Prof. Gennaro Boggia (male) Telecommunication Full Professor. He is active in the IETF ICNRG working group and the IEEE WG 6TiSCH. He is also regularly involved as a Member of the Technical Program Committee of many prestigious international conferences. He is currently an Associate Editor for the IEEE Commun. Mag., the ETT Wiley Journal, and the Springer Wireless Networks journal.

Prof. Vitoantonio Bevilacqua (male) Electronic and Information Bioengineering Associate Professor, supervised > 300 BSC, MCS and PhD students, > 200 scientific publications (h-index of 22, and > 1700 citations). He was also involved in the Technical Program Committee of IJCNN

International Joint Conference on Neural Networks and was a lecturer at PhD. International School on Medical Imaging using Bioinspired and Soft Computing-Miere (Spain) MIBISOC FP7-PEOPLEITN-2008 - GA N. 238819. He is currently an Associate Editor in Computational BioImaging section of Frontiers Bioinformatics.

Lund University

Lund University is a public research university in Sweden and one of Northern Europe's oldest universities. Lund University was founded in 1666 on the location of the old studium generale – founded in 1425 - next to Lund Cathedral. Lund University has nine faculties, with campuses in the cities of Lund, Malmö, and Helsingborg and around 44,000 students. The faculty of engineering (LTH) is the technical faculty at Lund University with its own rector. LTH has approximately 1,700 employees and 10,000 students. At LTH, there are currently 16 master's engineering programs, 5 university engineering programs, and 18 international master's programs. LTH trains civil engineers, fire engineers, architects, industrial designers, and technology doctors. Within LTH, there is unique training in risk management.

Professor Sebastian Thöns works since September 2020 at the Division of Structural Engineering at Lund University. The areas of his main expertise encompass value of information and decision analysis; reliability, risk, and resilience analysis of built environment systems, and building and structural health information system design and optimization. Prof. Thöns has provided more than 20 invited and keynote lectures in academia and industry. He organised and co-organised more than 20 Special Sessions and Minisymposia at international conferences. Prof. Thöns has been awarded the IRIS Price of Excellence in 2011 and acted as an Executive Board Member in the Les Trophées de l'Europe awarded European Marie Curie Project project Infrastar.

Associate Professor Ivar Björnsson has a broad research background concerning the application of decision, risk and reliability-based methods in engineering applications. Most recently has achieved significant research results in climate impact research on bridges.

Zavod za gradbeništvo Slovenije

The Slovenian National Building and Civil Engineering Institute (ZAG) is an internationally recognized organization specializing in construction. The institute is primarily focused on developing new materials and technologies pertinent to the sustainable development of Slovenia and holds international relevance. ZAG actively participates in international projects, collaborating and sharing knowledge with leading research groups globally. ZAG performs various services, including testing, measurement, preparing opinions and expertise, as well as conducting external quality control and investigations in multiple fields such as buildings, bridges, dams, roads, railways, ski lifts, power lines, natural disasters, and underground structures. .As a public research institute, ZAG is a leader in the construction field within Slovenia. Research and scientific activities form a significant part of its operations, both in terms of content and strategy. The institute's work in various building and civil engineering sectors has earned it recognition not only in Slovenia but also internationally. ZAG is among the most active members of the European Network of Building Research Institutes (ENBRI). Furthermore, ZAG's researchers contribute to scientific excellence through publications in recognized domestic and international journals

Assistant Professor, Aleš Žnidarič, PhD (male) will supervise the ESR BIM (supervised 10 PhD students, h-index of 18, and >1300 citations). He has over 30 years of experience in condition and safety assessment of bridges, bridge loading, bridge weigh-in-motion (B-WIM) and bridge monitoring. He coordinated or contributed to over 20 international research projects and is a member of several national and international associations.

Assistant Professor, Stanislav Lenart, PhD (male) will supervise the ESR PLATFORM (supervised 10 PhD students, h-index of 10, and >360 citations). He works as laboratory head and senior researcher in the field of transportation geotechnics and soil dynamics. He contributed to numerous R&D and commercial projects. His recent research work deals with the integration of infrastructure monitoring results into BIM models. He was visiting researcher at the Universities of Bristol, Lisbon and Tokyo. Member of ISSMGE and its committee TC203.

Andrej Anžlin, PhD, (male) will be deputy supervisor of the two ESRs. He led the establishment of the biggest national permanent structural health monitoring system on a highway viaduct, that included B-WIM. He works as the Head of the Section for bridges at ZAG, where he leads the R&D activities related to B-WIM system and assessment of bridge condition rating by using remote sensing techniques.

Royal Institute of Technology

Royal Institute of Technology (KTH) is the largest and oldest technical university in Sweden. KTH conducts top-notch education and research of a broad spectrum, from natural science to all branches of technology. Studies at KTH can lead to a number of degrees – Architect, Master or Bachelor of Science, or Doctor/licentiate in either science or philosophy. Continuing education is also an important part of our activities.

The division of Structural Engineering and Bridges specializes in structural health monitoring, advanced numerical methods for dynamic vehicle-bridge interaction, soil-structure interaction, model updating, and fatigue remaining life assessment. The division has 2 professors, 2 associate professors, 1 assistant professor, 1 senior researcher, 1 postdoctoral researcher, 10 PhD students, and 1 laboratory technician.

Prof. Raid Karoumi (male), professor of bridge engineering and head of the division of structural engineering and bridges. Supervised 13 PhD, >100 scientific publications (Google Scholar h-index of 31, >3010 citations). Developed methods for the analysis of bridge-vehicle dynamic interaction and traffic-induced vibrations in bridges. His research activity also incorporates instrumentation and monitoring of bridges, development of methods for evaluation of traffic loads from measurements as well as life-cycle assessment of bridges. Karoumi has been responsible for the instrumentation and monitoring of several large bridges in Sweden.

Dr. John Leander (male), Associate Professor in bridge engineering, expert in fatigue assessment, probabilistic methods, reliability methods and SHM. Is currently the main supervisor of 4 PhD (supervised 7 PhD students in total), >50 scientific publications (Google Scholar h-index of 13, >570 citations), >10 years experience in bridge design, advanced FE analysis and bearing capacity assessment of bridges.

Karoumi and Leander have extensive cooperation with the Swedish Transport Administration (Trafikverket) on the development and implementation of methods for sensor-based condition assessment of bridges. They currently have three bridges under continuous monitoring as part of their research.

Sacertis

Sacertis Ingegneria S.r.l. (SAC) is a highly innovative SME providing a real-time Monitoring and Diagnostics System, through a smart combination of Civil Engineering Knowledge, Advanced Cloud Computing, easy-to-install Sensors, and SHM systems. Founded by university professors, professionals, and managers of large electronics companies and supported by the partnership with international operators, SAC monitors in real-time a network of more than 50 infrastructures. SAC employs civil, electronic, and

mathematical engineers who are experts in Big Data analysis, providing several services, from measurements to the assessment of the structural health of the asset.

Prof. Giuseppe Mancini (Male) is CEO of SAC and Partner and Chairman of the Board of Directors of Engineering Society Sintecna srl. He's been the design leader of more than 200 railway and road bridges. Former Professor at Engineering Faculty of Politecnico di Torino of Structural Design and Bridge Design (supervised >50 PhD students/professionals, h-index of 19, and >858 citations), he's the author of 192 papers. President of fib 2004÷2006, Honorary Chairman; Deputy Chair of C3 Fib « Assessment and Interventions upon Existing Structures » (2012-2020) Chairman of Project Team for Eurocode EN1992-2 Concrete Bridges (2002÷2005); Chairman of SC2 Commission – Concrete Structures – TC250 of European Community period 2005÷2014. Chairman of TC250/SC2/WG1/TG9 Concrete bridges. Co-Chairman of Fib Model Code 2020 Core Group. Chairman of CIS-UNI n° GL9 Commission – Bridge Design. Proud Member of ASCE (American Society for Civil Engineering); fib Freyssinet Medalist.

Dr. Paola Darò (Female), MSc 2012, is the Technical Director of the Engineering Department at SAC. She worked as a Structural Engineer at Expedition Engineering in London from 2012 to 2015. From 2015 to 2016 she worked as a Research Fellow at Politecnico di Torino. In 2016 she joined SAC to focus on the design and development of Structural Health Monitoring Systems (SHMS) for structural diagnostics of civil infrastructures. In 2019 Paola won the MIT Technology Review Italy Award as Young Innovator TR35.

RAMBØLL

Ramboll Denmark A/S

Ramboll (RAM) is a leading engineering, design, and consultancy company founded in Denmark in 1945. The RAM Group employs 18,000 experts globally in 300 offices in 35 countries. RAM is a truly multi-disciplinary engineering, design, architecture and consultancy company working in market areas such as Buildings, Transport, Planning & Urban Design, Water, Environment & Health, with a strong focus on applied technical research and development to lead the innovation with digitalization of consulting engineering. Within Transport, the focus areas include Major Crossings and Bridges, where RAM for decades has provided services within bridge design, bridge rehabilitation, bridge construction management, bridges supervision and maintenance, reliability, load and safety assessments and structural health monitoring internationally as well as domestic.

Dr. Joan Hee Roldsgaard, PhD 2014, works as Chief Consultant, Specialist, in reliability assessment and structural health monitoring of structures

(mentored 8 PhD students/professionals). She has participated in several high-rank reliability projects within reliability of bridges and offshore structures e.g., reliability assessment and updating of codes for floating bridge structures for the E39 highway project in Norway.

Dr. Claus Pedersen (male), PhD 1996, is an expert in reliability of infrastructures, design codes, structural behaviour of bridges, structural robustness, maintenance, deterioration mechanisms for existing bridge, life-cycle costs. He has participated in several research EU projects.

Dr. Henrik Gjelstrup (male), PhD 2011, is an expert in the implementation of data acquisition and data management. Furthermore, he is an expert in structural vibration in relation to human comfort.

Torben Bangsgaard (male), MSc 2010, is an expert in the design and implementation of large-scale structural health monitoring systems for major bridges, including data acquisition, management, and analysis.

Dr. Tobias Friis (male), PhD 2020, is an expert in structural dynamics with emphasis on virtual monitoring and fatigue estimation for lifetime assessment, model updating (digital twin) and SHM (damage detection).

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Ingeniería y Control

CEMOSA

CEMOSA (CEM) is an engineering consultancy company in the field of construction, including transport infrastructure and building (born in 1972). Its headquarters are in Malaga (Spain) and include 14 national offices and 12 international offices providing services in 15 countries in Europe, America and Asia. CEM comprises several business lines including “Transport Infrastructures Engineering” and “Research & Innovation”. CEM is an active member of the European Construction Technology Platform (ECTP), the Spanish Construction Technology Platform (PTEC), the Spanish Railway Technology Platform (PTFE). CEM is also an Associated Member of the Joint Undertaking Shift2Rail, through the Consortium Smart Demain (SDM) and is Founding Member of the Europe’s Rail Joint Undertaking

Dr. Noemi JIMENEZ-REDONDO (Female), PhD in Industrial Engineering, 1999. Since 2001, she is an Associate Professor at Universidad de Málaga (mentored 14 students/professionals). She has been leading or collaborating on 30 research projects funded by the European Union, the Spanish Government, the Andalusia Regional Government, and private companies. In 2007, she joined CEM where she is director of the R&D division. Since 2010, she is working full-time for CEM, where she has acquired extensive experience in European Research & Innovation projects both as coordinator and partner in the fields of transport infrastructures and buildings and energy efficiency. Regarding transport infrastructures European R&D projects, she has coordinated/participated (or is participating) in the following projects: ACEM-Rail (FP7- coordinator),

INFRALERT (H2020), FORESEE (H2020), IN2SMART (H2020), IN2SMART2 (H2020), IN2TRACK (H2020), IN2TRACK2 (H2020), OMICRON (H2020). Role: ESR Supervisor.

Jose SOLÍS HERNÁNDEZ (Male) Bachelor of Mechanical Engineering (BEng, 2016) and M.Sc. in Advanced Mechanical Engineering (2017). He currently works at the R&D division of CEM. He focuses on the areas of monitoring, data analytics, and predictive maintenance in the field of transport infrastructures. He has participated in several national and European research projects.

Concepción TORIBIO (Female) M.Sc. Civil Engineering (2011) and M. Sc. in Engineering Management (2015). She works at the R&D division of CEM where she focuses on the areas of risk analysis, vulnerability and criticality assessment, and resilience assessment of transport infrastructures. She has participated in several national and European research projects. She is a member of the working group CEN/CLC/WS018 for the assessment of infrastructure resilience.

Socotec Monitoring France

Socotec Monitoring France (SMF, ex Cementys) is a French SME specialized in structural health monitoring of key infrastructures in various fields (civil infrastructures including bridges, energy, oil & gas, nuclear, historical buildings). As a subsidiary of the Socotec group, SMF can support its clients throughout the life cycle of their projects, from the design phase to the maintenance phase. Drawing on their substantial experience, its engineers capitalize on the projects carried out to offer the optimal SHM solutions. A major player in the auscultation, geotechnics and expertise fields, SMF exports its knowledge around the world. With projects spread over 4 continents, it is recognized as a leading expert in its field. SMF has chosen to integrate the entire production and value chain to maintain total control over production costs and delivery times. In a logic of continuous improvement and surpassing, it continues to improve conventional techniques by positioning R&D as one of the central functions of its organization. This is materialized by the allocation of 20% of its turnover in R&D in order to develop new solutions combining precision, reliability and efficiency.

Dr. Maxime Tatin (male) is the Managing Director of the Civil Engineering Department at SMF. Before joining the company in 2015, he obtained an engineering degree from École Centrale de Nantes (France) in 2010 and a Ph.D. in Civil Engineering from Université Grenoble Alpes (France) in 2014. he has also contributed to the company's R&D by supervising the research of three Ph.D. students through the French industrial doctorate program (Cifre).

Raphaël LECLERCQ (male) is Head of Data & AI at SMF and SOCOTEC. He is also attached Professor in AI at École Normale Supérieure Paris-Saclay. He graduated from INSA Lyon (France) and received on MSc in Civil Engineering from Polytechnique Montreal (Canada). He worked on several R&D topics, including AI applied to civil engineering, SHM and finite element modelling.

Pedelta

Pedelta is a leading and multinational bridge engineering firm, founded in Spain in 1994, with international recognition for cutting-edge innovation and expertise committed to technical excellence and innovative design. The company is a long-established independent firm that has grown systematically over the years since its foundation and has currently presence in six countries, which include NOR America, where it continues to expand. The company has operated in USA since 2006 and in Canada since 2012. Pedelta's worldwide experience includes more than 2,000 bridge designs of all materials, structural types, and sizes, as well as construction engineering, assessment, inspection and rehabilitation of bridges. Pedelta has been involved in the most intriguing projects on an international scale, working both for public and private sectors and are active members of technical Committees.

Javier Jordan, MSc. PE, PEng, ICCP, (male) is the technical director of Pedelta's bridge group and has over 24 years of work experience as a structural designer and team leader, managing medium to long-span bridge projects and other heavy civil engineering structures such as tanks and tunnels. Together with Juan Sobrino he has pushed forward the introduction of advanced materials in bridge construction such as GFRP and stainless steel and strengthening of steel bridges. He is a member of many associations like ASCE, CSCE, ECCS, ACHE, IABSE, and Technical committees Spanish and European technical groups for composite bridges, like the Spanish Horizontal Group of Bridges, Working Group 5/2 of ACHE for seismic devices, Committee 1 of ACHE for Design of concrete structures, CEN/TC 250/SC 3/WG 13 for Steel Bridges, Evolution Group for Eurocode 1994-2 for composite bridges and Spanish Technical Committees CTN 140/SC3 and SC4 for Eurocodes 3 and 4. He is the author or co-author of more than 30 publications and has supervised >20 PhD students/professionals.

Wölfel

Wölfel Engineering GmbH & Co. KG is a technology-oriented SME in the field of structural mechanics with more than 100 employees. The main focus of their work is on engineering services and monitoring of structures as well as the associated use of measurement technology and development of analysis algorithms. As a technology leader in the structural monitoring of wind turbines, they have built up a unique core competence, especially in signal analysis. Bridge monitoring has so far been carried out for singular bridges. For the company the next step is to transfer and extend the knowhow to a large number of bridges in the sense of "fleet monitoring".

Dr.-Ing. Carsten Ebert (male) is Chief Technology Officer (CTO). He has extensive knowledge in structural dynamics, especially in the field of structural health monitoring based on vibration measurements, extensive knowledge of vibration measurements in industrial applications, data analysis and signal processing in Matlab, extensive knowledge in project management, Design and Development of Structural Health Monitoring Systems and Condition Monitoring Systems. He is a member of the German Consulting Engineers Association (VBI); IEA Wind Task 42 “Wind Turbine Lifetime Extension”; working group of VDI4551 “Structure monitoring and assessment of wind turbines and offshore stations; standards committee for DIN4150-3 Vibrations in buildings. He is the author or co-author of more than 20 publications. He mentored >30 PhD students/professionals. He will supervise ESR15

Cestel

Cestel ltd was established in 1992 because of the restructuring of a privately owned company, Elektronika Brozovič, and has been an important part of the road engineering business ever since 1978. Cestel is built on strong foundations with a clear goal to use its own knowledge and technology to increase safety on Slovenian roads and decrease road maintenance and repair expenses. They are the leading B-WIM manufacturer in the World, with an ambition to become a market leader in WIM systems production. The company has completed over 5,000 B-WIM system installations of its SiWIM® system in over 20 countries on all continents, except Africa. They continuously invest in research and development. Among others, they have led the FP7 project Bridgemon.

Matjaž Skobir (male), is the leader of the research and development department at Cestel.

Julijana Jamnik (female) has 28 years of experience in pavement condition assessment, pavement management and SiWIM® analyses.

Robert Brozovič (male), is the leader of research and development of the SiWIM® system in the company and will be involved in bridging the gap between the scientific and applicative aspects of the project.

Matija Mavrič (male) has more than 20 years of experience in the WIM industry and will be involved in bridging the gap between the scientific and applicative aspects of the project

Federal Highway Research Institute

The Federal Highway Research Institute (BASt) is the practice-oriented, technical-scientific research institute of the German Government in the field of road engineering. It is dedicated to a wide range of tasks, which result from the relationships between roads, humans and the environment. BASt provides the Federal Ministry for Digital and Transport (BMDV) with scientifically aids as decision support in technical and transport policy issues. The tasks range from planning, coordination and performance of multi-annual research projects to the fast response to questions in supporting the current work of the BMDV. It is a leading member of the network of national and European cutting-edge research institutes in the field of road engineering and is significantly involved on a worldwide basis in drawing up regulations and standards.

Prof. Dr. Jürgen Krieger (male), is the Head of Division Bridges and Structural Technology.

Dr. Matthias Müller (male), is the Head of Section “Concrete Structures”.

Dipl.-Ing. Ralph Holst (male), is the Head of Section “Maintenance of Engineering Structures”.

IBM

IBM Research GmbH, (IBM Research - Zurich), with approximately 300 employees, is a wholly owned subsidiary of the IBM Research division with headquarters at the T.J. Watson Research Centre in Yorktown Heights, NY, USA. IBM Research - Zurich, which was established in 1956, represents the European branch of IBM Research. At the lab, scientific and industrial research is conducted in three scientific and technical departments: Cloud & Computing Infrastructure, Cognitive Computing & Industry Solutions, Science and Technology. IBM Research - Zurich employs a steady stream of

postdoctoral fellows, PhD candidates, and summer students who pass through the laboratory.

Cristiano Malossi (male, PhD 2012) is Principal Research Staff Member (PRSM) and Manager of the AI Automation group at the IBM Research laboratory in Zurich.

Florian Scheidegger (male, PhD 2020) is a Research Staff Member at the IBM Research laboratory in Zurich, researching and developing AI solutions for inspecting Civil infrastructures

Tallina Linnaplanermise Amet

Tallinn Urban Planning Department is a department of Tallinn city and the main responsibilities are: - Planning the sustainable and harmonious development of the city of Tallinn, taking into account the values of the existing urban environment; - creating the preconditions for a cultural, social, economic, and natural environment for longterm, coherent and harmonious development, ensuring a good quality of life for people and a safe and clean environment.

Christopher-Robin (male) is the Head of Digital Construction: Implementation of BIM in public permit processes. Combining GIS, BIM and AIM to maximize the value from the digitization of building life cycle. **Andres Maremäe** (male) – 3D Specialist

Eidgenössische Technische Hochschule Zürich

The Swiss Federal Institute of Technology Zurich (ETH) is one of the leading universities for technology and the natural sciences worldwide. It comprises 16 departments and is host to 21,400 students, including 4,180 doctoral students, from over 120 countries. In the 2021 edition of the QS World University Rankings ETH Zurich has been ranked 8th in the world and is also ranked 10th in the world by the Times Higher Education World Rankings 2022. ETH was involved in 175 People Marie Curie projects (113 Fellowships, 4 IRSES, 46 ITNs, 3 Researchers' Nights, 3 COFUND, 2 Euraxess, 1 ERAMORE, 3 IAPP). ETH had 90 ERCs, 28 projects within the Capacities programme and 290 projects within the Cooperation programme in FP7. Within Horizon 2020, to date, 29 Marie Skłodowska-Curie Actions have been successfully conducted at ETH and came to term (19 IF, 10 ITN).

Dr. Michele Magno (Male, 15% FTE): His current research interests include smart sensing, low power machine learning,

Prof. Luca Benini (Male, 5% FTE): Chair at Integrated System Laboratory at the department of Information Technology and Electrical Engineering (ITET). His main research topics are in the area of energy-efficient computer architecture

Fred Westenberg

Ingenieursbureau Westenberg (Westenberg Engineering) is a leading engineering company in the Netherlands, specialised in asset management of Civil Structures. Every year Westenberg Engineering is inspecting app. 15.000 objects in the Netherlands (and Belgium). Westenberg Engineering took the initiative to start “Platform Bruggen” in the Netherlands; Platform Bruggen combines the strengths, initiatives, and knowledge of all parties in the bridge sector. The goal is to share and secure knowledge and together accelerate innovations that will help to make the replacement, renovation, and sustainability task ahead more efficient and effective with the available resources. This contributes to a safe and future-proof infrastructure and fulfils the (inter)national climate and circularity ambitions. The platform acts as a catalyst in the bridge sector and ensures that all parties are involved and aware of new developments.

Ing. Klaas Dirk Ferdinand (Fred) Westenberg (male) Civil Engineer and founder of Westenberg Engineering (MD), iASSET (Partner), Platform Bruggen (board member), Dutch Bridge Foundation (Chairman), Guest lecturer at several Universities (the Netherlands and Bulgaria), IMBOR (member), Initiative group National Prognose Report Infrastructure (member), Bridge-dialogs (member organizing committee), Bridge Breakfast Club (member organizing committee), Bridge lunch meetings (member organizing committee). He mentored >100 PhD students/professionals.

Exprivia

Exprivia SpA (www.exprivia.it) is an Italian company active in process consultancy, technology services and Information Technology solutions. Listed on the Italian Stock Exchange since 2000, the Exprivia Group has a team of around 2000 individuals, located in its headquarters in Molfetta (Bari) and throughout its offices in Italy (Trento, Vicenza, Milan, Rome, Matera, Lecce, Palermo) and abroad (Spain, Germany, Mexico, Guatemala, Brazil, China). In BRIDGITISE the Innovation Lab will host 3 ESRs.

Ing. Giovanni Melone (Male) Degree in Electronic Engineering (1990). Chief Technical Officer (1993-2017) of an associated company of Finmeccanica S.p.A. Currently Manager of the Innovation, Research & Technology (IRT) Unit of Exprivia, in charge of managing the Research Project Management (IRT-RPM) sector.

Dr. Pietro Noviello (Male) Degree in Computer Science (1984). Currently Manager of the Innovation, Research & Technology (IRT) Unit of Exprivia, in charge of managing the Technology & Prototyping (IRT-TP) sector. He has mentored around 15 graduating students and professionals.

Dr. Maria Vittoria Marabello (Female). Degree in Physics (1990). Project Manager for Exprivia of European (FP6, FP7, H2020), national projects, currently Project Manager in the Exprivia Research Project Management sector.

Egnatia Odos

Over the last ten years of operation, EGNATIA ODOS A.E. has been transformed into an organization with employees capable of meeting their current obligations and ready to undertake new projects that will supplement the infrastructures of the overland transport network both in Greece and in the wider region. During the last few years, EGNATIA ODOS S.A.E. has extended its activities abroad, by participating in international tenders and undertaking contracts for the management and supervision of designs and construction works, mainly of large infrastructure projects.

Dr Panagiotis Panetsos is the Head of the Structure inspection and Maintenance Unit, Maintenance Department, Egnatia Odos A.E. As supervisor of the Unit, consisting of 6 engineers and 3 technicians, he is responsible for the preparation and execution of all the types of inspections (visual, non-catastrophic, and monitoring) and evaluation of existing (constructed or under construction) bridges, tunnels and geotechnical works of road sections in Greece and in Balkans, under the responsibility of EAOE. He mentored >20 PhD students/professionals.

TRE Altamira

TRE ALTAMIRA (TREA), a CLS Group company, is the leading global provider of commercial services based on SqueeSAR®, an industry standard for advanced Permanent Scatterer SAR Interferometry techniques. Along with commercial activities, TREA carries out R&D, industrial development, and service provisions activities with Regional, National, and European Institutions (European Commission, JRC, EEA), and Space Agencies

(European Space Agency, Italian Space Agency, Canadian Space Agency), IFI (World Bank, Asian Development Bank,...). TREA has scientific collaborations with several universities worldwide, the Italian Civil Protection Authority, and the Italian National Institute for Geophysics and Volcanology

Alessio Rucci (male) has a PhD in electronic engineering (mentored 6 PhD students/professionals). His primary research activity is on advanced PInSAR techniques and on the second generation of PSI (SqueeSAR). In 2016, he received the "IEEE Geoscience and Remote Sensing Society 2016 Highest Impact Paper Award".

Alfio Fumagalli (male) has a Master in telecommunication engineering. At TRE he is working on algorithms, software development, and data integration in GIS environment. His research interests concern non-linear systems inversion involved in PS Technique and phase unwrapping algorithms

Bexel

Bexel Consulting is a state-of-the-art technology vendor, engineering and consultancy company dedicated to the digital transformation of the construction industry. Bexel Consulting develops the BEXEL Manager construction management BIM platform using a fine-tuned synergy of innovation, technology, knowledge and experience. Bexel Consulting is a winner of buildingSMART (bSmart) International Innovation Award 2020. BEXEL Manager software platform allows the optimization of the digital workflows through advanced openBIM technologies. Bexel is Multinational Member of bSMART International, dedicated to openBIM standardisation as well as Certified bSMART International Professional Certification training centre.

Veljko Janjić, (male) MSc EE, CEO & Co-Founder of Bexel Consulting, is an esteemed Building Information Modelling expert and lecturer, and creator of BEXEL Manager platform. He is currently Technical Lead within the Steering Committee of building SMART International Construction Room, and Vice-Chair of Digitalisation & BIM Committee within EFCA (FIDIC).

Igor Osmokrović, (male) MSc CE, COO of Bexel Consulting is engaged in EU Horizon2020 CINDERELA project and supervises implementation of Bexel's innovation projects supported by grant schemes. He is in charge of the company's collaboration with universities and the student internship programme. He mentored 15 PhD students/professionals.

Croatian Motorways Ltd (HAC)

Croatian Motorways, Ltd (Hrvatske autoceste d.o.o.), is a limited liability company for the operation, construction, and maintenance of motorways. It was registered and started its business activity on April 11, 2001. The company is 100% owned by the Republic of Croatia.

Bojan Vivoda (male), Chief Engineer, expertise in environmental impacts of transport infrastructure, life cycle assessment.
Dr.sc. Boris Huzjan (male), Head of Management Board, optimization of maintenance planning, cross-asset management