ExchangeRisk

is an Intersectoral, International, Research and Innovation transfer scheme between academia and the industry in Europe and North America focusing on mitigating Seismic Risk of buried, steel natural gas pipeline Networks that are subjected to ground-imposed permanent deformations. It also aims in developing a (nearly real time) Decision Support System for the Rapid Pipeline Recovery to minimize the time required for inspection and rehabilitation in case of a major earthquake. EXCHANGE-Risk involves novel hybrid experimental and numerical work of the soil-pileline system at a pipe, pipeline and network level integrated with innovative technologies for rapid pipe inspection. The outcome of the project is a series of well targeted exchanges between the partners and ensures transfer of knowledge between the academia and the industry, Europe and North America as well as wide dissemination of the methodologies and tools developed to the engineering community.

University of Bristol · CAU · Bauhaus-Universität Weimar · Πανεπιστήμιο Πατρών · Università Degli Studi di Napoli Federico II · Università degli Studi del Sannio · Aristotle University of Thessaloniki · Hochtief Engineering · University of Toronto · NGI · Columbia University in the City of New York · VCE Vienna Consulting Engineers ZT GmbH

EXperimental & Computational Hybrid Assessment of Natural Gas pipelines Exposed to Seismic Risk

Further Information

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Project Website

www.exchange-risk.eu

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European Commission

University of BRISTOL

Department of Civil Engineering

Faculty of Engineering

Resilience of natural gas pipeline networks to natural hazards

1st September 2016

Old Council Chamber

Wills Memorial Building

ExchangeRisk

HORIZON 2020

WORKSHOP AGENDA

09:00-09:30 Welcoming Address

Ian Bond, Professor, Head of School of Engineering, University of Bristol, UK

Sally Heslop, Professor, Head of the Department of Civil Engineering, University of Bristol, UK

09:30-09:45 Overview of the EXCHANGE-Risk Project

Anastasios Sextos, Project Coordinator, University of Bristol, UK

09:45 Session 1: Inspection and Monitoring [Moderators: Paul Wilcox/Anastasios Sextos]

09:45-10:00 *Structural Health Monitoring of Natural Gas Pipelines. Project SAFEPIPES*

Helmut Wenzel, Professor and Chair, University of Natural Resources & Life Sciences, Vienna, WENZEL Consulting Engineers GmbH, Austria

10:00-10:15 *Advances in Oil & Gas Inspection*

Colin Hickey, Sky Futures, UK

10:15-10:30 *Inductively coupled ultrasonic sensors for infrastructure monitoring*

Paul Wilcox, Professor & Head of Dept. of Mechanical Engineering, University of Bristol, UK

Anthony Croxford, Reader, University of Bristol, UK

10:30-10:45 *Overview of Inspection Technologies for Geotechnical Hazards*

Ad Shadat, Vice President, VP Operations of PICA, RussellTech, Canada

10:45-11:00 *Structural monitoring of civil infrastructure*

Volkmar Zabel, Senior Researcher, Insti. of Structural Mechanics, Bauhaus-Universität Weimar, Germany

11:00-11:15 Coffee break

11:15 Session 2: Pipeline design, construction and integrity [Moderators: Spyros Karamanos/Carsten Könke]

11:15-11:30 *Structural Mechanics of Hydrocarbon Pipelines in Geohazard Areas*

Spyros Karamanos, Professor & Chair, University of Edinburgh, UK & University of Thessaly, Greece

11:30-11:45 *Strain-Based Design for Gas Transmission Pipelines*

Qishi Chen, Director, Pipelines & Structures, C-FER Technologies, Canada

11:45-12:00 *Integrity Management of Natural Gas Pipelines*

Mobin Ojaghi, Principal Engineer, KBR, UK

12:00-12:15 *Structural Analysis and Component Strength of Energy Systems*

Carsten Könke, Professor, Bauhaus-Universität Weimar, Germany

12:15 Session 3: Seismic Hazard and Risk of Natural Gas Networks [Moderator: Katsu Goda/Iunio Iervolino]

12:15-12:30 *Probabilistic Seismic Risk assessment of GAS distribution networks*

Iunio Iervolino, Professor, University of Naples, Italy

12:30-12:45 *Post-event risk assessment for gas pipelines at regional scale: the Friuli case: (a) vulnerability model and network data*

Flavia De Luca, Lecturer, University of Bristol, UK

12:45-13:00 *Post-event risk assessment for gas pipelines at regional scale: the Friuli case: (b) hazard model and preliminary simulations*

Raffaele De Rissi, Post-Doctoral Researcher, University of Bristol, UK

WORKSHOP AGENDA

13:00-13:15 *Computer-aided Resilience Assessment of Lifelines. Analogies between Transportation and Natural Gas Distribution Networks.*

Anastasios Sextos, Reader, University of Bristol & Andreas Kappos, Professor, City University London, UK

13:15-14:15 Light Lunch

14:15 Session 4: Soil-Pipeline Interaction [Moderators: George Mylonakis/Amin Kaynia]

14:15-14:30 *Constitutive modeling of soil-pipeline interaction systems*

George Mylonakis, Professor, Chair of Earthquake and Geotechnics Group, University of Bristol, UK

14:30-14:45 *Soil-pipeline interaction on slopes under earthquake loading*

Amir Kaynia, Technical Lead Vibration and Earthquake Eng., Norwegian Geotechnical Institute, Norway

14:45-15:00 *System modeling of cyclic loaded embedded geostructures in natural soil conditions*

Frank Wuttke, Professor, Head of Geomechanics and Geotechnics, University of Kiel, Germany

15:00-15:15 *Approaches for Seismic Soil Structure Interaction for Embedded Structures*

Robert Borsutzky, Head of the Department for Earthquake Engineering, HOCHTIEF, Germany

15:15-15:30 *Stress analysis of buried steel pipelines at strike-slip fault crossings*

Dimitris Karamitros, Lecturer, University of Bristol, UK

15:30-15:45 Coffee break

15:45 Session 5: Laboratory & Hybrid Testing of Soil-Pipeline Systems under Asynchronous Ground Motion

[Moderators: Adam Crewe/Stathis Bousias]

15:45-16:00 S*patially Variable Earthquake Ground Motion*

Nick Alexander, Senior Lecturer, University of Bristol, UK

16:00-16:15 *Differential deformations of pipelines. Numerical and Experimental Investigation.*

Anastasios Sextos, Reader, University of Bristol, UK, Savvas Papadopoulos, Aristotle University of Thessaloniki, Greece, George Deodatis, Professor, Columbia University, USA Oh-Sung Kwon, Assoc. Professor, University of Toronto, Canada, Simos Gerasimidis, Assist. Professor, Amherst University, USA

16:15-16:30 *Hybrid Testing of extended natural gas pipelines*

Adam Crewe, Reader, University of Bristol, UK

16:30-16:45 *An overview of UT-SIM framework and application examples*

Oh-Sung Kwon, Assoc. Professor, University of Toronto, Canada

16:45-17:00 *Experimental studies of extreme loading on structures*

Stathis Bousias, Professor, University of Patras, Greece

17:00-17:15 *Hybrid simulation of critical infrastructures: past experience for future applications*

Luigi Di Sarno, Assist. Professor, University of Sannio, Italy

17:15-17:30 Multi-hazard Risk Assessment of Oil & Gas Pipe Network: Applications in Canada.

Solomon Tesfamariam, Assoc. Professor, University of British Columbia, Canada (via Skype)

17:30-18:00 Discussion and concluding remarks