

JRC-IPSC Joint Research Centre in Ispra, Italy is a European scientific and technical research Centre established by the European Commission, which comprises several sites and Institutes. Within the Institute for the Protection and Security of the Citizen a number of Units are currently dealing with vulnerability of transport and energy networks. The scientific approaches range from statistical to structural analysis with a strong emphasis on the operational knowledge of such systems.

The European Laboratory for Structural Assessment (ELSA) is an analysis and experimental facility of the Joint Research Centre of the European Commission. Its mission is to provide research and contribute to European Standards for risk mitigation in construction, transport, and industrial installations. An emerging area of research activity in the Unit has been the development of numerical methods to study the behaviour of non-linear systems within an interdisciplinary context especially in the field of seismic vulnerability of transport infrastructures. Within the context of FP5 and FP6, ELSA has been participating in more than 20 research projects together with other European research teams and industries. Their aims are to contribute to the set-up and validation of design codes and norms for the open common market, to promote high-level scientific and technical developments and to increase the competitiveness of the European industry through the assessment of new innovative techniques for construction and transport.

The role of the JRC, in addition to networks data collation and analysis in the various research work packages, is to develop the interface between researchers and network users.

Eugenio Gutiérrez is a Mechanical Engineer with post-graduate studies in Applied Mechanics and Dynamical Systems Theory. He is currently involved in applying dynamical systems theory to generic non-linear problems in structural engineering and networked infrastructures. He has worked in number of interdisciplinary projects related to complex systems, such as multivariate GIS-based analysis of earthquake mortality, the analysis and control of discontinuous mechanical systems and, more recently, the application of non-linear time series analysis to electricity grid blackouts and network vulnerability indicators.

He has extensive experience in EU funded projects and contractual research work which has motivated his interest in applying an interdisciplinary approach to solving real-world technical problems grounded in analytical dynamical systems methods. His research approach to complex systems analysis is to synthesise the qualitative phenomena that generate complex behaviour in networked systems and transform these into simple but tractable mathematical problems. His role in the project will be to act as a bridge between the scientific specialists and the network stakeholders.

Carmelo Di Mauro is an environmental engineer with twelve years international experience in risk analysis and system modelling, with practical knowledge of decision-making supporting techniques (e.g. multi-criteria analysis, geographical information system, environmental modelling).

In the last two years at JRC, his research activities have been steered substantially towards vulnerability assessment of complex critical systems. This move was made as a response to strong interest in this field expressed by the Commission with its Communication on "Critical Infrastructure Protection in the Fight against Terrorism" and the forthcoming European Programme on Critical Infrastructure Protection (EPCIP).

To this end, he further developed the concept of vulnerability and resilience to support the activities of Civil Protection Authorities in managing natural and technological risks at local, regional and national levels. In particular, I lead two competitive projects that aim at the development of vulnerability and multi-risk maps with contribution of the most relevant stakeholders, for the Civil Protection Authorities of Piemonte Region and Varese Province, respectively. Validation of methods and maps had been the subject of a workshop held on April 11, 2006, with participation of more than fifty institutional stakeholders.

Dr. José-Manuel Zaldívar is a chemical engineer working on the application and development of nonlinear dynamical systems to engineering and environmental problems. He has researched in dynamical systems and non-linear time series analysis. He has recently patented a device for early detection of runaway initiation in chemical reactors based on chaos theory. This device has been industrially developed in the FP5 project AWARD and now it has been installed at several chemical plants. He has been working in the DITTY project concerning the management of coastal lagoons using advanced models and the IP project on Thresholds of Sustainability in coastal systems where nonlinear techniques are applied to analyze environmental data sets. During 2005 he has been Guest Editor of Ecological Modelling, Chemistry and Ecology and Hydrobiologia.

Russ Pride is a physicist with over 40 years research experience in the energy industry, the first 20 in the electricity sector and the last 20 in the gas sector. He is currently working for the European Joint Research Centre, ISPRA, Italy, on gas pipeline infrastructures. Prior to this he worked for Advantica Ltd in the UK, (previously the British Gas Research Centre) where he worked on gas appliances, heat pumps, flueing systems and sensor technologies. In recent years he specialized in pipeline monitoring systems. He has managed many multi-national projects including EU and ESA funded projects, and has presented and published widely on gas technologies. He has several patents to his name. He was a founder member of the Gas Analysis and Sensing Group –“GASG” in the UK with a focus on gas detection technologies. Two of the most recent successful multi-million euro projects he has managed were the 17 partner EU consortium on remote satellite surveillance “Presense”, focussed on third party interference to pipeline structures, and the 10 partner consortium “Vogue”, on visualisation of gas leaks using laser pointers and scanners.

Christiaan Logtmeijer is an economist with three years experience in damage assessment and consequence modelling. His expertise lies in the use of GIS and socio-economic modelling with the focus on providing input in decision making processes.

In his work his activities have included the vulnerability assessment of complex critical systems as well as socio-economic impact assessment. His most recent work has shifted towards network vulnerability. His research in this field stretches from assessment of vulnerability of critical systems like energy systems to the use of road networks in emergency management.