

PROGRAMA DEL SEMINARIO:

As the digital, physical and human worlds continue to integrate, we experience a deep transformation in industry, which far-reaches into our lives. The 4th industrial revolution, the internet of things and big data, the industrial internet, are changing the way we design, manufacture, provide products and services. This is creating a complex network of things and people that are seamlessly connected and communicating. It is providing opportunities to make production systems more efficient and faster, and more flexible and resilient the complex supply chains and distribution networks that tie the global economy.

In this fast-paced changing environment, the attributes related to the reliability of components and systems continue to play a fundamental role for industry. The innovations that are being developed have high potential of increased wellbeing and benefits, rendering everything “better and smarter”, but also generate new and unknown failure mechanisms, new and unknown functional and structural dependencies, and eventually new and unknown hazards and risks. On the other hand, the advancements in knowledge, methods and techniques, the increase in information sharing and data availability, offer new opportunities of analysis and assessment for modern system engineering and industry. Then, a new “revolution” is in the making for addressing the challenges brought about by the new and evolved, complex systems (and systems of systems), and the innovations therein; this calls for and, at the same time, drives the advancements of new methods and tools of complex system analysis, and the extension of their applications, based on the increased knowledge, information and data (KID) available, which can improve our system behavior understanding capability in support to decision making.

In this seminar, we will consider the above context and address some challenges and opportunities, focusing on desired attributes like reliability, safety, resilience, flexibility.

SEMINAR: ANÁLISIS DE RIESGO 4.0 PARA SISTEMAS COMPLEJOS E INFRAESTRUCTURAS CRÍTICAS

- State of knowledge on the current framework for (probabilistic) risk assessment of complex, hazardous systems (Nuclear, Oil and Gas, Chemical Processing, Aerospace, etc.)
- State of knowledge on industry situation: Industry 4.0
- Cyber-physical systems and complexity
- Critical infrastructures and complexity
- Characteristics of complex systems:
 - structural complexity
 - dynamic complexity
 - dependences and interdependences
 - systems of systems
- Risks 4.0: risks from complexity
- Failures in complex systems and critical infrastructures
- Key performance indicators:

- Safety
- Reliability
- Maintainability
- Resilience
- Flexibility
- Modeling and simulation for the vulnerability, risk and resilience of complex systems and critical infrastructures:
 - Complex network theory-based methods
 - Functional-based methods
 - Flow-based methods
 - Logic-based methods
- The Big KID: Big Knowledge, Information and Data
- Risk assessment 4.0: condition-informed risk assessment
- Conclusions