INCOSE Spotlight on Juan Llorens
Interviewed by Sandy Young, info@incose.org

Name: Juan Llorens
Titles/Organizations: Full professor at Universidad Carlos III de Madrid and CTO at The REUSE Company

Place of Birth: Bilbao, Spain
Current Residence: Madrid, Spain

Domain: Informatics
Studied in college: Industrial engineering and robotics
Year joined INCOSE: 2010
Roles in INCOSE: President, Spain Chapter of INCOSE (AEIS, Asociación Española de Ingenieria de Sistemas), Ontology Working Group chair and member, Requirements Working Group member and member of the INCOSE Technical Leadership Institute

Years in systems engineering: 28

1. **When did you first hear about systems engineering?**
   In a meeting with Jean Claude Roussel 10 years ago, I didn't know that what I had been doing almost all my professional life was systems engineering.

2. **What do you want others to know about the Spain Chapter of INCOSE?**
   INCOSE Spain (Asociación Española de Ingeniería de Sistemas or AEIS) promotes systems engineering in Spain and increases the maturity of systems engineering in Spanish industries and at the university level.

   Even if the country is one of few in the world that completely designs and produces aircrafts, satellites, tanks, warships, submarines, civil and military vehicles, trucks, buses, motorcycles and medicine, there is a lot of work to do in regards to systems engineering. Spain has some industrial sectors that have a leading position in the world (such as railway, infrastructure and banking), but these companies usually lack coordinated systems engineering practices. AEIS has a lot of work to do until all those companies link their systems engineering practices with INCOSE denominations and ISO Standards.

   Finally, if we can help, we´d be delighted to coordinate our chapter with chapters in America's and Africa's Spanish speaking countries.

3. **One of the topics that you are considered an expert in and teach about is "knowledge reuse." Please explain.**
   Knowledge reuse is the discipline that offers humans different means to classify, find and apply knowledge (learned information) that was already produced in the past, but for new usage.

The intention is to avoid reinventing the wheel and minimize "blank paper" syndrome. The benefit? A large reduction in costs.

Knowledge reuse allows systems engineers to reuse models, requirements, traceability between requirements and test cases, etc.

4. **You worked with artificial intelligence for database systems in the 1980s. Have you followed its use, and if so, how have you seen it change?**
   Yes. I started to apply artificial intelligence (AI) to automatically generate hierarchical structures with very little success. Since then, AI has evolved and been applied more widely in the engineering community.

   From the initial algorithms based on expert systems and production rules (used for diagnostic and classification purposes) the discipline has evolved toward a machine learning approach. Everybody wants to make computers "learn" what humans do or discover patterns around our information, structure or behavior. However, there is still much to do. Artificial intelligence is, today, really artificial with almost no intelligence.

5. **What do you consider to be the biggest advancement in systems engineering to date?**
   The biggest advancement is, in 2018, its awareness. A few years ago, if you said "systems engineering" to a field engineer outside aerospace and defense, he/she would think you were trying to describe Fourier and Laplace transforms. From being only a subject inside defense and aerospace, systems engineering is now known in almost all the other safety critical engineering disciplines (automotive, railway, healthcare and maritime). It's also great to see it embraced by new domains, such as oil and gas.

   There is still more to be done to bring systems engineering to infrastructure, banking, the chemical sector and, hopefully, the software community – which has completely disappeared from systems engineering.