ITEA Smart Systems Engineering workshop

7 April 2022

JF Lavignon, ITEA Vice-Chairman

ITEA 4

ITEA 4 is the Eureka Cluster on software innovation

Agenda

Welcome and introduction

- Introduction to ITEA
  - Presentation of Smart Engineering in ITEA
- Introduction to the ITEA Smart Systems Engineering workshop
  - Rationale
  - Format

Introduction to ITEA

ITEA

A Eureka RD&I Cluster on software innovation

ITEA, as part of the Eureka Clusters Programme, stimulates transnational and industry-driven RD&I in the domain of software innovation. ITEA enables a large international community to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

ITEA key challenges:

- Smart city
- Smart communities
- Smart health
- Safety and security
- Smart mobility
- Smart industry
- Smart energy
- Smart engineering

ITEA governance
Trustful relationship

ITEA is a non-profit association, with industry board members:

BARCO, BOSCH, Bull atos technologies, enerim, ERICSSON, esri Canada, KoçSistem, NOKIA, NXP, PHILIPS, SAAB, SIEMENS, software AG, TURKCELL TEKNOLOJİ

Public Authorities assigning budgets to ITEA projects are:

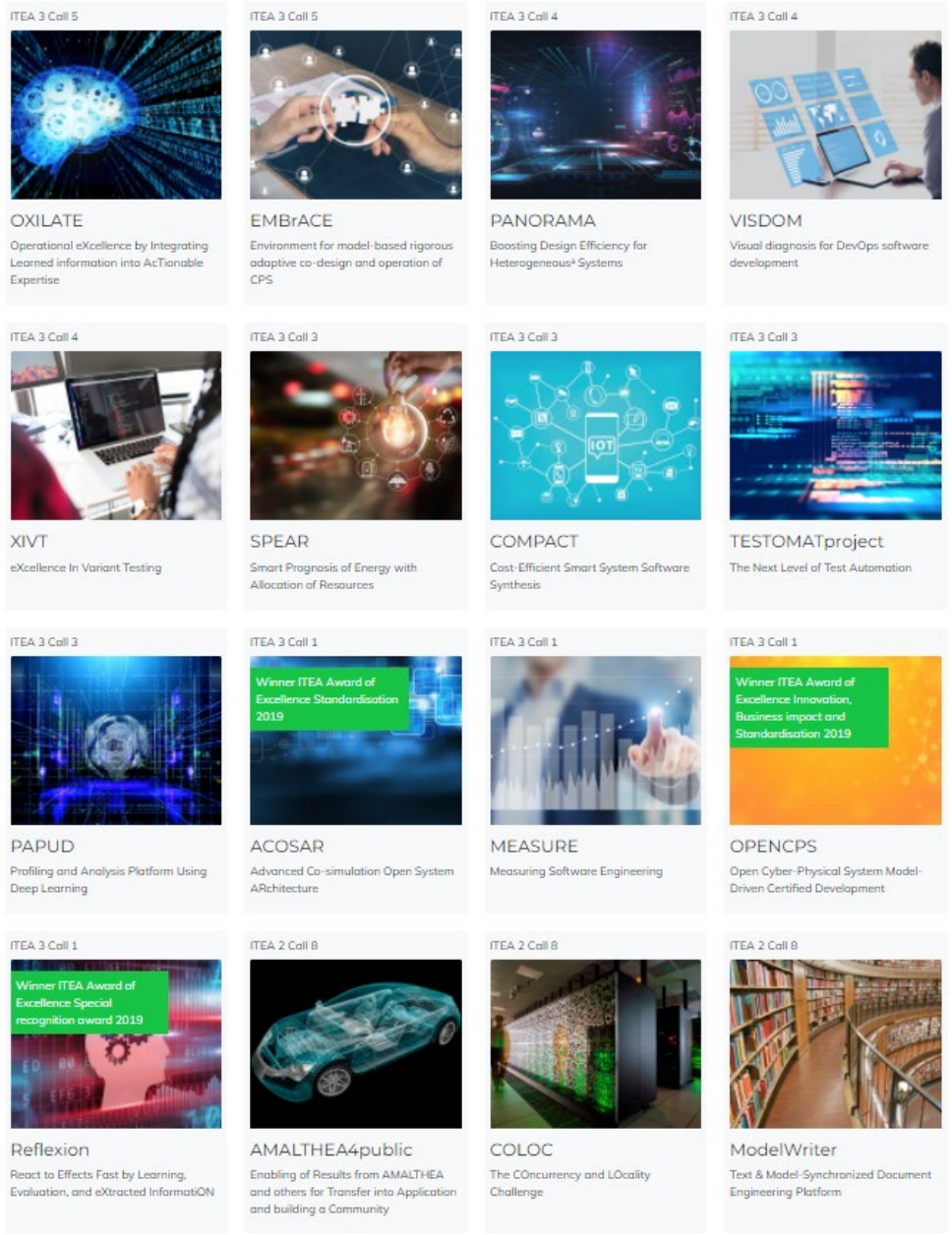
ITEA 4 | Σ

ITEA's Smart Engineering focus

ITEA Smart Engineering innovation

ITEA has a proven track-record in Smart Engineering innovation. Since 2000, many Smart Engineering projects have been set up, resulting in outstanding outcomes improving performance, reducing costs and boosting quality, security and safety:

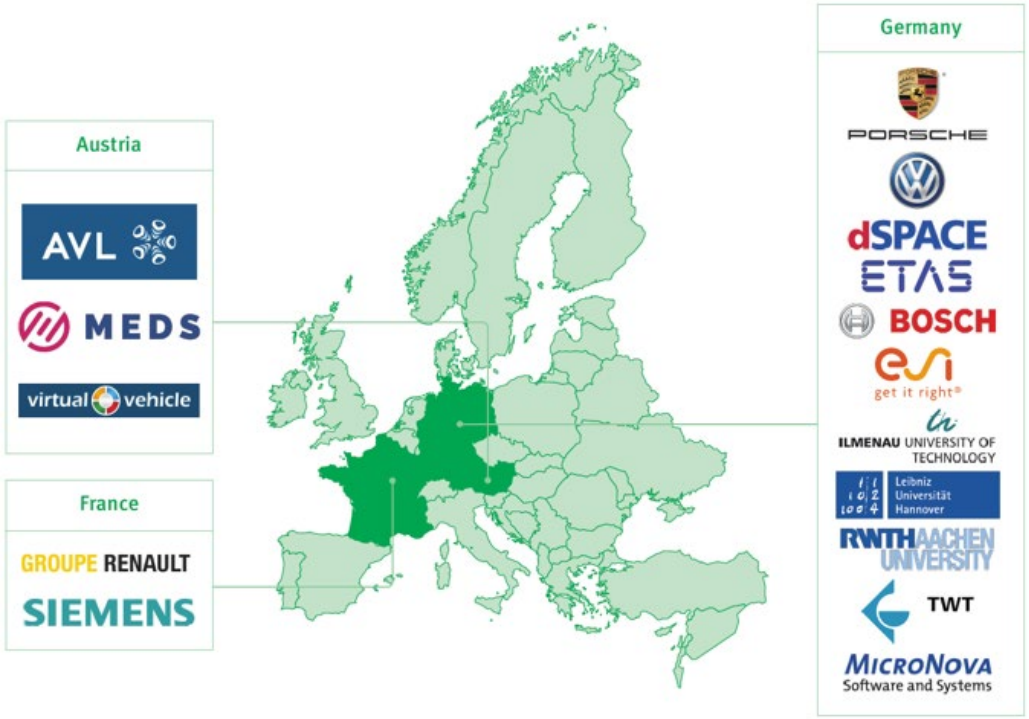
https://itea4.org/challenge/smart-engineering.html



Some ITEA Smart Engineering projects

Acosar - Advanced Co-simulation Open System ARchitecture

The ITEA project ACOSAR has developed the Distributed Co-simulation Protocol (DCP), which focuses on the efficient integration of distributed real-time systems and simulation environments. This leads to a significant improvement of development processes and accelerated time to market.



Start date: September 2015
End date: August 2018

Acosar website
https://itea4.org/project/acosar.html

Acosar Success story
https://itea4.org/project/success-story/acosar-success-story.html

Some ITEA Smart Engineering projects

EMPHYSIS - Rising to the automotive complexity challenge

The ITEA project EMPHYSIS (Embedded Systems with Physical Models in the Production Code Software), led by Bosch, aimed to jointly establish a new, open standard that lays the foundation for the development of innovative tools which makes it possible to implement model-based functions directly in embedded software with better code and less effort.

Start date: September 2017
End date: February 2021

EMPHYSIS website
https://itea4.org/project/emphysis.html

ITEA Smart Engineering challenge

The most important contribution

- 78 projects out of 220 completed or running projects
- 35% of ITEA projects
- Always a strong topic
  - During the 7 ITEA 3 calls from 17% to 67% of the running projects

Introduction to the

ITEA Smart Systems Engineering workshop

ITEA Smart Systems Engineering workshop

Goal

The aim of this workshop is to bring together researchers, (future) project leaders and developers from several disciplines to share their experiences and discuss the latest advances and innovations in Smart Systems Engineering with application to the development of smart systems.

The overall objectives of the workshop will be:

- To increase the understanding of problems of Smart Systems Engineering
- To benefit from the experience of ITEA projects
- To identify important challenges that could lead to new research projects

ITEA Smart Systems Engineering workshop

Organisation committee

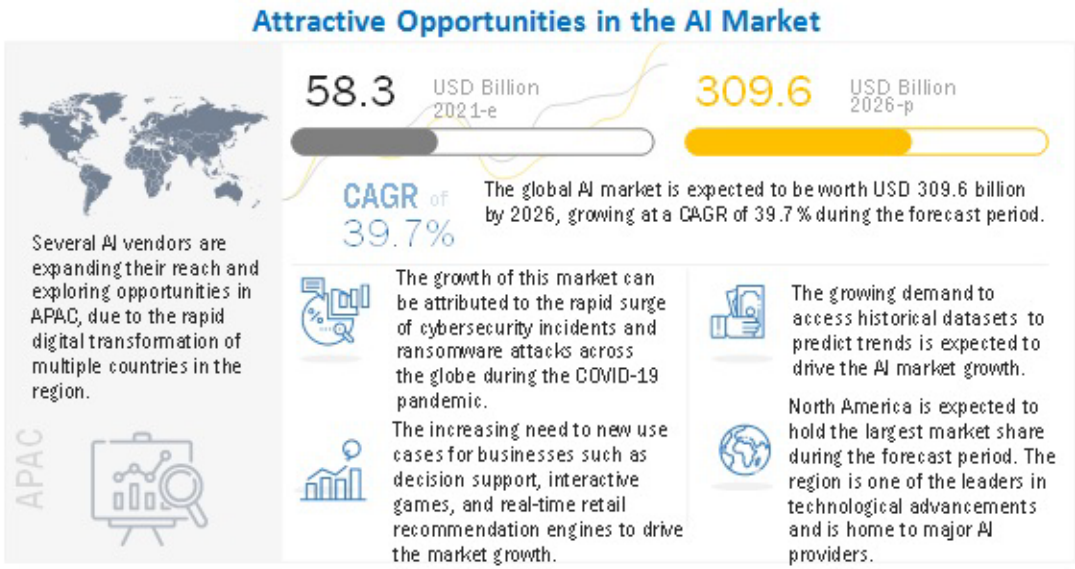
The organisation committee of the ITEA Smart Systems Engineering workshop consists of Smart Systems Engineering experts from:

ITEA Smart Systems Engineering workshop

Rationale

Smart system engineering context
Digital transformation, Data and AI expansion

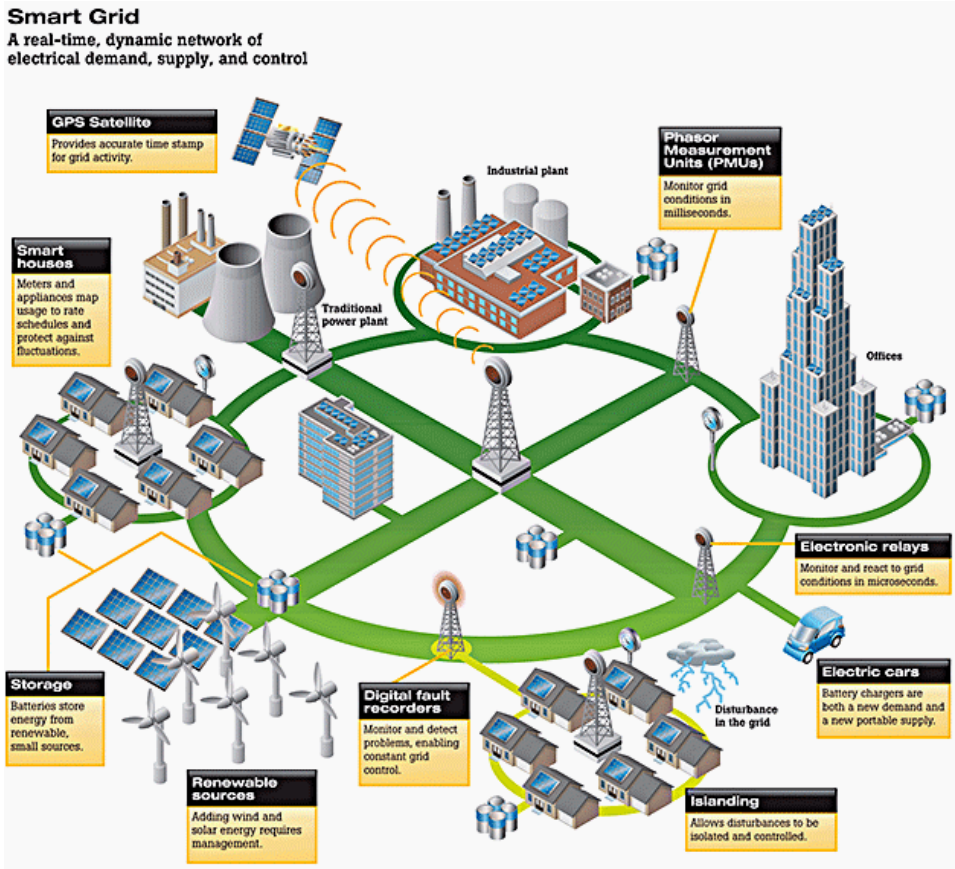
- Digital transformation: everyone search to benefit from digital systems
- Data and AI in system engineering
  - AI not yet at full speed in all sectors
  - A new generation of AI methods
    - Coupling with explicit knowledge, new learning methods, human collaboration
  - Open questions:
    - Explainable AI, Certification
- AI for software engineering



Source: https://www.marketsandmarkets.com/

Smart system engineering context
Multi stakeholders' systems

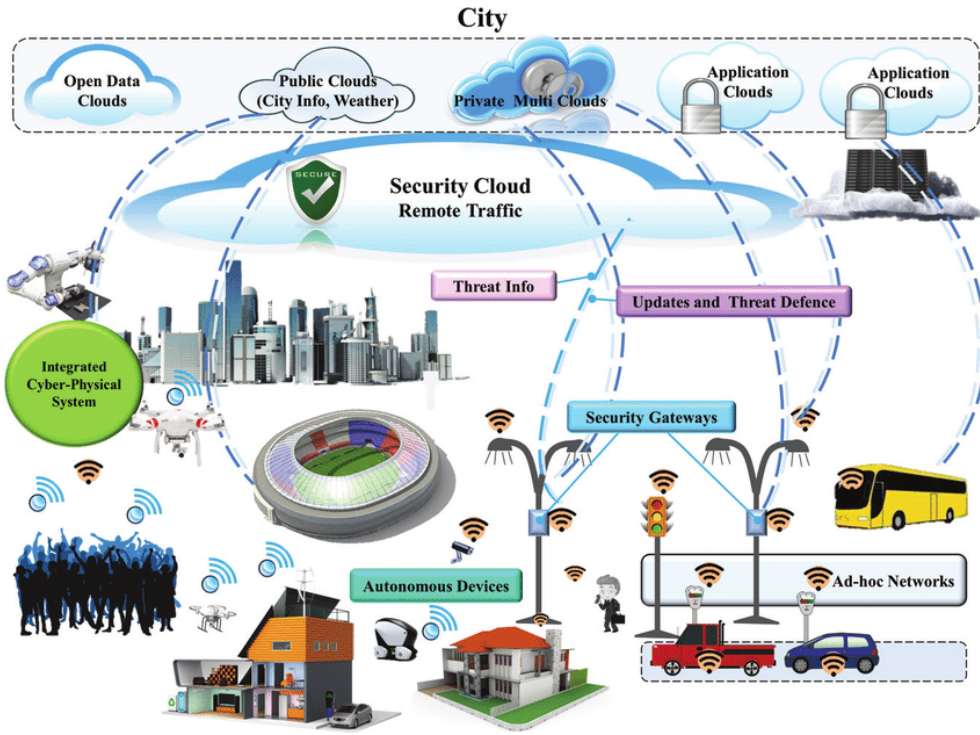
- Systems with more organizations involved
  - Co-design along the value chain
  - Integrated supply chain
- Decentralized versus centralized
  - No natural leading organization
  - Cooperation
- Non trusted partners
  - Open systems with potential newcomers



Source: https://www.ennomotive.com/what-are-and-why-of-smart-grids/

Smart system engineering context
System deployment

- Larger infrastructure
  - From edge to cloud and HPC
- Very heterogeneous devices
  - From constrainted computing resources to powerful CPU with various accelerators
- Unique vision
- Complex workflow management
- Digital loop
- Urgent computing



Source: https://www.researchgate.net/figure/Smart-City-Multi-layer-security-framework_fig29_304147073

Smart system engineering context
System flexibility

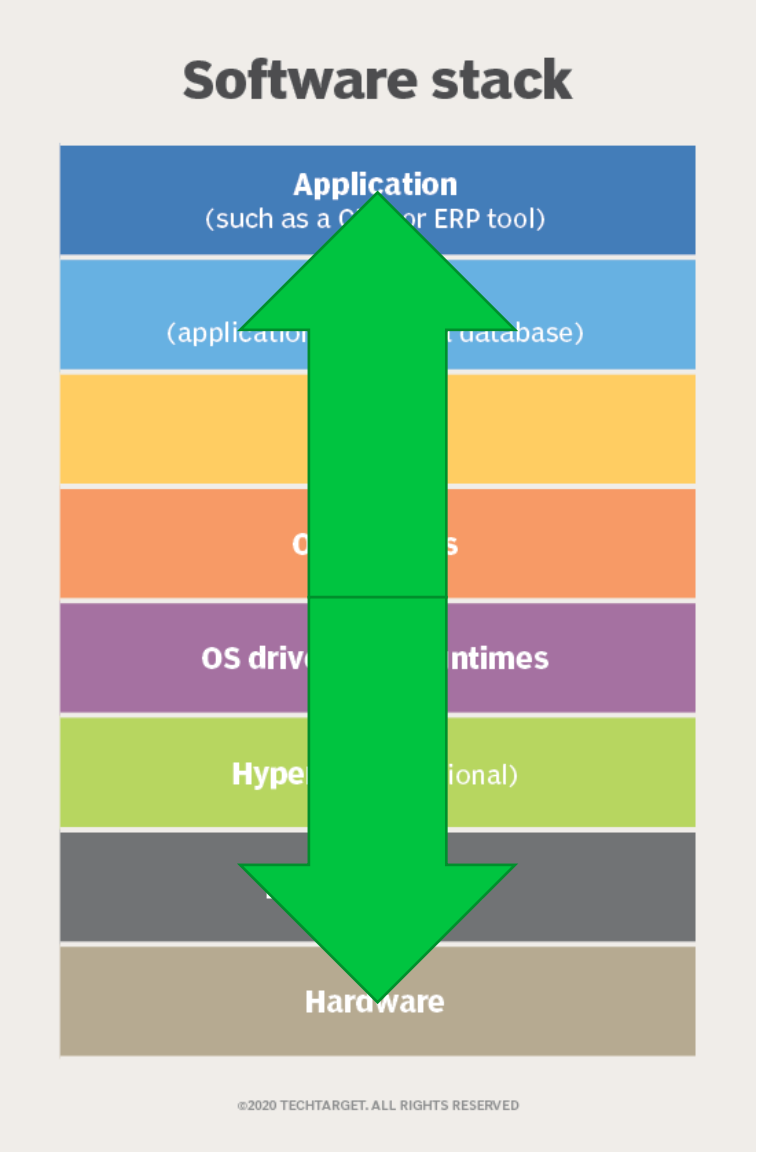
- One design for several deployed systems
  - One system many configurations

- Ability to adapt to:
  - Different infrastructures
  - Different set of users
  - Different system features

Source: https://www.hicx.com/blog/is-the-software-actually-flexible-why-is-this-so-important/

Smart system engineering context
Optimization versus layer approach

- Layer approach advantages
  - Decoupling problems
  - Building upon past efforts
  - Capitalization of the software industry
- Disadvantages
  - Inefficiency: execution time, environment
  - Too big to validate, certify
- How to optimize execution ?



Source: https://www.techtarget.com/searchapparchitecture/definition/software-stack

Smart system engineering context
Sustainability – Resource optimization

- How to reduce the environmental footprint
  - Less energy to produce and to run (green ICT)
  - Less raw material
- How to increase durability ?
  - More robust
  - More modularity
- How to plan recycling ?
  - What level of granularity
  - New players to integrate

Source: https://iaks.sport/news/iaks-congress-gold-partner-polytan-closes-material-life-cycle

Smart system engineering context
Security - Trustworthiness

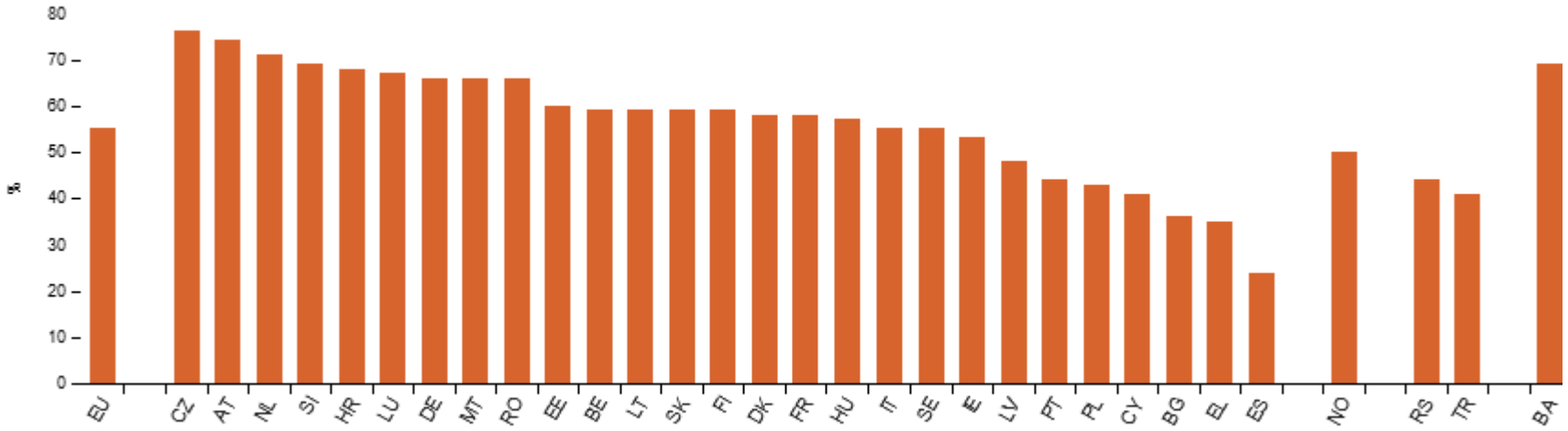
- Openness and connectivity of new systems
  - Sensors
  - Interconnected systems
  - Untrusted stakeholders
  - Data reliability
- Increased level of stakes
  - Critical infrastructures
  - More appealing for attackers

Source: iStock 184895346

Smart system engineering context
Shortage of expertise

- 19% of all entreprises with at least 10 employees employed ICT specialists in 2020
- In 2020, 8.4 million persons worked as ICT specialists across the EU (4.3% of the total workforce; in 2011 only 3%)
- In average, 53% of entreprises have hard to fill vacancies

Enterprises that had hard-to-fill vacancies for ICT specialists, 2020 (% enterprises that recruited/tried to recruit)



Source https://ec.europa.eu/eurostat/statistics-explained/index.php?title=ICT_specialists_in_employment

ITEA4

ITEA Smart Systems Engineering workshop

Format of the event

ITEA Smart Systems Engineering workshop

Format

The one-day (online) workshop will be structured in three interactive sessions and topics include the following:

1. The complexity of applications
2. Standardisation
3. AI application development – dataops versus devops

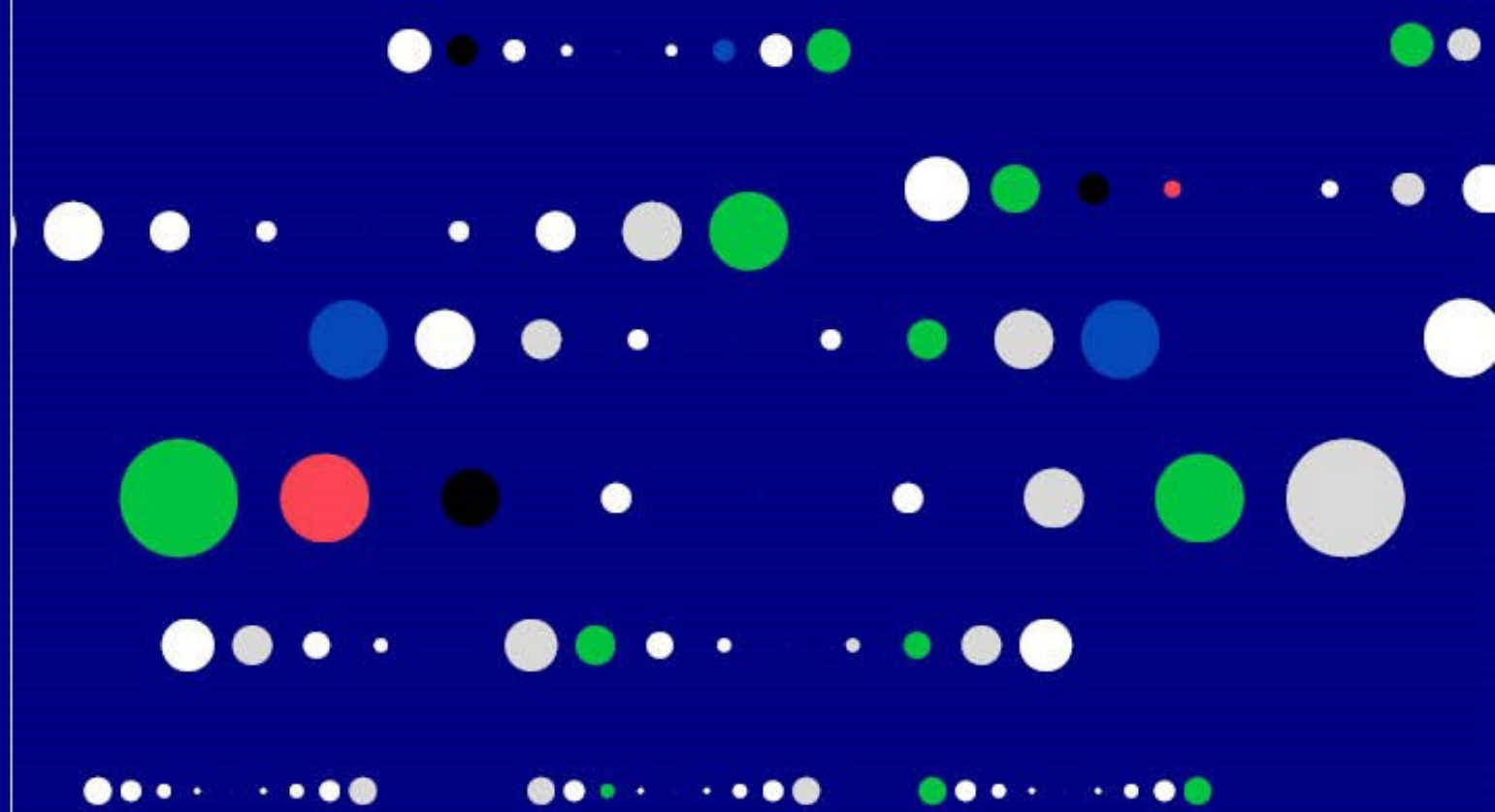
The workshop will be highly interactive: in addition to the invited panellists and short presentations, there will be discussion between the panellists and with the audience.

Nota Bene: for each session, a different link

ITEA Smart Systems Engineering workshop

Part of a bigger story

- The goals of the ITEA Smart Systems Engineering workshop are to understand the actual Smart Systems Engineering challenges and to build impactful RD&I projects
- The Smart Systems Engineering project ideas and corresponding project consortia can be further defined in the ITEA project idea tool (from May/June) and during the ITEA Project Outline (PO) Preparation Days in September 2022.
- Project proposals can be submitted in the upcoming ITEA Call for projects in November 2022.
- Successful proposals will receive the ITEA 4 label in March 2023 and could be funded and start by the end of 2023/beginning of 2024.



ITEA 4

https://itea4.org

ITEA is the Eureka Cluster on software innovation

eureka

https://www.eurekanetwork.org

Thank you