

Overview of French organizations active in SoS An AFIS point of view , IEEE SoSE conference – 22 June 2018

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Disclaimer: There are many entities that are not mentioned here.
This presentation is rather a sketch than a panorama

Areas of activity

- **System of Systems Engineering (SoSE)**
- **Service Engineering**
- **Architecture and Architecture Frameworks**
- **Complex Systems engineering**
- **Lifecycles and engineering**
- **Sustainable systems engineering**

Coordinated by : André Ayoun and Claude Pourcel

~45 members

Published products

- Glossary and data model for SoS
- Coupling component systems towards SoS, ICSSEA-2007, INCOSE 2008
- Tutorial on Complex Systems and SoS, 2009
- Services for SoS, definitions, 2010
- Organizational interoperability, CIGI-2011
- 2012-2014 (lifecycle management and societal responsibility)
- 2011, 2013, 2015 – Sustainable system engineering, 20 communications
- Service Engineering, INCOSE-2012
- Produits-Systèmes-Services (PSS) IPS2 2015
- Webinar: lessons learnt in SoS Engineering from SESAR, 2016
- Journal « Génie logiciel »: articles (2011 to 2016 editions)
- 2016-2017: Systems of services– Service system engineering: PSS - SESE Tour 2017
- Poster Service Engineering, CSDM 2017

Working groups active in 2018

- [GI07] SoSE , collaborative engineering, multi-lifecycles, organizational issues.
- [GPI4] Webinar on service engineering
- [GPI6] System of services – operations – Service systems engineering
- [GII7] Analysis of webinars of INCOSE SoSE WG
- [GPI9] Promotion of Service Engineering
- [GI21] From value chains to value networks



- 1. Academia : Research and Training organizations (Univ, Schools, Research Centres)**
- 2. Administrations and structured communities of users**
- 3. Industrials: developing / implementing / operating SoS**
- 4. Industrials : tools developers / vendors for SoS Engineering**



Universities

CNRS:

LABEX MS2T (SoSE)

LABEX SMART (smart Human Machine Interaction)

GdR MACS (Modelling, Analysis and Control-command of dynamic system)

Engineering schools:

Centrale Supélec, Arts et Métiers

ENSTA ParisTech

X-Mines-Telecom

Groupe ISAE SUPAÉRO, ENSMA, ESTACA, École de l'Air + Supméca

Groupe INSA: INSA Toulouse,....

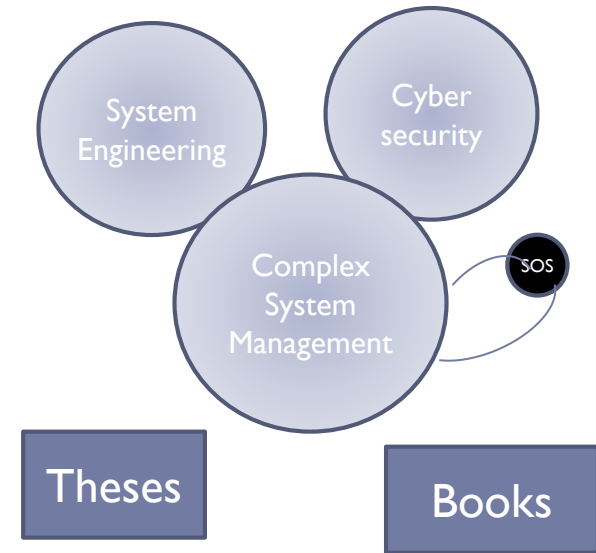
Mines d'Ales, d'Albi

Univ. de Strasbourg, Univ de Lorraine,....

8 Institutes of Research and Technology (IRT):

SystemX (Paris Area)

Saint Exupéry (Bordeaux Area),....



SoSE in French Academic institutions (AFIS Members)

Universities and schools

- Université de Lorraine
- IMT : Mines d'Alès
- INSA de Toulouse
- ISAE-Supaéro
- Grenoble INP
- Centrale Supélec
- ENAC Toulouse
- ENSTA ParisTech
- IPGP
- LAAS Toulouse
- UT Compiègne
- ENSTA Bretagne
- ENSTA ParisTech
- ESTIA

And

- CEA
- IRT SystemX
- IRT Saint Exupéry

Master in Complex Systems

- Université Paris Saclay
- Université de Lorraine
- Université de Bordeaux
- Université de Nantes
- Université Paris-Est Créteil
- Université de Technologie de Compiègne
- Université de Rennes – INSA de Rennes
- Université de Lyon
- Université d'Angers
- Université Savoie-Mont-Blanc
- Université Bretagne Sud- Université Catholique de l'Ouest- Université d'Angers
- Université de Toulon
- Université de Franche Comté
- INP Toulouse – INSA de Toulouse
- Institut Mines Telecom
- Université de Picardie
- Ecole Centrale Marseille
- INSA de Rouen
- Université de Technologie de Troyes

Networks

- GDR MACS (CNRS) : research in dynamic systems control-command and production systems
- AIP Primeca : coordinates pedagogic platforms

Master in Industrial Engineering

- Université de Strasbourg
- Université de St –Etienne - ENISE
- Université de Dunkerque
- Université Paris-Nanterre
- Ecole Centrale Lyon
- Ecole Centrale Nantes
- Grenoble INP – Université Grenoble Alpes
- INSA Toulouse
- Université d'Amiens
- Université d'Artois
- Université Paris-Est Marne la vallée
- Université Paris-Saclay
- UPEC
- ENI Metz

SoSE in French Administrations and communities of users

DGA (French MoD):

- Joint Command Information System (SIA)
- Federation of the Land Combat System (SCORPION)
- Future Combat Air System,...
- Naval Combat System
- Ballistic Missile Defence
- → National and NATO systems

CNES

- Space systems of systems
- → Cooperation with ESA

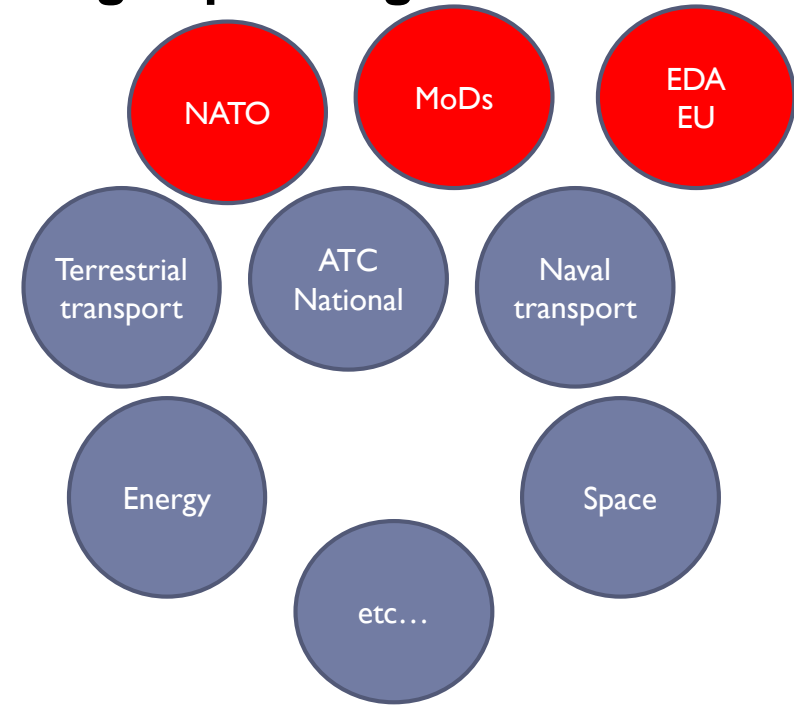
Smart cities

- Grand PARIS Transportation system of systems
- Grand LYON

Participation to European Programmes (FP7, H2020):

- **Air traffic Management SESAR** European Programme
- **Rail : Shift2Rail**
- **Global navigation service Galileo**
- **Electric Networks interconnection**
- **Interconnection of fluvial systems**
- **T-AREA SoS, DANCE, COMPASS, Road2SoS,**
- **Road2CPS, Platforms4CPS**
- **Other: Police, Security,**
- ...

SoSE addressed by French Industrials: developing / implementing / operating SoS



- **AREVA , FRAMATOME** : nuclear plant systems
- **AIRBUS** : Civilian (Satellite constellations) and Military SoS (border surveillance, tactical networks)
- **ArianeGroup**: Launch services
- **Atos** : signalling and control fo rail systems, Schengen
- **Cap Gemini** : Rail, Naval, Cyber....
- **C-S & Sopra**: Military Joint Information systems
- **ENEDIS + EDF / RTE**: Electric Power (co)generation/ distribution / management
- **NAVAL GROUP** : Military and Civilian Naval systems (e.g. Maritime surveillance; Search and rescue)
- **RENAULT** : Automotive industry , connected cars
- **Thales** : Civilian (Air Traffic Control, smart cities, railway signalling, ...) and Military SoS (Air Operations, Ballistic Missile Defence)
- **SAFRAN** : Information systems for police and firemen
- **TECHNIP FMC** : Oil industry
- ...



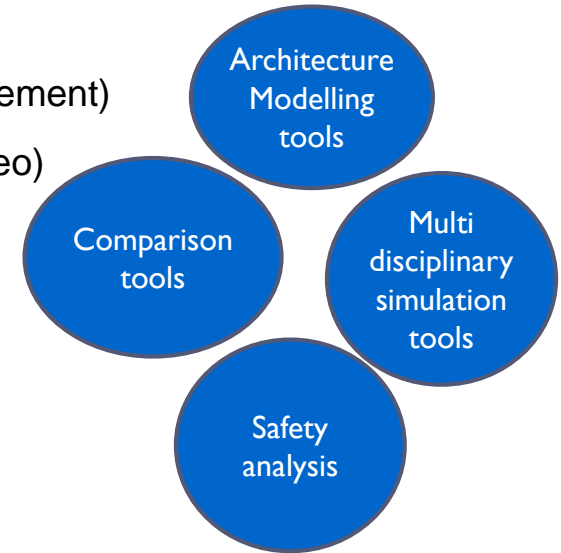
SoSE addressed by French Industrials: tools developers / vendors for SoS Engineering

- **All4Tech** : MBSE MBSA tools, Safety Architect
 - **ARTAL** : Capella* architecture modelling tool, CITRUS (IVV management)
 - **Dassault Systems**: 3D Experience suite (acquired **NoMagic**: Cameo)
 - **ESI Group**: Virtual twins
 - **Geeglee** : Architecture exploration / comparison tool,
 - **Knowledge Inside**: arKItect
 - **MEGA** : Architecture modelling tool (MEGA_suite_for_NAF)
 - **Obeo** : Capella distribution (developed by the “clarity” community)
 - **Sodius**: MDWorkbench, SE Collab
- + French subsidiaries of International Companies:**

- **APSYS** : SIMFIA (safety analysis tool)

And many more...

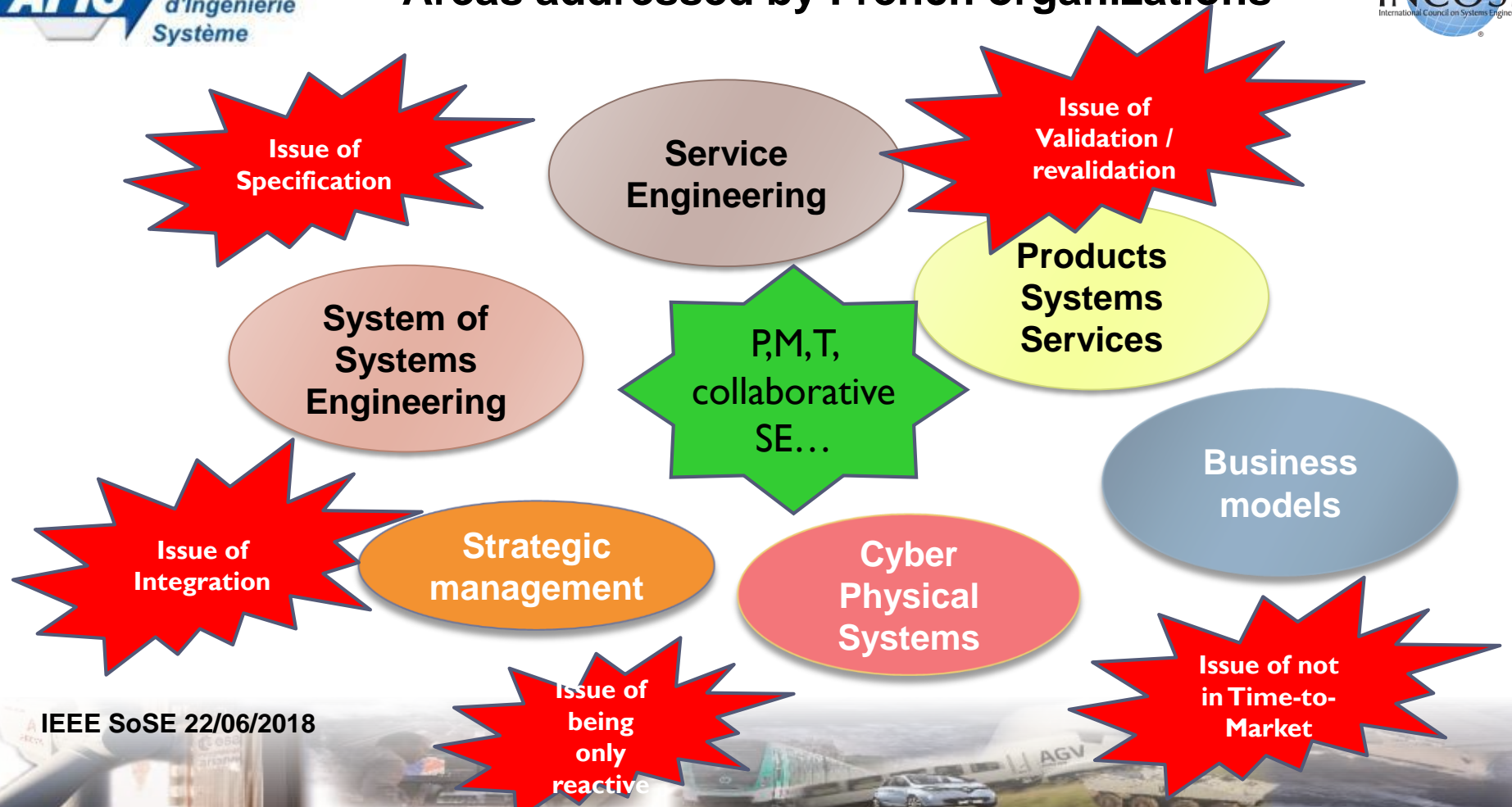
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Evolution towards Collaborative Tools



Areas addressed by French organizations



Thank you for
your attention

