



http://www.esa.int/Our_Activities/Operations/Ground_Systems_Engineering/ESAW_2017
(TBO)

Model Based Engineering | Service-Oriented Architectures | Ground Systems Game-Changing Approaches | Complex System-of-Systems | Ground Software Systems including ECSS-CC and CNES ISIS | Data System Harmonisation | Cloud Computing | Virtualisation | Emerging New Disruptive and Innovative Technologies | Data Systems Security and Information Assurance | Automation and Integrated Services | Interoperability and Standards

ESAW (European ground System Architecture Workshop) Overview

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ESA/ ESOC

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Background

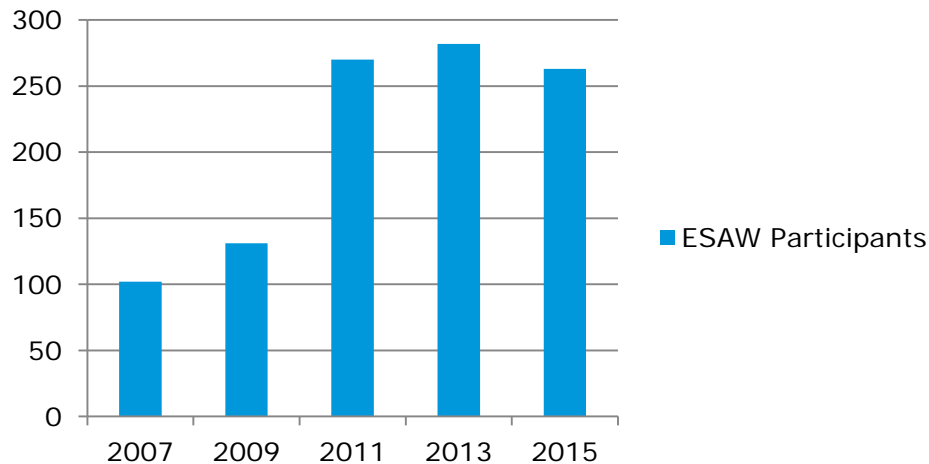


1. Inspired by GSAW
2. Inefficiencies detected at European level on Ground Systems
3. Need seen during European Technology harmonisation of Ground Systems
4. ESA is a world leader on “one size fits all”
 1. Commonality is a driver
 2. Minimal cost of a system
 3. Reference Architecture
 4. Reference Technology
 5. ESA is a world leader on “European Ground System Open Source”
6. ESA / ESOC decided that an European Workshop was valuable to
 1. Provide a forum for the Ground System experts to collaborate through presentations, posters and demonstrations
 2. Promote collaboration with commercial, civil, industrial and academic communities
 3. Share lessons learned
 4. Vision the short-, medium- and long-term future



ESAW Participants

	2007	2009	2011	2013	2015
ESAW Participants	102	131	270	282	263



- **6 Keynotes at Plenary Session**
- **Parallel Sessions, 42 Presentations**
- **More than 40 posters**
- **More than 10 demonstrations**

- Space Agencies (**NASA, ASI, CNES, DLR, NLR, EUMETSAT, NOAA, Lavochkin, ESA**)
- **Aerospace Corporation (USA), JHL/APL (USA)**
- Telecommunication Operators (**Eutelsat, Inmarsat, SES Astra**)
- European Satellite Primes (**ADS, TAS, OHB, SSC, SSTL**)
- **European Industry**
- **European Academia**
- Other Industry (**Argentina, Croatia, Gambia, Egypt, Turkey, Thailand**)



- Future Ground Systems Development **Roadmaps**:
 - **Institutional**
 - National Agencies, EUMETSAT, NASA, NOAA, ESA
 - **Commercial Satellite Operators**
 - Eutelsat, Inmarsat, SES Astra
 - **Industrial View**
- Development and **Commercialization** of Products based on **ESA Technology** in the Global Market
- European Technology **Harmonisation** (i.e collaboration)
 - **Emerging Technologies**

- **Small Missions, Cubesats, Constellations, Multi Mission, Mega-Constellation**
- **Standards driven Data Systems**
- **IPR, Licensing, 3rd Party Rights Management, Space Law**
- **Reference Architectures, Data Systems Architecture, SOAs**
- **Operations Preparation and Automation (Lights-out ops)**
- **Cyber Security, Virtualisation and Cloud Computing**
- **Big Data**
- **COTS / Infrastructure driven Data Systems (EGS-CC)**
- **Cost reduction & Efficiency**

Future ESAWs Challenges

- Challenge is not only technological
 - Is cultural
 - Is on decision makers
 - Is collaboration as a “Team of Teams” across organizations (one team / organization) → **CONSENSUS**
- Are we progressing with our Roadmaps / lessons learned?
 - **It is not easy to do what we dream**
- **CCSDS Standards “Enforcement” / New Standards infusion**
- Reusability of Launcher’s stages is becoming reality, and we are still discussing re-usability on Ground ?
 - Challenges for European “one size fits all” also including
 - nano- / cube-sats / small sats **SCALABILITY**
 - single, formation flying, mega constellations
 - any orbit
 - any type of missions
- MBSE and its degree of granularity when developing CSOS
- Cyber security / cyber attacks (ground and space)

Future ESAWs Challenges



- Big Data, cloud computing, semantic interoperability
- Are our users **flexible** enough to operate with **what they have or what they can get at low cost**?
 - With a **“Big Money”** new Project, a new set of requirements is produced that makes the system **“Complex, Slower and more expensive”**
 - → **“Fatty” Budgets** allows diversity, acting against reusability
- Are we accepting that space related Ground Systems will become a commodity ? **300 K U\$S for a SW turn key C&C !!!**
- It is not the cost of the SW Implementation !!
 - It is the cost of Verification & Validation
 - It is the cost of Mission Preparations & Operations
 - How to reduce the cost of the required FTEs ?
 - Shortening the development cycles ?
 - Reduce time to user ?
 - More autonomy operations (Telecomms like)
- From **Risk aversion** to **Risk fondness**

Will we use ROBOPSS?





20 and 21 June 2017

**ESA/ESOC
Darmstadt, Germany**

**Deadline for abstract
submission is 31st March 2017**

**Fliers available outside
in the Foyer**

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