



Software Product Assurance Workshop 2023

European Space Astronomy Centre, Spain
25-28 September, 2023

Workshop Opening, 26th September 2023

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Started at ESA in 1991

Monolithic Microwave Integrated Circuits (MMICs) designer
Millimetre and Sub-Millimetre Wave Technology engineer
Microwave technology engineer
Micro Nanotechnology Engineer
Head of the Components Technology Section
Head of the Components Section



Went through:

TOS-XRM, TOS-QCL, TOS-QCT, TEC-QCT, TEC-QTC, TEC-EDC

Head of the Quality, Dependability & Product Assurance Support Division TEC-QQ since 1/1/2019, today the division is about 76 persons (staffs and contractors)



15



34



14



11



7



Core activities by TEC-QQS (SW PA Section at ESA)



80-85 % of our workload
 Level of support varies
 (from fully integrated staff
 to small percentage)
 Mainly focused on flight
 SW (but also ground SW)
 All ESA sites (ESTEC,
 ESAC, ESOC, ESRIN,
 TLS)
 In close cooperation with
 SW engineers (TEC-SW)

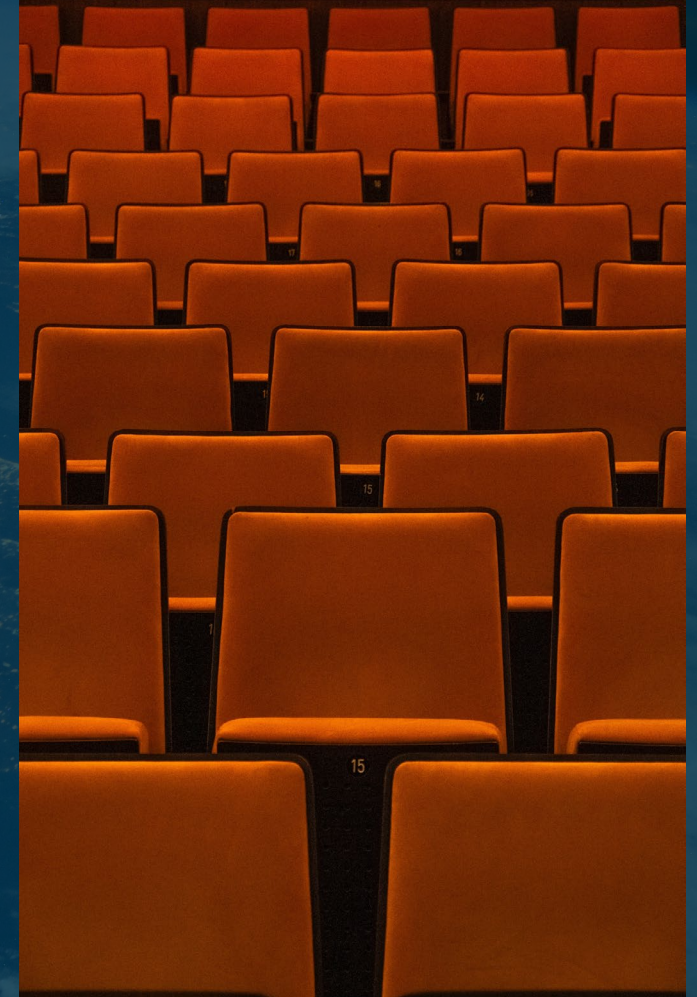
ECSS Q-ST-80C Standard
 ECSS-Q-ST-60-03C
 Standard
 and related handbooks: SW
 reuse, SW process
 assessment, SW dep &
 safety, SW metrication
 Cooperation in other SW
 engineering & PA standards

SW PA R&D priorities:
 MBSE
 FPGA tools
 SW process
 assessment
 Agile
 SW quality tools
 SW PA applied to
 Ground Segments
 Secure SW
 engineering
 New techniques and
 methods

Training activities:
 ECSS SW PA
 courses
 SW PA training for
 NMS & SME's, for
 students ...
 Bi-lateral & multi-
 lateral cooperation
 SW PA Workshop

Software Process
 Assessment &
 Improvement (S4S)
*(full or for Very Small
 Entities)*
 SW Quality
 Laboratory.

- Previous editions ESTEC (2013), ESRIN (2015), ESOC (2017), CNES-Toulouse (2019), Online (2021).
- 140 participants (constrained by facilities space).
- Strong presence from Space Agencies: ESA, CNES, DLR, JAXA, NASA.
- Increased participation of New Space companies.
- 30 Presentations and 7 posters.
- 3 Keynotes.
- 1 Training day
- 5 Sessions covered:
 - Session 1: SW Security, Safety and Dependability.
 - Session 2: Ground Systems.
 - Session 3: Lessons Learnt.
 - Session 4: SW PA Challenges for the Future.
 - Session 5: SW Tools and Methods.



- Tim Crumbley (NASA Office of Safety and Mission Assurance Technical Fellow)
 - *Software Assurance*
- Bob Aiello (IEEE Configuration Management WG Chair)
 - *Configuration Management and DevOps*
- ESA - Charlotte Beskow (Former Head of ESA/STS Kourou Office)
 - *Success is never guaranteed*



Workshop highlights: Standardisation

Dedicated presentations about current status of standardisation activities on most relevant standards:

- New **ECSS-E-ST-40C** Rev.1 (SW Engineering)
- New **ECSS-Q-ST-80C** Rev.2 (SW Product Assurance)
- New Independent SW Verification and Validation guide
- New Machine Learning handbook (**ECSS-E-HB-40-02**)
- New ASIC/FPGA/IPC Core Standards replacing ECSS-Q-ST-60-02C:
 - ECSS-E-ST-20-40C (Engineering)
 - **ECSS-Q-ST-60-03C** (PA)

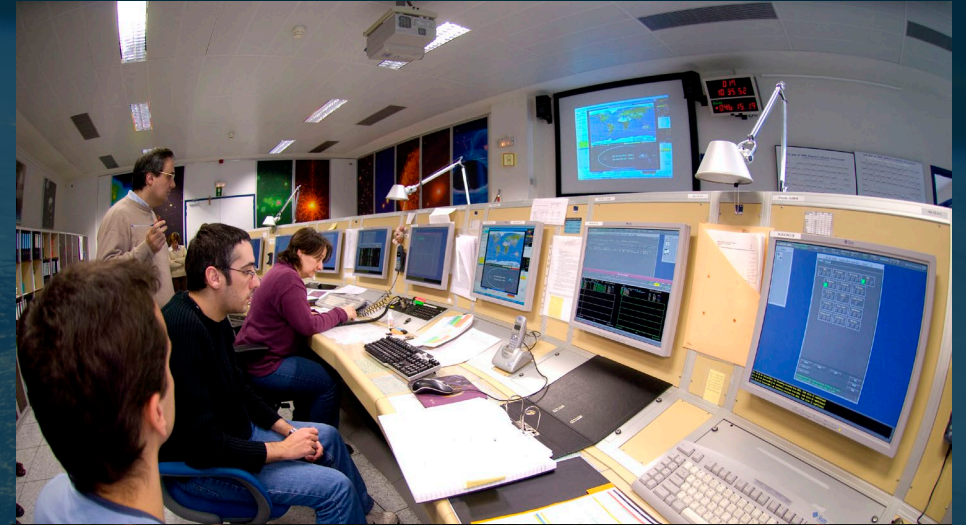


New training offered replacing usual ECSS training. How SW Tools can support the deployment of processes:

- Containerisation
- Front-end test automation
- Automation of SW Processes

Dedicated session on ground systems support:

- SW PA in ground systems.
- Licensing topics.
- Role of ESAC SW PA in science missions.
- ESA Datalabs.



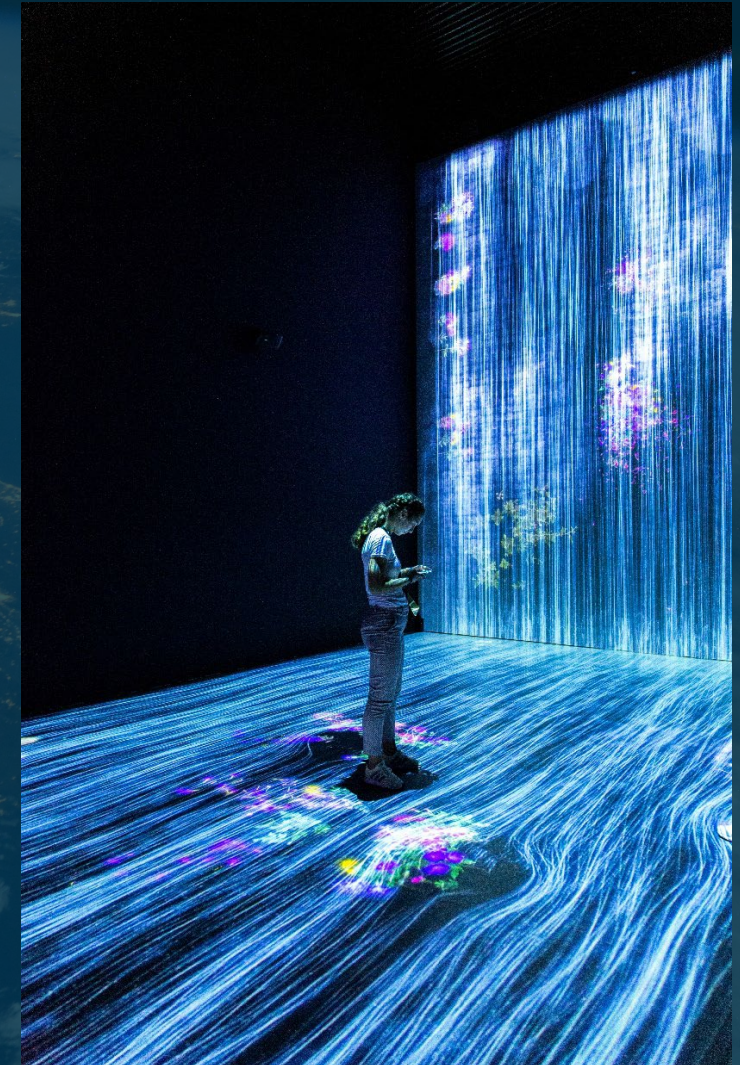
Workshop highlights: Challenges and future trends

There is a dedicated session on challenges for the future addressing topics such as:

- Model Based /Engineering Mission Assurance (several presentations).
- New Space paradigm implications for SW Product Assurance.
- Artificial Intelligence / Machine Learning implications for SW PA (three presentations).

As part of other panels there are also presentations dealing with emerging topics such as:

- Use of new programming languages
- Security and DevOps
- Formal verification



Thanks, and enjoy the Workshop!

