Recent developments in ESCC Qualification Methodology

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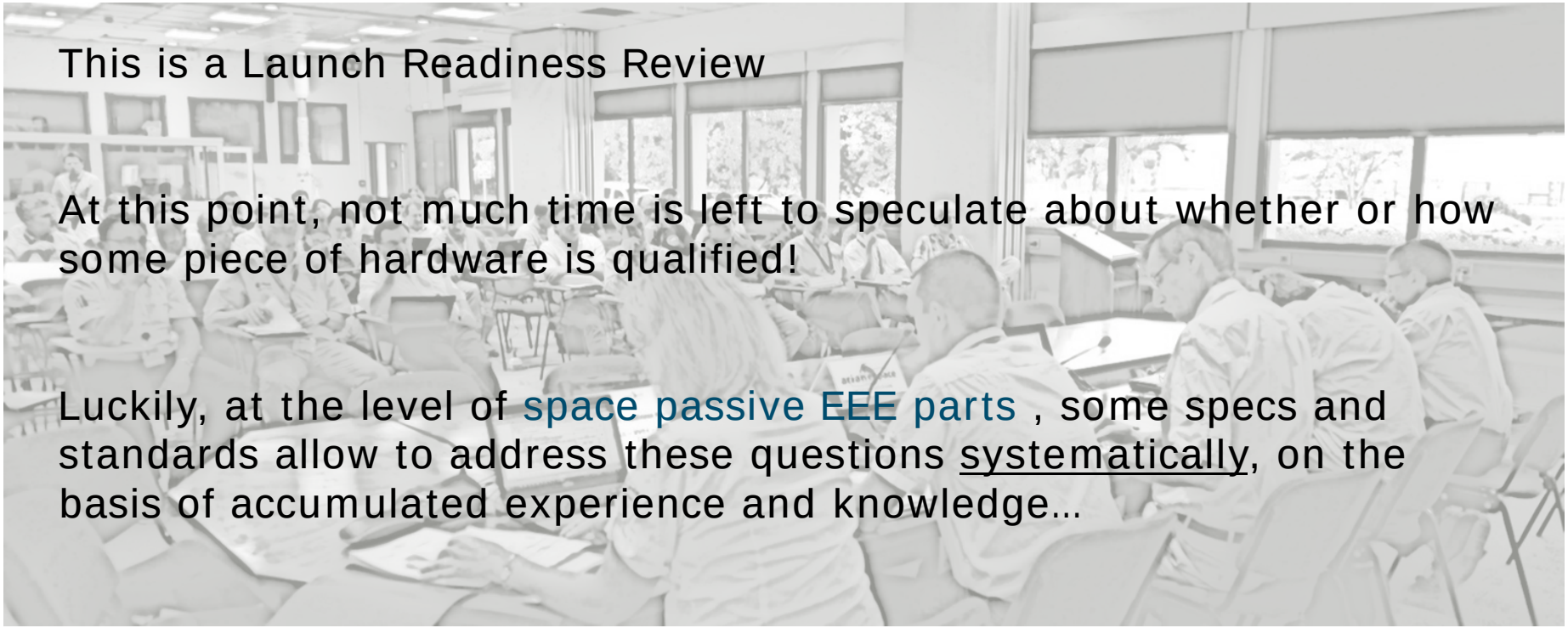
Overview

- Introduction and Motivation
- What has changed
- What has NOT changed
- ESCC Qualification of passive parts
- Conclusion, Q&A

Introduction (1). Qualification…a well-known term



This is a Launch Readiness Review

At this point, not much time is left to speculate about whether or how some piece of hardware is qualified!

Luckily, at the level of space passive EEE parts , some specs and standards allow to address these questions systematically, on the basis of accumulated experience and knowledge…

Introduction (1). What is ESCC?

The **European Space Components Coordination** (ESCC) was set in 2002 [*] with the objective of improving “the availability of strategic EEE space components with the required performance and at affordable costs [...]”.

In order to achieve that goal, ESCC is required to provide a “single and unified system for the standardization, product specification, evaluation, qualification and procurement of European EEE space components and for the certification of components and component manufacturers”.

[*] “Founding Act and Charter of the European Space Components Coordination”, *ESCC Founding Act and ESCC 00000 issue 2, both available at* https://spacecomponents.org

Introduction (1). What is ESCC?

🛠 🫧 **EEE Component community-engineering* for procurement and qualification testing, derating, radiation hardness assurance, test methods, …**

- 💰 **Makes scarce public resources for new EEE space components "made in Europe" to where there is a solid need, present or future**
- 🏛 **Aims at maintaining a dependable base of suppliers of EEE space components for the European space industry**
- 💰 **Supports the promotion of European EEE components in other markets (ASIA, AMERICA)**
- 🎖 **Builds on decades of cooperation, first ESA/SCC qualifications date back to the early 70's**

*** In coordination and collaboration between manufacturers + users + space agencies**

Motivation (2).

Obtaining reliable space quality parts requires special attention to:

✓ a number of mission application constraints

✓ some general principles, possibly applicable to parts procurement for any field of application; among these, there is a need of a **"stable manufacturing base"** where space quality may be built-in, knowing that *testing a part will not really make it better than it is…* (*)

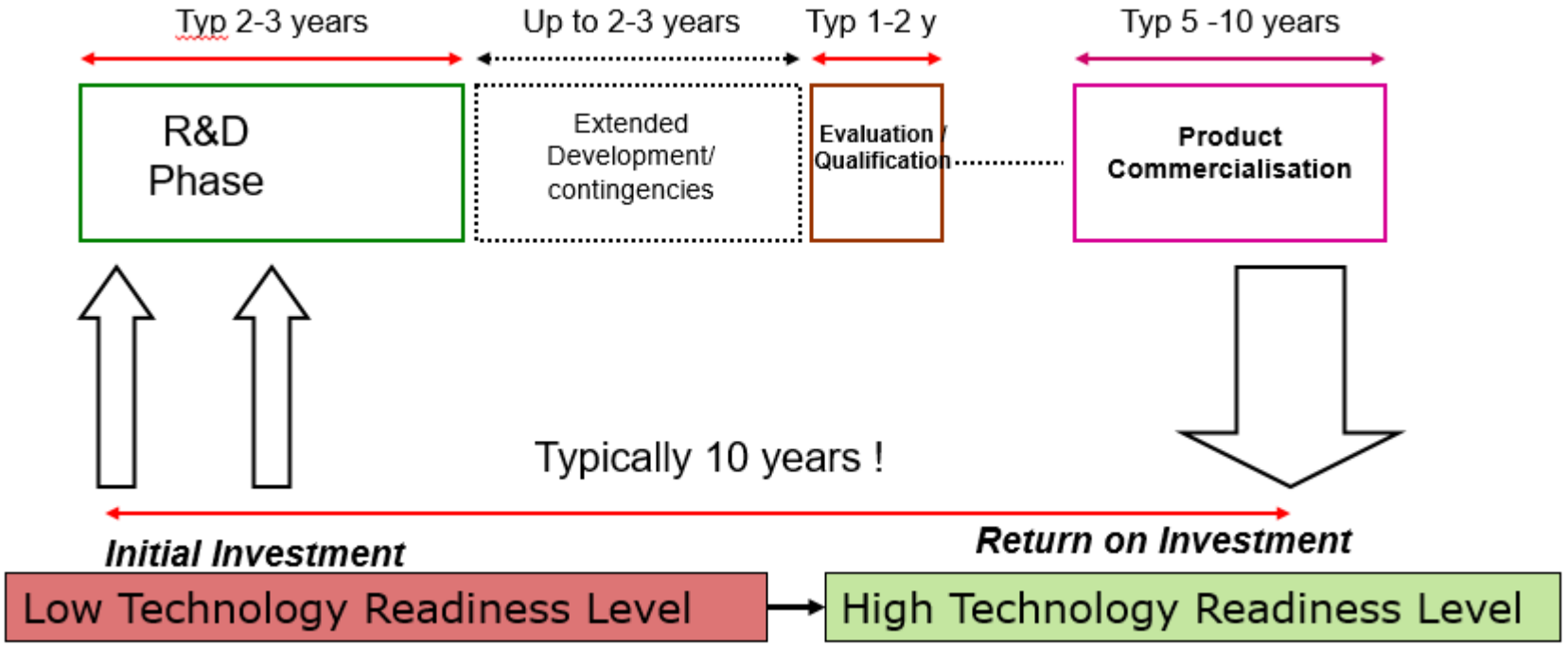
(*) "The History of Space Quality EEE Parts in the United States", *Leon Hamiter, presented at the ESA Electronic Components Conference, ESTEC, the Netherlands, November 1990, ESA SP-313*

Motivation (3).

ESCC Qualification adds and sustains value for component manufacturers and users:

- ✓ Simplified procurement with reduced lot-specific costs
- ✓ Workmanship and performance issues are infrequent with ESCC qualified parts.
- ✓ High product maturity, high TRL and low rate of obsolescence are typical of ESCC qualified parts
- ✓ Simplified parts approval process – for projects complying with ECSS-Q-ST-60C
- ✓ Proven supply chains - periodic testing and audit are inherent to the system
- ✓ Solid performance - very high repeatability between manufacturing lots and across manufacturers (multiple sources may be qualified to a common standard)

Motivation (4).



What has changed?

All ESCC schemes of Qualification include:

(1) an evaluation stage
(2) and a qualification testing stage

As **time to market** is a key performance indicator for the ESCC system….

To further expedite and simplify the Qualification Process it has been decided to introduce a new **Single Phase Qualification (SPQ)** Flow which integrates the existing evaluation (1) and qualification (2)phases, accelerating the sequence of activities and producing the same level of confidence in the qualified components as before**.**

What has **not** changed?

ESCC Quality Assurance system is not changed, the fast-track to Qualification does not imply any corners got cut!: traceability, configuration control, documentation, etc…

Requirements for Maintenance of Qualification (or Loss of Qualification!) remain the same… The requirements for Periodic testing apply just as well. Also, as the rest of ESCC Qualification schemes, SPQ is NOT a self-certification scheme

The Qualification Reports (QPL and QML) make no distinction on SPQ or classic two-stage qualifications. Procedural aspects are not changed for SPQ.

ESCC Qualification of Passive parts. (1)

What passive parts achieved new (*) ESCC Qualification since last SPCD in 2016?

2016:	2017:	2018:
cert. 340 (June)	cert. 347 (April)	cert. 350 (January) cert. 352 (February) 348 (April)

All these new Qualifications included elements of ESCC Evaluation like: construction analyses, initial audit, evaluation testing

* Hence re-scope and addition of new parts within existing qualification certificates is not addressed here

ESCC Qualification of Passive parts. (2)

A review of ESCC Evaluation-related specifications for passive parts:

- ESCC **202**00 – Component Manufacturer Evaluations (= manufacturer audit)
  + ancillary **202**xxxx checklists for some technologies:
    - 2023000 – checklist for capacitors line surveys
    - 2023400 – checklist for connectors line surveys
    - 2023501 – checklist for quartz crystal line surveys
    - 2023600 – checklist for relays line surveys
    - 2024000 – checklist for resistors line surveys

- ESCC **226**00 – Evaluation of Standard Electronic Components
  + ancillary **226**xxxx evaluation testing for some technologies:
    - 2263000 – evaluation testing of capacitors
    - 2263400 – evaluation testing of connectors
    - 2263501 – evaluation testing of quartz crystals
    - 2263503 – evaluation testing of oscillators
    - 2263600 – evaluation testing of relays
    - 2264000 – evaluation testing of resistors
    - 2263408 – evaluation testing of cable assemblies
    - 2263202 – evaluation testing of ferrite microwave

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However, every qualification is supported with a closed-out audit….

(so we lack checklists for oscillators, fuses, magnetics, wires and cables, SAW devices, cable assemblies, passive RF/MW)

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However, every qualification is supported with a characterization of the parts' limits, possibly based on a "test-to-death" principle

(so we lack ETP for fuses, magnetics, wires and cables, SAW devices)

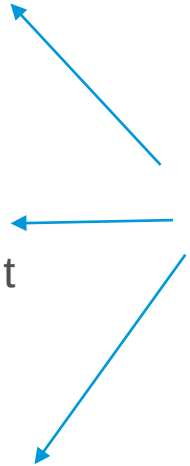
ESCC Qualification of Passive parts. (3)

So can SPQ be implemented for passive parts?

YES, but there is no support yet for it in the ESCC specifications system.

AND there remains a need to understand the limits of the component or technology.

AND the merits leading to qualification should be unambiguous



What could be done about it all then?

ESCC Qualification of Passive parts. (4)

So can SPQ be implemented for passive parts?

YES, but there is no support yet for it in the ESCC specifications system. ← Work with an ESCC Executive agency from the beginning

AND there remains a need to understand the limits of the component or technology. ← Consider SPQ for existing standard product supported by internal evaluation… extend qualification tests beyond qualification limits?

AND the merits leading to qualification should be unambiguous ← See what the others have done, remember ESCC Qualification includes some level of public disclosure in ESCIES

ESCC Qualification of Passive parts. (5)

How should ESCC SPQ be deployed for passive parts more systematically?

- Resources are limited everywhere. Pilot cases shall be supported on an “opportunistic” principle.

- For the same reason, feedback into the ESCC specifications system should be encouraged from these pilot cases so others can re-use the thinking put into any SPQ for a given technology

- The CTB and PSWG should receive and collect proposals and feedback for SPQ implementation and candidate technologies from the users industry and from manufacturers

Should SPQ become the baseline for new Qualifications of Passive parts when these are requested from the ESCC Executive?

Conclusion


We want to have more good parts to do reliably the job!
We hope that SPQ for passive parts will help that goal and improve:
(1) performance of space systems
(2) business of industry and manufacturers

Q & A

For more info on the ESCC Qualification Program, visit: https:escies.org

or contact us at:

secretariat@escies.org