ECSS-E-TM-10-25 evolution and the state of COMET

Sam Gerené – MBSE 2022 Session 9

ECSS-E-TM-10-25

ECSS-E-TM-10-25A

- ECSS-E-TM-10-25A is a technical memorandum published under the E-10 System Engineering. It defines both a language and an exchange protocol to facilitate collaborative Model Based System Engineering (MBSE) in the context of Concurrent Design.
- It has been developed by the ESA CDF and industrial partners to promote Concurrent Design, to support collaborative MBSE in CDF environments and to facilitate data-exchange between partners.

Annex A

Formal meta-model (ontology?) expressed in UML

Annex B

Population of reusable (referenced) data such as QUDV, Categories & Rules

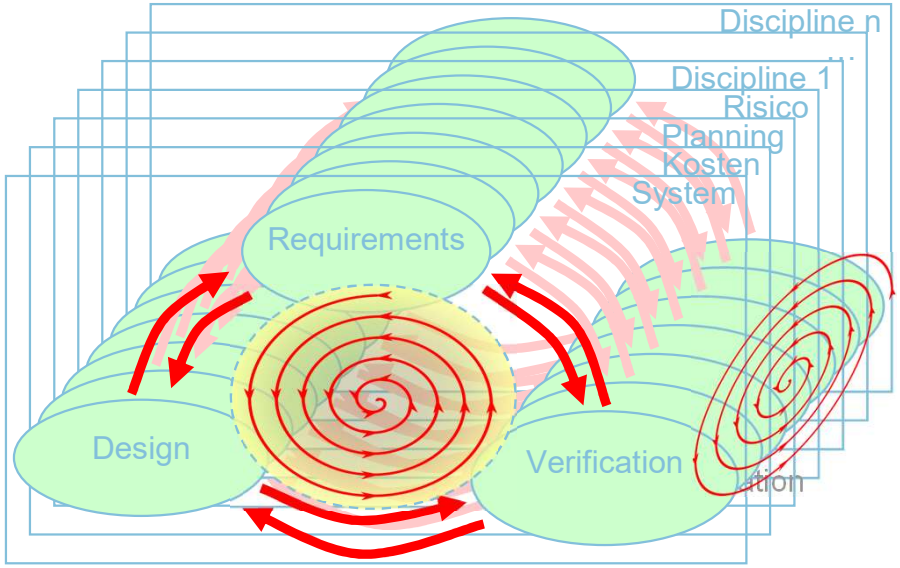
Annex C

JSON REST API (C.2) and Document (C.3)

Current version 2.4.1 - released in 2013-2014 (approved by CDUB)

ECSS-E-TM-10-25A

ECSS-E-TM-10-25A provides the means to express the **Problem Statement** in the form of **requirements** and a **solution** in the form of an **architecture** (including a logical, functional and physical architecture) with a means to create **relationships** between the two to perform (semi) automated **requirements verification**.




COMET

COMET

The RHEA **open-source** implementation of ECSS-E-TM-10-25 Annex A. and Annex C that is comprised of:

- COMET-IME: (Windows) Desktop Application + Excel Integration
- COMET-Webservices: Annex C REST API
- C# SDK / Java SDK / TypeScript SDK
- Dashboard - web application

10-25 -> de facto a collaborative MBSE tool

ECSS-E-TM-10-25 Data Governance

ECSS-E-TM-10-25A – Annex B - Governance

- A population of reference data, i.e. QUDV, Categories, Rules, Relationship Types
- Organisations can expand Annex B which is necessary, but leads to divergence and data incompatibilities between instances of 10-25 populations
- Need for Governance of this data, preferably in the public domain

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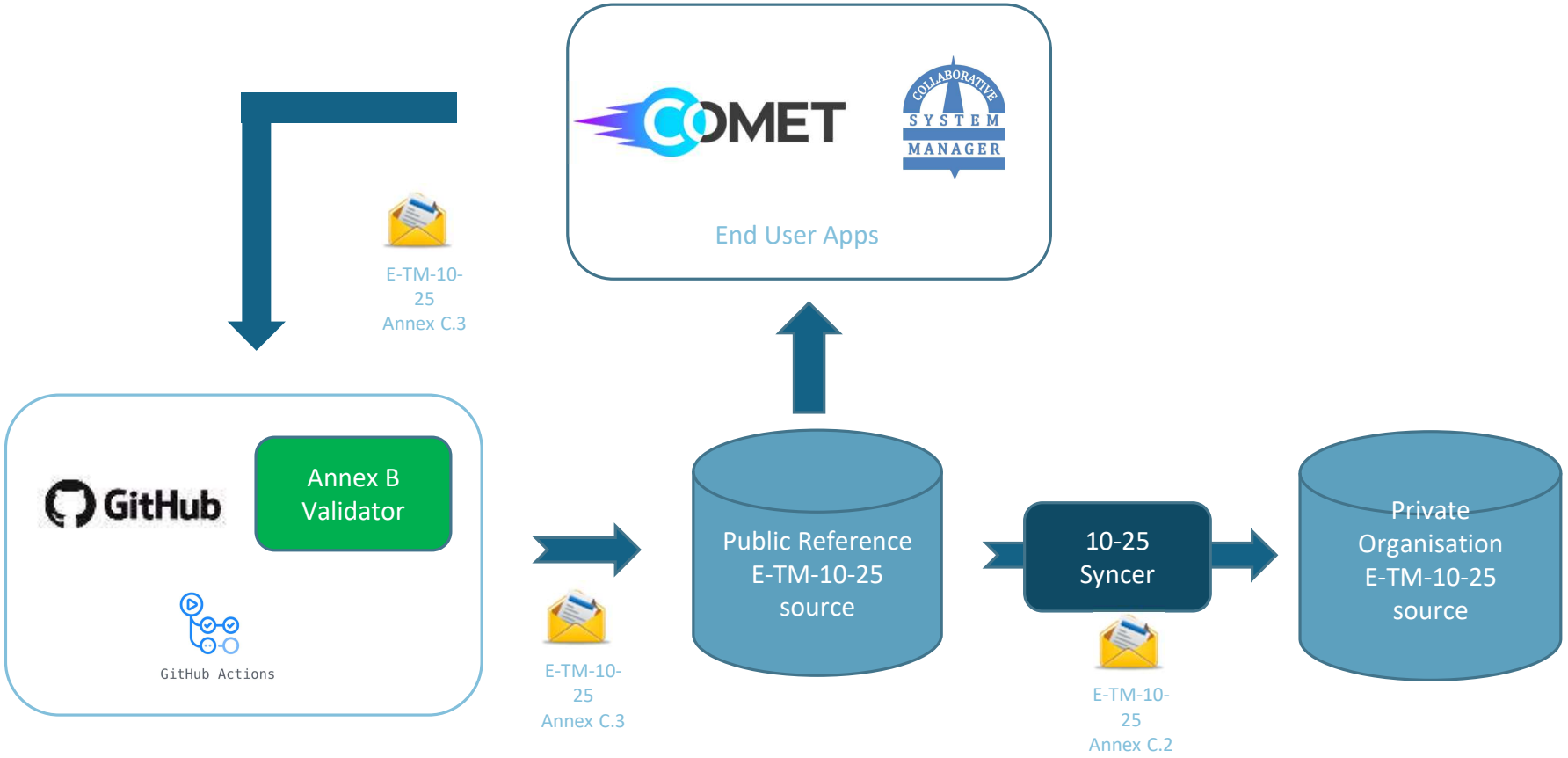
ECSS-E-TM-10-25A – Annex B - Governance



ECSS-E-TM-10-25A – Annex B - Governance

Similar challenges are applicable to the

Space System Ontology

ECSS-E-TM-10-25 Evolution

ECSS-E-TM-10-25 Evolution

During the COMET development, driven by user need, numerous backwards compatible extensions have been made to ECSS-E-TM-10-25 Annex A.

- **Product Assurance** (PA): concepts such as RIDs, RFx etc to support a Model-Based review process, this includes generic commenting/conversations
- **Diagramming:** supports Building blocks, Interfaces, Requirements
- Addition of **SampledFunctionParameterType** that supports time series data

Annex C proposed improvements:

- Best Practices for Authentication (OIDC / 0Auth 2.0 / JWT)
- Binary Serialization: e.g. Protobuff or MessagePack

COMET Evolution

COMET Evolution

The RHEA team continuously works on COMET development, planned improvements and features are:

Server Upgrades:

- Continuous improvement of Performance (framework, underlying dbase structure)
- Improved JSON deserialization performance
- **MessagePack** support in C# SDK to further improve REST API throughput (especially processing client side)
- Google like Index & Search (most likely based on **meilisearch**)
- Model Based “Continuous Integration” (rule checker already available)

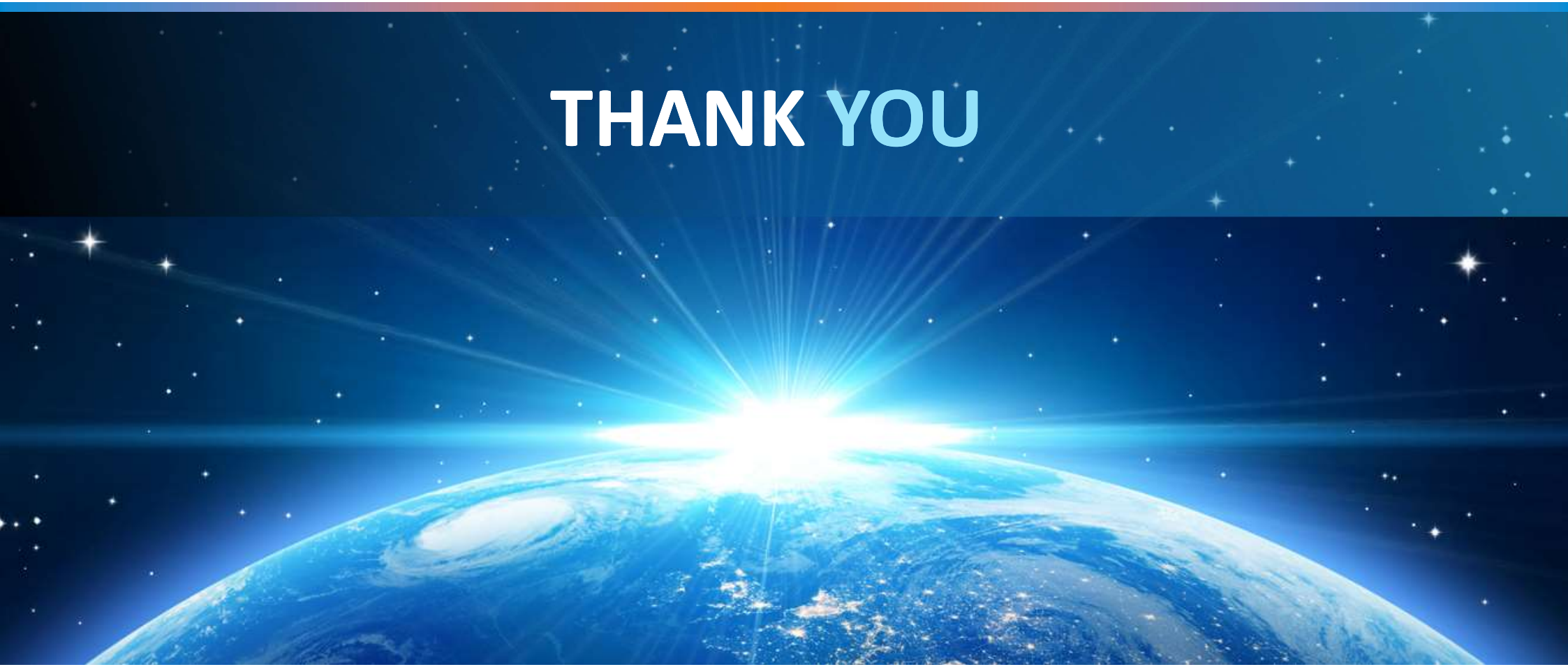
COMET Evolution

End User Tools:

- Expansion of Web Based UI – currently working on 3D geometry integration
- Improved Requirements verification capability
- Stand-Alone (file-based) use of COMET
- Support for windows 11

HUB expansions / improvements

- Improvement of various tool integrations based on user feedback (improvements Matlab and SysML v1 realized)
- Support for exchange with SysML2 (RHEA SysML2.NET implementation available on GitHub)


THANK YOU