Standardization for Space Environments and Effects

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ECSS

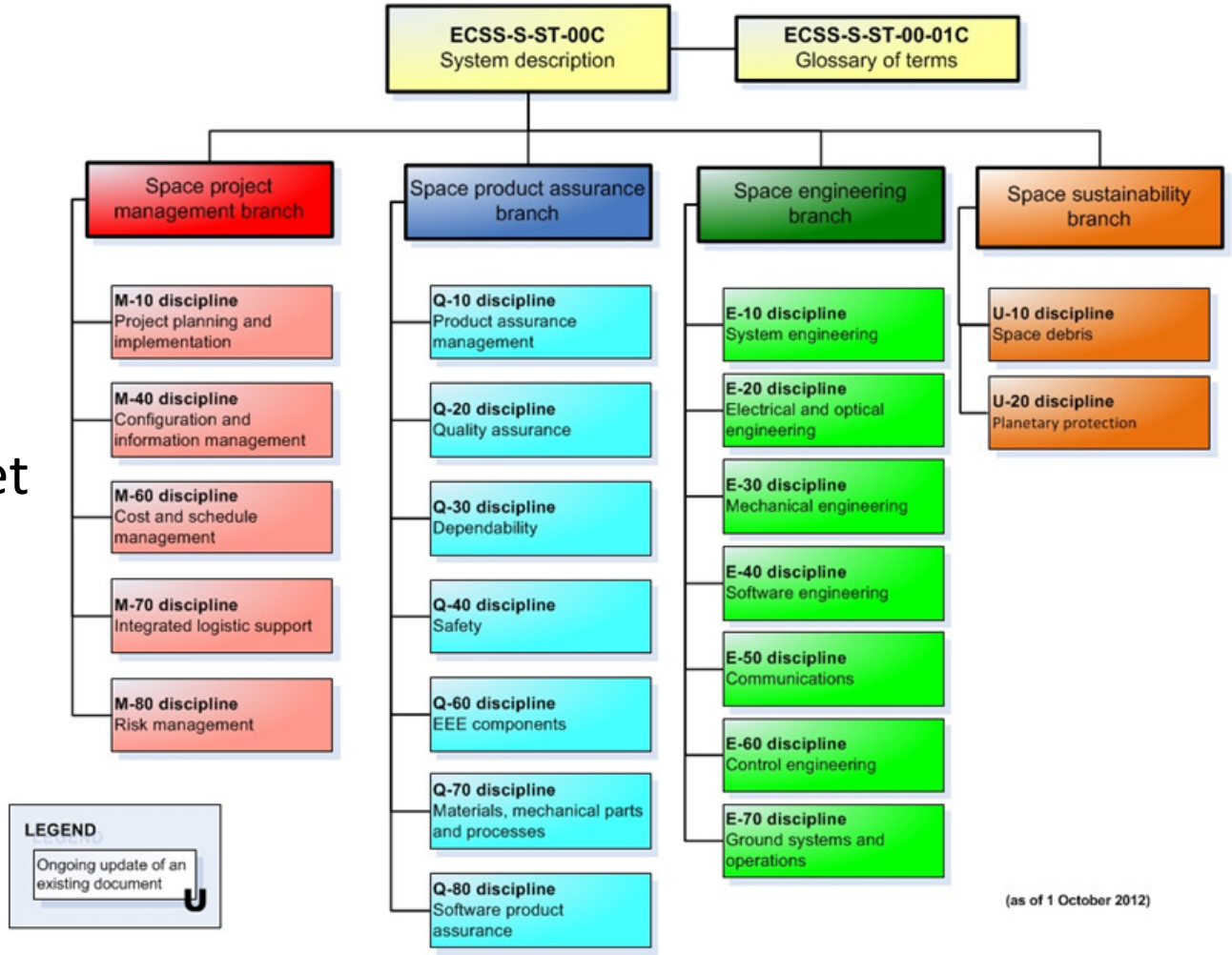
'The European Cooperation for Space Standardization

is an initiative established to develop a

coherent, single set of user-friendly standards

for use in all European space activities'

www.ecss.nl



ECSS standards

Standards are needed to aid the development process;
ensure people work in the same way and account properly for all issues

- Space Environment
  ECSS-E-ST-10-04C
- Method for calculation of radiation effects and a policy for margins
  ECSS-E-ST-10-12C
- Spacecraft Charging (= Spacecraft Plasma Interactions)
  ECSS-E-ST-20-06C
- Radiation Hardness Assurance - EEE Components
  ECSS-Q-ST-60-15C
- Handbook on Methods for Calculation of Radiation Effects
  ECSS-E-HB-10-12
- Q-ST-60-15c
  Radiation Hardness Assurance
- Others:
  - Materials
  - Human Factors

Updating Needs

- E-10-04 (space environment)
  - New radiation belt modelsAE9/AP9 and other new models
  - Definition and methods for “confidence levels”
  - Special cases: a procedure for tailoring for another more relevant model?
  - Policy to convert Environment/Model Uncertainty to Environment margin recommendation?
  - updates to magnetic field models
  - Solar proton model updates?
  - Cosmic ray model updates?
  - debris/micrometeoroid updates.
- ECSS New Work Item in preparation

- E-10-12 (Methods for Radiation Effects)
  - Reverse Monte Carlo methods
  - Shielding & data transfer methods (6 face vs 3d models)?
  - Human effects needs more detail
    Interplanetary missions, updates for new ICRP methods/techniques/limits
  - margins....combining uncertainties, assessing worst-case scenarios
- E-20-06 (spacecraft Charging)
  - Minor adjustments
  - Harmonisation with proposed ISO activities
- But
  - Depends on internal funding
  - Depends on future organisation of standardisation activities in Europe

ISO TC20 SC14 WG4 Activities

From agenda next meeting (Moscow, 27-31 May)

- DIS 16695 Earth Internal Reference Magnetic Field (Luehron behalf Maus)
- WD 17761 Model of high energy radiation at low altitudes (300 - 600 km) (Mikhailov)
- NWI 820 Procedure for obtaining worst case and confidence level of fluence using the quasi-dynamic model of the Earth's radiation belts (Matsumoto & Goka)
- NWI Spacecraft charging potential estimation in the worst case envir. (Toyoda, Goka)
- TS 12208 Observed Proton Fluences over long duration at GEO and Guideline for selection of confidence level in statistical model of Solar Proton Fluences (Ikeda/Goka)
- NWI 810 Space environment simulation at material tests. General principles and criteria (Novikov)
- NWI 764 The method of the solar energetic protons fluences & peak fluxes determination (Nymmik)
- IS 15390 GCRs (Nymmik)
- WD 18147 Geomagnetic cut-off model for SEP and GCR (Nymmik)
- CD 16709 Realtime Solar Activity and Space Environment Information for Spacecraft Operation (Akioka)
- CD 16457 The Earth's ionosphere model — International reference ionosphere (IRI) model and extensions to the plasmasphere (Bilitza; Gulyaeva)
- DIS 14200 Meteoroid & Debris Envir. Models (Orbital Altitudes below GEO+2000km) (Kitazawa)
- CD 16698 Methods for Estimation of Geomagnetic Activity (Iyemori)
- NWIP Spacecraft Charging Standard-Earth orbit (Feruson, Goka)

- Space Debris group will be come a WG

Conclusions

- Revisions of ECSS standards necessary (esp. for space environment)
- Standardisation of some aspects difficult (e.g. margins); the system seeks consensus agencies, industry, researchers
- Harmonisation with ISO desirable and probably necessary
- New standard methods may emerge from:
  - Technology development (CIRSOS, interoperability for telecom satellites)
  - Measurements (EPT, RBSP, …)