Automated Code Generation for AOCS

Maria Hernek (ESA/ESTEC, Flight Software Systems Section Head)
Bénédicte Girouart (ESA/ESTEC, AOCS and Pointing Systems Section Head)

Thursday Oct. 20th 2016 / ADCSS Day#3 PM

Automated Code Generation for AOCS: Introduction

- ACG is more and more used on ESA missions/projects (Sentinel2, MetOp-SG, Euclid, JUICE, SmallGeo, EDRS, Electra,…) -> towards "100%"…

- ESA internal WG on ACG use for flight SW generation: towards a white book to be shared with the Avionics community for a unified way forward in the use of ACG for our Missions

Automated Code Generation for AOCS: Presentations

- **Industrial and optimized auto-coding process for AOCS SW development in CD phase** - Mr. Jérôme BOURDON, Process Owner for Flight Dynamics and AOCS and GNC Division, Airbus Defence and Space (F)

- **Model Based AOCS Design and Automatic Flight Code Generation: Experience and Future Development** - Dr. Per BODIN, Head of AOCS Department, OHB Sweden

- **From 1995(MINISAT) to 2016(EUCLID): Auto-coding evolution for different types of AOCS** - Mr. Salvador LLORENTE, Project Manager within SENER Aerospace Division, SENER (Sp.)

- **Integration of automatic code generation in a AOCS development process: feedback and perspectives** - Mr. Pierre DANDRÉ, AOCS Engineer, Thales Alenia Space (F)

Automated Code Generation for AOCS: Round Table

- **ACG modelling rules**

    - do's and don't guidelines: which drivers (commonality, efficiency, readability, code quality,…)?

    - heritage from other industry?

    - expected evolutions (vs Matlab version, ACG tool,…)?

- **ACG impact on AOCS and SW development process and cycle**

    - AOCS design early constraint: which methodology to create early ACG-able simulation models?

    - AOCS SW development: raise simulink model to the level of a coding language ("model compiler")

    - AOCS validation

        - test generation: manual vs automated? testing: on Simulink or generated code (model) unit test: methodology? Criteria/objectives?

    - SW – SW interface: AOCS, Data Handling, Data Pool

Automated Code Generation for AOCS: Round Table

- **ACG impact on SW Maintenance phase**
  - **What will be maintained ?**
  - **Changes in maintenance approach?**
    - AOCS Models ?
    - ACG executable image?

- **Modularity** wrt mission specificities and layered industrial layout
  - re-use of models for code generation
    - better than 'manual' SW re-use?
    - Library oriented?
  - interface with 'manual' code:
    - Specific guidelines (on top of Interface document)?
    - Towards a 100% ACG?

European Space Agency

Automated Code Generation for AOCS: Round Table

- (**Non-)Compliance with AOCS and SW standards**
    - which expectation on ECSS evolution (SW and control disciplines)
        - revision of existing standards?
        - dedicated item for ACG?

... Questions?

... THANK YOU FOR YOUR ATTENTION!

European Space Agency