Open Source Lessons Learned with Open MCT

Jay Trimble
NASA Ames Research Center
Silicon Valley

Open Source CubeSat Workshop 2018
The Vision

• Closed —> Open

• Ground systems have traditionally been built on proprietary systems.

• Duplication of effort - we continually re-create the same thing

• Let’s move to a shared model for ground systems and build on each others work

• The internet economy as an analogy - companies may focus on their core differentiators and use existing infrastructure

https://github.com/nasa/openmct
Immediate Benefits

- Collaboration that works
- Use, adopt, make it your own, contribute
- No ownership issues
- Instant access
- Fork/Pull

https://github.com/nasa/openmct
More benefits

• Better software

• More eyes on your software

• More users

• A community that drives you to be better

• Yes, missions do some of this, but the environment is somewhat insular so there are benefits to a broader group of users and contributors

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How have we advanced since the 1960’s?

1960’s

2000 and beyond
Can open source be a vehicle for advancing technology?

1980’s Space Shuttle Display

Open MCT Display
The platform

- Open Mission Control Technologies - Open MCT

- Info
  - https://nasa.github.io/openmct/
  - From info site, click on Try it Now

- Code
  - https://nasa.github.io/openmct/
The Platform

Mobile

Desktop

https://github.com/nasa/openmct
All Your Data in One Place

All your data here

Data Visualizations, cross domain

Inspector
Mix Data Across Domains

Clocks and Timers

Images

Timelines

Telemetry

Widgets - logic driven

3D Rover View

Procedures

Add capabilities with plugins
Make Your Own Displays

Create

Build a display layout

https://github.com/nasa/openmct
Who has Open MCT in NASA

- JASON-3
- MARCO
- ASTERIA
- ICESat-2
- Mars 2020 Rover Testbed

More...

https://github.com/nasa/openmct
Samples from the community outside NASA

C-base backspace Berlin

Kerbal Space Program

https://github.com/nasa/openmct

https://github.com/nasa/openmct-iot-dashboard/
Example Contribution

• Export plot as image
• Based on user requests
• Implemented by open source contributor

https://github.com/nasa/openmct
Contribution Process

- Sign Contributor License Agreement
- Make changes
- Submit Pull Request (PR)
- Circle CI runs unit tests, enforces code standards through tooling
- Code review by core team member
- Feedback or Merge

https://github.com/nasa/openmct
Building a Community

Active Web Presence

https://nasa.github.io/openmct/

Active Repository

https://github.com/nasa/openmct

https://github.com/nasa/openmct
Building a Community 2

- Provide a codebase that is clean, and fun to develop for
- Provide clear and comprehensive developer documentation
- Provide a simple and powerful Application Programming Interface (API)
- Tutorials for extending Open MCT with a focus on common use-cases.
- "Help-wanted" issues that cater to a range of abilities

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Status & What’s Next

• Open source is a proven means to enhance collaboration and adoption of mission operations software

• It is possible to build an “outside” community of contributors who add value to the software through contributions and feedback

• Future goals

  • Build an active community of mission contributors building on each other’s work

  • Use open source as a vehicle for advancing technology

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