Open Source Lessons Learned with Open MCT

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Open Source CubeSat Workshop 2018

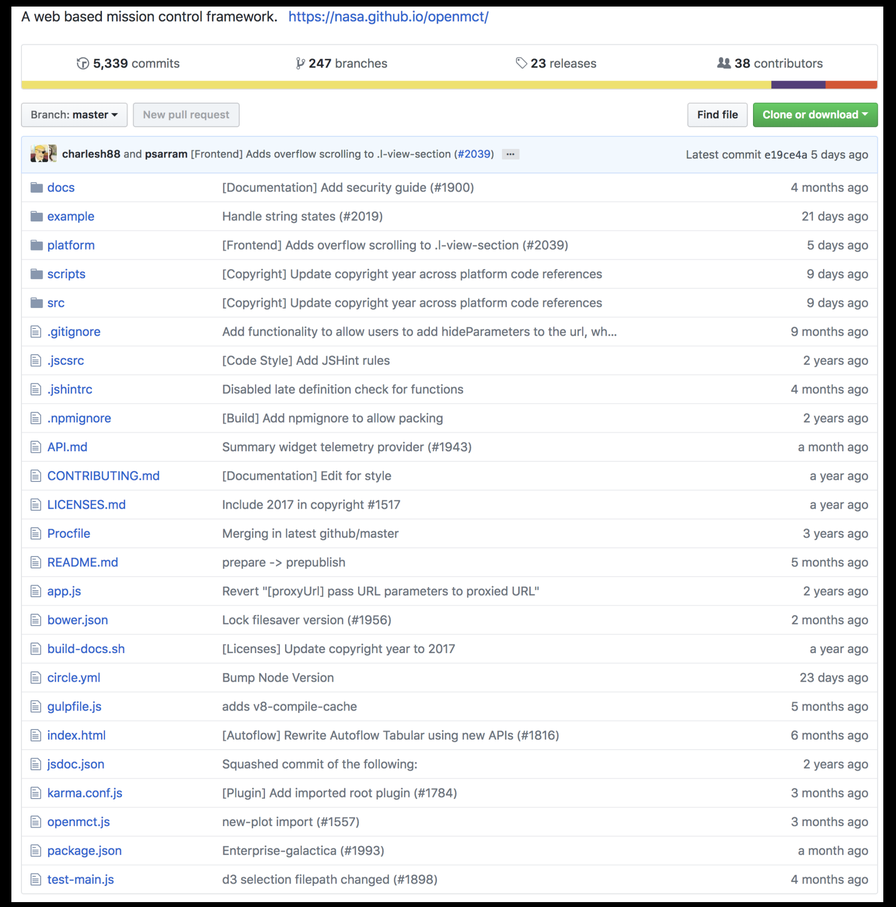
The Vision

- 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



A web based mission control framework. https://nasa.github.io/openmct/

5,339 commits | **247** branches | **23** releases | **38** contributors

Branch: **master** | New pull request | Find file | Clone or download

charlesh88 and **psarram** [Frontend] Adds overflow scrolling to .l-view-section (#2039) ··· Latest commit e19ce4a 5 days ago

docs	[Documentation] Add security guide (#1900)	4 months ago
example	Handle string states (#2019)	21 days ago
platform	[Frontend] Adds overflow scrolling to .l-view-section (#2039)	5 days ago
scripts	[Copyright] Update copyright year across platform code references	9 days ago
src	[Copyright] Update copyright year across platform code references	9 days ago
.gitignore	Add functionality to allow users to add hideParameters to the url, wh...	9 months ago
.jscsrc	[Code Style] Add JSHint rules	2 years ago
.jshintrc	Disabled late definition check for functions	4 months ago
.npmignore	[Build] Add npmignore to allow packing	2 years ago
API.md	Summary widget telemetry provider (#1943)	a month ago
CONTRIBUTING.md	[Documentation] Edit for style	a year ago
LICENSES.md	Include 2017 in copyright #1517	a year ago
Procfile	Merging in latest github/master	3 years ago
README.md	prepare -> prepublish	5 months ago
app.js	Revert "[proxyUrl] pass URL parameters to proxied URL"	2 years ago
bower.json	Lock filesaver version (#1956)	2 months ago
build-docs.sh	[Licenses] Update copyright year to 2017	a year ago
circle.yml	Bump Node Version	23 days ago
gulpfile.js	adds v8-compile-cache	5 months ago
index.html	[Autoflow] Rewrite Autoflow Tabular using new APIs (#1816)	6 months ago
jsdoc.json	Squashed commit of the following:	2 years ago
karma.conf.js	[Plugin] Add imported root plugin (#1784)	3 months ago
openmct.js	new-plot import (#1557)	3 months ago
package.json	Enterprise-galactica (#1993)	a month ago
test-main.js	d3 selection filepath changed (#1898)	4 months ago

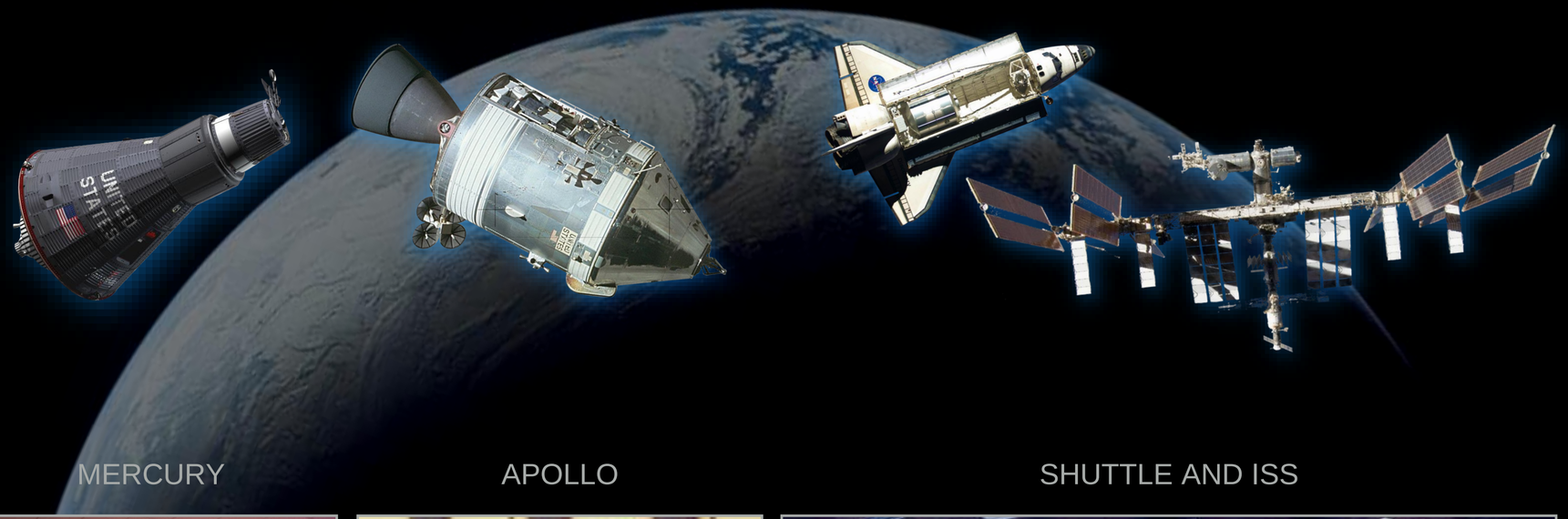
https://github.com/nasa/openmct

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

https://github.com/nasa/openmct

How have we advanced since the 1960's?



MERCURY

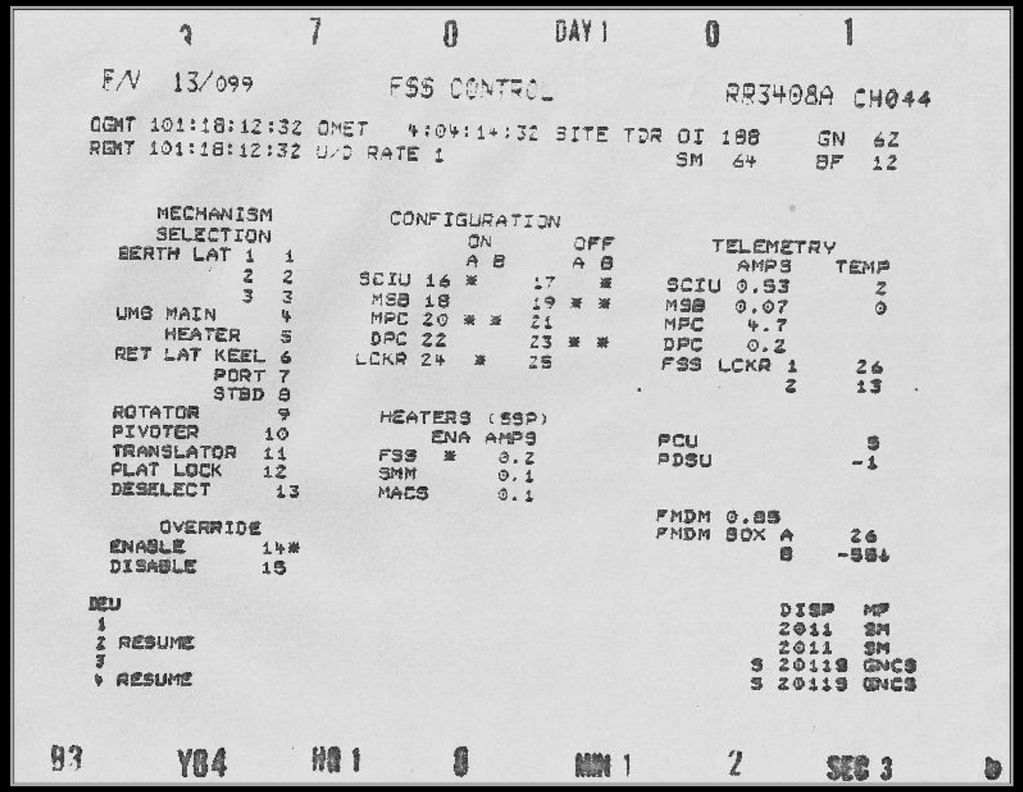
1960's

APOLLO

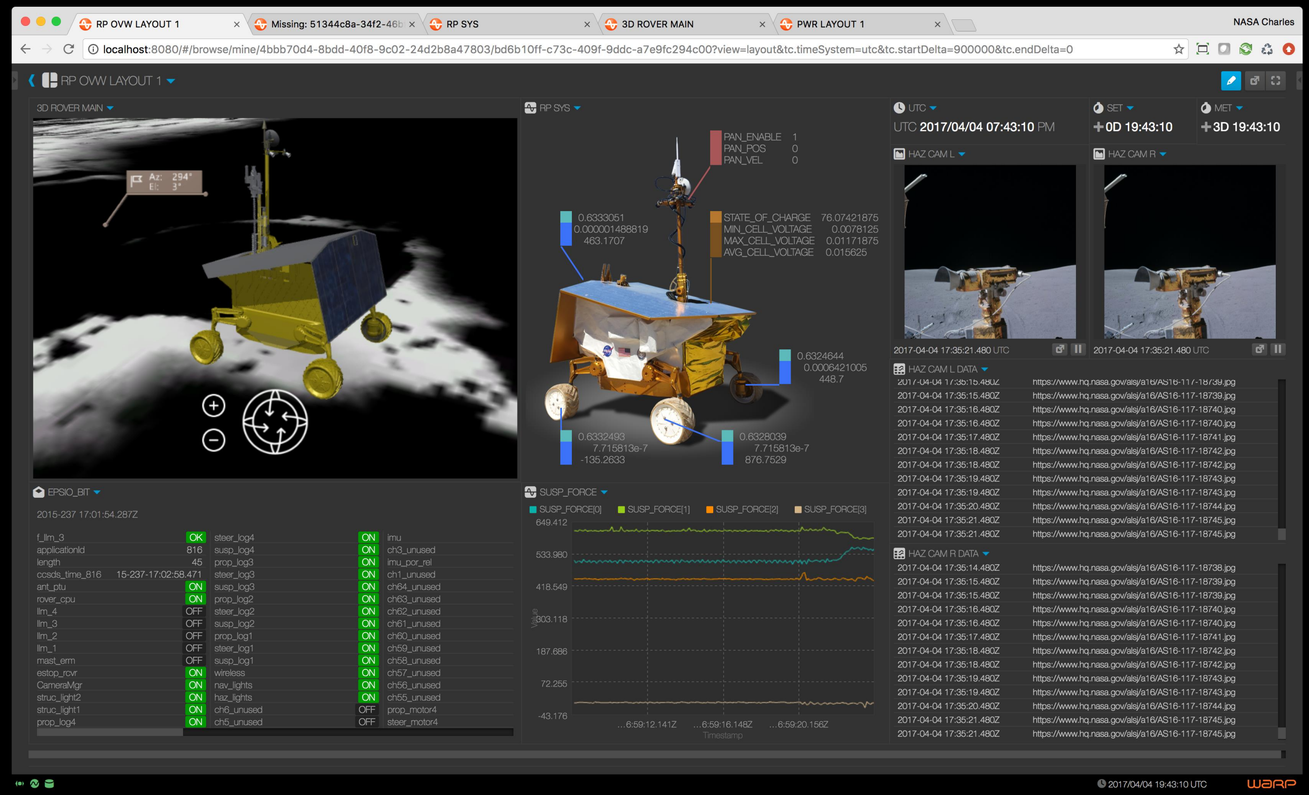
SHUTTLE AND ISS

2000 and beyond

Can open source be a vehicle for advancing technology?



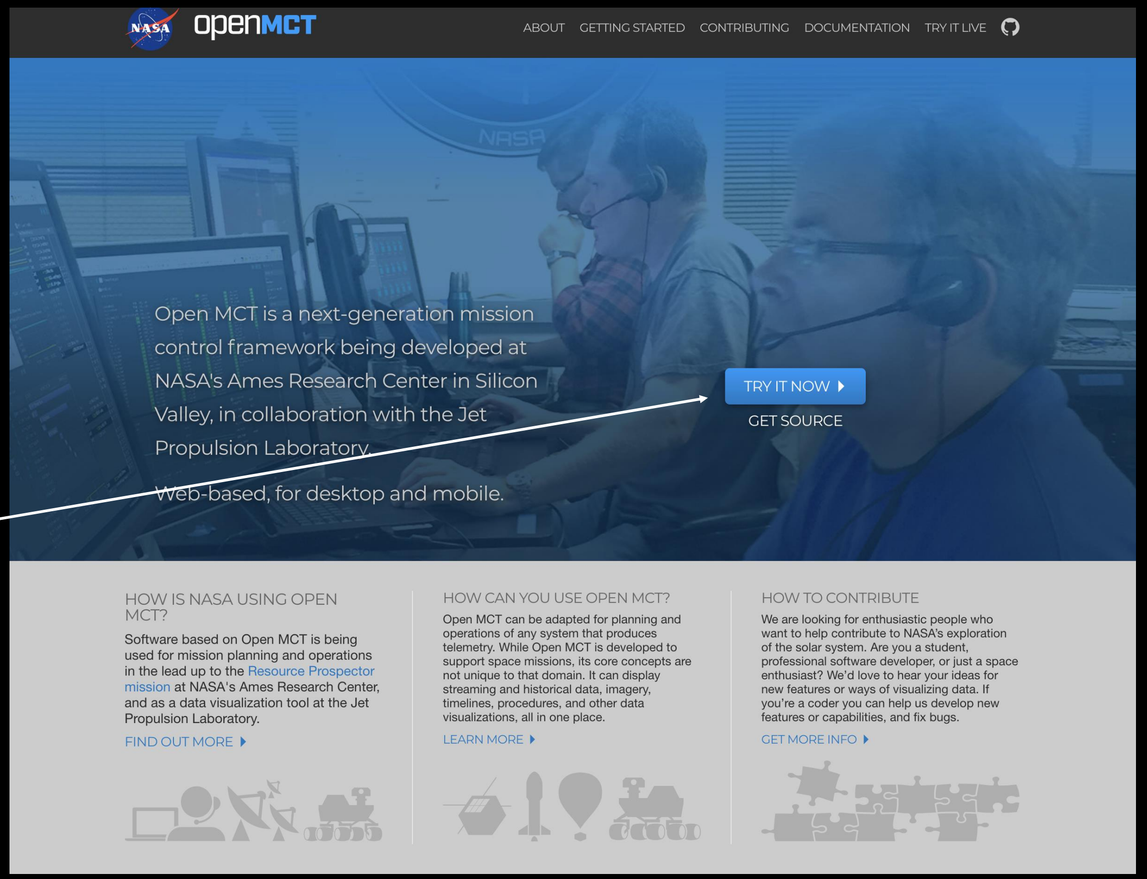
1980's Space Shuttle Display



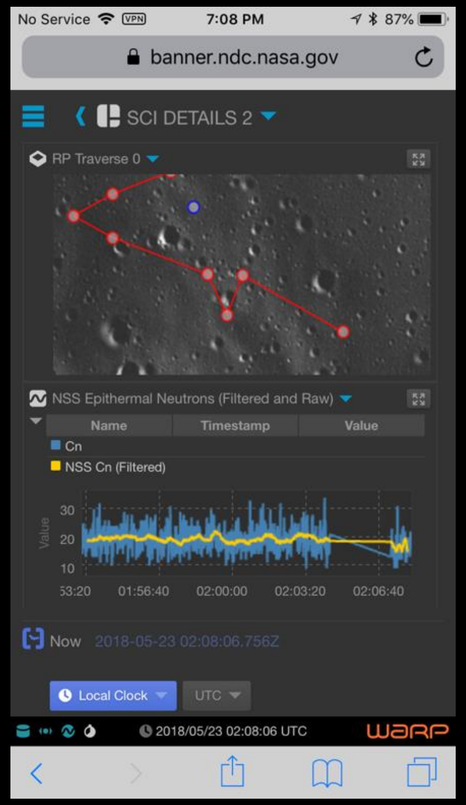
Open MCT Display

The platform

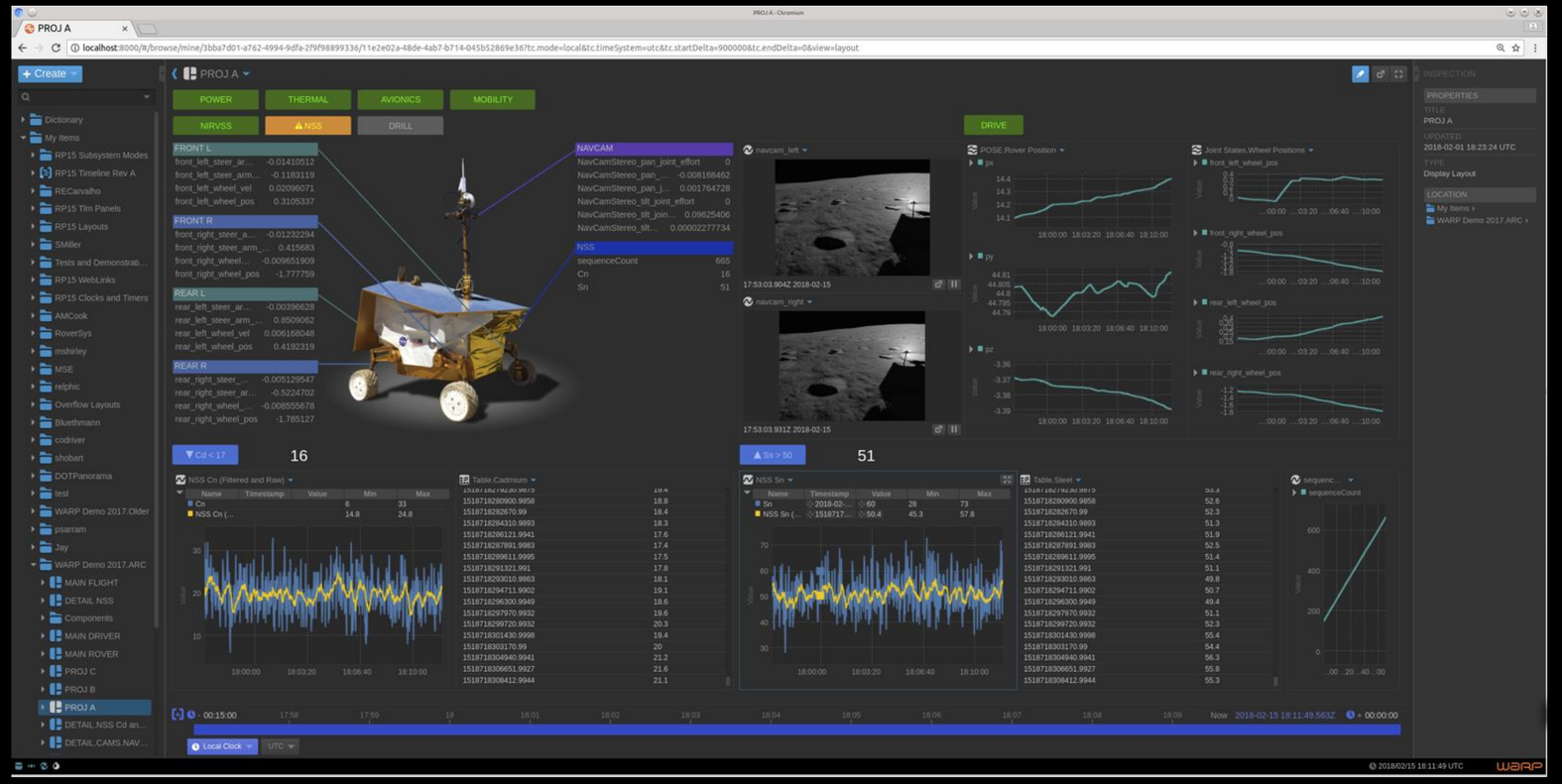
- Open Mission Control Technologies - Open MCT
- Info
  - https://nasa.github.io/openmct/
  - From info site, click on Try it Now
- Code
  - https://nasa.github.io/openmct/



The Platform



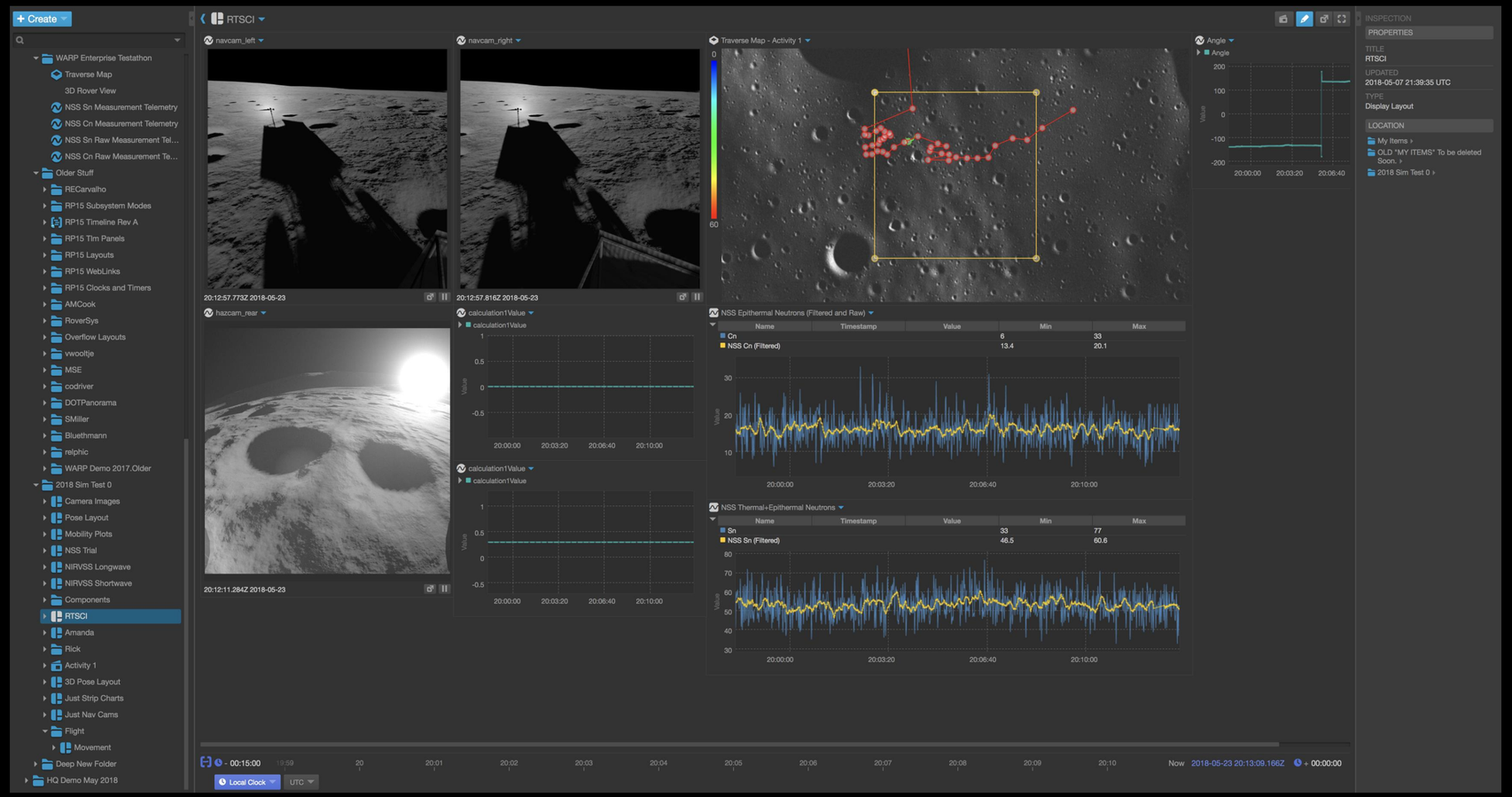
Mobile



Desktop

https://github.com/nasa/openmct

All Your Data in One Place

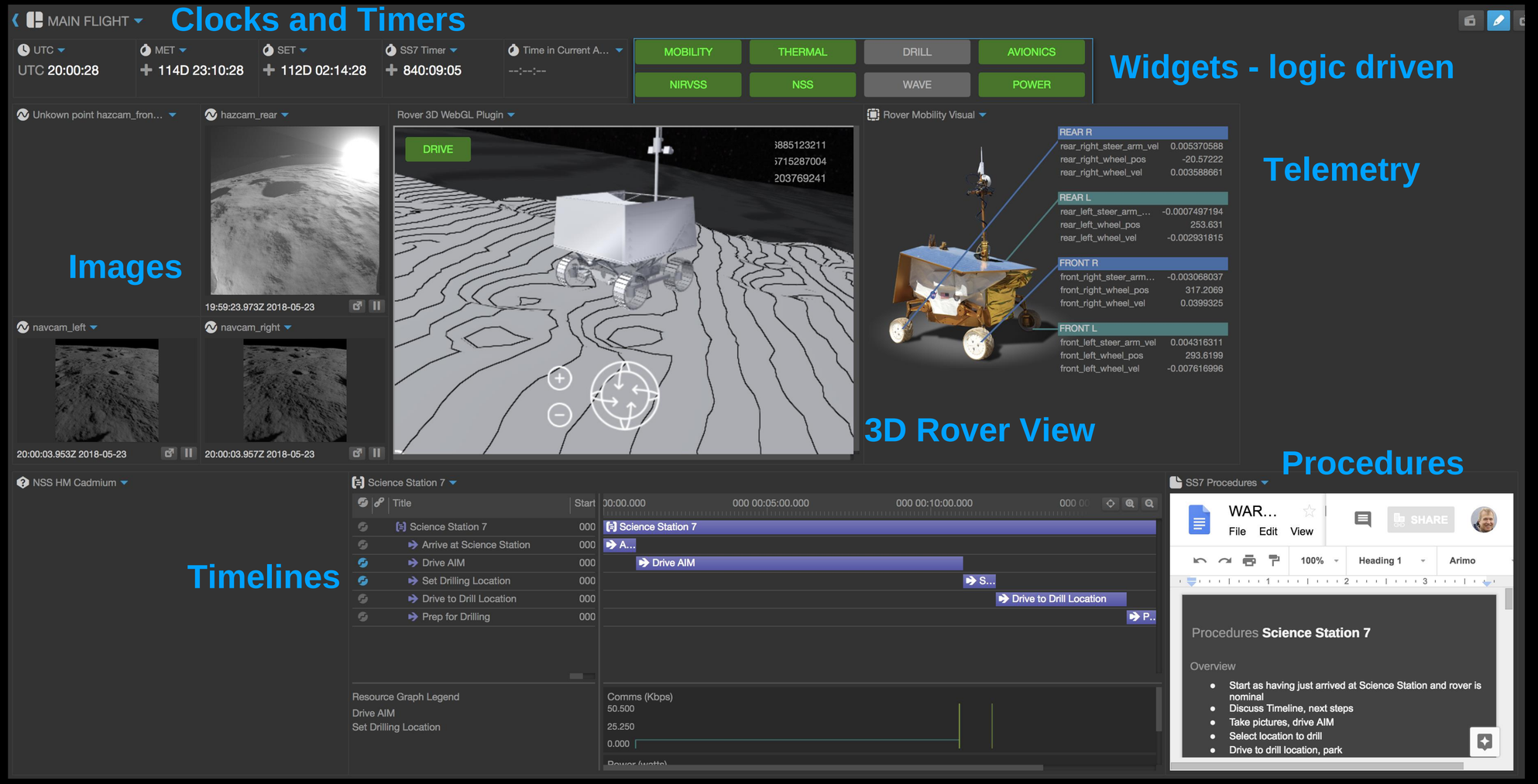


All your data here

Data Visualizations, cross domain

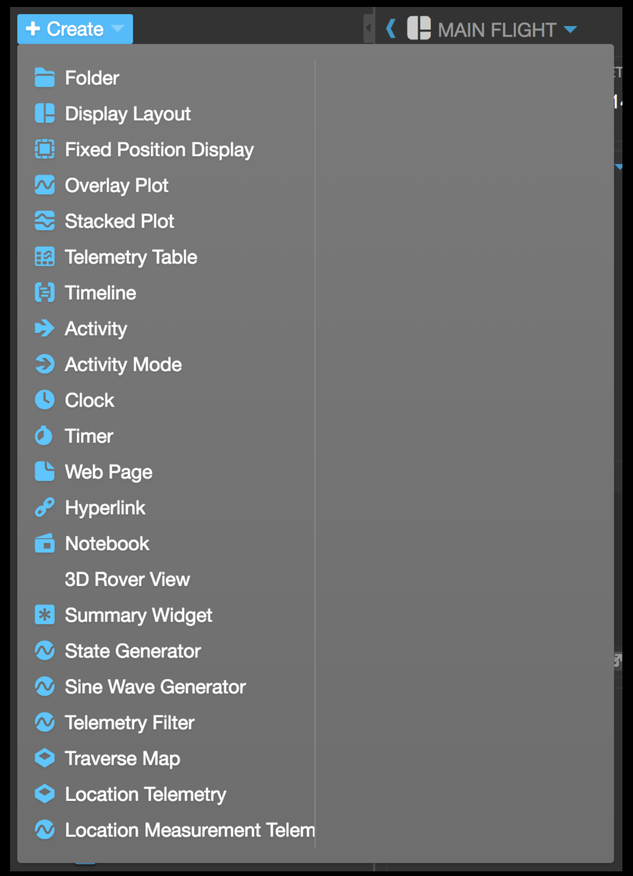
Inspector

Mix Data Across Domains

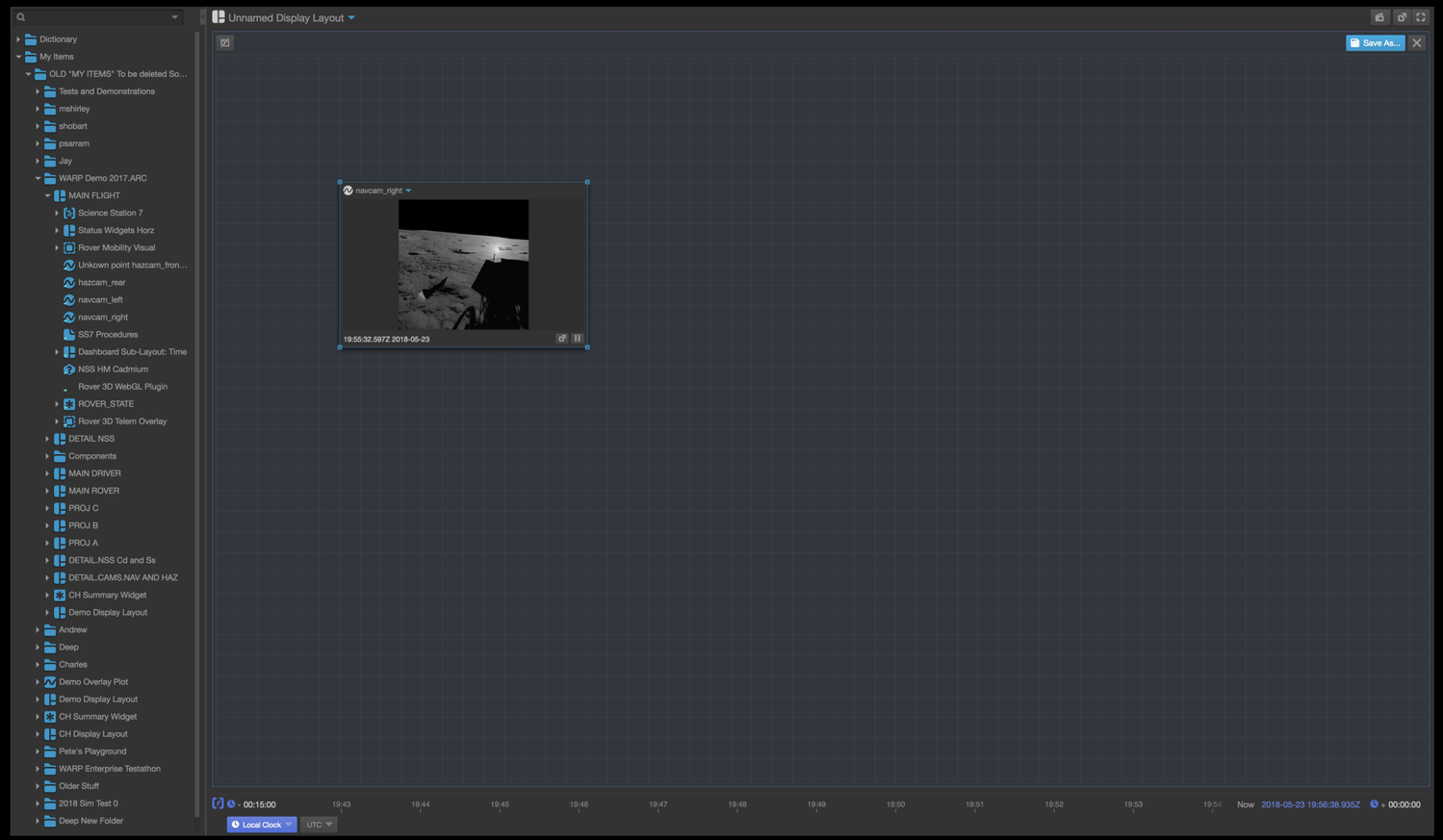


Add capabilities with plugins

Make Your Own Displays



Create



Build a display layout

https://github.com/nasa/openmct

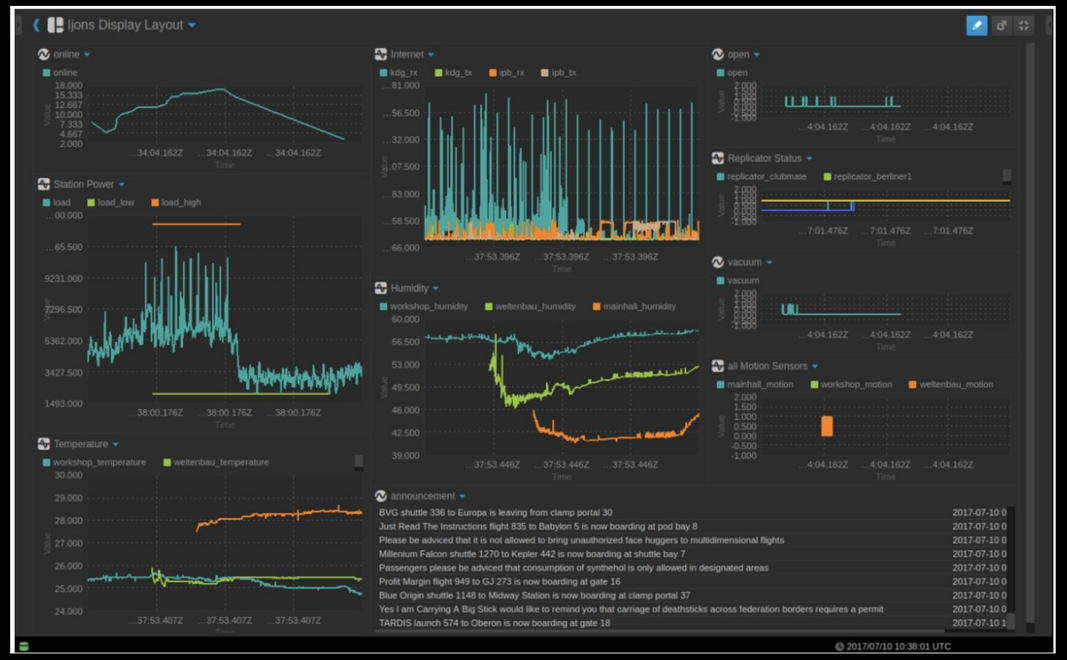
Who has Open MCT in NASA

More…

https://github.com/nasa/openmct

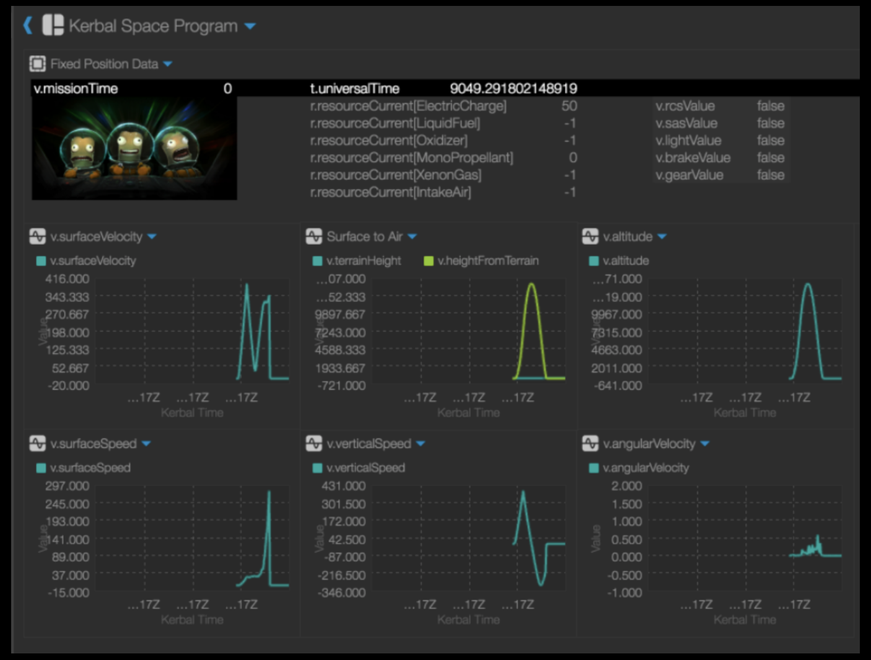
Samples from the community outside NASA

C-base backspace Berlin



https://bergie.iki.fi/blog/nasa-openmct-iot-dashboard/

Kerbal Space Program



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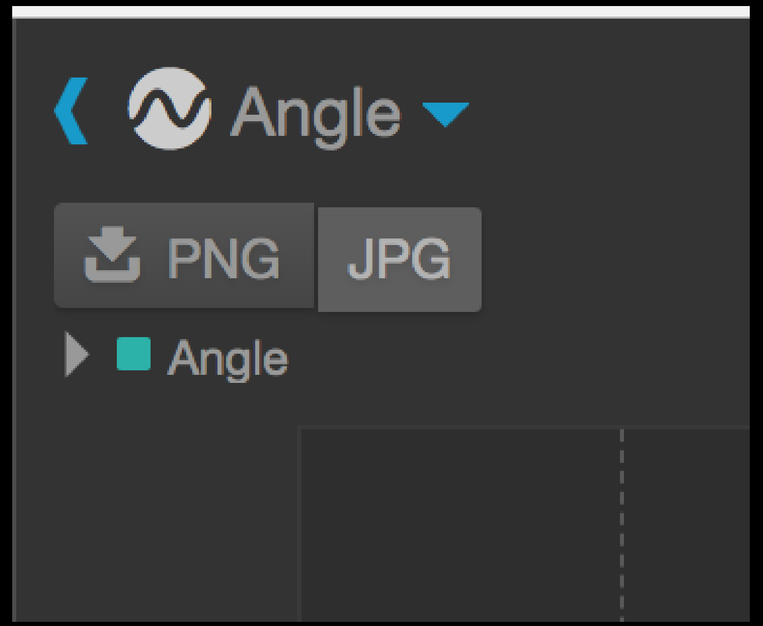
Example Contribution

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



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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

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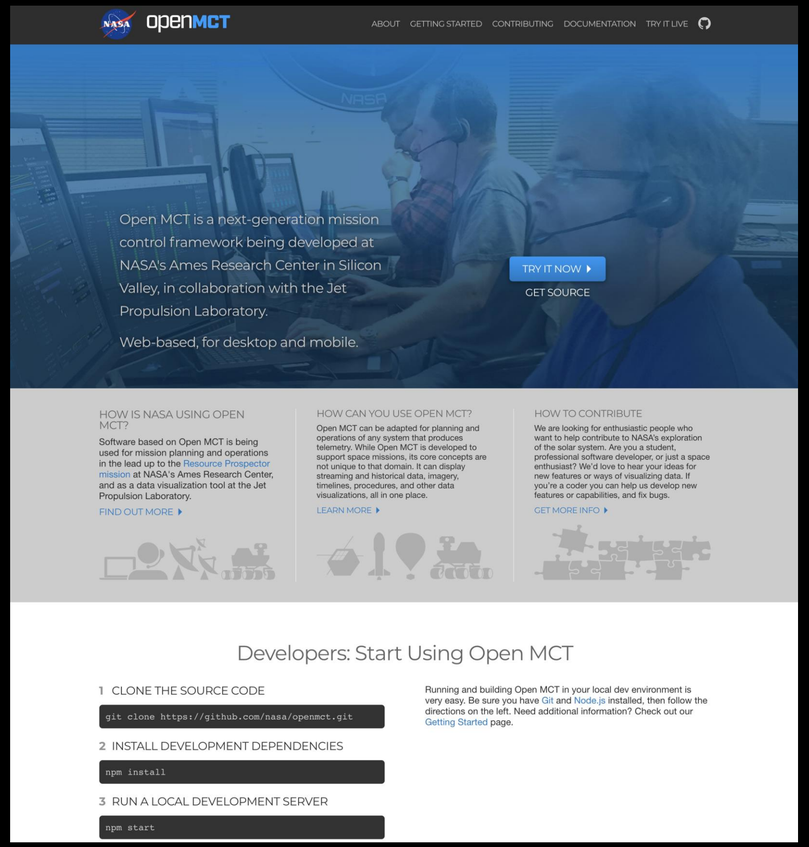
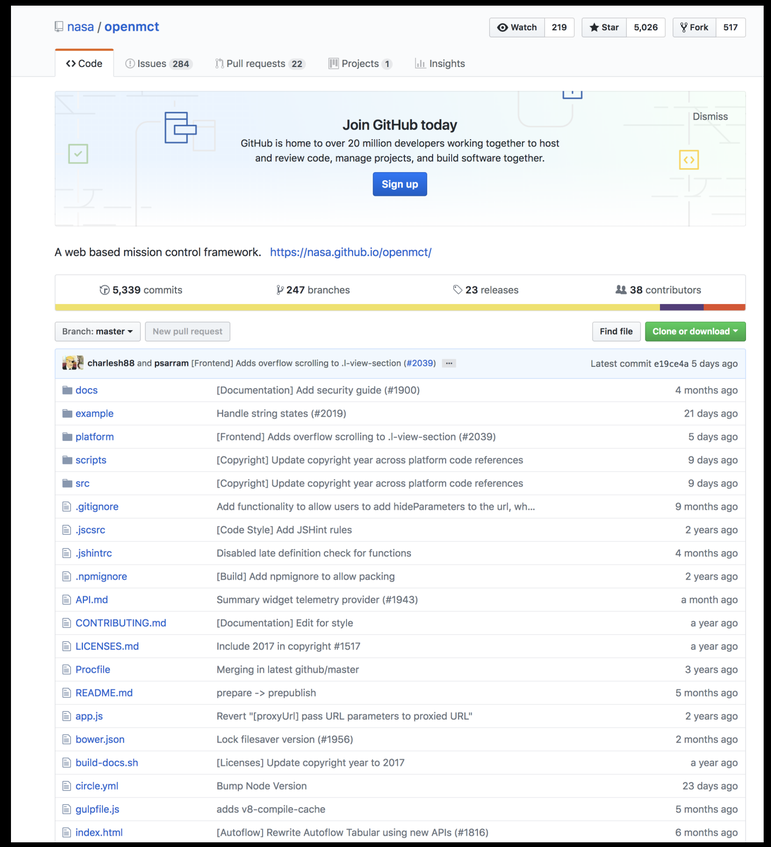
Building a Community 1

Active Web Presence



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

Active Repository



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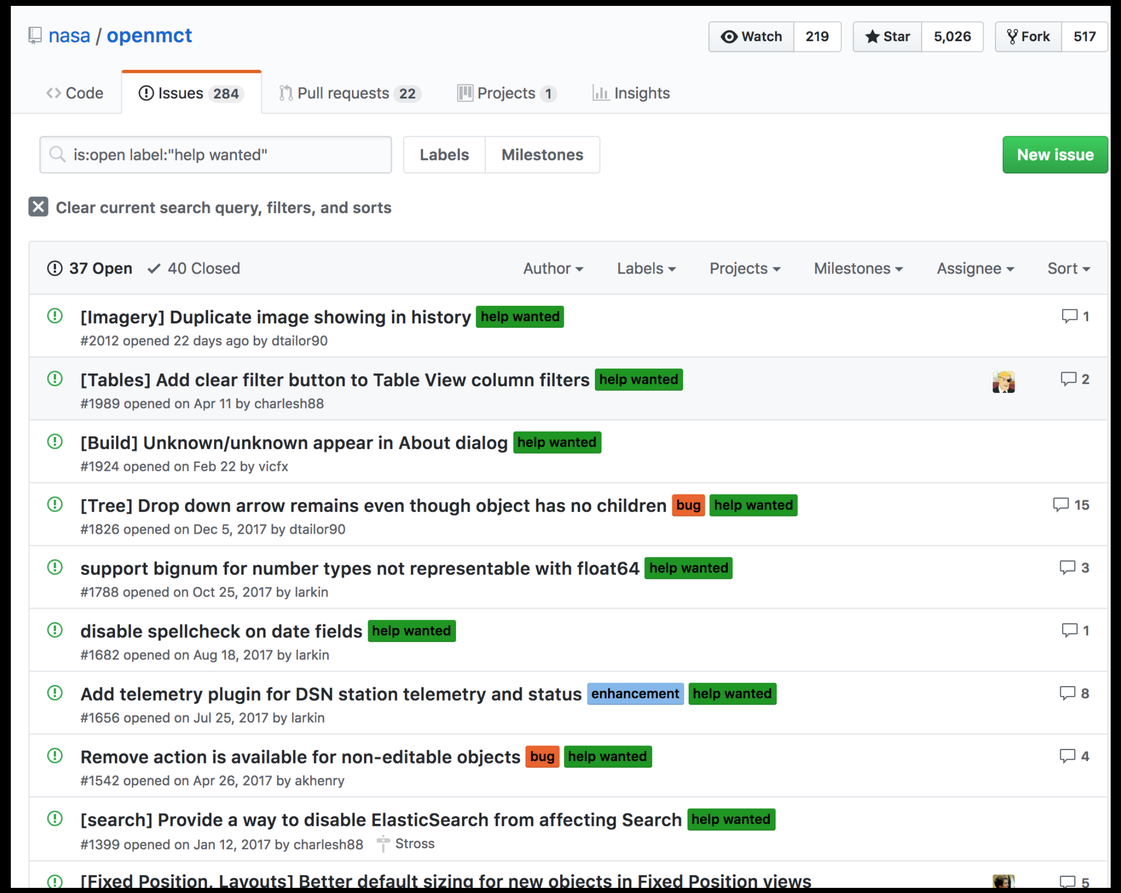
Building a Community 2

- 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 techology

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