EGOS User Desktop
A Generic User Interface Framework for Ground Segment Software

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What is EGOS User Desktop (EUD)

- Framework for building rich client graphical user interfaces
- Integration platform for GUI components
- Targets primarily ground data systems
- Provides powerful set of common GUI components used in ground segment
- ESA's fundament for new generation graphical user interfaces in the European Space Operations Centre
- In mission operation since 2013

Background

- ESA is in the process of modernising its ground data systems infrastructure
- Main motivation for this step is:
  - Obsolescence of existing implementations
  - Removal of dependencies from COTS products
  - Cost reduction through re-use
- Main drivers/objectives are:
  - Usage of state-of-the-art open sourced technologies
  - Platform independence (Linux/Windows)
  - Sharing of common implementations across systems and domains
  - Harmonisation of user interfaces look & feel

EUD Overview

- Implemented in Java™
- Based on Eclipse™ RCP*
- Uses exclusively Opens Source Software
- Runs on multiple platforms and OS

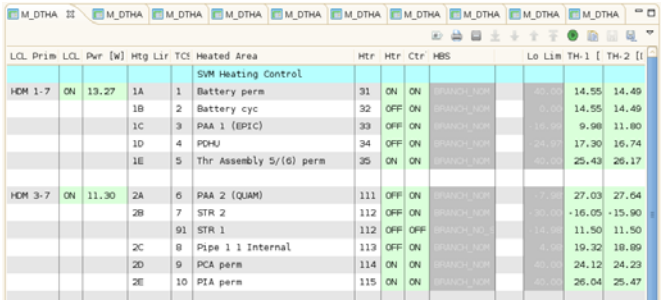
EUD Features

- Pluggable integration platform for User Interfaces
  - granularity of pluggable UI component referred as "***Display***"
  - technically an Eclipse RCP 'View' or 'Editor' plug-in
  - RCP compliant Views run in EUD w/o modifications
  - allows to easily integrate third party views
  - extended View base class available from EUD for added value from EUD facilities
  - can be used as 100% replacement of the AbstractViewPart

EUD Features (cont.)

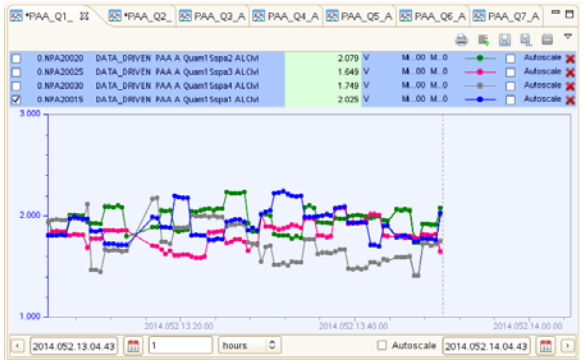
- Set of commonly used Displays (11 in total)

AND

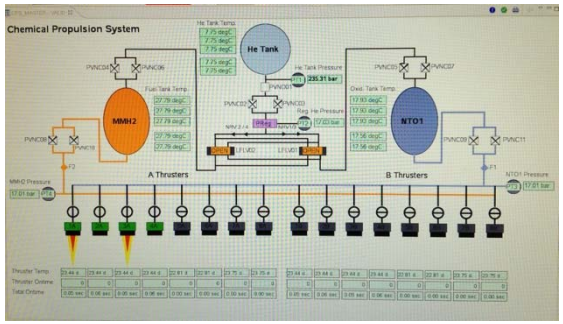


LCL	Prim	LCL	Pwr [W]	Htg	Lir	TCS	Heated Area	Htr	Htr	Ctr	HBS	Lo Lim	TH-1 [	TH-2 [
							SVM Heating Control							
HDM 1-7		ON	13.27	1A		1	Battery perm	31	ON	ON			14.55	14.49
				1B		2	Battery cyc	32	OFF	ON			14.55	14.49
				1C		3	PAA 1 (EPIC)	33	OFF	ON			9.98	11.80
				1D		4	PDHU	34	OFF	ON			17.30	16.74
				1E		5	Thr Assembly 5/(6) perm	35	ON	ON			25.43	26.17
HDM 3-7		ON	11.30	2A		6	PAA 2 (QUAM)	111	OFF	ON			27.03	27.64
				2B		7	STR 2	112	OFF	ON			-16.05	-15.90
						91	STR 1	112	OFF	OFF			11.50	11.50
				2C		8	Pipe 1 1 Internal	113	OFF	ON			19.32	18.89
				2D		9	PCA perm	114	ON	ON			24.12	24.23
				2E		10	PIA perm	115	ON	ON			26.04	25.47

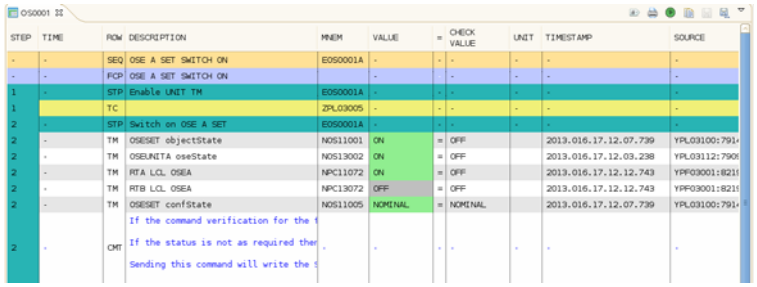
GRD



MIMIC



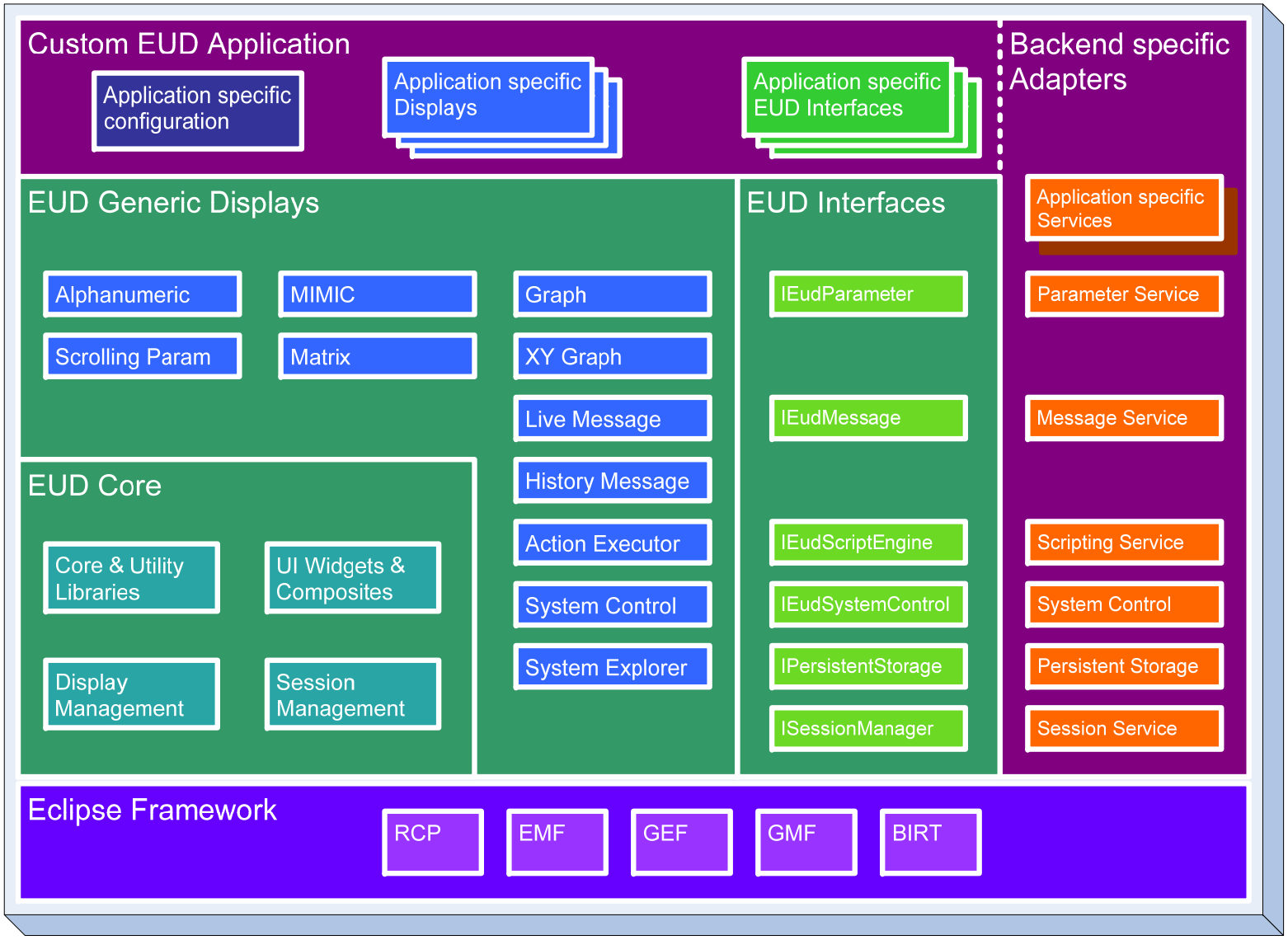
MATRIX



EUD Features (cont.)

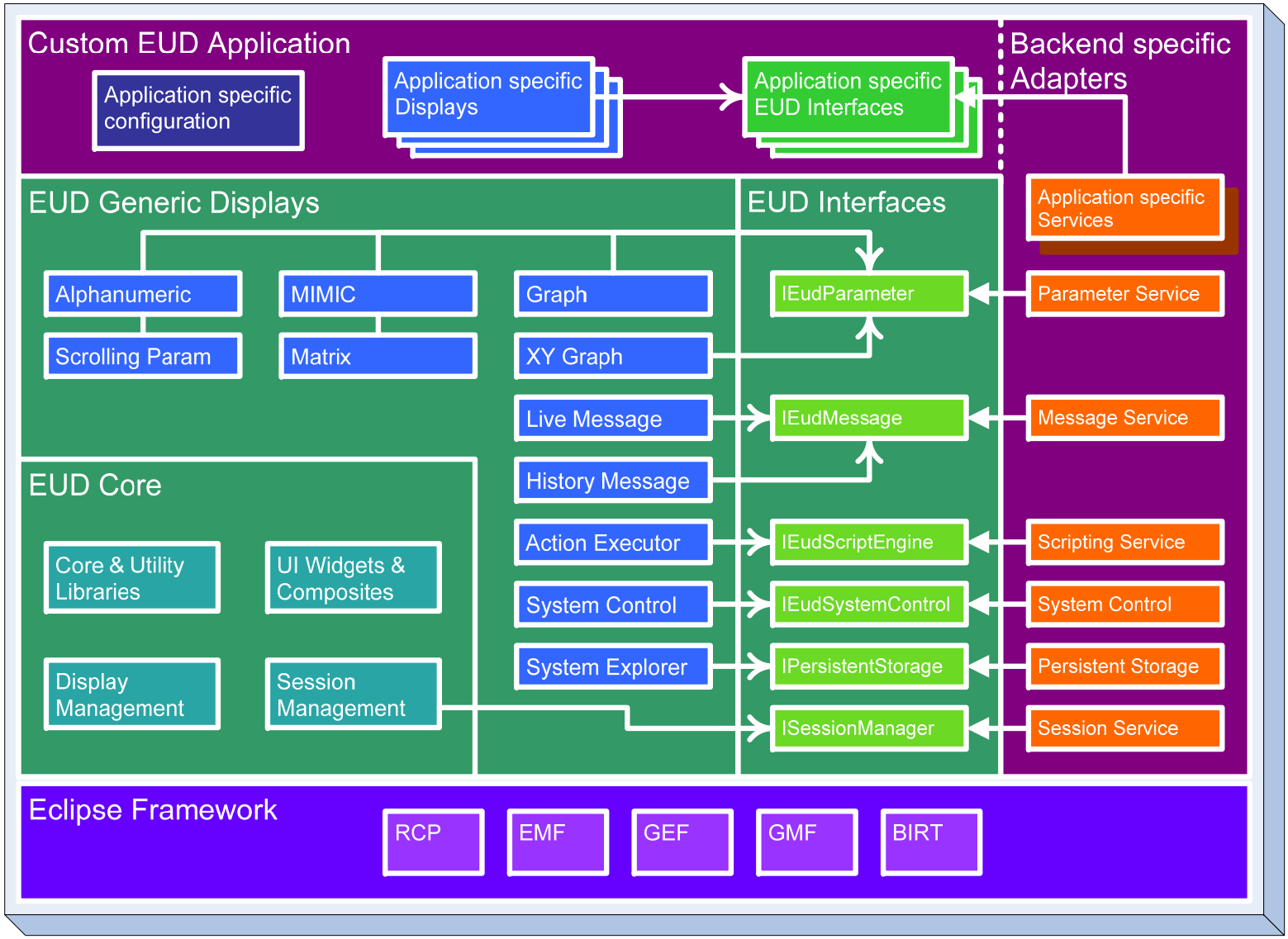
- Extended widget library
  - E.g. Time/Date chooser composite, navigation composite, data table, …
- Set of standardized interfaces for data provision of displays
- Integration and communication with the back-end through adapters

Architecture



Third Party Products | Generic EUD Framework | Application specific

Architecture



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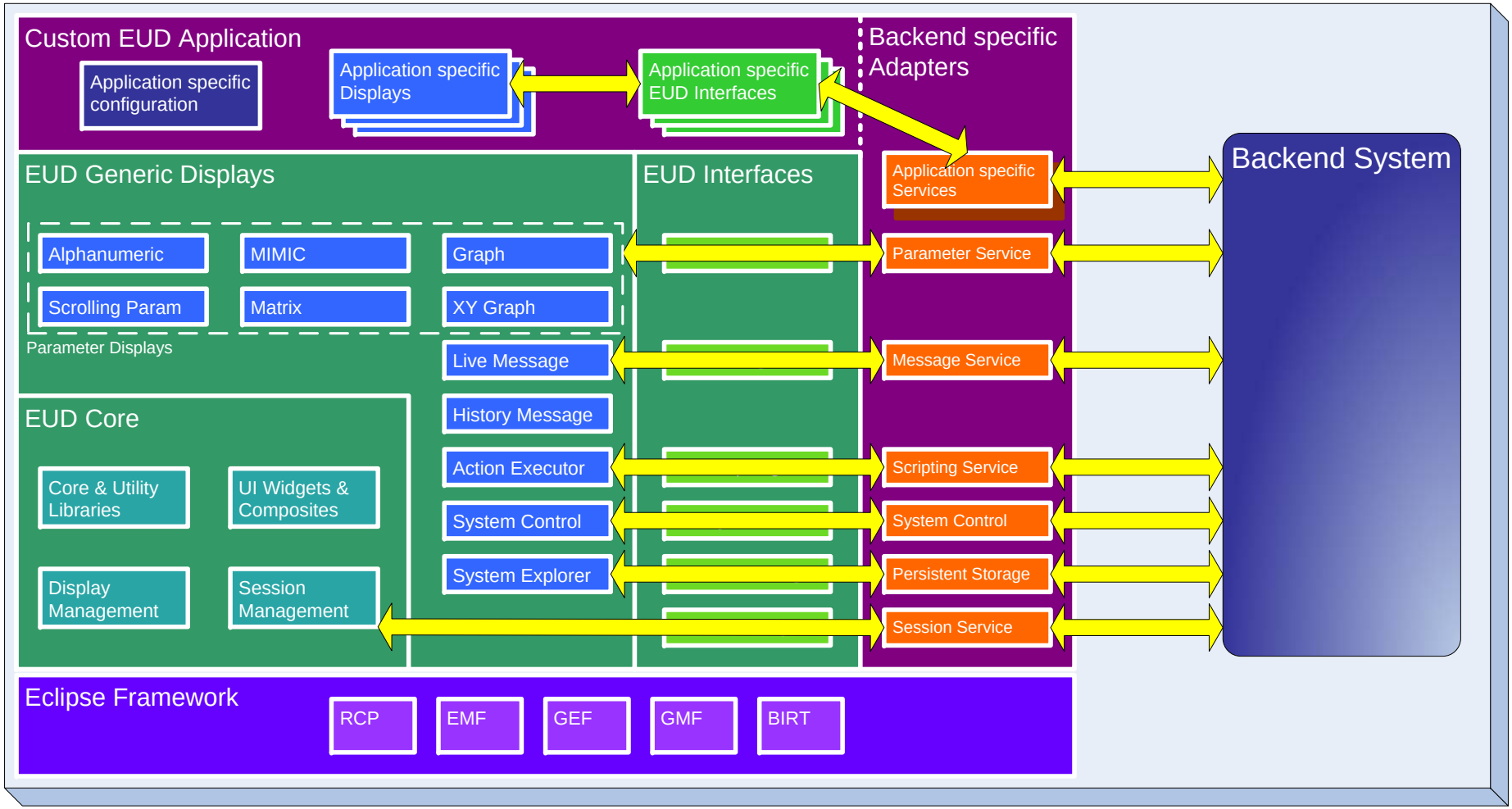


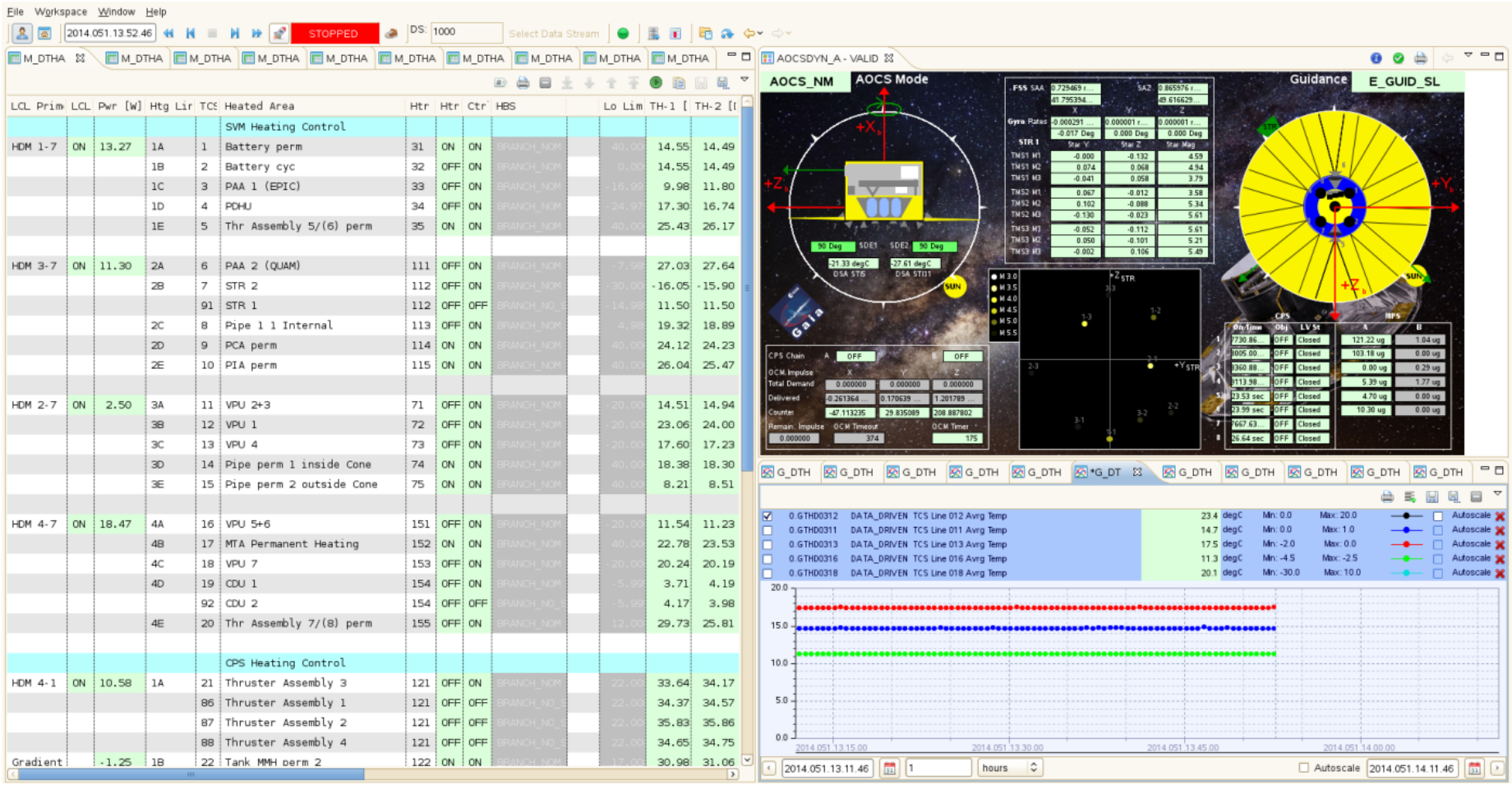
Current Status

- EUD Framework mature since 2011
- Majority of ground systems GUIs are now EUD-based
- Used as replacement GUI for existing systems
  - SCOS-2000
  - SIMSAT
  - NIS
  - FARC
- Used for new developments
  - ARES
  - GSMC
  - FIDES
  - GSSC
  - MPSF
  - ...

Current Status

- Ongoing Developments
  - MATIS
  - SPMON
- Planned Developments
  - GFTS
  - DARC
  - DABYS

EUD Telemetry Desktop (EUD-TMD) in operation (GAIA)



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HDM 2-7		ON	2.50	3A		11	VPU 2+3	71	OFF	ON			14.51	14.94
				3B		12	VPU 1	72	OFF	ON			23.06	24.00
				3C		13	VPU 4	73	OFF	ON			17.60	17.23
				3D		14	Pipe perm 1 inside Cone	74	ON	ON			18.38	18.30
				3E		15	Pipe perm 2 outside Cone	75	ON	ON			8.21	8.51
HDM 4-7		ON	18.47	4A		16	VPU 5+6	151	OFF	ON			11.54	11.23
				4B		17	MTA Permanent Heating	152	ON	ON			22.78	23.53
				4C		18	VPU 7	153	OFF	ON			20.24	20.19
				4D		19	CDU 1	154	OFF	ON			3.71	4.19
						92	CDU 2	154	OFF	OFF			4.17	3.98
				4E		20	Thr Assembly 7/(8) perm	155	OFF	ON			29.73	25.81
							CPS Heating Control							
HDM 4-1		ON	10.58	1A		21	Thruster Assembly 3	121	OFF	ON			33.64	34.17
						86	Thruster Assembly 1	121	OFF	OFF			34.37	34.57
						87	Thruster Assembly 2	121	OFF	OFF			35.83	35.86
						88	Thruster Assembly 4	121	OFF	OFF			34.65	34.75
Gradient			-1.25	1B		22	Tank MMH perm 2	122	ON	ON			30.98	31.06

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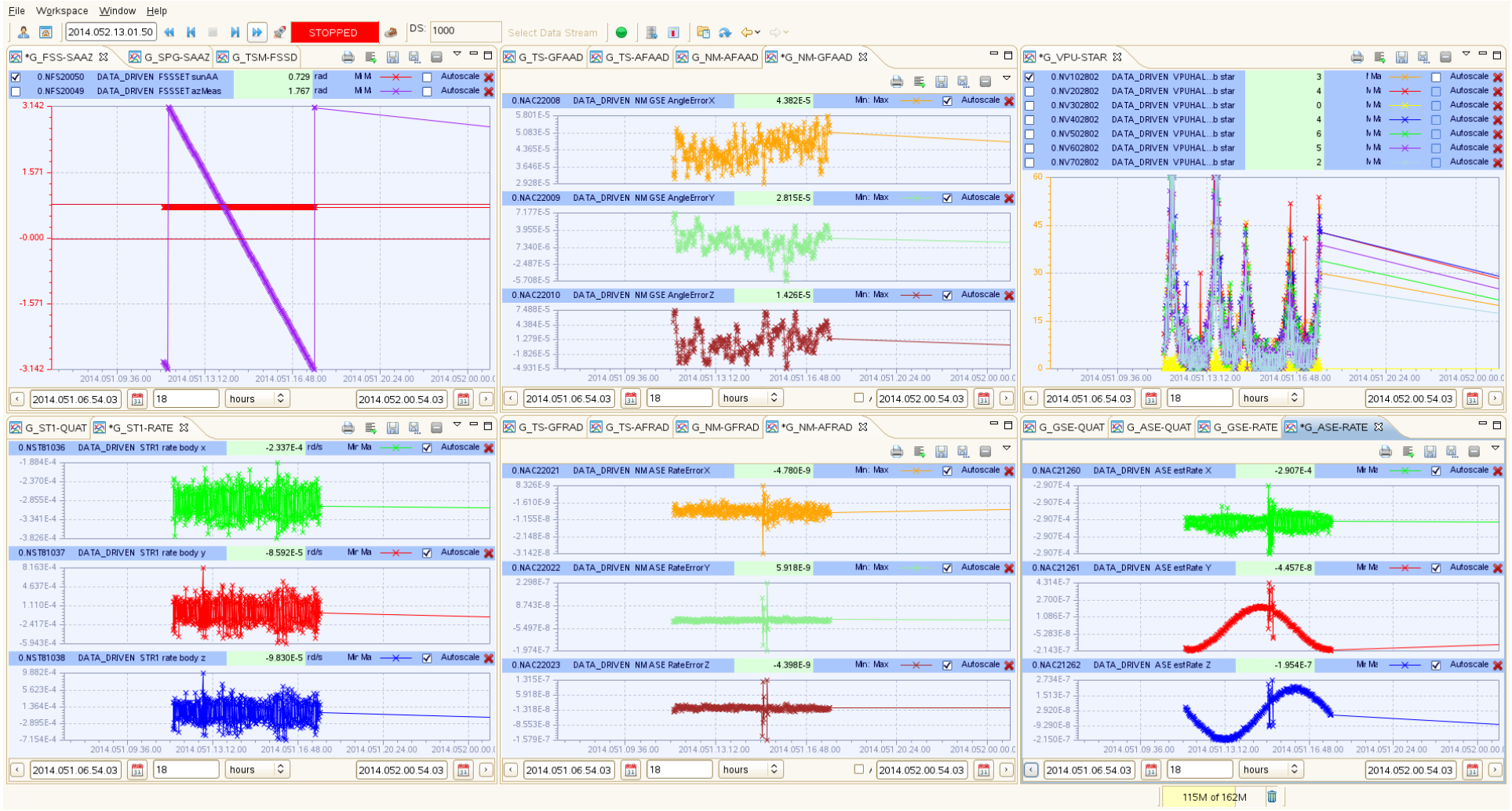
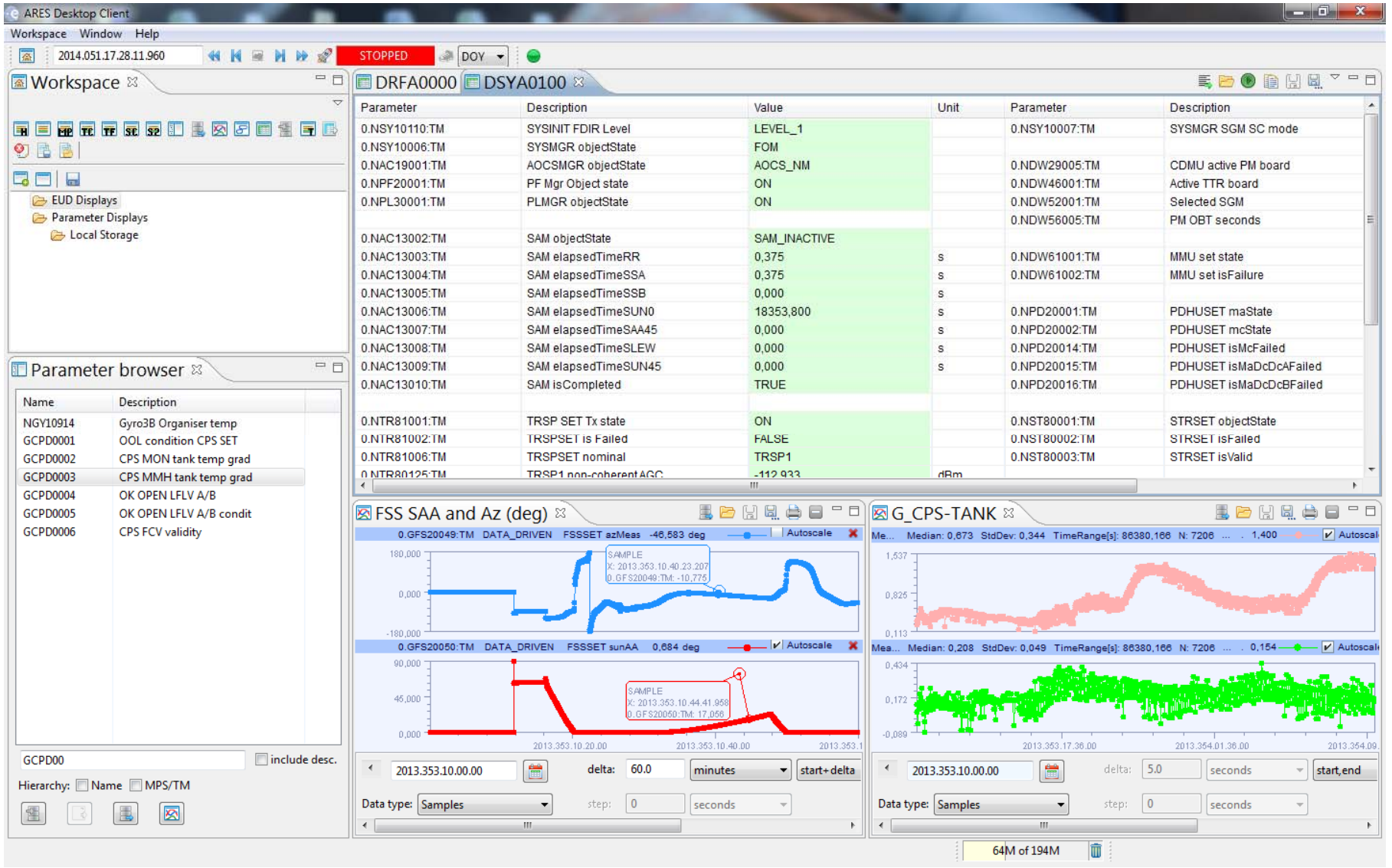


ARES (Offline Mission Analysis)



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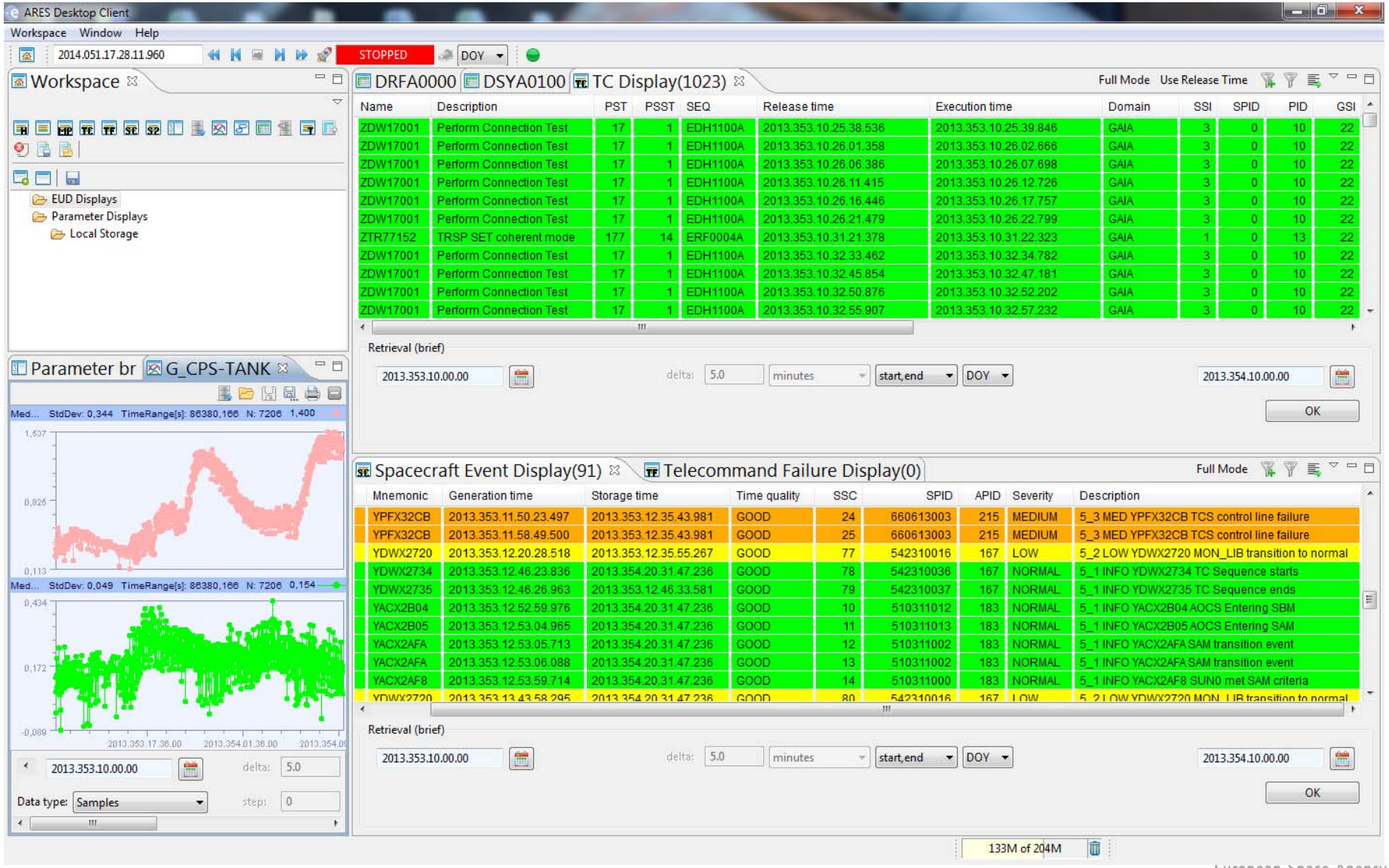
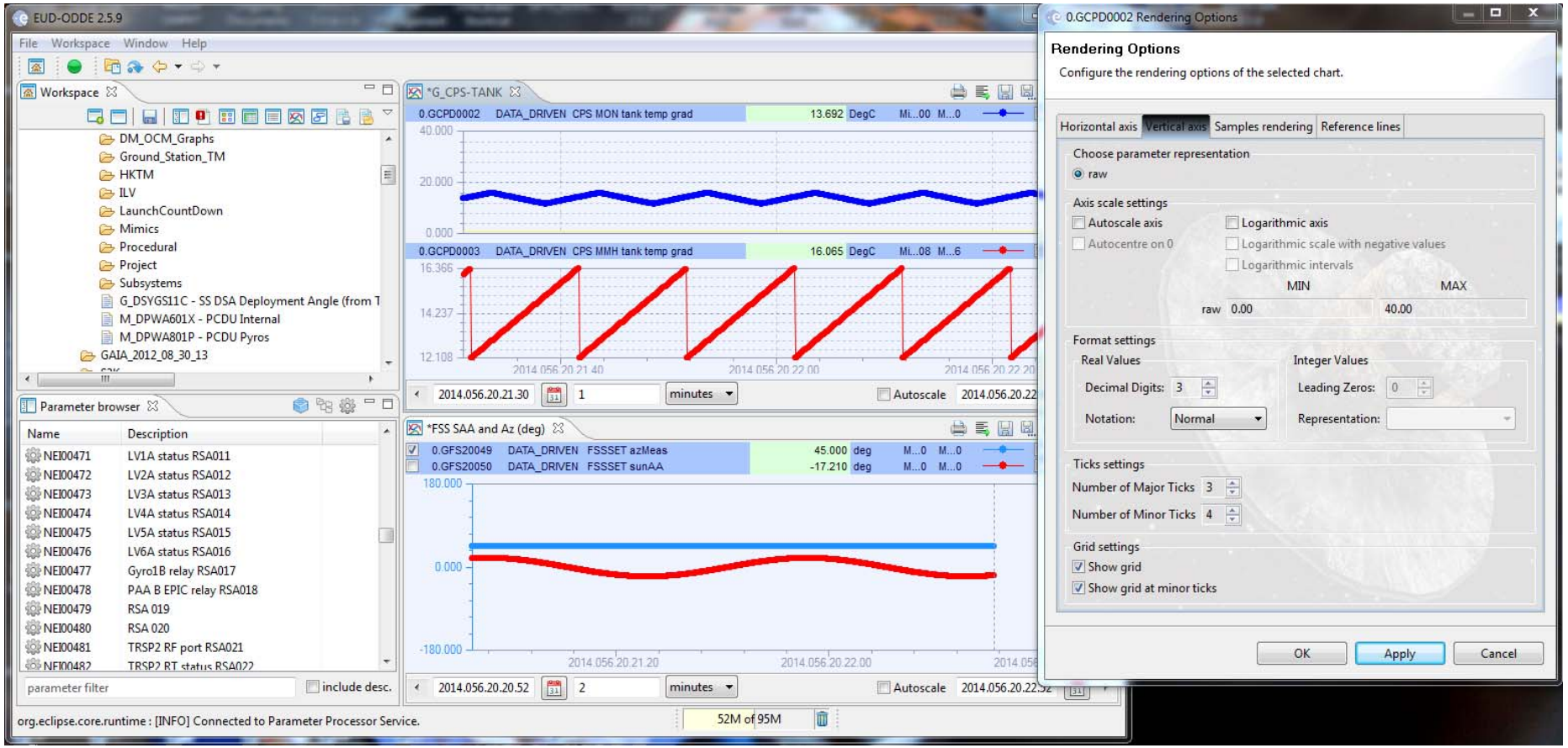


Offline Display Development Env.



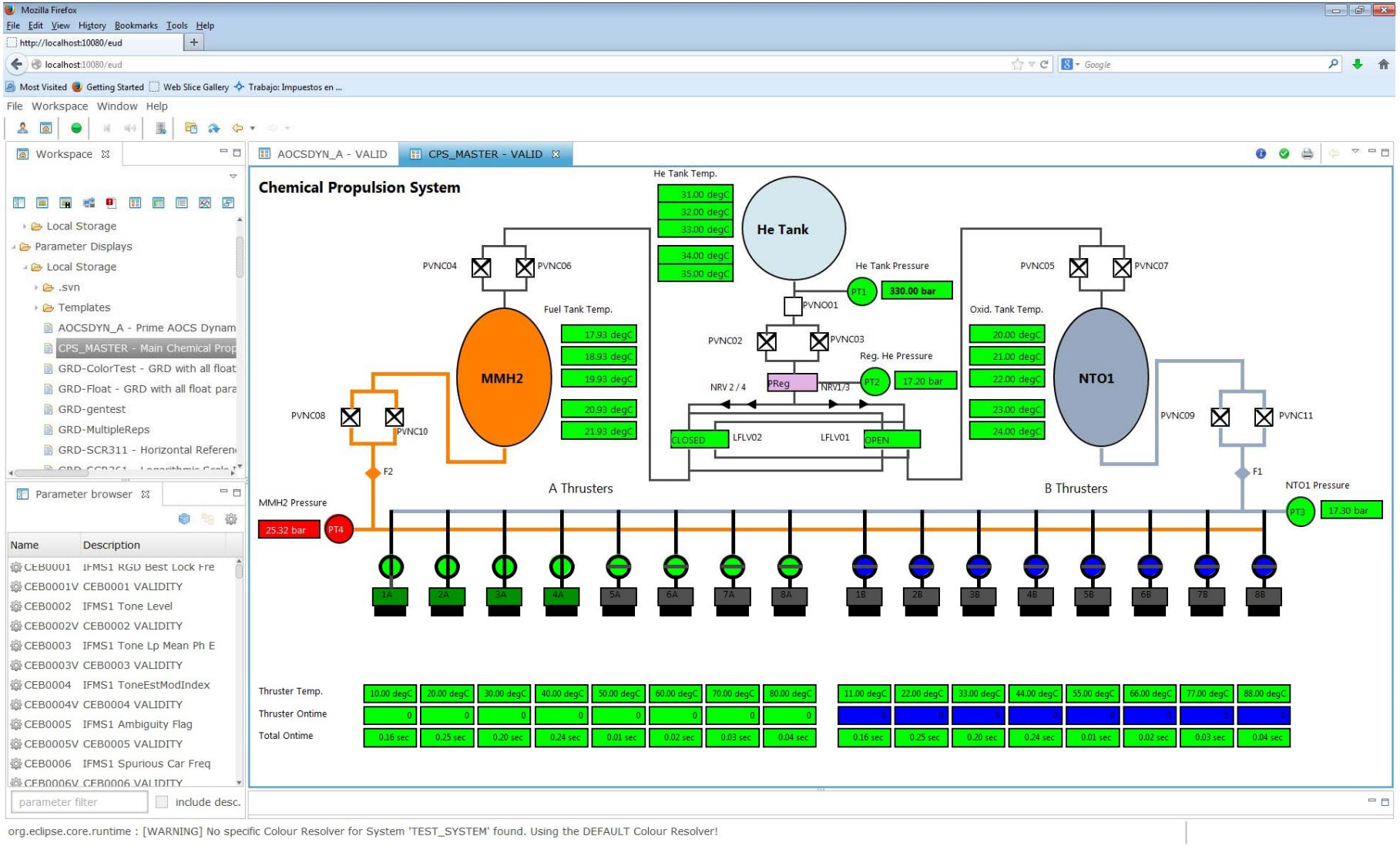
Benefits

- Very positive acceptance by the users
- Harmonized Look & Feel throughout different applications
- Reduced learning effort
- Features added for one application get available for others
- Cross compatibility of display definition files across domains
    - ODDE <-> MCS <-> SIMSAT <-> ARES <-> GSMC
- Flexible assembly of displays for an application
- Multi-system, multi-platform
- No license cost

Future Plans

- Web-EUD (ongoing)
  - Use EUD through a web browser
  - Usage of Eclipse RAP allows to run EUD as Web application as is, with only minor adjustments to the code base
- More generic displays
  - Density distribution display
  - Spectral analysis display
  - 3D Graphs
  - ...
- Usage in more systems (e.g. EGS-CC)

Web-EUD



Lessons Learned

- Initially lot of effort required to consolidate functionality across domains (discussions, meetings, reviews)
- Agile development approach appeared to be crucial for success
- Implementation of adapters for legacy system may be tedious

Thank you for your attention.

*) ‘Eclipse’, ‘Built on Eclipse’, ‘BIRT’, ‘RCP’ are trademarks of Eclipse Foundation, Inc.