An Easy Way to Web User Interfaces for Ground Segment Systems

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From Rich Client ...

Ground Segment System
- Ground Station
- Mission Control
- Planning & Scheduling

Non-space Systems
From Rich Client ... to Web-based

Ground Segment System
- Ground Station
- Mission Control
- Planning & Scheduling

Non-space systems
Agenda

1. Motivation – Current State
2. Rich Clients vs Web-based User Interfaces
3. Eclipse Remote Application Platform (RAP)
4. Implementation of Web-based MMI
   a. EGOS User Desktop (EUD) / WebEUD
   b. Semi-automatic creation of ground station subsystem web-based MMI
5. Conclusion & Outlook
Motivation – Current State

- MMI for ground data systems used to be implemented as separate standalone application
- Use of frameworks (Eclipse Rich Client Platform) allows to exploit commonalities and a more harmonized look & feel
- **EGOS User Desktop** providing common functionality for ground data systems
Motivation – Current Issues

- **Update**: update of all clients required
- **Deployment** (thin clients, screen forwarding): issues with audio, z-layering, printing
- **Management of user configurations**: requires synchronisation between all installed instances
- **Portability**: ok, but sometimes subtle issues and no mobile devices
Web-based MMI – Issues

• **Update**: updates deployed on server only  
  
• **Deployment**: audio, z-layering, printing via web browser  
  
• **Management of user configurations**: done on the server  
  
• **Portability**: support for different browsers necessary; mobile devices can be used  
  
• **Usability**: What about the usability of web-based MMI? Look & Feel?  
  
• **Effort**: What is the effort of switching to web-based MMI? Which skills are needed?
Quiz

RICH CLIENT OR WEB APPLICATION?
Quiz: Web or Rich Client?

Web-based MMI run via Java Web Start
Quiz: Web or Rich Client?
Quiz: Web or Rich Client?

EUD-based Rich Client on Linux (Gnome)
Quiz: Web or Rich Client?
**Quiz: Web or Rich Client?**

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**WebEUD-based MMI in Web-Browser (firefox)**
Quiz: Web or Rich Client?

Eud-based Rich Client on Linux (Gnome)
Eclipse RAP provides the **RAP Widget Toolkit (RWT)** which implements the **Standard Widget Toolkit (SWT)** API.
Eclipse Remote Application Platform (RAP)

- Developers write **Java code** (but be aware of multi-user support) → no html, javascript, ...
- **Porting of existing RCP** applications is straightforward
- **Single Sourcing** (same code for RCP and RAP application)
- Supports **drag & drop, menus, drawing, ...**
- Support **all major browsers**
- Client-side implementation of user interaction and low bandwidth usage → Can be used on **limited WAN links with high latency**
EGOS User Desktop (EUD)

- **RCP-based UI Framework** for ESA Ground Data Systems
- Provides a set of **commonly used displays**:  
  - Matrix Display  
  - Plot Display  
  - System Control  
  - Messages Display  
  - MIMIC Display  
  - … and many more
WebEUD

- Single Sourcing with RCP and RAP; typical issues:
  - **multi-user environment:**
    - separation of application and session scope
    - use of session singletons
    - provision of session context to background jobs
  - missing extension points or API
  - RCP/RAP specific plugin fragments
- ~2-3 men month of effort
- **All displays**, including plots and mimics, are available
WebEUD - Mimics
WebEUD – Plot
Web-based Ground Station Subsystem MMI

- ESA Ground Station Subsystems implement a common M&C interface via the Generic Subsystem Controller
- M&C capabilities (and some MMI aspects) are define in a MIB file
- The (Web)EUDGSSC uses the MIB to auto-generate subsystem-specific navigation, parameter and task displays
- New displays can be created by drag&drop
- Mimics can be designed with a Mimic Designer (or can be generated from different sources)
- Additional subsystem-specific displays can be easily implemented
WebEUDGSSC – SLE Provider
## RAP Application: ESTRACK Management System

**Operational Service Sessions (204)**

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**Event Timeline**

**Spacecraft**
Conclusion and Outlook

• Web-based MMI allow to solve issues regarding deployment, update, screen forwarding and user management
• Web-based MMI can provide a similar look & feel as RCP applications
• **Eclipse RAP** allows to create web-based MMI like Rich Clients with very little additional effort

Next Steps:

• Web-based MMI to control CFDP downlink to ground station
• Porting of WebEUD(GSSC) to Eclipse e4 application platform