FwWebViewPlus: integration of web technologies into *WinCC-OA*[1] based Human-Machine Interfaces at CERN

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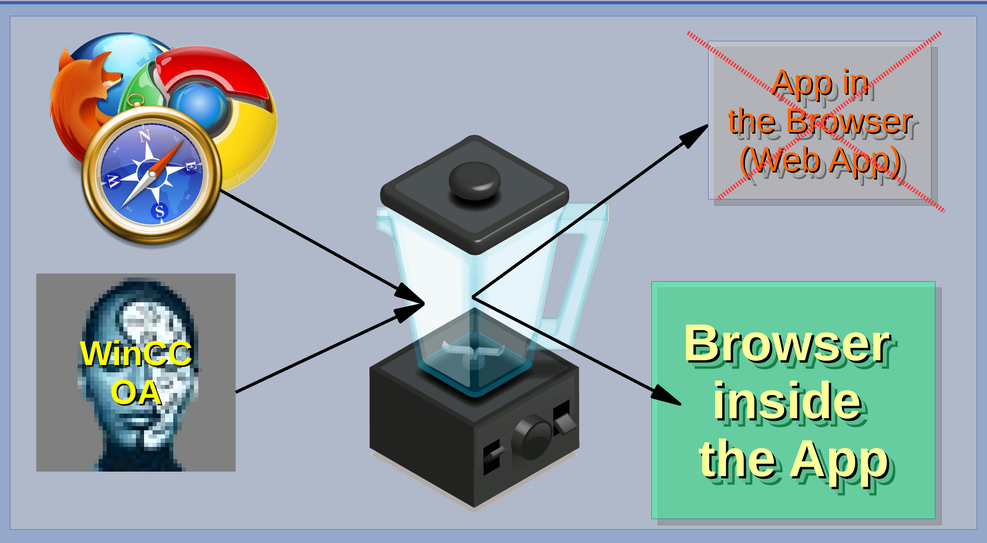
Introduction

- Operator screens (HMI) of control systems at CERN need more and more advanced and customized visualizations
- Maintenance of existing visualization plugins code (C++) and development of new ones requires effort
- We observe a multitude of general-purpose interactive visualizations and widgets on the web
- Growing use of JavaScript as scripting language in many domains (NodeJS, ProcessingJS, Qt Quick,...)

Solution

F*wWebViewPlus* delivers a generic web-rendering plugin (HTML5, JavaScript), deeply integrated with WinCC-OA

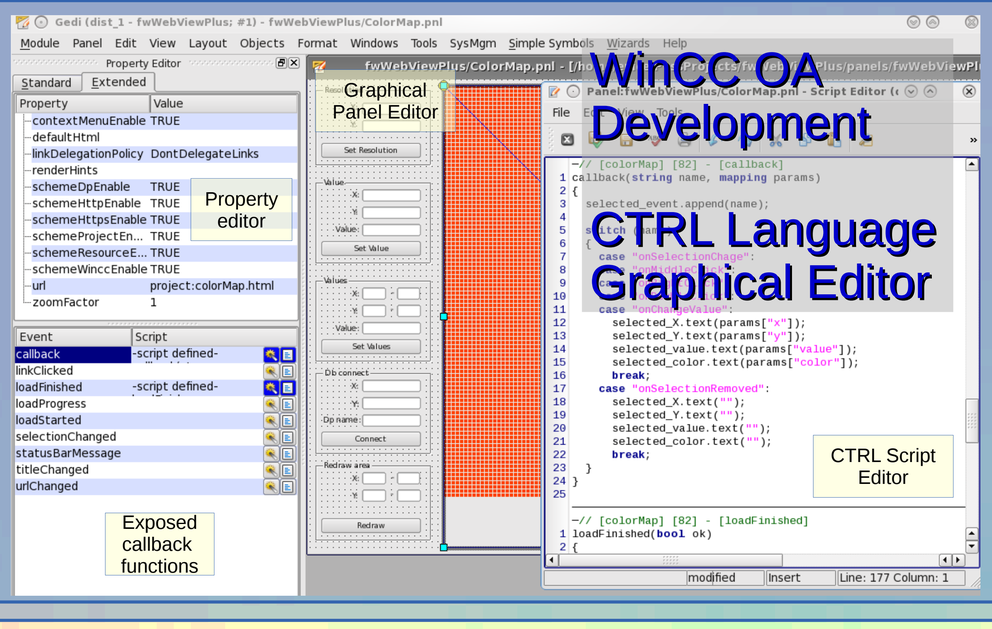


Technologies

- EWO: WinCC-OA's native binary plugin mechanism for User Interfaces, with open C++ API, linked to Qt
- WebKit: widespread open-source web engine
- QWebView/QtWebKit: webkit component of Qt

Approach

- Reuse and integrate existing components
- JS visualizations easier to maintain/create/adapt
- Aim: simplicity for WinCC-OA engineering
- Aim: “drag-and-drop” of prepackaged JS widgets



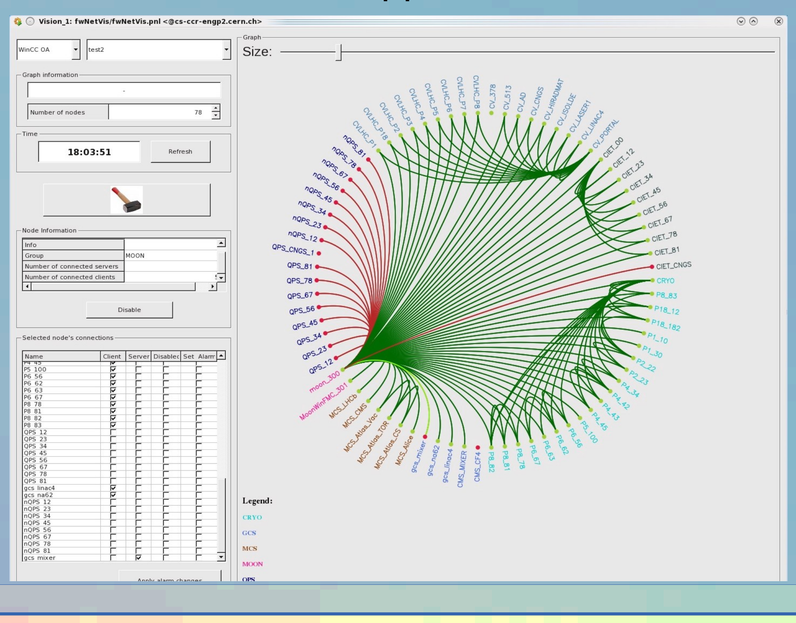
Hybrid programming:

JavaScript + HTML5 + CTRL

- New widget integration requires some (minimal) interfacing code, typically on both sides
- Added facilities for programmer:
  - making JS method known to CTRL
  - passing JS user events to CTRL
  - converting data types on-the-flight to their native representations

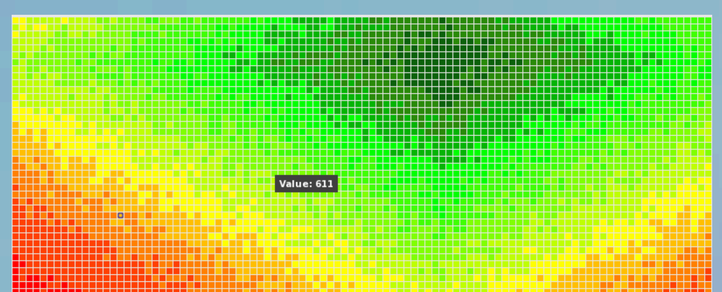
Results

Visualization of connectivity state embeds the MooWheel[3] web widget Into the fwWebViz application



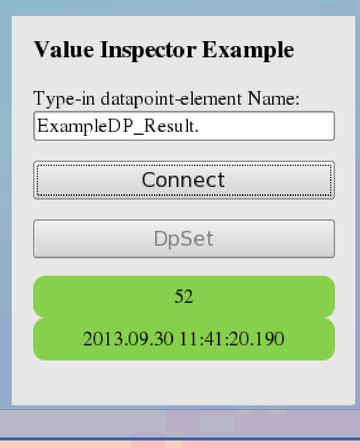
HeatMap visualization

- Written from scratch in JavaScript and HTML5
- Animated with live data from WinCC-OA
- Interactive (selection of cells)
- Works within fwWebView and equally well in a web browser



Example of simple value-change monitor panel implemented completely with HTML/Javascript (50 lines of code)

Connecting with WinCC-OA data required no code in CTRL!



Conclusion and outlook

- fwWebViewPlus allows to integrate already existing web visualizations and implement new ones with less effort
- The solution is platform-independent, secure and eases the long-term maintenance
- The powerful JavaScript engine of WebKit may be harnessed for data processing by employing projects such as D3.js, or Processing.js
- Enables the use of web-based techniques for HMI development now, to ease the full migration to the web in future

[1] Simatic WinCC Open Architecture, formerly PVSS, commercial SCADA software from ETM/Siemens

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[3] MooWheel: JavaScript connections visualization library, Unwieldly studios http://labs.unwieldly.net/moowheel

Poster: P1.03, Contribution: 457
Track: “Data Acquisition, trigger and controls

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