

Remotisation Activities and Projects in Elettra and FERMI



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Overview

- Internal Project on Remotisation
- In-house Developed Systems
- Relevant EU Projects
- Data Policy issues, Security and Privacy
- Experience from Beamtime Experiments

Project on Essential Remotisation (EsRe)

- inline with EU projects ExPaNDS & PaNOSC
 - joint work ELETTRA - CERIC



1. Remote data access

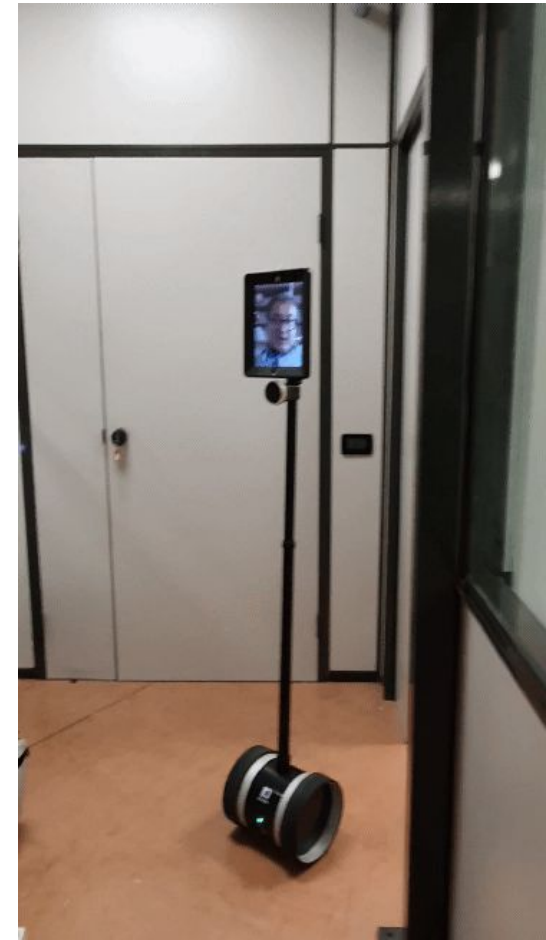
2. Remote control of data acquisition computers

3. Investigation of new technologies (ie. distributed logbooks, wearable cameras, telepresence robots)

14 Elettra beamlines and 4 in FERMI already in the EsRe process
(*work in progress*).

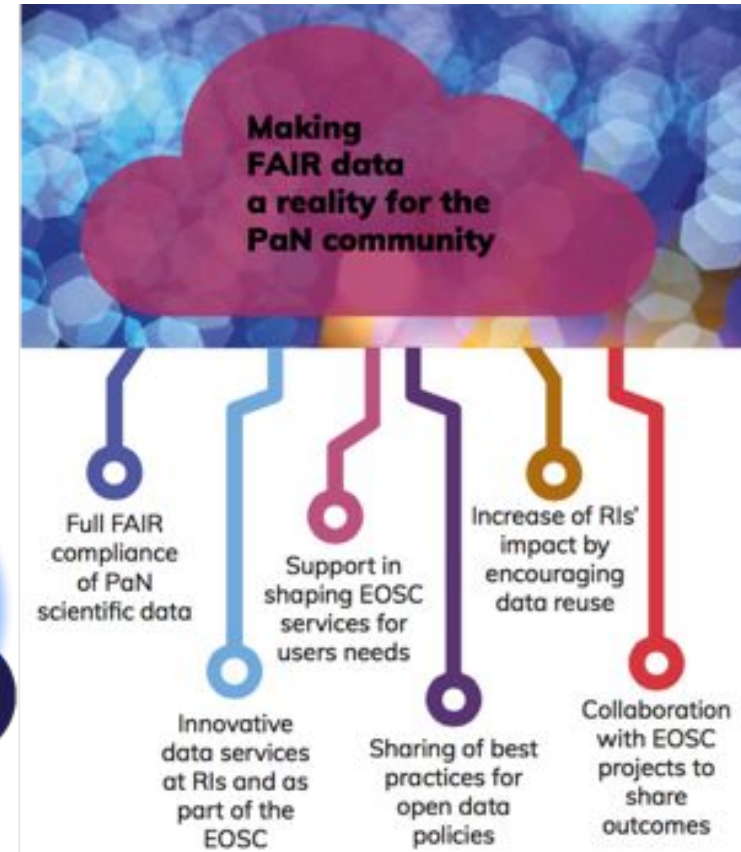
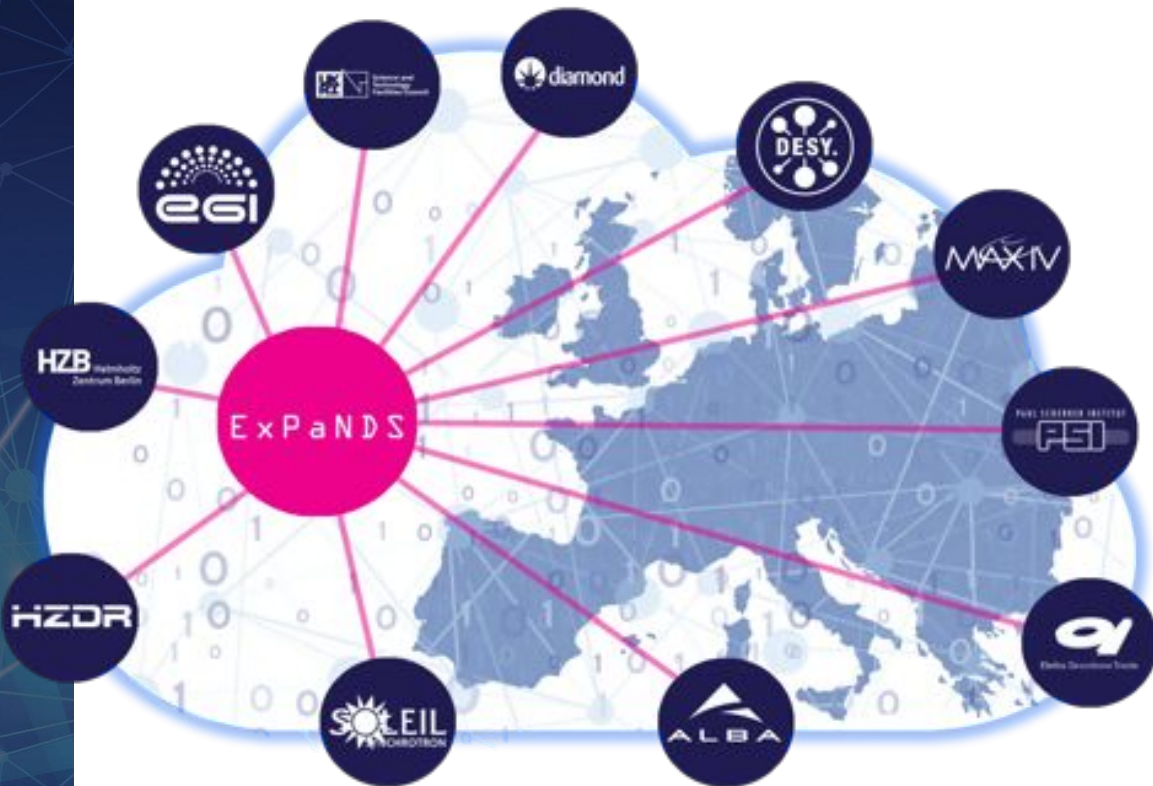
Enables science during the lockdown but should also **improve the workflow** even after that.

Wearables, Robotics and VR for telepresence @Elettra



ExPaNDS and PaNOSC EU Projects

- EsRe relies on the developments of multi-year projects which regard scientific Data Policy and aim at Openness

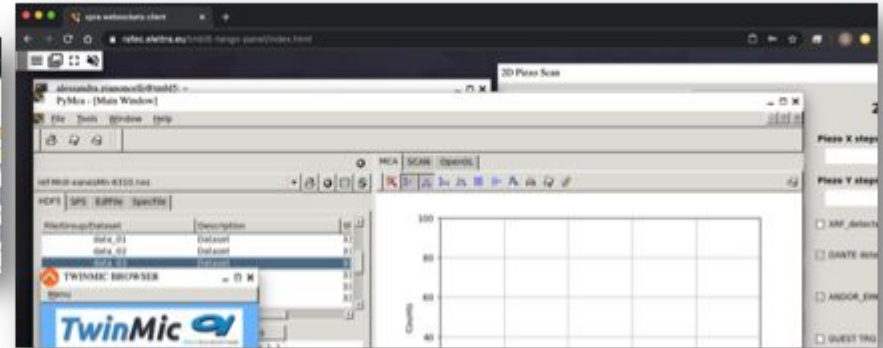


Data Policy issues, Security and Privacy

- Remotisation is not only a technical issue
- Data **Policy**, **Security** and **Privacy** should be considered
- Elettra has a new Scientific Data Policy compliant with PaNOSC and ExPaNDS
- We are working towards having the PaNOSC data policy adopted by all the CERIC-ERIC partner facilities (***not easy**, different member states, different institutes, different instruments*)
- Privacy has a huge importance:
 - In Italy (it's EU-wide) , if you put a camera that can potential capture people at work you have to discuss and sign an agreement with labour unions, ...
- In other terms, when dealing with remotisation, laws have to be considered and respected in order to avoid problems down the road!

3 in-house developed EsRe technologies

Remote Desktop in a Web browser (RAFEC by Marco De Simone et al. - CERIC)



Cloud Storage with Metadata association (Upload2Online by Alessandro Olivo et al. - CERIC)



Chat as distributed LogBook (Borghes et al.) a WhatsApp Group but better

The screenshot shows a web browser window with the URL `chat.elettra.eu/group/beamtime_megapixel_lungs`. The chat interface displays a group chat titled "beamtime_megapixel_lungs" with the subtitle "Beamtime on Megapixel XRF for Lung Tissues".

On the left sidebar, there are sections for "Favorites", "Discussions", "Channels", "Private Groups", and "Direct Messages".

The chat history includes:

- Scientific Computing bot** @SciComp.bot 11:45 AM: DonkiOrchestra started
- Scientific Computing bot** @SciComp.bot 11:45 AM: File prefix: twinmic_scan_81
- Scientific Computing bot** @SciComp.bot 11:45 AM: Scan points: 30000
- Roberto Borghes** @roberto.borghes.elettra.eu 11:47 AM: Ho dovuto riavviare i Tango devices, ho rimosso anche il player FICUS che crea solo confusione
- Alessandra Gianoncelli** @alessandra.gianoncelli.elettra.eu 12:03 PM: Ho visto che hai fatto partire lo scan...c'e' pero' qualcosa di strano alla seconda riga. Puoi dare un'occhiata?
- Roberto Borghes** @roberto.borghes.elettra.eu 12:20 PM: Screenshot from 2020-05-13 12-19-55.png

A red box highlights the three bot messages, with a red arrow pointing to them from the text: "Automated REST messages from the TANGO, LabView, Data Portal, etc".

The screenshot shows a heatmap visualization of data. The x-axis is labeled "sample_motors/sample_stage_x" and ranges from 25,300 to 26,200. The y-axis is labeled "sample_motors/sample_stage_y" and ranges from 24,400.6 to 24,408.3. The color scale represents "andor/intensity" from 1.25e+06 to 1.6e+06. The plot shows a grid of data points with varying intensities, indicating a scan process.

Below the heatmap, the text reads: "In realtà mi sembra OK ma fa più di 3 righe...".

The bottom of the browser window shows a message input field with a "Message" placeholder and a microphone icon.

Experience from an actual “remote” beamtime experiment

- A new method for X-ray Fluorescence imaging @ TwinMic
- Remote data acquisition, access and analysis
- Mostly through a web-browser!
- Slower but still feasible
- Certain instruments are not remotely controlled yet
- Elephant in the room: Sample preparation / change
- What does really “remote” means?
- Overall: ★★★★★

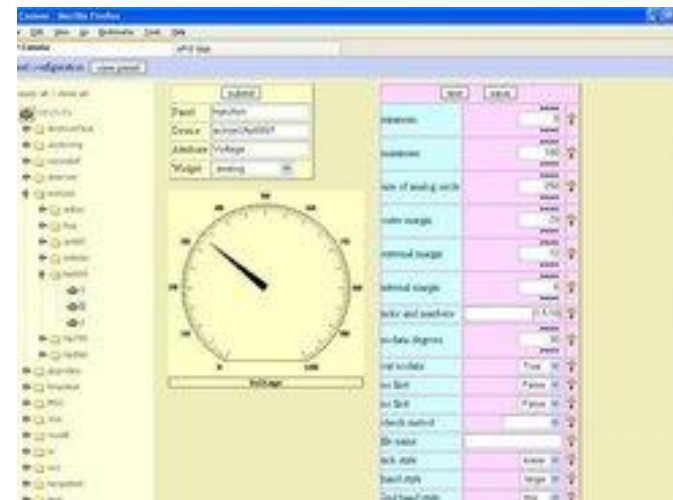
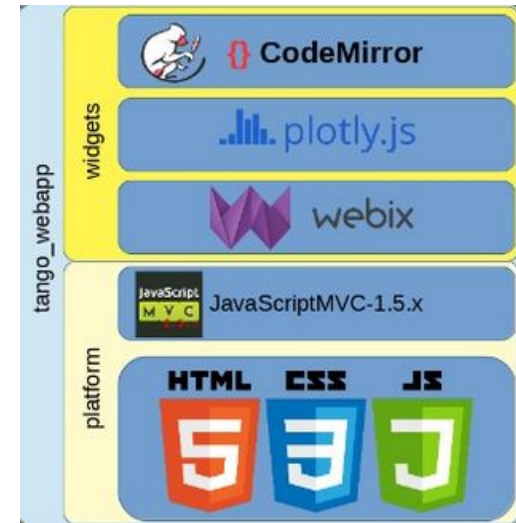
TANGO Controls framework

“Connecting things together”



www.tango-controls.org

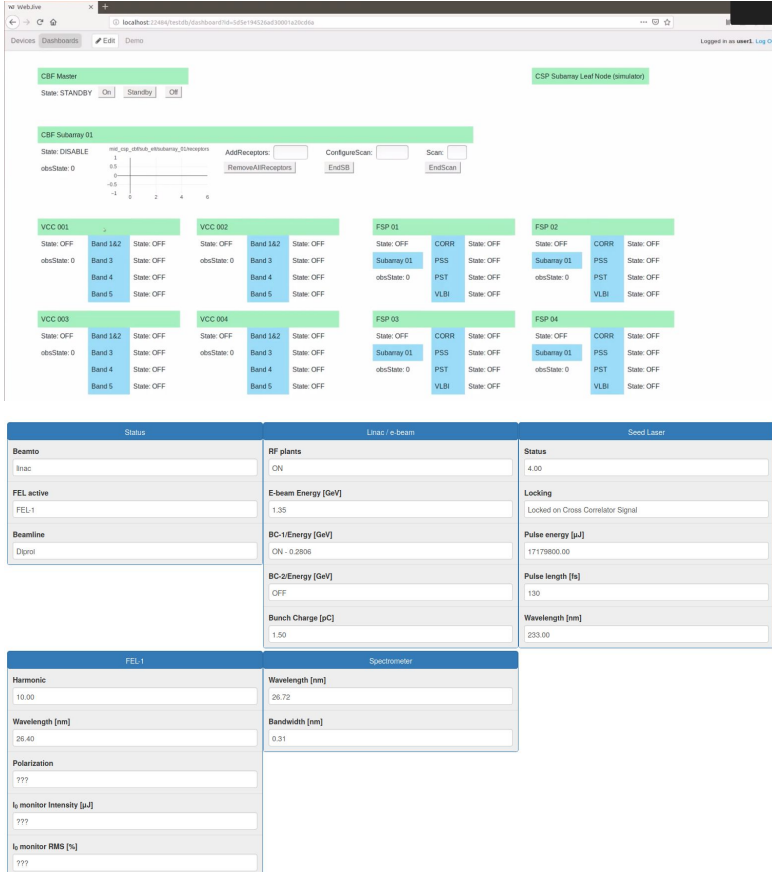
- Elettra and FERMI control systems are based on TANGO
- Legacy approach for GUIs based on Qt or Java
- But also support for WEB-based GUIs
- TANGO REST API
 - <https://github.com/tango-controls/rest-api>
- Waltz
 - <https://github.com/waltz-controls/waltz>
- Canone (PHP and JavaScript using AJAX and SQL)
 - <https://sourceforge.net/projects/canone/>



TANGO Controls framework

“Connecting things together”

- Webjive (REACT and TangoGQL)
 - A GraphQL interface for Tango.
 - <https://gitlab.com/MaxIV/web-maxiv-tangogql>
 - A React client to interface with Tango
 - <https://gitlab.com/MaxIV/webjive>
 - An API for saving and loading dashboards
 - <https://gitlab.com/MaxIV/dashboard-repo>
- PWMA
 - Websockets + Server Sent Events (SSE)
 - <https://gitlab.com/PWMA>
- Take advantage of web technologies for encryption, authentication, authorization...



The screenshot displays a complex web interface for controlling an accelerator system. It features several panels for different components, each with a state indicator (e.g., OFF, ON, Standby) and various control buttons. The components include:

- CSF Motor:** State: STANDBY, with On, Standby, and Off buttons.
- CSF Subarmy 01:** State: DISABLE, with a graph showing obsState over time and buttons for Add/Remove Receptors, Configure/EndScan, and Scan/EndScan.
- VCC (Vacuum Chamber Control) 001-004:** Each panel shows five bands (1&2, 3, 4, 5) with their respective states (OFF).
- FSP (FEL Subarmy) 01-04:** Each panel shows three subarmies (01, 02, 03) with states (OFF) and buttons for CORR, PSS, PST, and VLBI.
- Beamline:** A summary panel with fields for Inac, FEL active (FEL-1), and Dipro.
- RF plants:** A panel with fields for E-beam Energy [GeV] (1.35), BC-1 Energy [GeV] (ON - 0.2806), BC-2 Energy [GeV] (OFF), and Bunch Charge [pC] (1.50).
- Status:** A panel with fields for Status (4.00), Locking (Locked on Cross Correlator Signal), Pulse energy [pJ] (17179800.00), Pulse length [fs] (130), and Wavelength [nm] (233.00).
- FEL-1:** A panel with fields for Harmonic (10.00), Wavelength [nm] (26.40), Polarization (??), I₀ monitor Intensity [pA] (??), and I₀ monitor RMS [%] (??).
- Spectrometer:** A panel with fields for Wavelength [nm] (26.72) and Bandwidth [nm] (0.31).

Thank you!

We need your assistance and feedback on:

- Remote Desktops: Advanced setups of Nomachine NX, FastX, Other?
- Alternatives to OwnCloud, Google Drive?
- Wearable devices?
- Conversion of legacy TANGO GUIs to the Web?
- Other stuff we may be missing?