Remote participation – Discussion Points

19 March 2021

G. De Tommasi[1,2]

[1]Consorzio CREATE
[2]Department of Electrical Engineering and Information Technology, University of Naples Federico II, Italy

This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 633053.
The views and opinions expressed herein do not necessarily reflect those of the European Commission.

Discussion points – 1/3

- **In 2021-2022 EU CODAC experts can contribute to finalize the functional requirements for the EU REC toward an implementation in 2023 → while doing that a review of the JT-60SA remote access system should be performed**
  - QST VPN security model too strict (cuts out from all the local connections)…
    - …anyway it does not guarantee security (virtual machines works)
  - Technology used to implement the HMI too old & not robust/reliable
  - Different interfaces to the different databases (e.g., plant monitoring data & experimental data), also at the user-level → no abstraction → see also onsite experience made by Matteo Iafrati & Alexandre Louzgouti
  - API for Remote Data Access (RDA) not yet released to the general public (currently the documentation is available only in Japanese even if an effort is made both by QST and the EU colleagues to improve that (see the FP8 wiki [link])
  - RDA works only from the Naka Server → need to transfer data locally via **`sftp`**
- **EU CODAC experts can contribute but this should first agreed at PM level (remember remote access is a sensitive subject)**

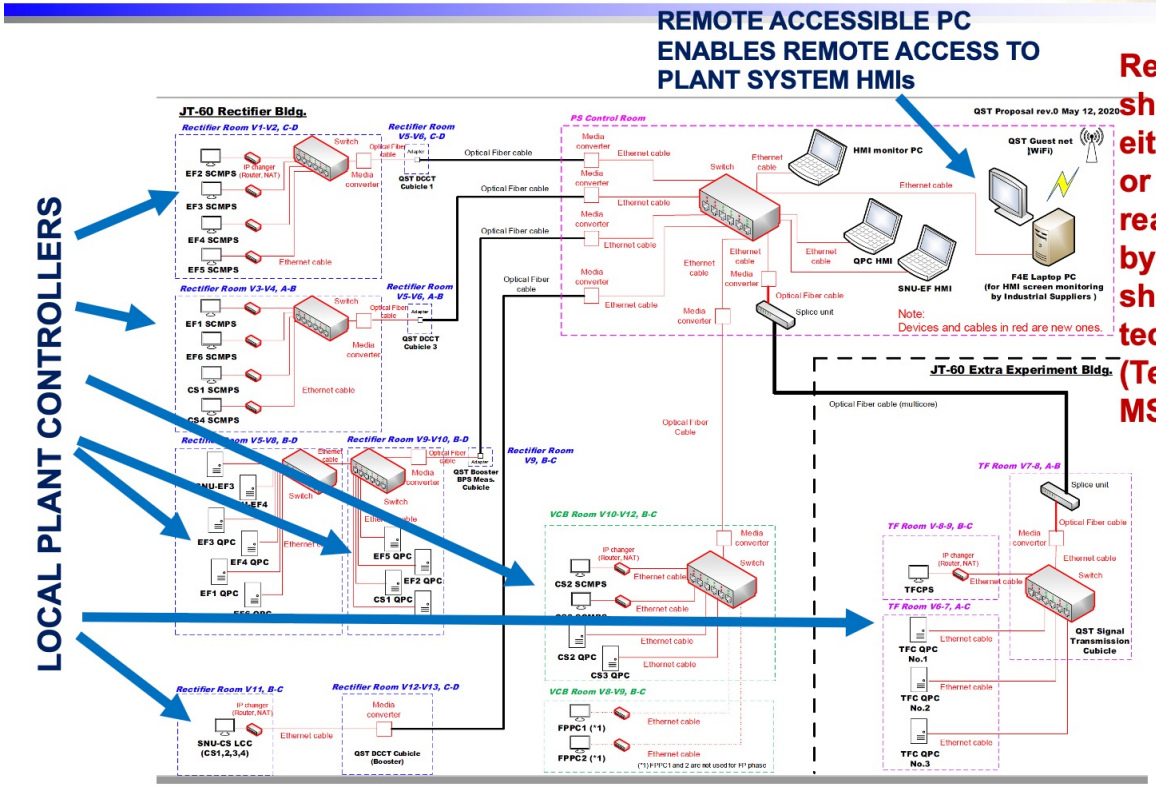
Discussion points – 2/3

- Better understand how plant systems & diagnostics are integrated in SCDAS? (it seems that ad-hoc solutions have been adopted)
- Define standard tools/procedures about how plant-systems diagnostic experts should access/operate their system from remote

Example: solution to access local HMI of the PS control system

Proposed solution for PS

JT-60SA Advanced Superconducting Tokamak
BA-Satellite Tokamak Program



Discussion points – 3/3

- In the framework of a HW/SW enhancement of the Naka Analysis Server, Hayashi-san asked for analysis software to be installed on the Naka Server (Matlab, IDL, ecc)
  - **Rather then asking software push to enhance the RDA capabilities**

Next actions

Remote access/participation → this task requires interaction with QST (throughout F4E) →

→ Organize a meeting with the beneficiaries that applied to the task to coordinate the next steps

BACKUP SLIDES

The JT60-SA remote access system (what we know)

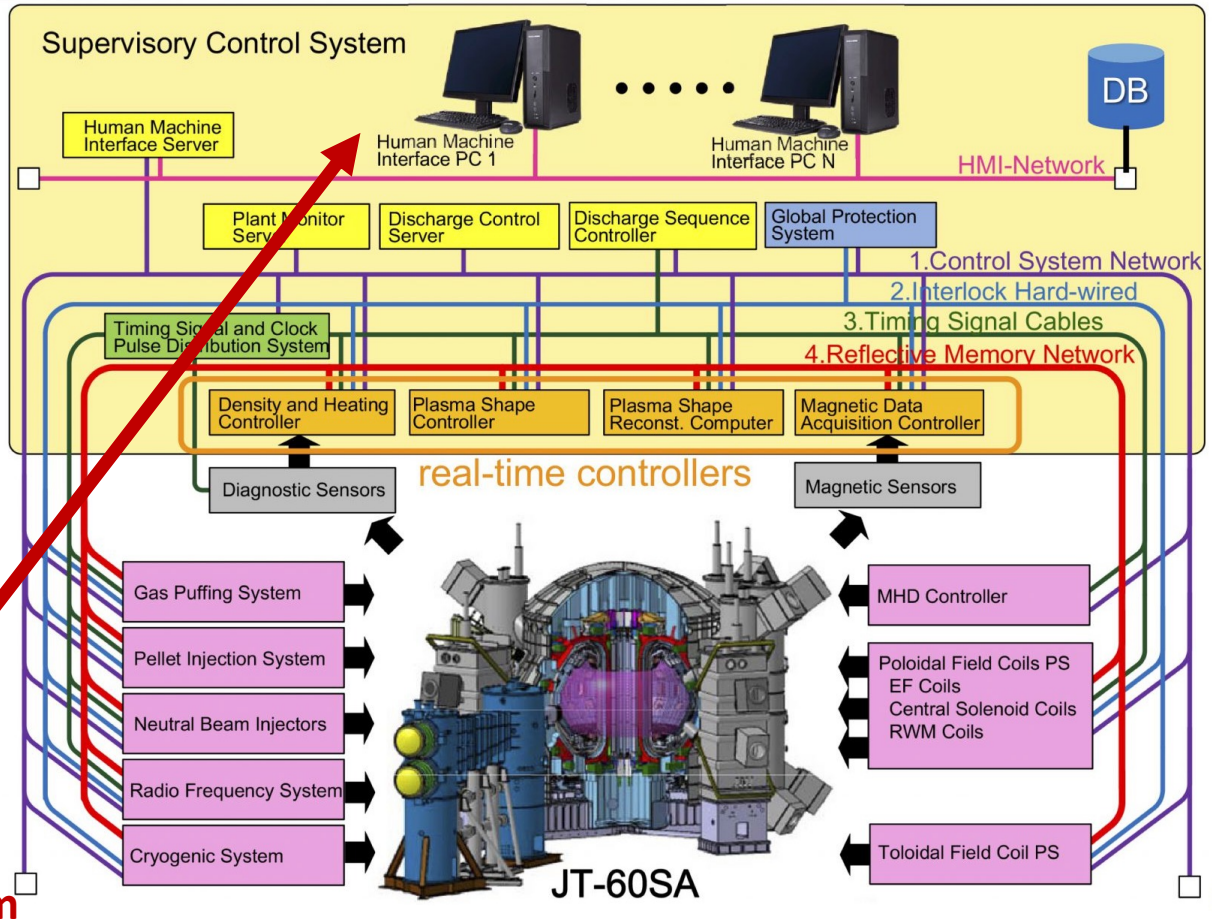
- Design & Implementation status presented during the TCM
  - Compared to other JT60-SA components/subsystems/diagnostics and also to what we are used to in projects like ITER, the “CODAS” never went throughout a proper design review process (and therefore remote access system)
- **SCDAS (supervisory control system and data acquisition system)** is the main component that coordinates/manages (according to **section 2.17 in the PID**)
  - real-time control and diagnostics systems,
  - plant monitoring systems,
  - machine protection
  - Data collection & storage
  - …and **“remote experimentation”**
- Another official source of information (summary slightly revised of the PID content) → https://www.jt60sa.org/wp/control-system/

JT60-SA remote access system – The HMI client

Figure taken from the website

Configuration of SCSDAS

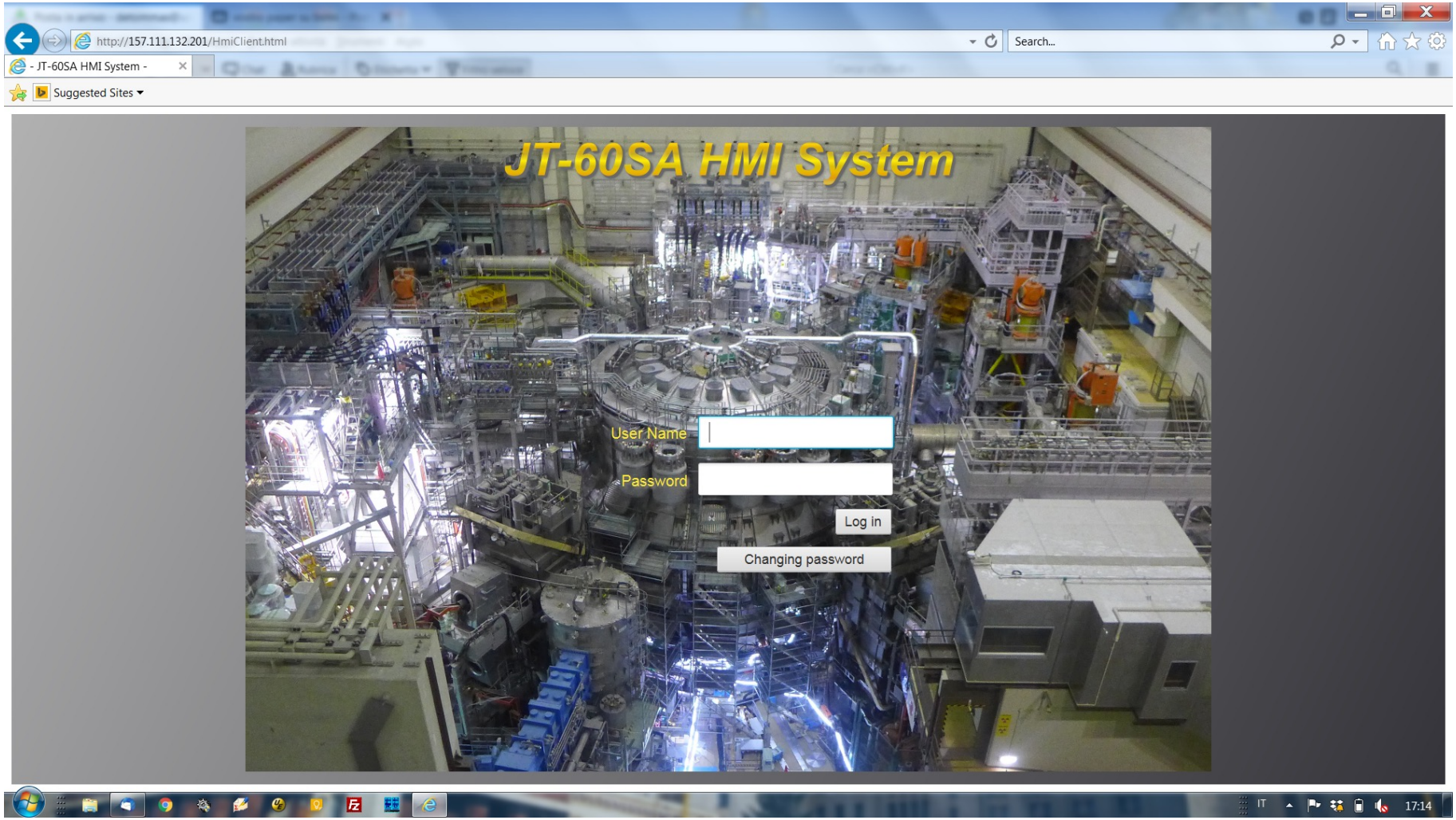
SCSDAS have several types data and signal communication lines, such as **HMI-Network (TCP/IP)**, **CS-Network (TCP/IP)**, **reflective memory data communication for real-time**, **timing signals**, and **interlock signals**.



The HMI client (accesible from remote once in the QST VPN) →

→ is the pulse editor

The HMI client



The HMI client – an old technology

JT-60SA HMI

- Setup your Windows machine to access HMI

- **Requirements**
  - **Windows 7 or 10**
  - **Java JRE 1.8.0_11 (or later versions)**
  - **Internet Explorer**
  - **Java setup files should be modified/created (follow the instructions)**

JT60-SA remote access system – The Analysis Server

The Naka server (nakasvr17)

accesible via ssh or NoMachine (once in the QST VPN)

Data visualizaton tools available (eGis, eSlice & eSurf)

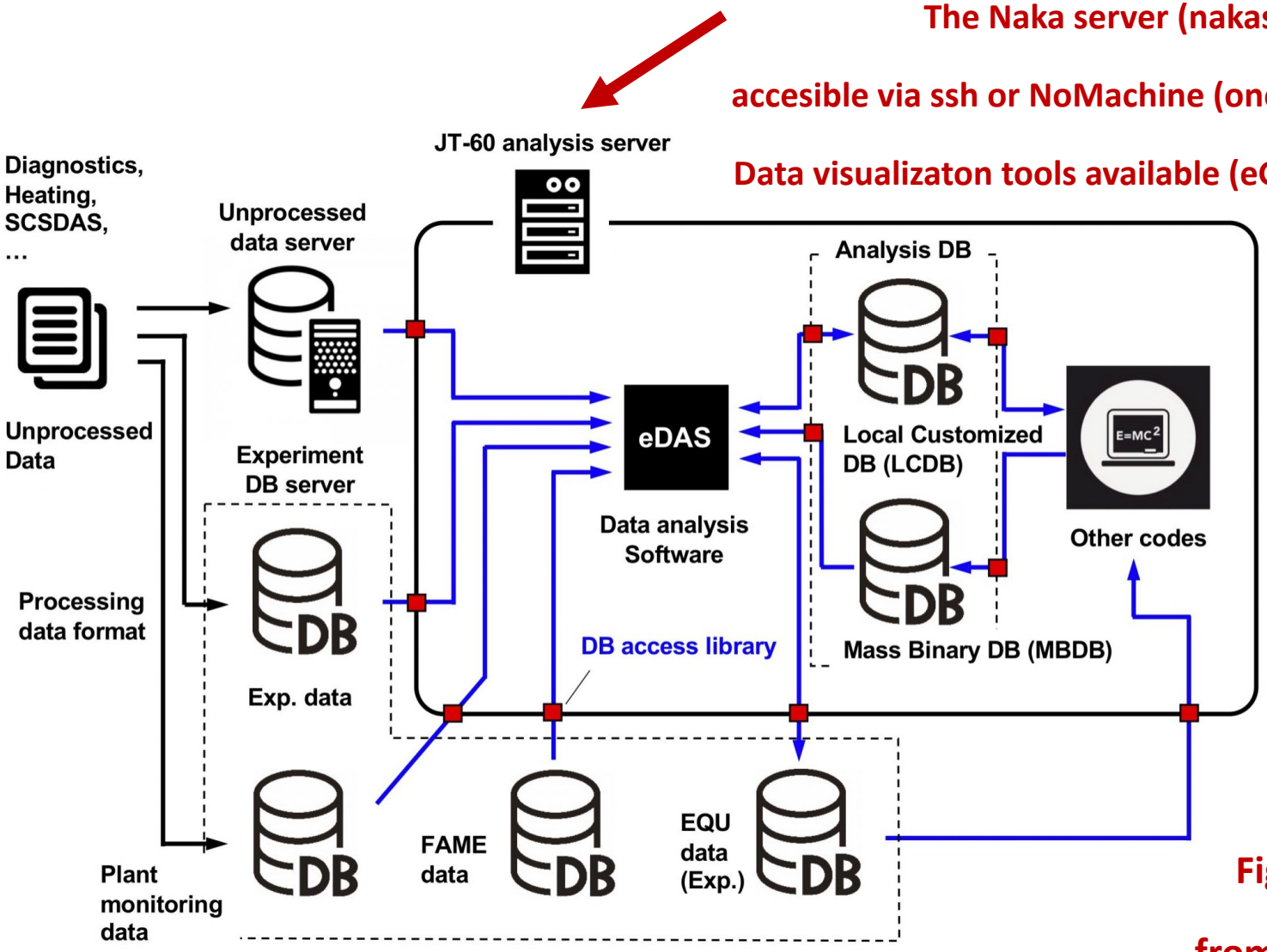
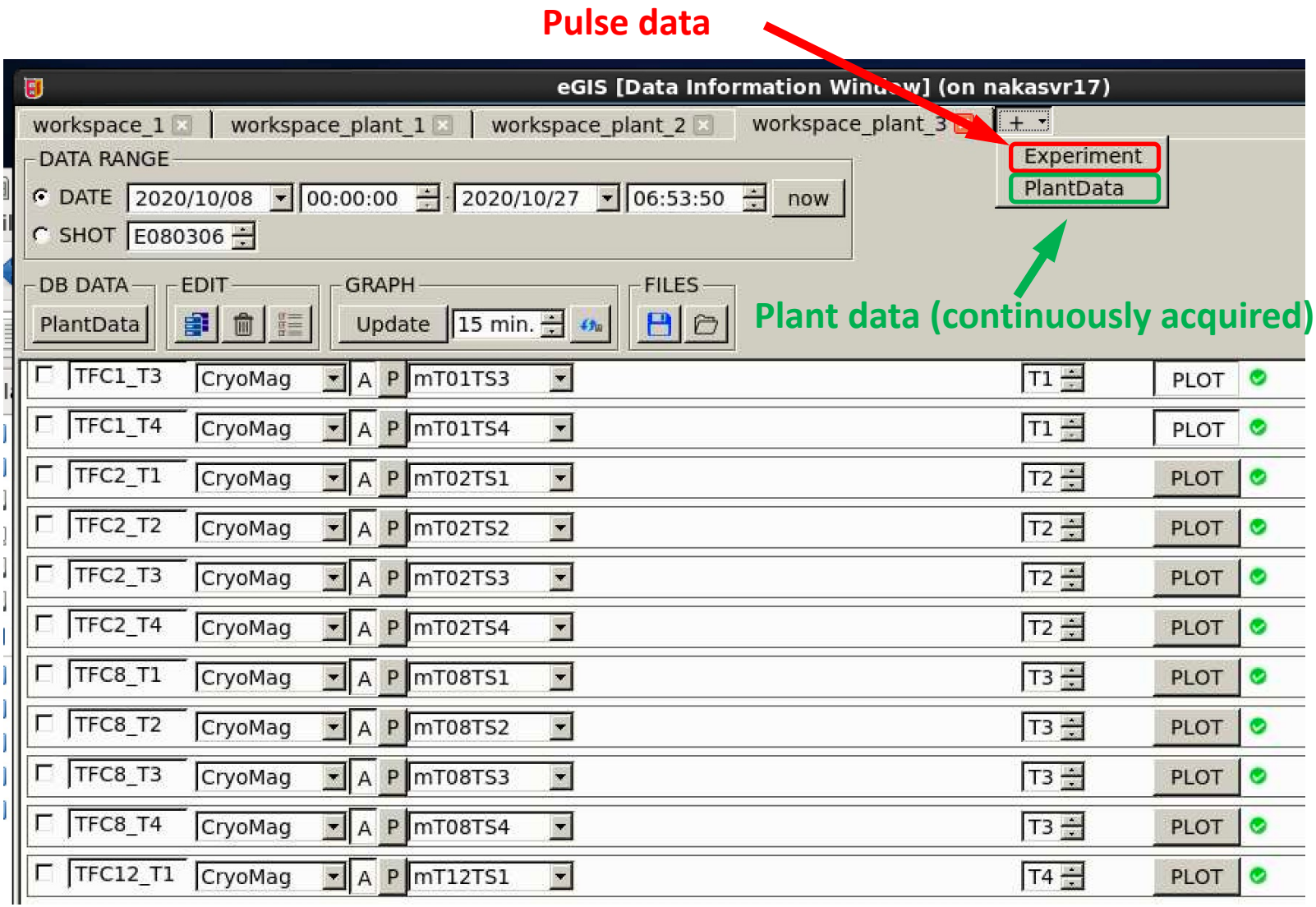


Figure taken

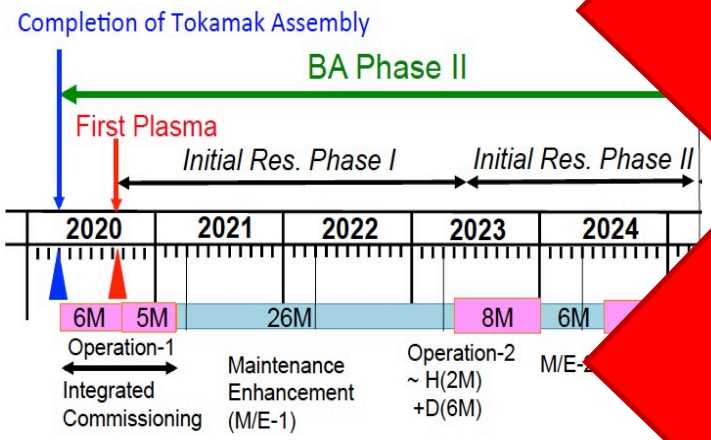
from the website

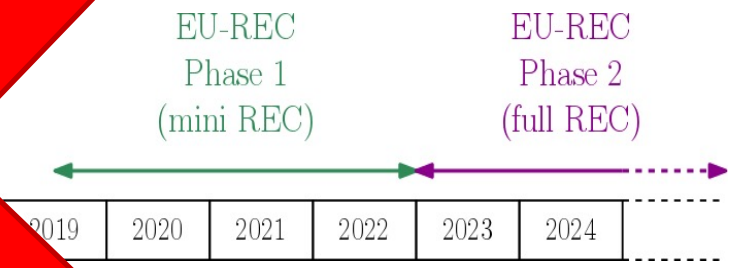
eGis


Pulse data
eGIS [Data Information Window] (on nakasvr17)
workspace_1
workspace_plant_1
workspace_plant_2
workspace_plant_3
Experiment
PlantData
DATA RANGE
DATE 2020/10/08 00:00:00 2020/10/27 06:53:50 now
SHOT E080306
DB DATA
PlantData
EDIT
GRAPH
Update 15 min.
FILES
Plant data (continuously acquired)
TFC1_T3 CryoMag A P mT01TS3 T1 PLOT
TFC1_T4 CryoMag A P mT01TS4 T1 PLOT
TFC2_T1 CryoMag A P mT02TS1 T2 PLOT
TFC2_T2 CryoMag A P mT02TS2 T2 PLOT
TFC2_T3 CryoMag A P mT02TS3 T2 PLOT
TFC2_T4 CryoMag A P mT02TS4 T2 PLOT
TFC8_T1 CryoMag A P mT08TS1 T3 PLOT
TFC8_T2 CryoMag A P mT08TS2 T3 PLOT
TFC8_T3 CryoMag A P mT08TS3 T3 PLOT
TFC8_T4 CryoMag A P mT08TS4 T3 PLOT
TFC12_T1 CryoMag A P mT12TS1 T4 PLOT

The EU-REC in the BA context – A staged approach

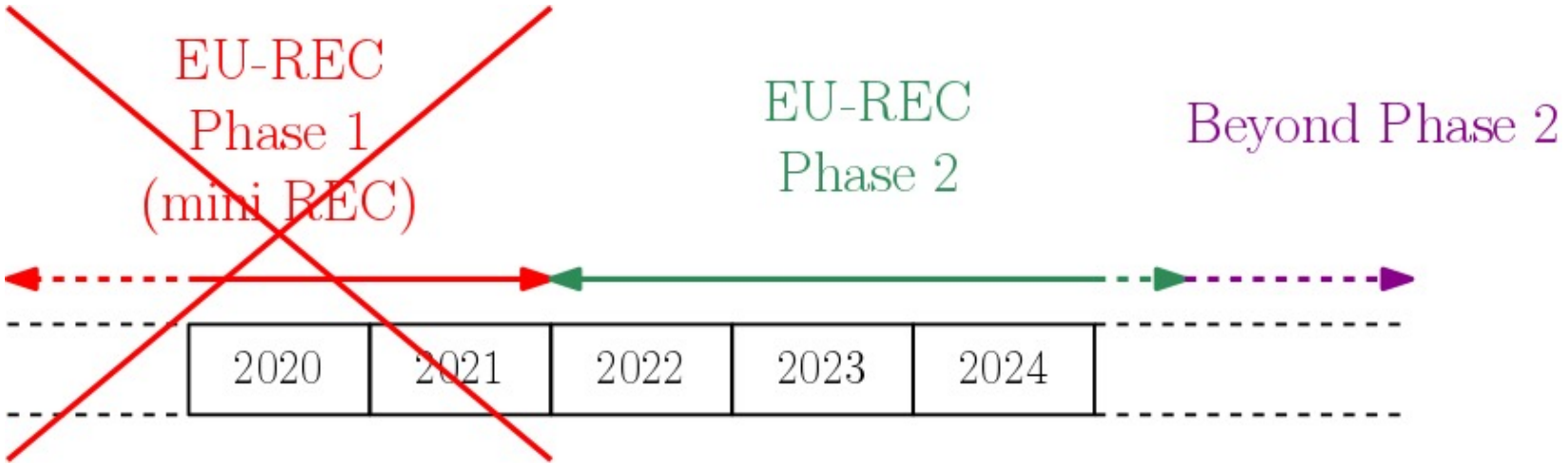
2018 – nario (V ssumption)





- ***Phas*** support of both systems and integrated commiss mote participation in first plasma operations → ***Naka Room*** in Ga
- ***Phase 2***: remote participation in JT-60SA operations

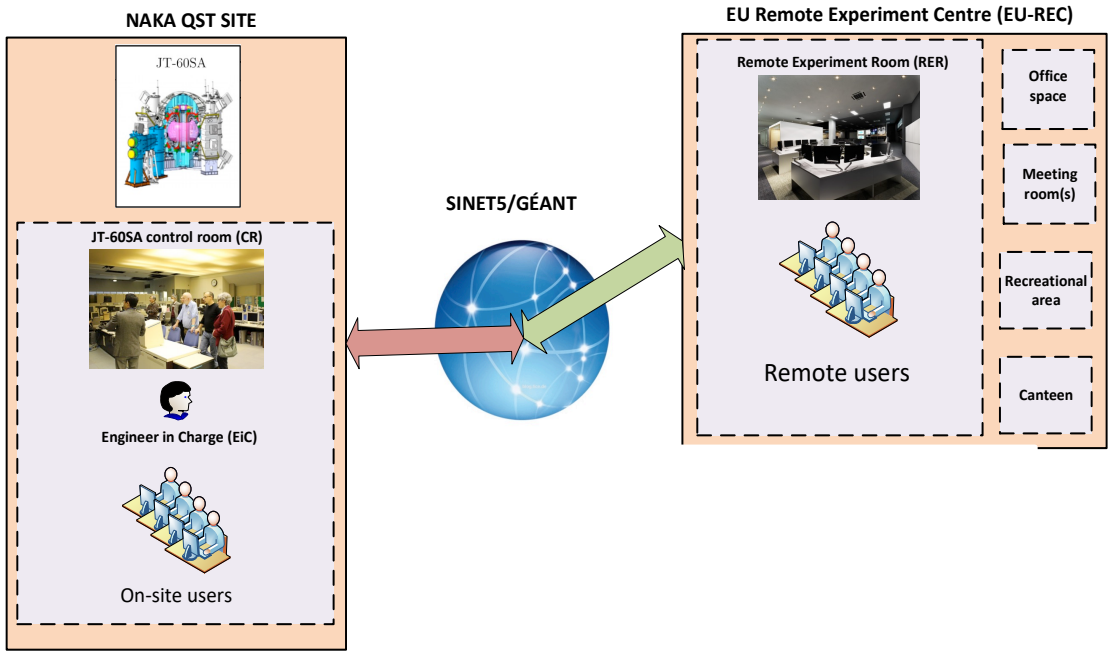
Current scenario



Phase 2 (and beyond)
Participation in the experiment campaign

High-level requirements

- participation in the experiments (including the inter-pulse data analysis)
- *offline* data analysis (including the use of modelling and simulation codes)
- preparation of experiment proposals
- preparation of scheduled experiments
- attendance at scientific meetings
- **commissioning of new systems**
- continuous training of the European experiment team.
- …



(single ?) Trusted access point in EU

Can facilitate the negotiation of special permissions with QST

Main assumptions

- About of **25 people** are expected to be at EU-REC **during Phase 2**, i.e. starting from 2023
  - estimation mainly based on the envisaged share of the EU participation in JT-60SA operation and on the fact that JT-60SA is similar in size to JET

- A peak of about **60 people** is envisaged **beyond Phase 2**
  - once in operation, and before ITER PFPO-1, JT-60SA will be the biggest fusion experiment contributed by EU
    → most of the EU scientists involved in JET experiment and MST program will participate to JT-60SA
    → it is likely that the EU participation in JT-60SA will at least double.

Remote access for plasma team members

Dedicated page on SA wiki

https://users.euro-fusion.org/iterphysicswiki/index.php/Naka_Remote_Access_Page

- **Contact person:** G. De Tommasi detommas@unina.it

For any enquiries please DO NOT contact QST…
…send me an email!

Remote Computer and Data Access

QST VPN — First connection and setup of the VPN client

- Setup remote access to QST VPN
- NOTE for OSX users: when installing the Pulse Secure client, you must allow the untrust installation app by enabling it in **System Preferences -> Security & Privacy -> General**
- link to Open Connect client (Linux alternative to Pulse Secure)

Naka Analysis Server — Setup the NoMachine connection to the nakafs17 server

- Setup NoMachine to access to the Naka server

JT-60SA HMI — Setup your Windows machine to acces to the HMI client

- Setup your Windows machine to access HMI
- .java.policy file - **This file should be copied in C:\Users\[user_name] and renamed as .java.policy (note the '.' at the beginning of the filename)**

eDAS — eDAS manual (available also on nakasvr17 webserver (just in case you need it locally…)

- eDAS User Manual (v. 1.0.0, 11 Sep 2020, the latest version is maintained on the Naka server at http://nakasvr17.naka.qst.go.jp/twiki/bin/view/Main/DataAnalysis)

Data dictionary — Useful data dictionary

- Cryo and Magnets Plant Monitoring Data
- Main plant monitoring data relevant for the Integrated Commissiomning (link to DMS)
- Experiment DB data dictionary as at 14 Jan 2021

Windows 7 Virtual Machine — How to setup a VirtualBox VM

- Short guide to install a Window 7 virtual machine to access the JT60-SA HMI

JT-60SA Advanced Superconducting Tokamak BA-Satellite Tokamak Program