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## The Information Technology tools for remote participation and remote experiment control of WEST

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## Introduction

- WEST is a full metallic environment tokamak, with an X-point divertor configuration. It is targeted at testing ITER like divertor prototypes made of actively cooled bulk tungsten units, in tokamak conditions during long pulse operation.
- The experimental program is conducted with the participation of the WEST partners from various institutions around the world. We have implemented several IT tools to share data and information with all users. They are used since the C1 campaign, two years ago. A brief description of these tools and the perspectives for further development are presented here.

## Web portal

That portal is the front door to give access to all kind of information managed with different web applications either provided by the [web portal application](#) (Liferay community edition!) or just [linked or embedded](#) for specific purpose.

### Web site

Apart from the directory, most of the information is freely updated by users in web contents. The web contents are organized by the webmaster in pages and pages in tab. The Operation tab give access to the [operation management software](#) and the Publications one to the [virtual pinboard](#) (see hereafter).



Welcome to the WEST users portal (WEST : Tungsten (W) Environment in Steady State Tokamak)

WEST is targeted at supporting ITER construction and operation. Its key missions are twofold:

- Paving the way towards the ITER actively cooled tungsten divertor procurement and operation
- Mastering integrated plasma scenarios over relevant plasma wall equilibrium time scale in a metallic environment

WEST is a user facility, open to ITER partners. This portal provides WEST users with a collaborative framework for the common scientific operation of WEST. You will find the following tools and information:

- For WEST experimental program, please consult the Task Forces wiki pages

C4 campaign getting closer

Mark as Read

WEST Users Portal  
The WEST C4 campaign plasma restart is planned in late May with experimental sessions until August 9. The campaign includes a Deuterium phase and a dedicated Helium phase. The main objectives are twofold:

- Increase power up to 10 MW towards H mode operation
- Explore plasma wall interactions between helium and tungsten components in a tokamak environment

You are very welcome to participate in this campaign, where WEST will be equipped with its 3rd ICRH antenna, a full set of ITER divertor prototypes and additional diagnostics.

To participate:

- 1) Add your name/email to the experiment wikispaces you are interested in on the WEST users portal
- 2) contact the Task Force leaders to agree on a timing for your visit/workplan

### Document management system

It is provided with the web portal with classical functionalities. All documents attached in the wiki and web pages are stored in it.

### Wiki

The flexibility of the wiki is used by Task force leaders to organize the pages. They give access to all documents and presentations given during all meetings. They define template for the experiment proposals which are then freely filled and added by physicists. When planned the experiment description page is linked to the corresponding session in the timeline.

### Operation Management Software Suite

The West Operation management Software Suite<sup>2</sup> allows managing the full cycle of the experimental campaign from the experiment scheduling phase until the physics summary filled online during the experimental session. Five modules are accessible from the "Operation" tab in the portal: *Timeline*, *Roster*, *Logbook*, *Physics summary* and *Systems status*.

Depending of their roles defined in the database and defined in the roster for each experimental session, partners may update their logbook and status of their system.

### Virtual Pinboard

In the "Publications" tab, one can access to a dedicated document management system in which every user may :

- see or propose any type of publication projects for journals or conference,
- start and follow the clearance process.

### Helpdesk

All users can open any kind of tickets in the helpdesk. It is based on an IT asset management freeware (GLPI<sup>3</sup>).

## Remote computer access and remote data access

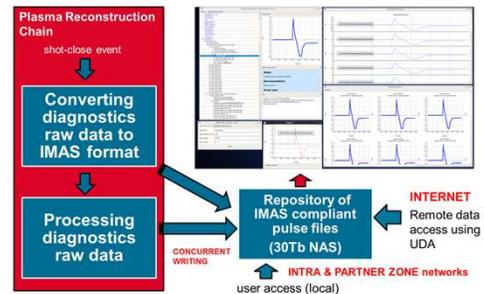
A set of Linux computers are available for all partners. Once connected, a user may develop its own tools, or use any tools available. Each tool is described in the dedicated tab of the portal:

- WEST data visualization with GUI
  - Computation (Matlab, C++, Python, Fortran)
  - Several analysis and modeling software
- Remote data access is also available using MDSplus.

## IMAS data model

WEST data are available in the IMAS<sup>4</sup> data model (documentation provided in the portal). Its main components are:

- the Data Dictionary which describes a fusion data model (available in the portal)
- The Access Layer for reading/writing data using different implementations in various languages: Matlab, C++, Python, Java, Fortran
- The Unified Data Access component which allows remote data access



## REC tools

For an efficient scientific remote operation, we provide some basic but essential tools:

- Video conference for live interaction between remote participants and the people locally controlling the operation,
- Streaming of a compilation of some general information screens,
- The Pulse schedule editor.

These remote and REC tools have been used during the remote operation of WEST from the ITER Remote Experiment Centre of Rokkasho-Mura in Japan<sup>5</sup>.

## Users management

Each user needs a unique account to access all these tools (either web based or Linux computers session). All web based applications (except the Pinboard, but it will be implemented soon) support Single Sign-on authentication. Users account are managed in the LDAP-AD of the partners area of our network. In the future, a great simplification for users will be introduced by using federated identity management.

## Conclusion

We have listed here most of the requested functionalities needed for remote participation in the WEST experiment. Some improvements are still needed to improve the user experience, mainly:

- Fastest network
- Real streaming of the various control room screens
- Federated identity management

## References

- [1] www.liferay.com
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- [4] ITER integrated modelling & analysis suite, F. Imbeaux et al 2015 Nucl. Fusion 55 123006
- [5] Oral presentation by S. Tokunaga during this conference