WPSA Operations Area - Summary

WPSA General Meeting, 4-6 May 2022

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WPSA Operations Area Goals

SA.OP will support the execution of the experimental campaigns providing expertize in plasma operations, vacuum conditioning, plant commissioning and operation such as the diagnostics, of the heating and of the fuelling systems.

Primary goals in 2022:

1 - Ensure successful execution of the first **integrated commissioning** activities in 2022-23. Capture and share the commissioning and operations experience.

2 - Start the preparation of the **commissioning of EU enhancement projects** reviewing their needs, and connection to protection systems.

3 - Start building a team of EUROfusion experts to **support the operational activities of future campaigns**.

Thursday, 5th May 2022 session 1 – 9.45 CET

Diagnostic available in IC 2022-23

Thursday, 5th May 2022 session 2

Previous commissioning experiences, expected working conditions and policies, documentation

Friday, 6th May 2022 session 1 – 9 CET

IC preparation, control room support and remote participation tools

Friday, 6th May 2022 session 2 – 10.40 CET

IC related physics studies

1st 2022 EU IC team meeting – 23/3/2022

Integrated commissioning activities in 2022

Timeline:

- Wait for the Global Paschen test results and **updated IC timeline**.
- **Visit plans** to be reviewed following the Global Paschen test and pump down. (see current travel procedure in the 1st EU IC team meeting).
- 3 deliverables are funded under FP8 and need to be completed in 2022 or need allocation of new FP9 resources to do in 2023.

Continue to support integrated commissioning in 2022:

- 2nd EU IC team meetings planned in June 2022
- Regular JP-EU **Plasma Team Meetings** (PTM) to restart around pump down, restart IC topic meetings as well
- Resume IC topical meetings with QST

Magnetics:

- Review the magnetic calibrations with attention differentiating various offset types (static calibration, integrators, hardware, TF on PF, power supply config, weather, …)
- Check with QST if/what type of standard pulses are planned (magnetic, plasma)

FP9 WPSA Operations (E. Belonohy)
Plasma Operations (incl. vacuum conditioning and breakdown)
Equilibrium control
Magnetics and the disruptions database
Cryo and Magnets
EDICAM operation
Camera tomography implementation

FP9 WPSA Code Management (G. Falchetto)
ECWC simulations
EDICAM software tools
Camera tomography software tool
Breakdown simulations
Disruption modelling

FP9 WPSA Enhancements (J. Ayllon)
Remote access architecture (incl. data and computer access in IC)

Integrated commissioning activities in 2022

Strong connection to the WPSA Code Management and Experiment Team:

-> Arrange a joint dedicated meeting in the near future:

- Disruption database
- Runaway generation and recovery during first plasma operation
  (involved WPSA-OP teams: plasma operations, breakdown, equilibrium control, real-time control)

Remote participation:

- The use of Internet Explorer in the IC (discontinued in June 2022)
- Follow up RSA key access for the additional 2022 experts
- Further JT-60SA seminars on how to connect to the Naka server and QST tools
- PC availability for EU visitors (as VPN does not allow use of standard services)
- Outstanding IC computer and data access needs:
  - EDICAM raw data access for camera tomography
  - GDC outside the pulse data
  - Upload of the camera tomography data to the Naka-server as official processed data
- Extend use of WebAPI to IC team and prepare python wrapper

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Preparation of future commissioning and campaigns

Enhancement projects

- Continue discussion with the enhancement projects to understand the commissioning plans, needs, interfaces with protection system.
- Start preparation of EU documentation in collaboration with F4E (improve commissioning procedure template, boundary conditions/knowledge map)
- Understand the QST processes and documentation needs

- Expect to move the MGI Naka-inspection deliverable to 2023

Neutral Beam Injection:

- Include QST team in the monthly NBI operations seminars organised by the EUROfusion Operations Network starting in May 2022

Real-time networks:

- Agree structure of the real-time network review on European devices (hardware, methods, networks?) and connect with the Experiment Team.

FP9 WPSA Operations (E. Belonohy)
Fast Ion Loss Detector (FILD)
Thomson Scattering (TS)
VUV Spectrometer (VUV)
Pellet injection
Massive Gas Injection (MGI)
Divertor Cryopump System
Neutral Beam Injection (NBI) (QST enhancement)

FP8 and FP9 WPSA Enhancements (J. Ayllon)

F4E Enhancements (G. Phillips)

FP9 WPSA Operations (E. Belonohy)
Real-time networks

Back-up slides

Capture and share the operations experience

Publications

- Encourage publications in collaboration with QST and F4E on the commissioning and operational experience, strategy and lessons learned
- PPCF Special Issue on Operations (QST special editor: Y. Kamada) (dedicated operations papers, published once accepted)

EUROfusion Operations Network

Starting 2022 EON organizes events, training and seminars on dedicated operational topics open to all EUROfusion experts:

- facilitate stronger connection between the operational groups of EUROfusion facilities to share operational experience, improve operational reliability and performance,
- support development and training of operators, creation of a joint knowledge base
- contribute to the EUROfusion preparation for the (integrated) commissioning and operation of ITER.

→ Need information from other operational teams? Can organize a workshop to share commissioning or operational experience.

EUROfusion Operations Network members

WPSA Operations Area – 2022 deliverables

FP9 Management tasks	Deliverable owner	Beneficiaries
Coordination of the integrated commissioning activities in 2022 in relation to plasma operations (including wall conditioning and breakdown), EDICAM operation and camera tomography, equilibrium control and magnetics, cryogenic systems and superconducting coils).	E. Belonohy	UKAEA
FP9 2022 integrated commissioning activity tasks		
Ensure that the EDICAM camera is ready for wall conditioning and first plasma operation of JT-60SA. Operate and optimise the camera during the integrated commissioning phase.	T. Szepesi	EK-CER
Interface with the EDICAM system and provide timely camera tomography analysis to support ECWC modelling, breakdown studies during the integrated commissioning phase.	J. Cavalier	IPP.CR
Participate in the integrated commissioning of JT-60SA and support the QST team related to plasma operations	M. Iafrati	ENEA
Participate in the integrated commissioning of JT-60SA and support the QST team related to plasma operations	P. Moreau	CEA
Participate in the integrated commissioning of JT-60SA and support the QST team related to plasma operations	E. Belonohy	UKAEA
Support the achievement and optimisation of the plasma breakdown for the first plasma operation of JT-60SA.	D. Ricci	ENEA, MPG
Validate control-oriented plasma linear models against experiment data. This validation will include the implementation of the control algorithms adopted during the Integrated Commissioning within the CREATE tools.	G. de Tommasi	ENEA
Participation of ENEA experts to MECS training provided by QST and/or EU experts.	G. de Tommasi	ENEA
FP8 2022 integrated commissioning tasks		
CREATE personnel to support QST onsite in the commissioning of the plasma equilibrium control system.	G. de Tommasi	ENEA
Support the commissioning of the magnetic diagnostics and perform MHD analysis during the integrated commissioning.	L. Pigatto	ENEA
Support the commissioning activities related to the JT-60SA cryogenic and magnet systems.	F. Michel	CEA

WPSA Operations Area – 2022 deliverables

FP9 Management tasks	Deliverable Woner	Beneficiary
Coordination of the activities related to machine and plasma operations. Coordination and training of control room experts Coordination of Remote Access and Participation Coordination of the activities related to the commissioning of the EU-led Enhancements	E. Belonohy	UKAEA
FP9 Preparation of future campaigns tasks		
Review and summarise currently available scientific real-time networks used on EUROfusion facilities as input for consideration by the JT-60SA Experimental Team.	S. Hall	UKAEA
Review and summarise currently available scientific real-time networks used on EUROfusion facilities as input for consideration by the JT-60SA Experimental Team.	O. Ficker	IPP.CR
FP9 Preparation of commissioning of EU enhancement tasks		
Inspection of the Massive Gas Injection system with an onsite visit upon delivery of the system to the Naka site.	M. Dibon	MPG
Preparation activities related to the commissioning and operation of the JT-60SA divertor cryopump system including consideration of experience from European devices.	C. Day	KIT
FP8 Preparation of commissioning of EU enhancement tasks		
Preparation and commissioning of the VUV diagnostic in ENEA prior to delivery to Japan	S. Scully	UKAEA