EUROfusion

"THEORY, SIMULATION, VERIFICATION AND VALIDATION"

TSVV TASK 7: PLASMA-WALL INTERACTION IN DEMO

KICK-OFF MEETING | WELCOME, INTRODUCTION, SUMMARY OF TSVV-ACH KOM

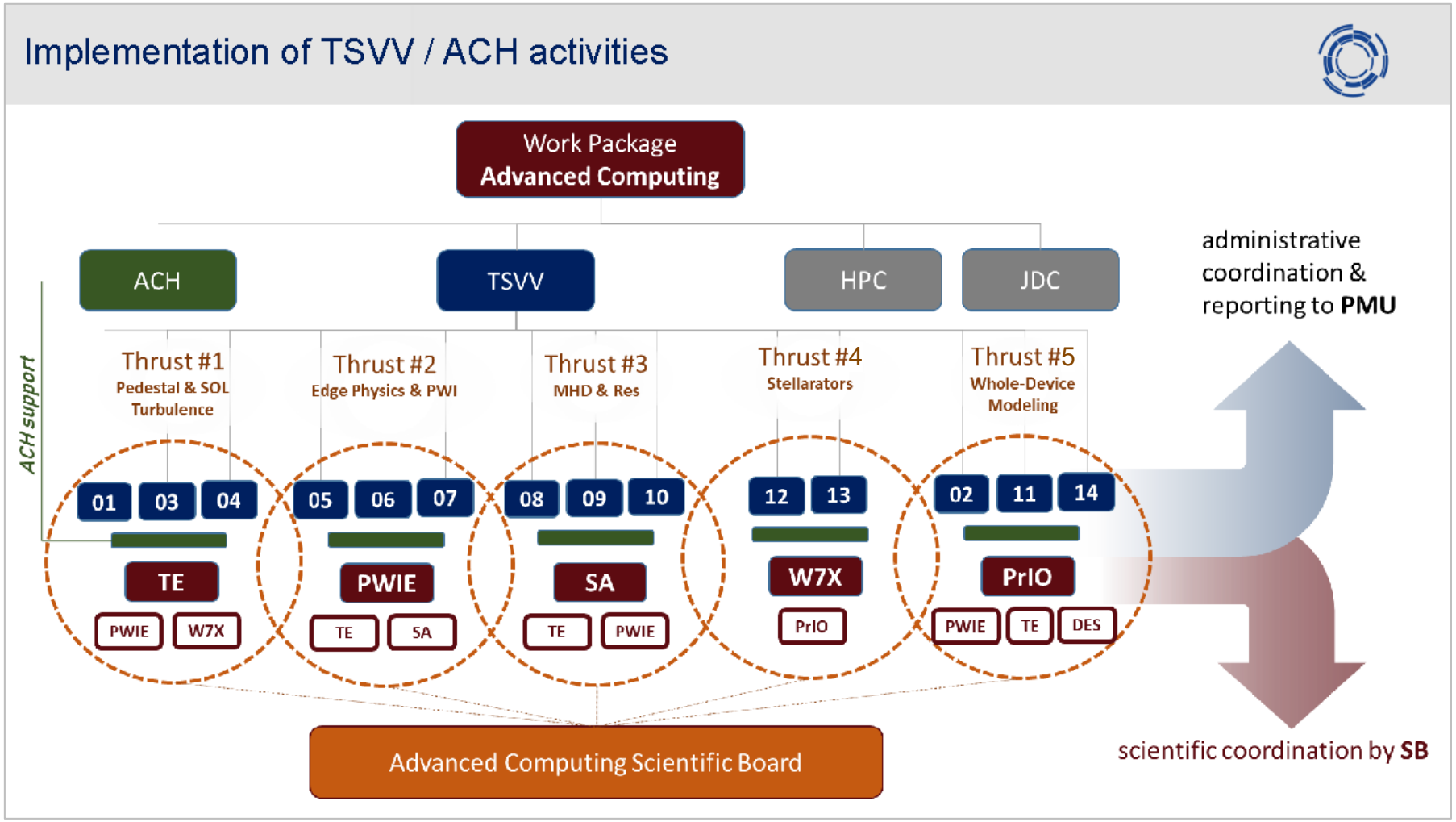
D. MATVEEV | 11.05.2021

JSI UNIVERSITY OF HELSINKI KTH VETENSKAP OCH KONST cea Université Sorbonne Paris Nord IPP CAS CR IPP JÜLICH Forschungszentrum

TSVV-07 KICK-OFF MEETING TIMELINE

Dmitry Matveev (10 min):	Welcome, introduction, summary of TSVV-ACH KoM
Sven Wiesen (10 min):	Overview and status of SOLPS DEMO activities within the DEMO Central Team
David Tskhakaya (15 min):	BIT-1 activities
Michael Komm (15 min):	SPICE activities
Juri Romazanov (15 min):	ERO2.0 activities and status of full-W ITER simulations
Svetlana Ratynskaia (15 min):	MIGRAINe activities
	Coffee break (10 min)
Svetlana Ratynskaia (15 min):	MEMOS-U activities
Fredric Granberg (10 min):	MD simulations for D supersaturated W, interatomic potential development
Klaus Schmid (10 min):	Retention and permeation: thermal effects
Jonathan Mougenot (15 min):	Retention and permeation: mechanical and He effects; cross-code validation
Udo von Toussaint (15 min):	SDTrimSP activities, introduction of RAVETIME and UQ framework
	Discussion and summary (15 min)

Organizational placement of TSVVs



Organizational placement of TSVVs

Thrust definition

A Thrust serves as a communication platform among a group of related TSVVs and WPs, on behalf of the entire E-TASC SB. It consists of a set of TSVV leaders, E-TASC SB members, and relevant PLs/TFLs and is coordinated by a facilitator chosen among the latter. The facilitator provides feedback on the Thrust activities and proposes corrective actions for the TSVV work programmes to the E-TASC SB if and when needed

Thrust #2: Edge Physics & PWI

(Strong) Interaction between the different TSVVs and associated codes

Links linear plasmas & laboratory experiments with tokamaks & stellarators to benchmark where approrpriate (e.g. detachment)

Facilitator:

S. Brezinsek [WPPWIE]

Involving:

D. Borodin [TSVV5]

G. Ciraolo [TSVV6]

D. Matveev [TSVV7]

A. Alonso [WPW7X]

C. Sozzi [WPSA]

M. Wischmeier [WPTE]

B. Braams [AC SB]

D. Tskhakaya [AC SB]

SOME PRACTICAL ISSUES

Annual meeting cycle (additional meetings can be scheduled as needed)

Mar	Thrust meeting
June	E-TASC SB meeting with TSVV/ACH PIs
Sept	Thrust meeting
Dec	E-TASC SB meeting with TSVV/ACH PIs (AWP, incl. review of annual reports)

Annual reporting cycle

TSVV/ACH PIs submit brief reports and updated work plans to the E-TASC SB prior to the Dec meeting

Publications

All publications and presentations to international conferences must follow the EUROfusion publication rules: https://users.euro-fusion.org/webapps/pinboard/EFDA-JET

Publications are endorsed by the TSVV/ACH PI and one of the Thrust's PLs/TFLs

MISSIONS

Limited mission funds are available for TSVV / ACH team members for travelling within their projects or for TSVV staff visiting ACH (Missions of TSVV / ACH team members related to WP activities must be funded through the relevant WP)

IMS mission application is required – **approval by the PMU**

Mission rules in FP9 have changed:

- no unit costs, all missions will be done on **actual costs**
- **tickets are eligible**
- support level: **70%** (indirect costs are eligible)

FROM RESEARCH CODES TO EUROFUSION STANDARD SOFTWARE

An up-to-date release version of the source code used for production runs must be freely available within EUROfusion via a suitable license

Good software engineering practices (version control, regression/unit tests, shared development rules etc.)

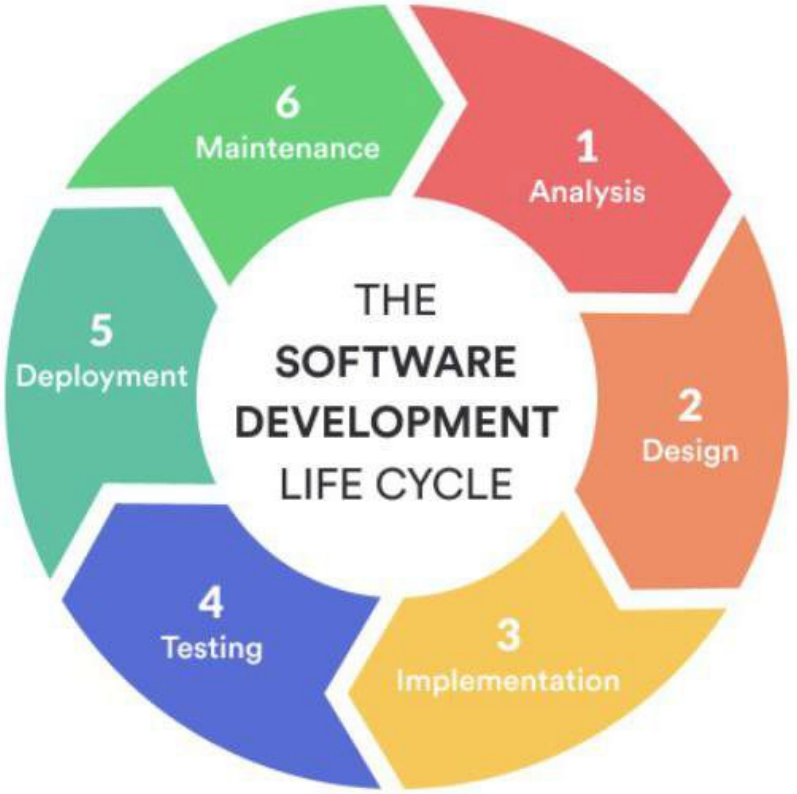
Code documentation (user manuals, reference publications)

Good support for users and co-developers

Specific plans for code verification and validation including aspects of uncertainty quantification

Specific plans to provide interfaces to IMAS (if applicable)

Specific plans for code dissemination



TSVV-07 Plasma-Wall Interaction in DEMO

Aims of the project

Establish an integrated modelling suite capable to treat complex 3D wall geometry to predict steady-state PWI in DEMO

Provide safety-relevant information for DEMO reference scenarios concerning first-wall erosion, dust, and fuel inventory

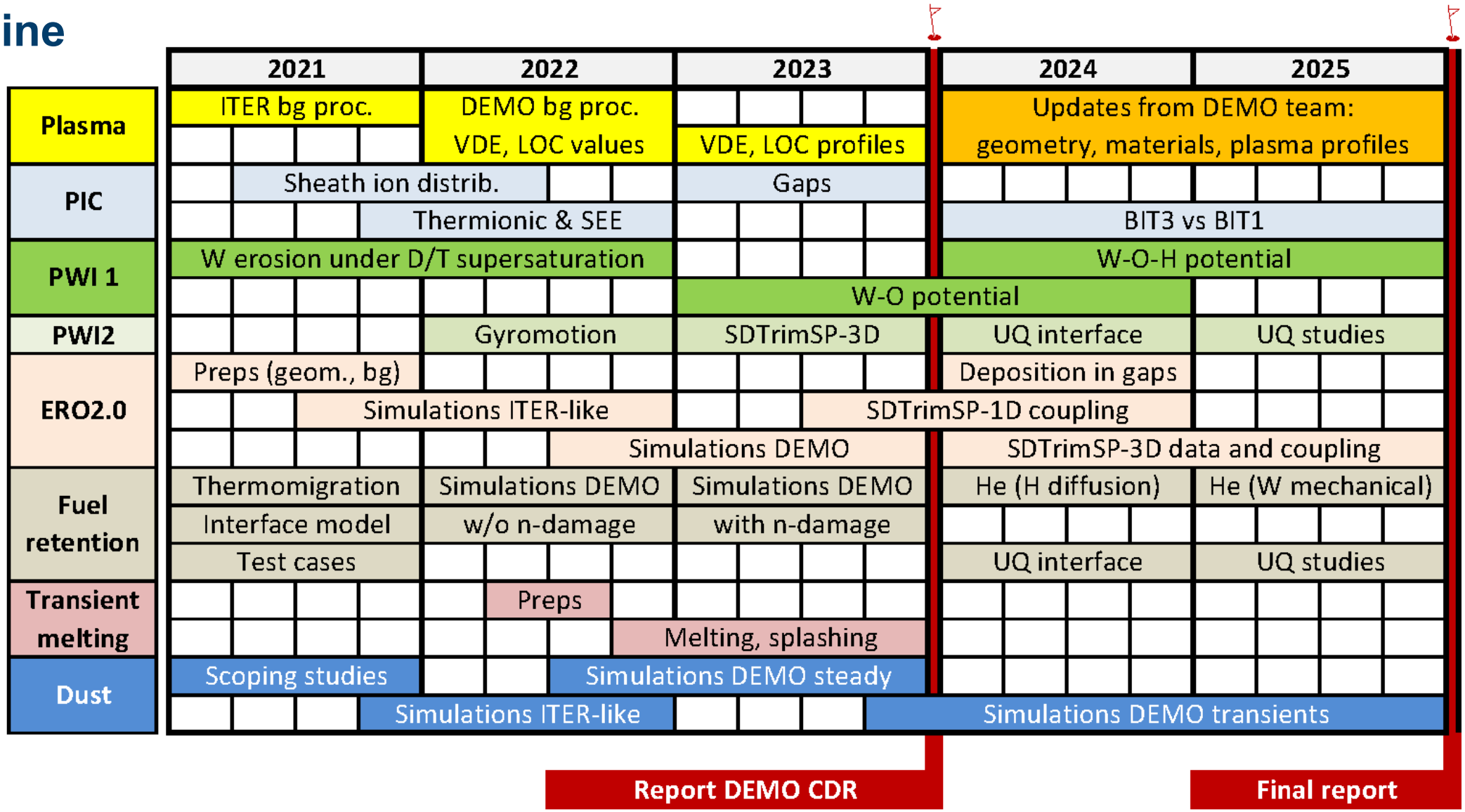
Develop and apply modelling capabilities to treat PWI in DEMO-relevant transients regarding their impact on PFC integrity

TSVV-07 Plasma-Wall Interaction in DEMO

Objectives

- Assessment of steady-state W erosion rates for first wall and divertor
- Mapping of preferential W re/co-deposition locations
- Assessment of dust mobilization from likely dust production sites
  (dust survival rates and dust accumulation maps)
- Assessment of PFC response to transients: melting and splashing
  (melt-stability, likelihood of splashing, droplet-to-dust conversion rates)
- Assessment of W erosion rates for locations affected by transients
- Assessment of tritium in-vessel inventory
  (co-deposition, bulk retention with He-induced and neutron damage)

Task timeline



Marconi 5th Fusion cycle

TSVV-07 was allocated:

307 200 standard hours

1 std hour = 5 CPU-h, A3 has 48 CPU/node ⇒

Only 32 000 node-h (~6% of requested)

(30% already consumed)

Too little for BIT1 (460 800 node-h requested)

? SPICE1D/2D/3D (17 000 node-h requested)

? ERO2.0 (32 000 node-h requested)

? MEMOS-U (7000 node-h requested)

Project: EUROfusion A3 Phase 5

AccountID: TSVV7

Science Domain: Nuclear Fusion

Validity: Monday, 1 March, 2021 to Monday, 28 February, 2022

Status:

Active

ExpirationDelay:

6

Details

Hosts: MARCON3

Budget (standard hours): 307 200

WORK Quote (in GB): 1 024

Online resources

- Wiki-pages for Advanced Computing (WPAC) – working space for projects

  https://wiki.euro-fusion.org/wiki/WPAC_wikipages:_Advance_Computing_Work_Package

  https://wiki.euro-fusion.org/wiki/TSVV-07

- INDICO – meeting organization and presentation storage

  https://indico.euro-fusion.org/category/209/

- IMAS sources of information
  - Integrated modelling homepage (ITER account required)

    https://confluence.iter.org/display/IMP

  - Tutorials from the Polish group

    https://confluence.man.poznan.pl/community/display/WFMS/ITER