



Summary and plans for the WIMAS area

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WIMAS: Adaptation of Workflow in IMAS



Task	Description	Coordinator	PPY
WIMAS-0	Coordination of IMAS related developments 2019	David Coster	
WIMAS-1	Equilibrium reconstruction and stability chain deployment in IMAS	Rui Coelho	1.4 (1.4)
WIMAS-2	ETS core transport simulator with improved physics capabilities in IMAS	Thomas Jonsson	4.1 (2.5)
WIMAS-3	Turbulence with synthetic diagnostics workflows in IMAS	Anders Nielsen	0.8 (0.7)
WIMAS-4	Heating and current drive modules in IMAS	Thomas Jonsson	1.2 (1.85)
WIMAS-5	Pedestal/SOL and core-edge integration in IMAS	David Coster	0 (1.2)
WIMAS-6	AMNS data and interfaces in IMAS	David Coster	1.1 (0.8)
WIMAS-7	Plugins and support for visualization tools in IMAS	Leon Kos	0.4 (0.4)
WIMAS-8	Synthetic diagnostics in IMAS	Erik Andersson Sunden	0.7 (0.85)

List of WIMAS Tasks



- **Task WIMAS-0:** Coordination of the porting in IMAS of existing workflows
- **Task WIMAS-1:** Equilibrium reconstruction and stability workflow deployment in IMAS
- **Task WIMAS-2:** ETS core transport simulator with improved physics capabilities in IMAS
- **Task WIMAS-3:** Turbulence with synthetic diagnostics workflows in IMAS
- **Task WIMAS-4:** Heating and current modules in IMAS
- ~~**Task WIMAS-5:** Pedestal/SOL code development and core-edge workflow in IMAS~~
- **Task WIMAS-6:** AMNS data and interfaces on IMAS (atomic / molecular/ nuclear data)
- **Task WIMAS-7:** Visualization tools on IMAS (plugins)
- **Task WIMAS-8:** Synthetic diagnostics on IMAS

Some things to discuss



Workflows

- MHD reconstruction
- MHD stability
- ETS
- Turbulence

Other

- Synthetic diagnostics
 1. Need to identify which synthetic diagnostics are needed and can/should be implemented
- AMNS
 1. Need to identify AMNS needs

Challenges

- In parallel: support existing CPO versions (manpower divided)
- Need to consider-how much effort on ETS-5 vs ETS-6
- **Strategic decision: Kepler vs Python**

Some issues that were raised, I



- It would be good if we could use Eindhoven to
 - either resolve any release issues (WIMAS-1)
 - identify any release issues that will need to be resolved (WIMAS-3)
- Need to manage the development needs for ETS-5 and balance against the ETS-6 development
 - Could identify and solve problems in ETS-5 that can then be ported to ETS-6
 - Without additional staffing, will have to accept that we might not be able to do everything this year
- For ETS-6, can we interpret edge to be the pedestal? Would we want to do this?
- High priority to update neutron_diagnostic IDS

Some issues that were raised, II



- At least three sorts of documentation are needed
 - for users (could be github, doxygen, or something else)
 - what is the physics implemented
 - what options are available
 - how do I interpret the results
 - for developers (doxygen can help provide this)
 - what is the structure of the code
 - what can be changed
 - public (github)
 - high level summary of the options
- Then also need tutorials

Some issues that were raised, III



- Perhaps we could use “user stories” methodology (<http://www.agilemodeling.com/artifacts/userStory.htm>) to capture user enhancement requests
 - and then to identify the
 - necessary resources
 - priority



follows ...

Timeline for 2020 – WIMAS-1



	Jan	Feb	Mar	Apr	May	Jun
R.Coelho	rhomass		ILSA rhomass	WS - workflow	ITER WS	
G.Vlad/V.Fusco			MARSGW rhomass			
E.Giovanozzi	CLISTE plan	CLISTE IDS	CLISTE IDS adherence	WS – CLISTE	CLISTE on AUG	SOL currents (DD+ EWE1)
A.Merle/O.Sauter			KINX rhomass			
L.Appel/G.Szepesi			EFIT++ at GW	EFIT++ test	<i>ITER WS</i>	EFIT++ actor
W.Zwingmann	EQUAL 3.25.0		Kinetic recons.	WS – kinetic + q(0) constr.	ITER WS	
B.Faugeras	EQUAL 3.25.0		Kinetic recons.	WS – kinetic + passive (<i>EWE1</i>)	ITER WS	
E.Suchkov et al			SDSS 3.25.0	Test on targets	Offline GUI	

Timeline for 2020 – WIMAS-1



	Jul	Aug	Sep	Oct	Nov	Dec
R.Coelho	-	-	Workflow maintenance + MHD case testing			
G.Vlad/V.Fusco	-	-	MHD case testing			
E.Giovannozzi	-	-			CLISTE w/o prep. in IDS	
A.Merle/O.Sauter	-	-	MHD case testing			
L.Appel/G.Szepesi	-	-		EFIT++ w/ circuits		Revised actors
W.Zwingmann	-	-		Pf_circuit		Revised actors
B.Faugeras	-	-		Pf_circuit		Revised actors
E.Suchkov et al			Actor+GUI			



Timeline for 2020 *deliverable*: Core-edge

	Jan-Apr.	May-July	Aug-Sept	Oct-Dec
Coster				
Emiliano				
Rui				

Timeline for 2020 *deliverable*: Moving boundary

	Jan-Apr.	May-July	Aug-Sept	Oct-Dec
Jorge	Moving boundary	Moving boundary Core-edge	Moving boundary Verification	Training
Daniel	30-40% WIMAS-2 <ul style="list-style-type: none"> • Database actors • Workflow development • Verification • Moving boundary 	50% WIMAS-2 <ul style="list-style-type: none"> • Moving boundary • Workflow development • Verification 	60-70% WIMAS-2 <ul style="list-style-type: none"> • Moving boundary • Workflow development • Verification 	60-70% WIMAS-2 <ul style="list-style-type: none"> • Training • Verification



	Jan-Apr.	May-July	Aug-Sept	Oct-Dec
Nathan	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Receive data from ITER. • Document data provenance. • Ensure data is complete. • Translate data into CPOs. • Design param-files. <p><i>cpo2ids:</i></p> <ul style="list-style-type: none"> • Development/support <p><i>Visualisation:</i></p> <ul style="list-style-type: none"> • Learn to add plots in viz/ETS 	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Verification of sub-WFs <p><i>Visualisation:</i></p> <ul style="list-style-type: none"> • Support for viz/ETS 	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Verification of sub-WFs • Scenarios verification <p><i>Visualisation:</i></p> <ul style="list-style-type: none"> • Support for viz/ETS • • 	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Scenarios verification • Write report. <p><i>Visualisation:</i></p> <ul style="list-style-type: none"> • Support for viz/ETS •
Michal	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Design param-files. 	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Verification of sub-WFs 	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Verification of sub-WFs • Scenarios verification 	<p><i>Verification</i></p> <ul style="list-style-type: none"> • Scenarios verification • Write report.



	Spring	Summer	Autumn
Dirk/Ernesto	Maintenance and development when time permits.	Develop and release IMAS actor of FoPla.	Maintenance and development when time permits.
Mervi/Xavier/Dani	Add NBI interface. Verification.	Deliver alpha version. Verification and debugging.	Deliver stable version



	Jan-Apr.	May-July	Aug-Sept	Oct-Dec
Pär	TCI-maintenance	TCI-maintenance	TCI-maintenance	TCI-maintenance
Emil, Andreas	Verification of transport actors	Verification of transport actors	-	-
Bruce	Maintenance BgB/NEOWES	Maintenance BgB/NEOWES	Maintenance BgB/NEOWES	Maintenance BgB/NEOWES

	Spring / summer	Autumn + 2021
Dragan, Anna, Vicko, Silvestar	Create new FEM solver with modified weak form (to avoid derivatives of D)	New FEM solver with modified space-time discretisation (first space and then time discretisation)



	Jan-Apr.	May-July	Aug-Sept	Oct-Dec
Irena	Discussion about boundary condition in IMAS for neutrals. Prepare initial ids for neutrals.	Start work on solver for neutrals	Finish solver for neutrals	Testing the solver for neutrals
Tskhakaya				
Cedric				
Jean-Francois	Integrated modelling for WEST	Integrated modelling for WEST	Integrated modelling for WEST	Integrated modelling for WEST
Blais				

	March	June	Dec
Gergo/Soma	Integrate Runaway Indicator into ETS6 Instantaneous events. Till the end of the ITER Code Camp	Integrate Runaway Fluid into ETS6 H&CD workflow. Till the end of summer Code Camp.	Integrate kinetic runaway electron modelling into ETS6. Till the end of the year.

WIMAS-2: Timeline for 2020: WIMAS-2 Coordination (Thomas)



March	April	May	June	July
Workflow develop <ul style="list-style-type: none"> • Verify H&CD actor • Verify convergence loop Core-edge <ul style="list-style-type: none"> • Planning meetings Moving boundary <ul style="list-style-type: none"> • Planning meetings H&CD synergies <ul style="list-style-type: none"> • Integrate FoPla-WF in ETS-5 Verification ITER <ul style="list-style-type: none"> • Data from ITER/Metis 	Workflow devel <ul style="list-style-type: none"> • tbd Core-edge <ul style="list-style-type: none"> • tbd Moving boundary <ul style="list-style-type: none"> • tbd H&CD synergies <ul style="list-style-type: none"> • tbd Verification ITER <ul style="list-style-type: none"> • tbd 	Workflow devel <ul style="list-style-type: none"> • tbd Core-edge <ul style="list-style-type: none"> • tbd Moving boundary <ul style="list-style-type: none"> • tbd H&CD synergies <ul style="list-style-type: none"> • tbd Verification ITER <ul style="list-style-type: none"> • tbd 	Workflow devel <ul style="list-style-type: none"> • tbd Core-edge <ul style="list-style-type: none"> • tbd Moving boundary <ul style="list-style-type: none"> • tbd H&CD synergies <ul style="list-style-type: none"> • tbd Verification ITER <ul style="list-style-type: none"> • tbd 	Partly vacation
Aug	Sept	Oct	Nov	Dec
1 week conference Workflow devel <ul style="list-style-type: none"> • tbd Core-edge <ul style="list-style-type: none"> • tbd Moving boundary <ul style="list-style-type: none"> • tbd H&CD synergies <ul style="list-style-type: none"> • tbd Verification ITER <ul style="list-style-type: none"> • tbd 	Workflow devel <ul style="list-style-type: none"> • tbd Core-edge <ul style="list-style-type: none"> • tbd Moving boundary <ul style="list-style-type: none"> • tbd H&CD synergies <ul style="list-style-type: none"> • tbd Verification ITER <ul style="list-style-type: none"> • tbd 	Workflow devel <ul style="list-style-type: none"> • tbd Core-edge <ul style="list-style-type: none"> • tbd Moving boundary <ul style="list-style-type: none"> • tbd H&CD synergies <ul style="list-style-type: none"> • tbd Verification ITER <ul style="list-style-type: none"> • Tbd Training <ul style="list-style-type: none"> • Prepare training 	Core-edge <ul style="list-style-type: none"> • Finalise Moving boundary <ul style="list-style-type: none"> • Remaining issues H&CD synergies <ul style="list-style-type: none"> • Finalise Verification on ITER scenarios <ul style="list-style-type: none"> • Final simulations • Start report Training <ul style="list-style-type: none"> • Prepare training 	Core-edge <ul style="list-style-type: none"> • Remaining issues Moving boundary <ul style="list-style-type: none"> • Remaining issues H&CD synergies <ul style="list-style-type: none"> • Remaining issues Verification ITER <ul style="list-style-type: none"> • Finalise report Training <ul style="list-style-type: none"> • Give training session

WIMAS-3: Turbulence with synthetic diagnostics workflows in IMAS



	Jan	Feb	Mar	Apr	May	Jun
O. Asztalos		Release Integration test for RENATE-OD-CHERAB	Develop BES actor	Develop BES actor	Release BES Actor	Develop Turbulence workflow
A.H. Nielsen		...	Risø WS HESEL AUG (AUGPED => IMAS/IDS)	...	...	Develop Turbulence workflow
G.I. Pokol		Release Integration test for RENATE-OD-CHERAB	Develop BES actor	Develop BES actor	Release BES Actor	Develop Turbulence workflow
A.S. Thryssøe			Risø WS	Code development and documentation	...	...
R. Coelho			Infrastructure	...	...	...
	Jul	Aug	Sep	Oct	Nov	Dec
O. Asztalos	Test and use Workflow	Parenting	Test and use Workflow EAST?	Test and use workflow on AUG	Test workflow on JET	Release workflow
A.H. Nielsen	Test and use Workflow	Test Workflow	Test Workflow EAST?	...	...	Release workflow
G.I. Pokol	Test and use Workflow	Parenting	Test Workflow	Test and use workflow on AUG	Test workflow on JET	Release workflow
A.S. Thryssøe	Test and use Workflow	Test and use Workflow	Test and use Workflow	...	..	Release workflow
R. Coelho	Coordinating infrastructure	...	...	...	...	...

HESEL at AUG (synthetic Langmuir probes)



HESEL@AUG#34106

$$B_0 = 2.92T, q_{95} = 3.95,$$

$$R = 1.65m, a = 0.5m$$

LCFS:

$$n_e = 1.5 \times 10^{19} m^{-3}$$

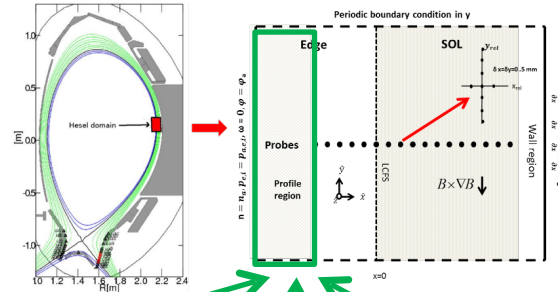
$$T_e = 50eV$$

$$T_i = 75eV$$

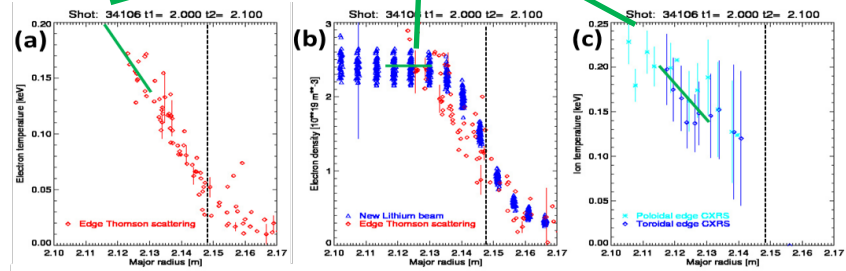
L-mode

$$P_{Ohmic} = 0.55MW$$

$$P_{NBI} = 0.7MW$$



- Radial shift of different diagnostics
- LCFS not well defined
- Fine tuning of profiles



Need for manual control of the input (EWE)





	Spring	Summer	Autumn
Lorenzo	<ul style="list-style-type: none"> • Maintenance for GRAY. • Developing TASK-PCS for NTM control. 	<ul style="list-style-type: none"> • Maintenance for GRAY. • Developing TASK-PCS for NTM control. 	<ul style="list-style-type: none"> • Maintenance for GRAY. • Developing TASK-PCS for NTM control.
Silvana	-	Create a new version for the NTM module in ETS translating from CPO to IDS .	IMAS workflows for the stabilisation of NTM with ECCD for the deliverable D4.
Seppo			
Markus			
Laurent Villard			



	Q1	Q2	Q3	Q4
David Coster	Task Coordination; library maintenance			
Viorica Stancalie	provide datasets (as raw data or in different formats: adf04, for population processing and further emissivity code adf15)			
Erik Andersson Sunden	identification and remediation of deficiencies in the existing nuclear data		provision of anisotropic nuclear cross section data	
David Tskhakaya	Recommendation, provision and importing of new data, and checking of existing cross section data			
Karoly Tokesi	Provide and verify cross-section data on demand			
Martin O'Mullane	Provision of beam-stopping data		Provision of spectral emissivity data	



Plugins and support for visualization tools in IMAS

- ParaView plugins upgraded and extended to support GGD based IDSes:
 - A more **universal plugin** (ReadUAEEdge successor - ReadUALGGD outside SOLPS-ITER GUI) intended for visualization of 2D data from any IDS/GGD structure, not only the Edge IDSs (this is already partially implemented -> MHD IDS)
 - Improve support for **time-dependant data** e.g. reading all time slices at once and use them as frames for the ParaView control features
- Support for IMASViz plugins:
 - ETSplugin:
 - many tabs are yet to be added (“Main 1-D Parameters” etc.)
 - enable real-time plotting from the IDSs
 - Support EqStabil upon request
- Gateway NX GPU supported with vglrun for 3D graphics



Timelines on following pages

DRESS and AFSI -Timeline for 2020



	Jan	Feb	Mar	Apr	May	Jun
Erik			Preparation of the neutron diagnostic IDS	Not available	Preparation of the neutron diagnostic IDS Bench-marking of DRESS and AFSI	Continue
Jari / Seppo					Bench-marking of DRESS and AFSI	Continue

	Jul	Aug	Sept	Oct	Nov	Dec
Erik	Continue		Construction of DRESS actor using neutron diag IDS	Comparison of DRESS and AFSI results in new neutron diag IDS	Report	Report
Jari / Seppo	Continue		Construction of AFSI actor using neutron diag IDS	Comparison of DRESS and AFSI results in new neutron diag IDS	Report	Report

tofu - Timeline for 2020



	Jan	Feb	Mar	Apr	May	Jun
Maintenance	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
User support	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Documentation	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Better portability	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
X-Ray spectro.	Basics	Basics	Basics	Basics	Full 3D synth.diag	Full 3D synth.diag
Classes for handling ions populations				First version	First version	First version
Classes for handling radiation				First version	First version	First version
Volumes of Sight	Volume sampling	Volume sampling	Volume sampling	Solid angles	Solid angles	Solid angles
Meshes						
Tomographic inversions						

Tofu - timeline for 2020



	Jul	Aug	Sept	Oct	Nov	Dec
Maintenance	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
User support	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Documentation	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Better portability	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
X-Ray spectro.	Full 3D synth.diag	Full 3D synth.diag	Full 3D synth.diag	Full 3D synth.diag	Full 3D synth.diag	Full 3D synth.diag
Classes for handling ions populations	Test, debug and improve first version	Test, debug and improve first version	Test, debug and improve first version	Include second version in release	Include second version in release	Get Return on experience from users
Classes for handling radiation	Test, debug and improve first version	Test, debug and improve first version	Test, debug and improve first version	Include 2 nd version in release	Include 2 nd version in release	Get ROE from users
Volumes of Sight	Solid angles	Solid angles	Solid angles	Solid angles	Include in release	Include in release
Meshes		Rectangular meshes	Rectangular meshes	Rectangular meshes	Rectangular meshes	Include in release
Tomographic inversions					Start linear regularizations	Start linear regularizations

Working Sessions and Code Camps



Main Activity	Dates	Place	Main Participants
WIMAS-2/4 WS	Jan 27 - 31	Chalmers, Gotheborg	WIMAS Team
Annual Planning meeting	Feb 24 - 28	ENEA, Frascati	All
WIMAS-1/2/3/4 WS	Mar 23-27	Risø, Denmark	WIMAS Team
Summer General Code Camp	June 8 - 19	DIFFER, Eindhoven	All
EWE-2 / WIMAS-1 WS	tbd	ITER	EWE-2, WIMAS-1 Teams
???	???	???	???

Attendance at other events as needed
Additional bilateral exchanges also possible.