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Adoption and Validation of IMAS Data

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The suite of tools being developed to support the preparations for ITER operation, including data interpretation and analysis, and the refinement of the ITER Research Plan, are underpinned by a common data representation that forms the basis around which the Integrated Modelling & Analysis Suite (IMAS) is built and which strives to make fusion data more FAIR.

Adopting a common standard for the representation of data allows tools to be interoperable and for them to be tested and validated on present day experimental data, with the aim of accelerating the transition from initial testing to production-ready applications that would otherwise have to wait for the start of ITER operations and the production of ITER data. The Data Model itself is described by a Data Dictionary that follows a well-defined life-cycle and evolves in response to community needs, with most changes arising from its application to new Use Cases while improving data reusability.

In this presentation the mapping of experimental data to IMAS Interface Data Structures (IDSs), both dynamic and static (so-called Machine Description metadata), as well as their accessibility, will be discussed as a prerequisite for the validation of tools both directly against experimental data and also in comparison with existing tools used on today's research facilities.

Effort has already started on many devices to begin to map their experimental data into IDSs including ASDEX-Upgrade, DIII-D, EAST, JET, KSTAR, MAST-U, and TCV, whilst on WEST their plasma reconstruction chain [1] is now wholly based upon the IMAS data representation.

In addition to the validation of software tools and workflows, the populated data structures can also be validated using a recently developed tool that forms part of the IDStools package. This uses extensible rules to validate against generic physics and data constraints, as well as Use Case-specific rules, e.g. for a particular device such as ITER or when developing a specific database for specific events such as disruptions.

[1] L. Fluery et al., WEST plasma reconstruction chain and IMAS related tools, SOFT 2020, Croatia

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