The ITER Integrated Modelling Programme W.A. Houlberg ITER International Organization, Cadarache, France

The ITER Integrated Modelling Programme is being developed to provide physics input to all phases of the ITER Project: i) supporting design decisions, ii) developing plans for plasma commissioning and operation, and iii) analysis of the experimental results. This program contributes to the goal of establishing ITER as a centre of excellence in fusion research with an extensive interaction with the research programmes of the ITER Members.

There are many common physics elements among the modelling requirements that support the various phases of the ITER Project. This means that an integrated and common approach is necessary to ensure access to latest developments in the Members' programmes, as well as consistency among the studies. There will be new physics addressed by ITER in terms of size scaling for core and edge energy confinement, transport barriers, rotation, core-edge-SOL coupling, and plasma wall interactions. MHD stability needs to address ELMs, disruptions, sawtooth behaviour, NTM, and RWM control under burning plasma conditions. Understanding the effects energetic particles on confinement, self-heating and MHD across a variety of conditions will help establish the basis for burning plasma scenarios that will possibly exhibit non-linear interactions between heating, pressure, rotation and current profiles.

ITER will need comprehensive modelling tools to develop self-consistent scenarios, which will place heavy demands on physics and computing. Integrated plasma control capability will be as much a modelling tool as an experimental tool. During experimental operation, a comprehensive modelling capability for burning plasmas will be an essential ITER "sub-system" to justify each experimental run as well as to evaluate the results.

ITER needs to start working with the ITER community to develop the required tools now. Because the ITER IO will be seriously limited in size it will necessarily rely heavily on the Parties' physics communities that have an extensive reservoir of expertise and talent. The ITER IO would like to build on the integrated modelling initiatives in the Parties' fusion programmes. We need to develop common data and software frameworks for developing the ITER tools that provide low "threshold" for access of new contributors and users. The programme of model development and integration should set priorities and timescales, allocate responsibilities and tasks, and identify adequate computing resources. It is also essential to establish an accompanying programme of model documentation, verification and validation. This is where organizations such as the TTF are expected to play a major role.

We review the plans for implementing this programme. This includes the establishment of the interface with the Members' programmes (Integrated Modelling Advisory Group, Visiting Scientists, Post-Doctoral programme, Task Agreements, etc), as well as the technical aspects (physics scope, code infrastructure, data and user interfaces, etc).