

## MQP Level 2

# ITER Planning & Scheduling Procedure

The purpose of this ITER Planning & Scheduling Procedure is to define how the schedule of work that is to be performed for the ITER Project will be developed and managed. This ITER Planning and Scheduling Procedure describes the main processes and methodologies which the IO and DAs will use to manage the ITER Project schedules and to achieve the project objectives by ensuring effective integration and reporting of planning and scheduling information.

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v4.0	Signed	05 Oct 2017	<p>This version 4 is a complete rewrite to reflect the revised ITER scheduling system and the Baseline of 2016 approved by IC - 19</p> <p>It implements the recommendations from the 2016 IC Review Group (ICRG) on the ITER schedule.</p> <p>It implements the Planning and Scheduling aspects of the ITER Project Management Plan level-1 document</p> <p>The main items are:</p> <p>Introduction of the Master Schedule under configuration control.</p> <p>Introduction of 3 main sub-processes within the Procedure:</p> <ul style="list-style-type: none"> <li>- Schedule Development</li> <li>- Schedule Execution and Maintenance</li> <li>- Schedule Control</li> </ul> <p>Use of new MQP template, including links to Other Processes.</p>
v4.1	Approved	11 Oct 2017	<p>Minor editorial corrections following IO FPD Dept. head review</p> <p>Added chapters :</p> <p>5.1.2 list of IC Milestones (subsequent chapters within section 5 renumbered accordingly, cross references updated accordingly)</p> <p>8.6 Interactions with the Budgetary Procedure</p> <p>Added hyperlinks to IDM documents referenced</p>
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# 1 Purpose

The purpose of this ITER Planning & Scheduling Procedure is to define how the schedule of work that is to be performed for the ITER Project will be developed and managed. This ITER Planning and Scheduling Procedure describes the main processes and methodologies which the IO and DAs will use to manage the ITER Project schedules and to achieve the project objectives by ensuring effective integration and reporting of planning and scheduling information.

The purpose of this procedure is also to describe the schedule hierarchy and structures used by the IO-CT and IO-DAs in the Overall Project Schedule (OPS), Level-1 and Level-2 WBS Summary Schedules, the Level-3 Master Schedule and the Detailed Work Schedules (DWS).

# 2 Scope

This Procedure describes the Planning & Scheduling Processes and Systems and the requirements to achieve what is described in the MQP Level-1 Project Management Plan.

It is an MQP Level-2 procedure within the Project Controls Organization.

This ITER Planning and Scheduling Procedure apply to all IO and DA.

# 3 Definitions and acronyms

## 3.1 Definitions

**ITER baseline:** ITER baseline represents the formally approved status of requirements, design, physical items and project key performance parameters (cost, schedule, scope). It provides the point of departure for further changes. The ITER baseline includes the technical, scope, schedule and cost baselines.

**ITER scope and schedule baselines:** All work on the ITER Project is organized in a common Work Breakdown Structure (WBS) that defines ITER scope baseline. The WBS forms the basis for planning, execution, and controlling project activities. Each WBS element is a product, data, or service. The WBS is aligned with the Plant Breakdown Structure (PBS) that includes an exhaustive, hierarchical tree structure of deliverable components that make up the ITER plant and equipment. Individual activities of the WBS and points in the timeline set as milestones that are most significant for the Project exist in the Master Schedule. Detailed Work Schedules (DWS) from both the IO and DA's describe the schedule of work that is performed under each WBS.

## 3.2 Acronyms

BCP	Baseline Change Proposal
BIPS	Building Infrastructure and Power Supply
BoE	Basis of Estimate
CAS	Credit Allocation Scheme
CCB	Configuration Control Board
CDD	Committed Delivery Dates
CMA	Construction Management as-Agent
CPM	Critical Path Method (Planning & Scheduling methodology)
CWBS	Central WBS
DA	Domestic Agency
DG	Director-General
DT	Deuterium Tritium
DWS	Detailed Work Schedule
EPB	Executive Project Board
EPS	Enterprise Project Structure (in Primavera database)
FP	First Plasma
IC	ITER Council
IO	ITER Organization

IPL	Inter-Project Links
MAC	Management Advisory Committee
MQP	Management and Quality Programme
MSS	Master Schedule Subset
OBS	Organization Breakdown Structure
OPC	Overall Project Cost
OPS	Overall Project Schedule
PA	Procurement Arrangement
PBS	Plant Breakdown Structure
PCO	Project Control Office
PCR	Project Change Requests
PEE	Project Execution Entity (IO or DA)
PMP	Project Management Plan
PT	Project Team
RAD	Required Arrival Date
RAM	Responsibility Assignment Matrix
RBS	Resource Breakdown Structure
RFE	Ready for Equipment
RO	Responsible Officer
ROS	Required On-Site Date
TRO	Technical Responsible Officer
WBS	Work Breakdown Structure
WBSE	WBS Element
WP	Work Package

## 4 Applicable and References Documents

### 4.1 Applicable documents

1. ITER Project Management Plan ([ITER\\_D\\_2NCR3F v4.0](#))
2. Performance Baseline Change Procedure ([ITER\\_D\\_U24XQQ v2.1](#))
3. Project Status Reporting Procedure ([ITER\\_D\\_SDC9T4 v1.1](#))
4. Risk and Opportunity Management Procedure ([ITER\\_D\\_22F4LE v6.3](#))
5. Scope Development Procedure ([ITER\\_D\\_U2RADM 1.2](#))
6. Procedure for the Preparation, Review, Approval and Award of Procurement Arrangements ([ITER\\_D\\_2W4F7A v3.1](#))
7. Master Schedule Technical Specification ([ITER\\_D\\_RTN4RX v1.1](#))

### 4.2 Reference documents

8. Scope and Basis of Estimate Guideline ([ITER\\_RDU88S](#))
9. Working Instruction for Required Scheduling Standards ([ITER\\_D\\_7A4588](#))
10. Working Instruction for Preparation and Submission of DWS for Procurement Arrangements ([ITER\\_D\\_7MYQBS](#))
11. Working Instruction for Initial IPL Generation, IPL Preparatory Table/ ICT Implementation and Agreement of Initial ICT ([ITER\\_D\\_77ESZ9](#))
12. Working Instruction for Standard DWS Global Activity Codes and User Defined Fields ([ITER\\_D\\_7MX5S3](#))
13. Working Instruction for Application of Control Points in the DWS ([ITER\\_D\\_77XUU5](#))
14. Working Instruction for Definition and DWS Representation of Deliveries, Customs Activities and Shipping ([ITER\\_D\\_7NEBZA](#))
15. Working Instruction for Task Agreements: Budget and Schedule Application ([ITER\\_D\\_7NKTNG](#))
16. Working Instruction for DWS and Master Schedule monthly statusing and update ([ITER\\_D\\_VETRUN](#))
17. Procedure on Procurement Documentation Exchange between IO, DAs and Contractors ([ITER\\_D\\_35BVQR](#)), section on schedule data exchange.

18. Project Controls Information Systems Architecture Description ([ITER-D\\_UVTZNZ](#))
19. Responsibility Assignment Matrix (RAM) ([ITER\\_D\\_TMSSUQ](#))
20. Site Construction Schedule Management Procedure ([ITER\\_D\\_UC8KEW](#))
21. ITER Work Breakdown Structure (WBS) ([ITER\\_D\\_RLUDKV](#)).
22. PCO yearly calendar ([ITER\\_D\\_VETSQB](#))
23. In-Cash Procurement Procedure ([ITER\\_D\\_658PD4](#))

## 5 Basic principles – ITER Project Schedule Structure

The ITER Project Schedule governance is described in the Project Management Plan ([Reference 1](#)). Figure 1 describes the schedule hierarchy and how it reflects from the detailed bottom up supplier and PA schedules through the levels up to the Overall Project Schedule setting the main programmatic milestones for ITER.

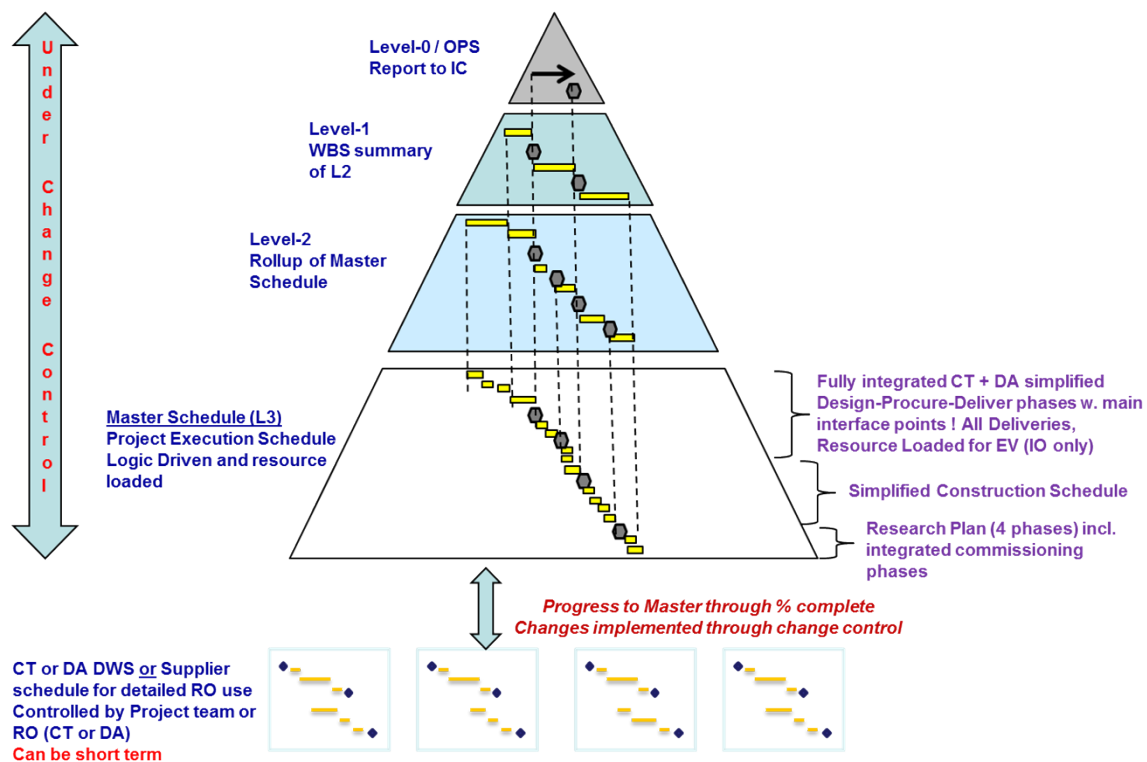


Figure 1: ITER Project Schedule hierarchy

The Schedule structure is such that the information rolls up in order to provide the right level of visualisation and information to the different stakeholder levels as shown in Figure 2.



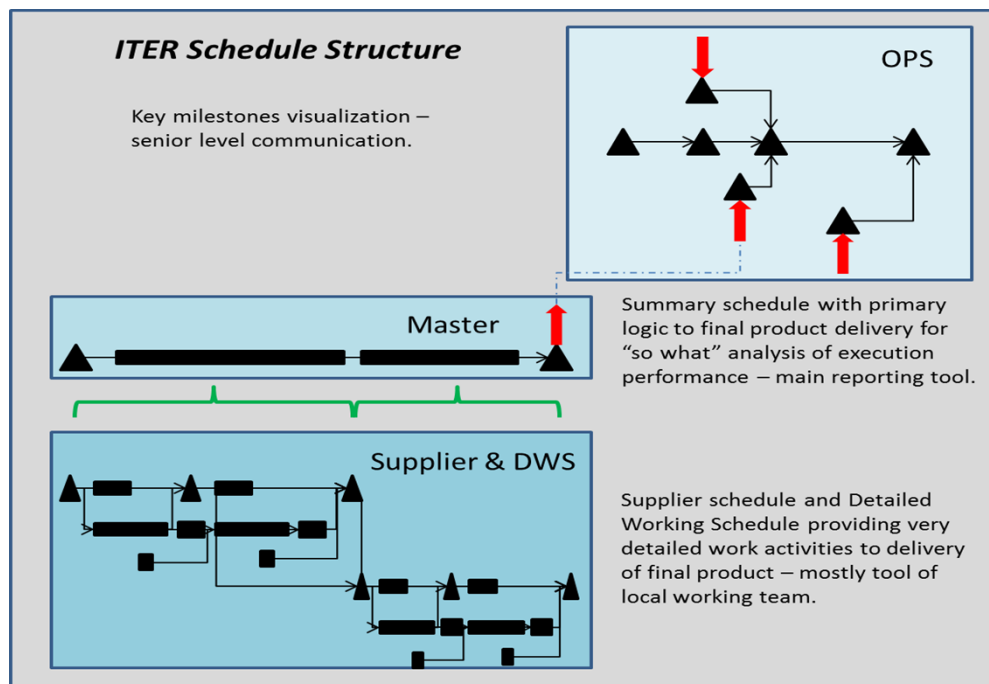


Figure 2: Schedule hierarchy

### 5.1.1 Level-0 Overall Project Schedule (OPS)

The highest level schedule for ITER is the OPS, a top level graphical representation of the timeline for the Construction and Operational phases of the ITER facilities.

The OPS is developed, maintained and published by the IO Project Control Office using non-Critical Path Method (CPM) software as an insert to the Overall Project Schedule document. The OPS shall reflect the ITER critical path, strategically important near critical path activities and significant programmatic milestones.

The OPS should be used to communicate with stakeholders not directly involved with the execution of work about the timing of major project phases, milestones, critical and near critical paths.

Figure 3 shows the current baseline OPS Gantt chart as approved by IC-19 in November 2016.

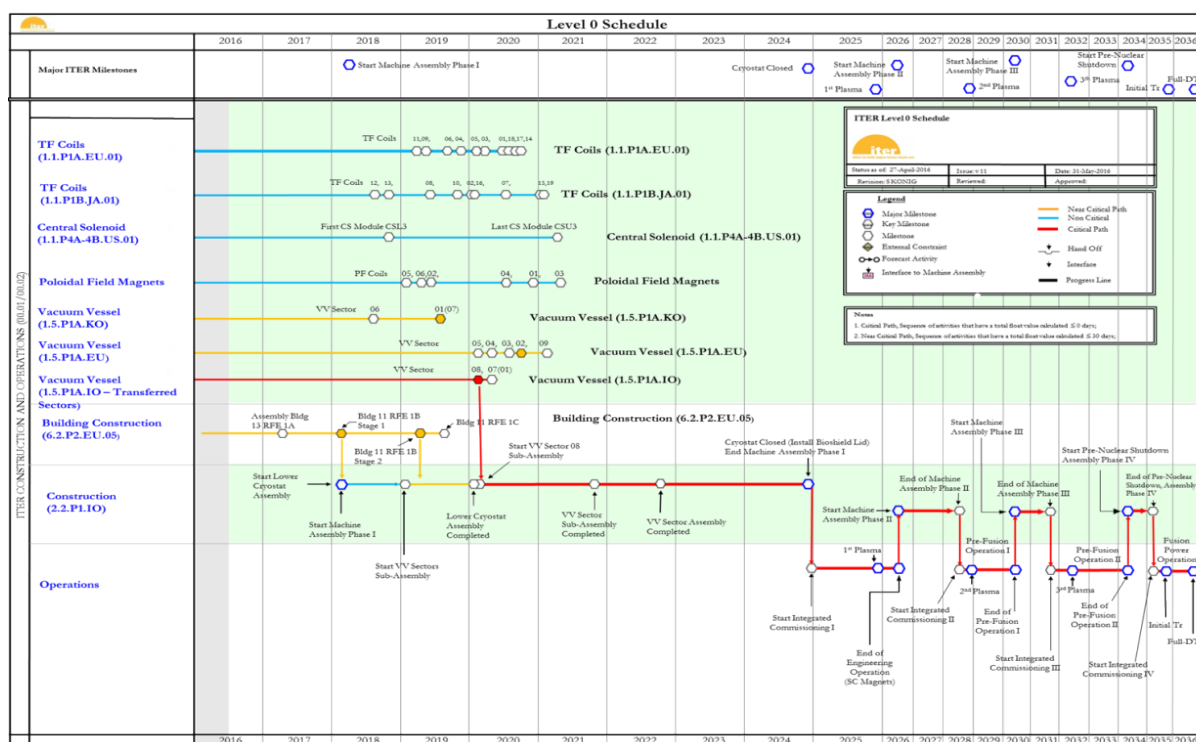


Figure 3: The Level-0 Overall Project Schedule

The OPS is under configuration control, the Baseline OPS document is a level 0 document and is approved by the IC, it is part of the Current Configuration Map and is available in IDM ([ITER\\_D\\_43N7X7](#)).

Although the OPS and the Overall Project Cost (OPC), which is also approved by the ITER Council, are consistent with each other, the ITER Schedule is resource-loaded with IO costs at Level-3, and not explicitly at higher levels.

### 5.1.2 List of IC Milestones

At its nineteenth meeting (IC-19), the ITER Council (IC) approved the Overall Project Schedule and an associated suite of the proposed IC milestones from 2016 through to 2025. As described at IC-18 and IC-19, the milestone list is annually supplemented with additional milestones for the coming two years of execution such that this time window always contains circa 25 milestones. This expanded suite will be submitted for approval at each November meeting of the IC.

The approved IC milestones are in the Master Schedule and reported up through the Level-2 and Level-1 Schedules.

Changes, additions/ deletions or re-definition of the IC Milestones requires the approval of the IC, such changes are executed according the Performance Baseline Change Procedure ([reference 2](#)).

### 5.1.3 Level-1 WBS Summary Schedule

The Level-1 WBS Summary Schedule contains a summary of the timeline for all systems, construction work and the research plan through to DT. It includes all IC milestones. It is a WBS rollup Gantt chart report with a summary of the Level-2 Schedule Report and does not contain logic which is at the level of the Master Schedule.

The Level-1 Schedule covers all the scope (WBS) in the Level-2.

The Level 1 usually shows a summary for each Procurement of the main phases: PA signature, Design, Manufacturing, Deliveries and Installation with a specific colour for each phase within the line in the Gantt chart. Figure 4 gives an example of the Level-1 WBS summary for the US Vacuum Auxiliary System PA



Figure 4 Excerpt of the Level-1 schedule for the VAS system (example), visualizing the design phase (green), the manufacturing phase (blue) and the delivery phase with first and last delivery (yellow).

The Level-1 Schedule is developed by IO-PCO as a WBS summary report in Primavera. It is published twice a year in April and in September for the MAC and IC meeting cycle.

#### 5.1.4 Level-2 Schedule

The Level 2 is a summary schedule for all capital item procurements (both in-kind by DA and in cash by IO), the assembly and installation as well as the commissioning to the operations. Within it the main phases for each procurement (WBS) are summarised from the Master Schedule:

- Conceptual Design
- PA preparation (if PA)
- Preliminary Design
- Final Design
- Contract Awards
- Prototype and Qualification
- Manufacturing Design
- Procurement
- Manufacturing and Fabrication
- Deliveries to ITER Site (with first and last as milestones)
- Installation and Commissioning

For each phase, the Level 2 is tied with the first and the last activities/milestones in the Master Schedule to obtain summary and a rollup from the logically linked Master.

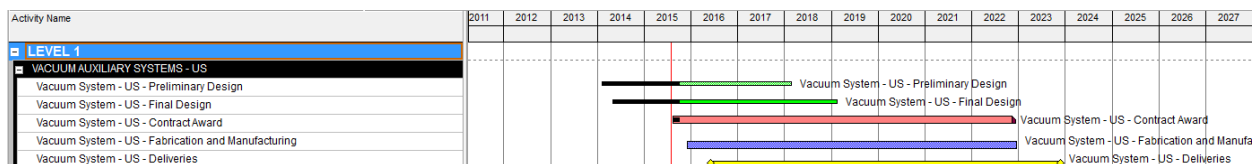


Figure 5 Excerpt of the Level-2 schedule for the VAS system (example)

Figure 5 shows the roll-up of the US Vacuum Auxiliary System PA, with each phase easily distinguishable.

The activities in the Level-2 Schedule are not logically linked; they are only representing the time-phasing for the main phases as they are scheduled in the Master Schedule.

The Level-2 Schedule does not contain any summary activities for the Project Oversight and Support WBS (00.01.06.XX).

Activities are summarized from the beginning of 2016 till the end of the projects according to the 2016 Baseline Master Schedule.

The Level-2 Schedule is developed by IO-PCO in Primavera from Master Schedule details of the phases. It is published twice a year in April and in September for the MAC and IC meeting cycle.

#### 5.1.5 Level-3 Master Schedule

The IO and DAs recognized the need to develop a simplified Level-3 Schedule (“Master Schedule”) as the basis for the Level-0 Schedule (Overall Project Schedule) controlled by the IC.

The Master Schedule contains all construction and operations work scope of the ITER Project (for both IO and DA) from January 2016 (when the revised baseline was started) through to full DT.

The Master Schedule is based on a rolling wave principle with more detail in the near term 2-3 years as “Work Packages (WPs)” and less details for the future beyond as “Planning Packages (PPs)” associated with certain assumptions. As the schedule is executed, and the annual IO and DA cycles advance, the planning packages are detailed out into work packages in the yearly cycle, and the Master is updated through formal change control to correctly reflect the near term work.

The Master schedule was developed according to the Master Schedule Technical Specifications (Reference 7) by the IO and DA in preparation of IC-19 and the proposed updated baseline.

The Master Schedule is configuration controlled centrally by the ITER Organization and Domestic Agencies; it forms the basis for project-wide performance monitoring and control by individual technical teams.

An important point to note is that the Master Schedule baseline was originally formed by summarising (by a factor of 5 to 10 smaller) the submissions of the IO and Domestic Agencies through the Detailed Work Schedules (DWS) as of September 2016. Since then it has been changed following the approved change control procedures through Baseline change Proposals (BCPs according to the Performance Baseline Change Procedure ([Reference 2](#)).

The Master Schedule has associated (IO only) labour resources and contracts (expenses) in order to provide a fully resourced integrated lifecycle schedule and cost baseline.

The Master Schedule consists of multiple Master Schedule Subsets (MSS), which are integrated and logically linked together in the Primavera Master Database.

The Master Schedule uses the Critical Path Method for planning and scheduling, and must contain hard logic networks allowing for calculation of the Critical Path and Near Critical Paths to the 4 plasma phases, from system design through procurement to delivery, installation, commissioning, and operations.

There are 2 instances of the Master Schedule: A) BASELINE, which is the baseline plan without any progress; B) STATUS, which is the monthly updated schedule with progress to date. Both instances contain the same activities, resources, expenses and logic. Changes to the Master Schedule baseline activities, logic and delivery dates due to change in scope or strategy are to be managed according the Performance Baseline Change Procedure ([Reference 2](#)).

Figure 6 shows the main Primavera Enterprise Project Structure (EPS) and some of the MSS (projects in the EPS).

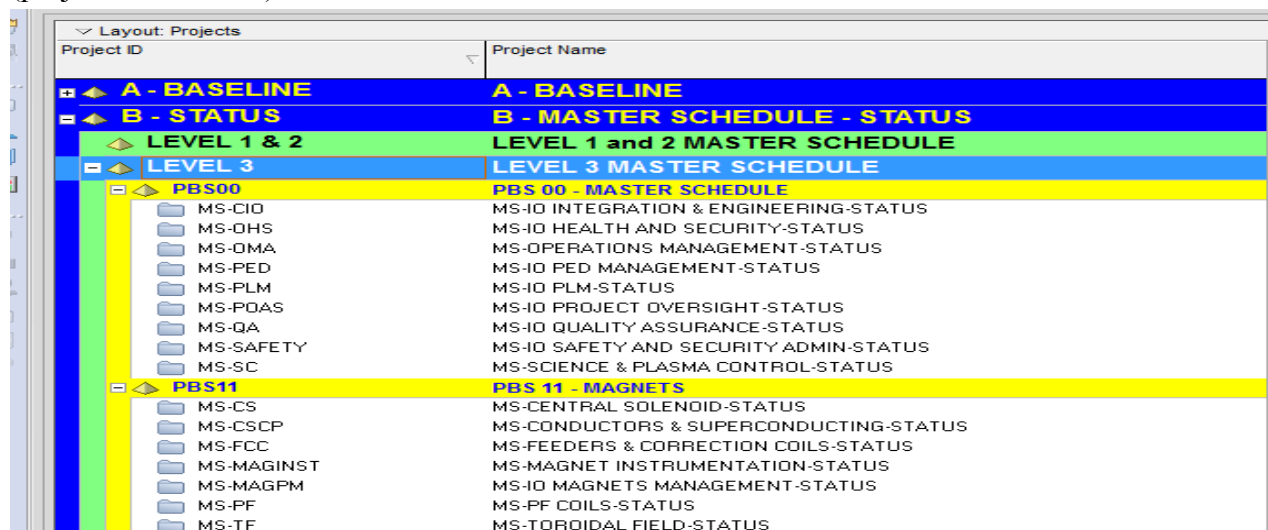


Figure 6 Master Schedule EPS in Primavera

Each MSS in the Master Schedule Status is updated monthly with % complete (in addition to forecasting completion dates) by the owning PEE PCO in collaboration with the PEE TRO. Following the monthly progress update, the IO PCO calculates the integrated Master Schedule and provides integrated status, reports and analysis to the project.

#### 5.1.6 Level-4 Detailed Work Schedules (DWS)

The DWS are the working level ITER project schedules.

The DWS reflect weekly or monthly work requirements. These schedules are used by line management and responsible officers to accurately plan and schedule the project execution.

The DWS should:

- Contain activity schedule based on the Critical Path Method, and shall be logically driven defining processes, interfaces and deliverables throughout the project lifecycle for all sub-systems;
- Be coded to the approved ITER WBS with WBS subdivision below that held in the Master at WBS Level 5 which is logical and reflects the nature of the system;
- Have activity durations supporting effective project and cost management requirements (Ideal activity length more than 1 week and <2 months although rolling wave principles will apply);
- Identify schedule/project input and output interfaces identified and implemented as inter-project link milestones (IPL's);
- Be "Bottom-up" schedules based upon; and constrained as necessary; by the available resources and actual budget commitments per funding period;
- Have all mandatory IO activity codes applied as described in Working Instruction for Standard DWS Global Activity Codes and User Defined Fields ([Reference 12](#));
- Apply logic "templates" for repetitive processes i.e. reviews, approvals, PA Preparation, etc.;
- Use reasonable assumptions agreed between assigned PEE PCO teams and PEE TRO to complete the logic whenever full details are not currently known and recorded in the Scope/BoE for the associated WBS or activity ID in the Master that summarizes the affected area of the DWS;
- Perform monthly cycle based Schedule progress updates and reconciliation of any differences in forecast dates with the supplier schedules and interfacing DWS on provided DWS activity status (i.e. not started, started, completed) and changes to forward planning.

#### 5.1.7 IO DWS

The IO DWS' covers all scope of work of the IO as PEE for Capital Procurements, Installation and Assembly, Commissioning, Integrated Commissioning and Operations. The DWS' shall meet the above requirements and they must follow the general process for DWS Development, Execution and Maintenance and Change Control as described in chapters 6.1 (Flowcharts) and 6.1.1 to 6.1.3 (Process Descriptions) of this procedure.

The IO DWS are developed, maintained and published by IO PEE Planners on behalf of the IO PEE Technical Responsible Officers, Project Controls Managers and their management.

#### 5.1.8 Construction DWS (C-DWS):

The C-DWS is an IO controlled subset of DWS for all assembly and installation work on the ITER Construction Work site, covering all IO and DA Installation and Assembly work (defined as Site Construction) performed on the IO Site. The requirements for the C-DWS are the same as for other IO DWS, with minor differences identified in the following text.

It is under the responsibility of the Construction Organisation. The C-DWS covers all construction work scope, both under IO responsibility and under DA (through PA execution) responsibility. The C-DWS is fully integrated in the Integrated DWS through IPLs (inter project links) established between deliveries (input) and equipment ready for testing and commissioning (output).

The C-DWS shall meet all requirements applicable to an IO DWS, and must follow the general processes for DWS Development, Execution and Maintenance and Control as described in chapters 6.1 (Flowcharts) and 6.1.1 to 6.1.3 (Process Descriptions) of this procedure.

In addition the C-DWS has additional construction specific requirements in terms of detailed WBS (under level-5), activity coding, resource loading, and statusing of work progress. These requirements are described below and in chapters 0 to 6.4 (Process descriptions) and must be reflected in the Site Construction Schedule Management Procedure ([Reference 20](#)).

It should be noted that there are elements in the C-DWS which are subject to change control per the Performance Baseline Change Procedure ([Reference 2](#)) and as described in chapter 6.4.1 DWS Schedule Control. Activities (scope, schedule, cost) in the C-DWS may be modified in so far as the thresholds for change control as identified in the BCP procedure are followed. This specifically concerns the IPLs to and from Site Materials, they are controlled and established in the Interface Correspondence Table (ICT) which is controlled by the IO-PCO.

### 5.1.9 DA DWS

The DA DWS are developed, maintained and published by DA Project Controls Staff (PEE PCO) on behalf of the DA Technical Responsible Officers (PEE TRO) and their management.

The DA DWS should contain logically driven detail for the execution of all DA time phased activities related to specific Procurement Arrangements (PA); the DA is in this case the PEE for the planned work. The requirements for the IO DWS are the same as for DA DWS.

In addition they shall

- Contain detailed activities related to the scope of work for each system related to Procurement Arrangements or Task Agreements;
- Contain all CAS milestones (for deliverables) according to the agreed CAS table attached to the PA to which kIUA values are allocated enabling performance and budget tracking;
- Be developed following the requirements in the Working Instruction for Preparation and Submission of DWS for Procurement Arrangements ([Reference 10](#)).

The Procedure for the Preparation, Review, Approval and Award of Procurement Arrangements ([Reference 6](#)) sets out the requirements for Procurement Arrangements, the DWS for a PA should apply those related to the schedule, in particular the initial baseline PA schedule.

### 5.1.10 DWS Integration

The Integrated DWS is comprised of multiple Primavera™ project files residing in the PM-IO DWS database instance. The EPS is structured to WBS Level 3 and below which the IO DWS are defined and managed at WBS Level 4. Each DWS shall be structured consistently with the Master Schedule to the equivalent WBS Level 5 and work-packages and activities at level 6.

The DWS from IO and DA are integrated through interfaces (hand-over points) defined as Inter Project Links (IPLs) which sets the delivery/reception from one DWS to another and establishes the fully Integrated DWS as available on the Primavera Integration Server. The integrated DWS takes the project through its lifecycle (Design – Procurement – Construction – Commissioning - Operations).



The structure and relationship of the interfaces (through IPLs) between the projects (DWS) in the integrated DWS can be seen in Figure 7, together with the planning entity responsible to maintain the DWS.

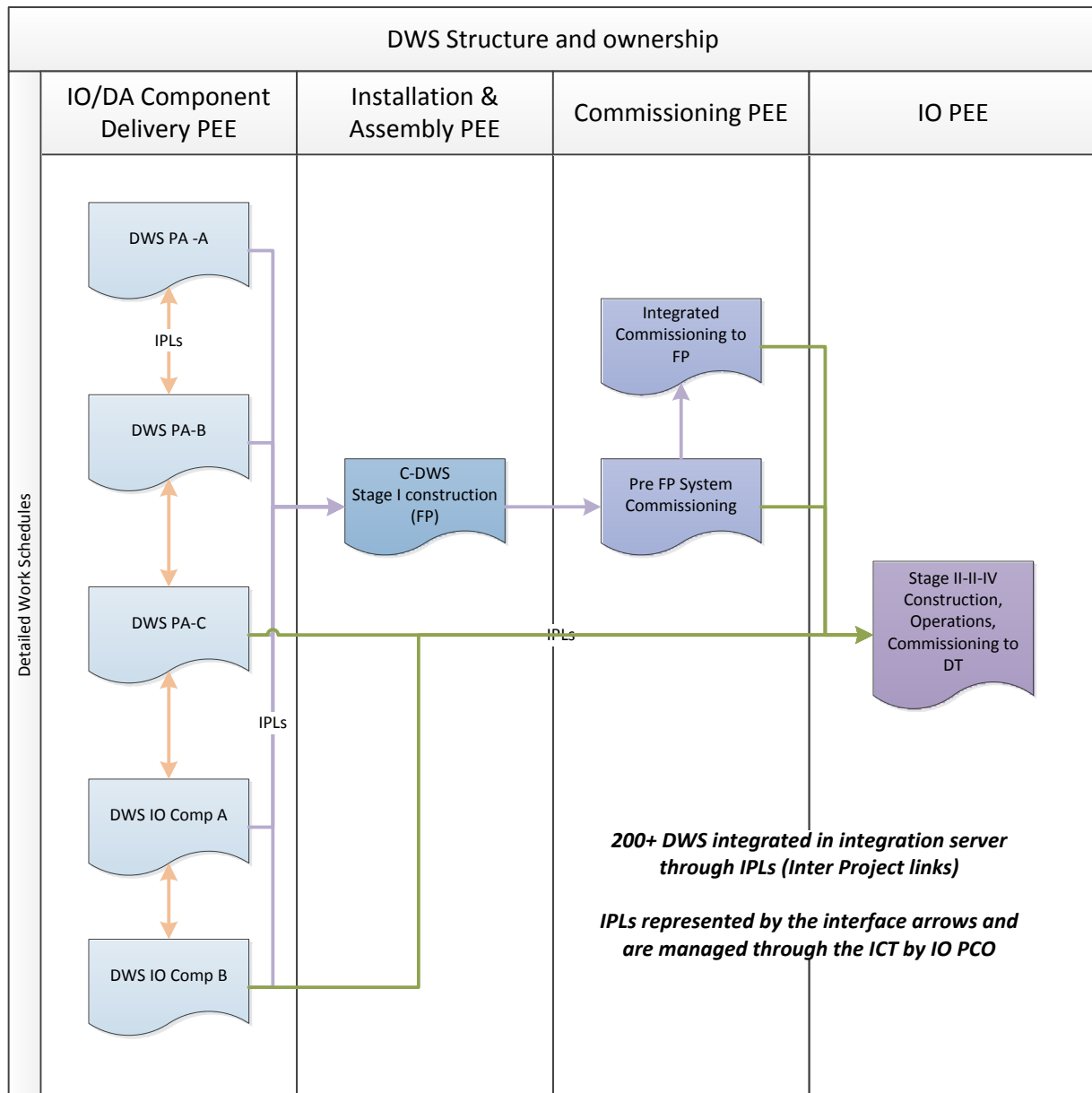


Figure 7 DWS Structure and ownership

### 5.1.11 Inter Project Links (IPLs)

The IO integrates the multiple DWSs, implementing the logical inter-system interfaces [via inter-project links] and producing the Integrated DWS that shows the forecast dates for all activities of all participants in a network with the agreed interdependencies.

#### DWS Integration

1. The IO and DA produce their monthly status updates on their respective DWS's.
2. The IO and DA submit their DWS to IO PCO, and an "As-submitted" status is created for all DWS's.
3. The "Horizontal Integration" Routine is run on Primavera. This process uses the Inter Project Links between the various schedules to implement the interface logic (IPLs)

between them. This produces the “As-integrated” status on all DWS’s with an end to end DWS schedule being fully integrated.

### 5.1.12 Supplier and Level-5 Installation Work Face schedules

Supplier (contractor) schedules are underpinning the DWS for specific contracted work (IO or DA) according to the contractor’s delivery strategy; they follow the contract terms.

Supplier schedules are developed, maintained, progressed and submitted to the IO or DA according to the terms of the contract. They are normally not subject to this procedure.

Supplier schedules may for IO or DA procurements substitute the DWS if fully integrated at Level-4, in that case they should follow the standards for IPLs and other DWS scheduling requirements as described in this procedure. Such substitution may only be done following IO PCO approval.

Level-5 Installation Work Face schedules are detailed installation schedules for IO and DA on site installation work, they define the detailed work (hourly, daily, weekly...) required to execute one or several Installation Work Packages (IWPs) contracted to a construction contractor.

Installation Work Face schedules are developed, maintained, progressed and periodically submitted by the IWP contractor according to the terms of the construction contract. They are normally not subject to this procedure. The contractor assigned to the assembly and installation C-DWS is in charge of integrating these IWPs from all on site works contractors (IO and DAs) to optimise site and labour utilization.

### 5.1.13 WBS

The WBS forms the basis for planning, execution, and controlling project activities. The WBS is the integrating tool of the ITER Project that provides the structure for work scope, schedule, and cost (and also for budgeting and actual cost collection, so as to maintain full coherence and consistency). It is a hierarchical framework that includes all of the project’s discrete work elements to organize and define the total work scope of the project. Each WBS element is a product, data, or service. The WBS also provides the necessary framework for project management and control. The WBS is aligned with the Plant Breakdown Structure (PBS), which is a subset of the WBS that includes an exhaustive, hierarchical tree structure of deliverable components that make up the ITER plant and equipment. The WBS and associated dictionary provides the structure to organize, define, and display ITER work scope. As such, they provide the structure and basis for estimating, scheduling, assigning responsibility, performing, measuring, managing, and reporting of work scope.

All work on ITER is organized in the WBS. As shown in Figure 8, the WBS is developed as a hierarchal (tiered), essentially product-oriented structure to organize, define, and display the ITER work to be performed. Each descending level or subdivision of the WBS is developed as an increasingly detailed definition of the work component (product or service). The WBS is subdivided until the lowest required level of detail is established to estimate and schedule the work activities.

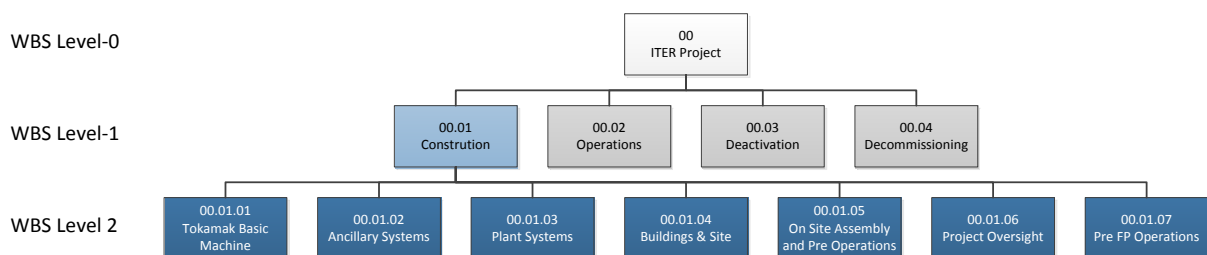


Figure 8 ITER WBS down to level 2



The WBS includes a code structure that allows consistent roll-up of performance measurement data in detailed working schedules maintained by both the ITER Organization and Members/Domestic Agencies into the Master Schedule. The lower levels of the WBS are consistent with and provide for the roll-up of data to the summary WBS levels. Revisions to the WBS are controlled through a formal change control process. The levels of the WBS are defined as follows: Level 0 (Program), Level 1 (Project), Level 2 (Subproject), Level 3 (System), Level 4 (Subsystem), and Level 5 (Control Account). Below Level 5 are activities which, for ITER Organization work, are represented by Work Packages/Planning Packages.

The Master Schedule is organised according to the WBS, each Master Schedule Subset corresponds to one or several WBS Level 4 elements and shows the hierarchy down to WBS level 5, the activities are assigned under the level 5. Figure 9 shows an excerpt of the WBS organisation and activities in the Master Schedule baseline for TF Coils MSS.

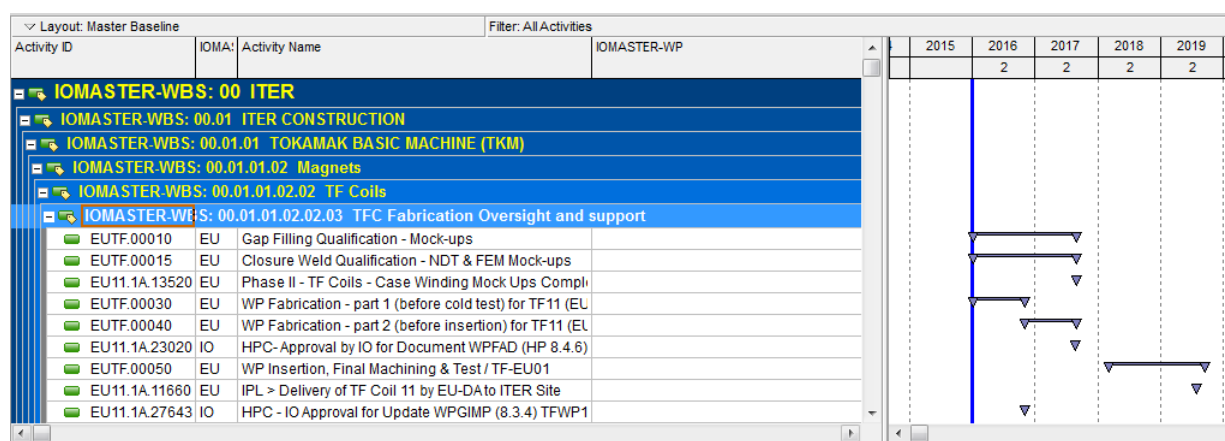


Figure 9 WBS in Master Schedule (example)

The DWS contains a higher level detail of the WBS at Level 4 or 5, specific to a PEE's responsibility of scope of work (DA PA or IO procurement for example). The DWS is adapted to the specific PEEs detailed WBS under level-5 and may have several additional underlying levels which are specifically controlled by the PEE.

The configuration controlled WBS list, from Level-0 down through Level-5 is maintained in the ITER Work Breakdown Structure (WBS) document on IDM ([Reference 21](#)), it is linked and replicated into the Primavera EPS in the IOMASTER-WBS code to be used as defined in the Working Instruction for Standard DWS Global Activity Codes and User Defined Fields ([Reference 12](#)).

A WBS Dictionary from Level 0 through Level 5 and including ITER Organization activities describes the scope content and boundaries of individual WBS elements. The WBS Dictionary is contained in the Scope/BoE database ([ITER\\_D\\_S4RTAA](#)). This also includes the basis of estimate for each Work Package carrying IO cost under level 5.

### 5.1.14 Relationships within the ITER Schedules

Within the ITER schedule hierarchy the schedules maintain a relationship and alignment by being summarised and rolled up vertically through the schedule levels (DWS to Master Schedule through Level-2-and Level-1 to the OPS) as described in Figure 10Figure 1.

Each month the IO and DA DWS are horizontally integrated through interfacing Inter Project Links (IPLs) creating the Integrated DWS (see chapter 5.1.10) with forecast delivery dates for all components. Main phases and milestones within the DWS have been selected and summarised to form the Master Schedule showing the full ITER project lifecycle. All deliveries are included in the Master. Execution performance in month as monitored in the Master is compared against the monthly DWS forecast for deliveries to determine need for additional management action and/or delivery uncertainty.

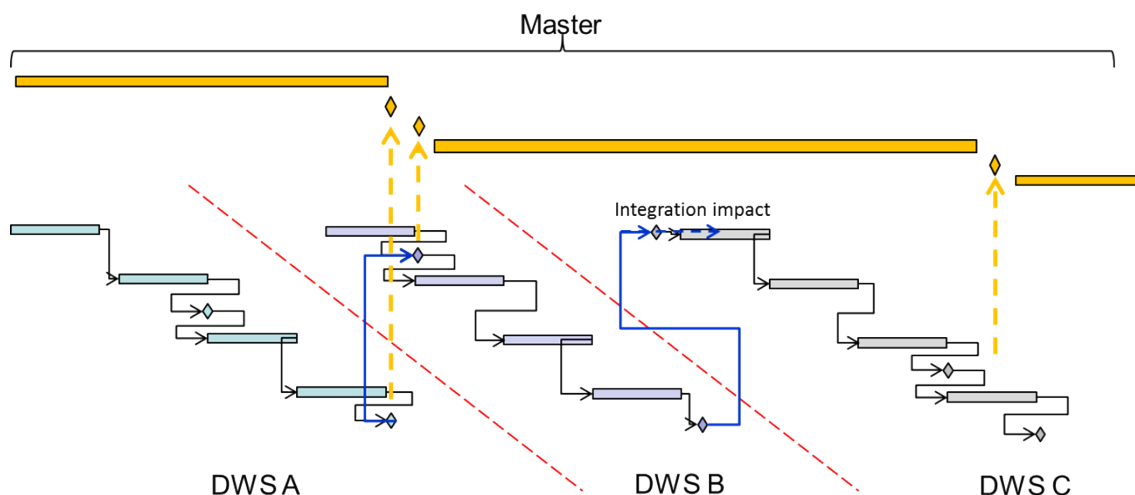


Figure 10 Relationships within the ITER Schedule, Master vs. DWS.

### 5.1.15 Baseline Committed Delivery Dates

The activities and milestones in the Baseline Master Schedule define baseline start/end dates and are a commitment by the PEE (IO or DA) responsible for the work.

The PEE is responsible to execute the work to meet these dates, or to define and implement corrective actions such that the overall delivery is meeting the baseline date.

The baseline Committed Delivery Date (CDD) is the planned delivery date to either IO or to another PEE, the CDD is defined by the baseline date of the delivery IPL. Each PEE will have multiple CDDs, one for each delivery IPL.

Performance will be measured against Master Schedule baseline, and variance will be reported, with explanation and corrective actions taken according to the Project Status Reporting Procedure ([Reference 3](#)).

### 5.1.16 RFE, RAD and ROS dates

The Master Schedule logically connects scheduled deliveries from IO and DA to the start of installation and assembly work. Specifically the Master schedule (and its underpinning C-DWS) defines as construction predecessors:

- the Building availability in which installation works will be performed and
- the components which will be installed.

Typically the driving path to the start of installation and assembly is building availability.

The date which a building is available for installation works is defined as the Ready for Equipment (RFE) date, it is an IPL between the Buildings DWS and the C-DWS as well as the Buildings MSS and the Construction MSS. The RFE conditions are defined in the RFE Documents ([ITER\\_D\\_B7BDGV](#)).

The date which is agreed between IO and DA as the latest acceptable delivery date on site for a component is defined as the Required Arrival Date (RAD). The date when the component will be used for installation is defined as the Required On Site (ROS) date and includes 5 weeks for inspection and preparations before the start of the construction work package (CWPS). The

difference (duration) between the RAD and the ROS is established based on risk assessment of the system maturity, the TRO's confidence level and the Plasma phase of the delivery. The MINIMUM difference between these two dates is 6 months except for a limited number of exceptional components (for example VV sectors and TF Coils).

This establishes a “pull” strategy whereby the IO through right to left is defining when a component is required to be delivered.

Performance will be measured against the CDD with variance reporting of execution versus baseline and free float controlled between the CDD and the RAD.

### 5.1.17 Planning & Scheduling monthly cycle

The Planning & Scheduling procedure has a fixed monthly cycle as shown in Figure 11, detailing the schedule statusing and integration, the reporting and analysis, and the change control windows used in ITER.

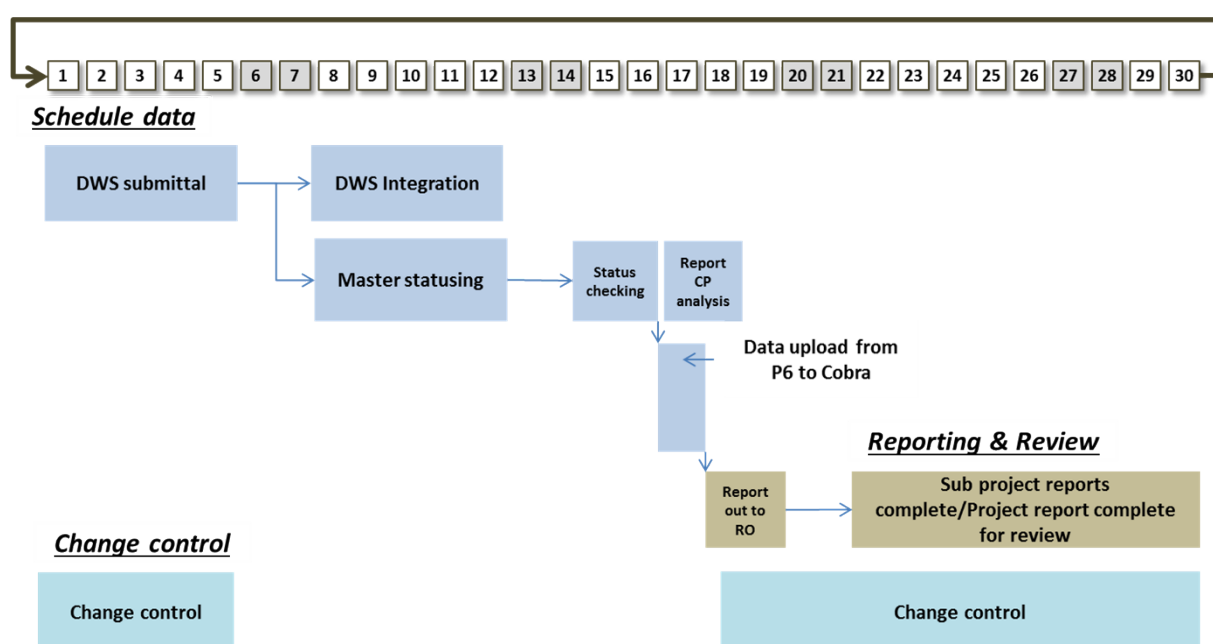


Figure 11 Planning & Scheduling Monthly Cycle

The Monthly DWS submission with status of previous months work and forecast forward planning is due in the beginning of the month according to the PCO Yearly Calendar ([Reference 22](#)).

The Master Schedule is statused with progress the week following the DWS submission. Both the DWS submission and the Master statusing must use a data date with the last day at 23h59 of the previous month.

The Change Control monthly window in Figure 11 refers to actual implementation of approved changes into the Master Schedule, the execution of the change control process is concurrently done during the month. The Performance Baseline Change Procedure ([Reference 2](#)) details the workflow change control.

The months with MAC/IC preparation have an anticipated DWS submission date, see the PCO Yearly Calendar ([Reference 22](#)) for details of the entire monthly project controls related dates.

### 5.1.18 Planning & scheduling software and structure

The Oracle Primavera™ Enterprise Project Management software suite; hereafter referred to as P6; is the CPM software selected for the control, integration and management of ITER Project Planning. P6 enables the management of multiple projects, organises data and also enables

responsible managers' access to project data by pre-defined global hierarchical structures. P6 uses EPS, OBS and WBS to rationally organize schedules.

The ITER Oracle Primavera system, licenses, databases and user access are managed, administered and controlled by the IO Project Controls Office; Primavera can only be installed on IO networks and infrastructure after authorisation of the IO PCO.

IO and DA Project controls and planning staff and contractors shall use P6 as the software for Planning and Scheduling. If working on ITER site, or connected to the IO Primavera Databases they shall have an IO controlled Primavera license.

Licenses and user access are assigned to IO and DA project controls staff, TRO's and authorised contractors with full direct read and write access or with read only access depending on user profile.

The detailed software solution and systems architecture is described and documented in the Project Controls Information Systems Architecture Description ([Reference 18](#)).

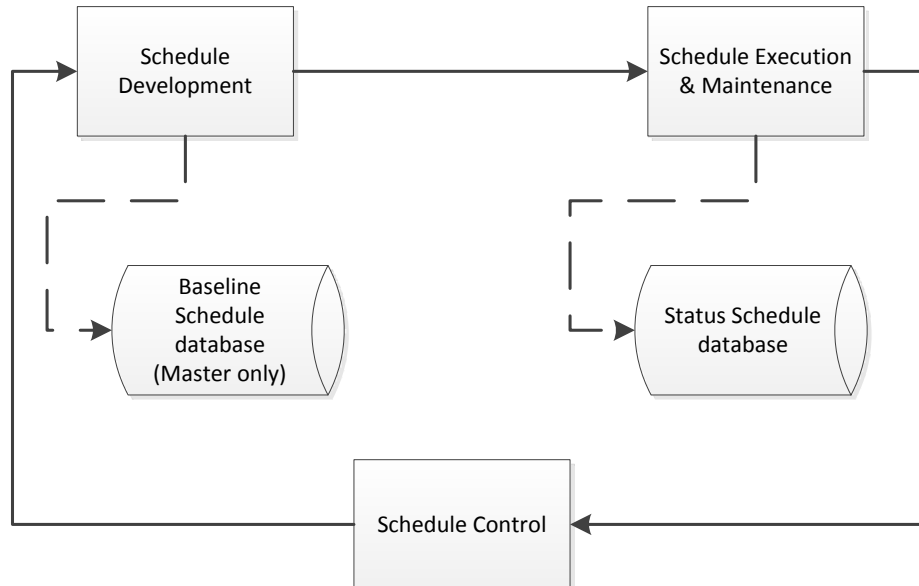
## 6 Workflow

### 6.1 Flow charts

The Planning & Scheduling Procedure contains 3 main processes:

- Schedule Development
- Schedule Maintenance and Execution
- Schedule Control

Together they cover the lifecycle of planning and scheduling and are interconnected as described in Figure 12.



**Figure 12 Planning and Scheduling Procedure**

These detailed processes are only applicable to the DWS and Master Schedule

They are applicable both to the DWS and the Master Schedule with some variations; their detailed workflows are described in chapters 6.1.1 Flowchart Schedule Development Process through to 6.1.3 Flowchart Schedule Control Process.

The OPS, the Level-1 and the Level-2 Schedules are summary reports of the Master Schedule baseline and are produced by IO-PCO, they are described in chapter 5 Basic principles – ITER Project Schedule Structure and are not the scope of these detailed processes and their associated workflows.

### 6.1.1 Flowchart Schedule Development Process

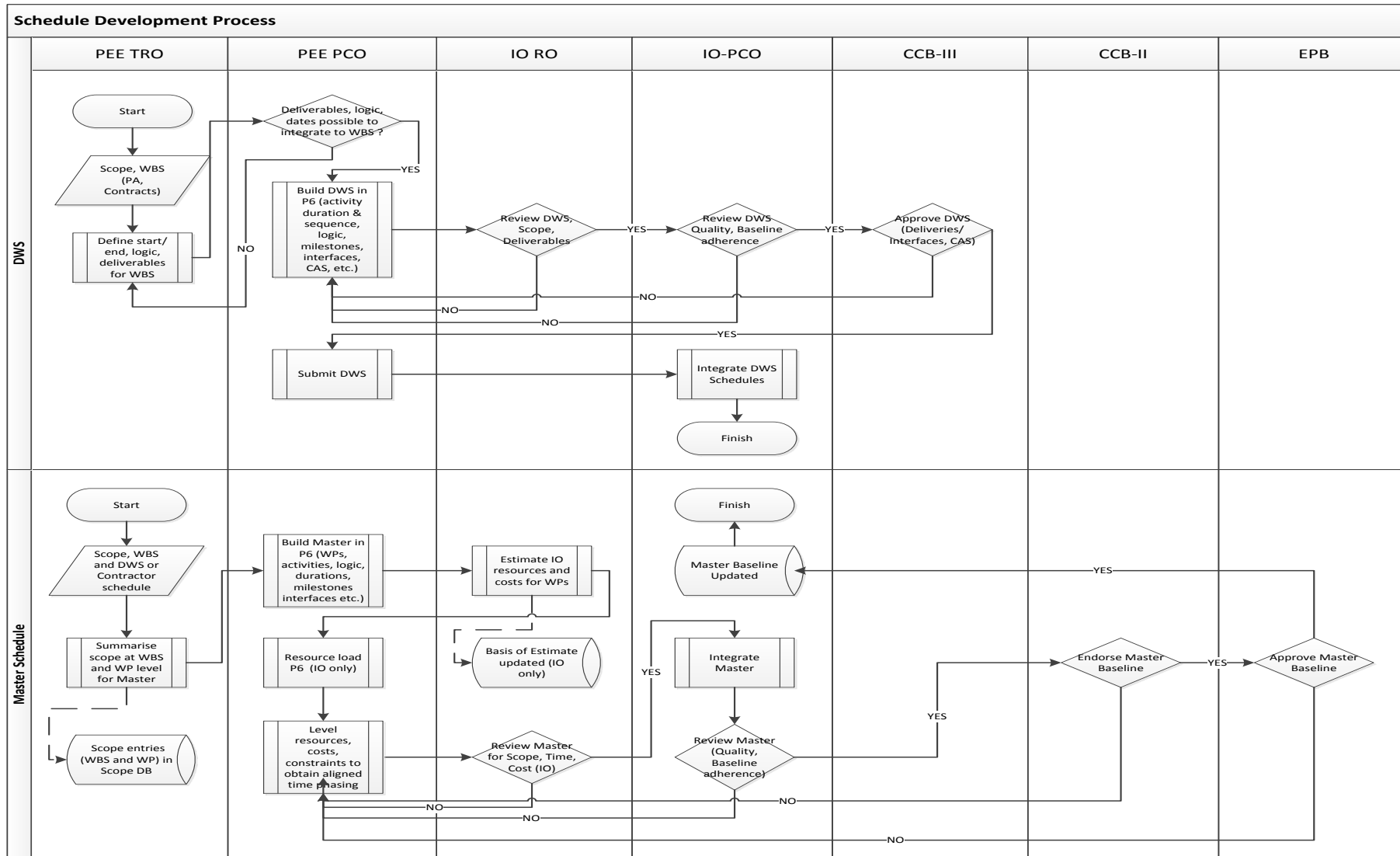


Figure 13 Schedule Development flowchart

### 6.1.2 Flowchart Schedule Execution & Maintenance Process

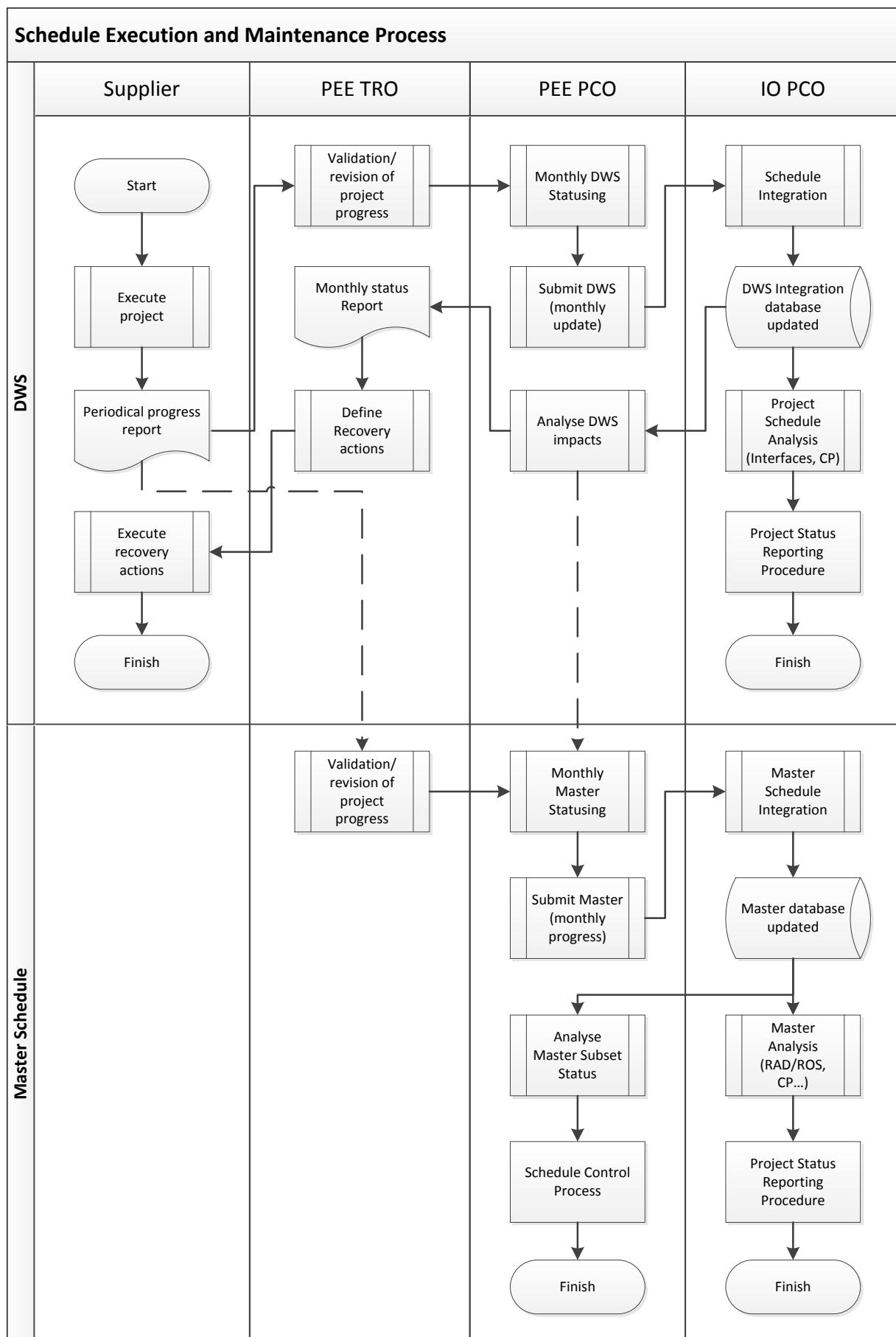


Figure 14 Schedule Execution & Maintenance flowchart

6.1.3 Flowchart Schedule Control Process

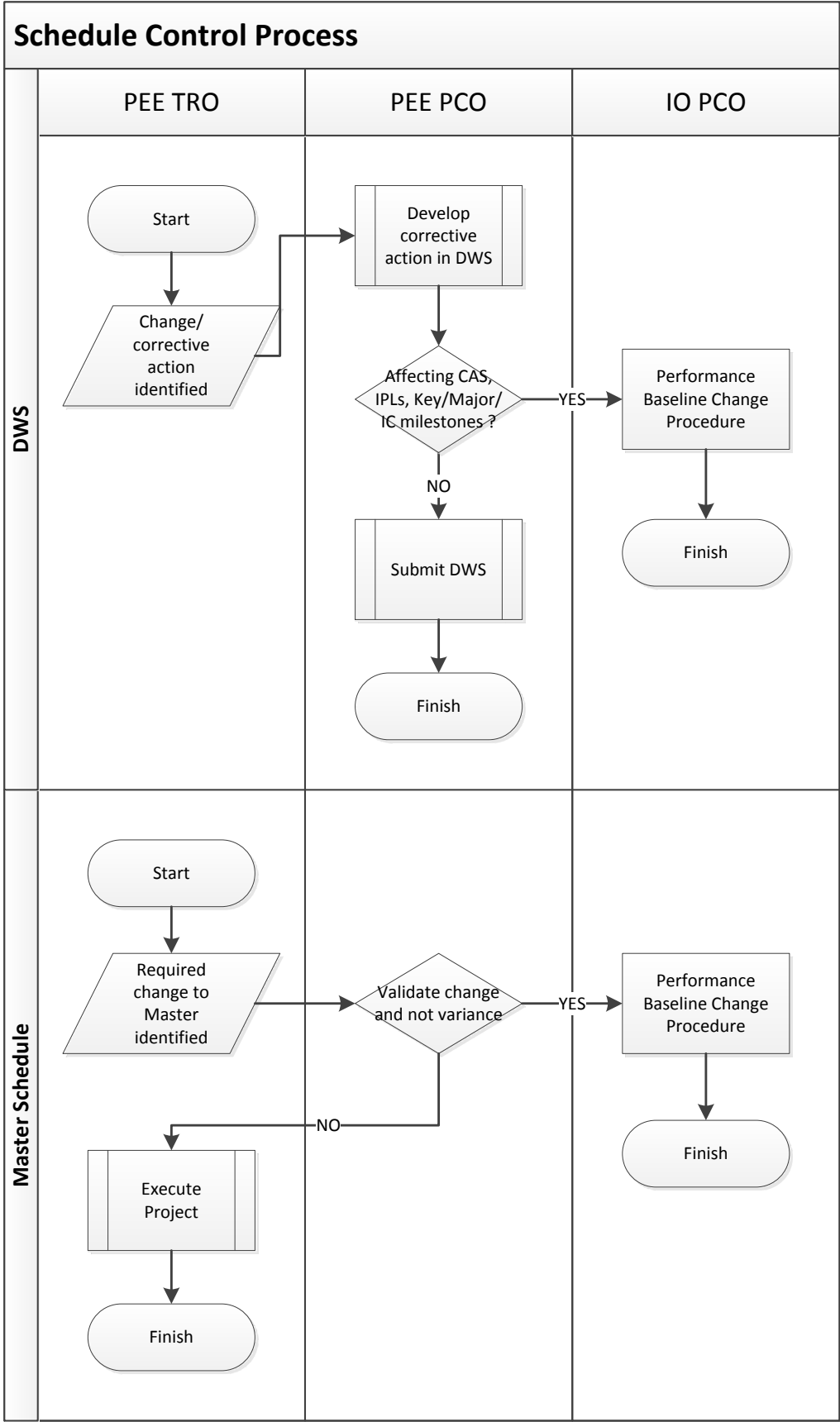


Figure 15 Schedule Control flowchart

## 6.2 Description: Schedule Development

The schedule development process applies to both the DWS and the Master Schedule and is visually described in

Figure 13 Schedule Development flowchart in chapter 6.1.1.

### 6.2.1 DWS

The DWS development is the responsibility of the PEE TRO (IO or DA) responsible for the specific DWS work scope and the associated PEE PCO team (IO or DA) supporting him/her. The DWS is reviewed by the IO RO for conformance with the specific scope and by IO PCO the requirements for DWS, it is approved by the CCB-III.

The DWS must follow the instruction for DWS development defined in the following working instructions and guidelines for DWS:

- Working Instruction for Required Scheduling Standards ([Reference 9](#)) - applicable to IO and DA DWS.
- Working Instruction for Preparation and Submission of DWS for Procurement Arrangements ([Reference 10](#)) - applicable to DA DWS only.
- Working Instruction for Initial IPL Generation, IPL Preparatory Table/ ICT Implementation and Agreement of Initial ICT ([Reference 11](#)) - applicable to IO and DA DWS.
- Working Instruction for Standard DWS Global Activity Codes and User Defined Fields ([Reference 12](#)) - applicable to IO and DA DWS.
- Working Instruction for Application of Control Points in the DWS ([Reference 13](#)) - applicable to IO and DA DWS
- Working Instruction for Definition and DWS Representation of Deliveries, Customs Activities and Shipping ([Reference 14](#)) - applicable to IO and DA DWS.
- Working Instruction for Task Agreements: Budget and Schedule Application ([Reference 15](#)) - applicable to DA DWS only.
- Procedure on Procurement Documentation Exchange Between IO, DAs and Contractors ([Reference 17](#)), section on schedule data exchange and submission.
- Site Construction Schedule Management Procedure ([Reference 20](#)) – applicable to the C-DWS only

The DWS schedule development goes through the following steps which are further detailed in the associated work instructions (see above):

- Define start/end, logic, deliverables
- Review Deliverables
- Build DWS in P6
- IO RO review of DWS
- IO PCO Review of DWS
- DWS Approval
- Submit DWS
- DWS Integration

### 6.2.2 Master Schedule

The Master Schedule development is the responsibility of the organisation (PEE) responsible to execute the specific work scope (IO or DA) and is performed by the PEE PCO(s) in charge of the MSS specific to that work scope. Multiple organisations (IO and DA) PEE PCO may be involved in developing a MSS, in that case the IO PEE PCO shall coordinate the work.



The Master Schedule development is based on the DWS or contractor schedule where they are available. Where they are not available, the master schedule is based on the defined Scope, WBS, target completion dates derived from the OPS and project strategy.

The Master Schedule development must follow the requirements defined in the Master Schedule Technical Specification ([Reference 7](#)) – applicable to both IO and DA.

The Master Schedule development goes through the following steps:

- Summarise Scope at WBS/WP Master level
- Build Master Schedule in P6
- Estimate IO resources and costs for WPs[*only applicable for IO:*]
- Resource load P6[*only applicable for IO:*]
- Level resources, costs, activities to obtain time phased alignment.
- RO review of Master (Scope, Time, Cost)
- Integrate Master
- IO PCO review of Master
- CCB-II Master Baseline review
- EPB Master Baseline Approval
- Update Master Baseline

### 6.3 Description: Schedule Execution and Maintenance

The schedule execution and maintenance is the responsibility of the PEE TRO supported by the PEE PCO and is based on the execution of work by the Supplier (or the direct execution by the PEE).

The schedule execution and maintenance process applies to both the DWS and the Master Schedule and is visually described in Figure 14 Schedule Execution & Maintenance flowchart in chapter 6.1.2.

The schedule execution and maintenance process follows the Planning & Scheduling Monthly Cycle (see chapter 5.1.17) according the PCO yearly calendar ([Reference 22](#)) and provides input to the Performance Reporting Procedure to report progress of work execution.

#### 6.3.1 DWS

The DWS Execution and Maintenance is the responsibility of the PEE TRO (IO or DA) responsible for the specific DWS work scope and the associated PEE PCO team (IO or DA) supporting him/her

The DWS execution and maintenance must be compliant with the following working instructions and guidelines for DWS:

- Working Instruction for Required Scheduling Standards ([Reference 9](#)) - applicable to IO and DA DWS.
- Working Instruction for DWS and Master Schedule monthly statusing and update ([Reference 16](#)) – applicable to IO and DA DWS
- Working Instruction for Preparation and Submission of DWS for Procurement Arrangements ([Reference 10](#)) - applicable to DA DWS only.
- Site Construction Schedule Management Procedure ([Reference 20](#)) – applicable to the C-DWS only.
- Procedure on Procurement Documentation Exchange between IO, DAs and Contractors ([Reference 17](#)), section on schedule data exchange and submission.
- Performance Reporting Procedure ([Reference 3](#))

The DWS schedule development goes through the following steps which are further detailed in the associated work instructions (see above):

- Execute project (also input to Master Schedule Execution and Maintenance)

- Validation of project progress
- Monthly DWS statusing
- Submit DWS (according to PCO yearly calendar ([Reference 22](#)))
- Schedule Integration
- Project Schedule Analysis (CP & Float etc.)
- DWS Impact Analysis and monthly status report
- Define corrective actions
- Execute corrective actions

### 6.3.2 Master Schedule

The Master Schedule execution and maintenance is the responsibility of the organisation (PEE) responsible to execute the specific work scope (IO or DA) and is performed by the PEE PCO(s) responsible for the MSS specific to that work scope. Multiple organisations (IO and DA) PEE PCO may be involved in developing a MSS, in that case the IO PEE PCO shall coordinate the work.

The Master Schedule execution and monitoring is based on Supplier work progress and the PEE DWS for ongoing work.

The Master Schedule execution and maintenance must be compliant with the following procedures, working instructions and guidelines relating to the Master Schedule

- ITER Project Management Plan ([Reference 1](#))
- Performance Baseline Change Procedure ([Reference 2](#))
- Project Status Reporting Procedure ([Reference 3](#))
- Master Schedule Technical Specification ([Reference 7](#))
- Working Instruction for DWS and Master Schedule monthly statusing and update ([Reference 16](#))

The Master Schedule execution and maintenance process identifies progress of work to date and forecasts completion of ongoing work. It assigns physical progress (physical % complete) to ongoing (and completed) work and sets expected finish dates on started (ongoing) activities. Not started activities and milestones are recalculated by Primavera to show execution performance based on actual work. Reforecasting of future work is not allowed in the Master Schedule, forecasting is done through the DWS.

The Master Schedule execution and maintenance process goes through the following steps:

- Validation of project progress
- Monthly Master statusing
- Submit Master monthly status (according to PCO yearly calendar ([Reference 22](#)))
- Master Schedule Integration
- Project Level Master analysis (by IO PCO)
- Analyse Master Subset (by PEE PCO)

The output of the process is used in the Schedule Control Process to control corrective actions and changes required and by the Performance Reporting Procedure to report performance in period.

## 6.4 Description: Schedule Control

The schedule control process is the responsibility of the PEE TRO owner of the scope with support from the PEE PCO; it applies to fully to the Master Schedule and in a limited extent to the DWS,

The Schedule Control process is visually described in Figure 15 Schedule Control flowchart in chapter 6.1.3.

The Schedule Execution and Maintenance process acts as input to the Schedule Control process where issues and corrective actions are reviewed and identified as either normal variance in execution (to be corrected through the execution of the project) or as a change requiring a revision of the baseline schedule.

The major reasons for changes to schedule baseline are due to:

- design change,
- strategic change to recover or improve performance;
- changing external constraints i.e. typically financial or research interests;
- rolling wave planning as project advances through major stage gates such as design phases and contract award.

Changes to the schedule baseline (OPS, Master Schedule and certain DWS elements) are executed according to the Performance Baseline Change Procedure ([Reference 2](#)) and the specified Thresholds therein. The IO PCO coordinates the execution of the BCP procedure.

#### 6.4.1 DWS

The DWS is a forecast schedule and is not under formal change control, however certain elements in the DWS required for schedule integration and performance reporting are controlled, these are:

- activity ID and name of incoming and outgoing IPLs as defined in the ICT;
- activity ID and name of higher level control milestones (IC, Key and Major);
- activity ID and name of CAS milestones (DA DWS only)
- activity ID, name and date of RAD and ROS milestones (IO Only);
- CWP coding to Master summary activity (C-DWS only)
- Direct predecessor logic from CWP to Receipt IPLs (C-DWS only)

These controlled elements cannot be removed, replaced, created or their scope changed without an authorised Baseline Change Proposal (BCP).

The DWS Schedule Control is the responsibility of the organisation (PEE) responsible to execute the specific work scope (IO or DA) and is performed by the PEE TRO responsible for the DWS specific to that work scope supported by the PEE PCO.

The DWS schedule control goes through the following steps:

- Identify need for corrective action
- Develop Corrective actions in DWS
- Identify if controlled element affected and change required (apply Performance Baseline Change procedure)
- Submit DWS

Changes to the DWS shall be executed according to the requirements and instructions in the Performance Baseline Change Procedure ([Reference 2](#)) and be compliant with the working instructions and guidelines applicable to DWS Development and to DWS Execution and Maintenance processes (see chapters 6.2.1 and 6.3.1).

#### 6.4.2 Master Schedule

The Master Schedule Control is the responsibility of the organisation (PEE) responsible to execute the specific work scope (IO or DA) and is performed by the PEE PCO(s) responsible for the MSS specific to that work scope. Multiple organisations (IO and DA) PEE PCO may be involved in executing and controlling a MSS, in that case the IO PEE PCO shall coordinate the work.

The Master Schedule baseline is fully under configuration control, the WBS, activities and milestones, start and finish dates, durations, logic, resource and expense loading and activity

coding are subject to control according the Performance Baseline Change Procedure ([Reference 2](#)) per the defined thresholds therein.

Changes to the master schedule shall be reviewed and approved according the Performance Baseline Change Procedure ([Reference 2](#)).

The Master schedule control goes through the following steps:

- Change need identified
- Validate change, not variance
- Performance Baseline Change Procedure
- Execute corrective action to recover variance

Approved changes must be executed and implemented according to the Master Schedule Technical Specification ([Reference 7](#)) and are subject to the process of Master Schedule development (chapter 6.2.2).

## 7 Responsibilities

### Supplier

The Supplier (to IO or DA) is responsible to execute the project works scope he has been contracted for. He should within the terms of the contract provide a baseline plan for project execution and monthly (or more often) schedule status reports providing the physical progress to date and forward planning for expected completion of work.

The Supplier is responsible to implement approved change requests and corrective actions within the terms of the contract in the current work plan baseline as instructed by the contract managing PEE TRO (DA or IO).

The Supplier can be an internal team within the IO or DA who is providing work scope under the responsibility of the PEE TRO (design, analysis, etc.).

### PEE TRO

The Project Execution Entity TROs are responsible for project management in their areas, including schedule development and maintenance, analysis and input for project schedule progress, performance and identification of emerging problem areas, and determining the effect of proposed changes to the schedule. They are responsible for the execution of the work for their assigned Procurement Arrangement (DA), Fund capital procurement (IO) or transversal integration and support activities (IO).

PEE TRO can be from a DA or IO, depending on the responsibility of the scope.

### PEE PCO

The PEE PCO staff (IO or DA planners and project controls managers, etc.) is responsible for; developing and maintaining the DWS and Master Schedule for their assigned WBS areas: to plan and monitor progress of scheduled activities; to collect status of progress, update and maintain their DWS and Master Schedule; to generate schedule reports for submission to the PEE TRO and IO PCO; and to prepare, assess and implement change requests for their assigned scope.

The PEE PCO scheduling staff is also required to have a working knowledge of PCO Planning & Scheduling Procedure and associated MQP Level-3 documents.

### IO PCO

IO PCO provides leadership for coordinating overall ITER project management activities and tools that establish, develop and maintain an integrated scope, schedule and cost baseline for the ITER Project. Specific responsibilities for planning & scheduling include:

- Administration of planning and scheduling system including the preparation of policies and procedures, schedule database administration and enhancements, change control, analysis and reporting of schedule performance management.
- Coordination of schedule recovery actions with PEEs (IO and DAs).
- Ensure that costs are time-phased in accordance with the project schedule in order to provide a cost profile for the current year and the ITER Project lifecycle, and work to ensure broad consistency between costs and budgets.
- Provide systems and procedures for timely, accurate and integrated schedule reporting. These systems ensure that the processes across all IO and DAs support effective and timely compiling of schedule information to agreed reporting frequencies.
- Responsible for maintaining the overall administration of the scheduling system. This includes the horizontal and vertical integration of IO and DA elements of the scheduling system, monthly critical path analysis of the integrated schedule, maintenance of schedule baselines, planning for and providing enhancements to the scheduling system.

IO PCO is responsible for defining and providing the rules, tools and procedures against which the baseline is developed, and progress monitored. IO PCO is responsible for providing the necessary expertise and support to the IO ROs and PEE Project Controls to facilitate execution of their responsibilities under this procedure.

### **CCB-III**

By DG delegation is the decision making entity contained within a Department i.e. Departmental manager and by delegated authority that organizational units reporting line. For those actions beyond its authority, it advises CCBII on the preferred course of action.

For the Planning and Scheduling Procedure the CCB-III is the IO PCO led CCB-III for authorisation and validation of DWS and Master Schedule changes

### **CCB-II**

By DG delegation is the decision making entity referred to if performance impact, risk, or action goes beyond the authority of the Departmental Director or threatens ITER Council commitments for project delivery. For those actions beyond CCBII authority, it advises EPB on the preferred course of action.

Through DG decision making authority as Chair, is the body that takes significant actions to address performance issues and risks that influence achievement of the Overall Project Schedule, ITER Council Milestones, or Overall Project Cost.

### **EPB**

Through DG decision making authority as Chair, is the body that approves baseline changes to the Master Schedule and takes significant actions to address performance issues and risks that influence achievement of the Overall Project Schedule, ITER Council Milestones, or Overall Project Cost.

## **8 Link with other processes**

### **8.1 Interactions with the Scope Development Procedure**

The Schedule Development Process (chapters 6.1.1 and 6.2) uses output from the Scope Development Procedure ([Reference 5](#)) as input to schedule development for the DWS and the Master Schedule.

## **8.2 Interactions with the Procedure for the Preparation, Review, Approval and Award of Procurement Arrangements**

The Schedule Development Process (chapters 6.1.1 and 6.2) uses output from the Procedure for the Preparation, Review, Approval and Award of Procurement Arrangements ([Reference 6](#)) as input to schedule development for the DWS and the Master Schedule related to PAs.

## **8.3 Interactions with the Procurement Process**

The Schedule Development Process (chapters 6.1.1 and 6.2) uses output from the In-Cash Procurement Procedure ([Reference 23](#)) as input to schedule development for the DWS and the Master Schedule related to IO procured work scope and IO contracts.

## **8.4 Interactions with the Project Status Reporting Procedure**

The output of the Schedule Execution and Maintenance process (chapters 6.1.2 and 6.3) provides input to the Project Status Reporting Procedure ([Reference 3](#)).

## **8.5 Interactions with Performance Baseline Change Procedure**

The output of the Schedule Control Process (chapters 6.1.3 and 6.4) provides input to the Performance Baseline Change Procedure ([Reference 2](#)).

## **8.6 Interaction with the Budgetary Procedure**

The schedule development process is linked to the budgetary procedure (over a rolling wave three year horizon) of Finance & Budget Division to ensure that the schedule and the associated work scope can be executed with the available annual budgets.

# **9 Outputs (Records, Deliverables, Implementation plans....)**

The Primavera planning and scheduling system includes the templates, layouts and forms required to execute the planning and scheduling procedure, they are maintained by IO and DA PCO and only available to IO, DA and contractor staff with authorised Primavera license and database user setup. Their use is part of the basic function of the planners and schedulers in IO and DA.

The OPS is recorded on IDM, and reflects the IC approved baseline, it is available in the following document:

ITER Overall Project Schedule (OPS) ([ITER\\_D\\_43N7X7](#))

The ITER WBS down to level 5 is recorded on IDM, and reflects the approved baseline WBS; changes approved through the Project Change Procedure are recorded in new revisions of the following document:

ITER WBS L0 - L5 ([ITER\\_D\\_RLUDKV](#))

The schedule records are contained in the IO Primavera database for the Level-1 and Level 2 Schedules, the Master Schedule and the DWS Schedules. For the Master Schedule this includes 2 datasets: The Baseline Schedule and the Status Schedule including progress to the last month.

The Master Schedule Baseline report is printed in PDF and is available for information in IDM:

ITER Master Schedule Baseline Report ([ITER\\_D\\_VESQ56](#))

(It should be noted it only lists activities and milestones and dates, logic relationships and other linked data is not available in the PDF format, only in the Primavera database).

The Primavera scheduling system and databases at IO are backed up daily through the IT backup processes.

The Primavera database structure, EPS nodes, Monthly Status and Monthly Archive are detailed in the Project Controls Information Systems Architecture Description ([Reference 18](#)).

The DA Monthly DWS submissions are recorded according to the Procedure on Procurement Documentation Exchange between IO, DAs and Contractors ([Reference 17](#)), section on schedule data exchange, the records are stored on IDM in [ITER\\_D\\_3XMJKA](#).