**Design Collaboration Implementation Form (DCIF) for the Design Office activities related to the**

**Cryostat PA**

**PBS 24**

**2.4.P1A.IN.01**

**Abstract**

This document complements the Procurement Arrangement (PA) documentation by focussing on IO DO & DA DO collaboration organisation, responsibilities, processes & inputs/outputs for the Cryostat.

**Major Changes**

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| --- | --- | --- | --- |
| Version | Date | Location | What |
| 1.0 | 02/03/2011 | - | First version |
| 1.1 | 15/03/2011 | - | Switch in synchronous mode and addition of the design phase for the temporary workshop |
| 1.2 | 11/04/2011 | - | Wording change |
| 1.3 | 14/04/2011 | - | Change on contact person and on the workplan |
| 1.4 | 31/05/2011 | - | I&C workplan added |
| 1.5 | 21/07/2011 | - | Change following the discussion held the 20th July (DA TRO, IO RO, IO RE and IO DO) |
| 1.6 | 25/08/2011 | - | Change in accordance with last IN DA and IO comments |

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# Objectives of the DCIF

This document:

* Is related to the ITER cryostat Procurement Arrangement (PA), procured by IN DA, which includes the manufacturing and installation of the cryostat based on a Build-to-Print including site fabrication and subassembly of the cryostat components in temporary workshop and assembly in the tokamak pit (the design, the manufacturing and the installation of the temporary workshop is also DA responsibility).
* Recommends a collaboration scheme between IO Design Office (DO) and the DA DO for CAD data management.
* Characterises the related organisation aspects to be applied for the Procurement Arrangement.
* Proposes an implementation plan for the activities of the IO DO and DA DO.
* Conserves the consistency with the [Procedure for the Usage of the ITER CAD Manual (2F6FTX v1.1)](https://user.iter.org/?uid=2F6FTX&version=v1.1) and the [Protocol of Design Collaboration (24P2F6 v1.7)](https://user.iter.org/?uid=24P2F6&version=v1.7) between IO DO and DA DO
* Has been written based on the following documents:
  + - [2.4.P1A.IN.01 Cryostat Main PA (42T878 v1.0)](https://user.iter.org/?uid=42T878&version=v1.0)
    - [2.4.P1A.IN.01 Cryostat Annex A (42THDD v1.0)](https://user.iter.org/?uid=42THDD&version=v1.0)
    - [2.4.P1A.IN.01 Cryostat Annex B (45N2WS v4.0)](https://user.iter.org/?uid=45N2WS&version=v4.0)

# Collaboration Scheme

## CAD data

### Choice and justification

There are three possible collaboration schemes (synchronous, asynchronous and scheduled) possibly applied on ITER collaborative designs, which are described in the [Collaboration Scheme description (2WS83V)](https://user.iter.org/?uid=2WS83V&version=v1.0).

Among these three schemes, IO recommends two different collaboration schemes for the Cryostat Main component and Cryostat instrumentation on one side, and Temporary Workshop design on the other side:

**For the Design of the cryostat main component and cryostat instrumentation: Synchronous collaboration scheme** should be used (instead of Asynchronous, which would apply to a BtP PA with frozen environment). IO will be the owner of the design models up to 6 months from PA signature.

After contract award, a comparative technical and efficiency assessment will be done between synchronous and asynchronous collaboration schemes (DB sharing and ENOVIA reconciliation). If the assessment is positive for the synchronous approach, then this collaboration scheme will be continued otherwise asynchronous collaboration scheme will be applied.

“Synchronous collaboration scheme” means that all CAD design contributors (IO / IN DA/Vendors) are sharing the same CAD Database, preventing the additional works of exports from and imports into the database during the necessary design reviews and design integration reviews. This is enabled through the replication of ENOVIA Data Base between IO and IN DA, and through a direct remote connection between the IN DA DB and the Vendor’s premises.

If there is any new collaboration schemes evolved in future, this DCIF can be amended to incorporate new collaboration scheme only if IO & DA management mutually accepts.

**Justification:**

* Although the PA for Cryostat Main Component is of Built-to-print type, the schedule imposes some reserves on the stability of interfaces
* Functional specification PA for the cryostat instrumentation
* Several domestic agencies involved on interfacing procured packages.
* Due to the number of systems interfacing with the cryostat, the PCR on other systems will probably impact the Cryostat definition in the first design phases, including the phase during which the manufacturing know-how of the vendor is integrated within the design.

**For the CAD models representing the external envelop of the Cryostat Temporary workshop:**

**Asynchronous collaboration scheme** to be used.

The CAD information requested by IO for the Cryostat temporary Workshop will be limited to simplified external shape models of the building, located on the ITER Site layout model:

When requested by IO RO of the Building or Cryostat or Assembly or Safety, the model representing the external envelop of the building, saved in CATIA V5, shall be sent to IO by the DA and reintegrated in the ENOVIA Data Base by IO DO.

The model representing external envelop of the building shall be produced and updated by the DA each time IO requests it and each time that a change occurs in the external envelops of the detailed model (DM) or in the interfacing features of the DM provided by the contractor to the DA.

### Evolution of collaboration schemes along the task

**For the Cryostat Temporary workshop:**

Asynchronous collaboration scheme recommended all along the project time, no evolution

**For the Design of the cryostat main component and cryostat instrumentation (see flowchart hereafter called “Collaboration Strategy / PA Phases”):**

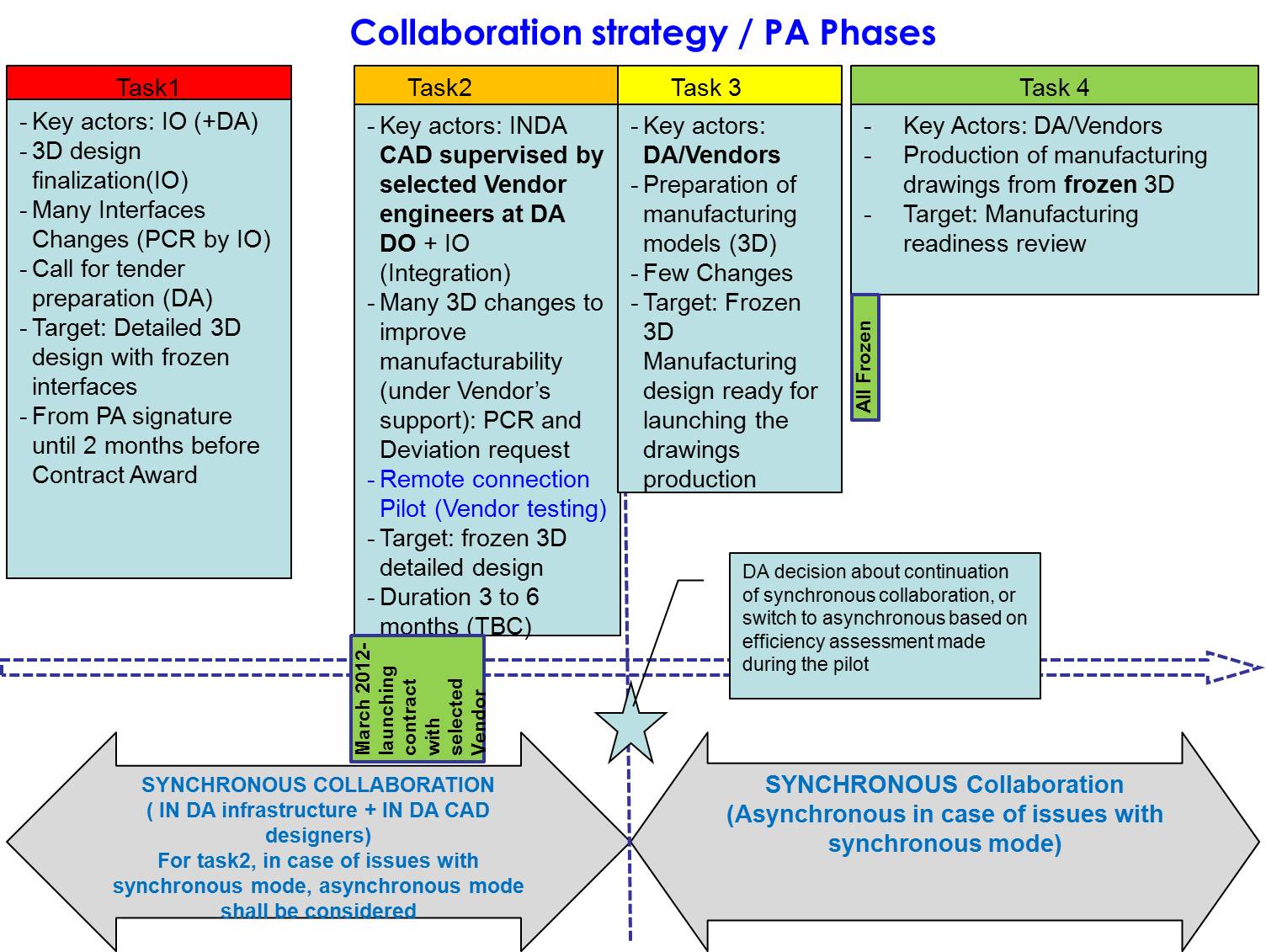
Task 1 (Implementation of the IO PCR) and Task 2 (Implementation of the DA/Vendors manufacturing requirements) shall be performed in synchronous mode (if technical/efficiency issue will occur during implementation of task-2, then Asynchronous scheme shall be considered as alternative).

In the case the conclusion of the pilot recommends the usage of the synchronous mode for Task 3 (Manufacturing Models of the cryostat main component and cryostat instrumentation) and Task 4 (Production of manufacturing drawings), the synchronous mode should be used for those 2 Tasks.

Nevertheless, in the case of technical and/or efficiency issues of the synchronous mode possibly met during the implementation of pilot, DA shall decide to switch to the asynchronous mode for implementation of Task 3 & 4. IO-DO will have no resource to implement the CAD data reconciliation in the ENOVIA data-base.

In the case the synchronous mode is implemented at the Vendor’s, the remote connection between IN DA DO and the Vendor’s DO could be deployed by IN DA DO with a support of IO. The Vendor’s Designer could follow a training session at the IN DA on ENOVIA V5.

The different Phases and associated collaboration schemes recommended for the design activities of the Cryostat main component and Cryostat instrumentation are summarized within the flowchart below:



### Acceptance of Multi-CAD design between DA and suppliers

**YES,**

* after switch to Asynchronous mode (if occurs)
* Provided compliance to the boundary conditions for Multi-CAD usage given in the [ITER CAD Manual Section 8 - Collaboration Processes (ITER\_D\_249WV4)](https://user.iter.org/?uid=249WV4).

## Diagram data

**Direct Remote Connection** promoted by IO.

**Justification:** The Cryostat system uses network elements. Their representations (one line and cabling diagrams, PFD and P&ID (fluids diagrams), CODAC…) will be done through a remote connection to the IGE+XAO SEE System Design licenses and database of IO which is the only reference solution on ITER collaboration diagrams.

# Enablers Related to this PA

## Software

### For CAD data

* IO DO and DA DO will use the CATIA version indicated in the latest version of the ITER CAD Manual released by IO DO, CATIA V5 (R19 SP5 currently). Further changes of CATIA release will be announced officially through the CAD working group and by mail to the DA DO.
* Product Data Management (PDM) system: ENOVIA V5.
* CATIA V5 E&S workbenches
* Mechanical Standard part management tool (including extensive standard and commercial catalogs which connect to CATIA and ENOVIA): CADENAS software
* CAD Quality checking: Q-checker
* CATIA customization provided by IO:
* Bill of Material (BOM) ([How\_to\_Generate\_VPMNav\_Export\_BOM\_Report (35PZ5Z)](https://user.iter.org/?uid=35PZ5Z) )
* Design Log Book ([How to use design logbook (3QFDA9))](https://user.iter.org/?uid=3QFDA9)

For details about IO DO CAD systems, refer to:

[ITER CAD Manual Section 1.3 - IO CAD System (249WLQ](https://user.iter.org/?uid=249WLQ))

For details of CATIA release, refer to:

[ITER CAD Manual Section 7 – CAD Fact Sheet (249WUL](https://user.iter.org/?uid=249WUL))

For the synchronous approach pilot, the IN DA and its Vendor shall organize a direct Remote connection between the INDA Enovia DB and the Vendor’s premises as described below: [Solution description: Remote CAD design solution (3VY6HV)](https://user.iter.org/?uid=3VY6HV)

### For Diagram data

* Engineering Design Diagram System: IGE+XAO SEE System Design (SSD).
* Publication system for all diagrams: ICP.
* IO will provide a remote access to the IGE+XAO SEE System Design platform via a CITRIX connection with appropriate licences.
* IO will provide IDM accounts (for ICP access).
* In addition, DA shall use these following tools and have their own licence:
* Cubicle detailed wiring diagrams: IGE+XAO SEE Electrical Expert
* Cabling Management: IGE+XAO SEE Cabling Manager

### For Piping isometric drawing generation

* Isometric system: I-RUN 3.5.0 or upper-version from Intergraph (previously called ISOGEN).
* All piping drawings are to be stored as CATIA Drawings in ENOVIA V5.

## Standards and templates

* Diagram templates for SEE-System Design as well as ITER’s symbols for diagrams, and related E&S set-up will be enabled for the DADO (or suppliers) through the configuration of machines.
* CAT settings recommended by IO and CATIA automation tools related to ITER customisation, including generation of Drawings frames and Titleblocks, will be enabled for the CDO thanks to the configuration of machines.
* ISO drawing standards are given in the [ITER CAD Manual Section 10 – ISO Drawing Standards (24MZWV)](https://user.iter.org/?uid=24MZWV)

## Procedures & Documentation

### For CAD data production and CAD data management

IO drawings and models management, approval processes and procedures:

* [Procedure for the Management of CAD Work & CAD Data (Models and Drawings) (2DWU2M v1.7)](https://user.iter.org/?uid=2DWU2M&version=v1.7)
* [Procedure for the Approval of CAD data – CMM , 3D Models & Drawings (2E3UCH v1.5)](https://user.iter.org/?uid=2E3UCH&version=v1.5)
* [Procedure for the Promotion of CAD Data from In-Work to Draft Status (28LVHH v1.7)](https://user.iter.org/?uid=28LVHH&version=v1.7)

### For CADENAS use

The use of Mechanical Standard Parts shall be done through the CADENAS software

The following methodologies and procedures shall be applied:

* [CADENAS Standard Parts – Collaboration Processes (342GSU v1.0)](https://user.iter.org/?uid=342GSU&version=v1.0)

The IN DA/Vendors can use CADENAS by two means:

* CADENAS integrated directly in CATIA/ENOVIA replicated data base: in this case, IN DA/Vendors shall buy a CADENAS licence, but would benefit of a fully integrated environment and immediate availability of the standard parts: For this solution, please refer to: [How To - CADENAS For ENOVIA Replicated Users (3M36FP)](https://user.iter.org/?uid=3M36fp)
* CADENAS used through CITRIX connection: In this case, all resources are run on IO Central databases (CADENAS and Enovia), which allows the use of CADENAS through IO licences, but it can take up to 3 days to have a part available in the ENOVIA replicated DB on DA side. For this solution, please refer to: [How To - CADENAS For File Based Users (CITRIX) (342DV4)](https://user.iter.org/?uid=342DV4)

### For diagrams production

IO diagram management, approval processes and procedures shall be applied:

* [CAD Manual 14 - Diagram Guidelines (35CY6V)](https://user.iter.org/?uid=35CY6V)
* [ICP\_SSD\_PDF Diagram management functional spec (2N2YX2)](https://user.iter.org/?uid=2N2YX2)
* [SSD Golden Rules (3TQGM4 v1.1)](https://user.iter.org/?uid=3TQGM4&version=v1.1)
* [Plant Diagram (2DW78H)](https://user.iter.org/?uid=2DW78H)

### For Equipment & System (E&S) production

IO populates its catalogues DB with standards references, commercial references or preliminary design references. The documentation of existing part families is stored in [Technical Description Sheet (TDS) (27YG5M](https://user.iter.org/?uid=27YG5M)) describing the equipment (material, size, attributes…) which are stored on IDM (IDM account needed) under the following link: [Catia Plant Designer Catalog Documentation](https://user.iter.org/?uid=283AMM) (283AMM).

The 3D representations are stored in ENOVIA and are available by CATIA through the different following workbenches:

* Equipment & System \ Multi-discipline
* Equipment & System \ HVAC discipline
* Equipment & System \ Piping discipline
* Equipment & System \ Structure discipline
* Equipment & System \ Preliminary Layout
* Equipment & System \ Electrical Cabling Discipline

For further details on modules to be used depending on the kind of work to perform, you can consult [03 EnS Add-on Documentation (2Y78NL)](https://user.iter.org/?uid=2Y78NL) on §8 “Licensing”.

Designers will have to follow E&S methodologies and HOW TO stored under: [Equipment&System (29FSLN)](https://user.iter.org/?uid=29FSLN)

The contractor may need specific catalog references not yet existing in the IO catalog to fulfil his design. In this case, the contractor shall follow this procedure to obtain integration of its own catalog production in Central IO catalog: [E&S Catalog Production (2EWCHG)](https://user.iter.org/?uid=2EWCHG)

### For piping isometric drawing production

The DA shall comply with the following IO requirements:

* Documentation for installation: see §13 of [ITER Equipment and Systems Add-On Deployment and Usage (2Y78NL).](https://user.iter.org/?uid=2Y78NL)
* Documentation for production: see [How to use ITER Piping ISOmetrics (2W547R)](https://user.iter.org/?uid=2W547R).

# Design Offices responsibilities

## IO DO responsibilities

As defined in the [ITER CAD Manual Section 03 - DO Organization & Responsibilities (249WQN)](https://user.iter.org/?uid=249WQN)

* To finalize the 3D design (task 1) through closure of open PCRs during the task 1, as defined within the IN DA
* To ensure the implementation of ITER ENOVIA database replication
* To allow a remote access to the IGE+XAO SEE System Design licences and to the IO Database (via CITRIX)
* To provide the inputs identified in §5.1
* To manage the diagram data approval process.
* To check on DA designers (or supplier) certification.
* To provide IDM accounts.
* To provide the 2D/3D checker tool.
* To provide Q-Checker profiles
* To provide I-RUN settings (E&S supplier package).
* To enable the DA all customization, setups and settings (Generic CAD supplier package, E&S supplier package…)
* To attribute relevant roles to the DA DOCC and designers (or supplier) in the ITER ENOVIA P&O concept after certification.
* To temporary allow a remote access to the ITER CADENAS Mechanical Standards Parts (via CITRIX) until DA get the CADENAS software licences if IN DA/Vendors makes the choice to use CADENAS through Citrix.
* To support (IT recommendations about infrastructure and network settings), , the DA in building the remote connection with selected contractor premises for the remote connection pilot (task 2) and for the remote connection deployment at the end of task 2.
* To inform DA DO about any interface change by using the ENOVIA subscriptions and the corresponding mail or meetings if required.
* To take in charge the implementation of new catalog parts designed by the DA DO (or its supplier) according to methodologies stated in §3.3.4
* To support DA with level 3 CAD support as described in [World wide support concept and procedures (34VB64 v1.0)](https://user.iter.org/?uid=34VB64&version=v1.0)
* To perform the reconciliations under ENOVIA (see §2.1.2.3) of the model representing the external envelop of the building (the Temporary Workshop) in CATIA V5 format when requested by IO RO of the Building or Cryostat or Assembly or Safety,

## DA DO responsibilities

As defined in sections §3.1.2 and §3.5.5 of the [ITER CAD Manual Section 03 - DO Organization & Responsibilities (249WQN](https://user.iter.org/?uid=249WQN))

* To provide the IO DO with the 3D geometry relevant for:
* The configuration control checking by the IO DI and building DICC
* The design checking by the IO TRO and the IO DO
* To prepare the call for tender (task 1)
* To modify the 3D to improve manufacturability (under Vendor’s support): PCR and Deviation request (task 2)
* To put in place, with the IO DO and IO IT support, the remote connection Pilot (Vendor testing) (task 2)
* To insure the consistency between 2D definition and 3D geometry delivered to IO (check if the 2D and the 3D have the same version and update the 2D from the 3D)
* To insure the consistency between diagrams and 3D representations delivered to IO (task assisted by the use of a 2D/3D checker utility to detect the most obvious mistakes).
* To put in place the proper procedures to insure that the data passed to IO DO are compliant with the CAD Manual (with a special care of the sections given in §8 of this DCIF).
* To participate to the diagrams approval process.
* To support their own designers (or Vendors) as described in the [World wide support concept and procedures (34VB64 v1.0):](https://user.iter.org/?uid=34VB64&version=v1.0) 
  + In obtaining the suitable CATIA/ENOVIA training and certifications (if needed), as well as for any other necessary trainings (E&S, SSD, …)
  + In following the proper design methodologies (for the levels 1 and 2)
* To provide the outputs identified in §5.2
* To purchase the CADENAS Software licences if IN DA/Vendors make a choice to use CADENAS directly integrated in ENOVIA DB.
* To purchase IGE+XAO SEE Electrical Expert licences
* To purchase IGE+XAO SEE Cabling Manager
* To purchase I-RUN
* To purchase Q-Checker licenses (if DA needs more than the number provided by IO (2 at the moment))
* To promote all CAD data to DA draft under ENOVIA for all deliverables (intermediate and final).
* To follow the temporary procedure which allows a remote access to the IO’s CADENAS Mechanical Standards Parts (via CITRIX) until they purchase the proper CADENAS licences.
* To take in charge 3D models creation for new catalog parts according to methodologies stated in §3.3.4
* To create remote connection between the selected contractor premises and the INDADB for the CAD remote connection pilot (task 2) and for the remote connection deployment at the end of task 2 if synchronous approach is decided to be prolonged through tasks 3 and 4.
* To maintain the environment and context updated once IO DO has informed about any interface modification. The maintenance of the context of design is enabled by his constant connection to the ITER Digital Mock-up (Enovia).

Especially, in the frame of the Asynchronous collaboration part, when it is requested by IO RO of the Building or Cryostat or Assembly or Safety, DA DO shall provide the model representing external envelop of the building (Temporary Workshop), according to the following responsibilities:

* All the model representing external envelop of the building in CATIA V5 format will be provided to IO DO through DET Process. ([How to fill a DER - plus the DET process (25MAL5)](https://user.iter.org/?uid=25MAL5))

# DO Inputs/Outputs

## PA inputs

* CATIA 3D models and 2D drawings at Final Design (FD) maturity and “Approved” status are provided by IO, for the Cryostat Main Component (refer to Annex B1).
* CATIA 3D model at Conceptual design (CD) maturity are provided by IO for the cryostat instrumentation (refer to Appendix APB1-13)
* Existing diagrams.
* Configuration Management Models (CMM) of the system with “Approved” status [CMAF for Cryostat DM approval (4B4RC2)](https://user.iter.org/?uid=4B4RC2) ).
* Space and ICD for the Temporary workshop

## PA outputs

* To provide the IO DO with the 2D drawings, 3D models and diagrams at each PA review according to the definition given in the [Design Review Procedure (2832CF v1.12)](https://user.iter.org/?uid=2832CF&version=v1.12):
* Preliminary Design (For cryostat instrumentation only)
* Final Design (For Cryostat instrumentation only)
* To provide the IO DO with the 2D drawings, 3D models, isometrics and diagrams at each PA review:
* Manufacturing Design
* As-Built Design
* As Installed Design
* In addition, the DA DO or CDO will have to provide:
* Design Log Book (CATIA customisation provided by IO DO) will be filled in order to allow the tracking of design changes and the related CAD data versioning.
* Bill of Material (CATIA customisation provided by IO DO).
* Those documents will be produced by the DA DO or CDO, based on their agreement and provided to IO:
* On a regular basis, for checking and monitoring (pace to be confirmed and adjusted according to the identified needs during the PA preparation phase).
* In relation with any Project Change Request (PCR) and Deviation request.
* Before each specified review for manufacturing and installation
* No deliverable is requested for the Temporary workshop but the model representing external envelop of the building (simplified external shape models of the temporary workshop) may be requested by IO to allow IO to assess the interfaces. Request would be formalized by a DET

# Collaborative Workplan:

Identified here after the logical sequences of actions of IO DO and DA DO, related to the expected outputs per phase.

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| **PHASE 0 : Preparation phase +Task 1 and 2** | |
| DA DO | * To submit their DA DO workplan, including important phases and milestones (e.g. conversions, work splitting...). * To inform IO about the unidentified DA/CDO actors and corresponding roles. |
| IO DO | * To check and approve the DA DO workplan (adaptation or merge of the present DO Collaborative workplan if needed) * To finalize the 3D design (task 1) * To closure the open PCR (task 1) |
| DA DO | * To prepare the call for tender (task 1) |
| DA DO  CDO | * To modify the 3D to improve manufacturability (under Vendor’s support): PCR and Deviation request (task 2) * To put in place, with the IO DO support, the remote connection Pilot (Vendor testing) (task 2) * To purchase the CADENAS Software licences if IN DA/Vendors make a choice to use CADENAS directly in ENOVIA DB. * To purchase IGE+XAO SEE Electrical Expert licences * To purchase IGE+XAO SEE Electrical Expert licences * To purchase IGE+XAO SEE Cabling Manager * To purchase I-RUN licences * To purchase Q-Checker licences (if DA needs more than the number provided by IO (2 at the moment)) * To create remote connection within the selected contractor premises for the remote connection pilot (task 2) and for the remote connection deployment at the end of task 2 * To put in place the proper procedures to insure that the data passed to IO DO are compliant with the CAD Manual (with a special care of the sections given in §8 of this DCIF). |
| IO DO | * To identify the CAD data (2D/3D) representing an interface with the system sub-assemblies * Definition of the environment by room filtering * Listing of interfaces. * To identify the diagram data. * To adapt, if needed, the 3D CAD data structure granularity. * To ensure the implementation of ITER ENOVIA database replication with the DA * To create IDM account (if needed) * To provide the 2D/3D checker tool. * To provide Q-Checker profiles * To enable the DA all customization, setups and setting (Generic CAD supplier package, the E&S supplier package, I-RUN settings …). * To assist the DA DO in creating remote connection with selected contractor premises for the remote connection pilot (task 2) and for the remote connection deployment at the end of task 2. * To allow a remote access to the IGE+XAO SEE System Design licences and its ITER database (via CITRIX) * To temporary allow a remote access to the ITER CADENAS Mechanical Standards Parts (via CITRIX) until DA get the CADENAS software licences if the IN DA/Vendors make a choice to wait 2 day to have the part available in CADENAS/ENOVIA. * To support DA with level 3 support as described in World wide support concept and procedures |
| DA DO | * To support their DESIGNERS (or Vendors designers) in following the suitable CATIA/ENOVIA training and obtaining corresponding certifications (if needed), as well as for the E&S ITER specific methodology and IGE+XAO SEE System Design and SEE Electrical Expert software. * DA DESIGNERS to have or to obtain certifications by attending the organized training by their DO, as well as for all other software and workbenches mentioned above |
| IO DO | * To check on DA (or supplier) designer certifications. * To attribute relevant roles to the DA DOCC and designers (or supplier) in the ITER ENOVIA P&O concept after certification. * To transfer the data ownership |

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**Collaborative Workplan for the Cryostat Main component**

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| **PHASE I: Manufacture, Sub-Assembly, Inspection, FAT, Approval for Shipping** | |
| MAIN EXECUTION STEPS | |
| Direct Remote connection (for Diagram data) | |
| CDO | * To perform diagrams once connected to the ITER SSD DB via CITRIX. |
| DA DO | * DA is responsible of the continuous identification of data representing an interface between the system and others. The maintenance of the design context is DA’s responsibility and is enabled by its constant connection to the ITER database via CITRIX. * To publish the diagrams under ICP. |
| IO DO | * To monitor the compliance of DIAGRAMS data, with the ITER design rules. * To perform the 2D/3D checks. |
| Synchronous scheme (for CAD data) | |
| CDO  DA DO | * To perform Manufacturing Design once connected to the ITER ENOVIA DB, * To follow the temporary procedure which allows a remote access to the ITER CADENAS Mechanical Standards Parts (via CITRIX) until they purchase the proper CADENAS licences if the IN DA/Vendors make a choice to wait 2 days to have the part available in CADENAS/ENOVIA. * To maintain the environment and context updated once IO DO has informed about any interface modification * Isometric data performed by designers based on their 3D representations thanks to I-RUN and saved under ENOVIA DB. |
| IO DO | * To create/update Configuration Management Models (CMM) for the objects interfacing with DAs works, when relevant. * To inform DA DO about any interface change by using the ENOVIA subscriptions and the corresponding mail or meetings if required. |
| **PHASE I: Manufacture, Sub-Assembly, Inspection, FAT, Approval for Shipping**-**CONTINUED** | |
| CDO, DA DO | * Intermediate deliverables are represented by the promotion to DA Draft of the models developed by the DA, assuming this promotion to draft is subsequent to their cursory check: * To check on CAD quality issues. * To insure the consistency between 2D drawings and 3D models delivered to IO at any PA stage. * To insure the consistency between diagrams and 3D models delivered to IO at any PA stage (task assisted by the use of a 2D/3D checker utility to detect the most obvious mistakes). * To promote to DA Draft the data. * To send to IO DO the DET mentioning DA Draft promotion is done, with associated BOM. |
| IO DO | * IO DECO monitors the compliance of 3D CAD models and 2D drawings of the detailed designs with the ITER CAD Manual rules. * Isometric RO monitors the compliance of isometric data with the ITER design rules.IO DECO submits requests of Draft promotion to IO DI and IO RO, after design progress assessed with the DA. * To Draft the data depending upon the agreement of IO DI and IO RO. * To send back to DA DO the DET mentioning Draft promotion is done. |
| MANUFACTURING READINESS REVIEW | |
| DA DO  IO DO | * Manufacturing Readiness Review: Identical sequence and involvement of IO DO and DA DO as shown intermediate deliveries above, apart the following:   + - Data to be finally approved through the Manufacturing Readiness Review is transmitted to IO at least **2** weeks before     - Design Review involves (in addition of the design reviewers identified in regular design reviews) all IO ROs of interfacing components * Promotion to ‘Approved’ status of the CAD data delivered by the DA DO performed by the IO DECO in ITER DMU |

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| **PHASE II : Construction of Site Temporary workshop at IO site** | |
| **Asynchronous scheme (for Configuration Model of Temporary Workshop)** | |
| DA DO | * To perform the model representing external envelop of the building “File Based” * When it is requested by IO RO of the Building or Cryostat or Assembly or Safety , to transmit to IO the model representing external envelop of the building in the CATIA V5 format * To update the model representing external envelop of the building according to the external shape of Detail Model develop for the temporary worshop * To maintain the environment and context updated for the CDO once IO DO has informed about any interface modification. * To follow the procedure which allows a remote access to the ITER’s CADENAS Mechanical Standards Parts (via CITRIX) * To inform IO DO about any interface change by using the ITER PCR process and\or the corresponding mail or meetings if required. * To provide support with level 1 and level 2 of [World wide support concept](https://user.iter.org/?uid=34VB64). |
| IO DO | * To inform DA DO about any interface change by using the ITER PCR process and\or the corresponding mail or meetings if required. * When it is requested by IO RO of the Building or Cryostat or Assembly or Safety, to make a reconciliation under ENOVIA (see §2.1.2.3) of the model representing external envelop of the building in CATIA V5 format * IO DECO submits requests of Draft promotion to IO DI, IO RO. * Depending upon the agreement of IO DI, IO RO, the IO DECO promote to Draft. * To monitors the compliance of the model representing external envelop of the building with other CM especially regarding the interfaces, envelope volume. * To support DA with level 3 support of [World wide support concept](https://user.iter.org/?uid=34VB64). |

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| **PHASE III : Site fabrication and Sub-assembly at ITER Site Temporary workshop** | |
| There will be major site fabrication and sub-assembly at the ITER site temporary workshop and as built sub-assembly Design shall be produce by DA.  DA shall produce the As-Built Design according to the phase above and eventual updates delivered by IO. | |
| AS-BUILT READINESS REVIEW | |
| DA DO  IO DO | * AS-BUILT Readiness Review: Identical sequence and involvement of IO and DA DO as shown in design reviews steps above, apart the   following:   * Data to be finally approved through the AS-BUILT Readiness Review is transmitted to IO at least 2 weeks before * Design Review involves (in addition of regular design reviewers) all IO ROs of interfacing components * Promotion to “Approved” status of the CAD data delivered by the DA DO performed by the IO DECO in ITER DMU |

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| **PHASE IV : Assembly of the section in the ITER Tokamak pit** | |
| DA shall produce the As-Installed Design according to the phase above and eventual updates delivered by IO. | |
| INSTALLATION READINESS REVIEW | |
| DA DO  IO DO | * Installation Readiness Review: Identical sequence and involvement of IO and DA DO as shown in design reviews steps above , apart the following: * Data to be finally approved through the Installation Readiness Review is transmitted to IO at least 2 weeks before * Design Review involves (in addition of regular design reviewers) all IO ROs of interfacing components * Promotion to “Approved” status of the CAD data delivered by the DA DO performed by the IO DECO in ITER DMU |

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| **PHASE V : Final leak testing and Acceptance of the full Cryostat** |
| N\A |

**Collaborative Workplan for the cryostat Instrumentation**

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| **PA DESIGN PHASE** (only for the cryostat instrumentation) | |
| **PRELIMINARY DESIGN** | |
| MAIN EXECUTION STEPS | |
| Direct Remote connection (for Diagram data) | |
| DA DO  CDO | * DIAGRAMS design performed by designers connected to the ITER SSD DB via CITRIX. * DA Designers are responsible of the continuous identification of data representing an interface between the system and others. The maintenance of the design context is DA’s responsibility and is enabled by its constant connection to the ITER database via CITRIX. * To publish the diagrams under ICP. |
| IO DO | * IO DO supports DA and its supplier designers on ITER DIAGRAMS and CITRIX methodologies. * IO DECO monitors the compliance of DIAGRAMS data, with the ITER design rules. |
| Synchronous scheme (for CAD data) | |
| CDO | * Preliminary Design performed by DA designers once connected to the ITER ENOVIA DB * To follow the temporary procedure which allows a remote access to the ITER’s CADENAS Mechanical Standards Parts (via CITRIX) until they purchases the proper CADENAS licences if IN DA/Vendors make a choice to use CADENAS directly integrated in ENOVIA DB.. * Isometric data performed by designers based on their 3D representations thanks to I-RUN and saved under ENOVIA DB. |
| DA DO | * To maintain the environment and context updated once IO DO has informed about any interface modification |
| IO DO | * When relevant, creation of Configuration Management Models (CMM) for the objects interfacing with DAs works * To inform DA DO about any interface change by using the ENOVIA subscriptions and the corresponding mail or meetings if required. |
| INTERMEDIATE DELIVERIES (every month) | |
| CDO | * To stop designing until the whole draft promotion is achieved. |
| DA DO | * To check on CAD quality issues. * To insure the consistency between 2D drawings and 3D models delivered to IO at any PA stage. * To insure the consistency between diagrams and 3D models delivered to IO at any PA stage (task assisted by the use of a 2D/3D checker utility to detect the most obvious mistakes).To promote to DA Draft the data. * To send to IO DO the DET mentioning DA Draft promotion is done, with associated BOM. |
| IO DO | * To monitor the compliance of 3D CAD models and 2D drawings of the detailed designs with the ITER CAD Manual rules. IO DECO provides the requested support to the IO RO and IO DI, and other design reviewers, in assessing the functional and integration aspects. * To Draft the data depending upon the agreement of IO DI and IO RO. * To send back to DA DO the DET mentioning Draft promotion is done. |

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| **PA DESIGN PHASE – CONTINUED** (only for the cryostat instrumentation) | |
| PRELIMINARY DESIGN REVIEW | |
| DA DO  IO DO | * Preliminary Design Review: Identical sequence and involvement of IO and DA DO as shown for the intermediate delivery steps above, apart the following:   + - Data to be finally approved through the Preliminary Design Review is transmitted to IO at least 4 weeks.     - Design Review involves all IO ROs of interfacing components * Promotion to ‘Approved’ status of the CAD data delivered by the DA DO (at maturity ‘Preliminary Design’) performed by the IO DECO in ITER DMU |
| **FINAL DESIGN** (only for the cryostat instrumentation) | |
| DA shall produce the Final Design according to the phase above and eventual updates delivered by IO. | |
| FINALDESIGN REVIEW | |
| DA DO  IO DO | * Final Design Review: Identical sequence and involvement of IO and DA DO as shown for the intermediate delivery steps above, apart the following:   + - Data to be finally approved through the Final Design Review is transmitted to IO at least 4 weeks.     - Design Review involves all IO ROs of interfacing components * Promotion to ‘Approved’ status of the CAD data delivered by the DA DO (at maturity ‘Final Design’) performed by the IO DECO in ITER DMU |

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| **PA MANUFACTURING PHASE** (only for the cryostat instrumentation) | |
| DA shall produce the Manufacturing Design according to the phase above and eventual updates during the Fabrication. | |
| MANUFACTURING READINESS REVIEW | |
| DA DO  IO DO | * Manufacturing Readiness Review: Identical sequence and involvement of IO and DA DO as shown for the intermediate delivery steps above, apart the following:   + - Data to be finally approved through the Manufacturing Readiness Review is transmitted to IO at least **4** weeks before     - Design Review involves all IO ROs of interfacing components     - The Manufacturing Readiness Review is leading to the formal agreement of the reviewers on the approval of the “For Manufacturing” drawings * Promotion to ‘Approved’ status of the CAD data delivered by the DA DO (at maturity ‘Manufacturing Design’) performed by the IO DECO in ITER DMU |
| AS BUILT READINESS REVIEW | |
| DA DO  IO DO | * Final Manufacture Review: Identical sequence and involvement of IO and DA DO as shown for the intermediate delivery steps above, apart the following:   + - Data to be finally approved through the Final Manufacture Review is transmitted to IO at least **4** weeks before     - Design review involves all IO ROs of interfacing components. * Promotion to ‘Approved’ status of the CAD data delivered by the DA DO (at maturity ‘As Built Design’) performed by the IO DECO in ITER DMU. |

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| **PA INTEGRATION PHASE** (only for the cryostat instrumentation) | |
| DA shall produce the Manufacturing Design according to the phase above and eventual updates during the Fabrication. | |
| INSTALLATION READINESS REVIEW | |
| DA DO  IO DO | * Manufacturing Readiness Review: Identical sequence and involvement of IO and DA DO as shown for the intermediate delivery steps above, apart the following:   + - Data to be finally approved through the Manufacturing Readiness Review is transmitted to IO at least **4** weeks before     - Design Review involves all IO ROs of interfacing components     - The Manufacturing Readiness Review is leading to the formal agreement of the reviewers on the approval of the “For Manufacturing” drawings * Promotion to ‘Approved’ status of the CAD data delivered by the DA DO (at maturity ‘Manufacturing Design’) performed by the IO DECO in ITER DMU |

# Contact Persons

For IO related issues the following persons are involved:

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| IO TRO | Bharat Doshi |
| IO Cryostat technical engineer | Caipin Zhou |
| IO Cryostat DECO | Franck Lachevre |
| IO DOCC | Eric Thomas |
| IO DO Monitor | TBD |
| IO E&S Catalog Coordinator | Frederic Autogue |
| IO Design Integration |  |
| IO DO Mechanical Design Section Leader | Fabien Lassueur |
| IO DO Configuration Control Section Leader | Heinz Heidl |
| IO DO Head | Eric Martin |

For DA related issues the following persons are involved:

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| DA TRO |  |
| DA DOCC | Shrishail Padasalagi |
| DA DECO | TBD at the start of the PA |

# CAD Manual sections applicable for this task

The requirements and recommended methodologies given in the ITER CAD Manual are to be followed for this design task. See the following hyperlinks for the list of the ITER CAD manual sections & how to documentation:

* [[Hyperlinks to the ITER CAD Manual & How To documents (24N3GT)](https://user.iter.org/?uid=24N3GT)](https://user.iter.org/?uid=24N3GT)

The ITER CAD manual covers a wide range of design activity types. After submission of the DA detailed workplan to IO, the IO DO will define which detailed methodologies from the CAD Manual should be applied, in particular when the CAD Manual includes several options.

# Design data records

DO data and changes are followed up through several documents.

* + - Bill of Material
    - DET
    - Design Log Book
    - Programme reports (reviews, approvals…)

Certain of those documents will be recorded through the Design Collaboration Implementation Monitoring for a more efficient follow-up of the DO activities related to the PA.

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# Glossary

The report of the ITER abbreviations database is available on IDM and in this linked document: [ITER Abbreviations (2MU6W5)](https://user.iter.org/?uid=2MU6W5)

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| **Abbreviation** | **Real Name/Definition** |
| BOM | Bill Of Material |
| CAD | Computer Aided Design |
| CD | Conceptual Design |
| CDO | Contractor Design Office |
| CITRIX | Solution enabling a distant connection to the ITER DMU – not requiring any specific resource or machine |
| CM | Configuration Model |
| CMM | Configuration Management Models |
| DA | Domestic Agency |
| DB | Data Base |
| DCIF | Design Collaboration Implementation Form |
| DCIM | Design Collaboration Implementation Monitoring |
| DCR | Design Change Request |
| DD | Detailed Design |
| DECO | Design Coordinator |
| DER | Data Exchange Request |
| DET | Data Exchange Task |
| DI | Design Integration |
| DM | Detailed Model |
| DMU | Digital Mock-Up |
| DO | Design Office |
| DOCC | Design Office Collaboration Coordinator |
| DOCT | Design Office Collaboration Team |
| ENOVIA | PDM used in ITER. Database where all ITER CAD data is stored and made accessible to ITER contributors. |
| E&S | Equipment and system |
| FDR | Final Design Review |
| I&C | Instrumentation and control |
| ICP | ITER Collaborative Platform |
| IDM | ITER Document Management |
| IO | ITER Organization |
| IT | Information Technology |
| PA | Procurement Arrangement |
| PCR | Project Change Request |
| PD | Preliminary Design |
| PDM | Product Data Management |
| PDR | Preliminary Design Review |
| P&O | People & Organisation |
| PDM | Product Data Management |
| RO | Responsible Officer |
| QA | Quality Assurance |
| TRO | Technical Responsible Officer |