IDM UID
E2RMD2

VERSION CREATED ON / VERSION / STATUS
11 Jun 2025 / 1.1 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical Specifications for IMAS DevOps

Technical Specifications for Software Engineering services to support the development and deployment of the Integrated Modelling & Analysis Suite (IMAS)

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1 Preamble

This Technical Specification is to be read in combination with the General Management Specification for Service and Supply (GM3S) – [Ref 1] that constitutes a full part of the technical requirements.

In case of conflict, the content of the Technical Specification supersedes the content of Ref [1].

2 Purpose

The ITER Organization has established an Integrated Modelling Programme to meet its scientific modelling needs that is built upon expertise from across all the ITER Members. The underlying infrastructure needs to be flexible and robust, and to follow an agile development approach to best meet the needs of the ITER Organisation during the development and implementation of the many physics workflows that are needed.

This document describes the technical needs of the ITER Science Division for Software Engineering services to refine and further develop the Integrated Modelling & Analysis Suite (IMAS) to meet the needs of the ITER Integrated Modelling Programme and address development requests from other ITER Divisions who wish to use IMAS to support their activities.

The purpose of this contract is to support improvements in the quality of ITER's scientific software through refactoring to adopt modern best-practices, to improve builds and package the software to facilitate distribution and installation, and to implement Continuous Integration (CI) / Continuous Delivery / Continuous Deployment (CD) pipelines to prevent regressions, track performance evolution, support portability and facilitate deployment by users at other sites and using other systems.

3 Acronyms & Definitions

3.1 Acronyms

The following acronyms are the main one relevant to this document.

Abbreviation	Description
CI	Continuous Integration
CD	Continuous Deployment
CRO	Contract Responsible Officer
GM3S	General Management Specification for Service and Supply
IO	ITER Organization
IMAS	Integrated Modelling & Analysis Suite
PRO	Procurement Responsible Officer
SDCC	Scientific Data & Computing Centre

3.2 Definitions

Contractor: shall mean an economic operator who have signed the Contract in which this document is referenced.

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Integrated Modelling: A component-based approach to modelling in which separate codes are combined to produce a more holistic description of a system.

Integrated Modelling & Analysis Suite: Infrastructure and suite of codes used for Integrated Modelling at ITER.

Scientific Data & Computing Centre: Cluster infrastructure used to host data and run modelling and analysis workflows.

4 Applicable Documents & Codes and Standards

4.1 Applicable Documents

This is the responsibility of the Contractor to identify and request for any documents that would not have been transmitted by IO, including the below list of reference documents.

This Technical Specification takes precedence over the referenced documents. In case of conflicting information, this is the responsibility of the contractor to seek clarification from IO.

Upon notification of any revision of the applicable document transmitted officially to the contractor, the contractor shall advise within 4 weeks of any impact on the execution of the contract. Without any response after this period, no impact will be considered.

Ref	Title	IDM Doc ID	Version
1	General Management Specification for Service and Supply (GM3S)	82MXQK	0.0
2	The ITER Integrated Modelling Programme	2EFR4K	3.2

4.2 Applicable Codes and Standards

No Codes and Standards are applicable to this scope of work.

5 Scope of Work

This section defines the specific scope of work for the service, in addition to the contract execution requirement as defined in Ref [1].

This contract concerns the development and further refinement of the ITER Integrated Modelling & Analysis Suite. It adds to and extends the functionality of the existing IMAS implementation to deliver a framework that meets the needs of the ITER Integrated Modelling Programme.

Specifically, this contract will refine and develop the IMAS infrastructure to: facilitate its easy installation and deployment; ensure it can robustly function as the means for finding and retrieving ITER data; support the execution of physics workflows required to support the IRP through the timely release of new software components; facilitate the maintenance (including at other remote sites) through the extension, simplification and re-factoring of the existing code base.

5.1.1 Description

The work consists of developing and refining the software tools to manage the installation and use of IMAS on the ITER SDCC cluster and the computing resources of collaborators within the ITER Members, their Domestic Agencies and their research institutes.

The performance and implementation of the installation of IMAS and the Integrated Modelling infrastructure as a whole shall be continuously reviewed and opportunities to implement

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alternative approaches (using best programming practices) exploited to deliver an enhanced experience for IMAS users.

IMAS functionality and best practices will be continually reviewed and updated as part of an agile continuous development and release cycle, working closely with other on-site colleagues.

The work shall include the following specific activities:

- Analysis of scientific software and creation of suggestions for improvements for quality, maintainability, and/or performance;
- Implementation of standard installation mechanisms to facilitate the widest possible installation and use of IMAS software;
- Preparing and installing scientific software packages on SDCC via EasyBuild package management system;
- Implementation of CI pipelines to maintain and/or improve code quality and prevent regressions;
- Implementation of CD pipelines to support software access and usage;
- Production of documentation and guidelines for software development and deployment;
- Setting up of continuous monitoring of functionalities and performance for the most critical scientific software/services.

To deliver the above services, it is expected that the Contractor will meet the following requirements:

- Extensive experience with software development in a Linux operating system, with familiarity with Windows and Mac OS an advantage;
- Extensive experience with revision controlled collaborative software development using Git;
- Familiarity with build and package management tools including PyPI and EasyBuild;
- Proficiency with Python and/or other relevant scripting languages;
- Familiarity with other programming languages such as C/C++, Fortran and Java an advantage;
- Demonstrable experience with CI/CD automation pipelines;
- A scientific background or experience is considered an advantage;
- Ability to work independently and propose new ideas within a multi-disciplinary international research team;
- Fluent in written and spoken English.

5.1.2 Service Duration

The maximum expected duration for this activity is 12 months.

6 Location for Scope of Work Execution

The contractor shall perform the work in the ITER Headquarters building at the ITER site.

7 IO Documents

No input documents expected from IO.

8 List of deliverables and due dates

The Supplier shall provide IO with the documents and data required in the application of this technical specification, the GM3S Ref [1] and any other requirement derived from the application of the contract.

The following minimum list of documents will be delivered with the associated due dates:

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Technical Design Family (TDF)	Generic Document Title (GTD)	Further Description	Expected date (T0+x) *
Review or Decision or Recommendations Report	Progress Report	Quarterly written report documenting activities carried out in the areas enumerated below	T0 + 3 months
			T0 + 6 months
			T0 + 9 months
			T0 + 12 months

(*) T0 = Date of the Kick-Off Meeting; X in months.

Activities to be described in quarterly reports:

1. Improvements to IMAS installation and testing;
2. Extensions of IMAS functionality as required to address foreseen Use Cases [1];
3. Refactoring of IMAS software to improve performance and facilitate maintenance;
4. Reproduction and solution of reported software errors;
5. Creation of documentation to facilitate use of IMAS by beginners and experts;

A revision-controlled copy of all software delivered shall reside in the ITER source code repositories (Stash / GitHub) together with a full record of all work undertaken in the appropriate issue management system (JIRA / GitHub). All software shall be delivered with an open-source licence that allows open access by third parties within the ITER Members' territories.

The supplier is requested to prepare their document schedule based on the above and using the template available in the GM3S Ref [1] appendix II (click here to download).

9 Quality Assurance requirements

The Quality class under this contract is Quality Class 4, [Ref 1] GM3S section 8 applies in line with the defined Quality Class.

10 Safety requirements

No specific safety requirement related to PIC and/or PIA and/or PE/NPE components apply.

11 Special Management requirements

Requirement for [Ref 1] GM3S section 6 applies as amended with the specific requirements below.

11.1 Contract Gates

There are no contract gates for this work.

11.2 Work Monitoring

The detailed work programme shall be assigned and monitored using the IO's issue management systems (JIRA / GitHub) and shall be continuously prioritized by the CRO in consultation with the Contractor.

11.3 Meeting Schedule

Weekly reporting at IMAS technical development meetings to facilitate prioritization by CRO.

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11.4 CAD design requirements

This contract does not imply CAD activities.