IDM UID
4AHJMR

VERSION CREATED ON / VERSION / STATUS
26 Nov 2020 / 1.2 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical Summary for CfN for development support for IMAS

This is the Technical Summary of the Call for Nomination for the Framework Service Contract for Development Support for ITER's Integrated Modelling & Analysis Suite (IMAS)

china eu india japan korea russia usa

Technical Summary

Call for Nomination

Development Support for ITER's Integrated Modelling & Analysis Suite (IMAS)

1. Purpose

The purpose of this Framework Contract is to provide support to the ITER Organization (IO) for the development, extension and refinement of ITER's Integrated Modelling & Analysis Suite (IMAS) to support the execution of the ITER Research Plan (IRP).

Two Lots of work are anticipated under this Framework Service Contract covering the following areas:

1. Extensions and improvements of IMAS software infrastructure

2. Development of physics modelling and data processing tools in IMAS

2. Background

ITER is an international research and development project that aims to demonstrate the scientific and technical feasibility of harnessing fusion power. IMAS is the software that will be used to provide modelling support in pursuit of this goal. It is built around a standardized representation of data that is passed between components in a workflow and to storage technologies. It addresses two main needs: to make high physics fidelity predictive simulations of ITER plasmas capturing the physics processes spanning multiple domains (so-call integrated modelling); and to process and interpret ITER's experimental data.

The present implementation of IMAS already supports the development and execution of modelling workflows involving multiple physics components and the reading and writing of data to storage.

Task Orders will be issued within this Framework Service Contract to refine and extend the existing IMAS infrastructure as well as the tools and applications developed with it. They

will be implemented based on the progression of IMAS developments, the support needs of the IRP, and external software developments.

The work under this Framework Service Contract is divided into two Lots:

1. Extensions and improvements of IMAS software infrastructure
    - This lot is concerned with developments that improve the capabilities of the IMAS software stack
2. Development of physics modelling and data processing tools in IMAS
    - This lot is concerned with software developments that use the IMAS infrastructure to deliver specific physics applications

3. Scope

The scope of the work under this Framework Service contract is divided into two Lots:

1. Extensions and improvements of IMAS software infrastructure
    - Improve performance and extend capabilities of IMAS Access Layer (AL)
    - Extend or refine IMAS Data Dictionary (DD) to address new use cases
    - Extend IMAS data storage capabilities through development of IMAS storage backend(s), including network-based backends
    - Improve packaging and installation of the infrastructure as a whole or its components
    - Improve management of datasets, including remote access, data provenance and indexation
    - Improve standard visualization tools
    - Extend and refine standard libraries for working with Interface Data Structures (IDSs) such as the General Grid Description library
    - Develop graphical tools to support the development and use of physics workflows
    - Improve user and developer documentation for IMAS software
2. Development of physics modelling and data processing tools in IMAS
    - Implement high-throughput experimental data processing pipelines
    - Undertake verification, validation and uncertainty quantification (VVUQ) of IMAS physics applications, e.g. the high-fidelity plasma simulator (HFPS)
    - Couple the high-fidelity plasma simulator (HFPS) to controllers running in the Plasma Control System Simulation Platform (PCSSP)
    - Implement standardized routines to support interpretation of experimental data and mapping between coordinate systems
    - Refactor physics codes to improve portability, maintainability and performance
    - Develop Machine Learning-driven surrogate/meta models for expensive simulation codes

4. Timetable

The tentative timetable is as follows:

Item	Tentative date(s)
Call for nomination issued	December 2020
Call for nomination submission	February 2021
Pre-qualification issued	February/March 2021
Pre-qualification submission	April 2021
Call for tender issued	May 2021
Call for tender submission	June 2021
Framework Contract Award	August 2021
Start of Framework Contract and 1st Task Order	September 2021

5. Experience

The acceptance criteria for the selection of the tender cover a broad range of technical capabilities, and the Contractor and its personnel shall have adequate experience in the areas as listed below in each of the two Lots categories:

- Lot 1: Extensions and improvements of IMAS software infrastructure
  - Software engineering (proficiency in Python, C, C++, Fortran, MATLAB languages)
  - Database management
  - API and GUI designs
  - Network protocols
- Lot 2: Development of physics modelling and data processing tools in IMAS
  - Processing of raw experimental data from fusion-relevant experiments
  - Experimental analysis of fusion-relevant data
  - Development of complex physics workflows

6. Candidature

Participation is open to all legal persons, participating either individually or in a grouping (consortium) which is established in an ITER Member State. A legal person cannot participate individually or as a consortium partner in more than one application or tender. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.

The consortium groupings shall be presented at the pre-qualification stage. The tenderer's composition cannot be modified without the approval of the ITER Organization after the pre-qualification.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Candidates (individual or consortium) must comply with the selection criteria. The IO reserves the right to disregard duplicated reference projects and may exclude such legal entities from the pre-qualification procedure.

On 31 January 2020, the UK left the EU and Euratom with a transition period from 1st February to 31 December 2020 to be used to determine the conditions of their future relationship. Euratom is the ITER Member and the withdrawal of the UK from Euratom leads to the fact that UK is not anymore party to the ITER project. Until the 31 December 2020, current end date of the transition period, UK entities retain the right to participate in IO procurement procedures.