

Technical Summary for Call For Nomination

Systems Engineering Support (SES) Services Contract Activities

Contents

1. Introduction	3
2. Purpose	3
3. Acronyms	4
4. References	4
5. Background	5
6. Required experience	6
7. Scope of work.....	7
7.1 Support to SE process owners	8
7.2 Support to the technical discipline owners	9
7.3 Support to the WBS ROs	9
8. Start of the Contract	10
9. Contract basis and execution.....	10

Framework Contract

Systems Engineering Support (SES) Services Contract Activities

Summary Technical Specification

1. Introduction

The ITER project is a joint international research and development project aiming to demonstrate the scientific and technical feasibility of fusion power. The partners in the project - the ITER Members - are the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the United State of America.

This project is being carried out as an international collaborative project among these seven participating countries for the implementation of design, procurement, construction, and operation and support. This collaborative approach is being used to effectively benefit from each country's specific technical experiences in order to provide the best possible facility for the ITER project.

This Framework Contract will provide overall guidance and support to the IO and the DAs in the Systems Engineering matters. It will bring industrial experience on how to manage the many and complex technical interfaces associated with the design, procurement, installation and construction of the ITER Plant.

2. Purpose

The purpose of this Framework Contract is to support the IO CIE and IO technical directorates for the development and implementation of the Systems Engineering Management Plan (SEMP) within the ITER Project.

The SEMP gives the collection of technical and management processes, responding to higher level requirements, to be applied by the Responsible Officers (ROs) for the realization of the ITER Systems and their integration in ITER Overall (also called ITER Plant).

The development of the SEMP shall be done according to the selected project management standards (ISO15288 & EN9200), shall be based on industrial experience demonstrated in the nuclear field, and shall take into consideration existing background.

3. Acronyms

CAD	Computer-Aided Design
CIE	Directorate for Central Integration and Engineering
CMMI	Capability Maturity Model Integration
CODAC	Control, Data Access and Communication
DA	Domestic Agency
DIPH	Department for the ITER Project-Head
DIR	Design Integration Reviews
DRMS	Design Review Management System
ECSS	www.ecss.nl
EDB	ITER Engineering Database
EDMS	Engineering Data Management System (EDB)
SDR	System Design Review
HAZOP	Hazard and Operability Study
I&C	Instrumentation and Control
IDM	ITER Document Management System
IMS	Interfaces Management System
IO	ITER Organization
IODP	ITER Overall Design Process
IT	Information Technology
LOE	Level Of Effort
MQP	Management Quality Programme
PCMS	Project Change Management System
PLM	Product Lifecycle Management
PR	Project Requirements
QMS	Quality Management System
RO	Responsible Officer
RAMI	Reliability, Availability, Maintainability & Inspectability
SDP	System Design Process
SE	Systems Engineering
SEMP	Systems Engineering Management Plan
SEMS	Systems Engineering Management System
SES	Systems Engineering Support Services
SRD	System Requirement Document
TO	Task Orders
UIT	Unique ITER Team
WBS	Work Breakdown Structure
WBS ROs	WBS Responsible Officer (IODP ROs [2], SDP ROs and DA-ROs)

4. References

- [1] [ITER_D_2F68EX - ITER Systems Engineering Management Plan - ITER-SEMP](#)
- [2] [ITER_D_48L7BT - CIE task-force group#4 proposal for improvement of IODP working instruction](#)
- [3] [ITER_D_4CK4MT - ITER System Design Process \(SDP\) Working Instruction](#)

5. Background

As Head of the ITER Construction Project, DIPH is responsible for:

- the definition of Systems Engineering processes which generates all the technical deliverables (documents, drawings etc...) responding to the input requirements (Project Requirements-PR),
- the execution and control of the Systems Engineering processes.

CIE is responsible to DIPH for:

- the definition of the Systems Engineering processes to be used by the various ROs during the design and the production (called also “build”) phases, and the execution of some of them,
- the development of a centrally managed system (ITER Engineering Data Management System called Engineering Database (EDB)) for the control of the production of technical deliverables and data.

The Systems Engineering processes are implemented in the engineering database through functional specifications.

The current SEMP has identified the following processes:

- 24 **technical specialty processes** which define the technical references for the execution of the project (handbooks, guidelines, technical procedures, templates etc...),
- 9 **management processes** which respond to the project management’s constraints on the design and production processes. These processes are shown in management plans.
- 3 major **technical processes** during the design phase (System Design Integration (IODP), System Design development (SDP) and design verification) and 3 major technical processes during the production phase (system integration, system verification [tests] and system validation [commissioning]). These processes shall be executed by the WBS ROs for the production of technical data in line with the above-mentioned management plans.

These processes are detailed in procedures and working instructions as part of the general IO Quality Management System (QMS).

While some processes have been matured according to design progress, others are still at an early stage (for example detail design requirements for the procurement, manufacturing design and control, DA/supplier’s document review and acceptance, verification and validation during the design and production phases etc...).

A first SES contract has been launched in April 2009 and will finish at the end of 2013. This contract has supported CIE for the definition of the SEMP, the identification of SE processes, the development of some of the management plans and procedures, the development and administration of specific databases (called “Management Systems” DRMS, IMS, PCMS, etc...), and a first integration of these processes in the EDB. This specification describes the new contract to provide support for the next 5 years with an optional 2 additional years.

6. Required experience

Potential contractors shall have demonstrated capabilities in the implementation of **a systems engineering management system (SEMS)** for large and complex projects at international level.

The specific experience and quality requirements we are looking for are:

[Legend: (1) Required, (2) Recommended (would be a plus)]

For the contractor organization

- (1) Certification of their QMS: ISO9001 and 14001 certificate or comparable,
- (2) Internal use and customization of a PLM system or EDMS,

For the improvement of processes

- (1) Experience of QA ISO 9001 v2000, project management standards: ISO 15288 and EN9200, and safety standards IAEA GS-R-3,
- (1) Implementation of a SEMS for large, multi-disciplinary projects, in an international environment. The contractor should have access to an internal database of documents, easily customizable to the IO needs,
- (1) Ability to implement a SEMS in the middle of a project, taking into account existing background, and focussing on the definition of deliverables,
- (1) Excellent speaking, reading and writing capability in English. All the produced documentation must be clearly understood by native and non-native engineers, and shall use the already in-use ITER terminology,
- (1) Experience of implementation of Nuclear Safety requirements,
- (2) Experience of the ECSS standards utilization,
- (2) Experience of improvement of a SEMS using a stepped approach (CMMI or equivalent).

For the definition of engineering deliverables

- (1) Experience of international construction codes, preferably nuclear;
- (1) Experience of development of design and production documentation, in support to the owner and to the architect engineer, taking into account system decomposition and integration (components & zones);

For the customization to the IO existing system

Computer Aided Design

- (1) Digital Mock-up (DMU) CATIA V5 and Life-Cycle management ENOVIA LCA
- (1) PFD, P&ID diagrams: See-System-Design (SSD) or equivalent
- (2) Electrical diagrams: See-Electrical-Expert or equivalent
- (2) Cabling diagrams: See-Cabling-Manager or equivalent
- (2) Isometrics diagrams: ISOGEN or equivalent
- (2) Viewer 3D-Live: ENOVIA LCA or equivalent; 3D Illustration: 3D-VIA-COMPOSER or equivalent
- (2) Assembly & maintenance simulation: DELMIA or equivalent

Structural Analysis

- (1) ANSYS environment

Other computer programmes

- (1) DOORS or equivalent, for requirements documentation and management
- (2) PIPE-STRESS and CAESAR II or equivalent; for piping analysis
- (2) FLOW-MASTER or equivalent; for hydraulic analysis
- (2) 3DCS or equivalent, for 3-D tolerance analysis
- (2) OPTICS or equivalent for diagnostics optical analysis.

7. Scope of work

The Contractor will provide support in 3 areas:

- (1) Support to the process owners of management and technical processes for the definition and implementation of their processes [procedural support],
- (2) Support to the technical discipline owners for the improvement of their references: handbooks, databases, provision of templates, etc... and review and acceptance of technical data [discipline-based support],

(3) Support to the WBS ROs (Integration ROs, System ROs and DA-ROs) for the execution of technical processes including the use of recommended documents [execution support], and support for review and acceptance of design and production documents as part of their verification or validation responsibility [discipline-based support].

7.1 Support to SE process owners

Under the supervision of the IO-SE process owner, the process owners of the management processes and technical processes shall be supported for the definition of their processes and their implementation into EDB.

The SE processes involved are:

- **Management processes:** Requirement Management, Planning management, Configuration management, Technical Assessment (Design reviews) management, Interfaces management, Risks management, Nuclear Licensing and Safety Control management processes, altogether linked into the SE management process.
- **Technical processes:** 3 major technical processes during the design phase (Design Integration (IODP), System design (SDP) and design verification) and 3 major technical processes during the production phase (system integration, system verification [tests] and system validation [commissioning]).

The list of management SE disciplines and process owners is given in **Appendix 1a**.

7.1.1. Support to the process owners the definition of management and technical processes:

- production of missing procedures and the improvement of existing ones. Missing procedures will be identified through a gap analysis in between the SEMP objectives and what procedures are already available, and a prioritization of the needs,
- production of functional specifications of new or improved processes for the implementation in the EDB by IT, and commissioning of new EDB applications.

Profiles sought after are professional people used to write procedural documents.

7.1.2. Support to the process owners for the implementation of management and technical processes in EDB:

- daily administration of their control databases, with information of users (training) and provision of indicators data for the reporting,

- maintenance and improvement of the usability of these databases, with development and implementation of detailed working instructions, guidelines and templates,
- technical support for the use of the database and the migration of available technical data in the database.

Profiles sought after are technical people (junior engineers/senior technicians) used to administrate databases.

7.2 Support to the technical discipline owners

Support for the improvement of technical input references for the design and production activities. This should be achieved through the update of handbooks, codes and standards, **technical execution procedures**, databases, provision of templates, etc...[discipline-based support].

The supporting work will be directed by the discipline/specialty owner under the overall IO-SE coordination. A preliminary list of technical disciplines is given in **Appendix 1b**.

Profile sought after are specialists of the relevant disciplines.

7.3 Support to the WBS ROs

This supporting work will be executed under the monitoring of the WBS RO. However this supporting work needs some overall SES team coordination by the contractor, under the general IO-SE coordination.

7.3.1 Support to the WBS ROs in the execution of their “supplier work”

The control of the technical work delivered by the WBS ROs (as supplier), requires some support and training in the execution of technical and verification processes based on the use of recommended procedures and documents [execution support].

Profiles sought after are technical people (junior engineers/senior technicians) in various technical disciplines.

7.3.2 Support to the WBS ROs in the execution of their “customer work”

The control of the technical work received by the WBS ROs (as customer) requires some support for review and acceptance of documents as part of the validation processes [discipline-based support].

Profile sought after are specialists of the relevant technical disciplines.

8. Start of the Contract

The new contract should start at the beginning of 2014.

9. Contract basis and execution

The Systems Engineering Support requirements of the ITER project will be procured via a Service Framework contract to a single contractor or consortium.

Following the contract award, deliverable-based or level of effort (LOE) based Task Orders (TO) will be issued for each contracted work.

For each task order, the contractor will provide the required set of deliverables such as plan, procedures, work instructions, handbook/guidelines, templates, functional specifications for implementation in the engineering database, presentations, training, audits and proposals and so forth. These documents shall use the ITER already used terminology, be easy to implement, compatible with the required standards and the existing background.

The indicative level of resources required to cover the 3 areas of work is in the range of 23-28 people per year.

ITER may require the contractor to perform the work either at the ITER site, close location or remotely.

Appendix 1a

List of management disciplines, management specialties and process owners

Management disciplines	Management specialties	Process owners
Integrated Safety	Occupational Health and Safety	SQS
	Environmental protection	SQS
	Nuclear Safety	SQS
	Security	SQS
Project Management		
	Planning and implementation	PCO
	Configuration and information management	PEI
	Cost and schedule management	PCO
	Integrated logistic support management	AOP
	Design Reviews management	PEI
	Interface management	PEI
	Risk management	PCO
	SE management	PEI
	Requirement management/Tech. specification	PEI
Systems Engineering		
	Design integration (IODP)	PEI
	System design (SDP)	PEI
	Design verification	PEI
	System integration	PEI
	System verification	PEI
	System validation	PEI

Shaded topics are not considered in the contract.

Appendix 1b

List of technical disciplines and specialties.

Technical disciplines	Technical specialties
Nuclear Safety & Environment	Safety analysis
	Nuclear buildings interfaces and layout
	Radiological& Environmental monitoring
	Licensing
	Decommissioning
Occupational safety	
	Fire protection
	HAZOP
Engineering	
	Systems Engineering
	Configuration Management
	Design and CAD design
	Standardization of components
	Building/Plant Integration
	Constructability/manufacturability
	Fusion Technology
	RAMI
	Human Factors
	Civil construction
	Piping
	Hot Cell
	Materials
	Diagnostics
	Software
	Electromagnetic systems
	Heating and current drive
Process	
	Instrumentation & Control
	Communication
	Water-cooling

Technical disciplines	Technical specialties
	Electric power

Appendix 1b (cont'd)

List of technical disciplines and specialties.

Technical disciplines	Technical specialties
	Optics
	Electronics
	Tritium/Fuel cycle
	Vacuum
	HVAC
	Liquids and gases distribution
	Cryogenics
	Radwaste treatment and storage
Analysis & Calculations	
	Models
	Mechanical/structural
	Thermohydraulics
	Radiation maps
	Electromagnetics
	Radiation resilience
Manufacturing	
	Manufacturing
Assembly	
	Handling/ Tooling
	Welding
	Functional Dimensioning & Tolerancing
	Dismantling
Integration and tests	
	System integration and tests
Operation&Logistics	
	Operations engineering
	Operations verification (Commissioning)
Maintenance	

Technical disciplines	Technical specialties
	Hands-on maintenance
	Remote Handling