

GNSS Evolutions Programme Future Satellite Navigation System Architectures

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This presentation is for information purposes only.
Bidders shall refer to the ITT documents to submit a tender

Introduction

- Part of the 1st stage of the GNSS Evolutions Programme
- Targeting the exploration of conceptual System Architectures for future GNSS to be operational around 2020.
- Based on consideration of the future international GNSS context:
 - Galileo Full Operational Capability
 - GPS and GLONASS system evolutions
 - Other GNSS e.g. China or India
- Complemented by other exploratory studies within the GNSS Evolutions Programme, e.g. Multi-constellation Regional Systems, C-band navigation system.

Study Objectives & Logic

Main Study Objective:

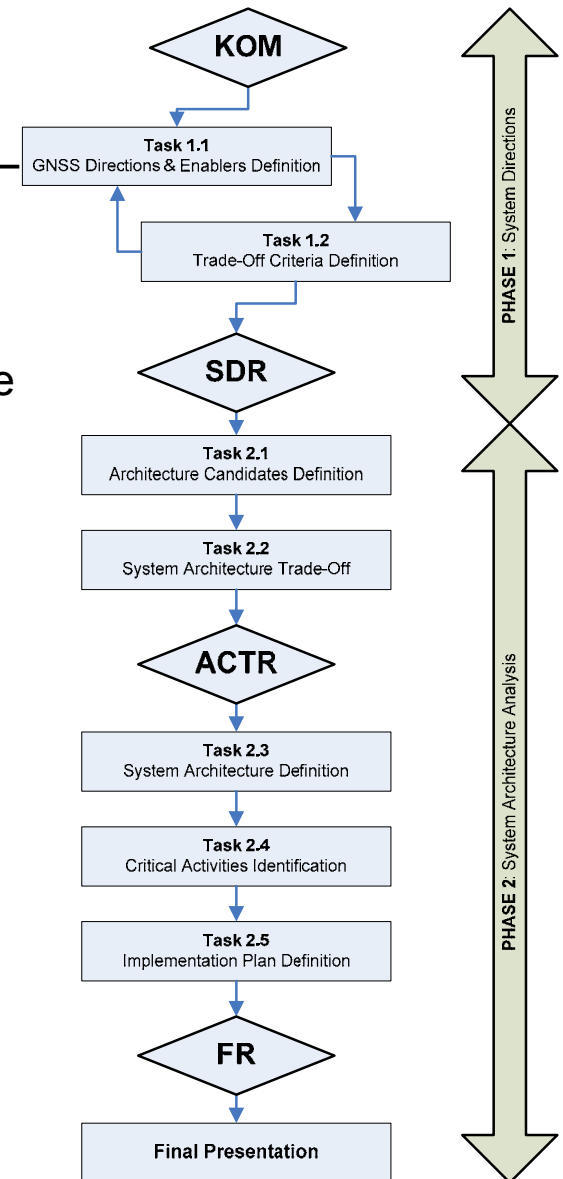
Identify flexible Future Navigation System Architecture Concepts – together with the associated technologies – capable to satisfy future user needs.

Phase 1:

- Definition of the Directions driving the evolution towards future GNSS and Identification of the key technologies that allow such evolution.
- Establish Trade-Off Criteria for later selection of the architecture concepts

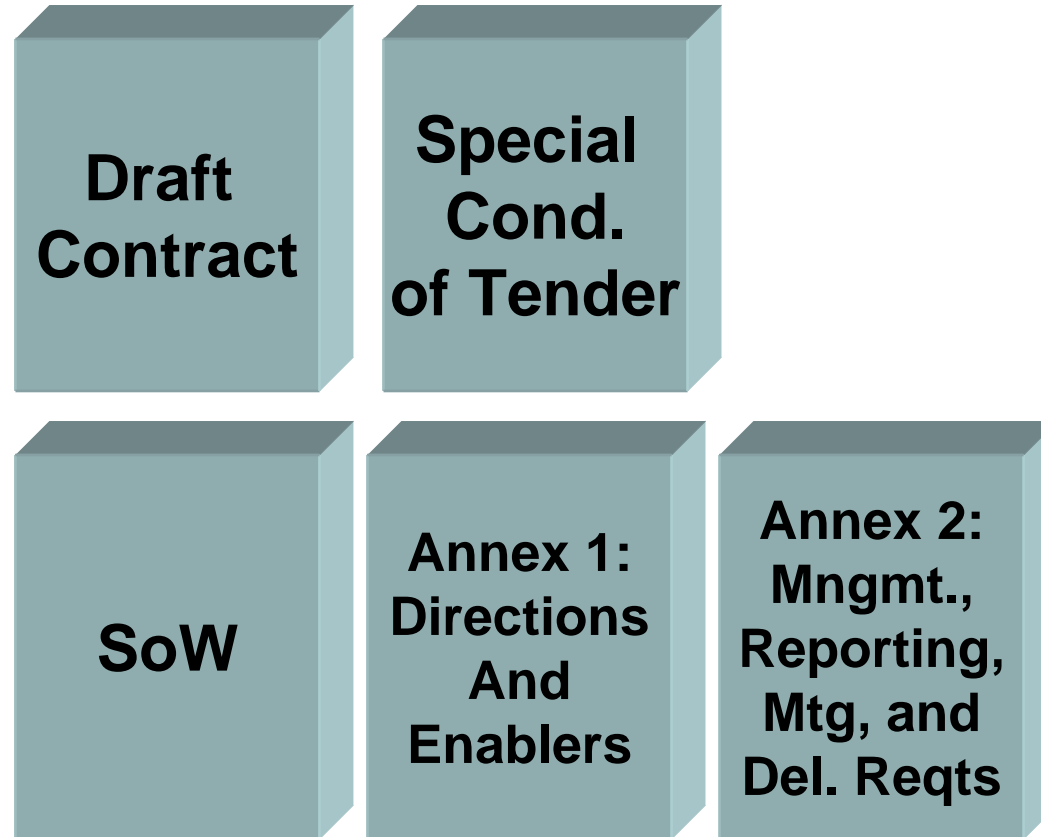
Phase 2

- Definition of preliminary system architectures to be evaluated and compared.
- Final proposal(s) for a System Architecture Concept
 - that meets the system directions but is at the same time flexible and open enough to be shaped in order to meet different future user expectations.
- Propose a Development Plan considering
 - the critical technology pre-developments
 - the associated cost and schedule aspects



ITT Structure

- 2 Parallel Contracts planned to be awarded



Directions and Enablers

- Mission requirements not being available, it has been decided to establish “Directions” and “Enablers”
- Directions:
 - Describe the evolution trends of European GNSS
 - Provide the “goals” of future GNSS architectures
 - Questions are provided with the aim to stimulate investigation of new approaches.
- Enablers:
 - Technical answers to the above Directions
 - Technologies to be available in the future

Schedule

- Overall budget of 1,500,000 EURO broken down as follows:
 - Phase 1: Euro 500.000 Firm Fixed price and
 - Phase 2: Euro 1,000,000 Ceiling price.
- Upon written authorisation by ESA, the Contractor shall proceed with the agreed work-packages of Phase 2.

Phase	ID	Milestone	Date
1	KOM	Kick-Off Meeting	T0
	SDR	System Directions Review	T0+4
2	ACTR	System Architectures Concept Trade-Off Review	T0+9
	FR	Final Review	T0+12
	FP	Final Presentation	T0+13

Deliverables

Phase	ID	Deliverable	Associated Task(s)
Proposal	1	TN on GNSS System Directions and Enablers (proposal version)	N/A
Phase 1	5	TN on GNSS System Directions and Enablers	1.1
	6	TN on Analysis Methodology, Trade-off Criteria and Simulation Scenarios	1.2
Phase 2	11	TN on System Architecture Candidates	2.1
	12	TN on System Architectures Trade-Off	2.2
	16	System Architecture Definition and Justification File	2.3
	17	TN on Identified Critical Activities	2.4
	18	System Development Plan(s)	2.5
	19	Final Report incl. Executive Summary	
	20	Analysis Tools procured, including all licenses, HW, libraries, manuals and scenarios settings	

Main Expectations

1. Make evolve the preliminary Directions and Enablers into a “Strawman” for Future Navigation System Architectures
2. Define an Architecture Concept flexible and adaptable to the mission needs that will be defined by the user community at a later stage
3. Identify critical and novel Pre-developments that have to be envisaged to be able to fill the gap from the technological point of view

Back-Up Material

Phase 1

Tasks:

- **Task 1.1: Critical Analysis of the System Directions and Enablers**
 - Critical Discussion of Directions
 - Identification and Discussion of Enablers
- **Task 1.2: Trade-off Criteria Definition**
 - Identify trade-off/evaluation criteria for the comparison of the alternative system architectures in Phase 2
- Tasks 1.1 and 1.2 are expected run in parallel and with strong interactions to achieve:
 - Good coverage of potential future technologies
 - Strong set of evaluation criteria.

Output:

- “Technical Note on System Directions and Enablers”
 - Technical discussion of the System Directions and Enabling Technologies
 - Set of preliminary system requirements (as a straw-man)
- “Technical Note on Analysis Methodology, Trade-Off Criteria and Scenarios”
 - Describes the trade-off criteria and methodology to be applied to the selection process in the next phase.

Upon written authorisation by ESA, the Contractor shall proceed with the agreed work-packages of Phase 2.

Tasks:

Phase 2

- **Task 2.1** Candidate System Architecture Definition:
 - Alternative Concepts based on Directions & Enablers
- **Task 2.2** System Architectures Trade-off:
 - Selection of concepts based on System analysis according to trade-off criteria.
- **Task 2.3** System Architecture Conceptual Design:
 - Detailing of the conceptual design
- **Task 2.4** Critical Activities Identification:
 - Identification of technology pre-developments and R&D recommendations to mitigate programmatic risks.
- **Task 2.5** Development Plan:
 - Planning of Implementation for the selected architecture concepts.

Output:

- “ TN on System Architecture Candidates “ (TASK 2.1)
- “ TN on System Architectures Trade-Off “ (TASK 2.2)
- “ System Architecture Definition and Justification File “ (TASK 2.3)
- “ TN on Identified Critical Activities “ (TASK 2.4)
- “ System Development Plan(s) “ (TASK 2.5)
- “ Final Report incl. Executive Summary “