

Scope and Project Plan of IFMIF/EVEDA

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for Advanced Systems: Fusion Devices (NuDL:FD)
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CONTENTS

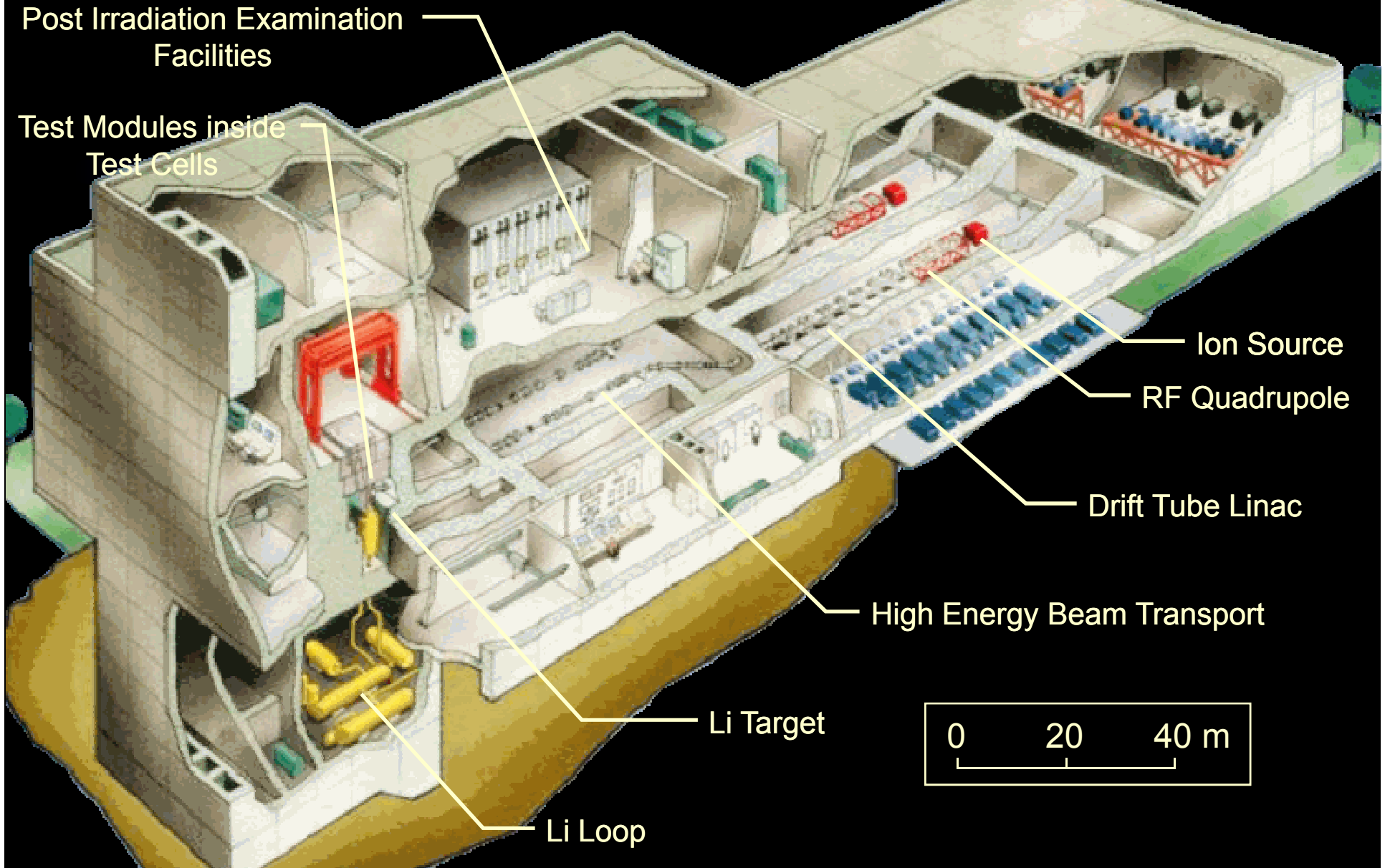


- Introduction
- Mission and Scope
- Main Schedule
- Organization
- Project Plan
- Working Site
- Summary

INTRODUCTION

- Phase of IFMIF Project consists of:
Conceptual Design (CDA, 1994~2004) /
Engineering Design & Engineering Validation
(EVEDA, 2007~2013?) / Construction &
Commissioning/ Operation & Maintenance/
and Decommissioning (CODA).
- Outcome of EVEDA: complete integrated
design of IFMIF with data validating long-term
operation of critical components and planning
for CODA.

Introduction - IFMIF "Artist View"



Introduction - Features

- To simulate neutron field in the blanket (and possibly in other components) of DEMO relevant devices using accelerator-based D+Li source based on the similarity of nuclear responses (e.g. displacement damage production, gas production) in the materials after irradiation
- To be criticized by the small testing volume ($\sim 500 \text{ cm}^3$ for highest flux area) and the high energy tail of neutron spectrum
- To apply Small Specimen Testing Technique (typical dimensions $\sim \text{mm}$ in thickness, $\sim \text{cm}$ in length) to avoid excessive activation and overcome smallness of volume
- Nuclear data above 20MeV have an important role to provide the level of proximity of the irradiation condition to the actual condition in DEMO.

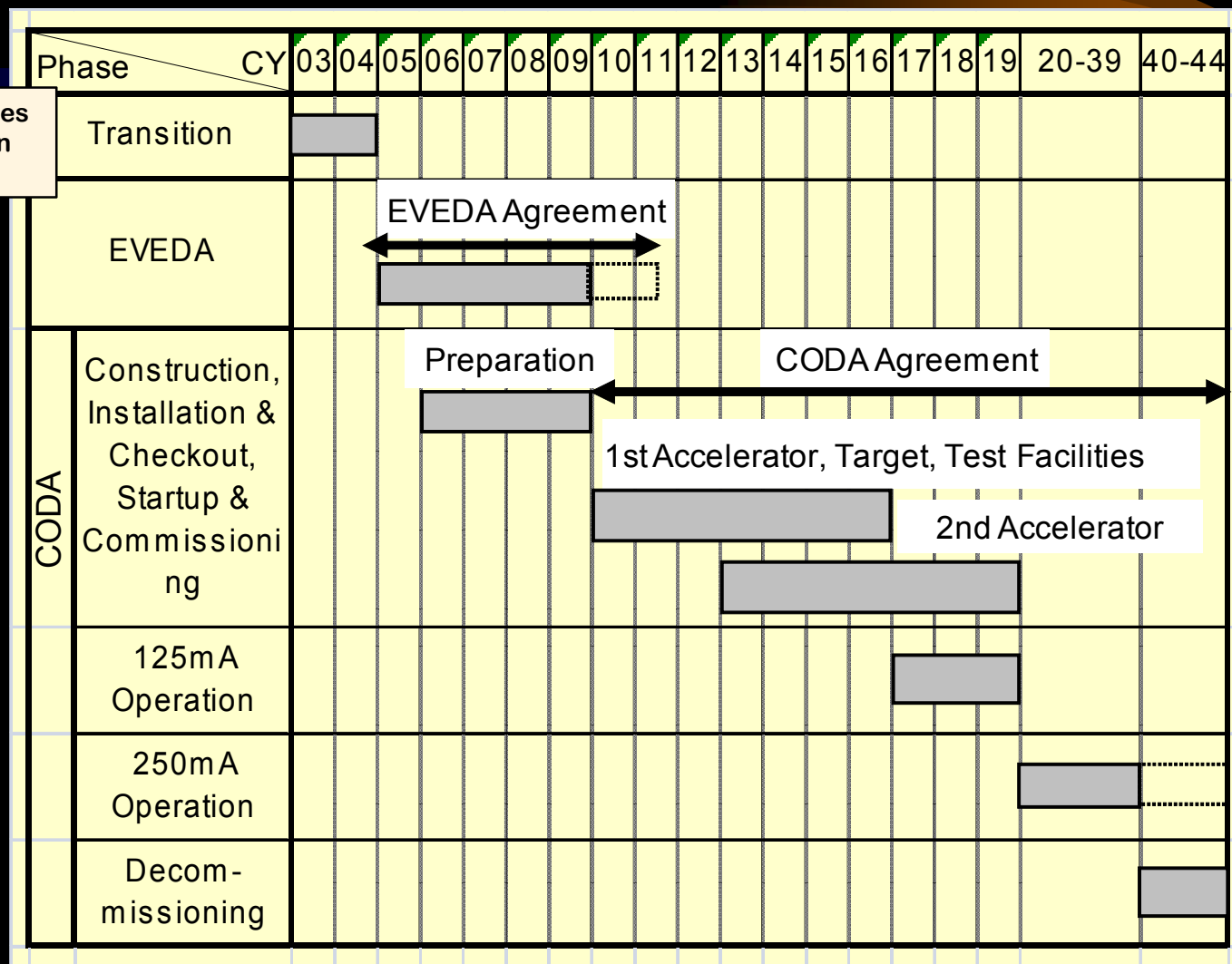
MISSION and SCOPE

- Objective: to prepare for the construction of the IFMIF intense 14MeV neutron source for DEMO relevant materials testing
- Project Team in Rokkasho is responsible for management & coordination of the project.
- Major activities:
 - Engineering design of IFMIF itself
 - Safety assessment for generic site
 - Technical specifications for the longest delivery components
 - Design & construction of low energy section of IFMIF accelerator for testing full beam power operation
 - Design, construction and tests of scale 1:3 model of target facility
 - Design and tests of target system including remote handling
 - Design, construction and tests of mock-ups of test facilities
 - Irradiation of test set-up to check performance under operating condition by using fission reactor

(From IFMIF/EVEDA Mission Report on 27 March 2006)

MAIN SCHEDULE (2004 proposal)

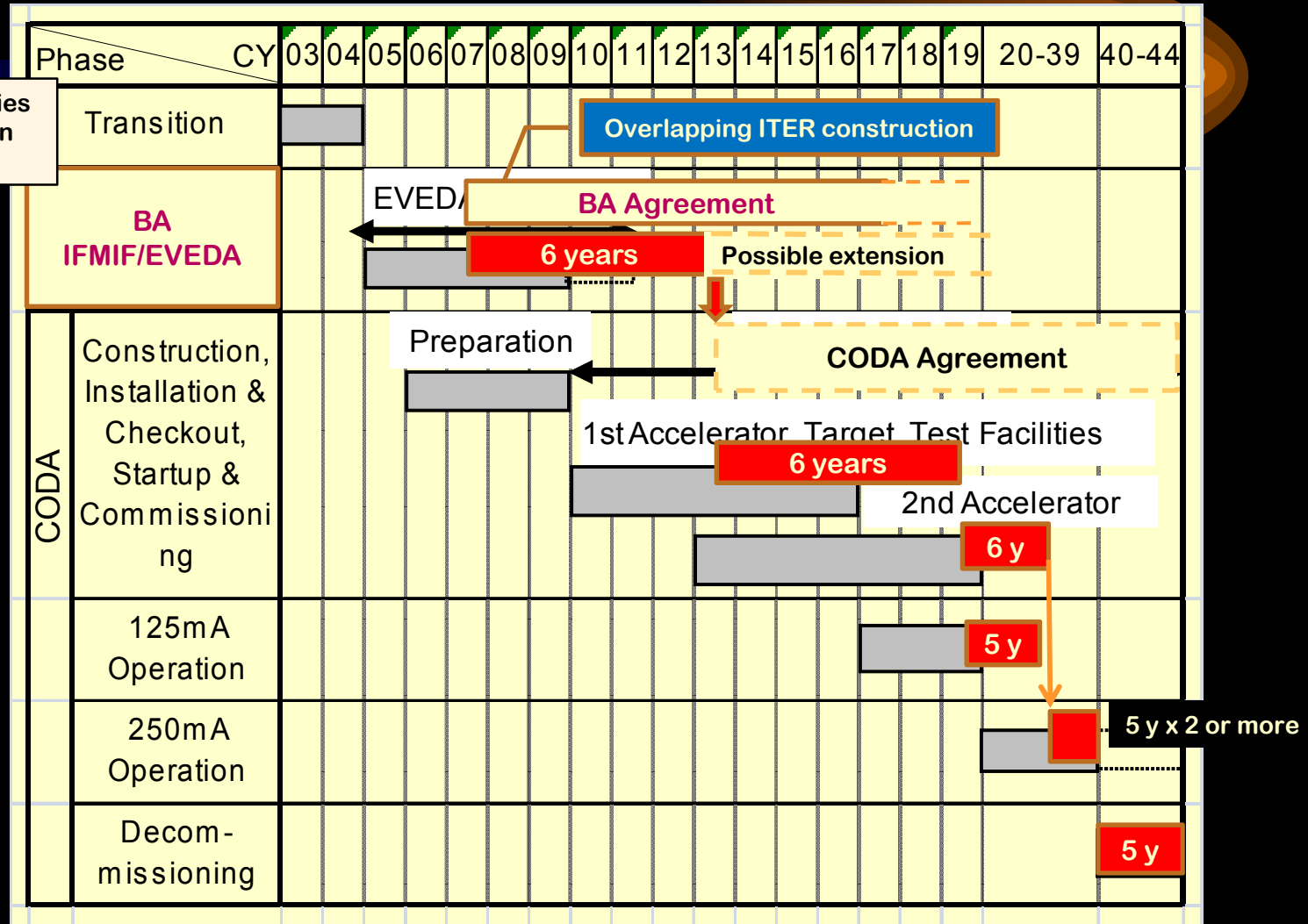
Conceptual Design Activities under the IEA collaboration (Japan, EU, US, Russia)



From IFMIF Comprehensive Design Report, January 2004, IEA, Fig.5.1-1

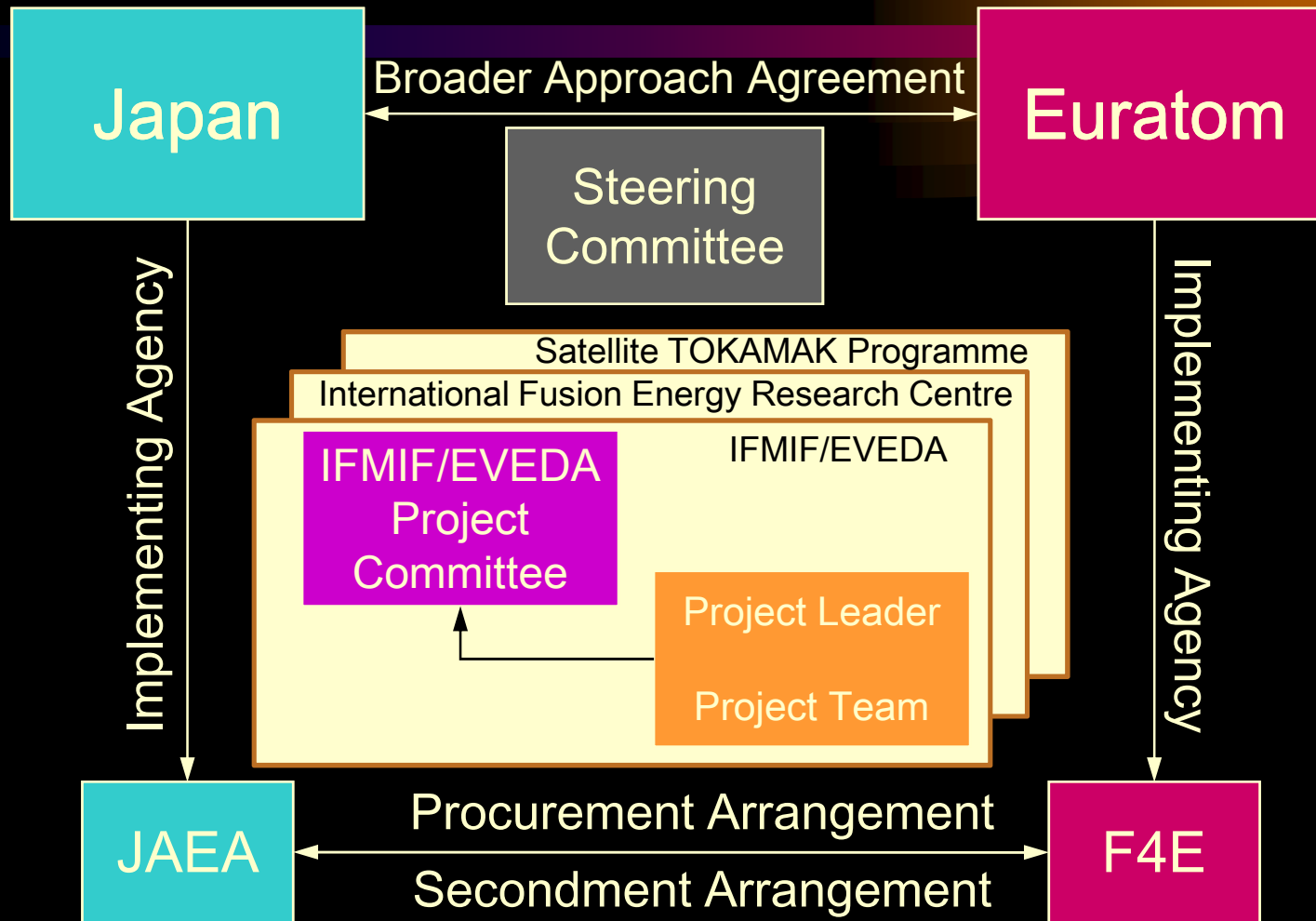
MAIN SCHEDULE (2007 plan)

Conceptual Design Activities under the IEA collaboration (Japan, EU, US, Russia)

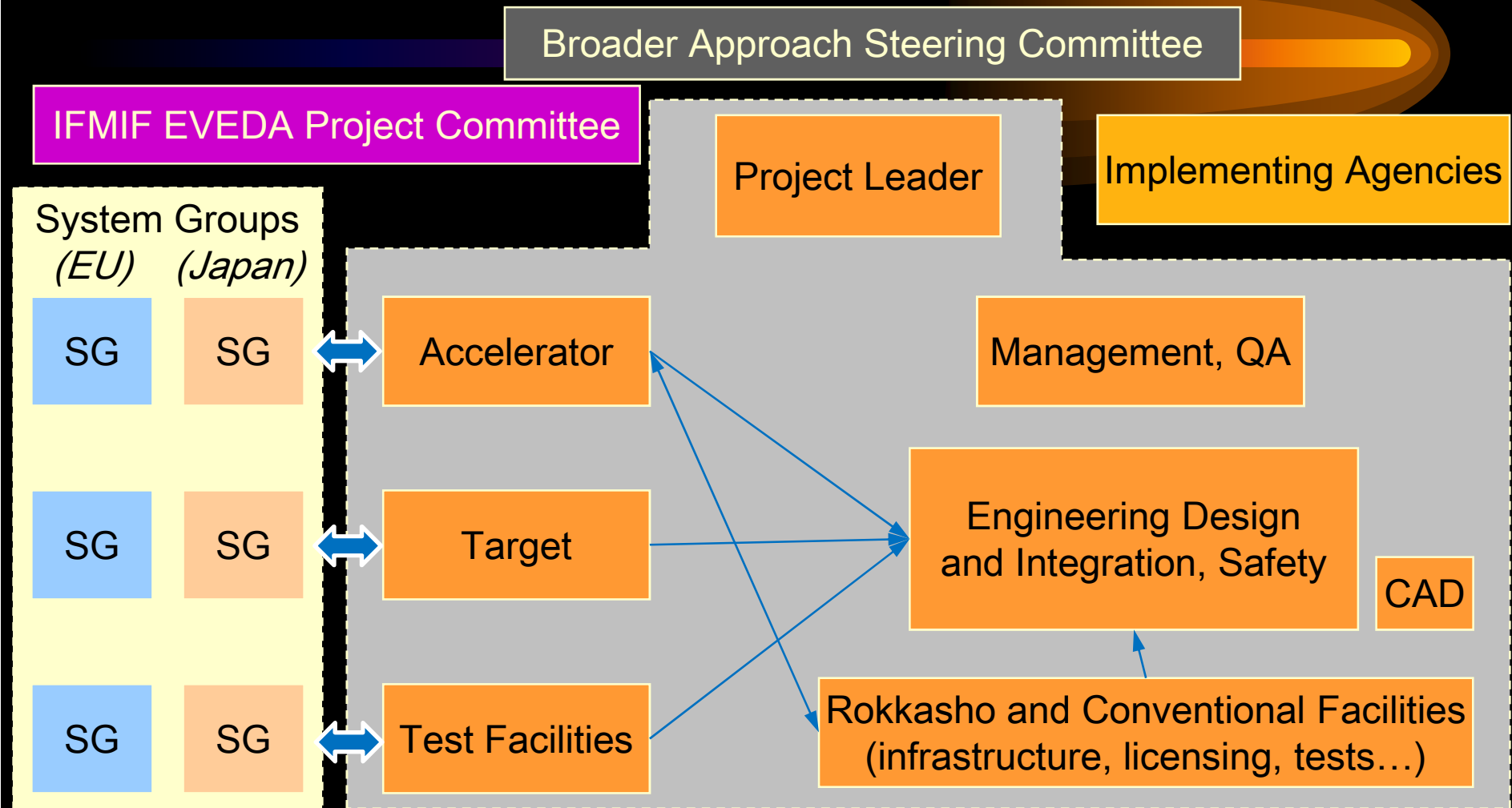


From IFMIF Comprehensive Design Report, January 2004, IEA, Fig.5.1-1

ORGANIZATION



Organization (IFMIF/EVEDA Project)



Organization (Project Team)

Group	Professional		Support	Lead
	EU	Japan	Japan	
Project Leader	1 ●		1 ¹ ●	
Management, QA ²	1 ○	1 ●	1 ○	JA
Accelerator	1 ○	1 ○	1	EU
Target	1 ○	1	1	EU
Test Facilities	1 ●	1 ●	1	JA
Design Integration	2 ○	2	7 ³ ○○	EU
Rokkasho Facilities	1	2 ○	2	JA
Total	8	8	14	

Oct.'07



In 2008



¹ The secretary will be common to the whole Project Team.

² The Management and QA Group Leader will also be Deputy to the Project Leader.

³ The CAD designers constitute the largest part of this group.

PROJECT PLAN

(Planning Cycle)

October, Yr- <i>n</i>	November, Yr- <i>n</i>	March, Yr- <i>n+1</i>	April, Yr- <i>n+1</i>
Project Committee	Steering Committee	Project Committee	Steering Committee
Work Programme <i>n+1</i>	Work Programme <i>n+1</i>	Project Plan Annual Report <i>n</i>	Project Plan Annual Report <i>n</i>
<i>Recommendation</i>	<i>Approval</i>	<i>Recommendation</i>	<i>Approval</i>
			
	Implementing Agencies		Implementing Agencies
	<i>Implementation</i>		<i>Accountability</i>

PROJECT PLAN

(Reporting Documents)

- Project Plan
 - Overview of the activities all along the project
 - Prediction of budget
 - Manpower (ppy)
 - Contracts (kBAUA, and % of Procurement Arrangements)
- Work Programme
 - Detailed description of the activities for the next Fiscal Year
 - Detailed budget
 - Manpower (ppy)
 - Contracts (kBAUA, and % of Procurement Arrangements)
- Annual Report
 - Detailed description of the activities of the passed Fiscal Year
 - Detailed budget (same presentation as for Work Programme)
- Final Design Report

Proposal of Procurement Arrangements

		BA (kBAUA)	EU (kBAUA)	EU (%)	JA (kBAUA)	JA (%)
Accelerator Facility	Management and Design	32.79	29.95	91	2.85	9
	Injector	4.58	4.58	100		
	RadioFrequency Quadrupole	26.51	25.37	96	1.14	4
	1st Drift Tube Linac	6.11	6.11	100		
	Matching Section	5.96	5.96	100		
	RF Power	23.20	23.20	100		
	Full Power Beam Dump, Transport Line	5.49	5.49	100		
	Auxiliary Systems (Control Systems and Support)	4.79	1.60	33	3.20	67
	Diagnostics	1.52	1.52	100		
	Installation, Checkout, Start-up & Commissioning	17.14	7.51	44	9.63	56
	Accelerator Prototype Building	10.83			10.83	100
Sub Total		138.91	111.27	80	27.64	20
Target Facility	Li Test Loop Construction & Operation	13.82	0.80	6	13.01	94
	Diagnostics	1.70			1.70	100
	Erosion/corrosion	1.22	1.22	100		
	Purification System	2.16	0.49	23	1.67	77
	Remote Handling	3.90	1.71	44	2.20	56
	Engineering Design	5.97	0.68	11	5.28	89
Sub Total		28.76	4.90	17	23.86	83
Test Facilities	Engineering Design of HFTM	2.65	2.07	78	0.59	22
	Irradiation Tests in Fission Reactor	1.83	1.83	100		
	Small Specimen Test Technique	0.65			0.65	100
	Other Engineering Validation Tasks	5.34	5.34	100		
	Engineering Design of "Post Irradiation Examination"	1.43			1.43	100
	Other Engineering Design Tasks	5.18	5.18	100		
Sub Total		17.09	14.41	84	2.67	16
Project Team	Professional Staff (JA 48 ppy, EU 48 ppy)	24.41	13.16	54	11.25	46
	Support Staff (JA 96 ppy)	11.07			11.07	100
Sub Total		35.48	13.16	37	22.32	63
Grand Total		220.24	143.75	65	76.49	35

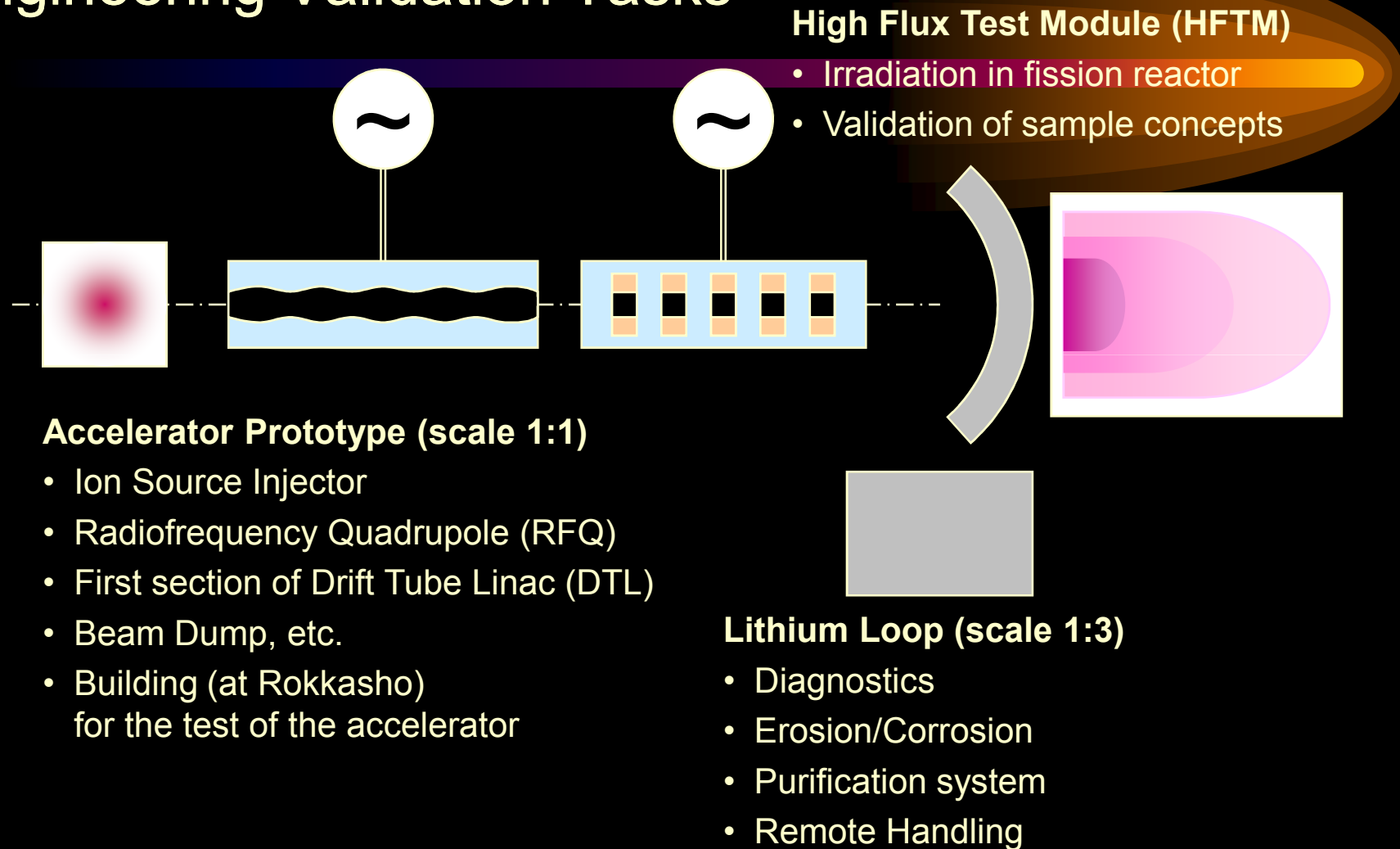
PROJECT PLAN

Engineering Design Tasks

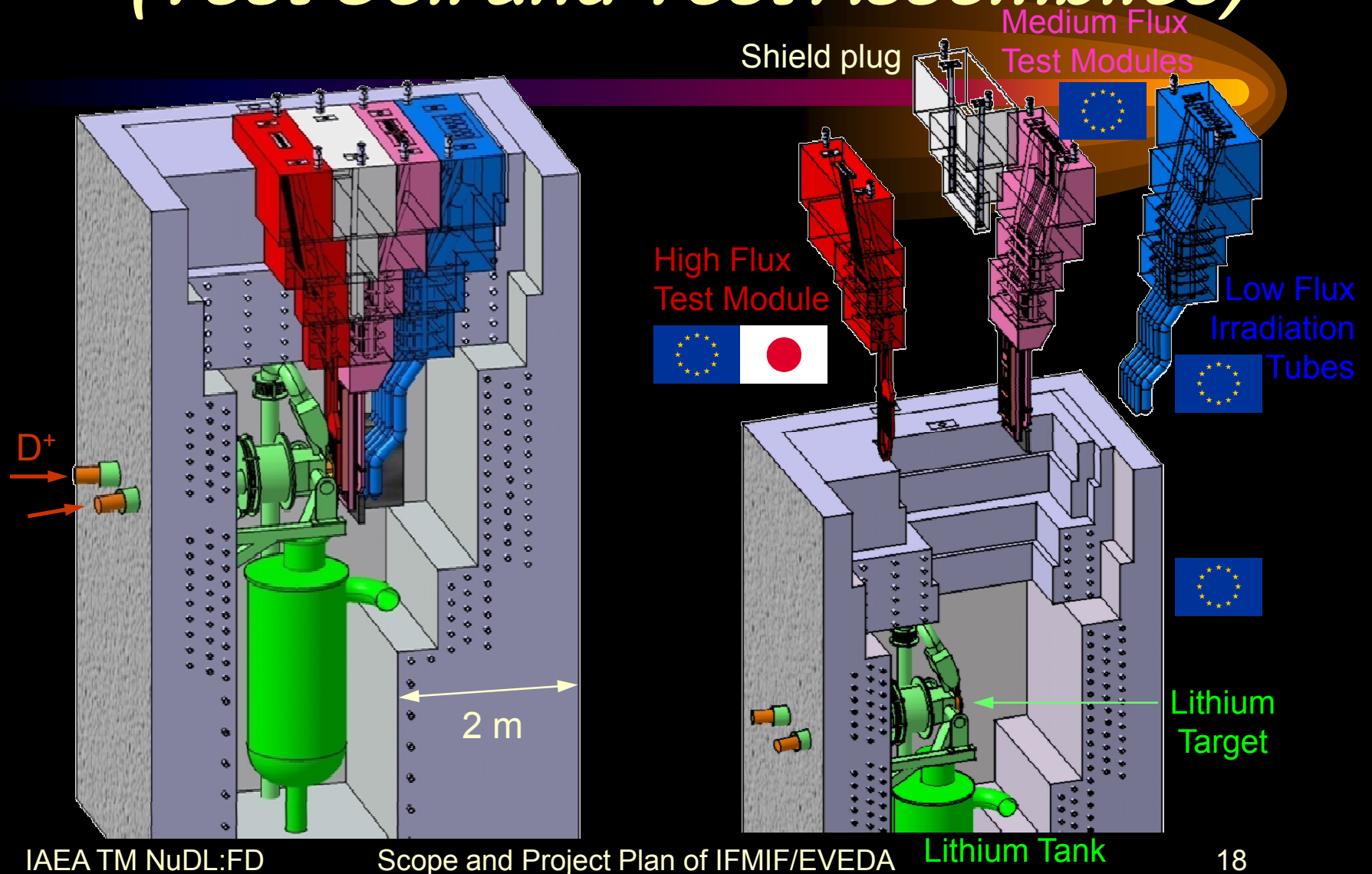
- Integration of systems
 - Test Facilities
 - Target Facility
 - Accelerator Facility
 - Conventional Facilities
- Costing
 - Of IFMIF (construction, operation and dismantling)
 - Of construction planning
- Generic Site Safety Report
- Site Requirements and Site Design Assumptions
- Specifications of elements on the critical path

PROJECT PLAN

Engineering Validation Tasks



Test Facilities Main Part (Test Cell and Test Assemblies)



Test Facilities (HFTM/vertical set-up)

High Flux Test Module:
SSTT/PIE (>20 dpa/yr)



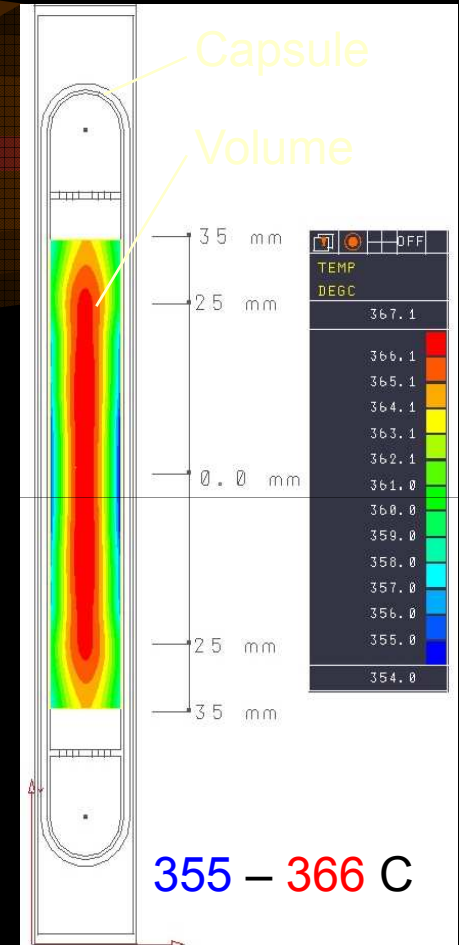
Thermocouples

Heating

4 x 3 capsules

700 – 1150
samples

He Gas



Test Facilities (HFTM/horizontal set-up)

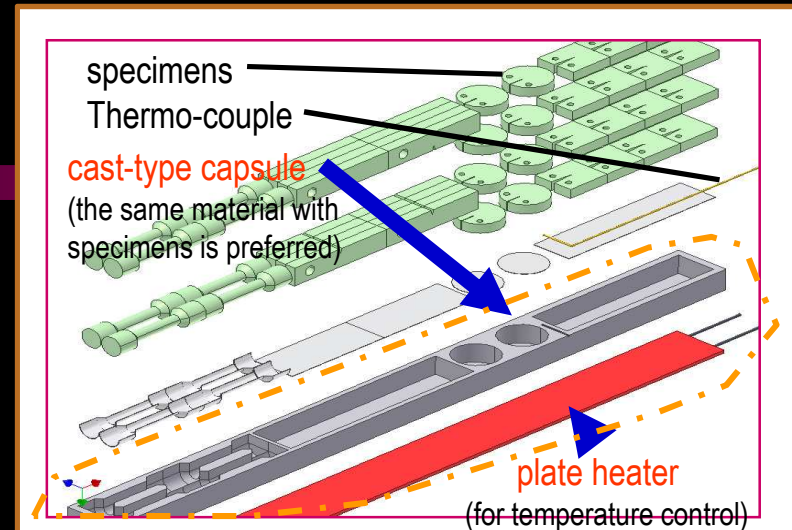
High Flux Test Module: SSTT/PIE (>20 dpa/yr)



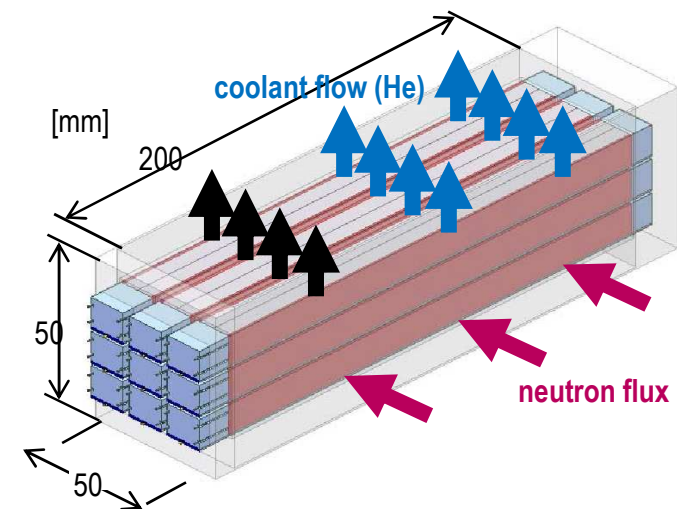
Objective: To provide the full detailed engineering file of HFTM (Horizontal set-up).

Project Plan:

1. Conceptual design of heater-integrated plate and capsule (H-I)
2. Fabrication and basic performance tests of model of H-I
3. Engineering design of prototype of H-I
4. Performance tests of prototype H-I in He loop
5. Engineering design of full scale HFTM

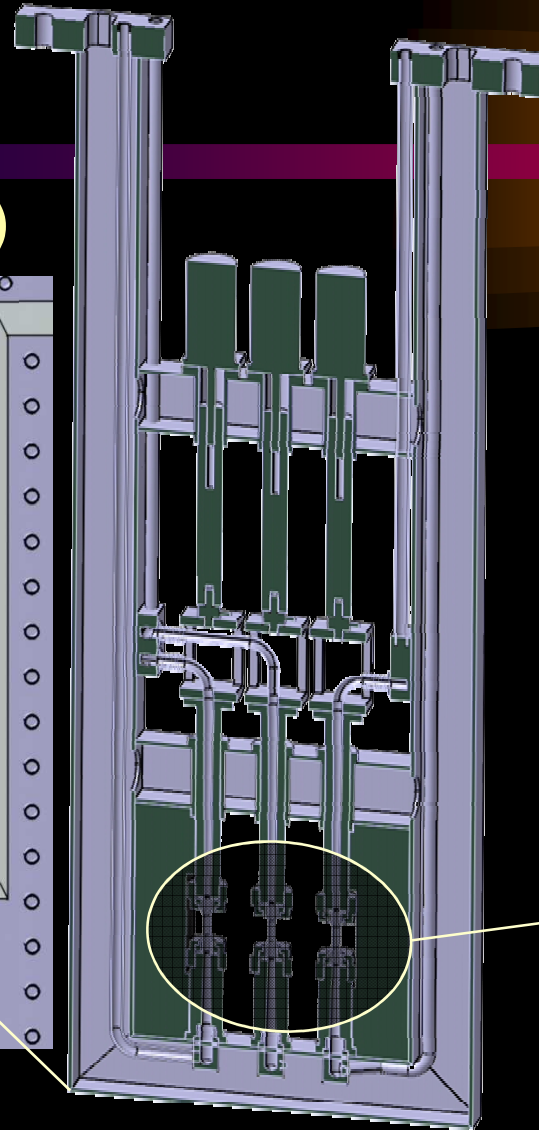
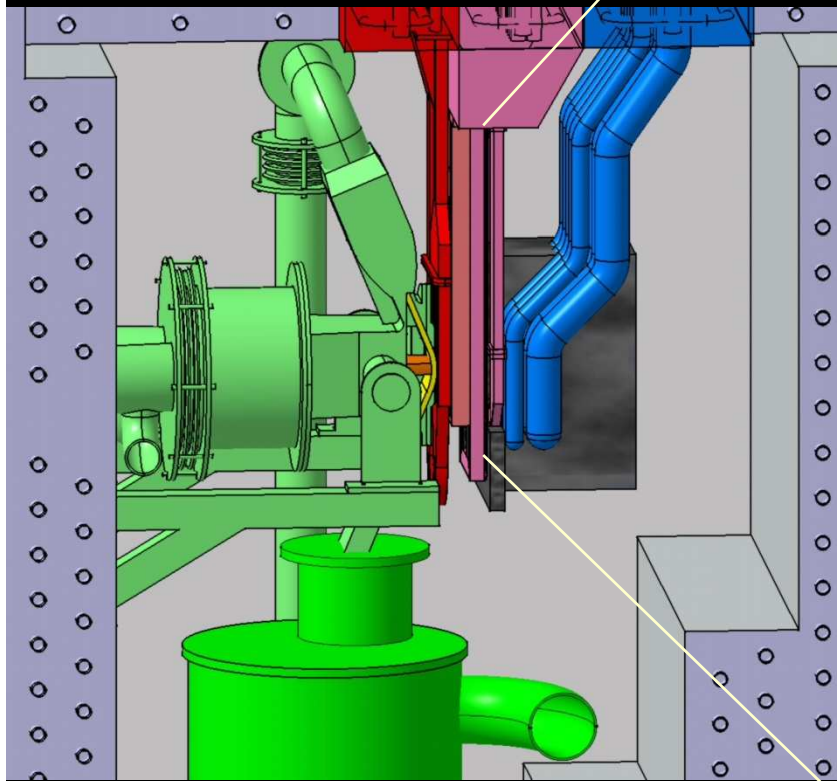


Heater-integrated plate and capsule

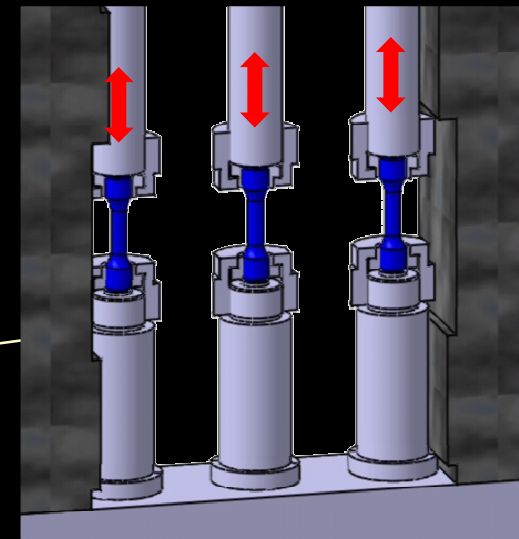


Test Facilities (MFTM/creep-fatigue)

Mid Flux Test Module:
Creep-fatigue (~5 dpa/yr)

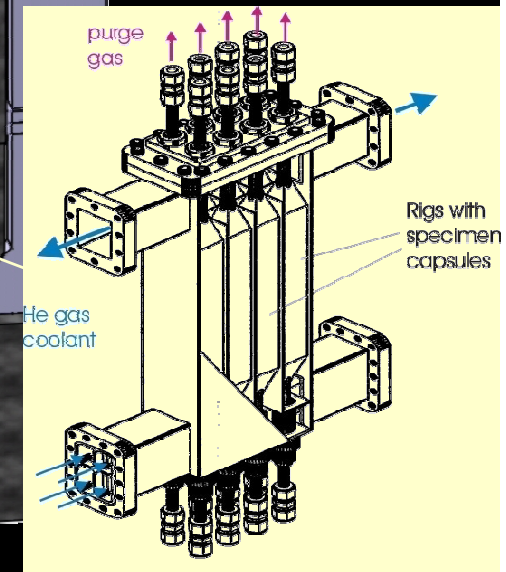
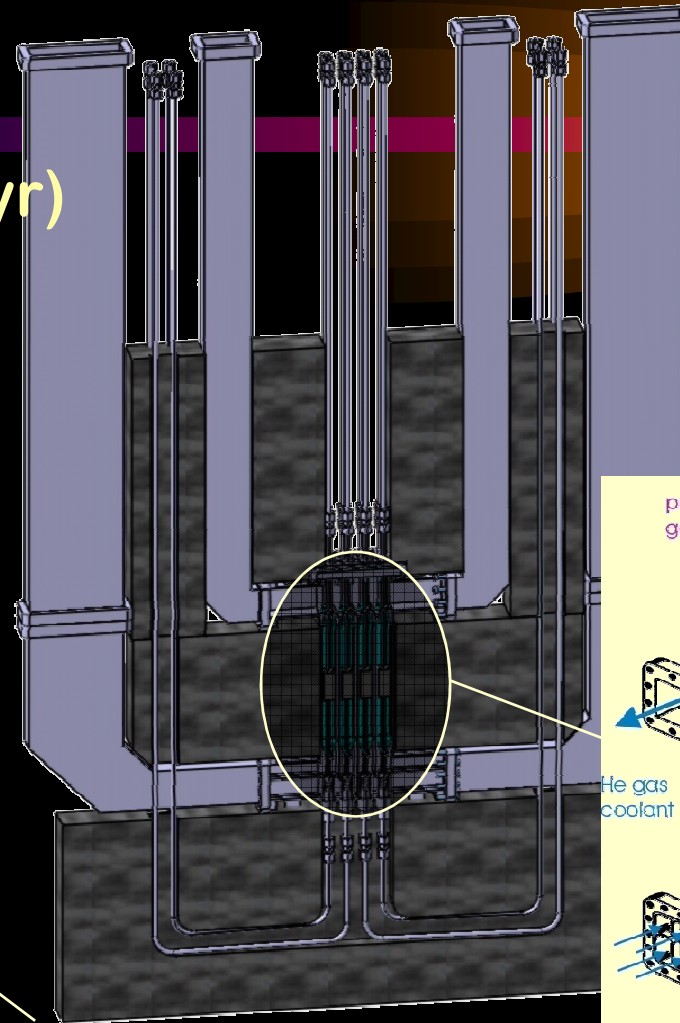
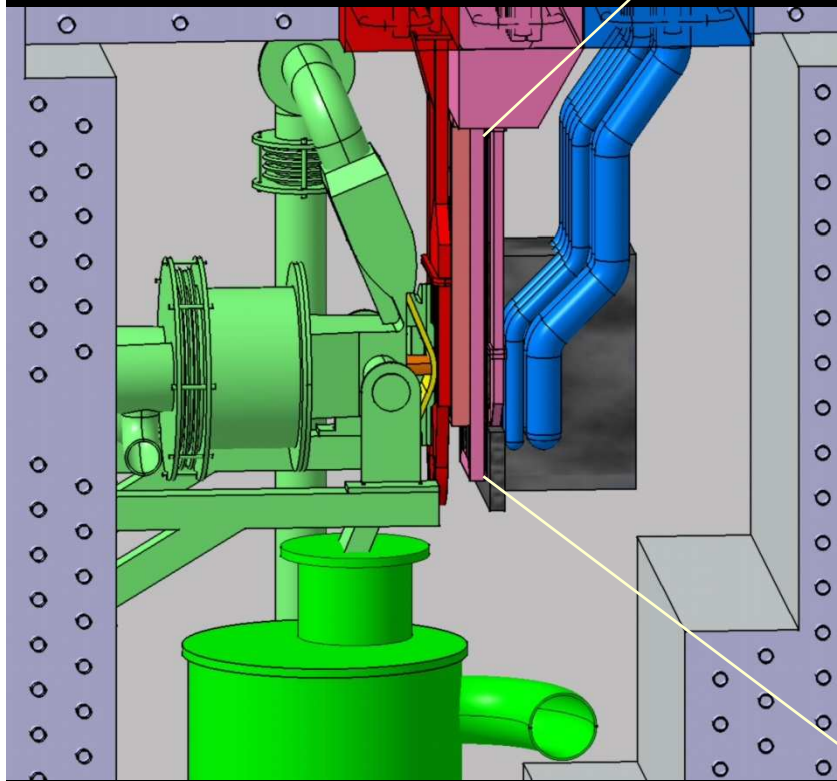


3 independent
samples
in creep fatigue



Test Facilities (MFTM/tritium release)

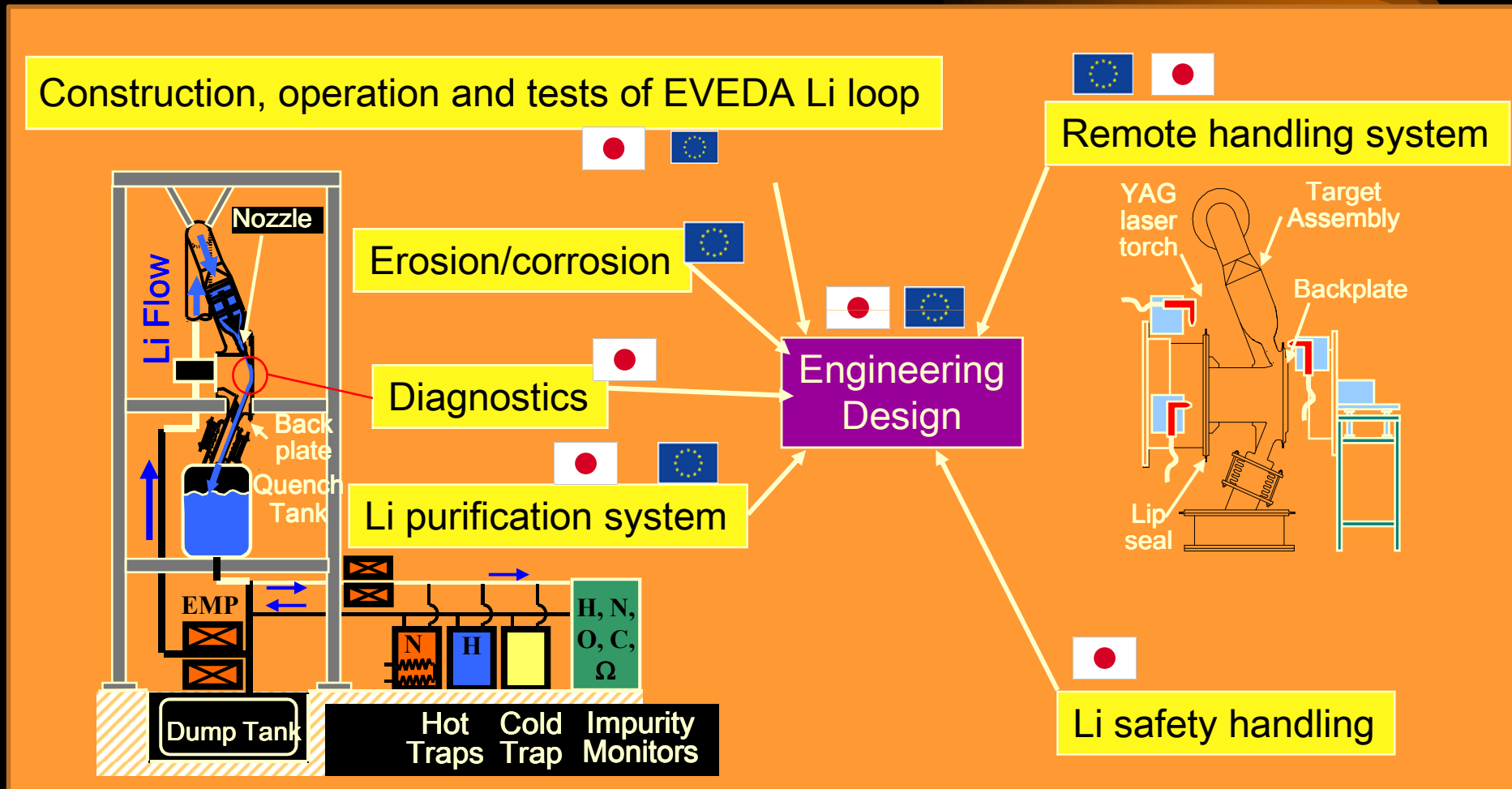
Mid Flux Test Module:
tritium release (a few dpa/yr)



Test Facilities - Tasks

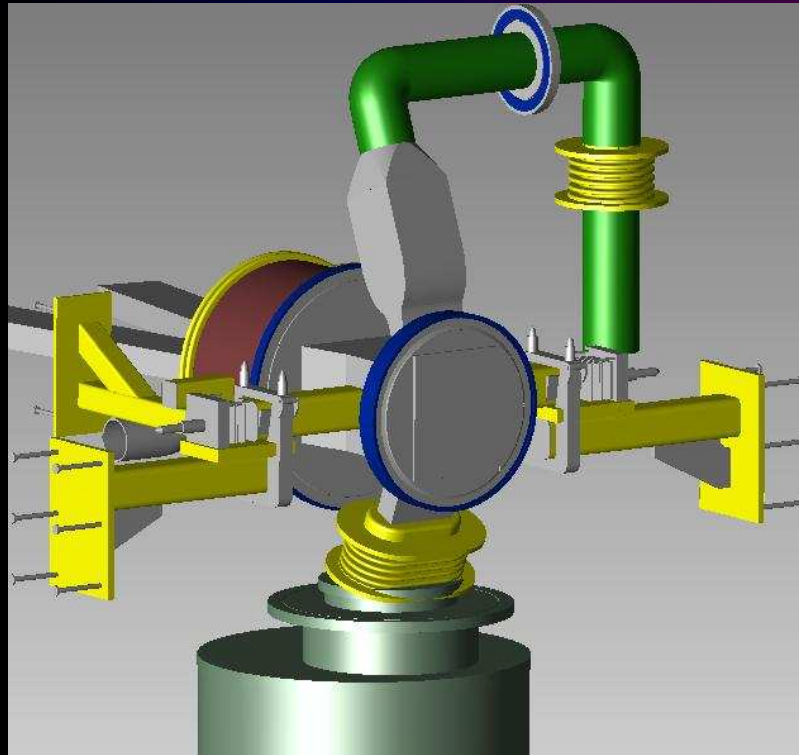
- Subsystem Management
- Engineering Design of High Flux Test Module
- Irradiation Tests in Fission Reactor
- Small Specimen Test Technique
- Other Engineering Validation Tasks
- Engineering Design of “Post Irradiation Examination”
- Other Engineering Design Tasks

Target Facility Main Part (Target Assembly and Li Loop)



Target Facility (backplate options)

Cut & Weld Option



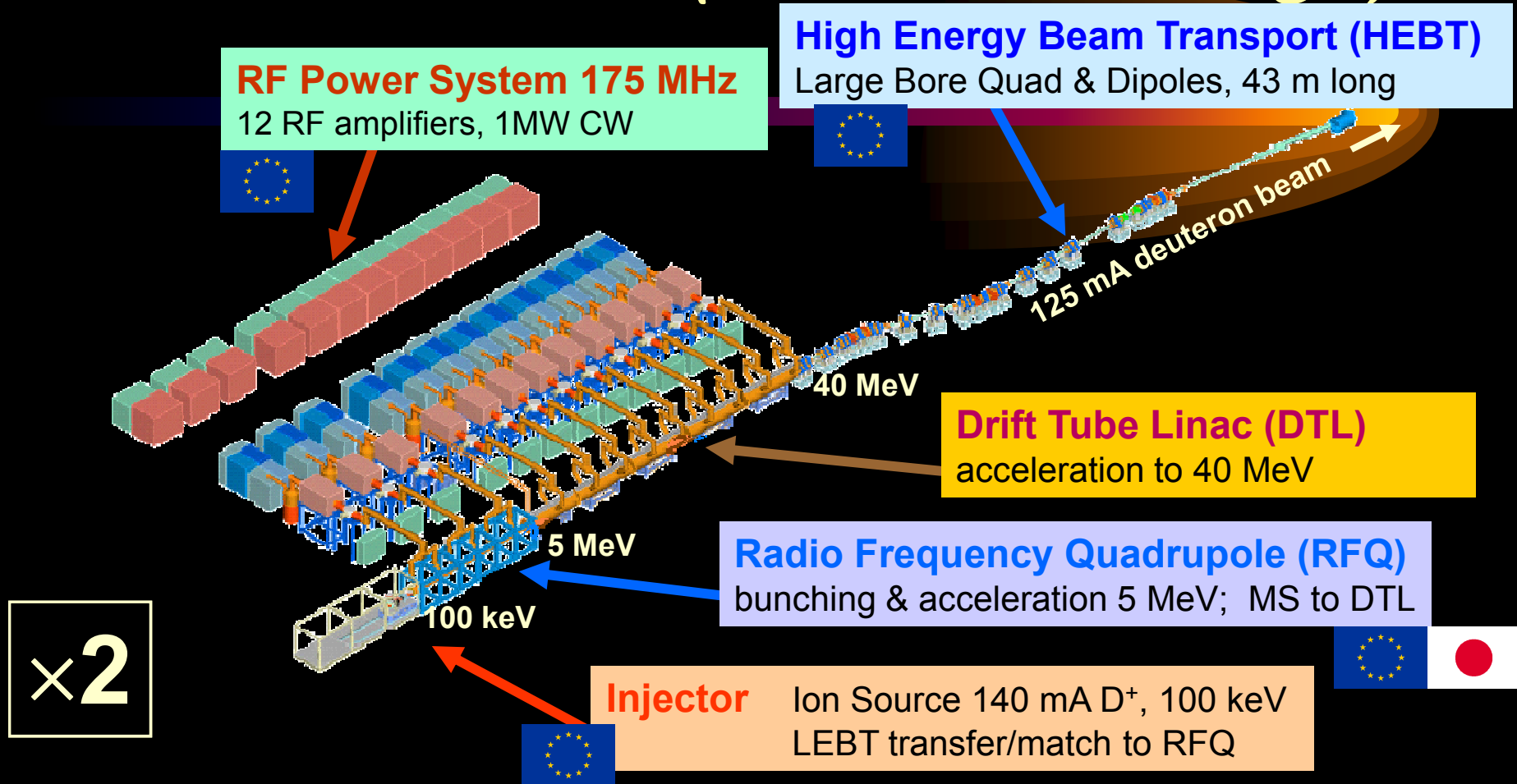
“Bayonet” Option



Target Facility - Tasks

- Subsystem Management
- Li Test Loop Construction & Operation
- Diagnostics
- Erosion/corrosion
- Purification System
- Remote Handling
- Engineering Design

Accelerator Facility (reference design)

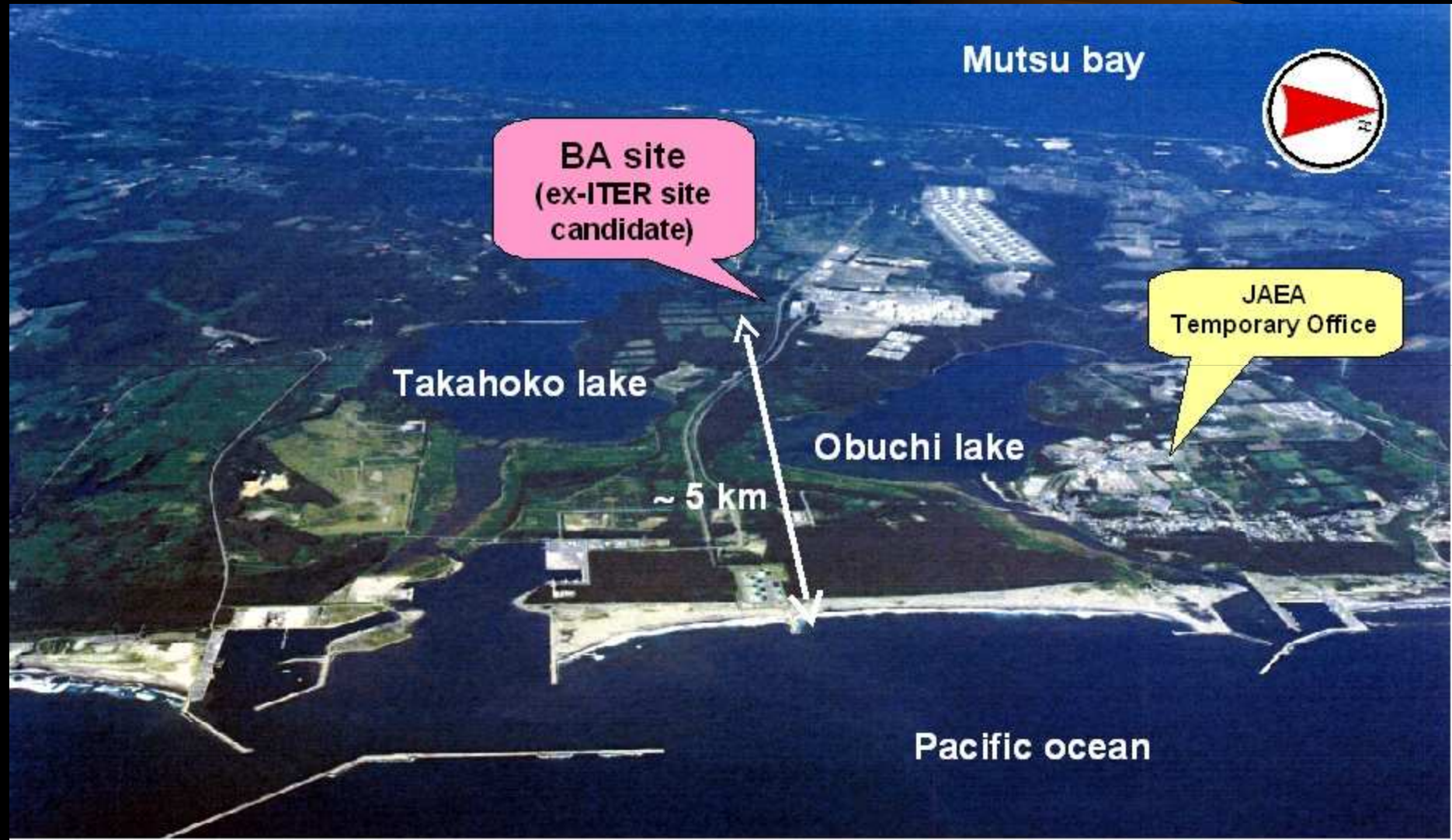


IFMIF uses 2 continuous-wave 175 MHz linear accelerators, each providing a 125 mA, 40 MeV deuteron beam

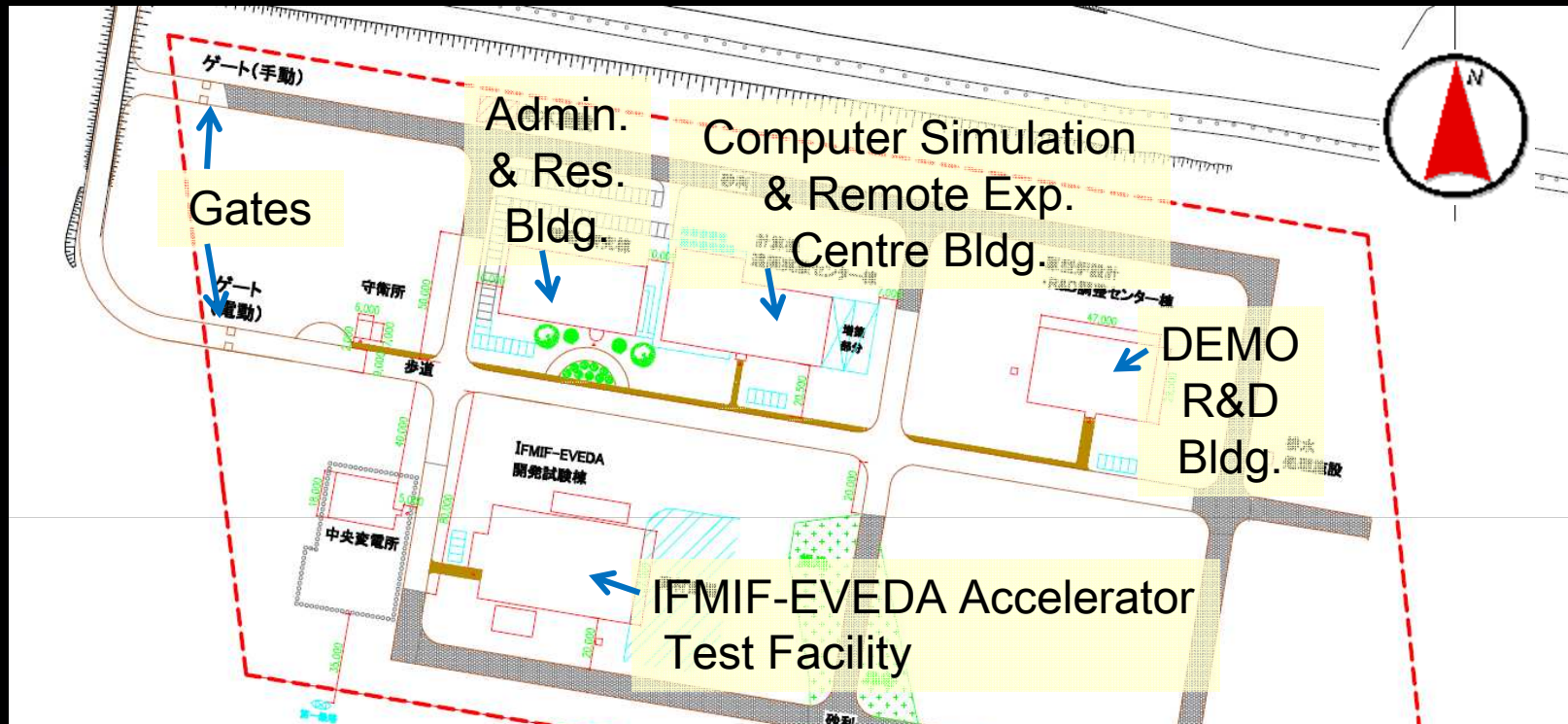
Accelerator Facility - Tasks

- Subsystem Management
- Injector
- Radio-Frequency Quadrupole
- First Drift Tube Linac
- Matching Section
- RF Power
- Full Power Beam Dump, Transport Line
- Auxiliary Systems (Control Systems and Support)
- Diagnostics
- Installation, Checkout, Start-up & Commissioning
- Accelerator Prototype Building
- Engineering Design

WORKING SITE – Rokkasho



Working Site - IFMIF/EVEDA Accelerator Building



SUMMARY

□ Outcomes of IFMIF/EVEDA Project

- Engineering design files for next coming CODA phase
- Acquisition of validation data for critical subsystems as the integrated systems (low energy part of accelerator, liquid lithium loop, high flux test module)

□ Organizations to implement tasks

- Project Team (16 professionals and ~14 supports) to manage and coordinate interfaces and produces reports to Project Committee & Steering Committee
- System Groups in EU and JA to conduct internal coordination

□ Project Plan

- Six years plan to scope all activities in the project to define (and refine) the schedule (and resources) to arrive at the final goal