

ESS Accelerator Design Upgrade Project



EUROPEAN
SPALLATION
SOURCE

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2011-12-09, SLHIPP-1

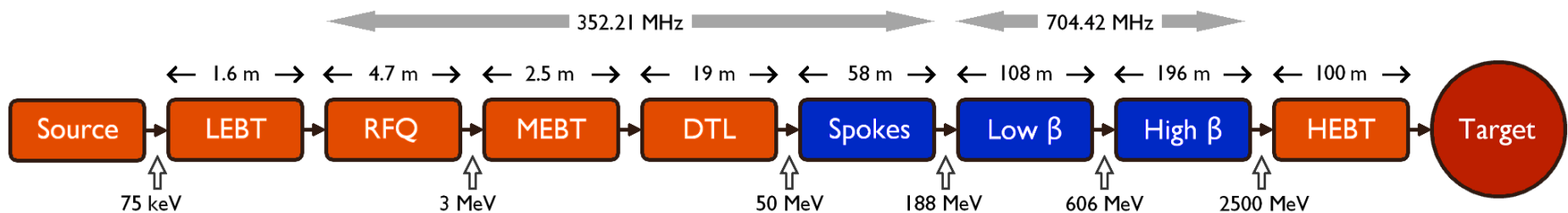
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Overview

- ESS is a long-pulse neutron spallation source
- The target is feed by a superconducting 5 MW proton linac
 - Pulse Length = 2.9 mS
 - Pulse Rate = 14 Hz
 - Beam Current = 50 mA



What is 5 MegaWatts?

- At 5 MegaWatts,
 - **one** beam pulse
 - has the same energy as a 16 lb (7.2kg) shot traveling at
 - 1100 km/hour
 - Mach 0.93
 - Has the same energy as a 1000kg car traveling at 96 km/hour
 - Happens 14 x per second
 - You boil 1000 kg of ice in 83 seconds
 - A ton of tea!!!



ESS is being built by a multi-national collaboration

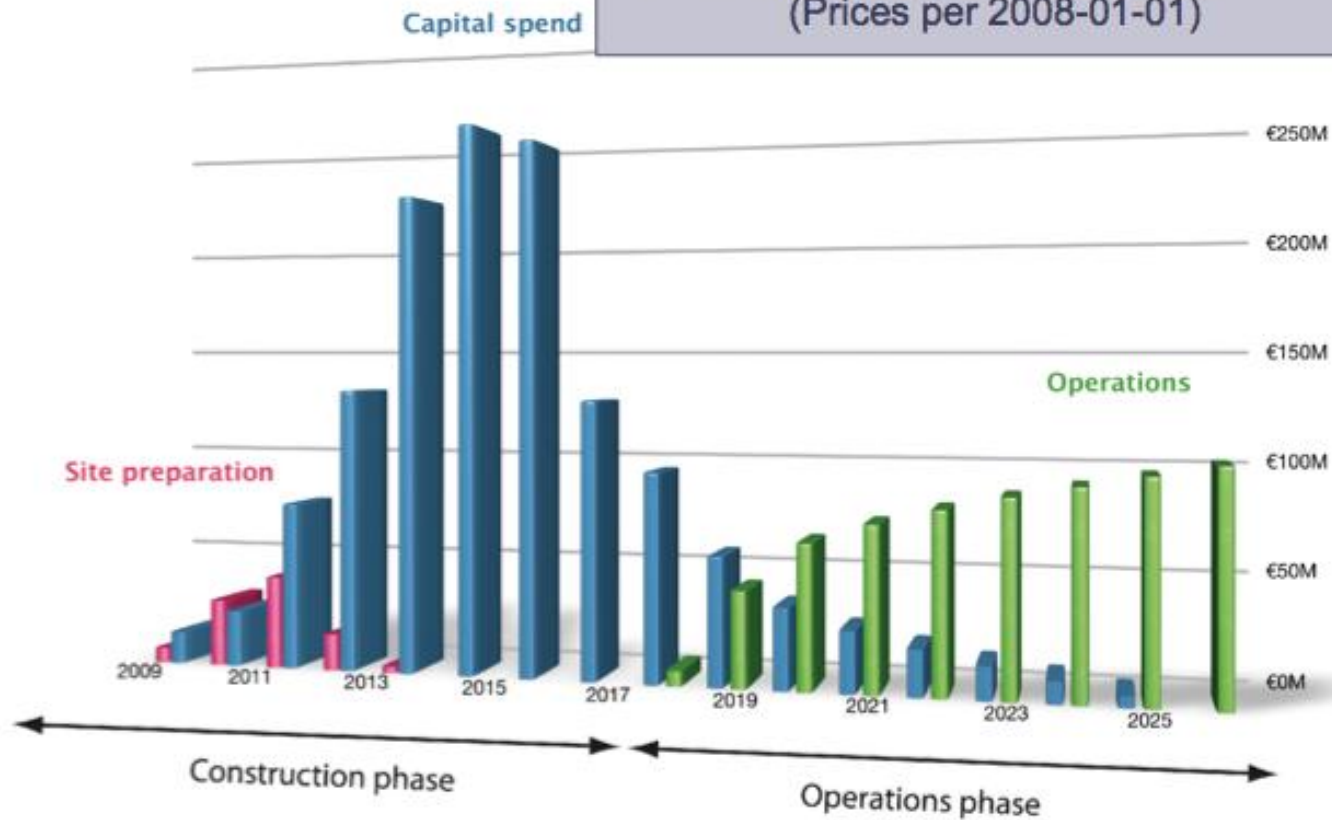
Accelerator collaboration

- NC linac: Ion source (INFN), RFQ (CEA), MEBT (Bilbao), DTL (INFN)
- SC linac: Spoke Cavities (CNRS), Elliptical cavities (CEA)
- High Energy Beam Transport: Aarhus university (Denmark)
- RF sources: High-power (Uppsala U), RF regulation, LLRF (Lund U)
- Utilities: power, network, cooling, etc (Tekniker)



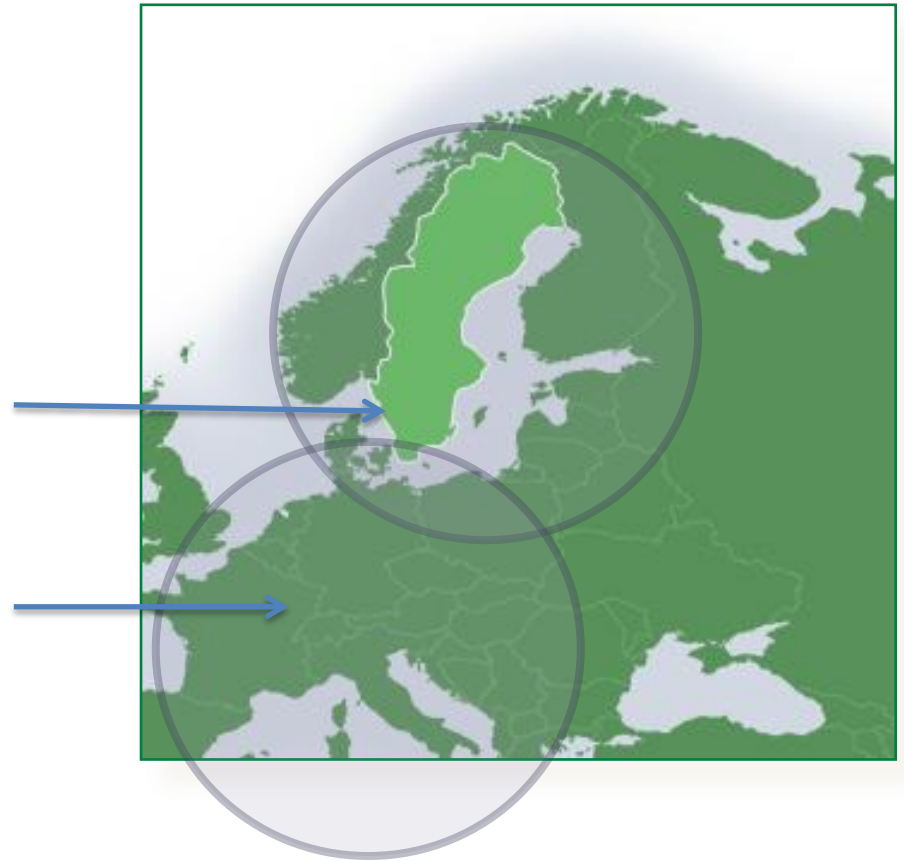
Cost

Investment:	1478 M€ / ~10y
Operations:	89 M€ / y
Decommissioning. :	346 M€
(Prices per 2008-01-01)	



Funding Strategy

- ESS AB is a Swedish public limited company (rather than a research laboratory)
- Sweden, Denmark & Norway cover 50% of cost
- The other 14 member states covers the rest, with the European Investment Bank

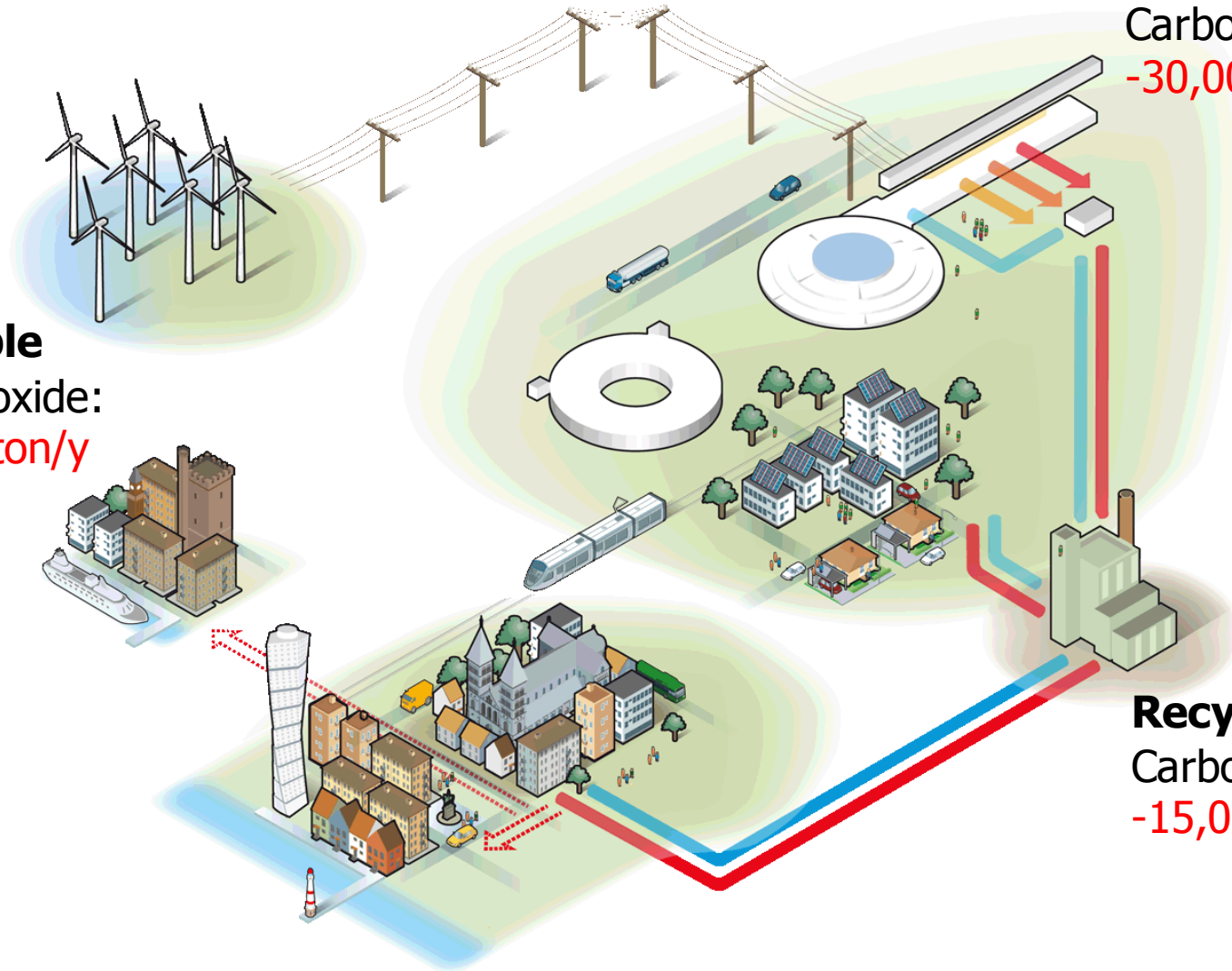


Sustainable Energy Concept

Renewable
Carbon dioxide:
-120,000 ton/y

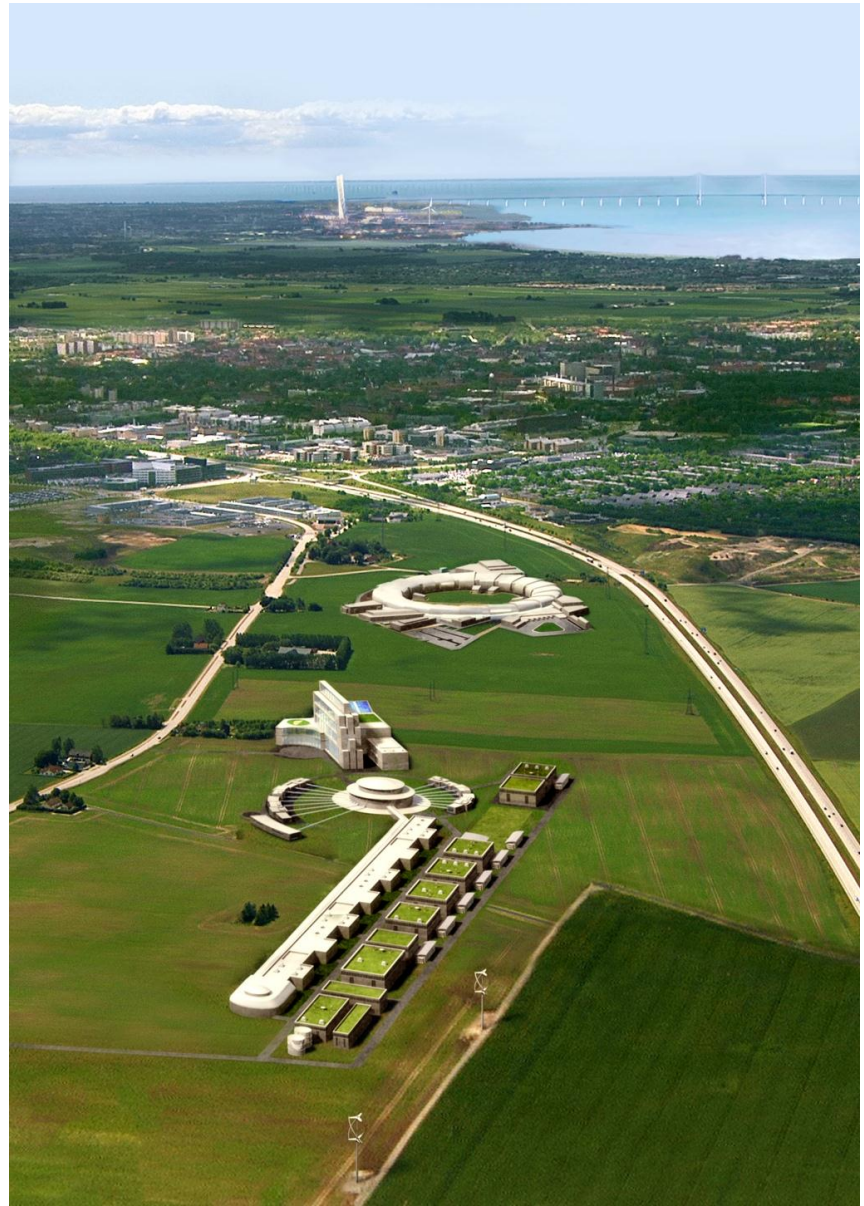
Responsible
Carbon dioxide:
-30,000 ton/y

Recyclable
Carbon dioxide:
-15,000 ton/y

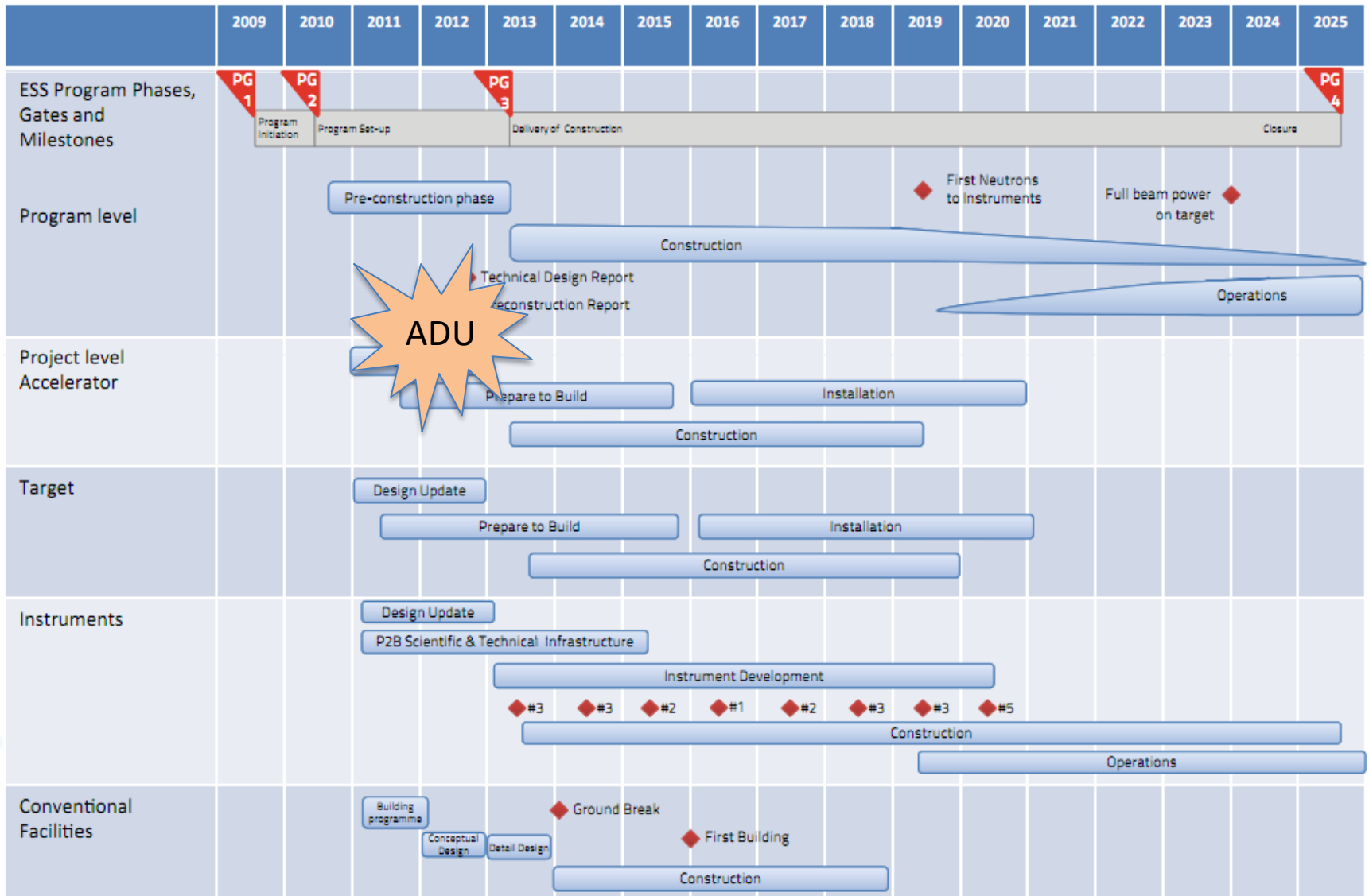


ESS in a nutshell

- 3 Systems:
 - Linac
 - Target
 - Instruments
- ~ 1.5 Bio Euro's
- Construction starts 2013
- First Neutron 2019
- Operation 2025



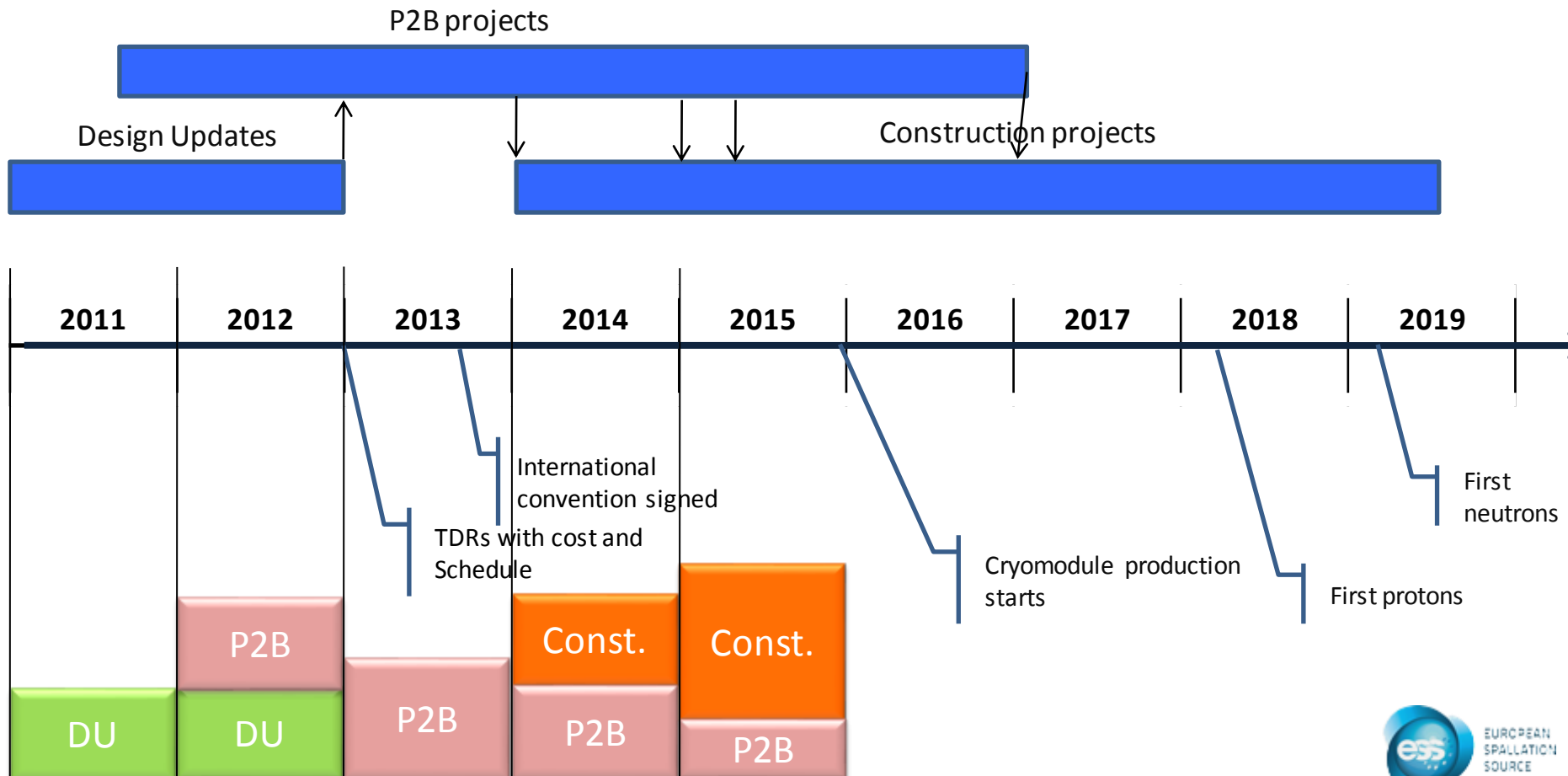
ESS programme schedule



ESS Project Strategy

P2B

- assures a stringent project framework for prototyping the design choices in the technical design
- a continuous transition from design to construction and keeps the collaborations intact through the construction decision process



Making the trains run on time at ESS

ESS is using the Project Management tools for its Design Update : a large project with diverse and international contributors and funding sources.

We must be:

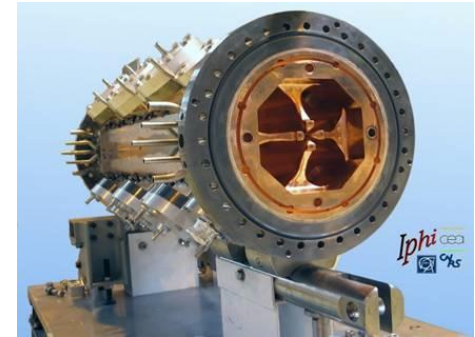
- efficient with our resources
- accountable to our funding agencies
- on time for all who are dependent on us.



Accelerator Design Update (ADU) Project

- Size
 - 1.5 calendar year (EOY 2012)
 - 252 000 hours
 - 4 193 000 € (Materials only)
 - ~ 60 -100 people
 - 7 organizations
- Deliverables
 - Technical Design Report
 - Costing estimate (20%)
 - Construction plan

IPHI RFQ at
CEA-Saclay



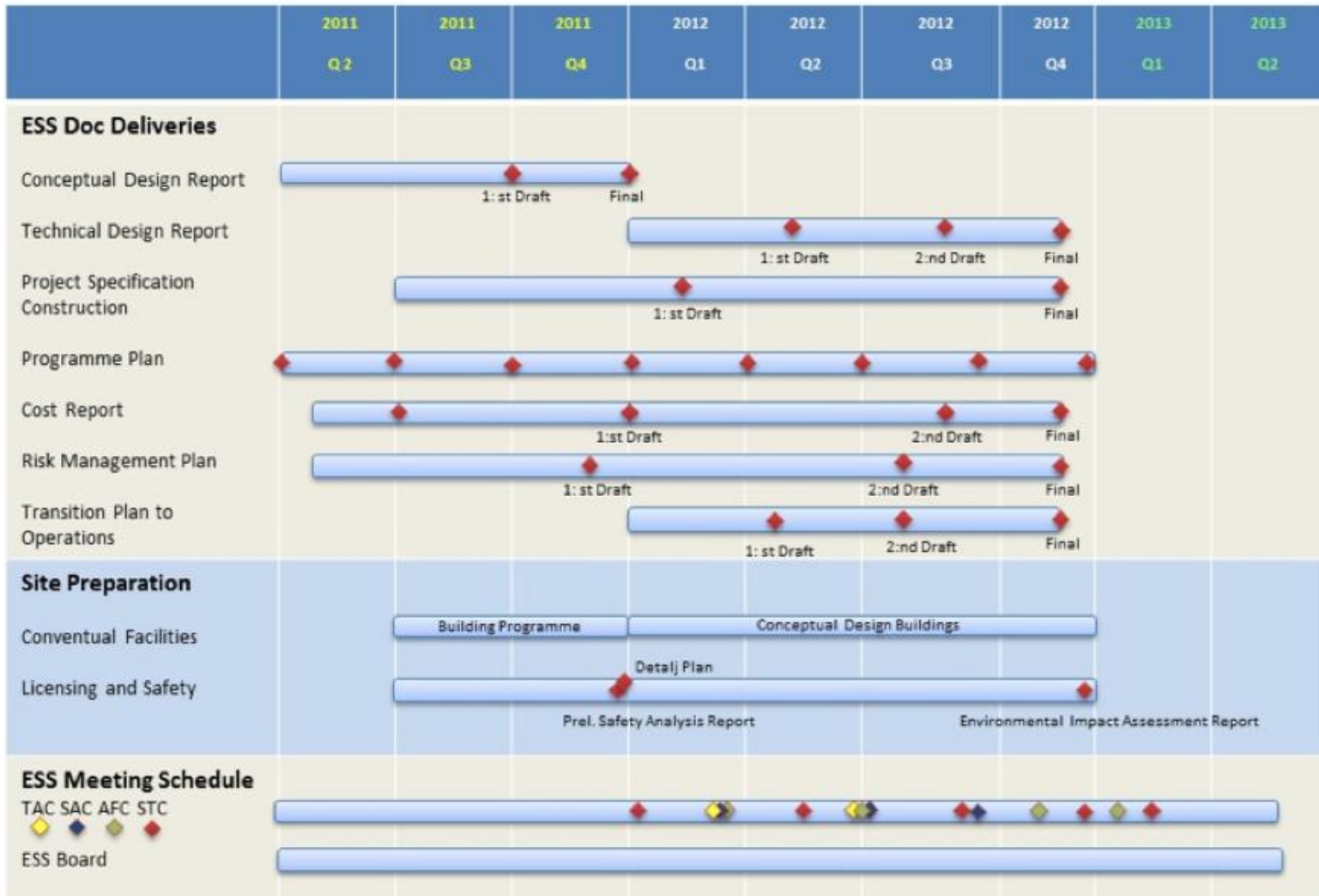
SC single spoke
cavity, IPNO
(CNRS)



SC 5 cell cavity for 704 MHz, CEA and
CNRS



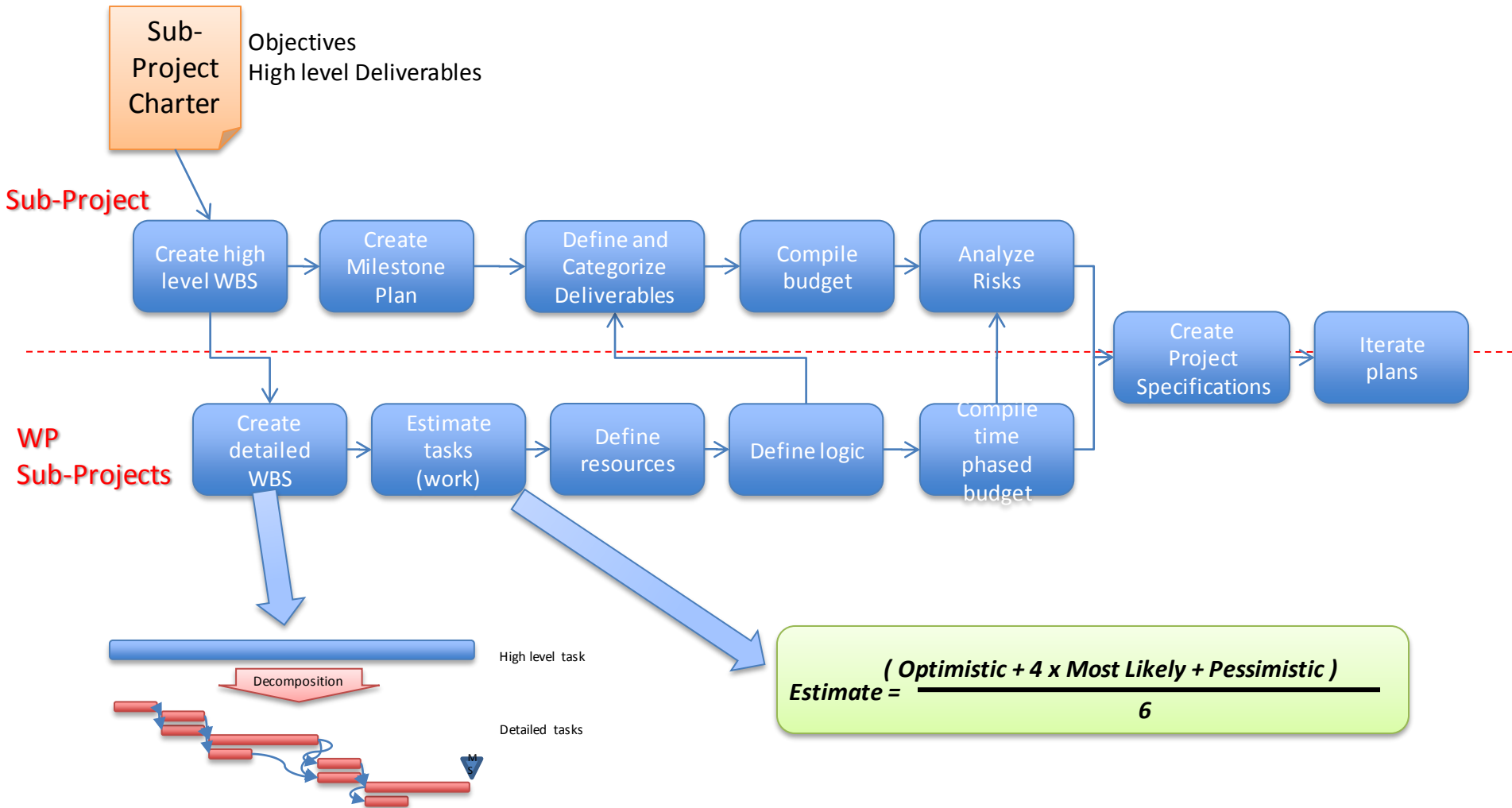
Accelerator Design Update



Project Management Tools

- Scope Management
 - Schedule Management
 - Communication Plan
 - Risk Analysis
-
- Cost Management
 - Earned Value Management (EVM)

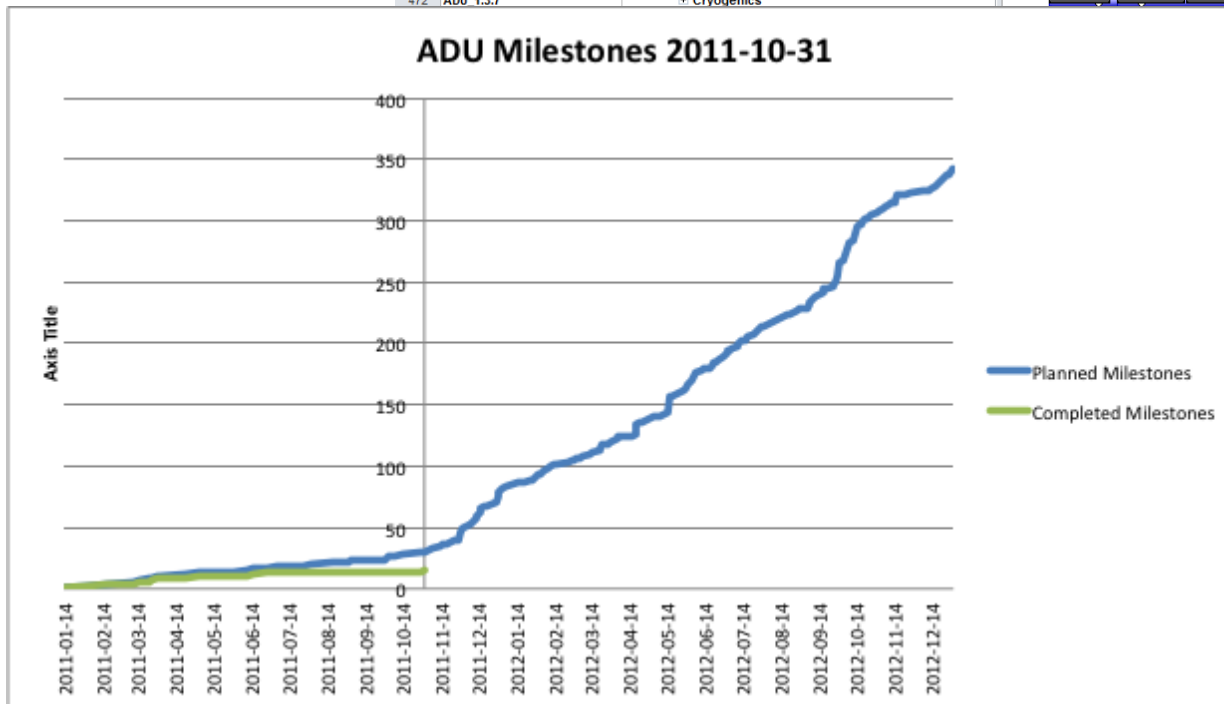
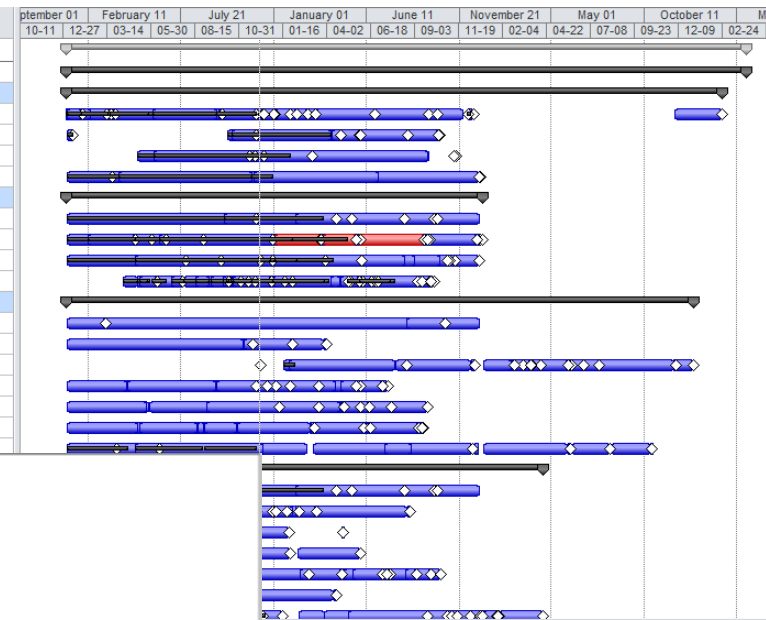
Planning Process for ESS DU and P2B projects



ADU Project Plan

1139 lines,
~350 deliverables

	WBS	Task Name
0	ADU_	ESS Accelerator DU schedule v0
1	ADU_1	Accelerator design update
2	ADU_1.1	Management
3	ADU_1.1.1	System Engineering
57	ADU_1.1.2	TDR editing
75	ADU_1.1.3	Review organisation
85	ADU_1.1.4	Planning and documentation
98	ADU_1.2	Accelerator science
99	ADU_1.2.1	Management and TDR contribution
116	ADU_1.2.2	Beam physics
158	ADU_1.2.3	Control systems
214	ADU_1.2.4	Beam Instrumentation
299	ADU_1.3	Infrastructure and Services
300	ADU_1.3.1	Management and TDR
308	ADU_1.3.2	Electrical systems
319	ADU_1.3.3	Vacuum system
367	ADU_1.3.4	Heating, Ventilation and Air Conditioning
406	ADU_1.3.5	Auxiliary equipment
430	ADU_1.3.6	Cooling systems
472	ADU_1.3.7	Cryogenics

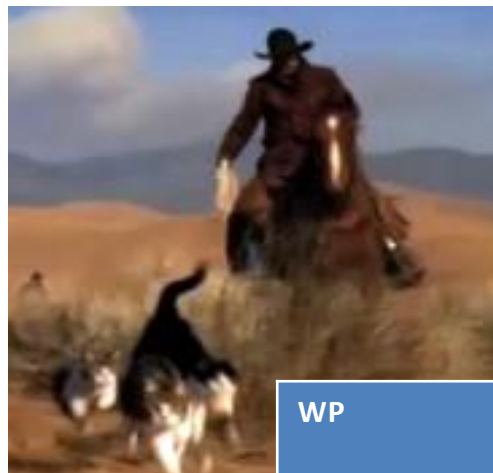



Communication


- Technical Board
 - Decision making body for ADU and P2B
 - Meets every month.
 - Forum to discuss technical issues and project status
 - Published agenda regular agenda items
- Project Group Leader's meeting
 - Meets weekly in Lund
 - Discusses project issues
 - Notes are distributed to all WPL's

Reporting and tracking

- Each Work Package Leader submits every month
 1. a status report and presents it at the Technical Board meeting.
 2. progress on project plan tasks.
- Compile overall status.
- AD reports once a quarter to the ESS Project Office



 **Linac Design WP4 - Month**

Status	Summary: Re-scheduling of the WP activities started. Active work on cryo-
	
Key Achievements	Plans
<ul style="list-style-type: none"> • Re-scheduling of the whole WP to take into account effective start date and correct mistakes • Report on cavity conceptual RF design in progress • Cavity detailed RF design started • Cavity mechanical calculations are ongoing to define thickness, stiffeners, with the goal to minimize Lorentz detuning • Cryomodule: conceptual design of the segmented version in progress. First ideas on dimension and layout. Participation to CM meeting 	<ul style="list-style-type: none"> • Niobium • Achievements • Start F

WP	WP leader	Status
1. Management	Mats Lindroos	G
2. Acc. Science	Steve Peggs	G
3. Integration	Peter Rådahl	R
4. SCRF Spoke	Sebastien Bousson	G
5. SCRF Elliptical	Guillaume Devanz	Y
6. NC Front-end	Santo Gammino	Y
7. HEBT	Søren Pape-Møller	G
8. RF systems	Roger Ruber	Y

Quarterly Risk Analysis

ESS has started to use formal Risk Analysis for construction and the design upgrade project.

1. Collect risks from Work Package Leaders (using a template)
2. Agree on the goal and assumption
3. Review the risks and select only risks relative to the agreed goal
4. Assign a probability and impact rating to each risk (0-5)
5. Multiply the probability and impact and sort ascending order
6. Review the resulting top 5 risks
7. Select a mitigation strategy
8. Track the progress of the mitigation
9. Repeat every quarter
10. (do not recycle the risks from last quarter)

ADU Risk	Risk description	Risk description	Criticality			Current actions
			5	4	3	
y	Vacuum resources	Recruitment of a vacuum engineer is delayed by lack of good, available candidates. Without a vacuum engineer at ESS, we need to resort to external consultants, which can not drive design of the vacuum system as well as local staff.	5	4	3	- negotiations with candidate - discussions with SNS on senior vacuum engineer 'on loan'
y	Cryomodule design	The design and designer of the elliptical cryomodules has not been chosen yet. If this process draws out too long, no meaningful information about the cryomodule design can be integrated in the TDR.	5	4	3	- negotiations with different designers - workshop on CM design to push along issue
y	Cryoplant resources	Engineer responsible for cryoplants will start in Q3 2012, which is too late to produce any meaningful input for the TDR.	5	4	3	- search for appropriate consultants from other institutions, e.g. CERN

Content Management System

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Site Dashboard Document Library Calendar Links Data Lists Members

Site Links

Create Link

ADU November Reporting Spreadsheet

Decision support and decision basis template

How to do monthly reporting

MS Project Viewer

Technical Board December 2011 agenda

Upcoming Milestones 2011-12-01

Work Package Leader Homework

Site Activities

Last 28 days All activities Activity Log

15:00, 08-Dec-2011

15:13 WP7-ADU reporting November.xlsx document added by Søren Pape Møller

15:13 WP7-ADU reporting November.xlsx document added by Miha Rescic

16:00, 07-Dec-2011

16:29 ADU_1.2.3.2.9 document added by Garry Trahern

12:00

12:03 ADU reporting calendar 2012.xlsx document added by Suzanne Gysin

11:00

11:16 How to do monthly reporting link created by Suzanne Gysin

11:15 Instructions for Monthly Reporting was deleted by Suzanne Gysin

08:00

08:50

15:00

15:40

14:00

14:20

12:00

12:25 Technical Board December 2011 agenda link updated by Suzanne Gysin

12:16 ADU-review schedule.xlsx document updated by Suzanne Gysin

23:00, 05-Dec-2011

Recently Modified Documents

WP7-ADU reporting November.xlsx Modified by Søren Pape Møller on 08 Dec 2011 15:13

ADU_1.2.3.2.9_DevEnvAlphaRequirem Modified by Garry Trahern on 07 Dec, 2011 16:29:58

Instruction update sheet 2011-04-28.ppt

Relevant Links

Document repository

Workflows

Version Control

Recently changed documents

- Alfresco hosted by IDOM in Spain
- Moving to Enovia
- Integrated with CATIA (CAD system)

Thanks for your time



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<http://www.youtube.com/watch?v=u5oQviuuZt0>