

Elettra Sincrotrone Trieste





ESS IKC WS PDR-2

The ESS WS acquisition system project

Mario Ferianis

Trieste, 13th December 2016



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OHSAS 1800



ESS WS Acquisition System Project Goals



Work Breakdown Structure ID: 11.7.7.1 The ESS wire scanner acquisition system project includes:

- Design and implementation of SEM section
- Design and implementation of SCINT section
- to operate the WS ICS infrastructure: set of μTCA based diagnostics stations
- to integrate the above into the ESS ICS by means of:
 - Control panels
 - Engineering panels
 - Profile Computation Code

- to interface to the ESS Machine Protection System







ESS WS Acquisition System: overview of ST IKC



The ST IKC to the ESS WS Acquisition System includes:

- AFE+BE for SEM signal acquisition Raffaele
- **OFE+BE** for SCINT signal acquisition
- CABLING layout
 - interface to the ESS Machine Safety System
- INTEGRATION into ICS
 - Synchronous & Safe operation of Acquisition and Motion
 - Beam profile computation algorithm
 - Engineering control panel
 - Operator Control Panel





Stefano

Sandi

Sandi & Raffaele

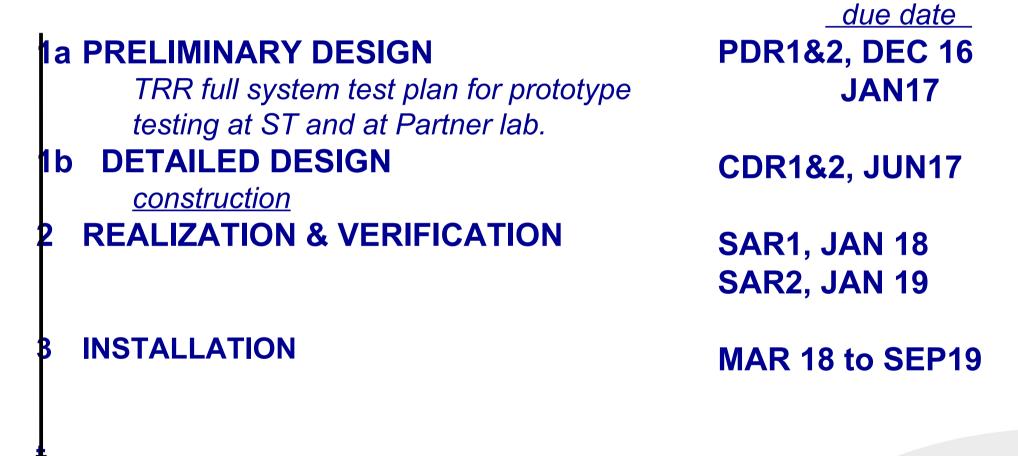


ESS WS Acquisition System Project phases



DNVO

The ESS WS Acq. System ST IK Project phases are:





ESS WS ACQ SYS PDR-2

Mario Ferianis December 13, 2016



ESS WS Acquisition System PRELIMINARY DESIGN

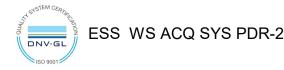


Most part of preliminary design is completed:

 AFE prototype 		done
 BE prototype 		done
 OFE prototype 		done
- General cabling la	ayout	defined
- General Interface	s with mechanics	defined
- Control software a	architecture	defined
- Computation algo	orithm	defined

In order to complete the *preliminary design*, we need:

- WS mech. with on-board items part numbers (motor, encoder, switch)
- motion controller part number, with connectors and pin out
- interface to ESS Machine Safety (PLCs)







ESS WS Acquisition System DETAILED DESIGN



Detailed design has started, as per following list:

 AFE prototype 		under test
 BE prototype 		under test
 OFE prototype 		under test
- Cabling layout		hold
– Interfaces		hold
 Control software 	development	. hold
- Computation alg	orithm	. started

- In order to complete the HOLDING tasks, we need (urgently):
 - development system @ ST (u-TCA system and Timing system)
 - support from ICS
 - final ADC u-TCA board
 - motion controller, as per machine on-board set-up
 - complete WS mechanics including one working prototype
 - PLC (if any)







ESS WS Acquisition System TESTING as part of DETAILED DESIGN



Testing of all deliverable prototype is required before completion of DETAILED DESIGN i.e. **before CDR**; CDR <u>unlocks REALIZATION</u>

Testing has to be carried out on **all WS ACQ system deliverables**:

- hardware modules, developed at ST
- ICS integration of HW modules, mechanics and COTS
- Testing is carried out in **two main steps**:
 - **in-house** at ST, relying on ESS deliveries (ICS + mech.)
 - at partner laboratory, running a full prototype system

to have access at signals from wires

Testing **critical issues** include:

- Low intensity signal detection in real accelerator environment
- Interfacing to the WS mechanics
- Synchronous operation of ADC and wire motion
- Beam profile reconstruction algorithm
- Safety & interlock features of WS system







ESS WS Acq. System Project schedule & milestones (ESS-0044053_2016.09.22)



4	WBS 11.7.7	PDR-2 - Full system Scintillation system	Dec. 2016	Partner	Partner or ESS ERIC	Preliminary design of full Scintilla- tion system	12.5%
5	WBS 11.7.7	TRR - Test Readiness Review	January 2017	Partner	TBD	Prototype ready in SEM mode (mech + FE+ADC+Soft). TRR (describes the full system test plan for the WS prototype	0%
6	WBS 11.7.7	Test at Part- ner Lab	May 2017	ESS ERIC	LNS Cata- nia	SEM AFE Proto- type test on a real WS	0%
7.1	WBS 11.7.7	CDR-1 - Full system SEM (ICS+AD)	June 2017	Partner	Partner or ESS ERIC	Final design of the FE electronic for SEM readout	20%
7.2	WBS 11.7.7	CDR-2 - Full Scintillator system	June 2017	Partner	Partner or ESS ERIC	Final design of the Scintillator sys- tem. Six (6) to read and combine for the scintillator based WS	20%



ESS WS ACQ SYS PDR-2

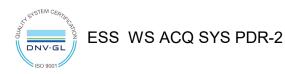


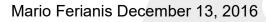


ESS WS Acq. System Project schedule & milestones (ESS-0044053_2016.09.22)



8	WBS 11.7.7	Prototype test SEM (no beam)	March 2017	Partner	TBD	First prototype test SEM (no beam)	0%
9	WBS 11.7.7	Prototype test SEM (with beam)	June 2017	ESS ERIC	TBD	Second prototype test SEM (with beam)	10%
10	WBS 11.7.7	Scintillation mode test	Dec. 2017	ESS ERIC	TBD	Possible Scintilla- tion mode test (To be decided). A facility with a similar beam has to be found.	0%
11	WBS 11.7.7	SAR-1, SEM only	January 2018	Partner	ESS ERIC	SAR-1 ensures that all require- ments have been	10%









ESS WS Acquisition System Comments to the Schedule



1		WSACQ	959 days?	Thu 01/10/15	Mon 03/06/19	
2		Kick-off meeting	0 days	Thu 01/10/15	Thu 01/10/15	Technical scope agreed by both partners. Already done at E
3		ESS final specification for the scintillator	0 days	Fri 01/04/16	Fri 01/04/16	
4		WS ACQ SYS layout definition	198 days?	Thu 01/10/15	Thu 30/06/16	Including acronym cabling lay out
5	III -	Design of SEM prototype	198 days?	Thu 01/10/15	Thu 30/06/16	Analog Front End module and Back End Module
6		SEM ICS integration preliminary design	132 days?	Fri 01/01/16	Thu 30/06/16	overview of SW
7		PDR-1 Full system SEM (ICS+AD)	0 days	Tue 28/06/16	Tue 28/06/16	Preliminary design of the FE electronic for SEM readout (ICS+AD)
8		Shipment of 1st ICS development station to ST	0 days	Wed 01/06/16	Wed 01/06/16	by ESS; VME crate with VME boards (milestone created by ST)
9		SEM ACQ SYS design	88 days?	Wed 01/06/16	Fri 30/09/16	AFE + BE
10		SEM board&module prototype & characterization	87 days?	Thu 01/09/16	Fri 30/12/16	Fabricate & lab test (AFE+BE) prototype
11		Controls Detailed Design Document	0 days	Thu 01/09/16	Thu 01/09/16	Baseline WS local control system design document.
12		Control Acceptance Test Plan	0 days	Thu 01/09/16	Thu 01/09/16	Acceptance test plan document.
13		SEM prototype integration in ICS	153 days?	Wed 01/06/16	Fri 30/12/16 8	AFE + BE + ADC
14		SEM ICS engineering and interface panels	87 days?	Thu 01/09/16	Fri 30/12/16 8	AFE + BE + ADC + Ev receiver
15		SEM ICS computation SW	85 days?	Mon 02/01/17	Fri 28/04/17 8	AFE + BE + ADC + Ev receiver
18		SCINT detection protovoe	87 days2	Thu 01/09/18	Eri 30/12/18	Ontirel French Fred Manhala anotations (RE anotations
17		SCINT ICS integration design	44 days?	Tue 01/11/16	Fri 30/12/16	OFE + BE + ADC
18		PDR- 2 - Full system SCINT	0 days	Mon 03/10/16	Mon 03/10/16	Preliminary design of the FE electronic for SCINT readout (ICS+AD
10						· · · · · · · · · · · · · · · · · · ·
20		Delivery of final uTCA boards to ST	0 days	Thu 01/12/16	Thu 01/12/16	by ESS; uTCA boards SPECIFICATIONS and SAMPLES (milestone cr
21		CDR- 1 - Full system design SEM (ICS+AD)	0 days	Thu 01/12/16	Thu 01/12/16 20	no final design without uTCA boards SPECIFICATIONS
22		SCINT ACQ SYS design	42 days?	Mon 02/01/17	Tue 28/02/17	OFE + BE + ADC
23		SCINT ACQ SYS CDR Data package	43 days?	Wed 01/03/17	Fri 28/04/17	
24		SCINT PROTOTYPE characterization	130 days?	Mon 02/01/17	Fri 30/06/17	OFE + BE + ADC
25		SCINT prototype integration in ICS	195 days?	Mon 02/01/17	Fri 29/09/17 19	OFE + BE + ADC
26		Delivery of one mechanical WS assembly to ST	0 days	Wed 01/03/17	Wed 01/03/17	(milestone created by ST)
27		SCINT ICS engineering and interface panels	195 days?	Mon 02/01/17	Fri 29/09/17 19	OFE + BE + ADC + E RECEIVER
28		SCINT computation SW	65 days?	Mon 03/04/17	Fri 30/06/17 19	OFE + BE + ADC + E RECEIVER
29		CDR- 2 - Full system design (SCINT)	0 days?	Tue 02/05/17	Tue 02/05/17	
30		setup TRR data package	65 days?	Mon 03/10/16	Fri 30/12/16	
		TRR -Test readiness for SEM prototype	0 days	Mon 02/01/17	Mon 02/01/17	



