HIE-ISOLDE Vacuum Controls

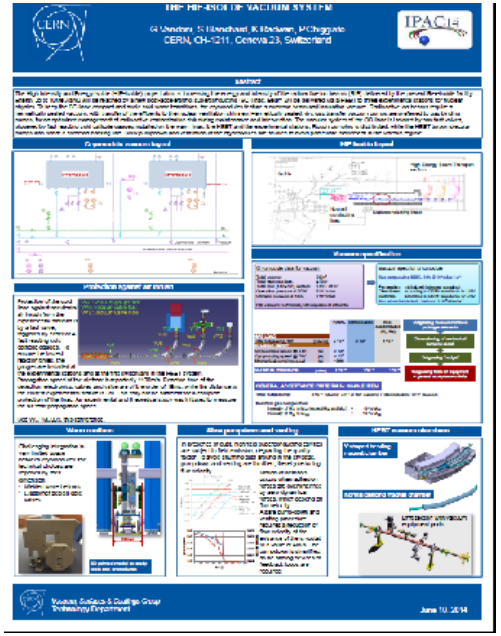
INSTALLATION

Krzysztof Radwan, PJAS, TE/VSC/ICM
Interlocks, Controls and Monitoring Section

HIE-ISOLDE

(High Intensity and Energy Isolde)

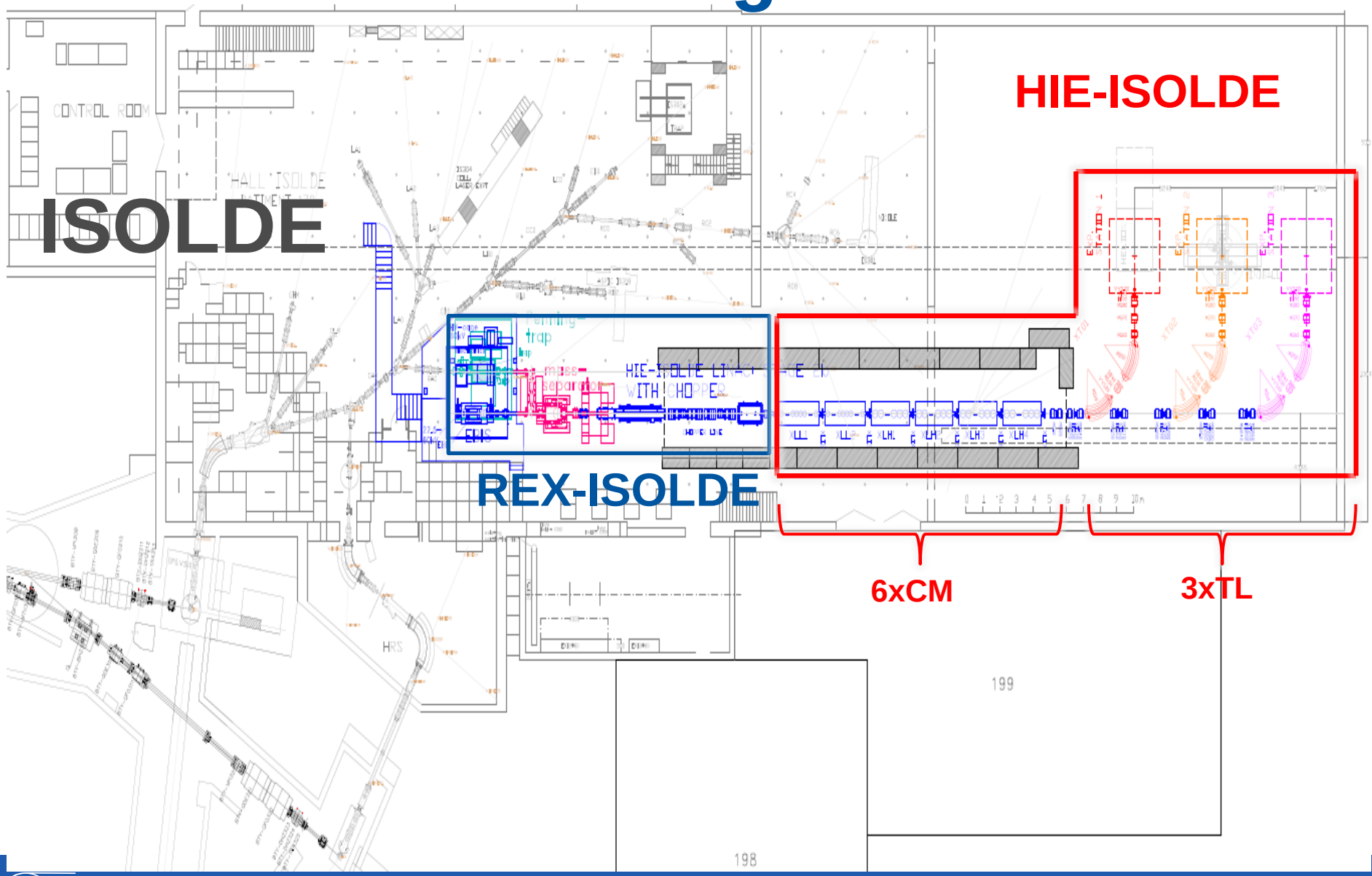
- Project aims at increasing the energy and intensity of the radioactive ion beams delivered by the present Rex-Isolde facility.
- Energy up to 10MeV/u will be reached by a new post-accelerating, superconducting (SC) linac.
- Beam will be delivered via a High Energy Beam Transfer (HEBT) lines to three experimental stations for nuclear physics



IPAC2014 - The HIE-Isolde Vacuum System

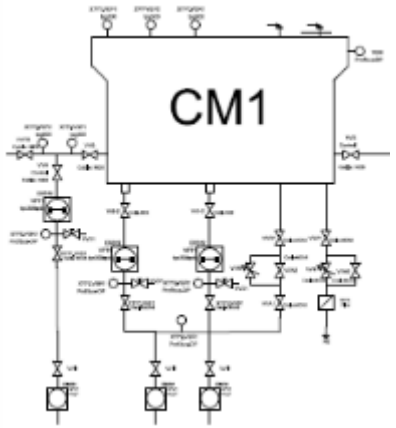
G.Vandoni, S.Blanchard, K.Radwan, P.Chiggiato

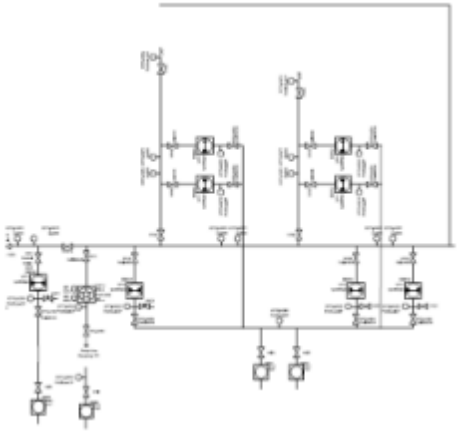
Building 170



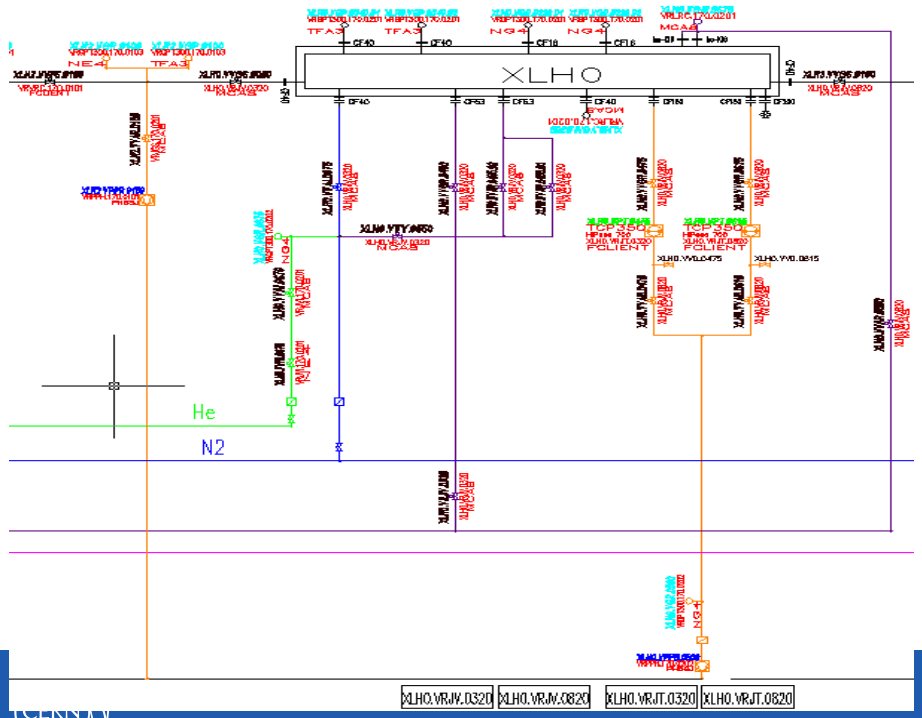
HIE-ISOLDE Evolution of HW & Vacuum Layout

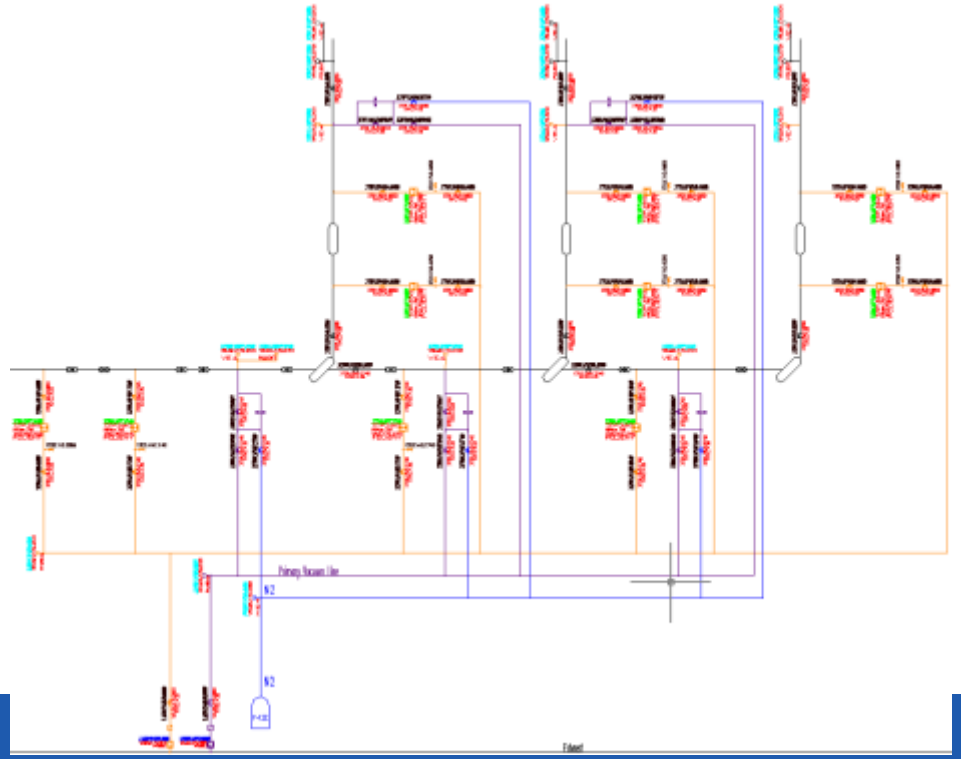
2012/2013





2013/2014

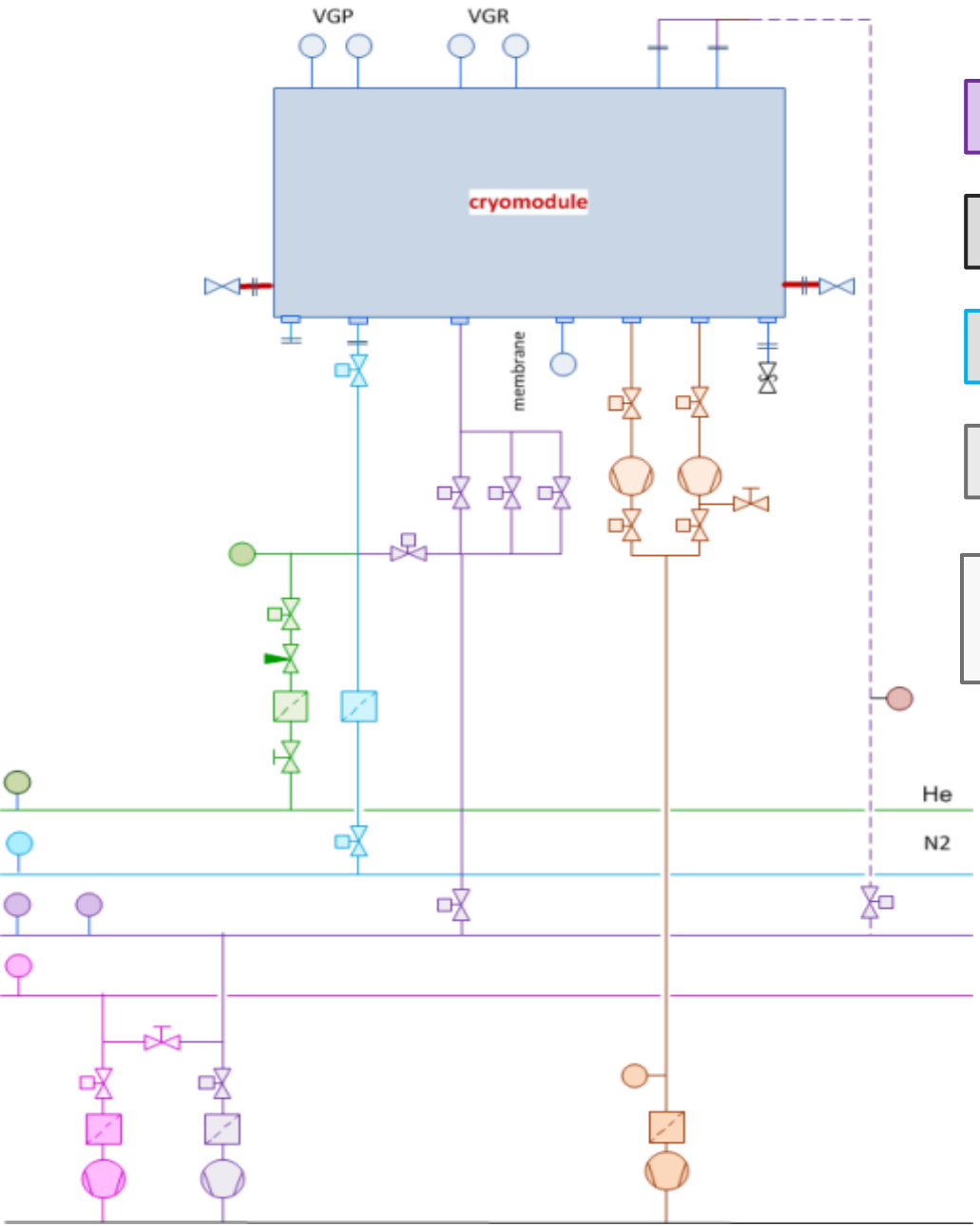




HIE-ISOLDE Evolution of HW & Layout

	2012	2014	
PUMPS (Primary + Turbo)	48	39	-19%
Valves (Angel + Gate + Fast)	137	144	5%
Gauges (Pirani+Penning + PB + PS)	81	83	2%

- Continuous changes of the vacuum layout & delays in the project
- Higher complexity of the system (several client processes, injection line)
- New kind of equipment (needle valve, pressure switch etc.) which were not foreseen at the beginning



Rough pumping

Turbo pumping

N_2 venting

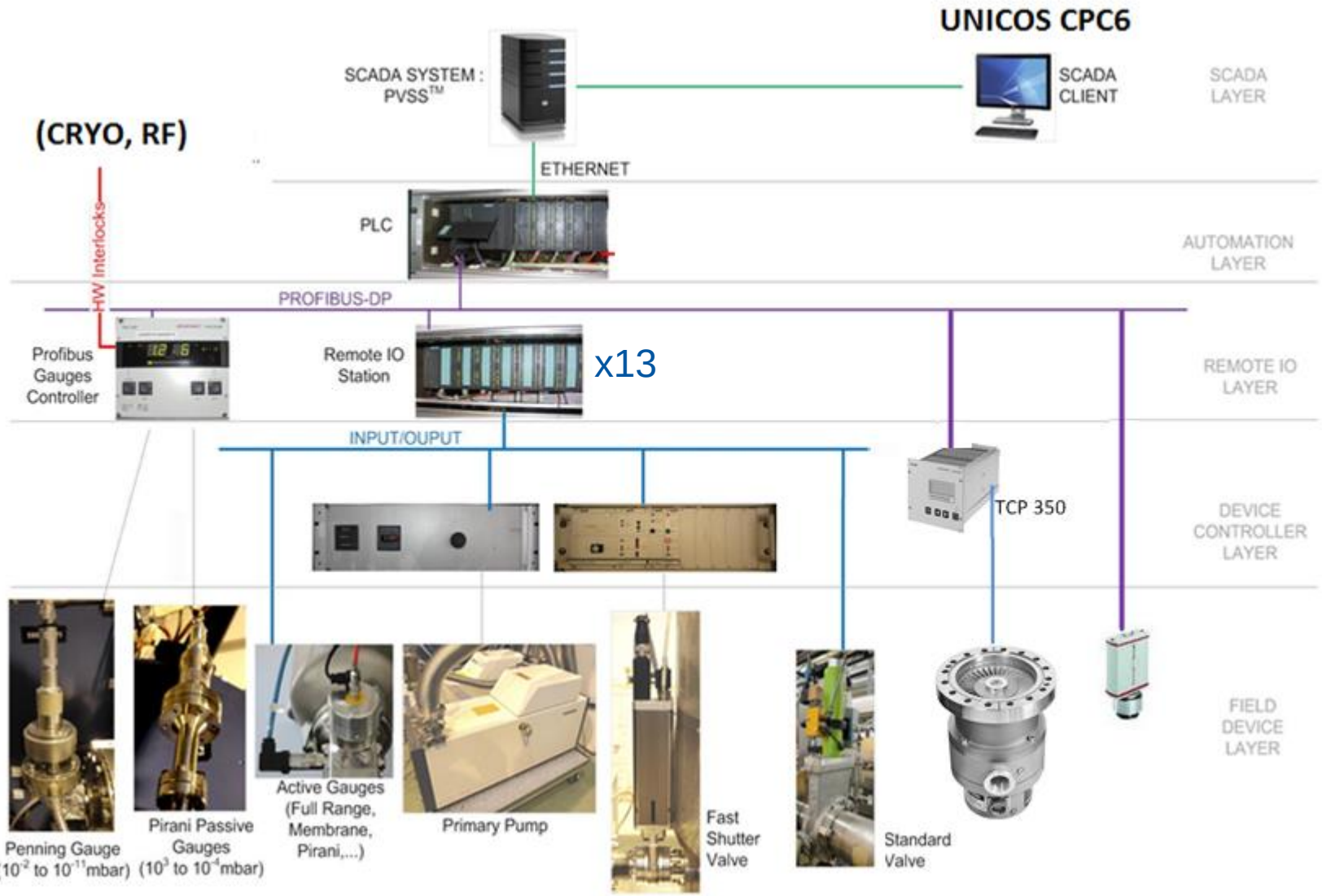
He processing

CM sector vacuum: gauges, valves

Process Control Schemes

G.Vandoni

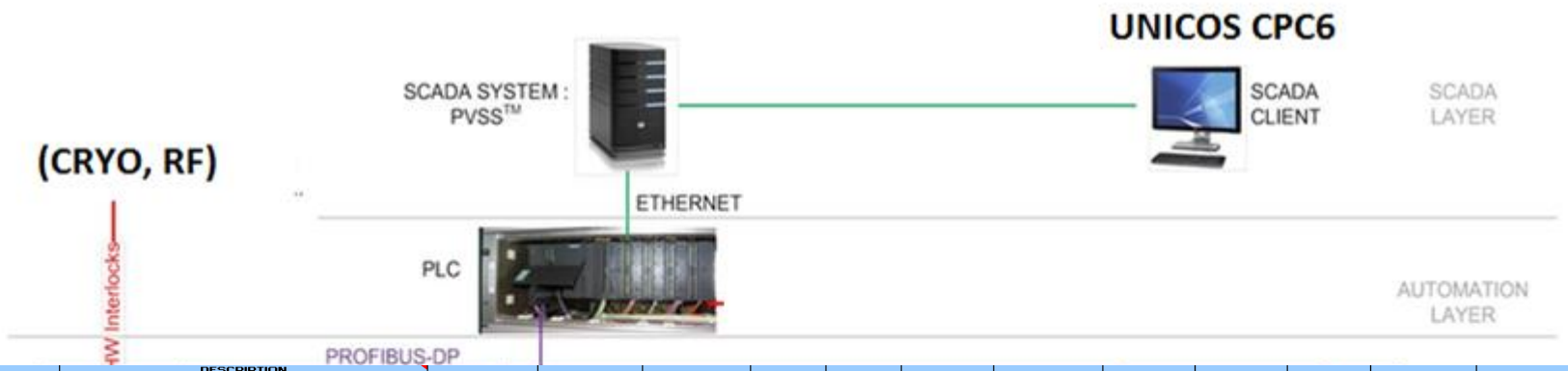
Hardware Architecture



Deliverables by Controls WU

Deliverables by WP main WUs

Hardware Interlock



LOCATION	NAME			Complete Name	DESCRIPTION	SENSOR SOURCE				VAC CRATE SOURCE						INTERLOCK Type	
		S	D			Sensor Name	Upper Threshold	Lower Threshold	Filter	Type	Rack	Name	Plug	PinOut	Connector	Type	Type&Version
7GP10	VRI	D	1	7GP10.VRID1	7GP10 7G1 Pressure HW Interlock for RF	7GP10.VGP1	2.0E-5 mbar	1.0E-5 mbar	1.6s	TPG300	C(RA18-IS	7GP10.VRG1	B4PMB	1-2	OUT_RLY-1	RO USER	BERTRONIX
7GP10	VRI	D	2	7GP10.VRID2	7GP10 7G2 Pressure HW Interlock for RF	7GP10.VGP3	2.0E-5 mbar	1.0E-5 mbar	1.6s	TPG300	C(RA18-IS	7GP10.VRG1	B4PMB	1-2	OUT_RLY-2	RO USER	BERTRONIX
7GP10	VRI	D	3	7GP10.VRID3	7GP10 7G3 Pressure HW Interlock for RF	7GP10.VGP3	2.0E-5 mbar	1.0E-5 mbar	1.6s	TPG300	C(RA18-IS	7GP10.VRG1	B4PMB	1-2	OUT_RLY-3	RO USER	BERTRONIX
9GP10	VRI	D	1	9GP10.VRID1	9GP10 9GP Pressure HW Interlock for RF	9GP10.VGP1	2.0E-5 mbar	1.0E-5 mbar	1.6s	TPG300	C(RA18-IS	9GP10.VRG1	B4PMB	1-2	OUT_RLY-1	RO USER	BERTRONIX
XLL1	VRI	D	1	XLL1.VRID1	XLL1 Pressure HW interlock for Cryo	XLL1.VGR1	2.0E-1 mbar	1.0E-1 mbar	1.6s	TPG300	VY01=170	XLL1.VRID1	B4PMB	1-2	OUT_RLY-1	RO USER	bdg. 199
XLL2	VRI	D	1	XLL2.VRID1	XLHL2 Pressure HW Interlock for Cryo	XLL2.VGR1	2.0E-1 mbar	1.0E-1 mbar	1.6s	TPG300	VY02=170	XLL2.VRID1	B4PMB	1-2	OUT_RLY-1	RO USER	bdg. 199
XLH1	VRI	D	1	XLH1.VRID1	XLH1 Pressure HW Interlock for Cryo	XLH1.VGR1	2.0E-1 mbar	1.0E-1 mbar	1.6s	TPG300	VY03=170	XLH1.VRID1	B4PMB	1-2	OUT_RLY-1	RO USER	bdg. 199
XLH2	VRI	D	1	XLH2.VRID1	XLH2 Pressure HW Interlock for Cryo	XLH2.VGR1	2.0E-1 mbar	1.0E-1 mbar	1.6s	TPG300	VY04=170	XLH2.VRID1	B4PMB	1-2	OUT_RLY-1	RO USER	bdg. 199
XLH3	VRI	D	1	XLH3.VRID1	XLH3 Pressure HW Interlock for Cryo	XLH3.VGR1	2.0E-1 mbar	1.0E-1 mbar	1.6s	TPG300	VY05=170	XLH3.VRID1	B4PMB	1-2	OUT_RLY-1	RO USER	bdg. 199
XLH4	VRI	D	1	XLH4.VRID1	XLH4 Pressure HW Interlock for Cryo	XLH4.VGR1	2.0E-1 mbar	1.0E-1 mbar	1.6s	TPG300	VY06=170	XLH4.VRID1	B4PMB	1-2	OUT_RLY-1	RO USER	bdg. 199
XLL2	VRI	D	2	XLL2.VRID2	XLHL2 Pressure HW Interlock for SCRF	XLL2.VGR1			1.6s	TPG300	VY02=170	XLL2.VRID2	B4PMB	1-4	OUT_RLY-2	RO USER	
XLH1	VRI	D	2	XLH1.VRID2	XLH1 Pressure HW Interlock for SCRF	XLH1.VGR1			1.6s	TPG300	VY03=170	XLH1.VRID2	B4PMB	1-4	OUT_RLY-2	RO USER	
XLH2	VRI	D	2	XLH2.VRID2	XLH2 Pressure HW Interlock for SCRF	XLH2.VGR1			1.6s	TPG300	VY04=170	XLH2.VRID2	B4PMB	1-4	OUT_RLY-2	RO USER	
XLH3	VRI	D	2	XLH3.VRID2	XLH3 Pressure HW Interlock for SCRF	XLH3.VGR1			1.6s	TPG300	VY05=170	XLH3.VRID2	B4PMB	1-4	OUT_RLY-2	RO USER	
XLH4	VRI	D	2	XLH4.VRID2	XLH4 Pressure HW Interlock for SCRF	XLH4.VGR1			1.6s	TPG300	VY06=170	XLH4.VRID2	B4PMB	1-4	OUT_RLY-2	RO USER	

6 x CRYOGENICS

6 x RF


Penning Gauge (10^{-2} to 10^{-11}mbar)


Pirani Passive Gauges (10^{3} to 10^{-4}mbar)


Active Gauges (Full Range, Membrane, Pirani,...)


Primary Pump

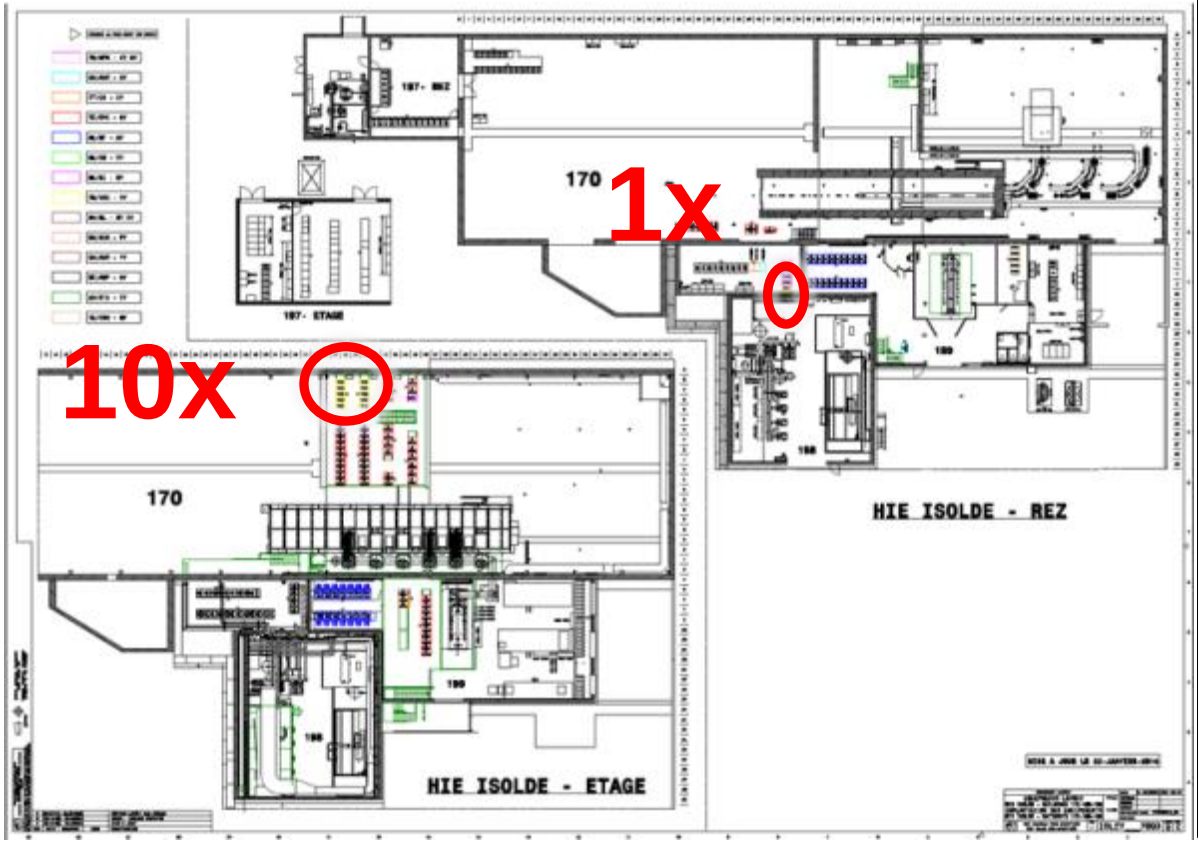

Fast Shutter Valve

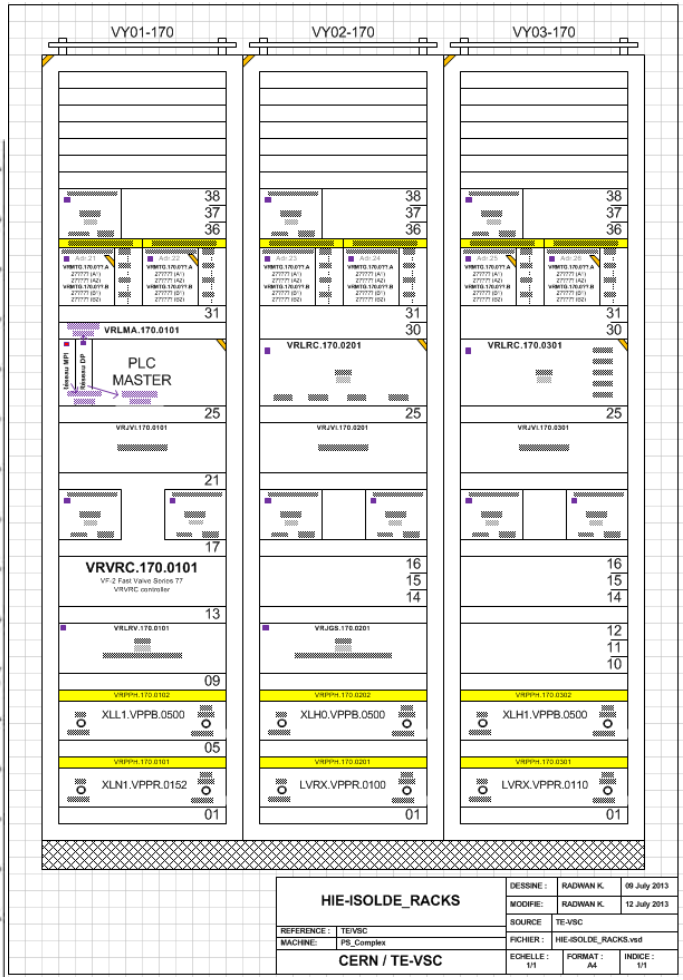

Standard Valve

Rack Layout

- Total: 11 Vacuum Control Racks;
- 2 positions

9 racks are used + 2 racks as spare





HIE-ISOLDE all racks installed

Vacuum Controls Cables - EN/EL

Cables + racks :

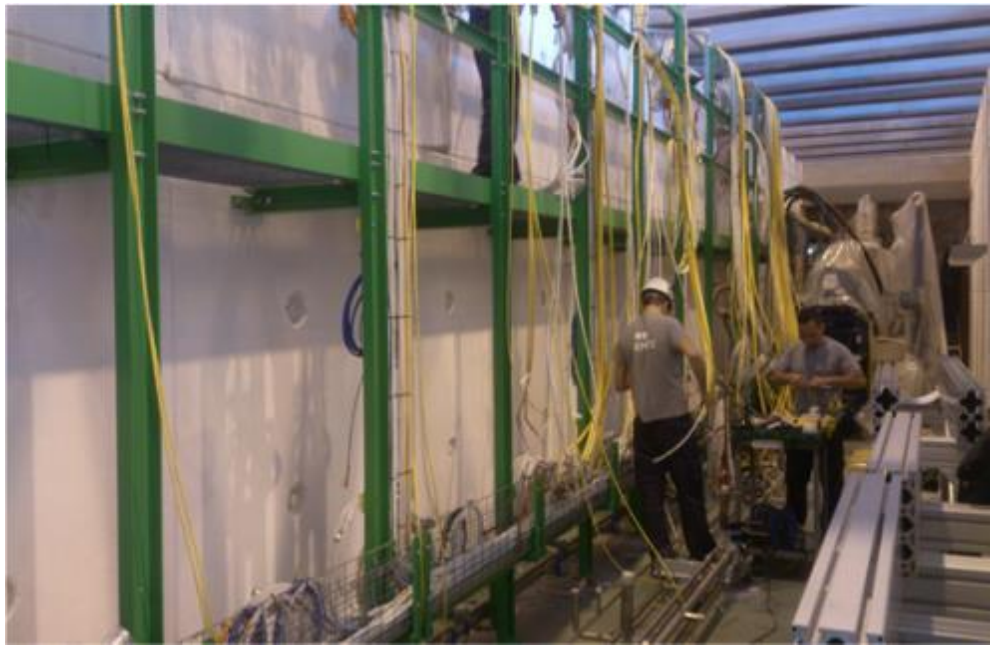
Cables DIC done
Cables installation : ongoing - 470 cables to be installed

HEBT cables installation finished: end-Sep-14
HEBT + SC-LIN cables installed + tested:
beg-Nov-14

Racks : all installed with voltage distributors
(10 sockets blocks)

HIE-ISOLDE cables installation – ongoing

SC Linac



HEBT

HIE-ISOLDE General Planning

Project is spreaded into stages:

	commissioning:
1 – HEBT (Transfer Lines TL)	end-Nov-14
1a – 1xCM + 1xInter Tank + TL	Jun/Jul-2015
1b – 2xCM + 2xInter Tank + TL	end-2015
2 – 6xCM + 6xInter Tank + TL	2016/17

Workunit Status – 1 –

Controls HW (Crates, Racks)

Design & manufacturing specs finished
All components from outside CERN purchased & available (Stage 1)
CERN-mag components will be bought by manufacturer (Dechelette)
Manufacturing specs sent to Dechelette

HEBT crates production ends : mid-Oct-14 (Stage 1)

SC-Linac crates production : end-Nov-14 (Stage:1a,1b,2)
(to be confirmed)

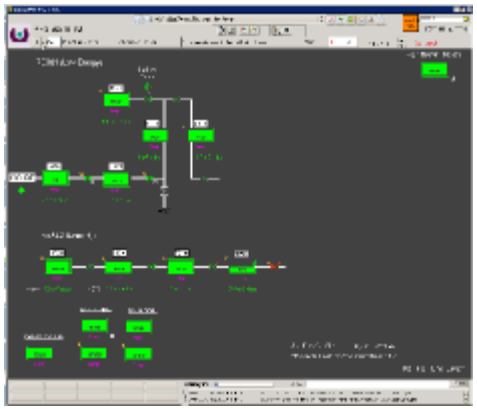
Crates installation + commissioning

Start immediately as first crate available & tested :
mid-Oct-14 (if instruments available)

Workunit Status – 2 –

Controls SW (PLC + SCADA) UNICOS CPC6

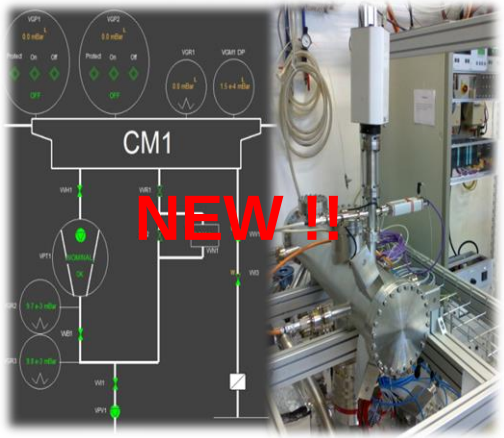
Instrums specification-list for SW generation (UNICOS): end-Sep-14 (HEBT)
Generate & load PLC + SCADA SW: mid-Oct-14 (HEBT)



Process development (pumping, venting): similar to REX
Other SW development for : injection-line, fast-valves,
Penning, TMPs -> ongoing : end-14

Cryomodule controls test-bench:

A test-bench (mockup CM) was set-up in Vacuum lab (b.101)
to develop and test the control system.
The controls (cables, crates, racks, SW) will be reused
for the RF cold tests in SM18.



Development ongoing : Dec-2014
Use crates already produced : mid-Oct-14
Move control system from b.101 to SM18 : by Jan-15

Workunit Status – 3 –

Timeline for commissionings

SCADA (supervision) availability for instruments commissioning:

- HEBT Stage 1: end-Oct-14
- B.101 test-bench : Dec-14
- CM cold tests in SM18: Jan/Feb-15
- SC-LIN CM1 Stage 1a: Jun/Jul-15

Conclusions

Hardware

Design done
Purchase ongoing
HW production ongoing

Software

Specs in work
Process in work
HEBT: SCADA ready in time for HEBT commissioning: end-Nov-2014

Cryomodule test SM18: SCADA ready Jan/Feb 2015
SC-LIN Stage 1b : Jun/Jul 2015

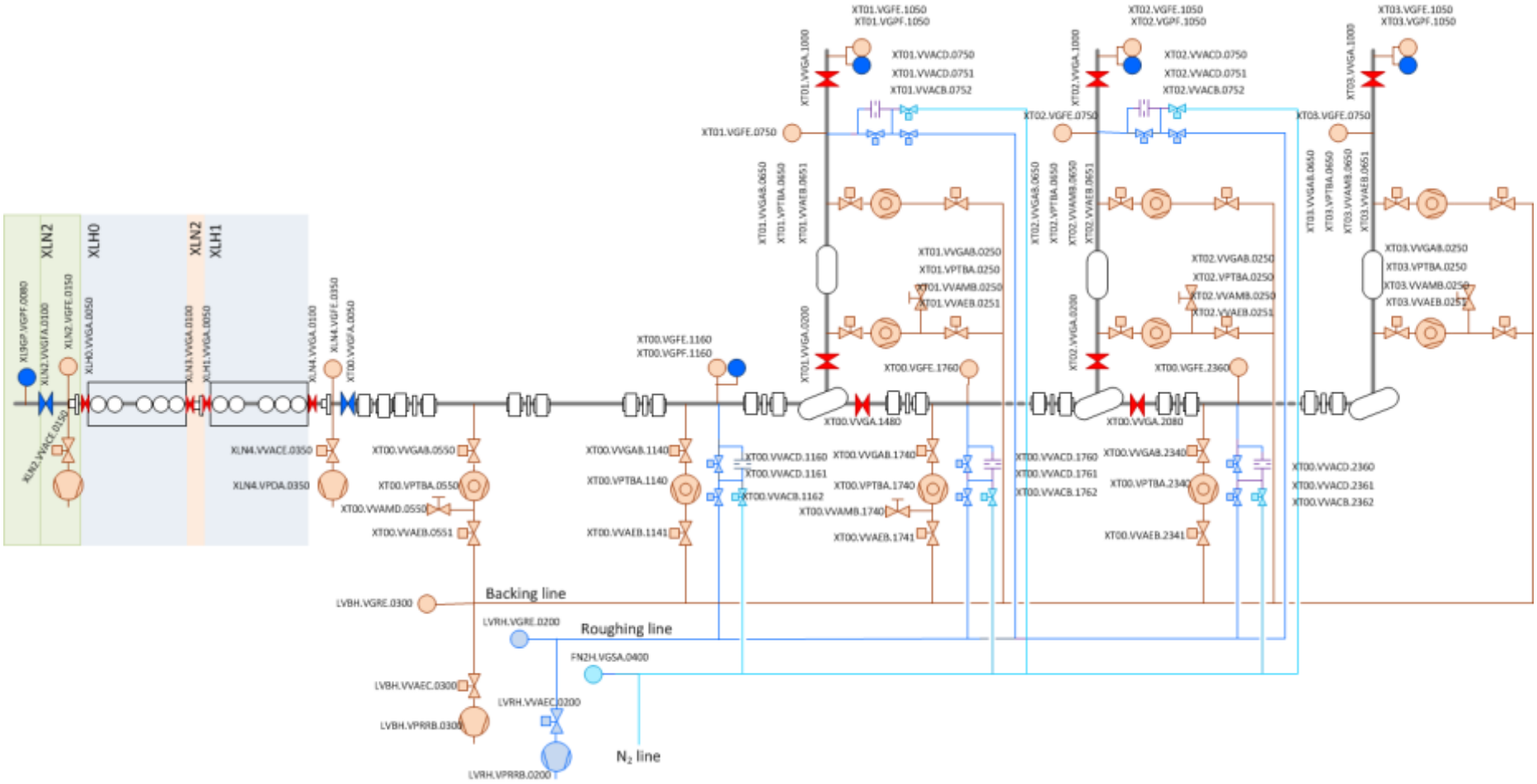
General

Users will be in charge of operating the facility, so the vacuum control system **must be simple and safe**!
Planning very tight after several changes of the layout & delays in the project

Thank you for your attention !

Spare slides

Vacuum layout – HEBT



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