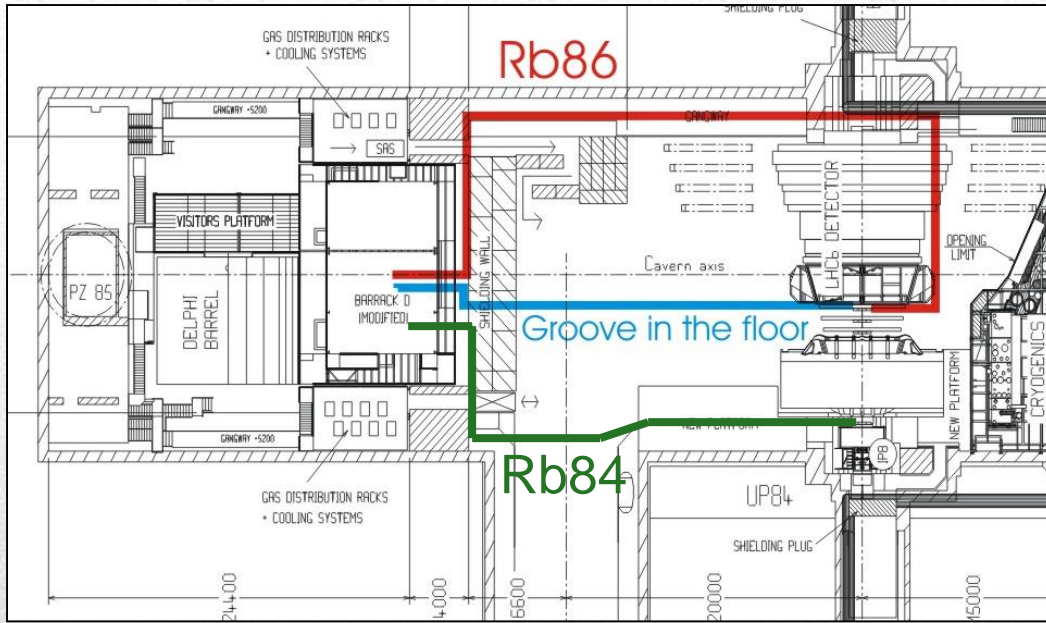# Cabling for LHCb Upgrade

- Cables and Racks : who is responsible for what ?
- Documents needed before installation
- A software tool in development
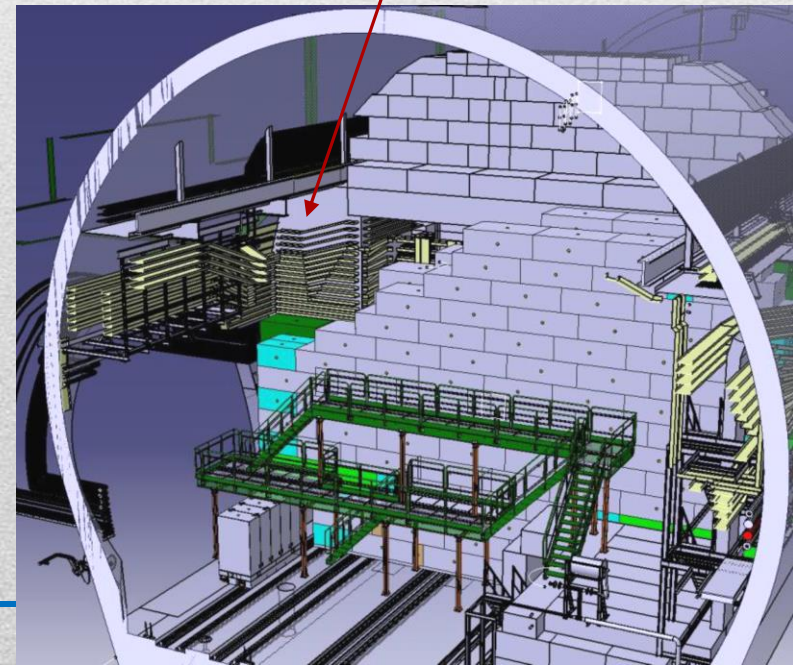- Safety aspects and purchasing delays
- Planning

CABLING

Routing example for copper
(Detectors-Barracks)

Rb86

Groove in the floor

Rb84

Access to Cable trays in the 'chicane'

~33% wall to dismantle ?

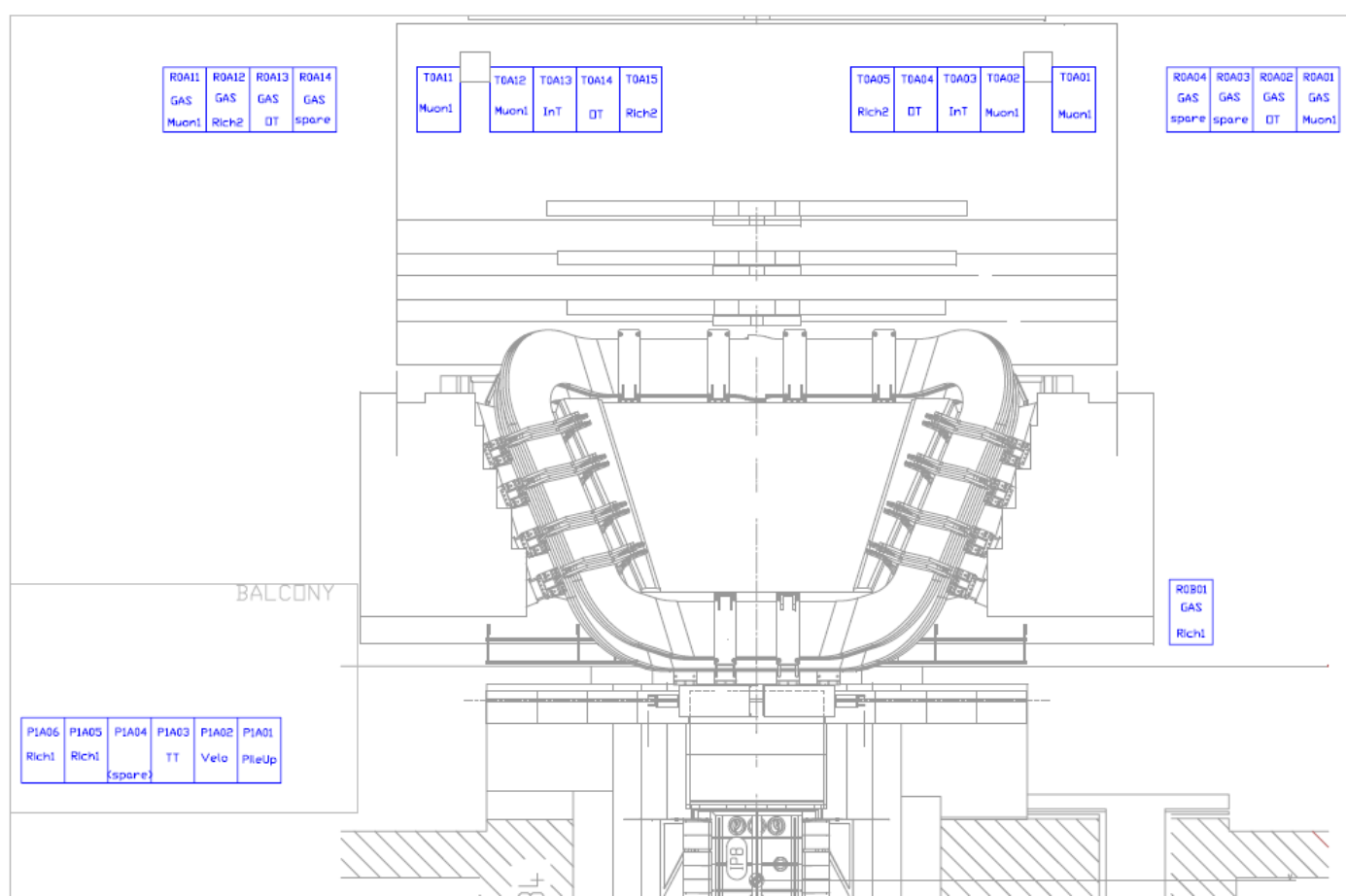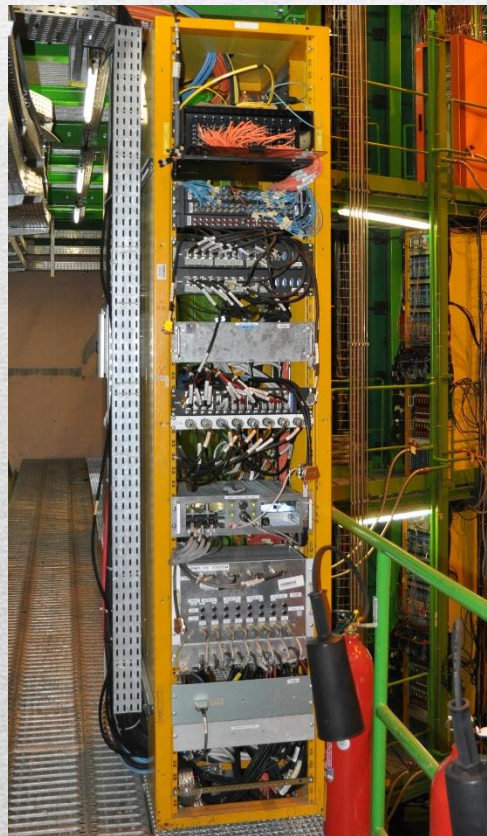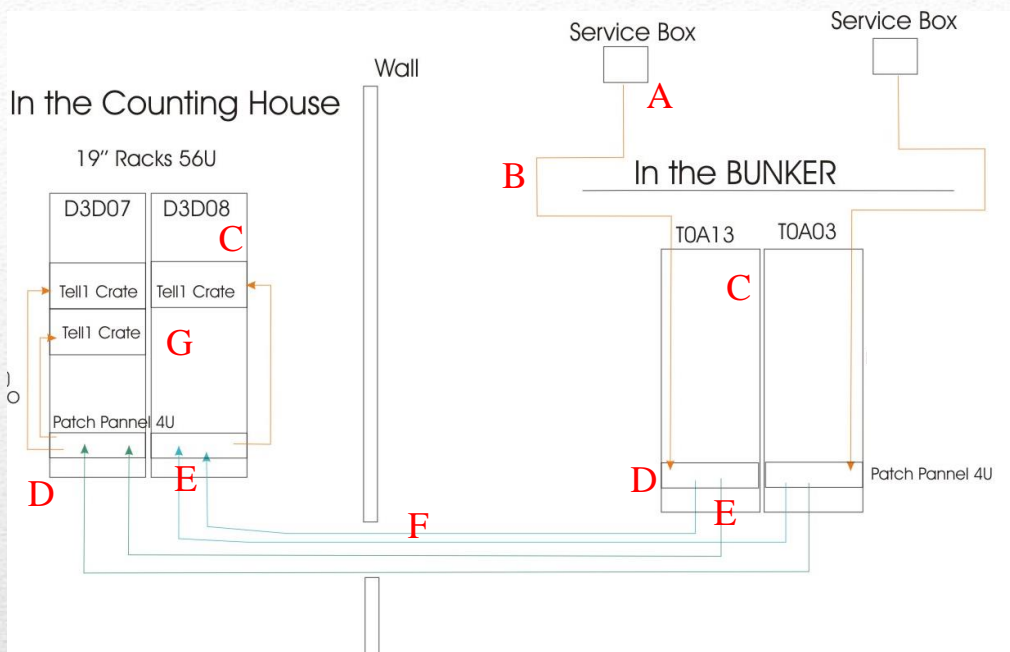# Racks

Space for equipment (LV, HV,…)
Space for Patch Panel
Cooling with air? with water ?
Smoke detection? Extinguisher system?

Patch Panel rack example

Rack attribution to do for Upgrade (in UX85, in D3 barrack)

Example:
(actual installation for IT)

A+B: cabling 'on' the detectors + cables from detector to 'Infrastructure' Patch Panel, cable chains included
→ Sub-detector (define, order, install)
Rk: for optical patch cords a grouped order could be proposed if sub-detectors define their requirements precisely

C: Rack preparation (rails, air/water cooling…) → Sub-detector (define) , help of Infrastructure (install)

D: Patch Panels
E: Connectors
F: Long distance cables
→ if 'common' (ex: Maraton or Optical fibres) → Infrastructure (order with sub-detector budget for copper cable, install)
→ if 'special' : Sub-detector (define, order), Infrastructure (install)

G: Equipment installation, short cables, connections → Sub-detector

Documentations

- Upgrade Infrastructure requirements (Heinrich)

reviewing on going for 'cable part' (Ken and me), doc will be released in next TB
→ Have an overview of cabling and racks needed
  Allows to estimate cable trays space and routing (1/3 dismounting wall enough?,…)

- Full Optical links doc

Start to complete an edms doc, one per sub-detector
→ Allows the procurement, installation, commissioning, then LHCb upgrade operation

- 'Long distance' Copper cable + connectors + racks doc

Mini meeting / sub detector will start after summer
One contact person to be assigned per subdetector (to give all information needed, the budget code for the 'grouped' orders, …)
→ Allows the procurement, installation, commissioning, then LHCb upgrade operation

Data Base, Software interface, Labelling, RP traceability

- Actual CABLE Data Base kept but updated
- **New Web Interface for Cable management**

    (**Lucas Vieira**, Gloria, Rainer, Joel, Laurent)

1) to declare the cable in place to keep
2) to declare the new cables you want to install
3) to have a DB updated with cable status: 'to be removed' or 'to installed' before LS2
4) useful interface for installation, labelling and other cables management
5) compatible with RP Traceability requirement

Rk: Mandatory for long distance cables
→ Will be also available for internal subdetector cables management

Web Interface ready after summer

CABLE Data Base new structure
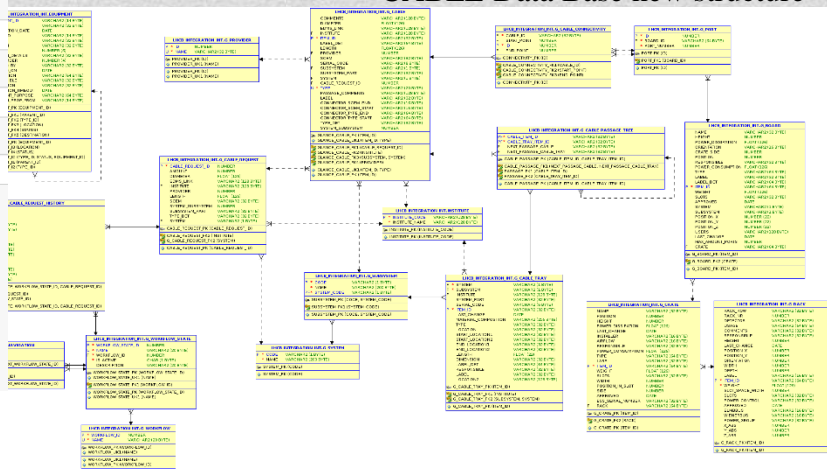
Safety aspect

Cable should be compliant with **Cern safety regulations (IS-23)**
A lot of criteria → https://edms.cern.ch/ui/file/335745/LAST_RELEASED/E_IS23.pdf

All certificates must provided by the manufacturer

If not: pay an accredited lab to do the tests
on a cable sample following the standards requested.

3.2   Flame propagation and fire resistance
3.3   Smoke density
3.4   Toxicity of gases from fires
3.5   Corrosivity of gases from fires
3.6   Radiation resistance
⋮

Rk: Choose cables/connectors available through CERN stores
Most of them are IS23 compliants

Delay for procurement

Delivery of Cable (from Cern store but also from external companies) can be very long !!
→Order well in advance to be ready in time for installation.

Same for power supplies
Ex: few Wiener Maraton ordered 19 Oct 2015 received 27 April 2016 **= 6 months**
Caen Power supplies ordered 11 Dec 2015 received 25 May 2016 **= ~ 5-6 months**

Planning

Detailed Documentations

		2016			2017				2018				2019				2020			
		Run 2			EYETS	Run 2			Run 2				LS2							
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Optical links	Sub-detectors requirements	▓																		
	Cabling Scheme UX-surface PP		▓																	
	End supports: design study			▓																
	End supports: installation				▓															
	PP surface design						▓													
	Cabling Scheme PP-Serveur						▓													
	LD Tendering Process						▓	▓												
	PP and Patch Cords Tendering Process							▓	▓											
	Order long distance								▓											
	Order PP and Patch Cords									▓										
	Delivery/quality control/storage										▓	▓								
	Installation and Tests - Long distance													▓	▓					
	Installation and Tests - Patch Cords															▓	▓			
Copper cable	Sub-detectors requirements	▓																		
	Cable DB update (IN/OUT)		▓	▓	▓															
	Integration				▓	▓	▓	▓												
	New cabletrays/supports...installation								▓											
	Order LD copper cables + connectors								▓	▓	▓									
	Delivery/quality control/storage										▓	▓								
	Remove old cables											▓	▓	▓						
	Installation LD + connectors and Tests													▓	▓	▓				
	Rack layout def.									▓	▓	▓								
	Rack modification												▓	▓						
	New equipment installation in Racks														▓	▓	▓			

CONCLUSION

*It is time to go in detail for the cabling
Full documentation deadline: before <u>end of this year</u>
Thanks in advance for your contribution !
*New Cable management interface is coming
*Do not neglect Safety aspects and Delivery durations in your plan

Good cabling

Not enough prepared !