

North Area and East Area LS2 activities

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LS2 DAYS

29-30 SEPTEMBER 2015

<http://indico.cern.ch/event/436424/>

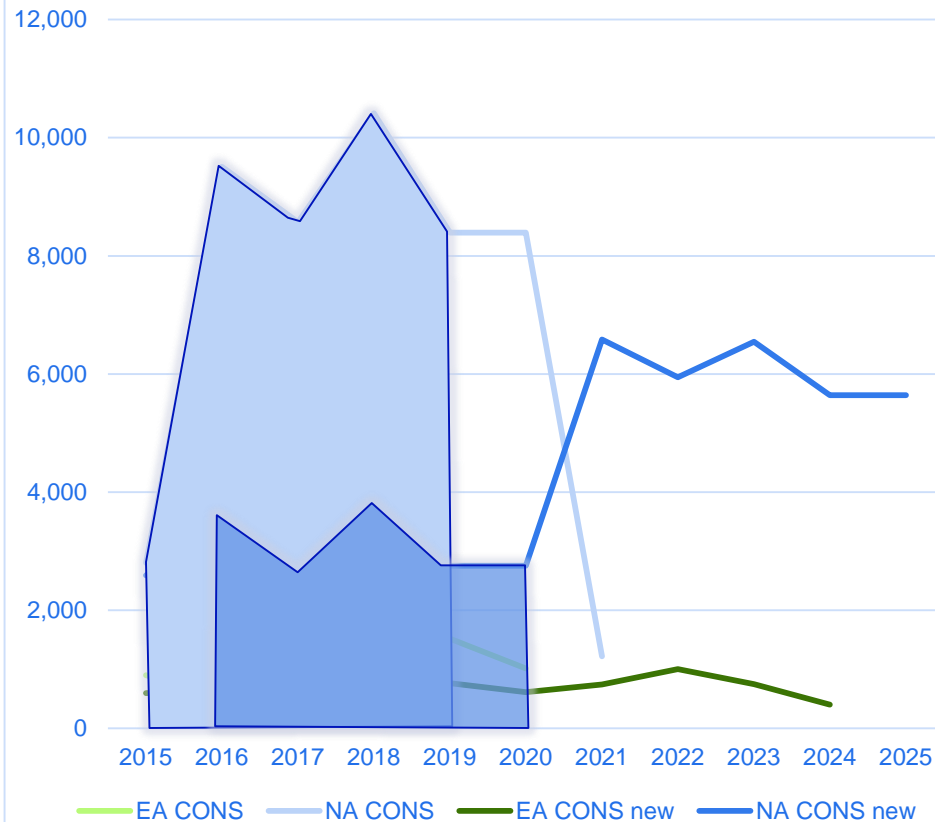
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AWAKE and Elena not covered in this talk.

Foreword (I)

NA & EA Consolidation budget reprofiling



Extract from MTP 2016-2020:

Due to the focus on the LHC injectors upgrade and accelerator consolidation and manpower shortage, 50-60% of the materials allocation is re-profiled until after LS2, for example for the consolidation North Area power converters. The allocation for the MTP period is limited to an absolute minimum and will only allow some urgent consolidation items.

Overall budget remains the same for NA and EA CONS.

Foreword (II)

Strategy and plan for the next 5 years (proposal under discussion)

- It is challenging to conduct the consolidation of EA and NA with current allocated budgets → Prioritisation of activities based on risk analysis
- Unique opportunity to include energy efficiency and equipment standardization solutions → Budget Change Request being written.
- ✓ Focus now on East Area consolidation and complete it by the end of LS2.
- ✓ North Area: focus on urgent consolidation items, EHN1 general infrastructure and start R&D for a new power converter prototype. Complete the main consolidation after LS2.

East Area Consolidation

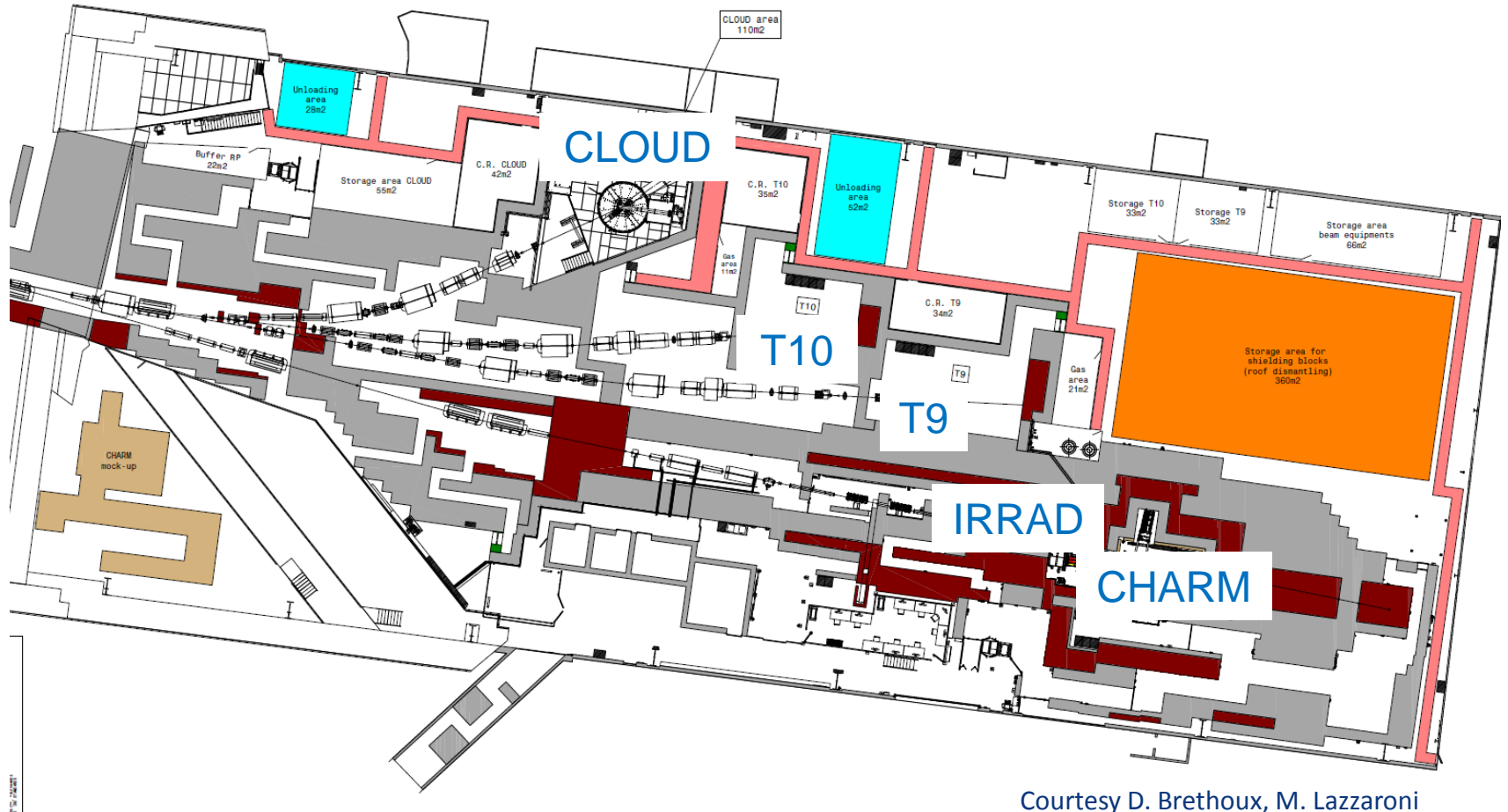
- Reminders

- East Area day in 2012: <https://indico.cern.ch/event/167761/>
- LS1:DIRAC dismantling, CHARM and IRRAD installation
- “Decision” to keep T11 like beam for Cloud

- Main activities

- Change beam line layout
- Pulse magnets for energy savings
- Consolidate infrastructure accordingly

East Area: New beam line layout



East Area layout after LS2



Courtesy D. Brethoux, M. Lazzaroni

East Area: pulse magnets

- **The East Area Energy Consumption is high** at 11GWh/yr
 - Third highest consumer after PS (55GWh) and PS Booster (25GWh)
 - **Cycling the magnet current can save electricity**
 - Energy requirement from 11GWh to 0.6GWh per year
 - Saving estimated at 600kCHF per year for new EA configuration
 - **Regenerative power converters**
 - most of the energy (inductive) returned to capacitor banks locally
 - **Single converter family in entire East Area**
 - However, as many **magnets** are massive, they have to be replaced (at least their yokes) by **laminated** ones.
 - As the power consumption decreases, the requirements on **electrical and cooling infrastructure decrease**.
- **60 new Power converters and 40 magnets with new laminated yokes.**

East Area Consolidation: schedule

SHUTDOWN/TS	PROTON PHYSICS	2015	2016	2017	2018	2019	2020	2021
COMMISSIONING	IONS	S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Group	Activity							
TE-EPC	Procure Power Converter							
TE-MSC	Prepare new yokes							
TE-MSC	Remove magnets							
TE-MSC	Modify magnets							
TE-MSC	Re-install magnets							
EN-EL	Renovate AC&DC distribution							
EN-CV	Renovate cooling systems							
TE-EPC	Install new power converters							
EN-MEF	Change beam line layout + survey							
All	Commission new facility							

Other consolidation activities: BTV upgrade, shielding modification, ventilation, beam stopper, control rooms, collimators.

Total: 20 MCHF and 30 FTE's

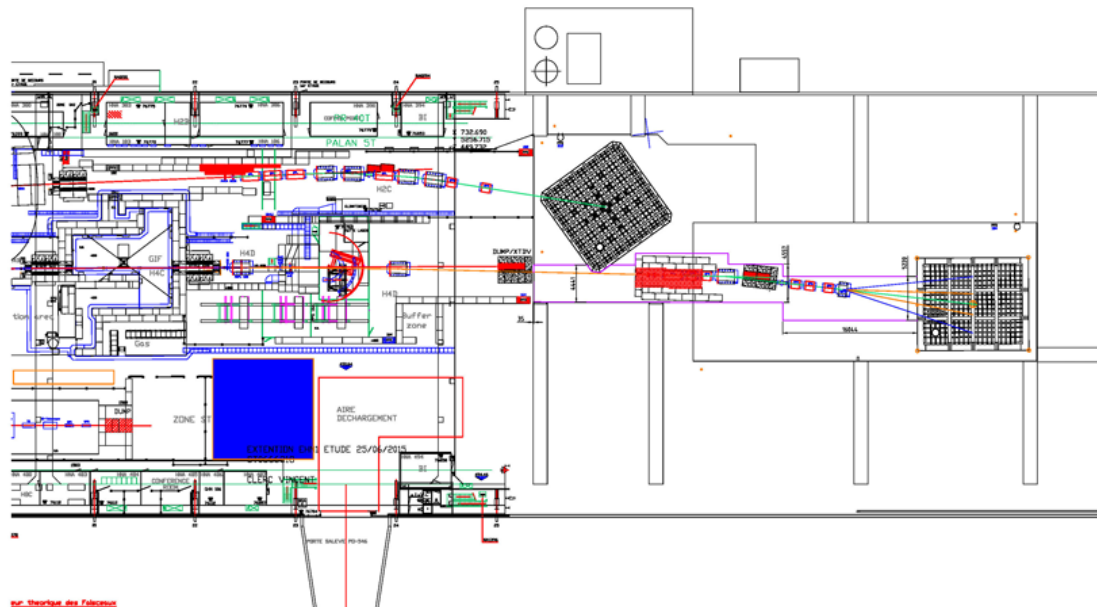
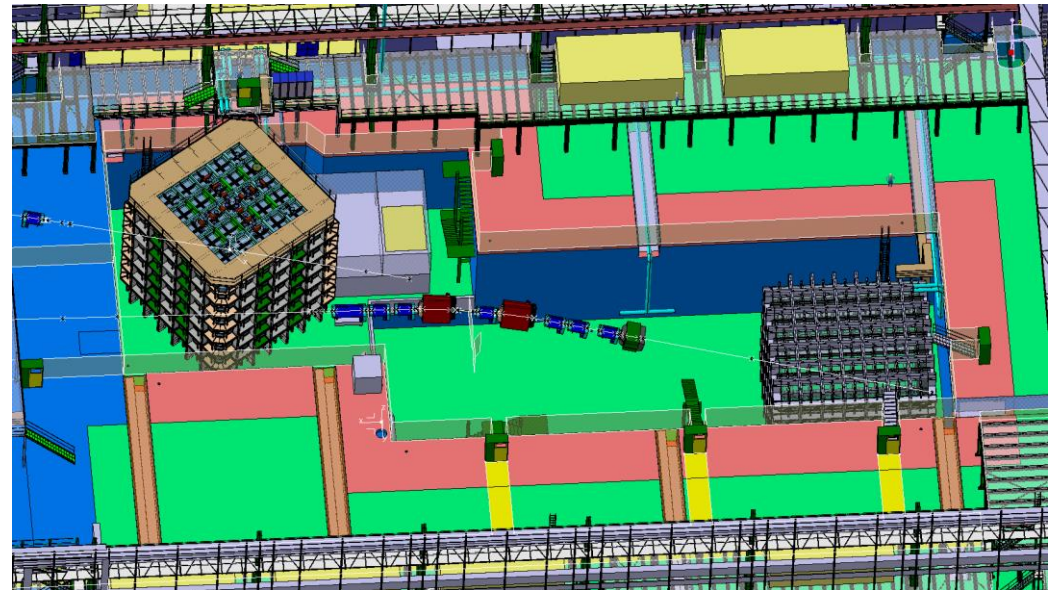
EHN1 extension

- In the framework of the CERN neutrino Platform (CENF), an extension of EHN1 is being built to house two neutrino R&D experiments and associated new beam lines.



EHN1 extension

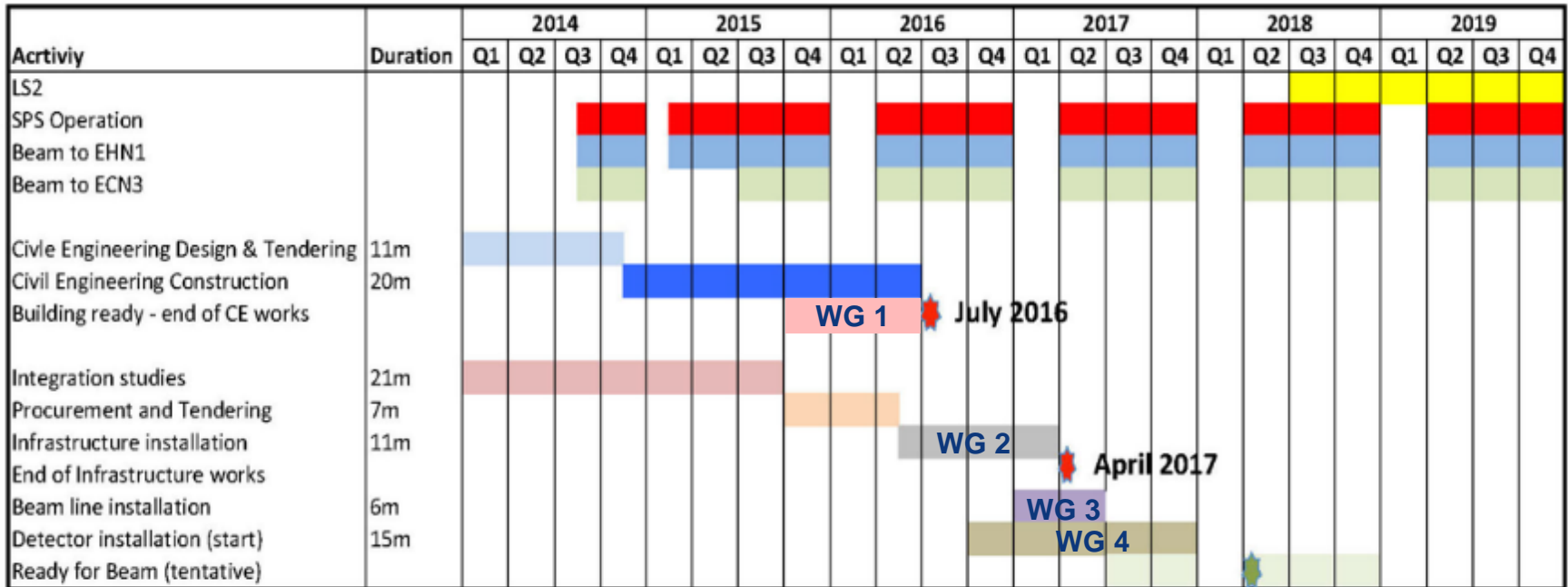
Extension of the H2 and H4 beam lines to provide low-energy beams to Large-size detector prototypes WA105 and P351 detectors



Courtesy V. Clerc, S. Girod

EHN1 extension

EHN1 Extension Timeline



Courtesy I. Efthymiopoulos

WG1	EHN1 North Wall dismantling
WG2	EHN1 extension building infrastructure
WG3	Extension of the H2 and H4 beam lines
WG4	Installation of detectors and associated infrastructure

EHN1 extension

Infrastructure WG1 & 2 EDMS 1543155

Group	Activity	2015	2016	2017
EN-CV	Ventilation, heating and air-conditioning			
EN-CV	Fluids- and water cooling			
EN-EL	Electrical infrastructure and lights			
EN-MEF	General coordination			
EN-MEF	Gas networks			
EN-MEF	Counting rooms & doors			
GS-SE	Metal structures			
GS-ASE	Safety systems: Alarms and ODH and fire detection			
GS-ASE	Personnel access			
IT-CS	IT-networks			
EN-HE	Transport- and handling			

In addition, EN-MEF-SU will provide support for:

- Geodetic Reference Network installation
- fiducialisation of different detector parts
- Geometrical follow-up of detector assemblies
- Alignment of machine and detectors components

Beam lines WG 3 EDMS 1532945

Group	Activity	2015	2016	2017
EN-MEF	Design and integration			
TE-MSC	Magnets			
BE-BI	Beam Instrumentation			
EN-MEF, EN-STI	BID equipment			
EN-MEF	General coordination & Vacuum			
EN-HE	Transport and handling			
EN-MEF	Beam line installation + survey			
BE-CO	Beam controls			
EN-EL	Cabling			
GS-ASE	Access			
DGS-RP	RP monitoring			

Courtesy I. Efthymiopoulos, M. Wilhelmsson

**Preliminary estimate (WG1,2 & 3):
7 MCHF and 10 FTE's**

North Area Consolidation

- Focus on urgent consolidation items, EHN1 general infrastructure:
 - Power Converter exchange for SM2/Compass (EYETS2016-2017)
 - TDC2/TCC2:
 - Irradiated cabling campaign (LS2)
 - Magnet cooling circuit (LS2)
 - Target boxes T2-T4-T6 exchange (YETS2015-2016)
 - EN-CV activities will cover chilled water circuit, AHU, cooling tower and stations refurbishment
 - EN-MEF (survey) will resume the beam line survey and alignment with H2 and H4 (YETS2015-2016)
 - EN-MEF will renovate 44 collimators until end of LS2
 - GS-ASE will consolidate the underground gallery access system in EHN1 (YETS 2015-2016 + EYETS 2016)
 - EHN1 extension is a good opportunity to consolidate general infrastructure in 2016 & 2017(EN-EL, EN-CV, EN-HE)

NA Consolidation: TE-EPC

- The NRE41-001 Power Converter is used in North experimental area to power SM2 spectrometer magnet, for DC application.
- Replacement in EYETS 2016-2017



Courtesy Y. Gaillard

NA consolidation: TDC2/TCC2

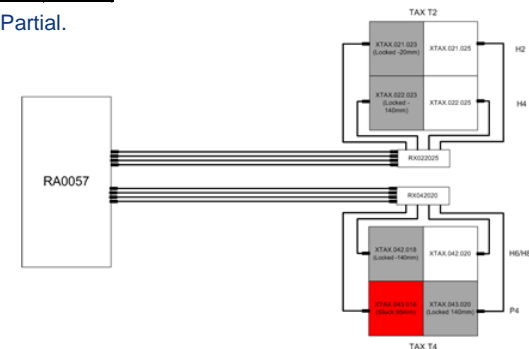
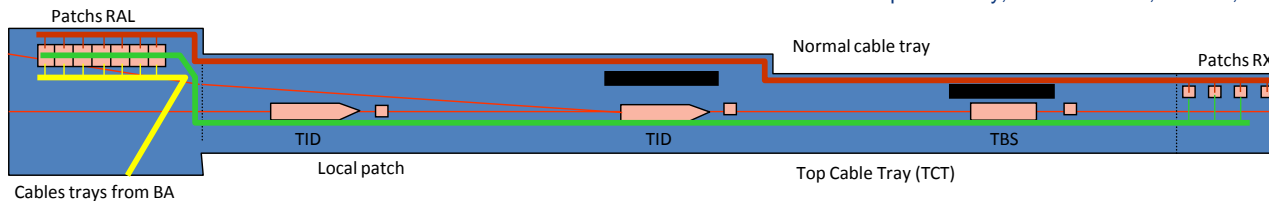
- Irradiated cabling campaign (end of LS2, 2020)

- Replace irradiated cables, avoid unnecessary cable length, eliminate cable with PVC if possible
- Only signal and control cables (not DC cables) between patch RAL and Patch RX
- 700 cables = 100 km in TCC2/TDC2 for the time being
- End user to fill a DIC if additional request

Areas	1990	91	92	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09
TS1	All					All								TCT						
TS2	ZS/MST/ MSE			All		ZS/MST/ V ac				Exc TCT										Exc TCT
TCC2			All								AA		R							
TDC2			All								All									
TS4										Part										
TS6	ZS/MST/ MSE	Exc TCT	TCT			Exc TCT		Vac exc TCT	TCT							Rem. ZS, Inst MKE				
TT60							All													
TCC6							All													
TNC			All																	



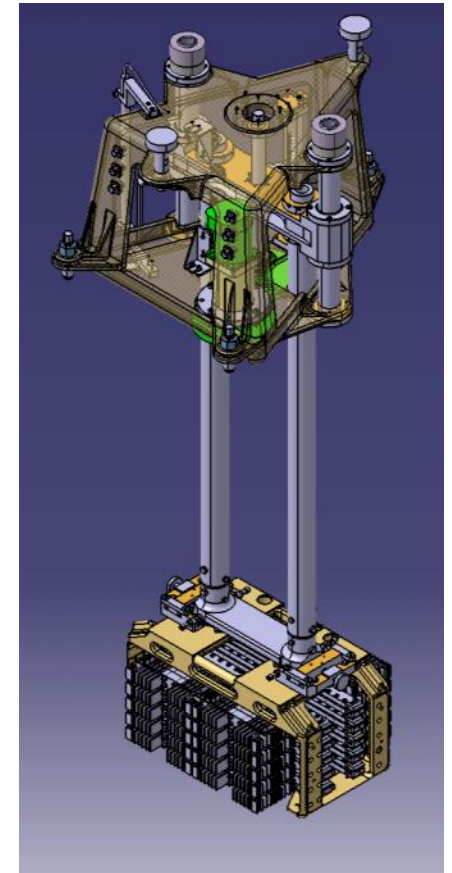
TCT: Top cable tray, AA: Almost All, R: Rest, Part: Partial.



Courtesy J-C. Guillaume

NA consolidation: TDC2/TCC2

- Target boxes T2-T4-T6 exchange (YETS 2015-2016)
 - Preparation for intervention: modify 4 spare targets for replacement of T2, T4 and T6
 - Carry out extensive pre-installation trials
 - Intervention in TCC2 to replace T2, T4 and T6 (approx. 1 day/target)
 - Upgrade the presently installed targets from TCC2 as further spares, following ALARA principle



NA consolidation : EN-CV infrastructure

- YETS 2015-2016:
 - Ventilation units in the NA PC rooms (BA81)
 - Chilled water (BA82)
 - Chilled water coils in AHU's (BA82)
- EYETS 2016-2017:
 - Chilled water circuits in EHN1
 - Ventilation units in the NA PC rooms (BA82)
 - AHU consolidation in NA surface buildings & BA80, 81 and 82
- YETS 2017-2018
 - Cooling towers control
 - Chilled water circuits in TT85
- LS2
 - Chilled water circuits in TT81 and TT82
 - Consolidation of the cooling stations



NA consolidation: EN-MEF activities

• Collimators

- Support needed from:
 - Survey (EN-MEF)
 - Controls (EN-STI)
 - Transport (EN-HE)
 - Radioprotection (DGS-RP)
- Schedule:
 - TCC2: 7 units in EYETS
 - Transfer lines, TT81 to 85
20 units in LS2



XCSV or H: Collimator Slit
Vertical or Horizontal:
25 units



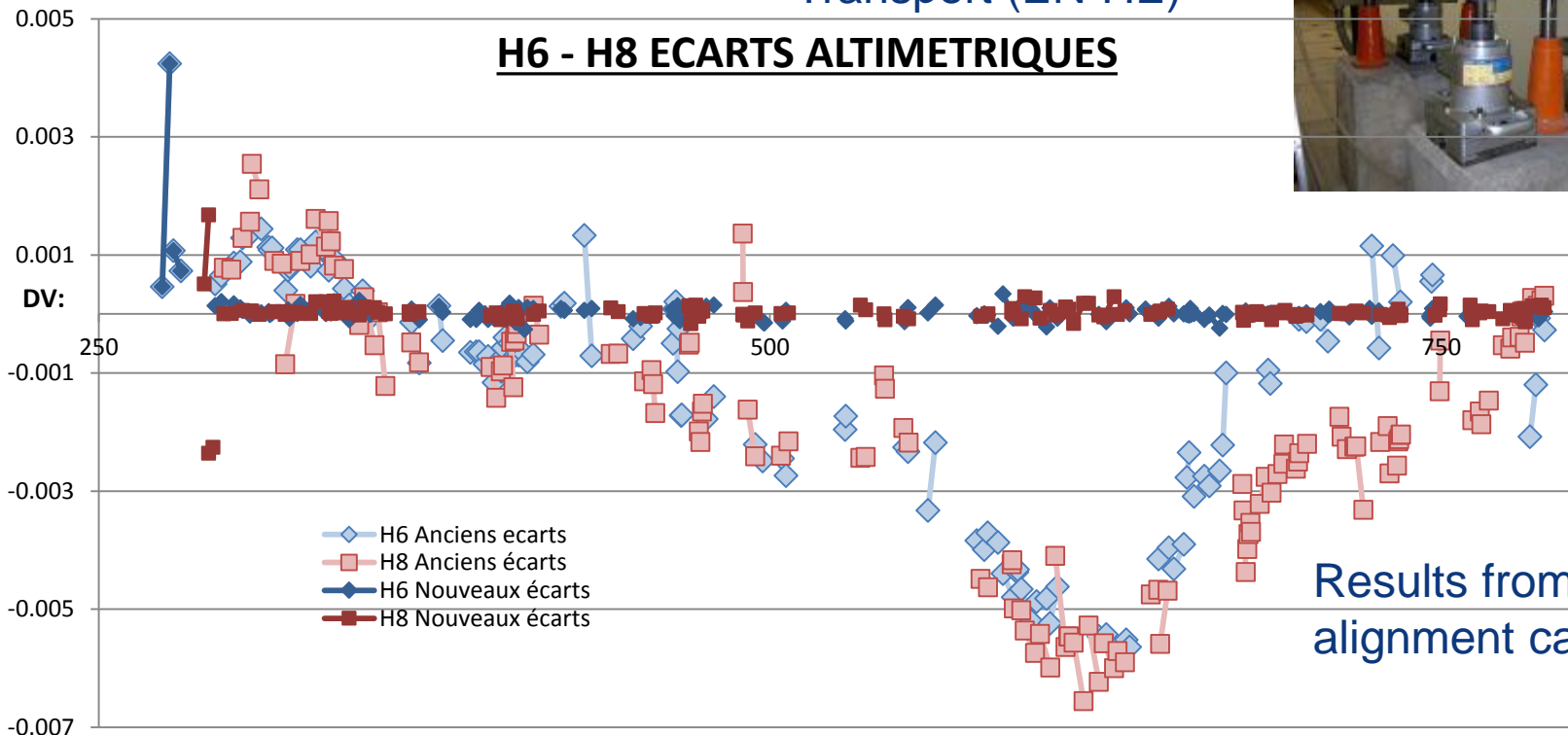
XCHV: Collimator twin
Vertical+Horizontal:
19 units

NA consolidation: EN-MEF activities

- Survey: H2 and H4 beam lines

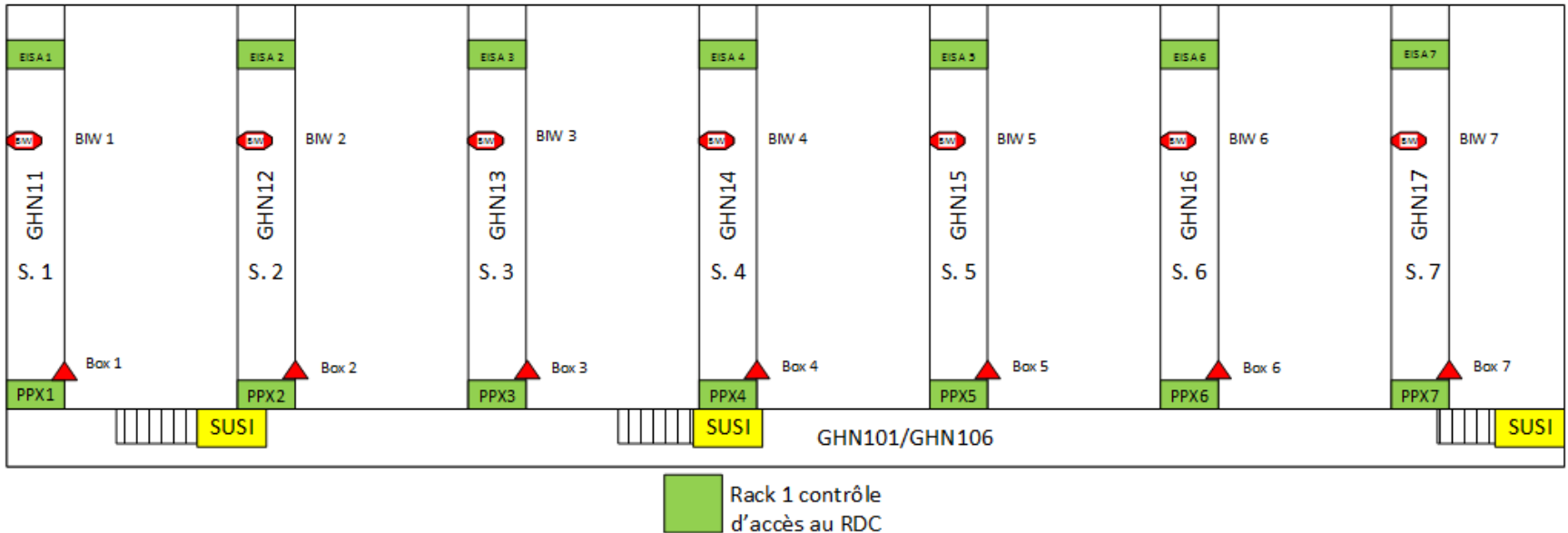
Support needed from:

- Radioprotection (DGS-RP)
- Mechanics (EN-MEF)
- Transport (EN-HE)



Results from LS1 alignment campaign

NA consolidation: underground gallery access system in EHN1



Access control for GHN101-106 → SUSI (YETS 2015-2016)

Access control and safety system (interlock) for GHN11-17 → ZORA (EYETS 2016-2017)

NA consolidation : EHN1 infrastructure

EN-CV EHN1 consolidation triggered by extension

- Raw water
- Compressed air
- Demineralized water
- Chilled water
- Fire fighting system
- Drinking water (domestic)
- General ventilation
- Barrack air conditioning

To take place in 2016/2017

EN-EL EHN1 consolidation triggered by extension

- UPS
- Control racks -3.3+18kV
- 19" Racks
- Control Systems (EN SCADA)
- 48V Source
- Barracks/Counting Room Fit out

To take place in 2016/2017

EN-HE EHN1 consolidation triggered by extension

Overhead crane PR534 refurbishment in early 2016



Two identical overhead cranes: PR534-PR538
Year: 1976
Capacity: 40 ton
Span: 46 m
Lifting height: 10 m → 19m
Possibility to work in «tandem» mode

Courtesy R. Rinaldesi

Mandatory works in parallel to EHN1 extension (standard compliance)

NA consolidation: schedule

SHUTDOWN/TS	PROTON PHYSICS	2015	2016	2017	2018	2019	2020	2021
COMMISSIONING	IONS	S O N D J	F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Group	Activity							
TE-EPC	Change SM2 Power Converter							
EN-EL	TCC2/TDC2 cable campaign							
TE-MSC	Magnet cooling panoply							
EN-STI	Replace T2,T4,T6 target boxes							
EN-MEF	Align H2 & H4 + possible corrections							
EN-MEF	Renovate Collimators							
EN-CV	Renovate cooling sytems							
GS-ASE	Renovate U-gallery access							
EN-EL	Consolidate EHN1 infrastructure							
EN-CV	Consolidate EHN1 infrastructure							
EN-HE	Consolidate PR534							

Preliminary estimate: 10 MCHF and 15 FTE's (not only NA-CONS budget)

Summary

- Our plan:
 - Focus now on East Area consolidation and complete it by the end of LS2.
 - North Area: focus on urgent consolidation items, EHN1 general infrastructure and complete the main consolidation after LS2.
- A lot of activities involving all infrastructure, equipment and support groups
- Anticipation of many activities in YETS and EYETS to relieve LS2 period. However, LS2 will be very challenging, especially in controlled areas.
- Consolidation is not an option and should be considered with high priority.



LS2 DAYS

29-30 SEPTEMBER 2015