



# R2E strategy & activities during LS1

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LHC Performance Workshop, 8<sup>th</sup> February 2012

Special thanks to  
the equipment owners, EN/EL, EN/CV,  
EN/HE, EN/MEF, GS/SE,  
the LHC integration team & the R2E team

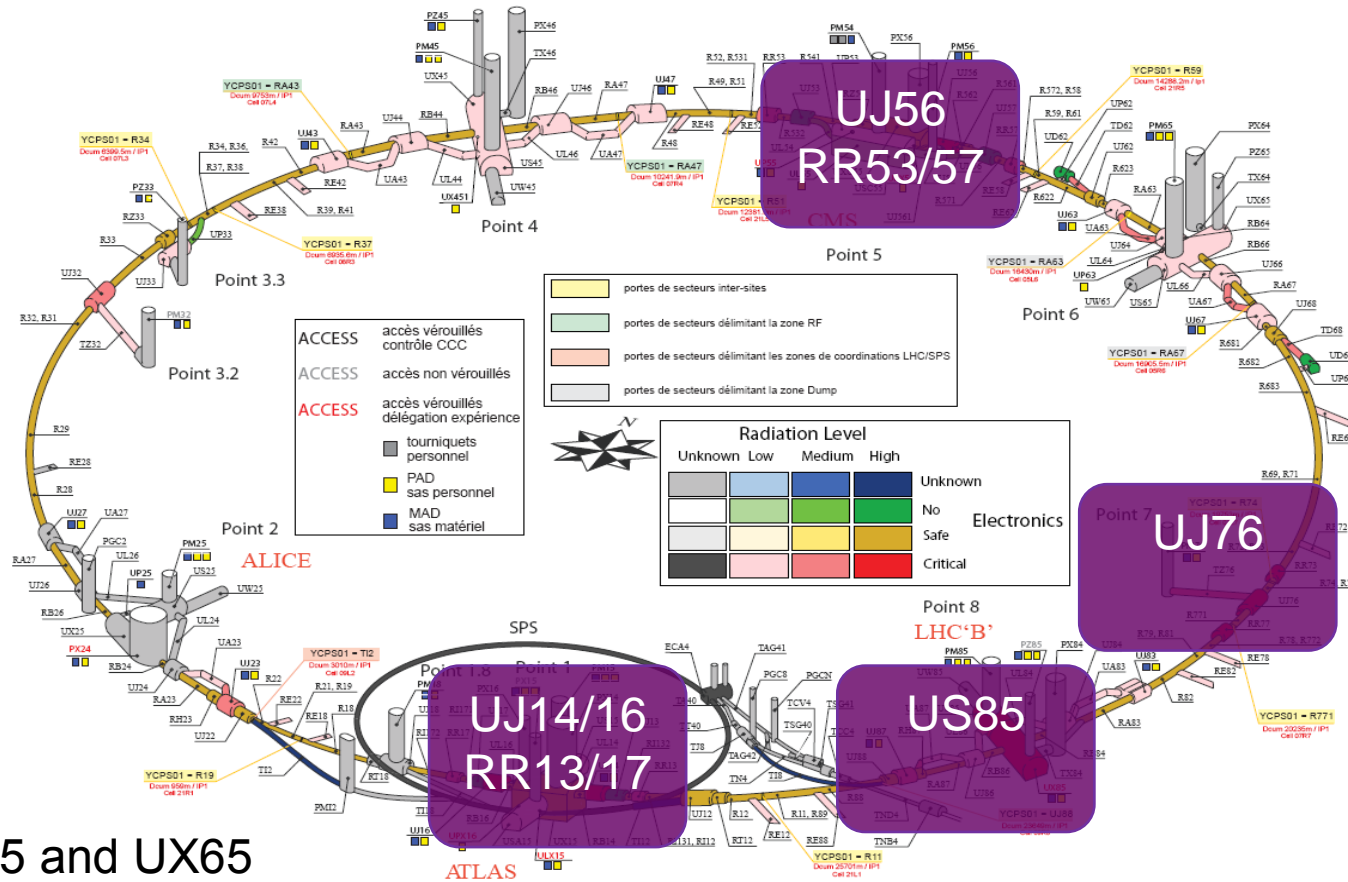
# Outline

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1. R2E mitigation activities:
  - 2011 Christmas break
  - foreseen improvements
2. LS1 activities schedule
3. Organisational aspects (2012 & LS1)
4. Priorities & main concerns

# Areas of the mitigation activities

Main critical areas today considered

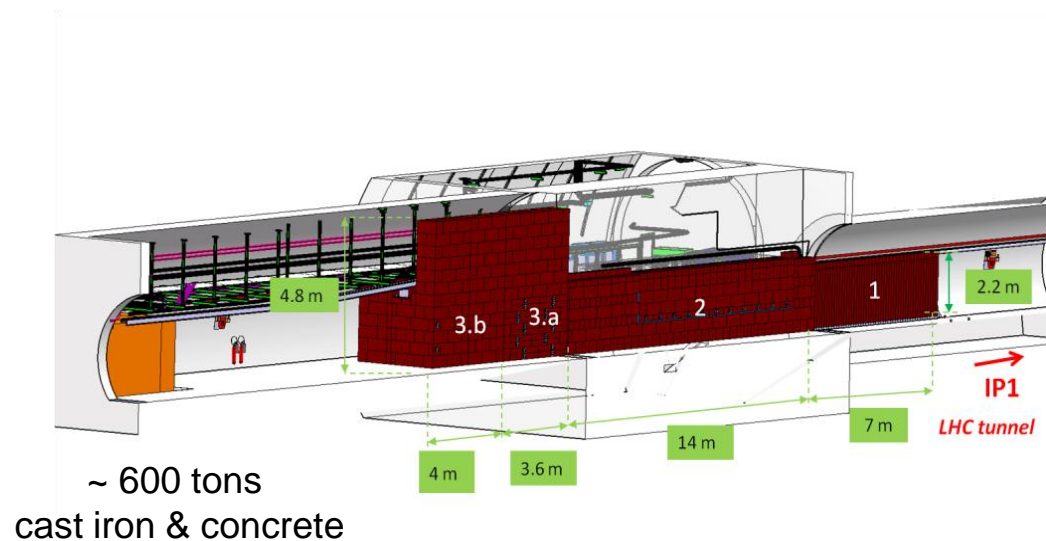


AND... UX45 and UX65  
(cryogenics PLCs)

# Mitigation activities - 2011 Christmas break

## Shielding

Point 1: RBs/UJs



Courtesy M. Lazzaroni

## Relocation

Point 1: Fire detectors

Points 4 & 6: cryogenics CPUs relocated from UX to UL

Point 5: Civil engineering (ducts in UL557, vault along 20 m)

UPS relocated from UJ56 to UL557

PIC relocated from UJ56 to USC55

Point 8: Ethernet racks (startpoint) (from US85 to UL86)

WIC & timing racks (from US85 to UA83)

QURCb & rack EYQ (from US85 level 2 to US85 level 0)

# Shielding activities - 2011 Christmas break

## Point 1: RBs/UJs



# Shielding activities - 2011 Christmas break

## Point 1: RBs/UJs



Thanks to EN/HE colleagues



# Mitigation activities

## Foreseen improvements

courtesy M. Brugger & M. Calviani  
talks in s03 & s07

### 2011:

- **Failures (beam dumps): expected: ~100 -> observed 70**
- **Performed mitigation actions:** IR7 Shielding, QPS/Cryo Patches, early relocations (PLCs, B/P/WIC, RTUs, Fire/ODH)

### 2012:

- **Failures (beam dumps):**
  - without further improvements: ~ **200 (extrapolated from 2011)**
  - with additional mitigation actions: **30-50 (expected)**
- **Performed mitigation actions:** P1 Shielding, QPS/FGC/Collimation Patches, additional relocations (UPS, PLCs, Fire)

### After LS1:

- **Failures (beam dumps):**
  - without further improvements: **>600 (extrapolated from 2011)**
  - with additional mitigation actions: **< 20 (expected)**
- **Mitigation actions:** remaining relocation (UJ14/16/56/76, US85), remaining shielding (RR 13/17/53/57), new developments (QPS, FGCs, PC R&D)

# LS1 mitigation activities

## Point 1 10 groups involved

relocation (UJ14/16 to UL14/16): 15 racks & 2 power converters

shielding (RR13/17): cast iron wall

## Point 5 12 groups involved

relocation (UJ56 to UL557 and USC55): 35 racks & 2 power converters

shielding (RR53/57): cast iron wall

## Point 7 11 groups involved

relocation (UJ76 to TZ76): 40 racks

## Point 8 7 groups involved

relocation (US85 to UL84/86 and UA83/87): 2 UPS, 4 racks, 24 valves positioners,

shielding (US85): cast iron wall

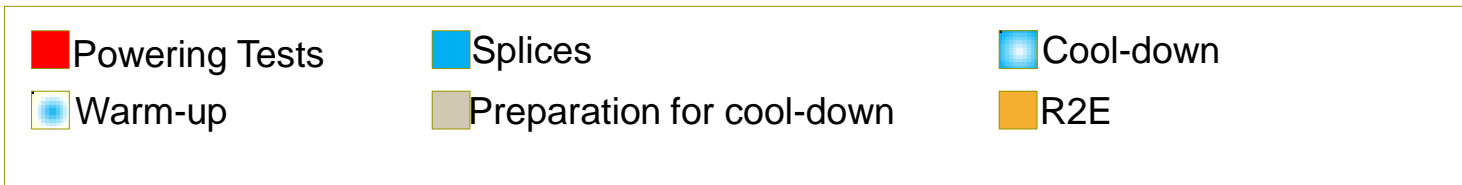
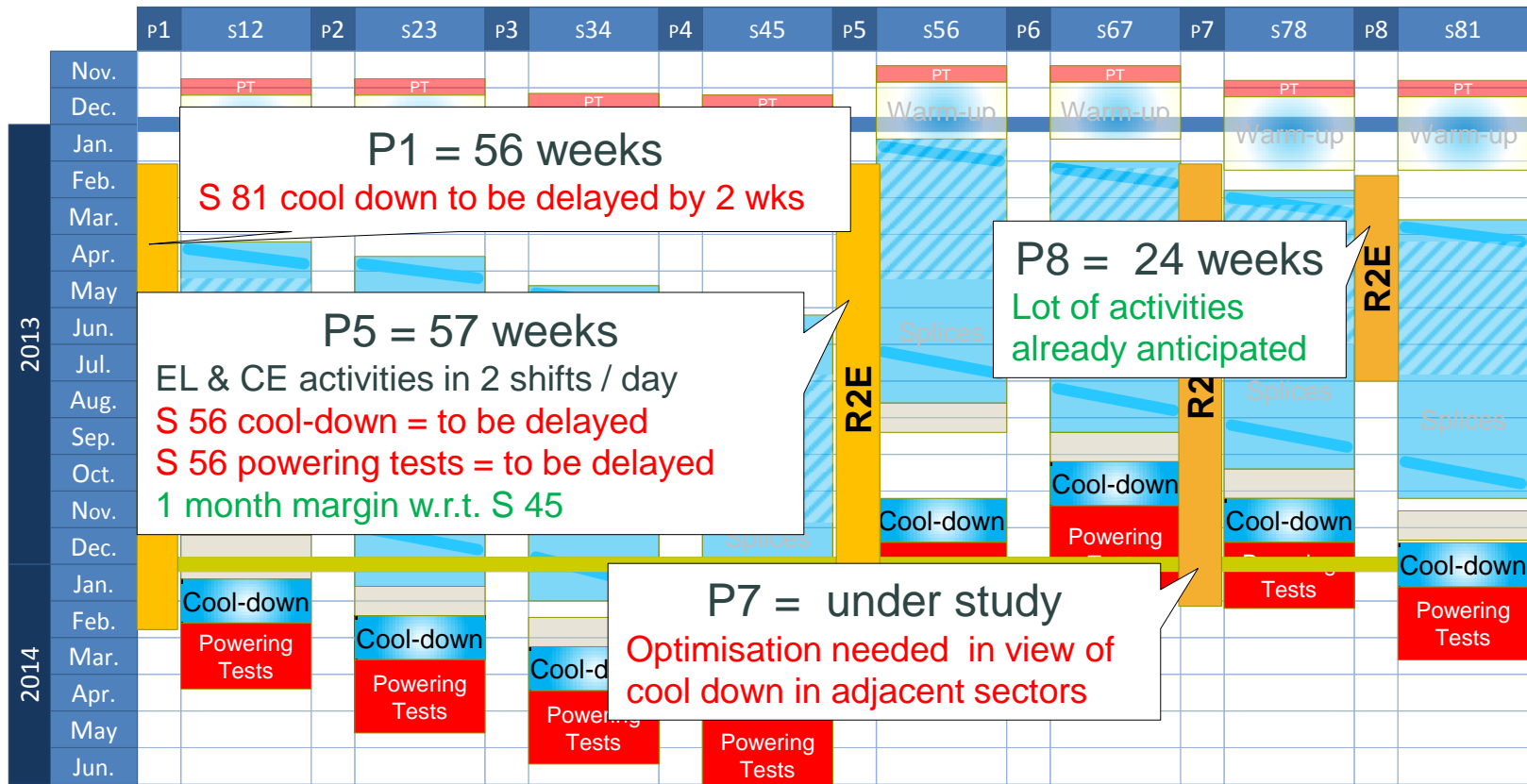
civil  
engineering

civil  
engineering



# LS1 activities schedule

work by M. Barberan & K. Foraz



# LS1 activities schedule

## Criticality

Point 1: EL 40 weeks, CV 31 weeks

No margin!

Point 5: EL 36 weeks, CV 31 weeks, CE 10 weeks

1 month margin

Point 7: EL 42 # weeks, CV 14 weeks, CE 5 weeks

Under study

## Minimise the criticality level

### Key points to avoid delays

- Material procurement
- Installation procedures
- Storage areas management
- Very close supervision of work in-situ

&

### Anticipation in implementation (2012 Technical stops)

- 20 days in total
- Profit of each day & each available ressource

# Implementation & worksite organisation

## Process towards LS1 installation

March 2012

integration and planning studies finished

(i.e. new locations= defined; activities= identified; works sequences= defined)



### Planning/manpower

Merge the R2E LS1 planning  
with the overall LHC LS1  
planning



Estimate the real intervention  
slots for each group



Finalise the material requests

### Material

All material requests identified



Contracts / material orders  
launched vs delivery deadlines



Follow-up of the material  
delivery

### Documentation for installation

ECRs



Safety documentation  
&  
Installation procedures  
&  
Installation drawings

Finished by summer 2012

Finished by autumn 2012

# Implementation & worksite organisation

## Main concerns towards LS1

### ➤ Integration studies

- 5 design offices involved: GS/SE, EN/CV, EN/EL, EN/HE, EN/MEF

Synergy & simultaneous effort  
to finish Point 7 in March 2012

- Relocation of EN/EL equipment located in the UJ76 safe room  
→ solution under study / decision needed

### ➤ Contracts

Need Point 7 finished to go ahead with  
the rest of the process

All needs = already identified

To be ready for LS1: all remaining orders to be launched

# Implementation & worksite organisation

## Main concerns towards LS1

### ➤ Manpower request

- General remark from services & equipments owners

Estimate will be finalised once

- Point 7 integration and planning finished
  - Planning of R2E activities merged into the LHC planning
  - Work in parallel in different points for all activities = known
- 
- Coordination & follow-up of the R2E mitigation activities  
3 work supervisors are needed (partial start in summer 2012)

In discussion with  
BE/OP

# Critical points during LS1 implementation

Critical points



Required action

Team

## ➤ Material

- procurement



Follow-up

Eqpt owners & services

- storage before installation



Management of storage areas

t.b.d.

## ➤ Installation



Day-to-day in-situ supervision

t.b.d.

## ➤ Integration no last minute change!

- Installation non conformities



Intermediate survey scans

BE/ABP



Cross-checks with models

EN/MEF

## ➤ Delays vs planning



Follow-up & adaptation

EN/MEF

# Conclusions – Main concerns

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## ➤ Integration studies

- Need a simultaneous effort of the 5 design offices to finish Point 7 in March 2012
- Relocation of EN/EL equipment located in the UJ76 safe room: decision needed

Need Point 7 finished to go ahead with the rest of the process

## ➤ Material procurement

Launch remaining orders to be ready for LS1

## ➤ Manpower

New iteration once R2E planning merged into overall LHC planning

Supervision in situ during LS1

Today good collaboration with all the  
equipment owners & the services

Thanks a lot to all of you for all we have  
already achieved

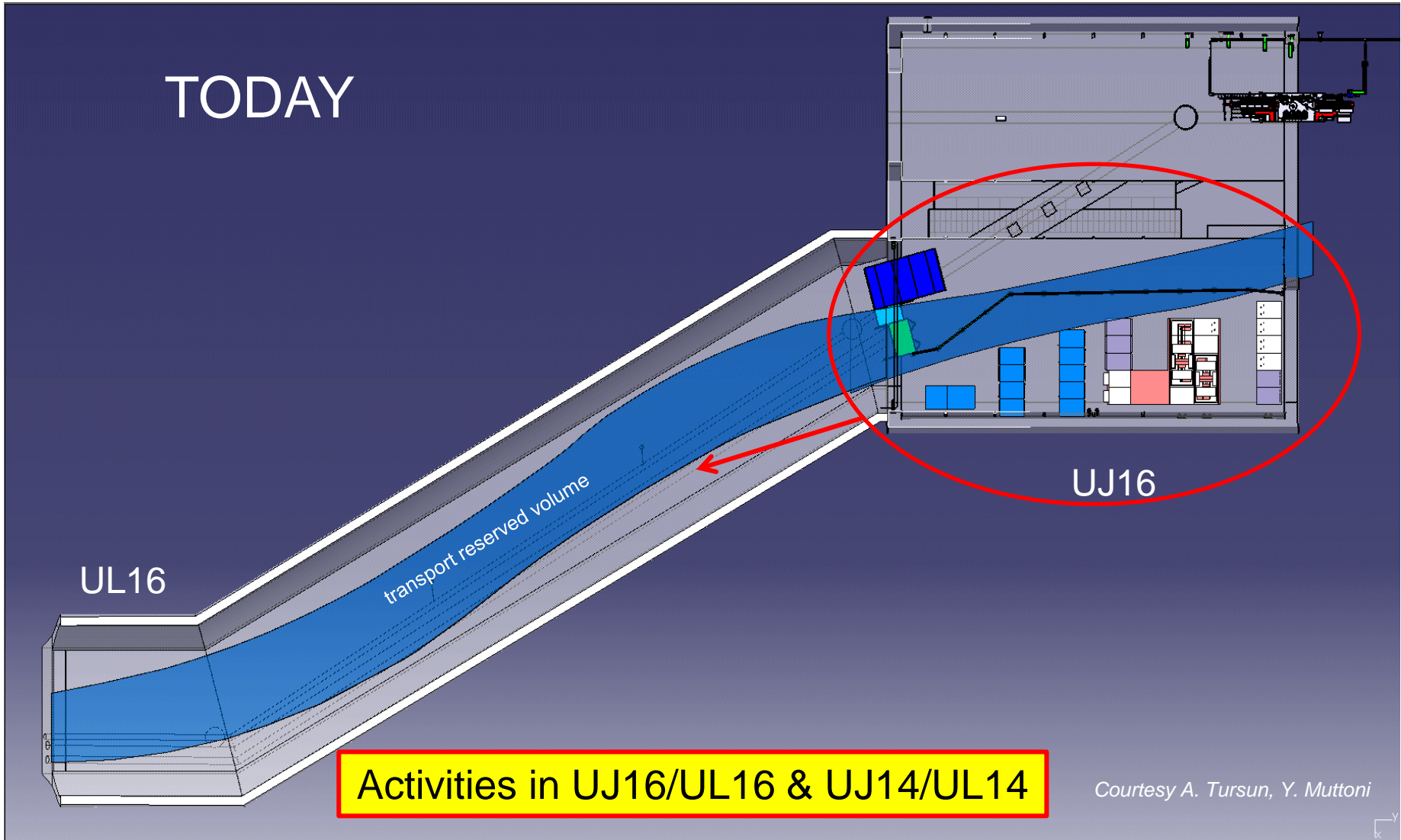
Still a lot of work ahead of us for LS1

Any question?



# Addendum

# Point 1- Relocation

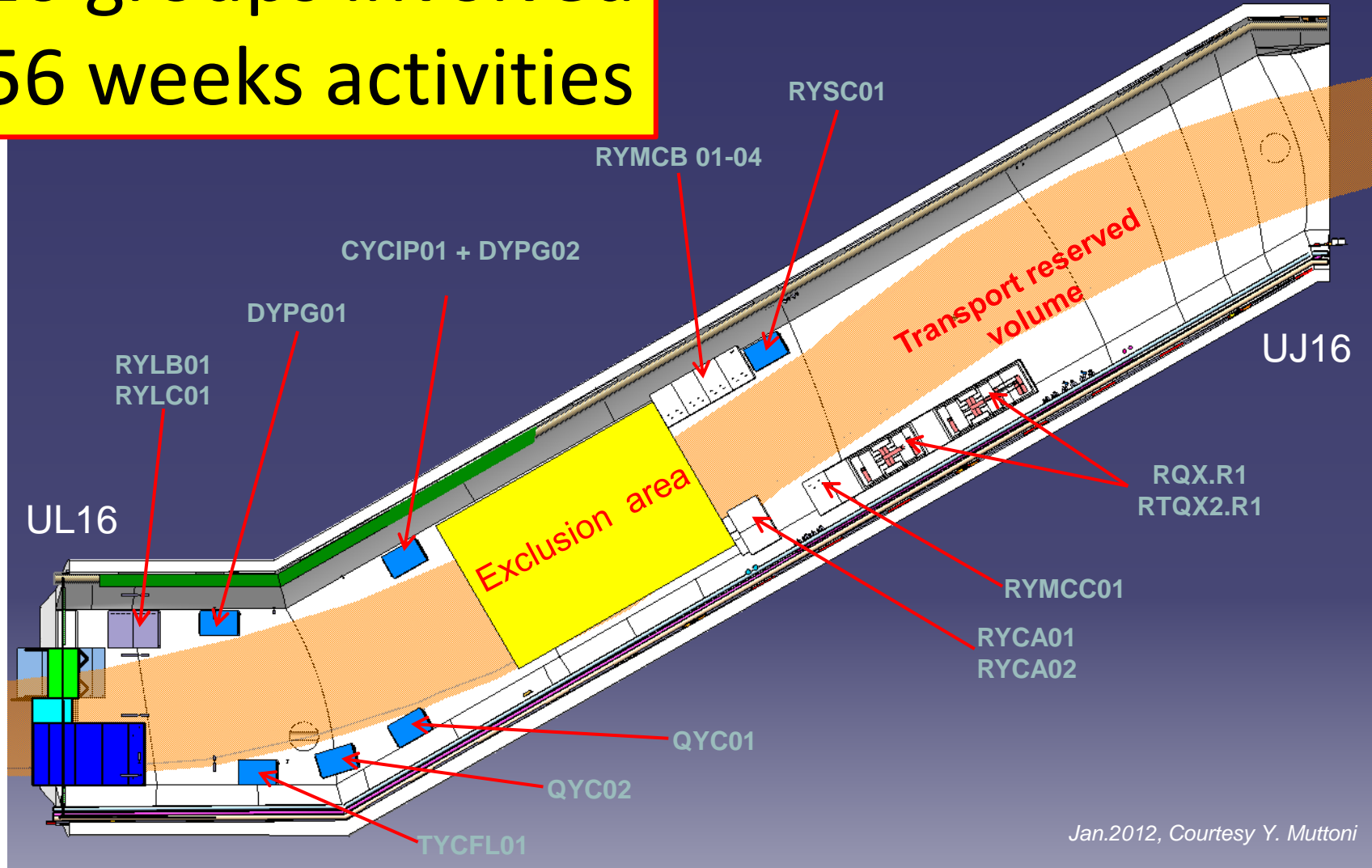


Activities in UJ16/UL16 & UJ14/UL14

Courtesy A. Tursun, Y. Muttoni

# Point 1- Relocation

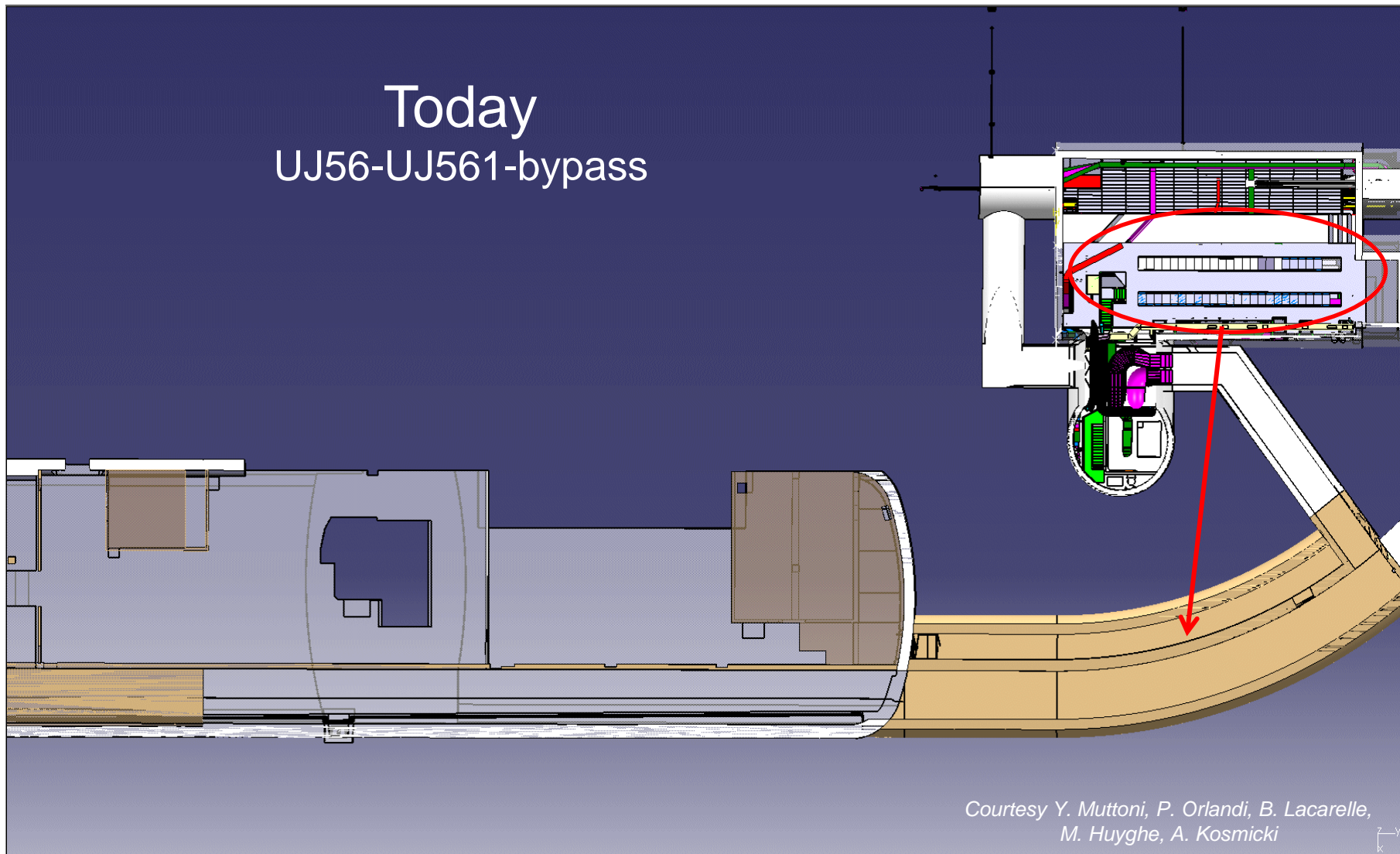
10 groups involved  
56 weeks activities



Jan.2012, Courtesy Y. Muttoni

# Point 5 - Relocation

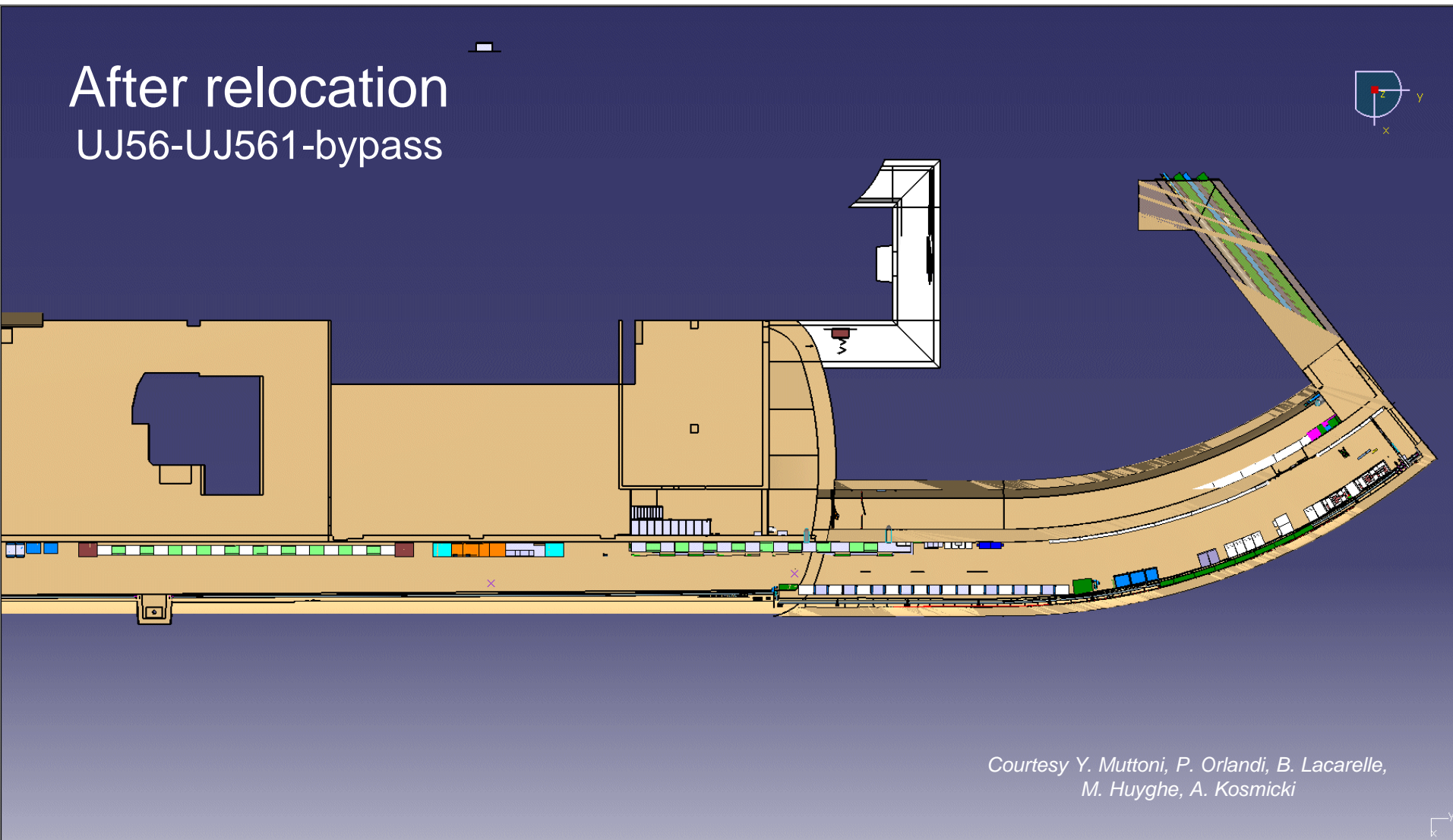
Today  
UJ56-UJ561-bypass



Courtesy Y. Muttoni, P. Orlandi, B. Lacarelle,  
M. Huyghe, A. Kosmicki

# Point 5 - Relocation

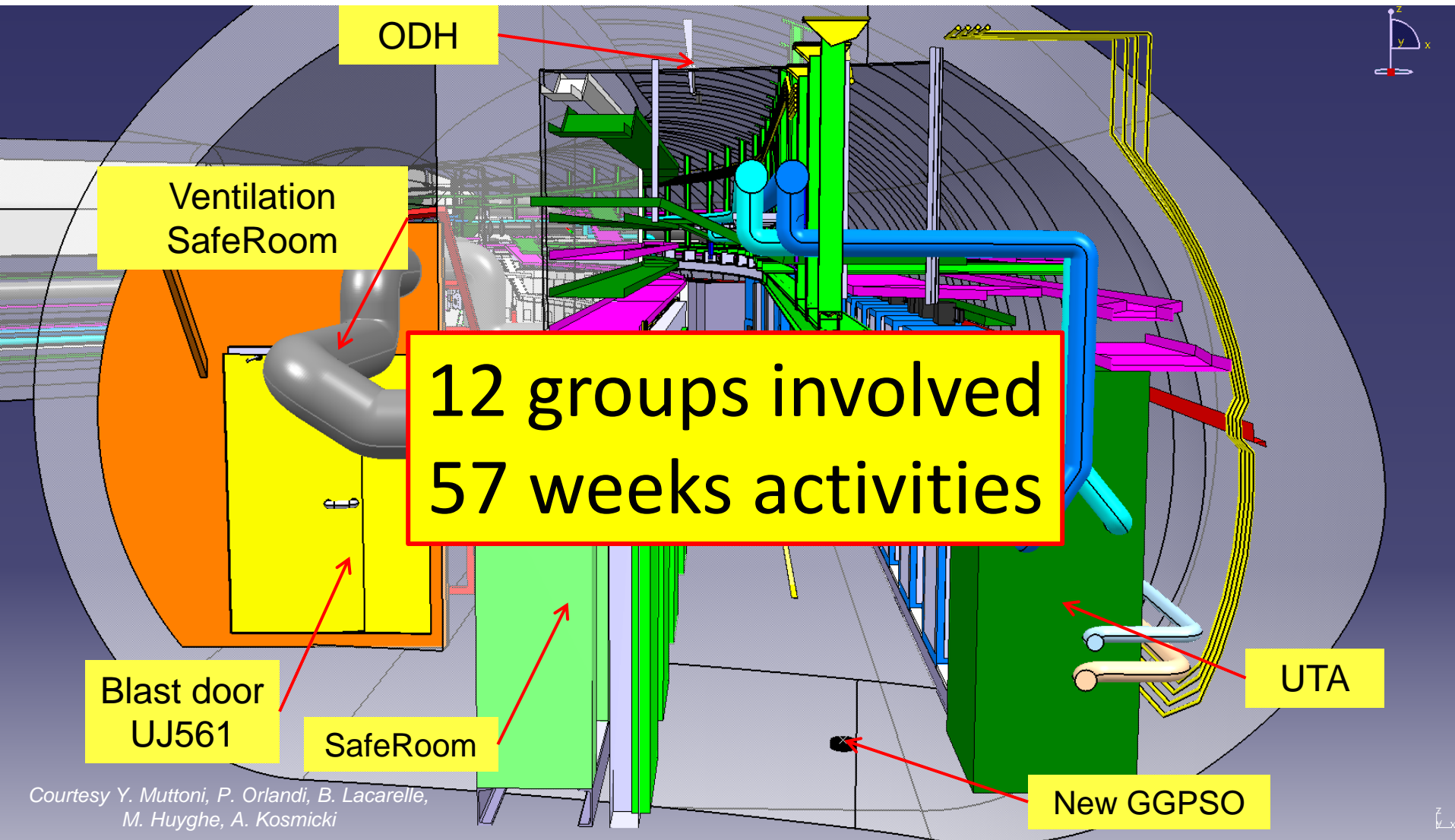
After relocation  
UJ56-UJ561-bypass



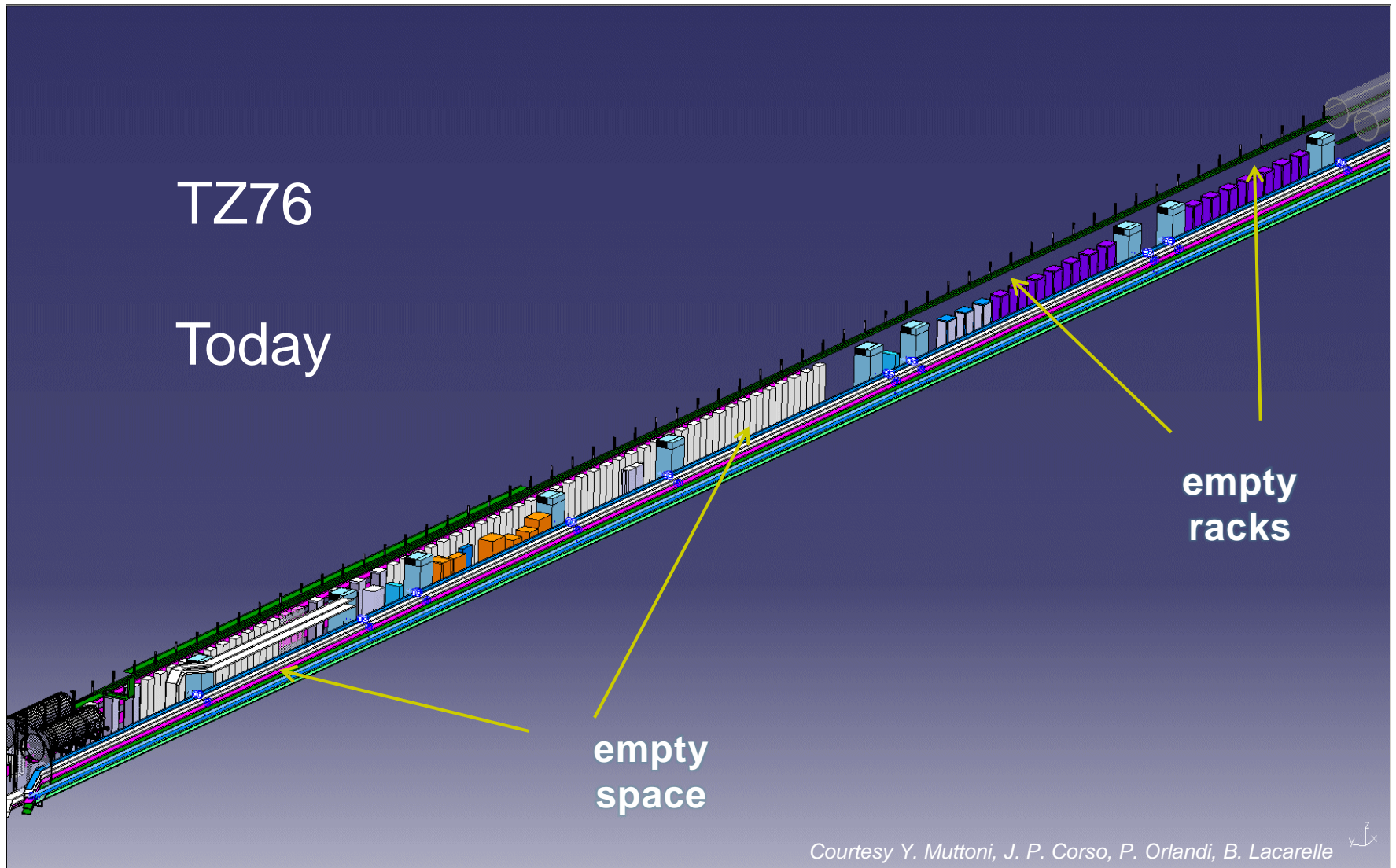
*Courtesy Y. Muttoni, P. Orlandi, B. Lacarelle,  
M. Huyghe, A. Kosmicki*

# Point 5 – Relocation

(cross-section UL557)



# Point 7 - Relocation

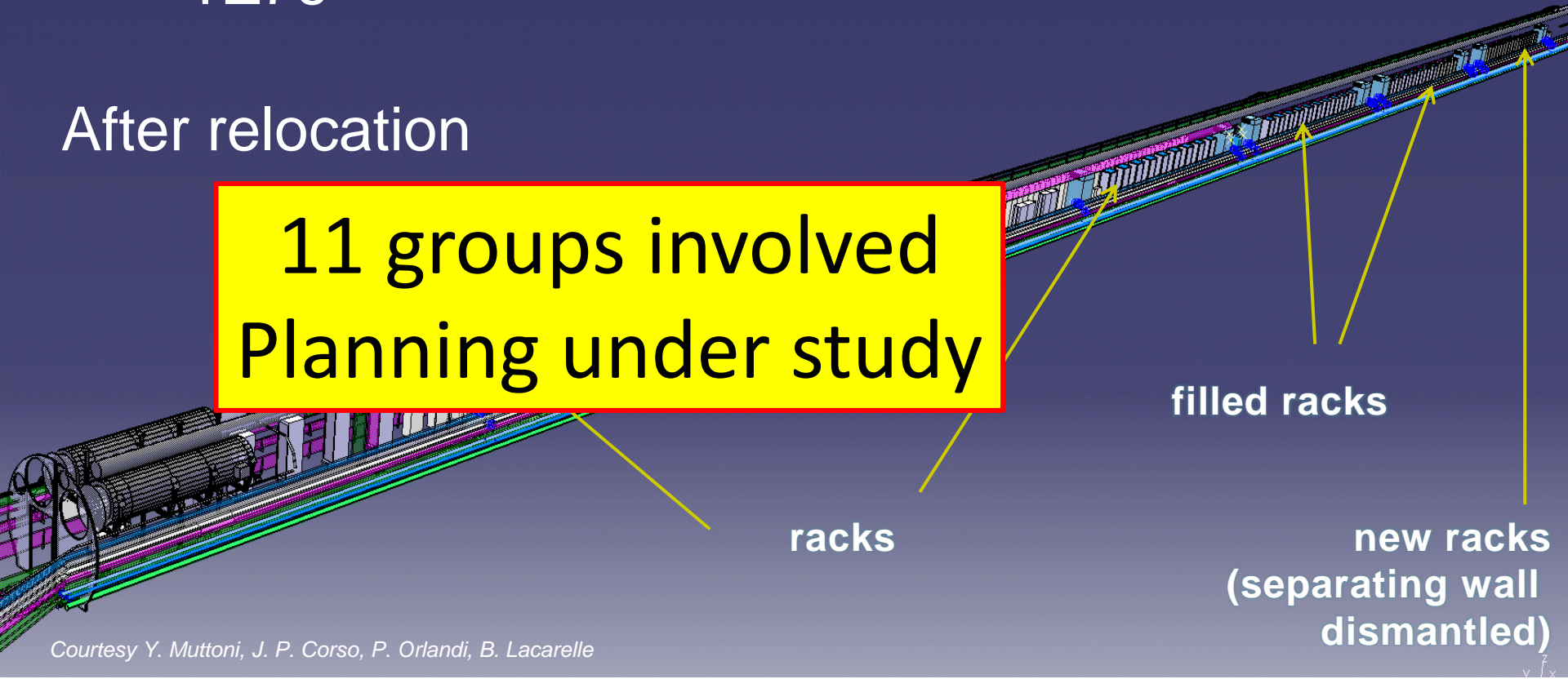


# Point 7 - Relocation

TZ76

After relocation

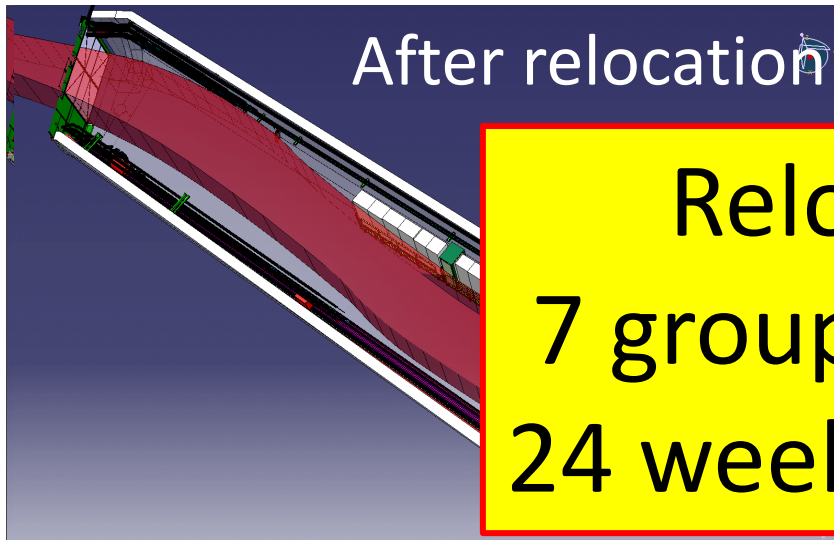
11 groups involved  
Planning under study



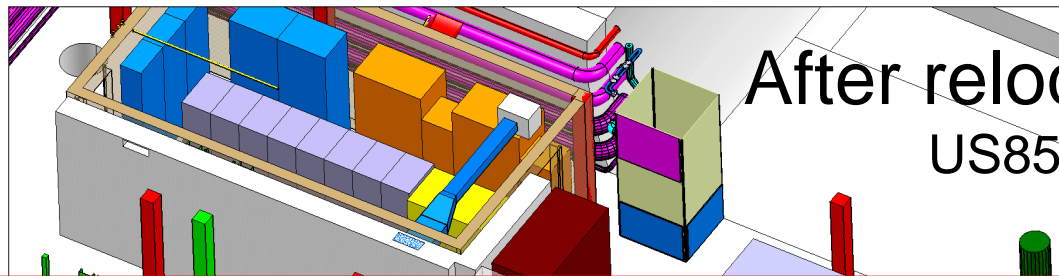
*Courtesy Y. Muttoni, J. P. Corso, P. Orlandi, B. Lacarelle*



# Point 8 - Relocation & shielding



**Relocation:  
7 groups involved  
24 weeks activities**



**Shielding installation: EN/HE 2 weeks**

