BI Outlook for 2012-15

Divonne - BI Day – 24/11/2011

J-J Gras

Presentation Overview

This presentation will give an overview of our major ongoing activities and plans up to 2015

These slides assume that:

- current planning remains the same (LS1, LINAC4, ELENA…)
- all the necessary external services will be provided (we may have some issues with cable requests)

- From Linac2/3 to LHC
- On Linac4
- On CLIC
- On ELENA (and AD)
- Other Goodies
- Conclusions

From Linac 2/3 to LHC

- We started a consolidation program for the beam instrumentation of the injector chain several years ago.
- The target was to replace obsolete parts to ensure the availability of our systems in the coming years.
- Originally, these developments were not directly linked to performance issues or improvement requests but the MTE and LIU projects added new requirements, which are now taken into account.
- I'll briefly give an idea below of what we plan to have done in 2015 in this context

From Linac 2/3 to LHC in 2015

- A new PSB orbit and trajectory system
- A new PSB BLM system
- A new PS BLM system
- New WCM in the PS for longitudinal density distributions
- Fast BCT electronics standardized all over the PS complex plus some monitor upgrades
- A new SPS orbit and trajectory system
- An online prototype of the new SPS BLM system
- A new fast BWS prototype in the SPS
- New Fast BCT and DCCT in the SPS
- SEM electronics upgraded everywhere
- BPM in LHC collimators
- Cooled electronic racks for BPM/BLM in LHC…
- …

From Linac 2/3 to LHC in 2015

- In parallel to all this, we have also to renovate our controls infrastructure to stay in line with the ACcelerator COntrol Renovation project (ACCOR) from CO and basically migrate our front end CPUs/OS to the new standard to avoid eventual obsolescence issues

- BI/SW plan in this domain (TBC) is to
  - Treat LINAC3 and LEIR in 2012
  - Eradicate old PPC4 from LHC during LS1 (17 FESA classes to be ported and tested!)

On LINAC 4

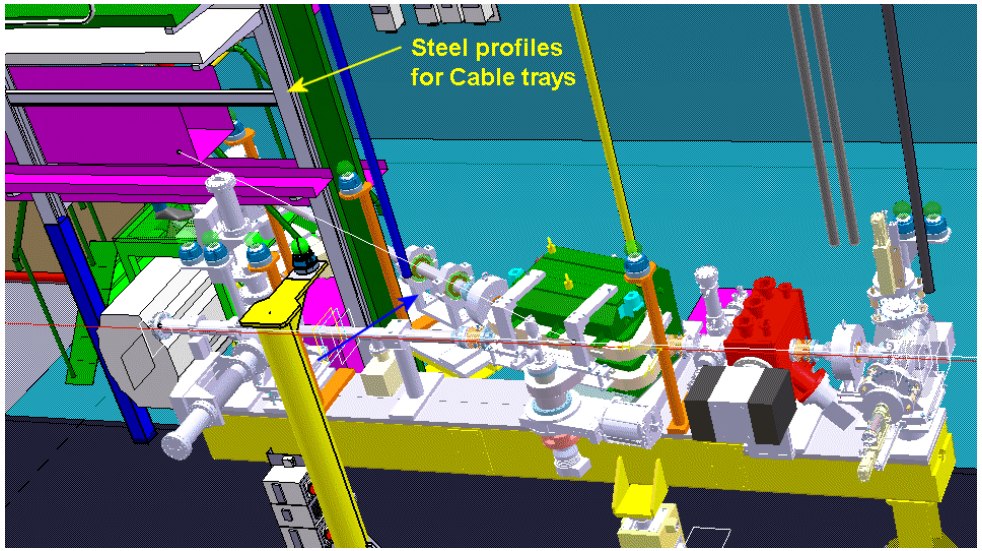
2012 the year of the 3 MeV test stand

RFQ startup foreseen for **March 2012**

The 3 MeV measurement line is being prepared **NOW**.

We have the following instruments:

- Emittance meter with 3-12 MeV slit
- Transformer
- BPMs measuring
  - Position
  - Phase
  - Intensity
- SEMGrids
- Wire Scanner
- Halo Monitor
- Bunch Shape Monitor

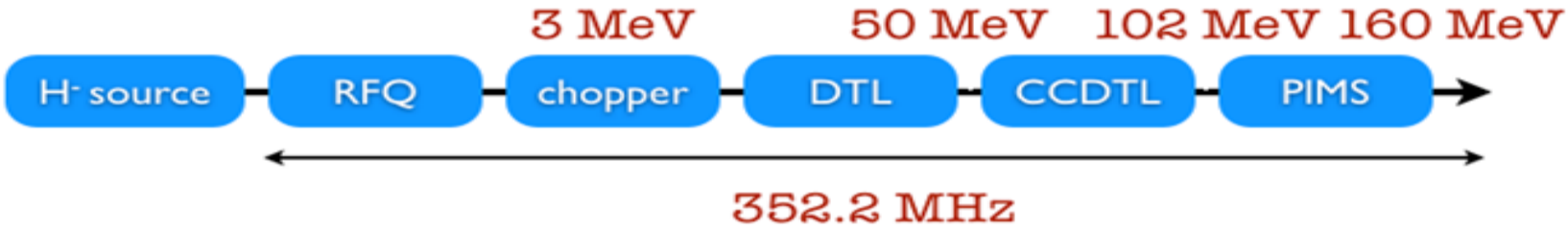


The installation of the first H^- source is foreseen for July.

Little time for tests on protons and not much more for H^-

On LINAC 4

2013 Installation in the Linac-4 tunnel



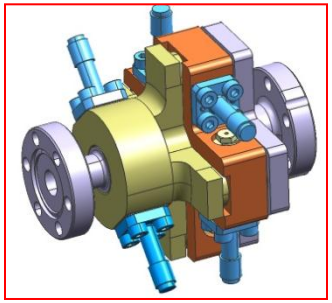
2013: Installation and commissioning in the tunnel

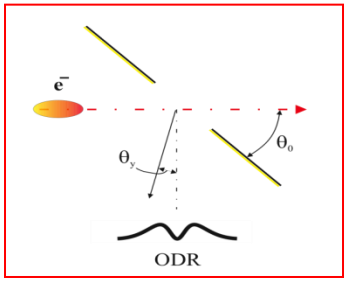
- Start of commissioning in slices in summer 2013
- End of commissioning (beam on the dump) foreseen for mid 2014
- most systems will have been tested on the test stand before final installation in the machine, except for BLMs.

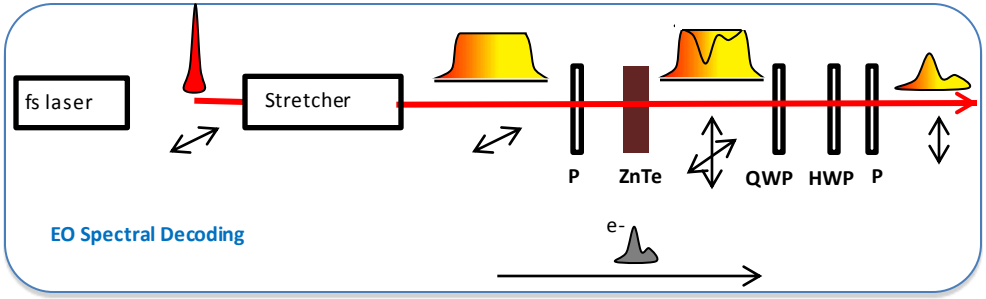
On CLIC

Now that the Conceptual Design Report is done (~70 pages for BI), CLIC goes in the **Project Preparation Phase (2012-16).** This means:

- Testing of CLIC prototypes: BPM, LWS, ODR, EOT, BLM …



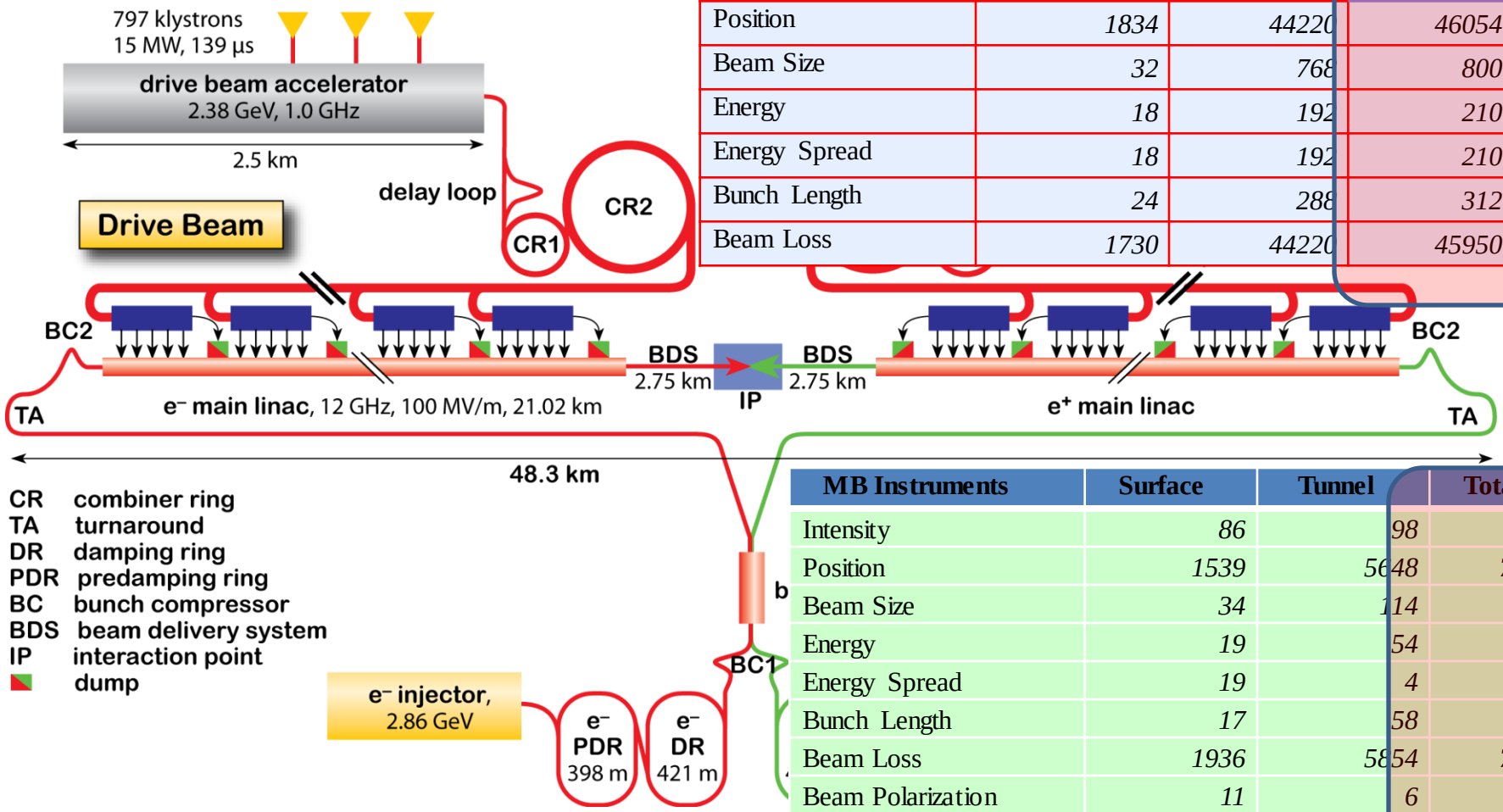




- Integrating CLIC instruments in the machine layout
- Investigating operational issues: reliability study and maintenance strategy
- Optimizing Costs:
  - Simplicity if applicable (not always compatible with tight tolerances)
  - Standardization (detectors, electronics) is a key concept
  - Gain in Mass production ?

On CLIC

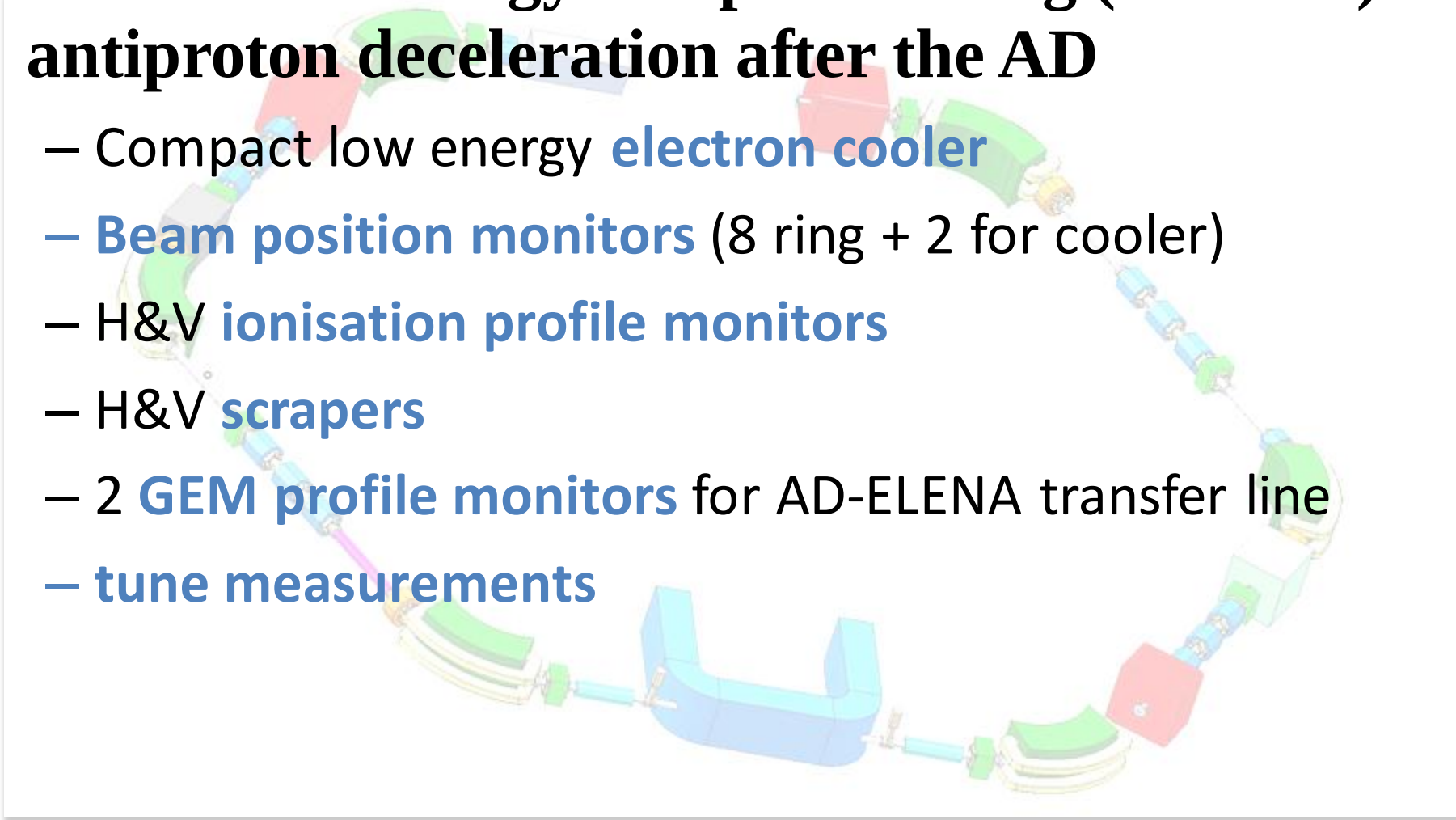
DB Instruments	Surface	Tunnel	Total
Intensity	38	240	278
Position	1834	44220	46054
Beam Size	32	768	800
Energy	18	192	210
Energy Spread	18	192	210
Bunch Length	24	288	312
Beam Loss	1730	44220	45950



MB Instruments	Surface	Tunnel	Total
Intensity	86	98	184
Position	1539	5648	7187
Beam Size	34	114	148
Energy	19	54	73
Energy Spread	19	4	23
Bunch Length	17	58	75
Beam Loss	1936	5854	7790
Beam Polarization	11	6	17
Tune	6	0	6
Luminosity		2	2

On ELENA and AD

- **Extra Low Energy Antiproton Ring (ELENA) for antiproton deceleration after the AD**
  - Compact low energy **electron cooler**
  - **Beam position monitors** (8 ring + 2 for cooler)
  - H&V **ionisation profile monitors**
  - H&V **scrapers**
  - 2 **GEM profile monitors** for AD-ELENA transfer line
  - **tune measurements**



On ELENA and AD

Current Planning

- TDR ready for June 2012
- Go ahead decision (at some point in time), then
  1. **Design, fabrication, installation** of ELENA whilst using the existing ejection lines for physics @ 5.3 MeV **for 3 years**
  2. **Commissioning** of ELENA in parallel with physics **for 6 months**
  3. **Installation and commissioning of new 100 keV ejection lines** (physics stopped) **for 0.5 to 1 year**

=>Total duration 4 to 4.5 yrs

On ELENA and AD

What about AD?

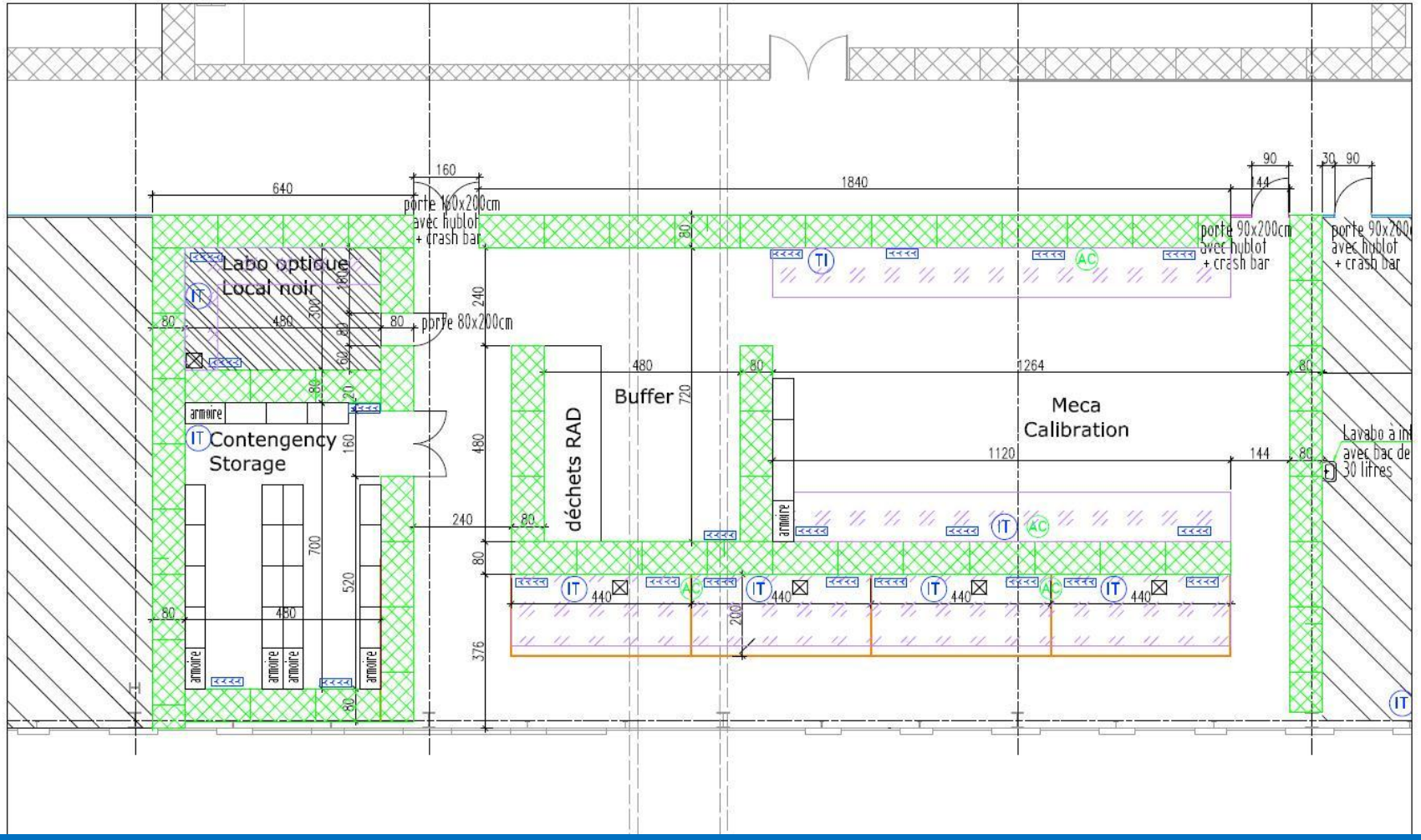
- With ELENA, AD will have to reach 2020 in a good shape which will most probably not happen if we leave it as it is.
- Michael is investigating the instrumentation needs for the AD in the ELENA era and preparing a renovation plan to cover correctly this period.
- We should have a first version of his report ready for engineering check beginning of next year, which will allow us to propose an accurate plan to the expected AD consolidation project

About Other Things: BI Workshops

- CERN has launched a couple of years ago a big project to secure and rationalise interventions on radioactive devices in our labs
- A special zone has been allocated to BI in building 867 on the Prevessin site
- This zone will be delivered to us during Q1 2012 with all the necessary services (ethernet, compressed air, racks, smoke extractors for small soldering, dark room…)
- We will also have some space there for contingency radioactive storage

On Other Things: BI Workshops - 867

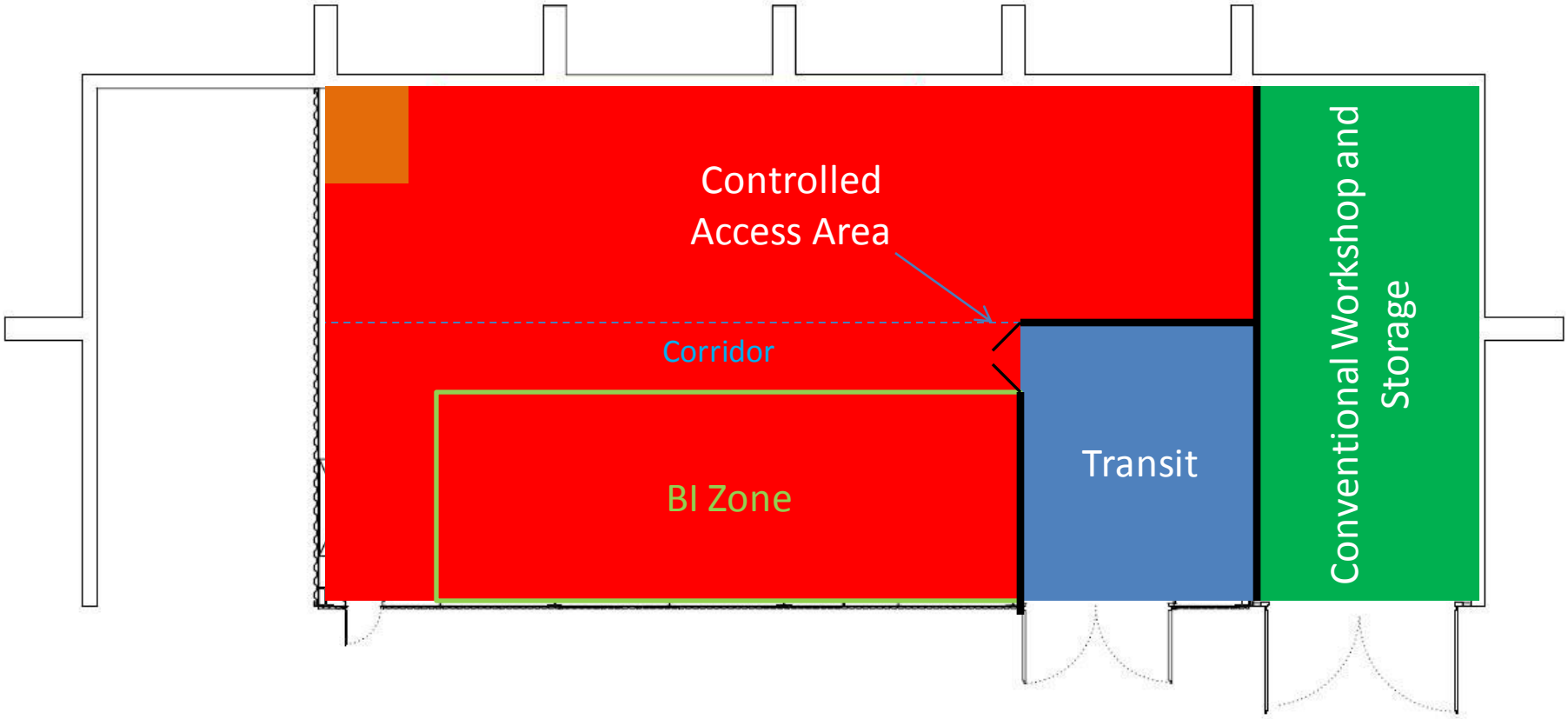
Our workshop layout is presented below



On Other Things: BI Workshops - 283

We are also preparing a BI radioactive workshop on Meyrin site (Bd 283) to avoid all unecessary transport of radioactive items across the border.
Our hope is to have it ready for LS1

We also have in this buiding a BI conventional workshop and storage for our activities on Meyrin site.
This place has just been delivered and is now usable.



On Other Things: Asset Management

- BI is currently responsible for several thousand monitors and related electronics all around CERN:
  - > 4000 beam loss monitors
  - > 1000 beam position monitors
  - Many beam current transformer, screens, sem grids…
  - Several exotic devices like the LHC synchrotron light telescopes
- All these instruments are used operationally and play a key role in our accelerator's results and performance.

On Other Things: Asset Management

- We do regularly corrective/preventive maintenance and renovation/upgrades on these devices.
- Sofar, there is no guidelines in BI on how to manage our inventories and keep trace of these activities: each instrument responsible has to make his/her choice.

- But the need for adequate tool and procedures to manage all these assets and interventions has been identified by several sections.

On Other Things: Asset Management

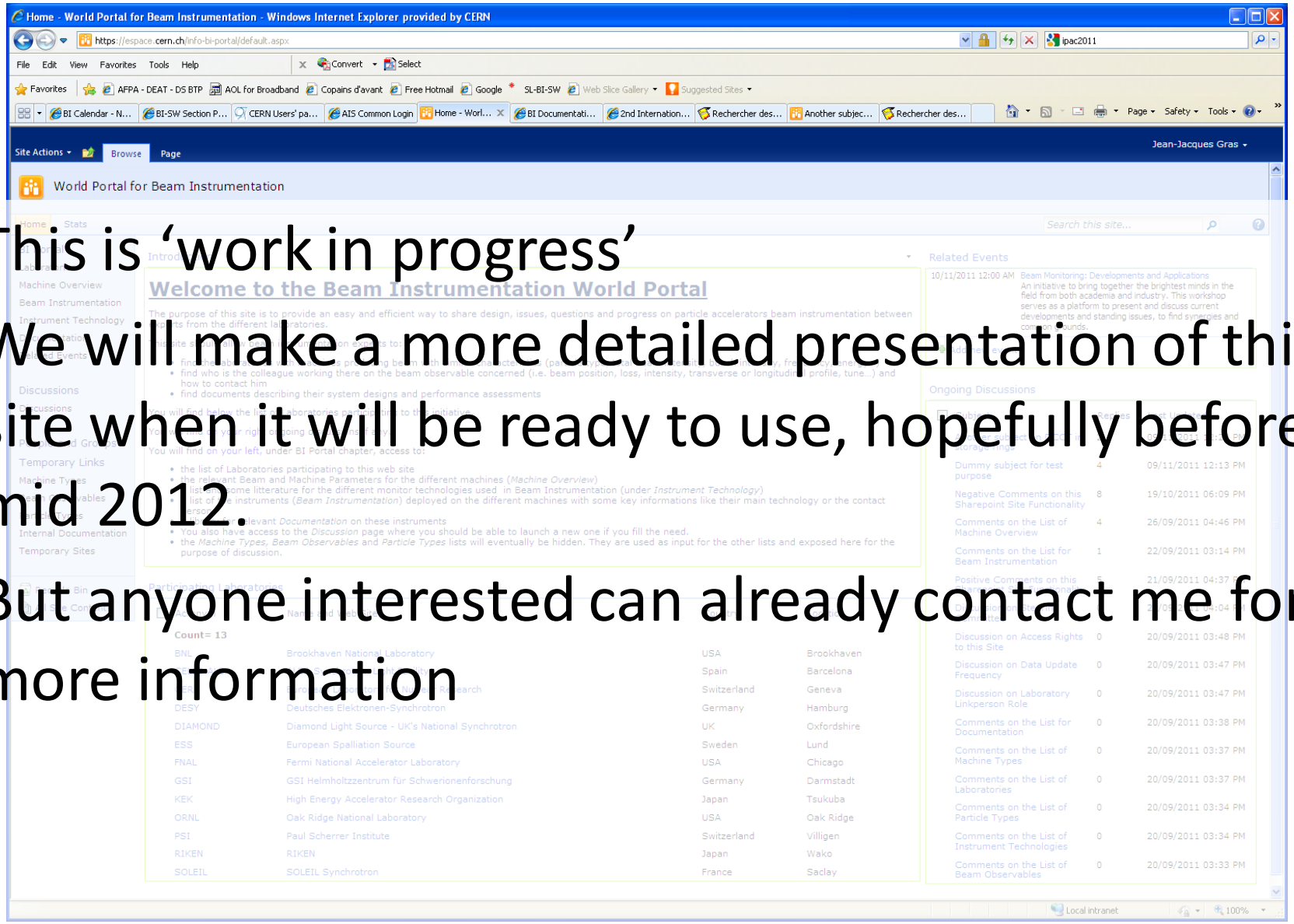
- That is why we requested to participate to a recent TE/EN project on asset management and maintenance tools.

- Our objective there is to make sure that our needs and requirements are included in the project definition so that we could benefit from this tool to improve our situation in this domain during LS1

On Other Things: BIGNet

- We are developing in collaboration with other Labs a global web site to:
  - Easily find the laboratories with machines using beams of similar characteristics than ours (particle type, total beam intensity, bunch intensity, frequency, energy…)
  - Easily find who is the person working there on the same beam observable (i.e. beam position, loss, intensity, transverse or longitudinal profile, tune…) and how to contact him/her.
  - Launch discussion forum with the right persons
  - Provide links towards documents describing system designs and performance assessments
  - And possibly more …

On Other Things: BIGNet



- This is ‘work in progress’
- We will make a more detailed presentation of this site when it will be ready to use, hopefully before mid 2012.
- But anyone interested can already contact me for more information

Conclusions

We have an impressive quantity of necessary, challenging and diverse work in our pipeline for the coming years

Let's Enjoy It!

Starting with a Drink!!!