



**High
Luminosity
LHC**

HL-LHC Vacuum Technical Meeting WP12

Lucio Rossi

6 March 2014 @ CERN

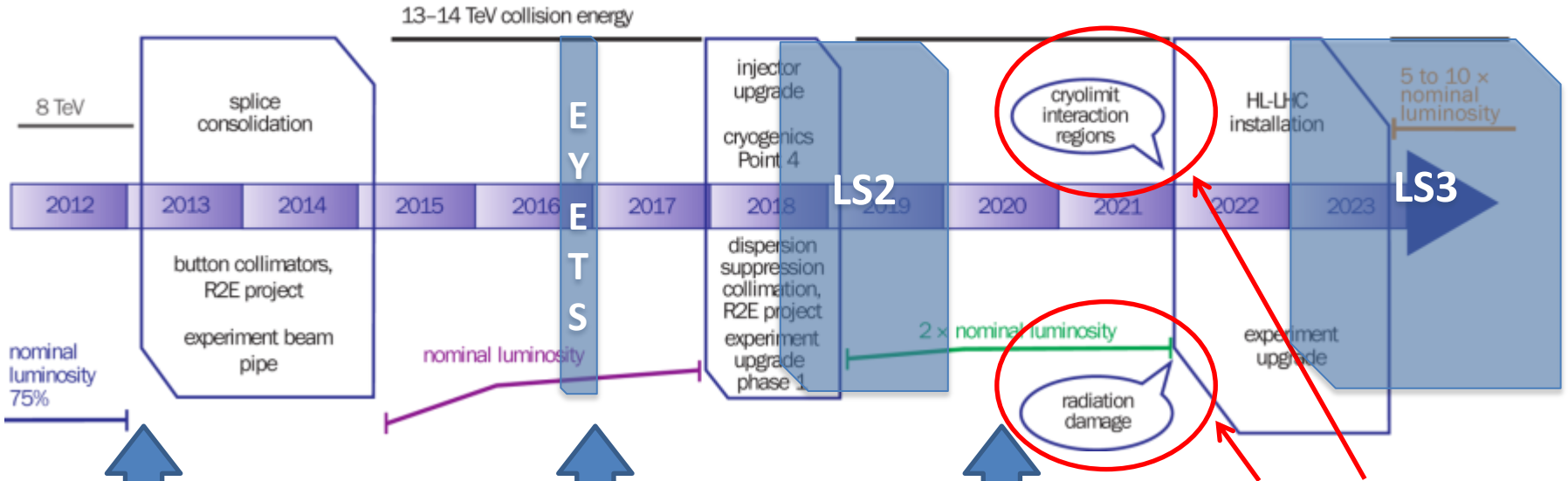


The HiLumi LHC Design Study is included in the High Luminosity LHC project and is partly funded by the European Commission within the Framework Programme 7 Capacities Specific Programme, Grant Agreement 284404.



The CERN 10-year plan (approved early 2011)

Plan modification
approved Dec 2013



$0.75 \cdot 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
50 ns bunch
high pile up ~40

$1.5 \cdot 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
25 ns bunch
pile up ~40

$1.7\text{-}2.2 \cdot 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
25 ns bunch
pile up ~60

Technical limits
(experiments,
too) like :

2013: HL-LHC: from Design Study to Construction Project (funded)



**Update of 2013
Approved at special CERN Council
Held in Brussels 30 May 2013**

*c) Europe's top priority should be the **exploitation of the full potential of the LHC**, including the high-luminosity upgrade of the machine and detectors with a view to collecting **ten times more data than in the initial design, by around 2030**. This upgrade programme will also provide further exciting opportunities for the study of flavour physics and the quark-gluon plasma.*

Review of LHC & Injector Upgrade Program (CERN-MAC)



Recommendation (R1): The committee supports the full LHC high luminosity program (HL-LHC), including the full LHC Injector Upgrade (LIU) project and the Upgrade Scenarios 1 and 2, and recommends scheduling LS3 for the installation of all necessary equipment for the HL-LHC as early as possible to maximize the integrated luminosity of the LHC.

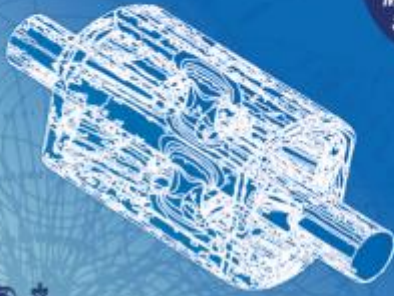
Full plan (incl. CC
and LRBBW): OK

Daresbury Laboratory, UK

3rd Joint Annual Meeting

11-15 November 2013

High
Luminosity
LHC Project
Kick-off
Monday 11 Nov.
Special Event



Organizing Committee

- L. Rossi - CERN, Project Coordinator
- G. Idrisov - CERN, Deputy Project Coordinator
- J. Dudař - CERN, Project Support
- S. Agostini - CERN, Chairperson
- D. Angeli-Kolon - STFC
- S. Bragut - JINR
- G. Bar - CERN
- A. Dudař - CERN
- K. Hock - CERN
- L. Kennedy-Waller - STFC
- A. Weber - CERN

The HiLumi LHC Design Study project

is organizing its 3rd Annual Meeting in collaboration with LARP. The meeting will review the progress in design and R&D of the FP7 HiLumi work packages, as well as other work packages. The main scope will be to provide a solid ground for the preparation of the High Luminosity LHC Conceptual Design Report, a key deliverable of the Design Study, due in the first part of 2014.

To mark the recent approval of the High Luminosity LHC project by the CERN Council as first priority for CERN and Geneva, a special event called the HiLumi LHC Project Kick-off will be organized on the afternoon of Monday 11th November, with the participation of directors of the major stakeholders of the project.

The HiLumi LHC Design Study is included in the High Luminosity LHC project and is partly funded by the European Commission within the Framework Programme 7 Capacities Specific Programme, Grant Agreement 299614.

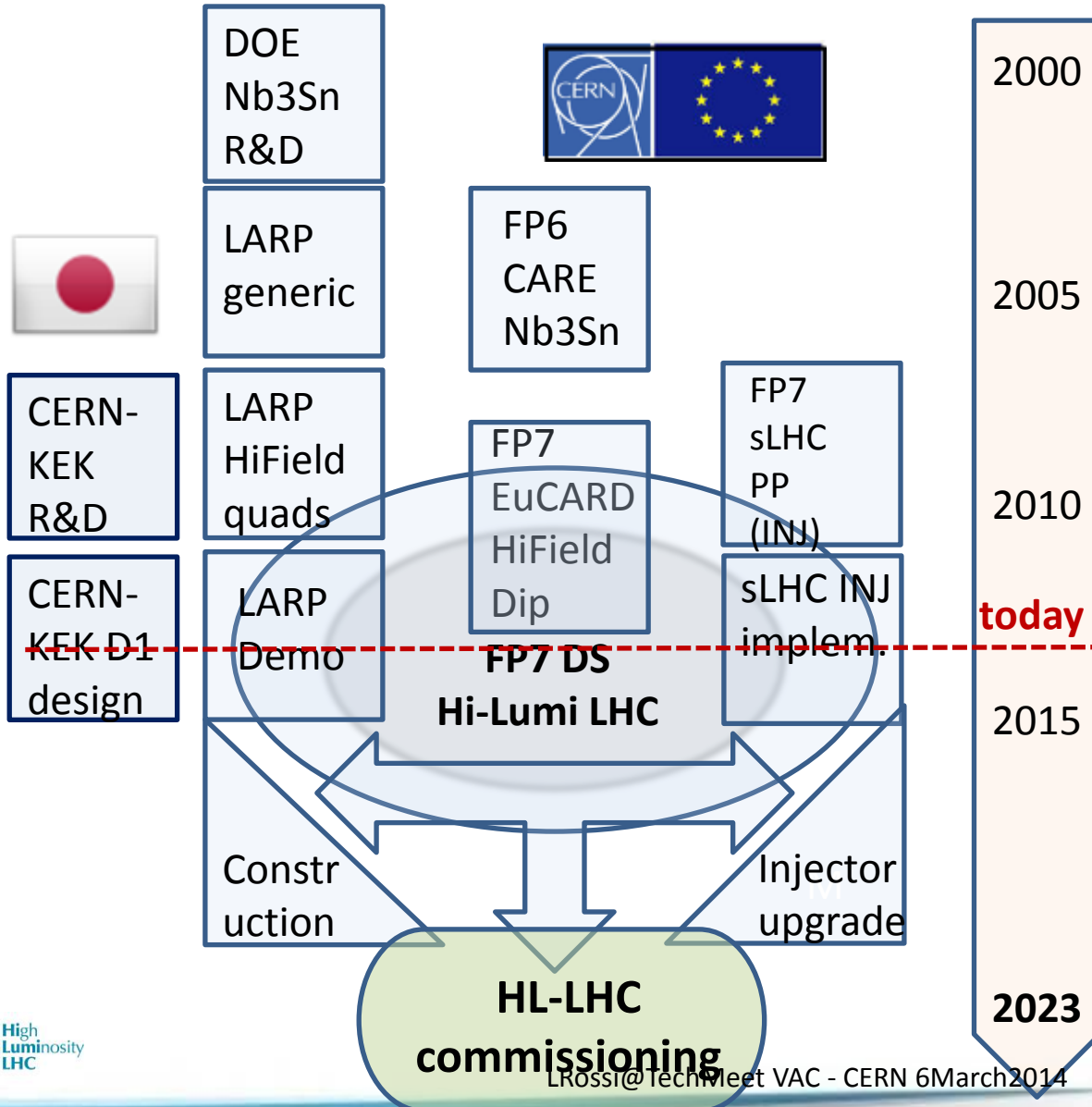
For more details and free registration:
<http://cern.ch/hilumilhc>

Project Kick off meeting on 11 Nov 2013





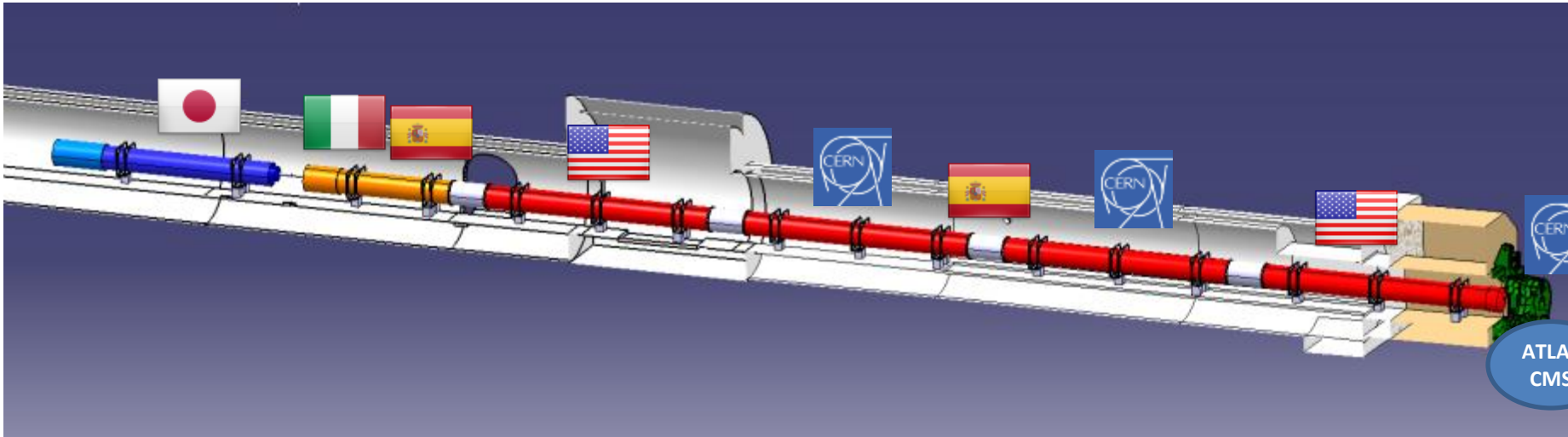
Collaboration: the long way



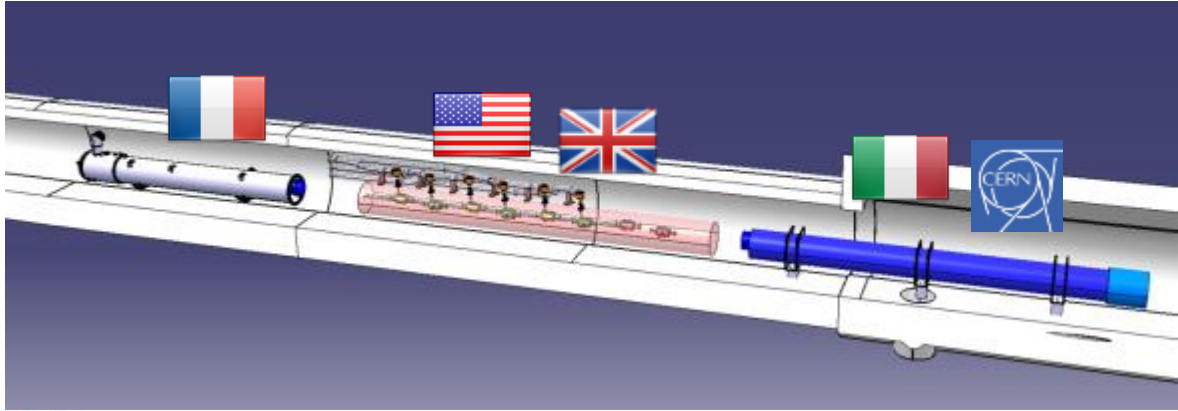
The HL-LHC project formally started in 2010; however it is the focal point of 20 years of converging International Collaboration



In-kind contribution and Collaboration for design and prototypes: Vacuum best practice enforced!



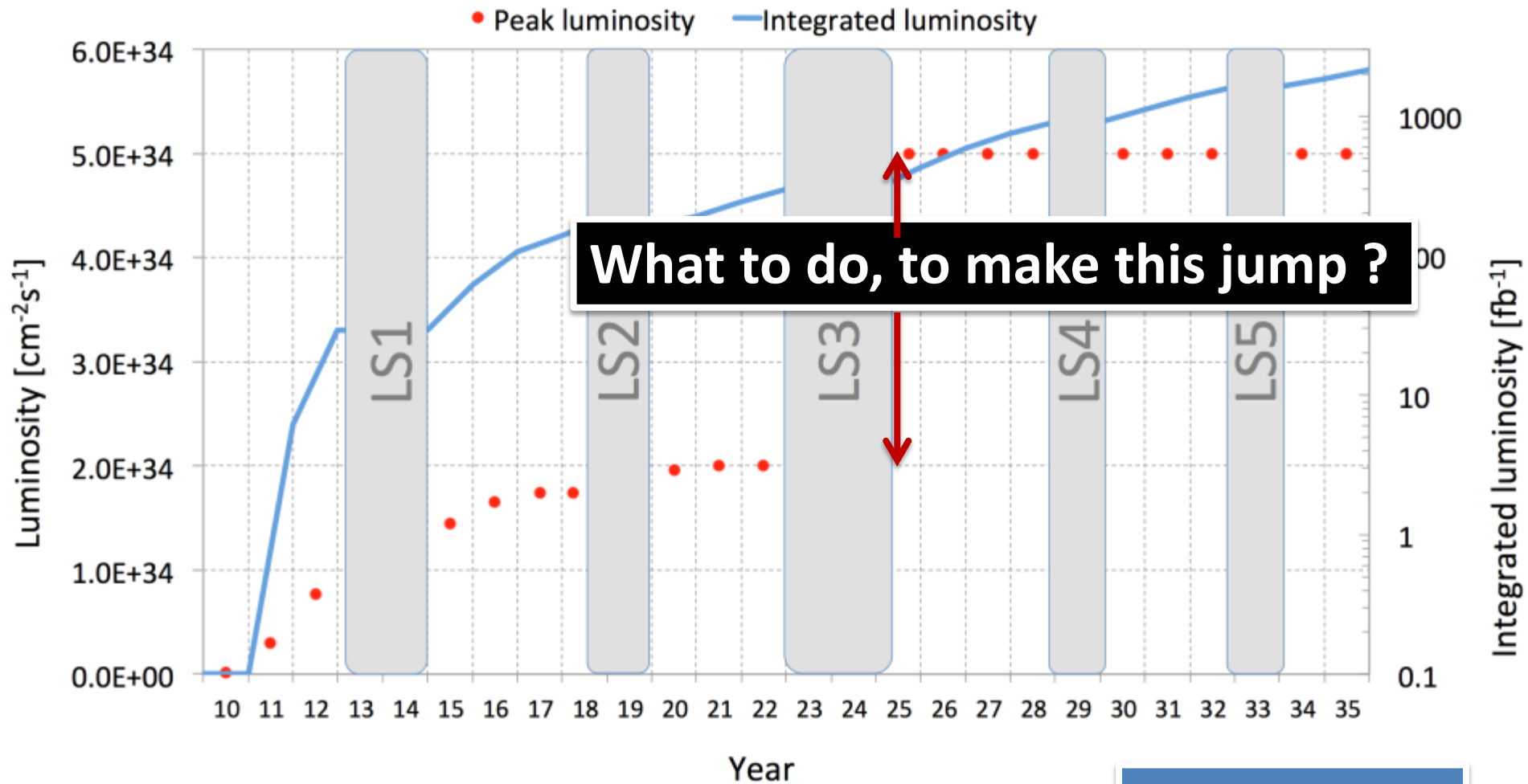
ATLAS
CMS



- Q1-Q3 : R&D, Design, Prototypes and in-kind **USA**
- D1 : R&D, Design, Prototypes and in-kind **JP**
- MCBX : Design and Prototype **ES**
- HO Correctors: Design and Prototypes **IT**
- Q4 : Design and Prototype **FR**

CC : R&D, Design and in-kind **USA** CC : R&D and Design **UK**

This goal would be reached by 2035-36



M. Lamont, CERN



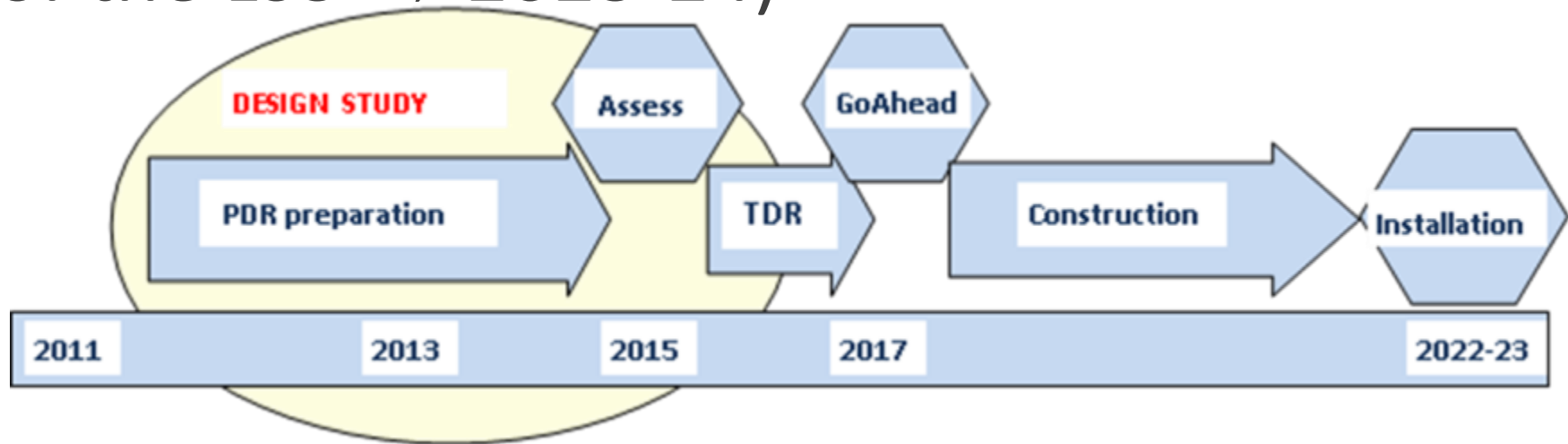
Vacuum: touch all WPs

- WP2 : e-cloud
- WP3 : cryostat vac, beam pipe, **beam screen** (and e-cloud); Test facilities
- WP4 : cryomodule and beam pipe; Test facilities and assembly facilities
- WP5 : collimators vacuum issue; e-lens?; Crystal?
- WP6 : cryostat of SC links
- WP8 : machine-experiment interface (vacuum lay-out)
- WP9 : Cryogenic equip. vacuum
- WP7 & W10: UFOs...
- WP11: 11 T cryostat and by-pass + collimators
- WP12: self-coupling ?
- WP13: beam diagnostic related?
- WP14: Kickers

WP15 : integration - Installation

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Implementation plan (BEFORE 1 year shift of the LS3 → 2023-24)



- All WP active, from diagnostics to Machine Protection;
- Integration started with vigour as well as QA (workshop soon)
- Cryo, SC links, Collimators, Diagnostics, etc. starts in LS2 (2018-19)
- Proof of main hardware by 2016; Prototypes by 2017
- Start construction 2017/18 from IT, CC, other main hardware
- IT String test (integration) in 2019-20; Main Installation 2022-23 2023-24
- Though but – based on LHC experience – feasible
- Cost: 810 MCHF (Material, CERN accounting)

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Most already in CERN plan: counting on the USA and JP contribution we are basically covered

Have a useful and productive Meeting!



... and do not ask the Moon: even in HiLumi resources are limited and must be optimized!