

HL/Consolidation Day

Introduction and motivation

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Thanks to Cecile Noels for her support



First of all....

***Thanks to everyone for
coming along and to have
prepared the analyses
that will be shown today***



Consolidation - background

- Huge, aging, complex serving a large and demanding user community
- **Challenging future program**
- Competition for resources (material and manpower)
 - New projects, operations, unforeseen incidents, experiments, computing, HR...
 - And inevitably the associated priorities
- Public image with clear need to demonstrate effective exploitation with due regard to:
 - Economics
 - Safety
 - Environment
- Dependencies across the accelerator chain

Dependencies

	L2/L4	PSB	PS	SPS	LHC	L3	LEIR
ISOLDE	X	X					
nTOF	X	X	X				
EA	X	X	X				
AD	X	X	X				
NA	X	X	X	X			
AWAKE	X	X	X	X			
HiRadMat	X	X	X	X			
LHC expts	X	X	X	X	X		
NA ions			X	X		X	X
LHC ions			X	X	X	X	X



CONS priorities

- Complex safety (machine and personnel)
- Exploitation of LHC
- Foresee HL-LHC era
- Exploitation of the complex
- Foresee LIU era
- Long term vision for exploitation of facilities (AD, NA...)
- Support the process (maintenance, upgrades...)
 - Tooling, on-site engineering, test facilities,

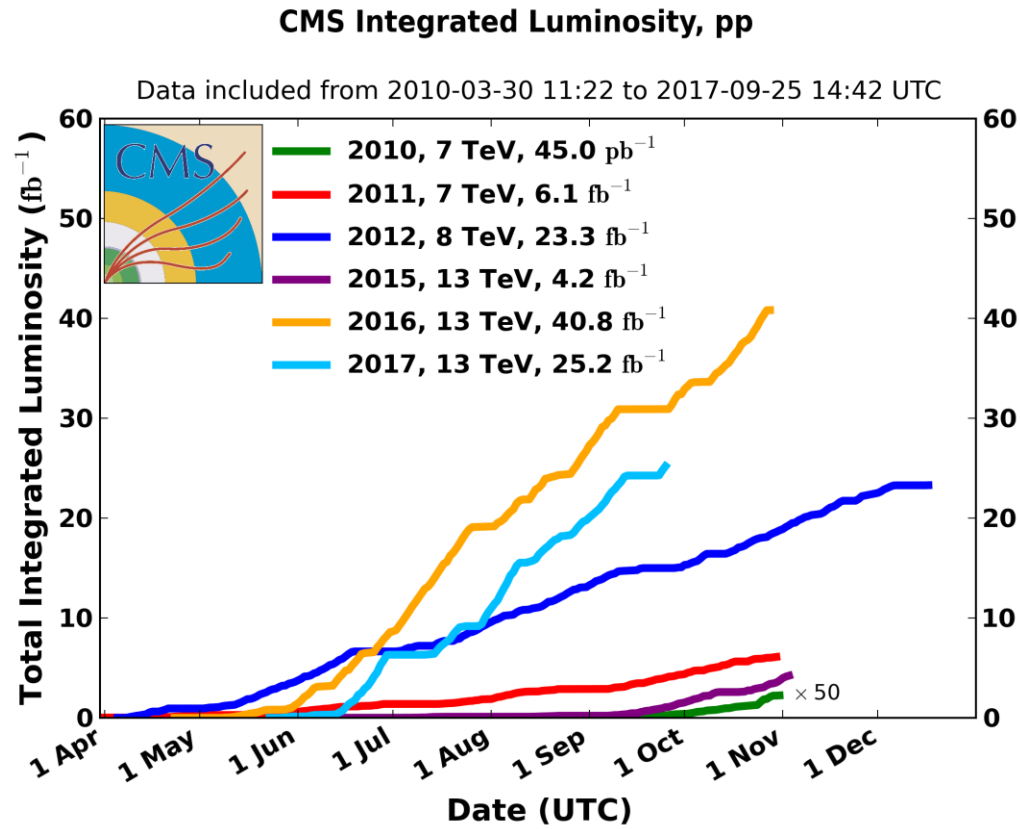
Process

- Essentially driven at group level
- Reflecting significant and familiar compartmentalization
- Interaction with other projects: LIU, HL-LHC
 - What we do and when we need to do it
 - Coherency in areas of mutual interest

BE	ABP	BI	CO	ICS	RF		
EN	ACE	CV	EA	EL	HE	MME	STI
TE	ABT	CRG	EPC	MPE	MSC	VSC	
SMB	SE						

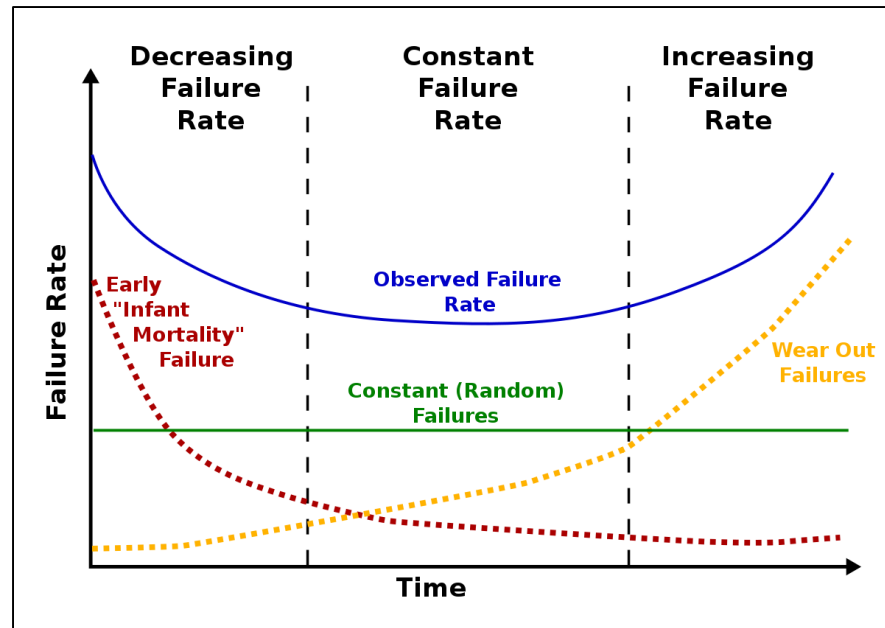
Reasons to be cheerful

- Huge and fruitful effort has gone into ensuring availability and reliability
- Systems have been upgraded, additional functionality deployed, performance has been excellent overall.



End of LS3...

- The installed LHC will be about 20 years old
- Some systems components were designed in the 1990s
- Hardware will have been exposed to $\sim 300 \text{ fb}^{-1}$ equivalent radiation dose (the other face of R2E)
- Mechanical and thermal fatigue, corrosion..
- Will be facing the bath-tub in waves over the coming years



HL parameter space

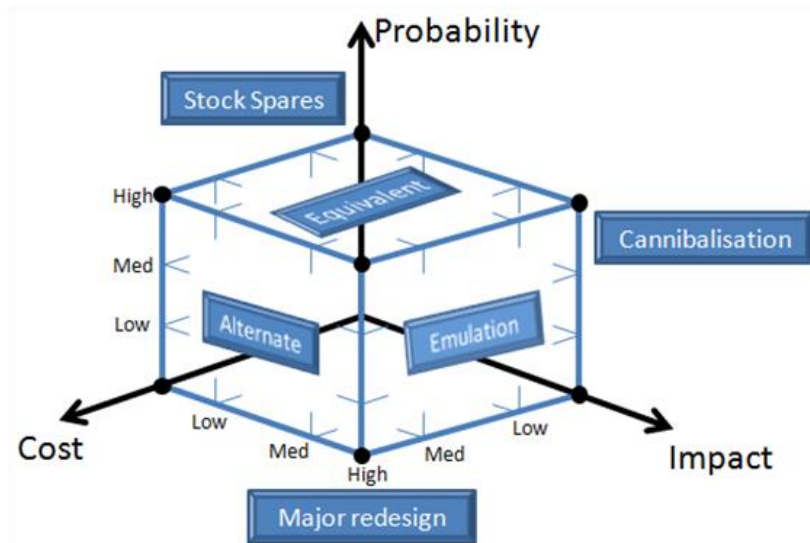
High bunch intensity, high luminosity, potentially high losses, high radiation

- Ensure the ability of **existing systems** to meet the challenges of the HL-LHC
- **Performance enhancing consolidation** as a sometimes pre-requisite between now and then (e.g. collimation)

15 TeV now also to be borne in mind

Obsolescence

- Unsupported components and technology
- Maintenance of spares, spares inventory
- The need to harness 21st century technology



Non-conformities

- Many non-conformities have been chased down and addressed
- A few remain
- Some have arisen
 - system weakness, ageing, radiation...
- What needs to be tackled before the HL era?

Viabile spares in the long-term

We should extend our vision till LS4

- Budget, storage, manpower
- Information, database etc.
- Tracing, reporting, appropriate stock, obsolescence
- Anticipate long procurement delays
- Lead-times for in-house manufacture
- Material for preventive maintenance

Aims of the day 1/3

- Review the needs of systems and equipment consolidation that would be necessary in order to have an LHC meeting the requirements for a successful upgrade.
- Identify possible LHC
 - non-conformities
 - obsolescence
 - lack of spares

that are not critical for the ongoing LHC exploitation program, but would become important for the HL-LHC.

Aim of the day 2/3

- The limitations to be discussed **should not** be the ones that the present HL-LHC project is tackling in its program.
- The focus shall be on the issues that would be still present after the successful completion of the HL-LHC project, and of the CONSOLIDATION actions approved until 2023.
- The target is to guarantee the successful and efficient operation of the machine at least until 2029 (LS4) with Run 4 in HL-LHC regime.

Aim of the day 3/3

- It is important to identify the possible activities that shall be included because they could have direct impact on
 - CERN budget allocation
 - Resources allocation
 - LS3 detailed planning via the resource allocation or the tunnel coactivity or sequencing

See today as start of a process to ensure a coherent strategy over the coming years

Today - format

<https://indico.cern.ch/event/662417/>

- Today time-wise:
 - First part of the morning BE
 - Second part of the morning EN
 - Afternoon TE
- Everyone is welcome to participate to the full day or partially according to his interests and duties!
- Today the focus is on machine and some support equipment strictly linked to machine system installation
- (A second day could be organized with the focus on infrastructure.)
- Decisions, on any proposed new items, will not be taken today, but we will try to collect all information required to do so in the near future.