

The background of the slide is a complex, abstract network diagram. It consists of numerous nodes, represented by small circles of varying sizes and colors (white, grey, blue), interconnected by a dense web of thin, grey lines. Some lines are thicker and more prominent, creating a sense of depth and connectivity. The overall aesthetic is technical and futuristic, typical of data center or network infrastructure visualizations.

CERN openlab Workshop on Data Center Technologies and Infrastructures

Welcome and Introduction

Maria Girone
CERN openlab CTO



Towards CERN openlab VI

CERN openlab V Research Areas



Data acquisition and filtering
Collecting data



Networks and connectivity
Connecting resources



Data storage architectures
Storing and serving data



Compute management and provisioning (cloud)
Managing resources for processing



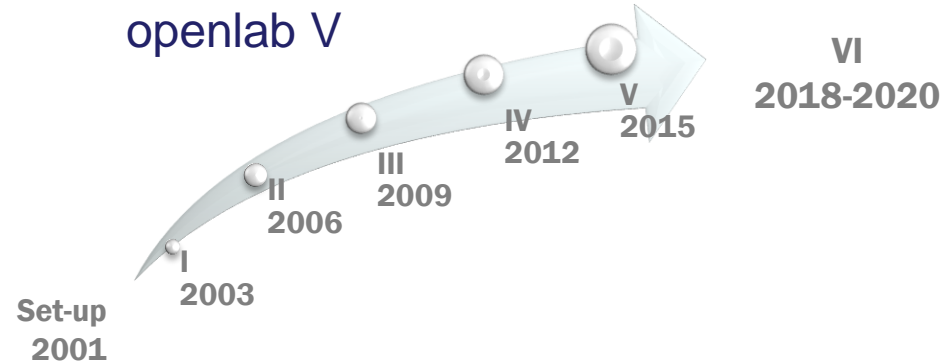
Computing platforms, data analysis, simulation
Improving processing and code efficiency



Data analytics
Extracting information

Medical applications

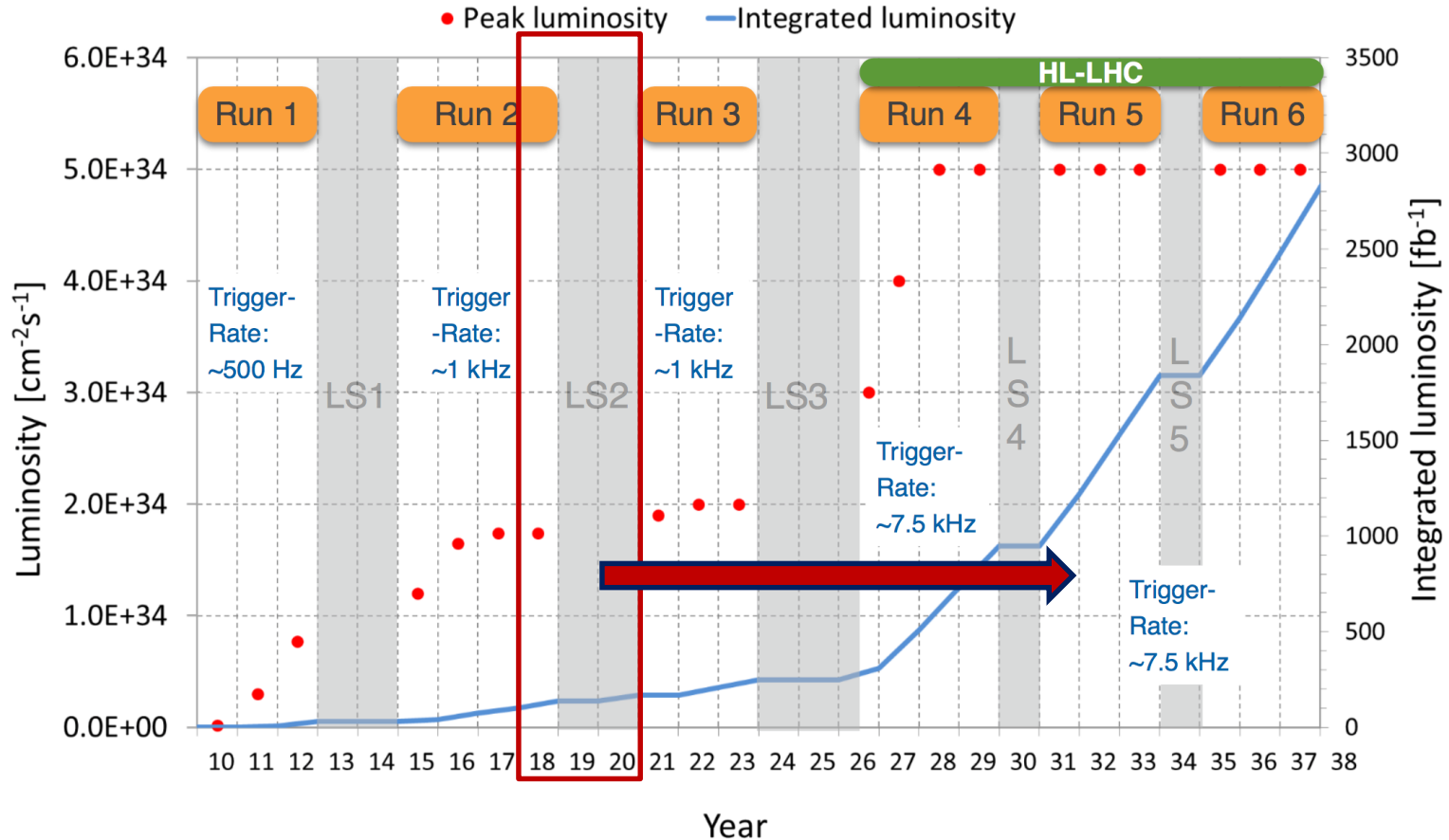
- We are at Q1 of year 3 of CERN openlab V



- This year is key for the preparation of phase VI
 - engaging the community to gather requirements and needs for Run3 and Run4
 - Identify with industry and research partners use cases and challenges of mutual benefit

The Big Picture – The LHC Schedule

CERN



LHC Run3 and Run4 Scale and Challenges

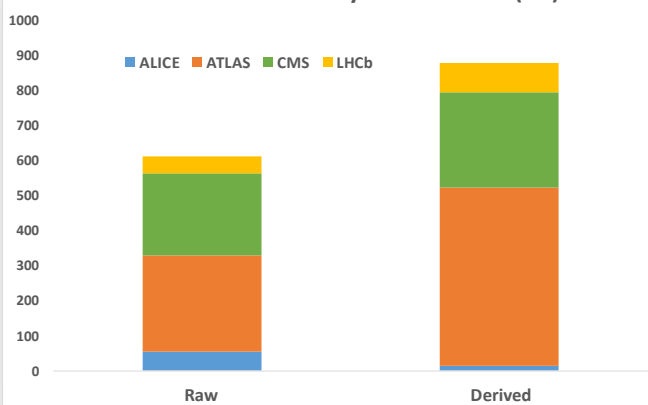


Raw data volume for LHC increases exponentially and with it processing and analysis load

Technology at ~20%/year will bring x6-10 in 10-11 years

Estimates of resource needs at HL-LHC x10 above what is realistic to expect from technology with reasonably constant cost

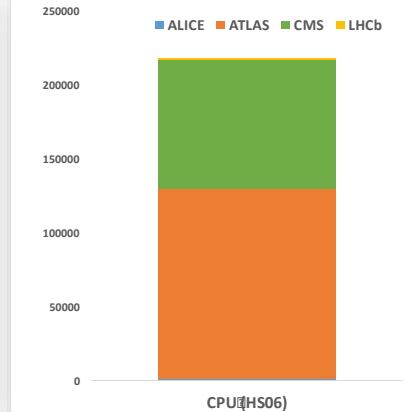
Data estimates for 1st year of HL-LHC (PB)



Data:

- Raw 2016: 50 PB → 2027: 600 PB
- Derived (1 copy): 2016: 80 PB → 2027: 900 PB

CPU Needs for 1st year of HL-LHC (kHS06)



CPU:

- x6 from 2016

Technology revolutions are needed

Courtesy of I. Bird

Three Broad Areas of R&D

- **Data Center Technologies and Infrastructures**

- › Networks
- › Cloud Computing
- › Storage and databases
- › Data Center Architectures (disaggregation)

- **Computing Platforms and Software**

- › Architectures
- › Software modernization/acceleration

- **Data Analytics and Machine Learning**

- › Physics
- › Engineering (Control systems, infrastructure optimization)
- › Great interest from other communities

Three Topical Workshops

- Data Center Technologies and Infrastructures: **March 1st**
- Computing Platforms and Software: **March 23rd**
- Data Analytics and Machine Learning: **April 27th**

■ **Whitepaper on Computing Challenges, September 2017**

■ Q4 2017: renewal of FA and finalization of projects

■ Jan 2018: start of Phase VI

5 Brainstorming Sessions

Data Center Technologies	9:15-10:30
Coffee Break	10:30 – 11:00
Storage Technologies	11:00-12:00
Lunch Break	12:00 – 13:00
Clouds	13:00-14:00
Databases 14:00-15:00	Networks 14:00-15:00
Coffee Break	15:00 – 15:30
Reports from the brainstorming sessions 15:30-16:30	

Today's Agenda

Goals

- Collect requirements and needs from the community towards HL-LHC
- Discuss innovative technologies and challenges from industry
- At the end of the day, discuss and pin-down some possible use cases for phase VI projects