

IRIS-HEP Blueprint: Concepts and Process

*AS/SSL Blueprint Meeting
June 21-22, 2019*

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NYU



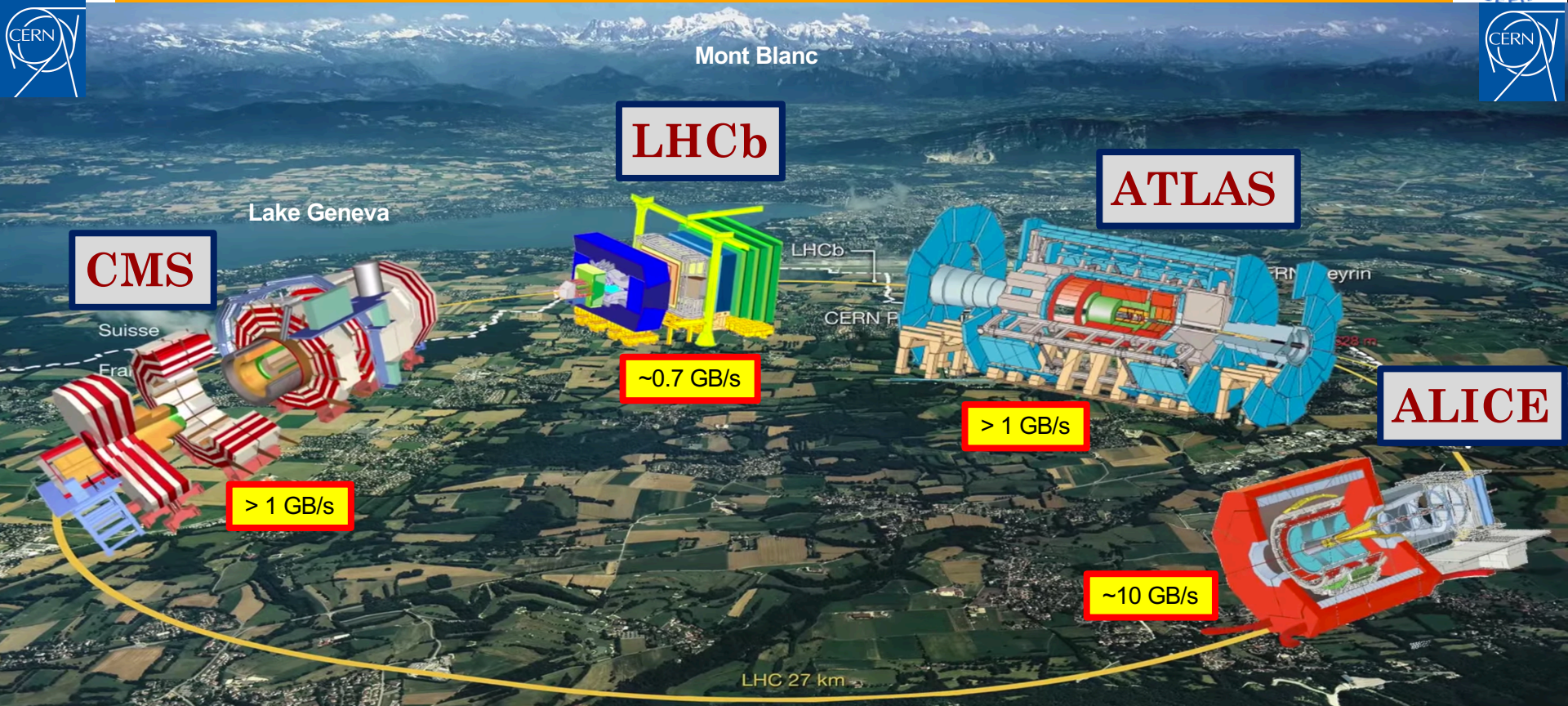
The Pursuit of Particle Physics

To understand the the **Universe** at its most **fundamental** level

Primary questions: What are the

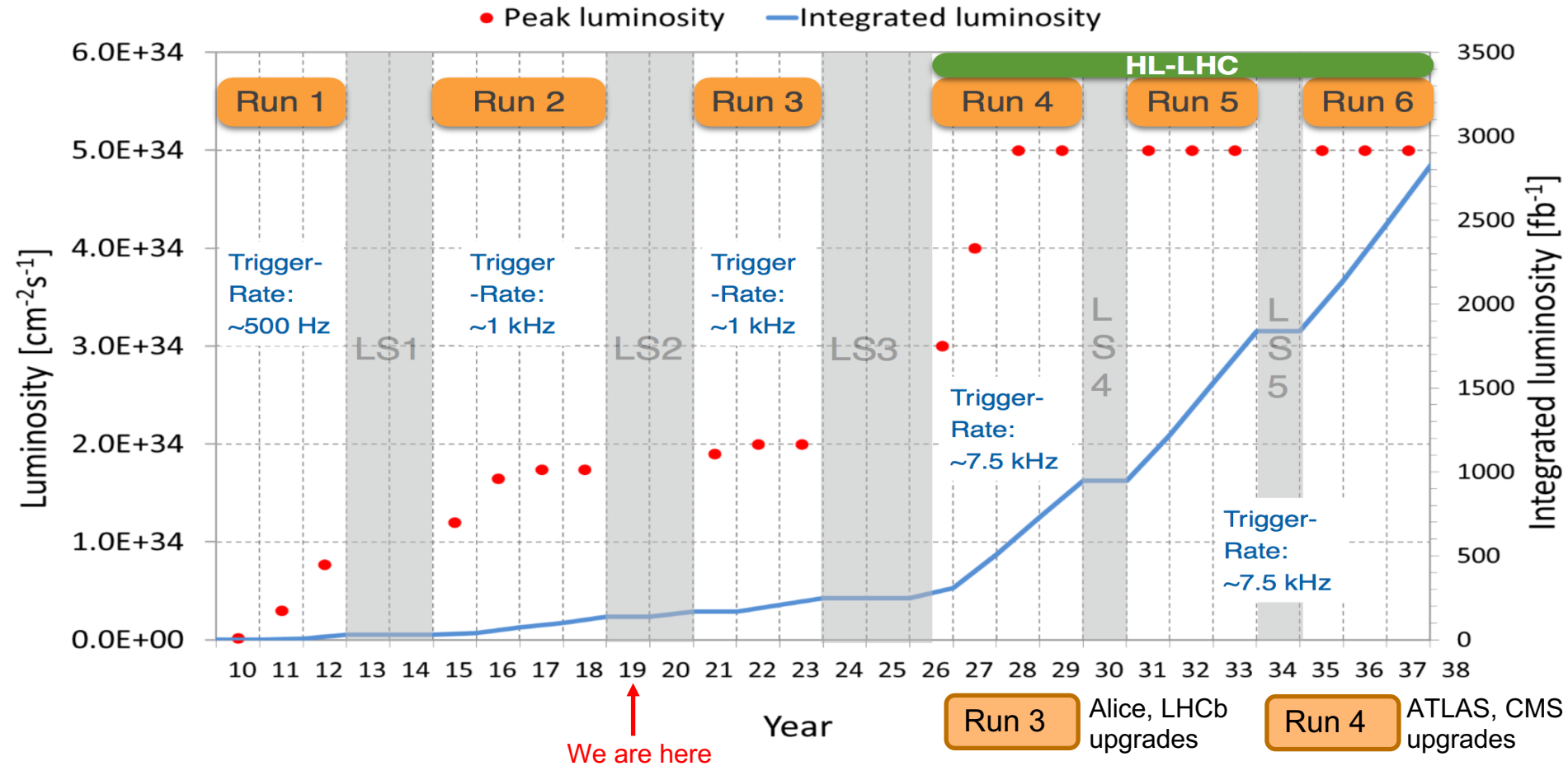
- **elementary constituents** of matter?
- **forces** that dictate their **behavior**?

LHC Experiments



LHC Experiments generate 50 PB/year of science data (during Run 2)

LHC Schedule





LHC as Exascale Science

NSA ~YB?

Google
Internet archive
~15 EB

LHC – 2016
50 PB raw data

LHC Science
data
~200 PB

Google
searches
98 PB

Facebook
uploads
180 PB

SKA Phase 1 –
2023
~300 PB/year
science data

Yearly data volumes

SKA Phase 2 – mid-2020's
~1 EB science data

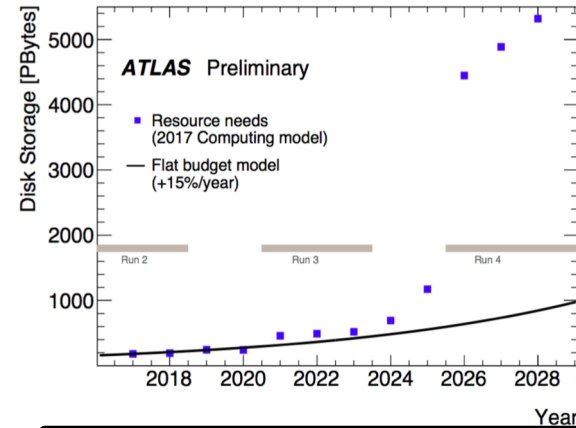
HL-LHC – 2026
~600 PB Raw data

HL-LHC – 2026
~1 EB science data

40 million of these →

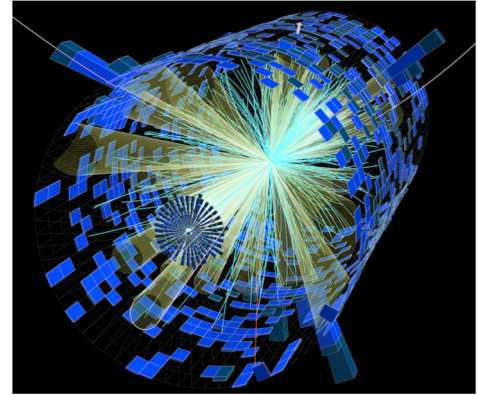


Computational and Data Science Challenges of the High Luminosity Large Hadron Collider (HL-LHC) and other HEP experiments in the 2020s



The HL-LHC will produce exabytes of science data per year, with increased complexity: an average of 200 overlapping proton-proton collisions per event.

During the HL-LHC era, the ATLAS and CMS experiments will record ~10 times as much data from ~100 times as many collisions as were used to discover the Higgs boson (and at twice the energy).



→ *Institute for Research and Innovation in Software for High-Energy Physics* (IRIS-HEP)

IRIS-HEP resulted from a 2-year community-wide effort involving 18 workshops and 8 position papers, most notably a [Community White Paper](#) and [Strategic Plan](#). IRIS-HEP starting in Sept 2018.

The Blueprint Activity

- It was recognized early in the community process of developing IRIS-HEP that its success depends on an informed evolution of its activities, direction, and (possibly) structure
- It was suggested to formalize this into a **Blueprint Activity** that was written into the Strategic Plan submitted to the NSF



Strategic Plan for a Scientific Software Innovation Institute (S^2I^2) for High Energy Physics

Peter Elmer (Princeton University)
Mark Neubauer (University of Illinois at Urbana-Champaign)
Michael D. Sokoloff (University of Cincinnati)

April 6, 2018

9 Building Partnerships

9.1 Partners

9.2 The Blueprint Process .

The Blueprint Activity

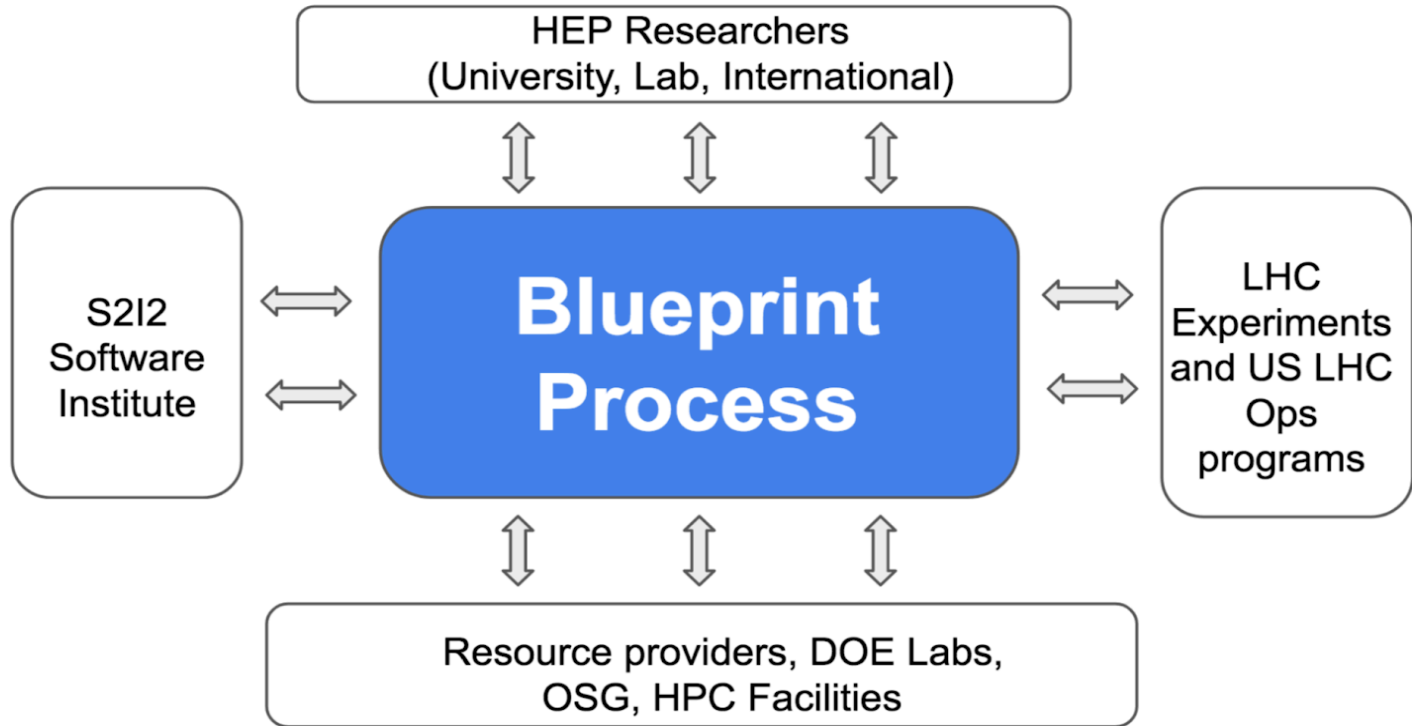
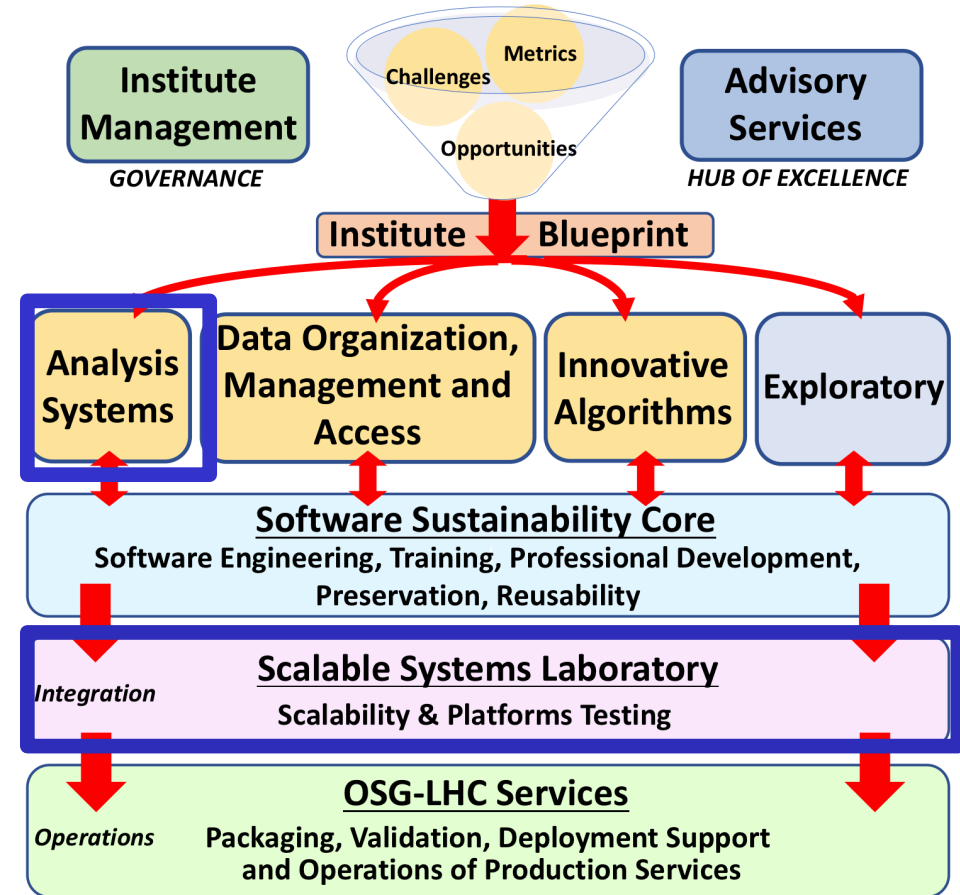


Figure 10: The Blueprint Process will be a primary means of developing a common vision with the major partners.

The Blueprint Process

- The Blueprint workshops are used to inform the development and evolution of the IRIS-HEP strategic vision
- At present, two Blueprint workshops have been scheduled:
 - [Analysis Systems R&D on Scalable Platforms](#) (June 21-22 at NYU)
 - [Accelerated Machine Learning and Inference](#) (Sept 10-11 at Fermilab)
- In (early) planning stages (contact me if you have more ideas!)
 - *HL-LHC S&C Alignment & Coherence, Software Training*
 - *Education & Workforce Development*
 - *Strengthening Connections between Theory & Experiment*
 - *Analysis Systems & Software Ecosystem*
 - *Intelligent & Accelerated Big Data Delivery*
 - *Analysis Preservation & Open Access Data*

This Blueprint Workshop



This workshop is designed to further develop the

- 1) SSL concept & planning
- 2) requirements on SSL to support the Analysis Systems area activities, in particular the prototyping, benchmarking and scaling of AS deliverables toward deployment to facilitate (HL)-LHC data analysis

Plug for an important (& related) meeting

- The HSF Data Analysis Working Group (DAWG) is organizing a meeting on July 22, 2019 (14.00-17.00 CERN time) to discuss paradigms for analysis hardware, ideas for future analysis facilities and experience with different platforms
- Also, a pre-CHEP workshop will be held on this topic in a joint WLCG-DOMA-HSF/DAWG session (official announcement will appear soon in CHEP bulletin)
 - The DAWG Conveners would like to start collecting input and discussing ideas from an analysts perspective
- Visit [here](#) (and join the Google Group) for more information