# Collaboration with industry in the future upgrades of computing infrastructure and services at CERN

Eric Bonfillou
IT Department – Computing Facilities Group

Fatima Najeh
IPT Department - Procurement and Industrial Services Group

# Agenda

Overview of CERN IT data centers

LHC Schedule

Procurement
- Market surveys
- Tendering cycle

Upgrades of computing infrastructure
- Upcoming tenders
- Technical configurations

Conclusion

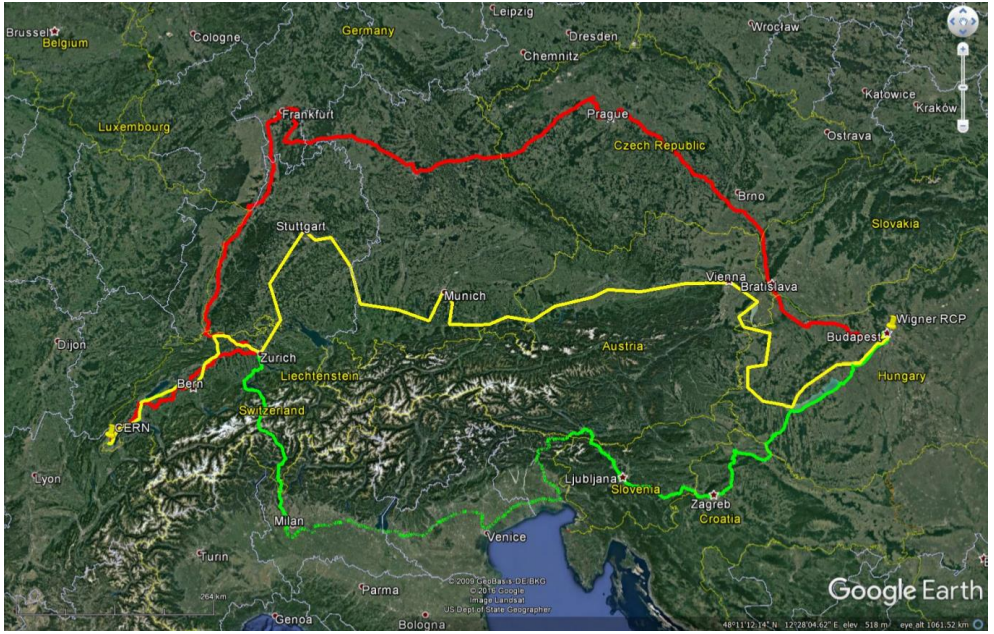
# Overview of CERN IT data centers (1)

IT department operates two data centers, one in Meyrin (Switzerland) and one in Wigner (Hungary)

The two sites are connected together via three redundant 100GbE links

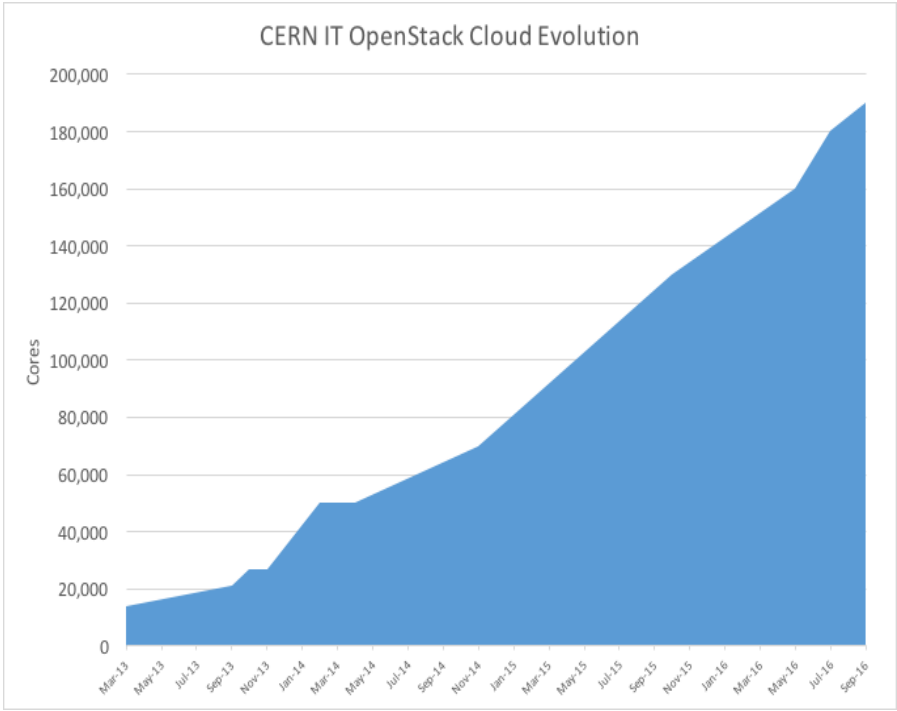
Computing equipment is homogeneous between the two sites

Wigner can be considered as an extension of the Meyrin site, also allowing to ensure business continuity

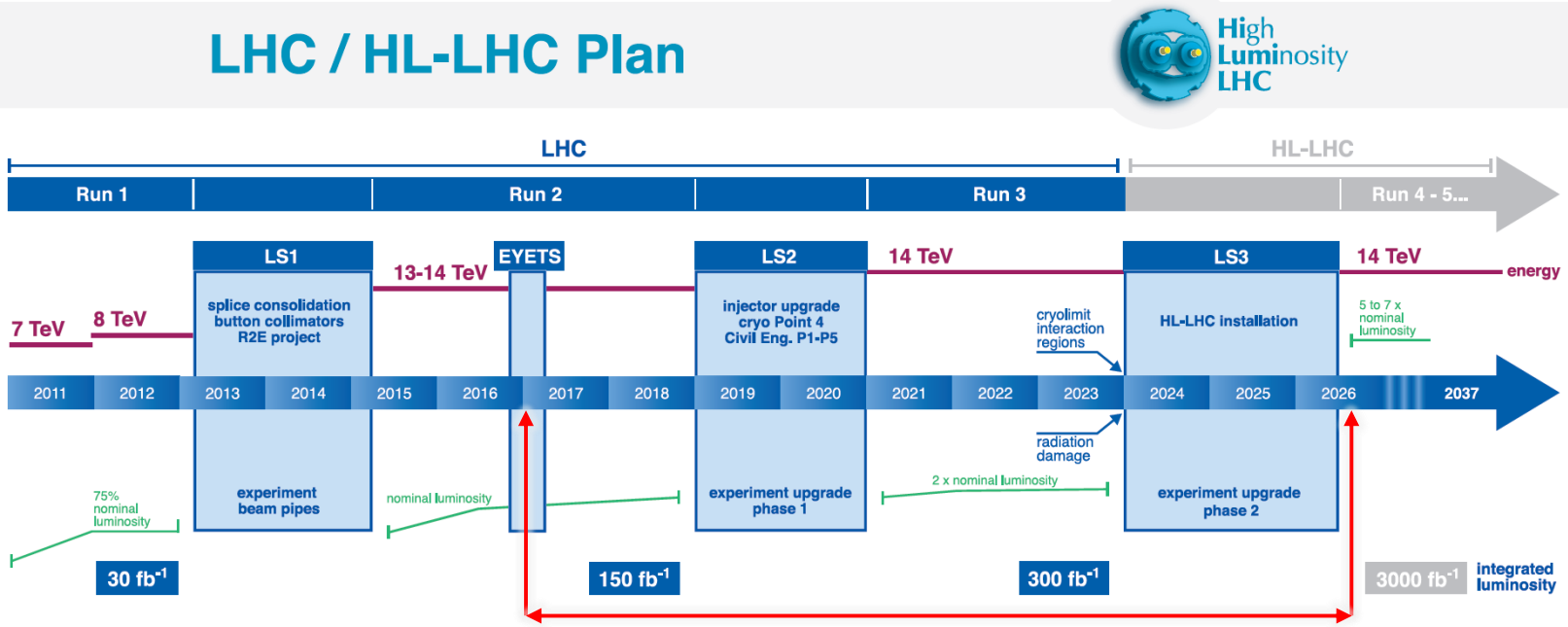


# Overview of CERN IT data centers (2)

- CERN Meyrin
  - 3.8 MW
  - 11000 servers, 1600 JBODs
- Wigner, Budapest
  - Co-loc contract →ends 31/12/2019
  - 2.5MW
  - 4000 servers, 900 JBODs
- **Combined**
  - 15,000 servers
  - Openstack ~280 kcores
  - Storage:
    - Disk Buffer 330PB
    - Tape 330 PB



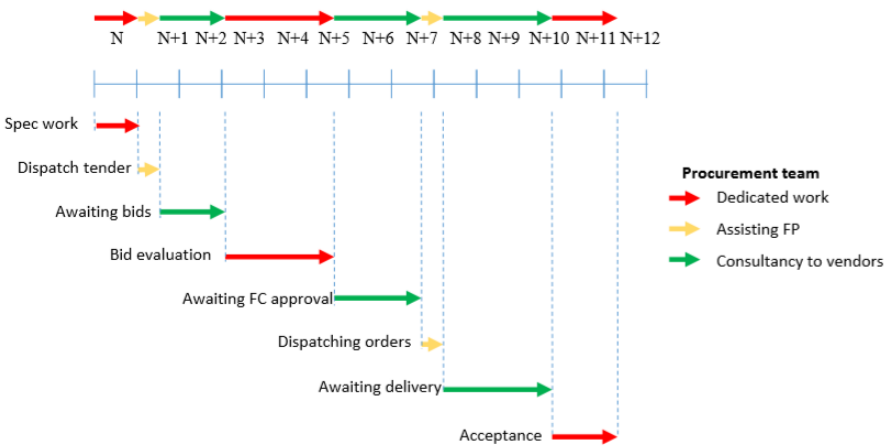
# LHC schedule and IT computing needs

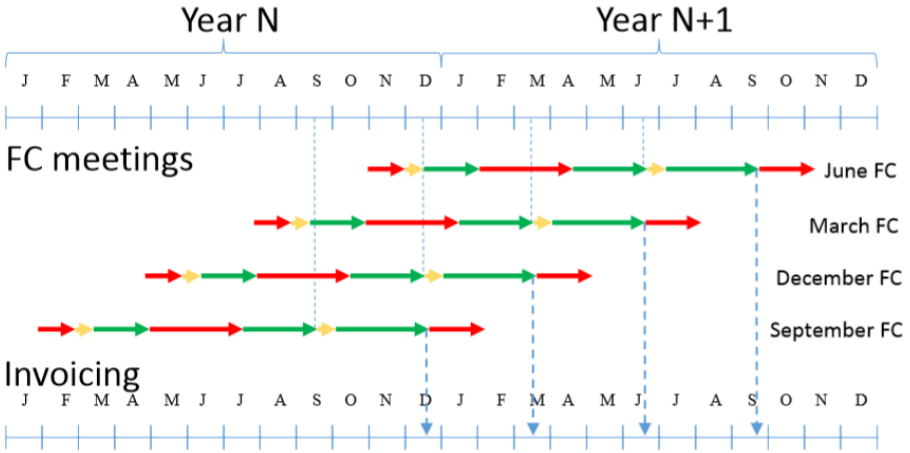



IT Challenges: 60x CPU and 10x storage (flat or decreasing budget)

# Procurement – Market Surveys

# Procurement – Tendering cycle



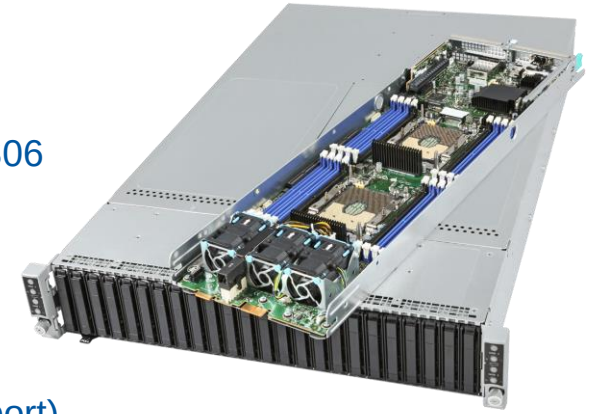
# Upgrade of computing infrastructure – Upcoming tenders

- From now, several tenders from the main physics experiments
  - Upgrade of their on-line facilities (including infrastructure)
  - First deliveries towards the end of the year, beginning of January 2020

- In January 2020, two large tenders for IT, Beams and the physics experiments
  - One tender for off-line server nodes, size > 1MHS06 (see next slide)
  - One tender for IT storage, size > 100PB
  - First deliveries in Q4 2020 (IT, Beams), remaining deliveries in Q1 2021 (physics experiments)

# Upgrade of computing infrastructure – Technical configurations (1)

- Compute nodes:
  - At least two system units per rack unit (U)
  - Per system unit:
    - 2x x86_64 sockets providing a total of a few hundreds of HS06 (https://w3.hepix.org/benchmarking.html)
    - At least 3GiB of RAM per processing unit (SMT core)
    - At least 1x 1TB/2TB of enterprise flash storage
    - At least 1x 10GbE or 1x 25GbE
    - 1x dedicated management interface (providing Redfish support)
    - 1x SAS 12Gbit/s HBA with 4x SFF-8644 ports



# Upgrade of computing infrastructure – Technical configurations (2)

- Storage arrays:
  - 4U – 24x bays SAS 12Gbit/s
  - Fully populated with enterprise drives (S-ATA or SAS)
  - Each drives with a capacity of at least 12TB
  - 4x arrays connected to one front-end server

- In the future, we might tender for different storage arrays:
  - 4U / 5U with 60 – 102+ bays SAS 12Gbit/s
  - Fully populated with enterprise drives (S-ATA or SAS)
  - Each drives with a capacity of at least 12TB
  - Arrays split in various SAS zones connected to different front-end servers

# Conclusion

- CERN requires significant compute resources to be in-line with the LHC schedule
- Companies must be qualified to our market surveys in order to be invited to subsequent calls for tender
- A new MS will be dispatched in November 2019 with subsequent calls for tender in Q1 2020
- We are looking forward to work with you!