Computational, Network and Storage Resources

Ron Fox, Jeromy Tompkins
NSCL Senior Physicist, NSCL Physicist

This material is based upon work supported by the U.S. Department of Energy Office of Science under Cooperative Agreement DE-SC0000661, the State of Michigan and Michigan State University. Michigan State University designs and establishes FRIB as a DOE Office of Science National User Facility in support of the mission of the Office of Nuclear Physics.

Outline

- The challenge of data processing at FRIB
- Preliminary requirements for FRIB experiments
- Discussion

The Basic Challenge

>100x increase in data volume per hit
(factor is detector dependent)

and

Increasing channel count

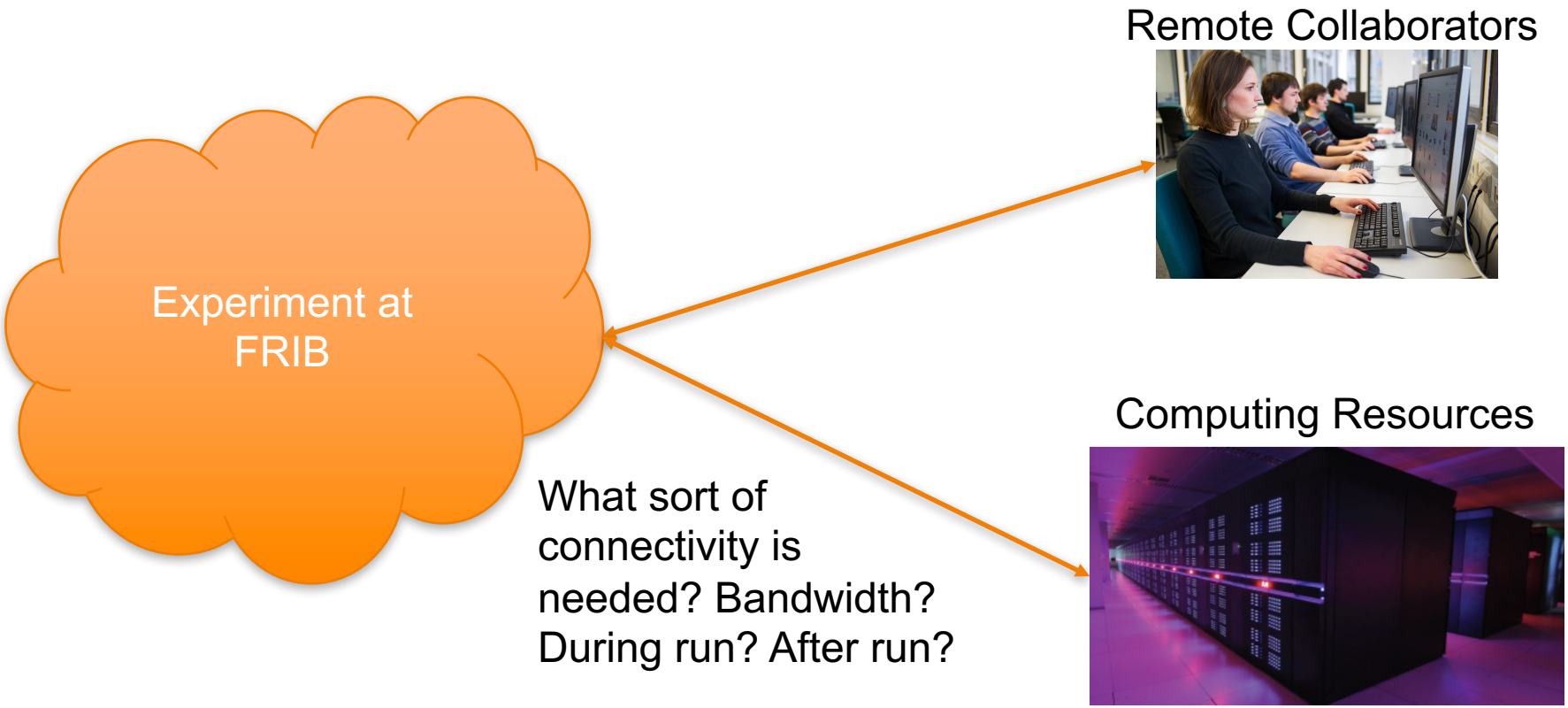
Greater than 100x increase in throughput

Implications

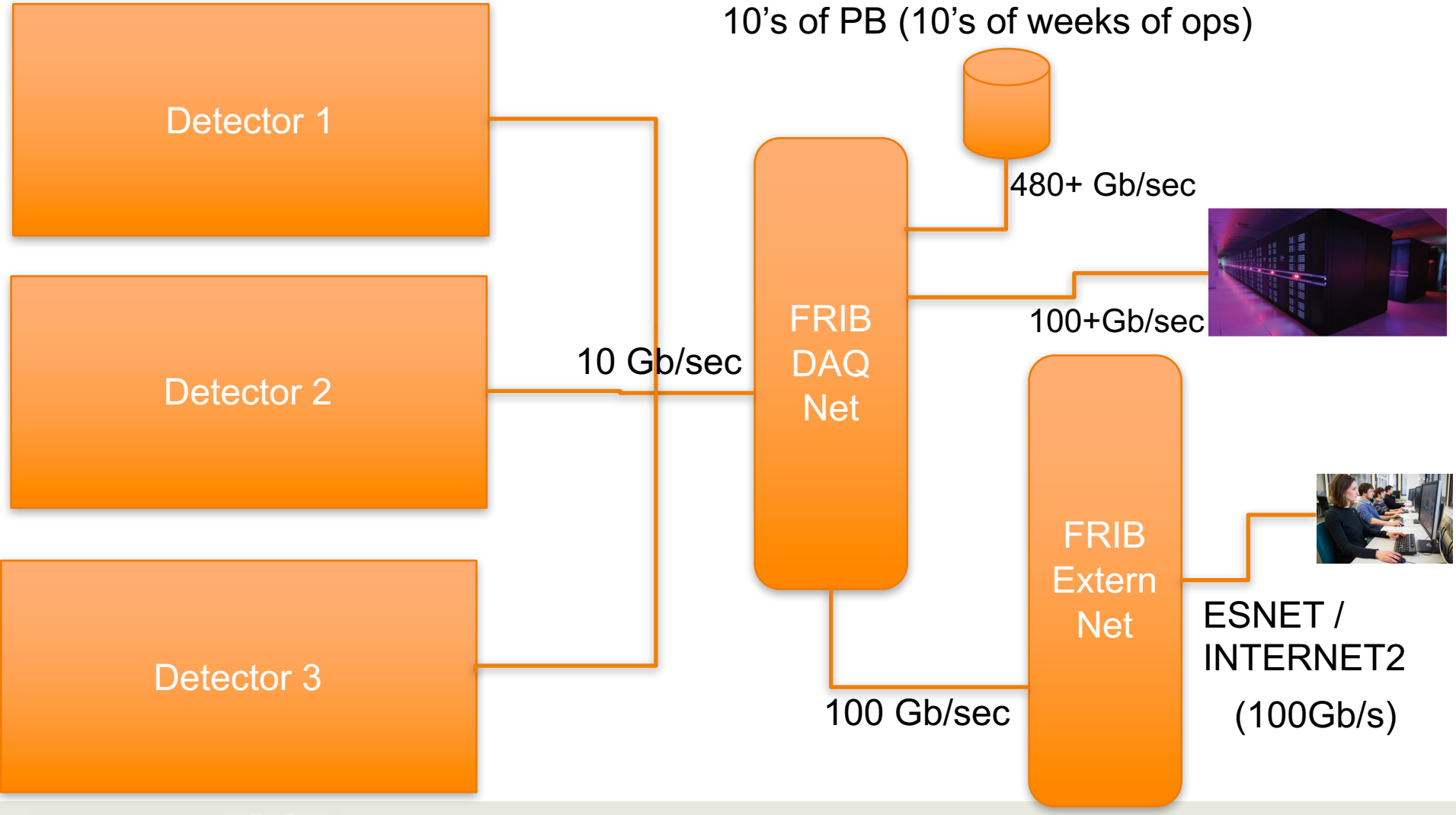
- Storage
  - Data footprint : 1TB/experiment → 100-500 TB/experiment
  - Peta-scale storage system?
  - Fulfilling data retention policies?
- Computing
  - Analysis in 1/10'th of the acquisition time needed for decisions during beam time
  - What does this imply for computing needs?
- Network Bandwidth
  - Acquisition throughput : 10 MB/sec → >1,000 MB/sec aggregate
  - But we also need to analyze simultaneously -> >10,000 MB/sec. lower limit.
  - Getting data offsite (ESNET? INTERNET2?) gives another >10,000MB/sec.

External Connectivity

- Data will likely be transferred to off-site computing resources during the experiment
  - Larger collaborations – not cost effective for all of the members to travel.
  - Diagnosis of problems by off-site detector experts
  - Greater processing power inside and/or outside the FRIB



Preliminary Specification



What We Need to Discuss

- Resources needed to make decisions during an experiment.
- Where the data goes during and after the run.
- How/what we make data available to on/off site collaborators during and after the run.

- Desired outcome: Gross specifications for FRIB computing/networking/storage to feedback to FRIB administration/planning

Backup Slides