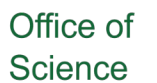


# Networking timeline questions

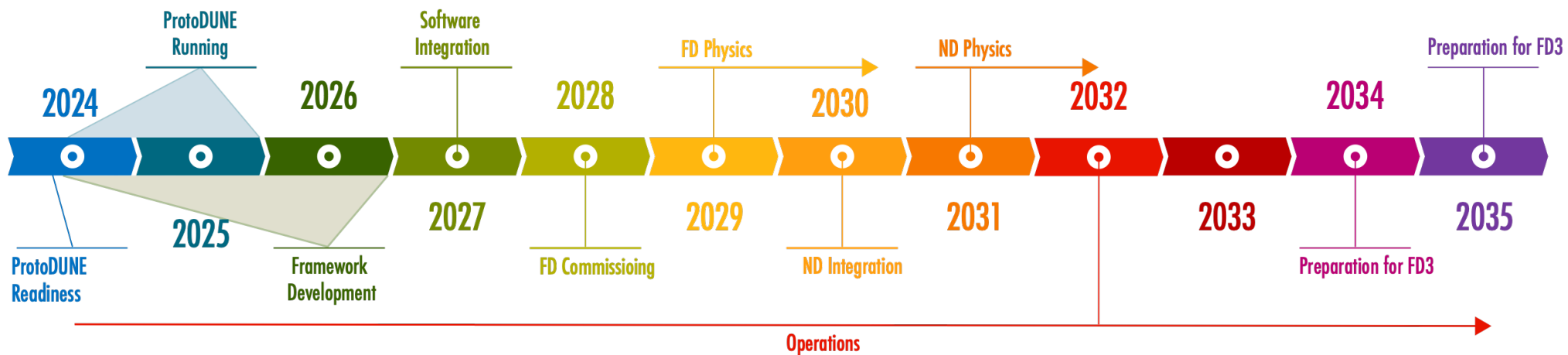
Heidi Schellman



# General timeline



## Computing Major Milestones



# Schedule as of July 2023

## Deep Underground Neutrino Experiment

**Sanford Underground  
Research Facility**  
Lead, South Dakota

Limited power budget in the cavern  
Limited rack space on the surface

**Fermi National  
Accelerator Laboratory**  
Batavia, Illinois

**SURF**

Data  
needs to  
get to  
Fermilab

**Fermilab**

32 km/20 miles  
1,300 kilometers/800 miles



# Important dates as of July 2023

- ProtoDUNE I test beam - late 2018 up to 16 Gb/s from CERN → FNAL
- Late 2021 - Testing workflows – ML ( FNAL → Google ) hit 100 Gb/sec
- 2021-2022 – Duplicate ~ 10 PB of reconstructed data/simulation copied to Europe
- Late 2021 Data analysis hits 20-40 MB/s/process streaming to compute sites
- Aug 2022 – Data Challenge - CERN—FNAL up to 40 Gb/sec
- ProtoDUNE II test beam – mid 2023 up to 40 Gbs /sec from CERN → FNAL
- DUNE DAQ commissioning 2027-2028 – 100 Gb/s SURF to FNAL
- First SURF module sensitive to supernova neutrinos 2029 – 160 TB of data in 100 sec
- 2 Modules + beam 2030-31 - full DUNE operations @ 30 PB/year ~ 100 Gb/sec
- Likely large rates into US/non-US HPC sites for fast reconstruction

DUNE FD WAN Bandwidth Timeline Projections:

Date	Stage of the experiment	Primary Path	Secondary Path	Tertiary Path
Now	Cavern excavation	10GE	< 1GE via SURF	none
2025	Detector construction	10GE	< 1GE via SURF	none
2027	Computing/DAQ deployment	100GE	10GE	< 1GE via SURF
2028	Cryo deployment completed	100GE	10Gb/s+	10GE
2029	Start of science	100GE	10Gb/s+	10GE

- vLAN service provided by REED/GPN (shared)
- Dedicated circuit Ross Dry Bldg. to Chicago
- Dedicated circuit Yates Complex to Denver (10GE or 100GE)

# How has this changed ?

## Questions about timing

- When is physics from the FD supposed to start? How far has it shifted
- When will there be a disk array available at SURF for testing?
- Do we need full network capability at start of DAQ commissioning?
- When can we test simultaneous DAQ/output from that array?
  - At 10 Gbs
  - At 100 Gbs
- When will there be a disk array at Fermilab capable of simultaneously
  - Sinking 100 Gbs from an SNB
  - Archiving 100 Gbs (or making a second copy) from a SNB
  - Distributing 100 Gbs to external processing a SNB
- How do we test that array?
  - Use BNL/LBNL/ANL as pseudo-SURF/processing centers?

We will not lose SNB data without this speed but not having the fast network/disk means delays in processing beyond the time-scale needed for optical pointing.

## FNAL endpoint timeline

- We need to have rigorously tested the data endpoint X months ahead of physics start
- What is the lead-time for actually getting such a system set up?
  - Specification
  - Procurement
  - Acquisition
  - Installation
  - Commissioning
  - Validation
  - Testing
  - ...
- Can do much of the testing with other endpoints

What about processing?  
How do we get algorithms in place?  
Where to we run them?

## Things to fill in for schedule

- Physics starts at time X with one module
- Need to do full rate from SURF ? year before physics
- Also do full rate with BNL? as source to test full chain 1-2 years before physics
- Need to do partial rate from ??? as source 3 years earlier
- When can we test against storage at SURF at 10 Gbs - does not need DAQ, but needs some disk in place.