DUNE Rucio Deployment and Issues

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For DUNE Data Management Group
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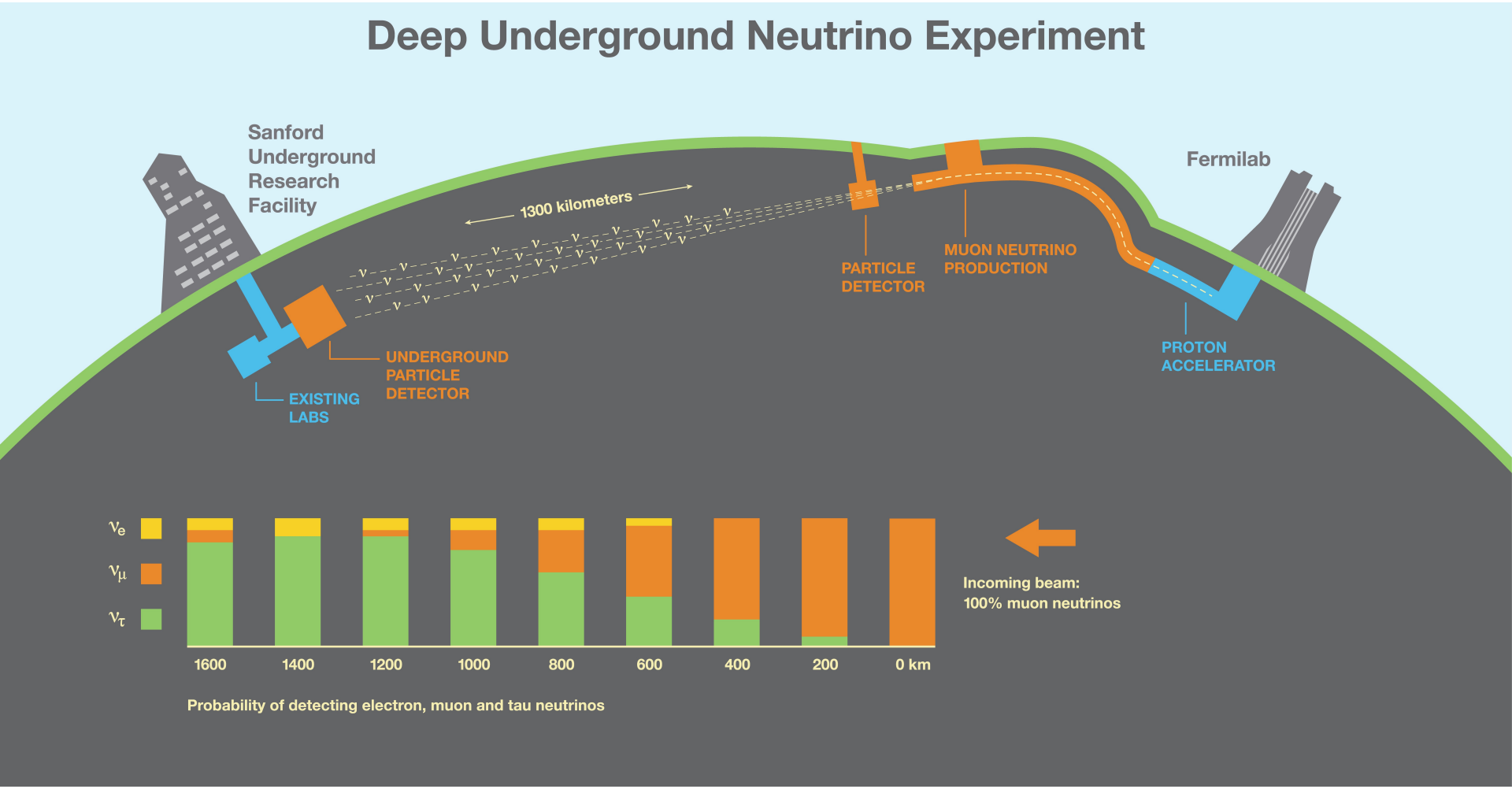
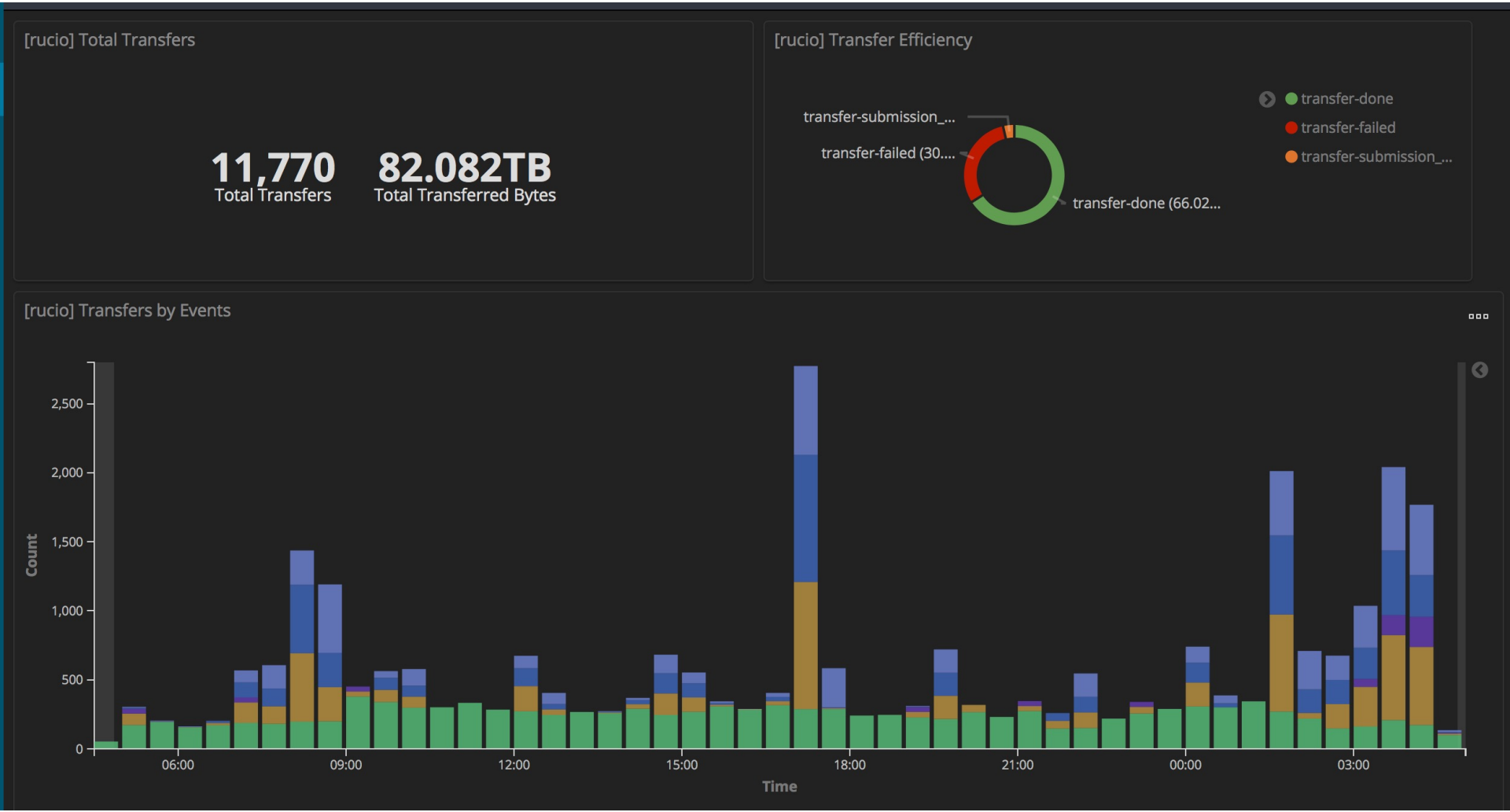

Deep Underground Neutrino Experiment
Sanford Underground Research Facility
1300 kilometers
Fermilab
PARTICLE DETECTOR
MUON NEUTRINO PRODUCTION
PROTON ACCELERATOR
UNDERGROUND PARTICLE DETECTOR
EXISTING LABS
ν_e
ν_μ
ν_τ
1600
1400
1200
1000
800
600
400
200
0 km
Incoming beam: 100% muon neutrinos
Probability of detecting electron, muon and tau neutrinos

DUNE Rucio Update

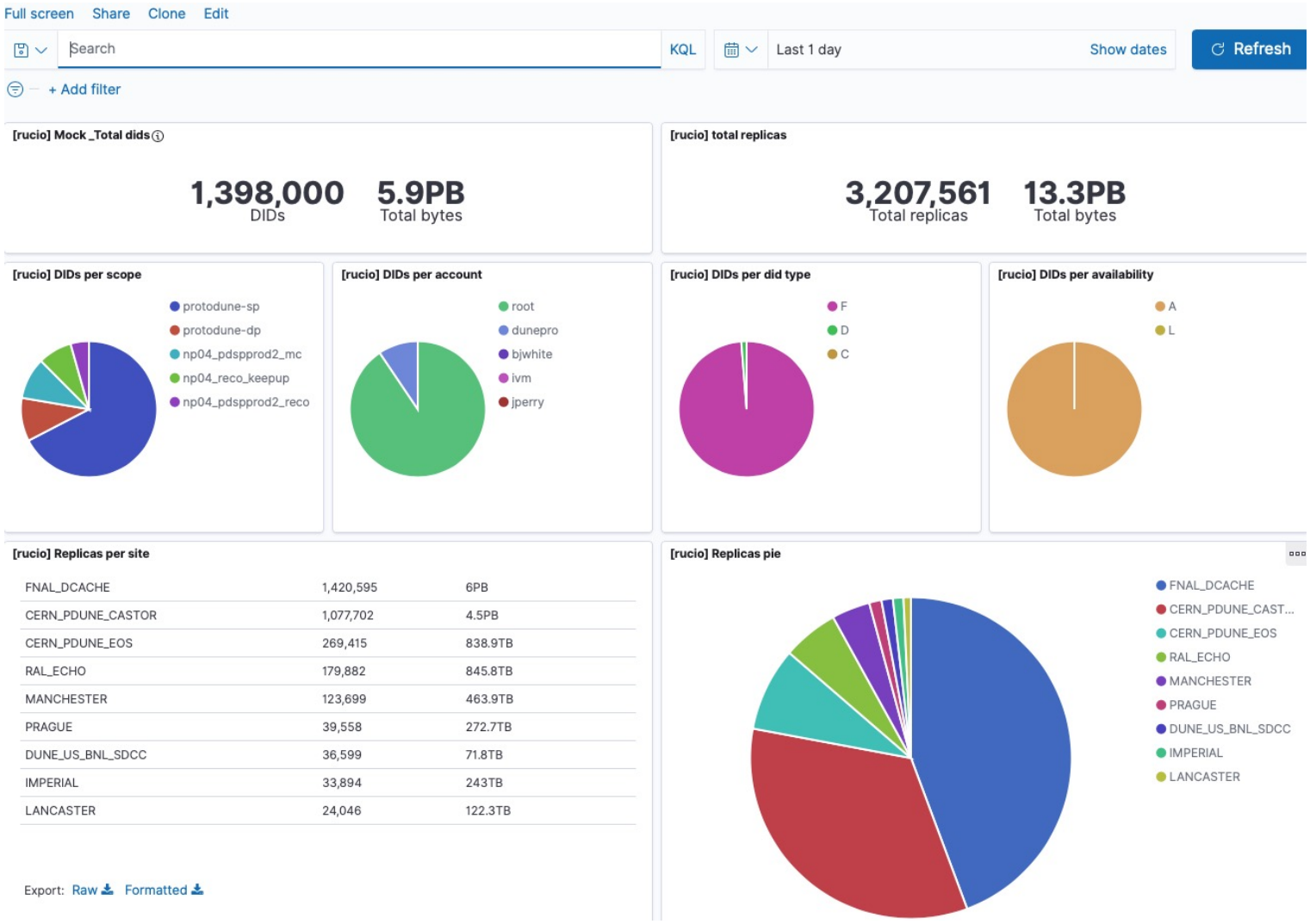
- As of the previous Rucio community workshop, March 2020, just before lockdown, DUNE was in the following situation:
  - 14 PB under Rucio management, 1190737 DID's, 2655705 replicas
  - 15 RSE's commissioned
- Much of the above data from ProtoDUNE @ CERN
- Electronics and coldbox testing now set to turn on @ CERN again this month, with ProtoDUNE beam data approx. 1 year from now.
- By the time ProtoDUNE II (a.k.a. "horizontal drift") takes beam it is our goal to be in a native all-Rucio data movement system.
- Have added lots of monitoring thanks to students working on project.

Monitoring: Transfers

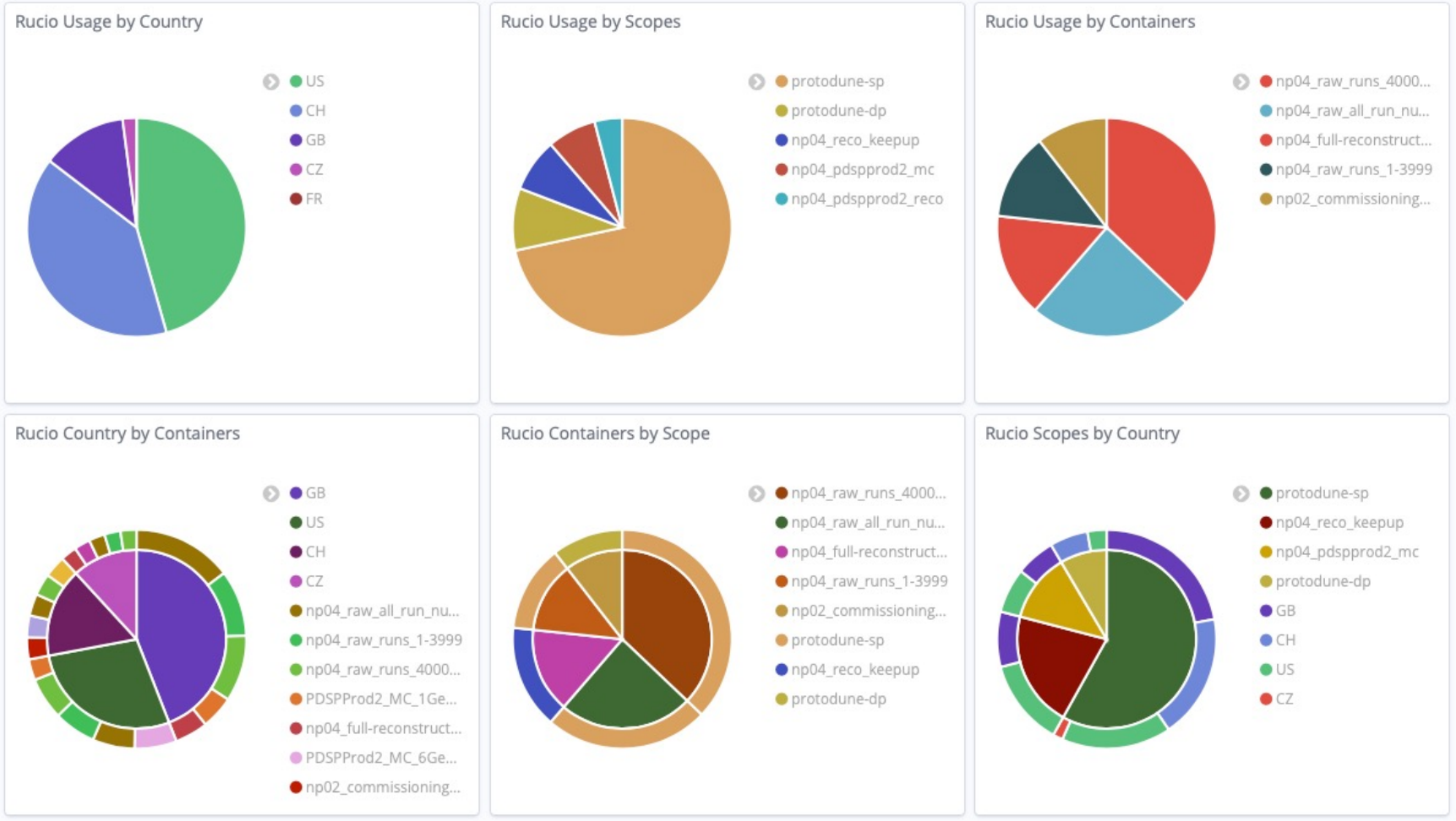
- Rucio Kibana Monitoring. Shows queued, failed, submitted, done.



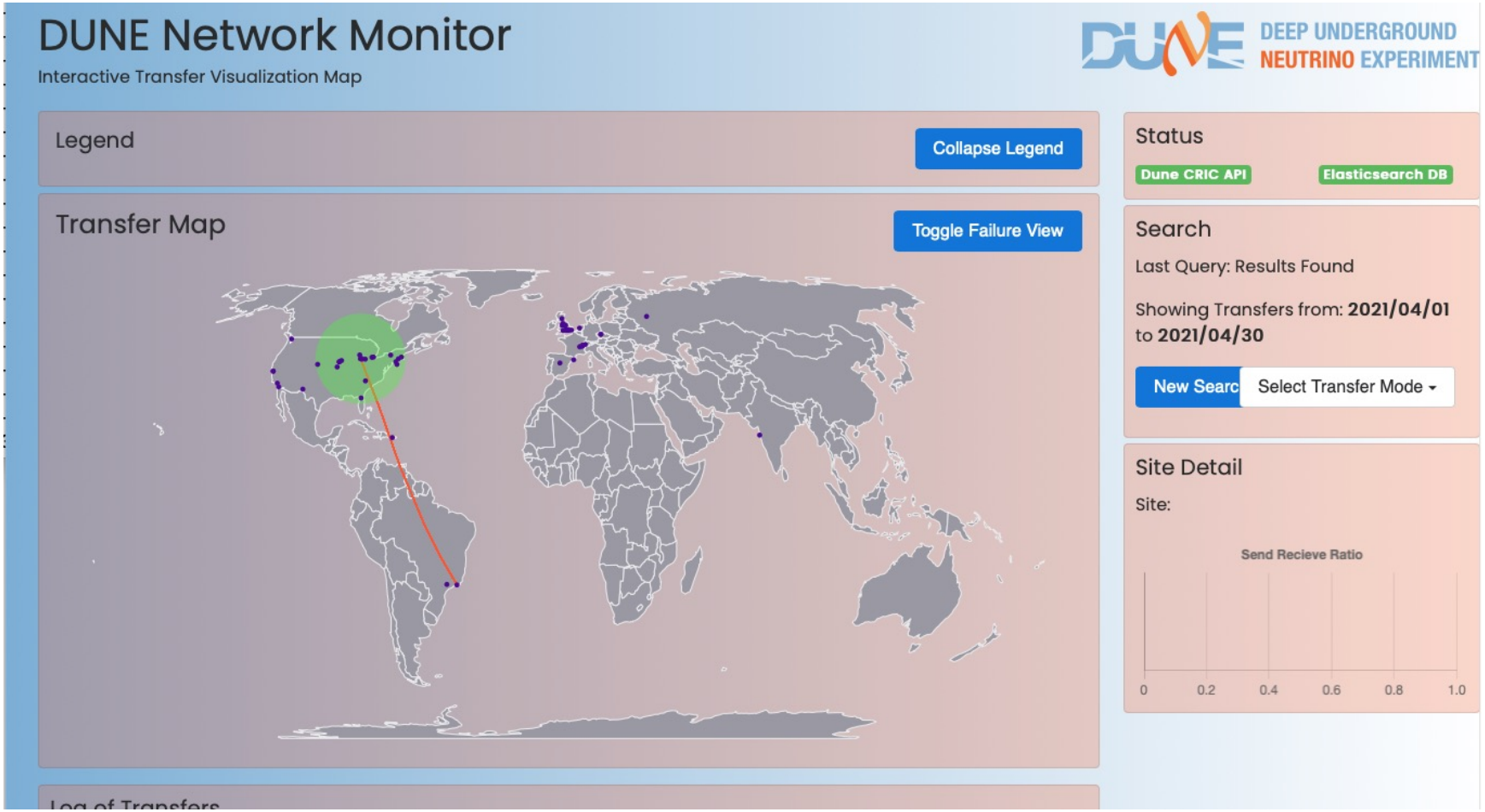
Rucio total monitoring



Rucio country/scope/container monitoring



Monitoring added:



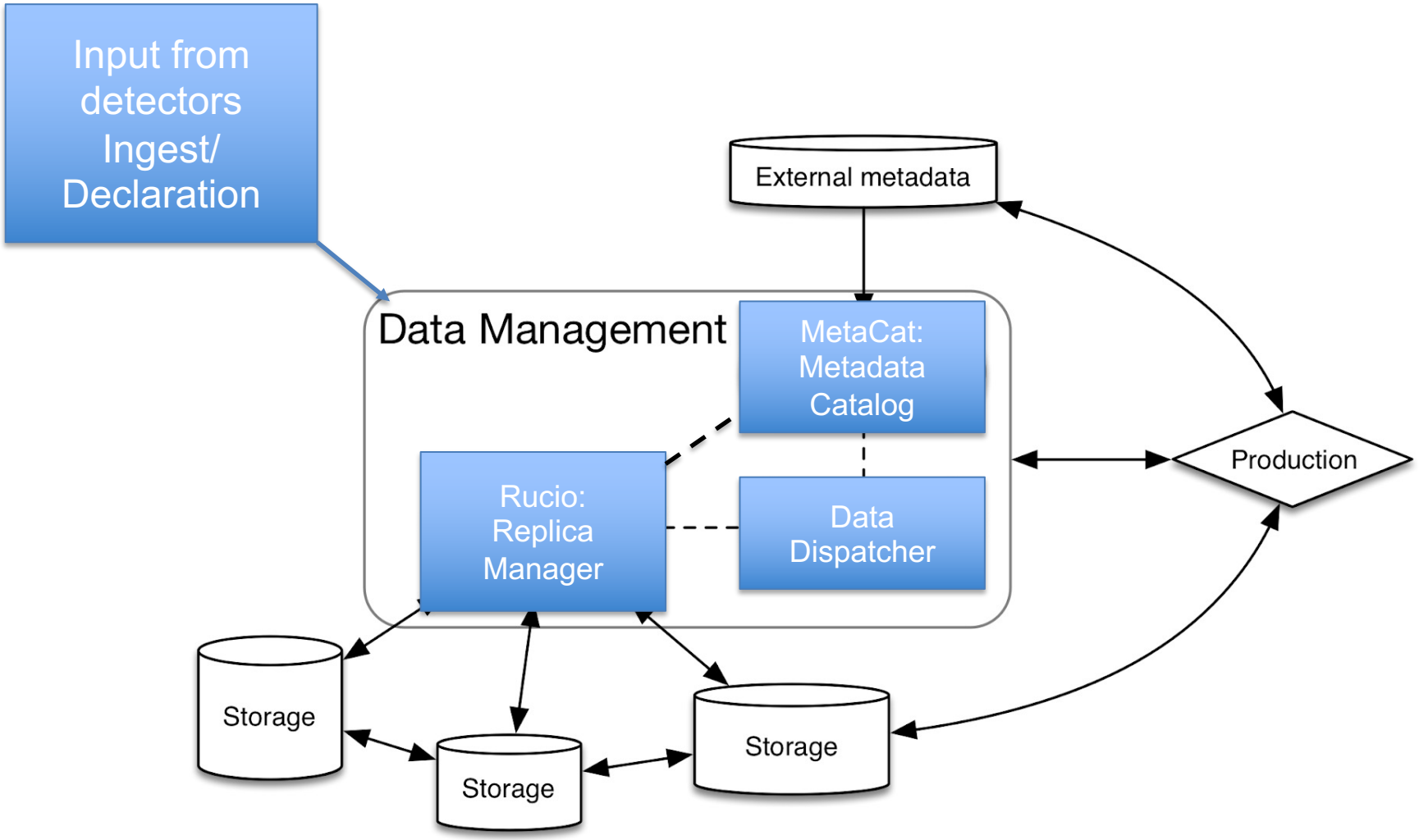
Challenges

- Fermilab runs OKD (Open Kubernetes Distribution) containerized platform
  - Open Source upstream product of RedHat OpenShift
  - Not the same as vanilla Kubernetes, Helm charts have to be modified.
- Made OKD-based containerized version be production early in 2021.
  - Version 1.22.x not stable in OKD. Lots of out of memory errors.
    - (10 file declares or a bunch of rucio list-parent-did enough to knock it over)
    - One nasty mode it falls over and then fails to restart
  - Hoping that 1.26.x does better.
  - If not, will request conventional non-containerized deployment.

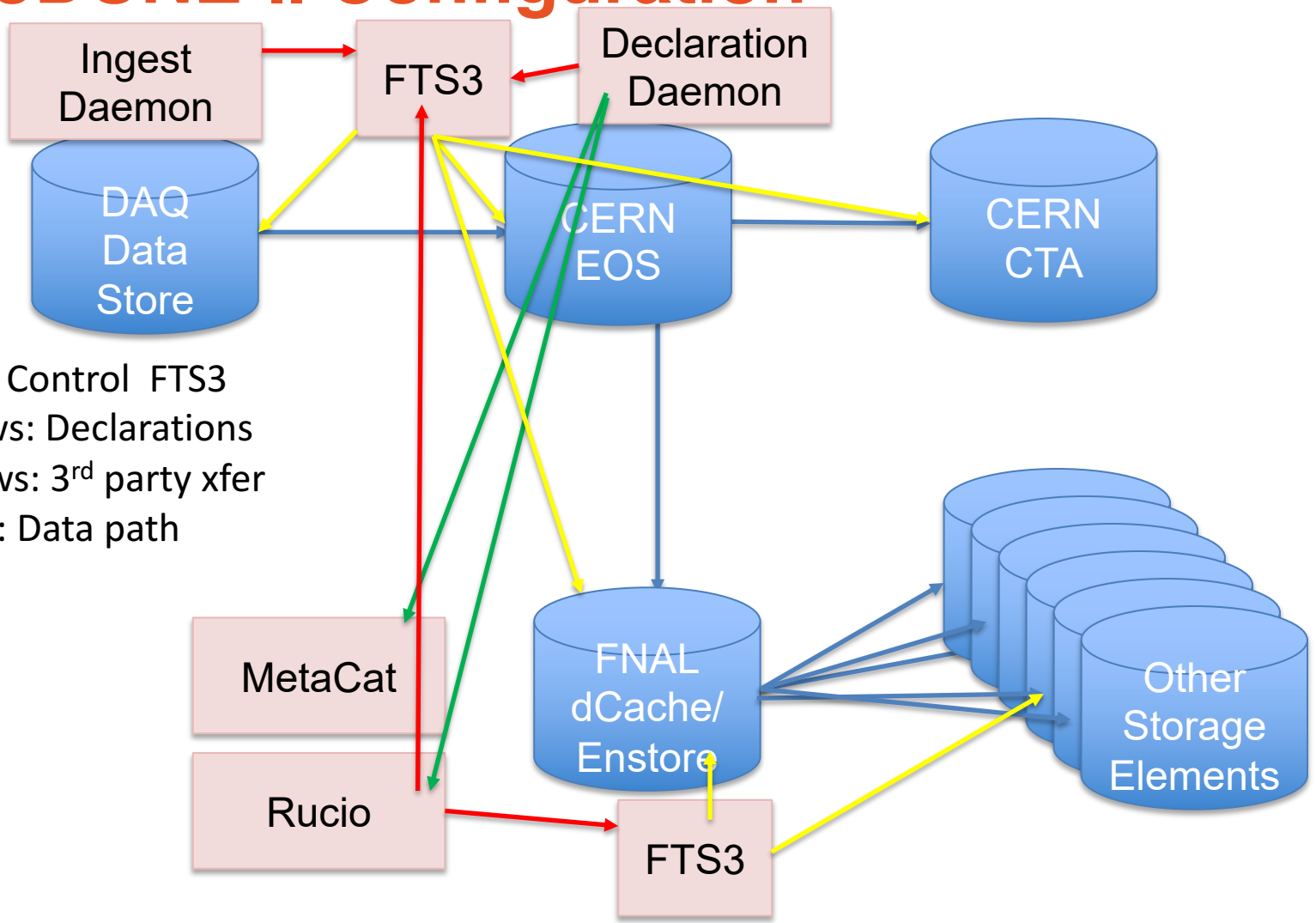
Features

- In progress:
  - Mapping to non-deterministic paths based on metadata
  - Lightweight Rucio client
  - Require file exist in external “MetaCat” metadata server before being declared to Rucio
- New: Quality of Service:
  - On combination disk/tape storage Element (Fermilab public dCache)
  - Need way to make a Rucio rule and have the file staged from tape to disk, or vice versa
  - Have heard this is being worked on for other experiments. Status?

DUNE Data Management System



ProtoDUNE-II Configuration



Status

- Getting all of our existing files to be known by Rucio is now on our critical path to deployment.
- Once that is done we still have a Data Dispatcher to write to be able to completely get rid of the SAM system at Fermilab.
- And a Data Ingest Daemon and a Data Declaration Daemon to run at the remote sites and initiate the Rucio / FTS3 transfers.
- And then do it all again with JWT Tokens.