

# DAQ for the ND

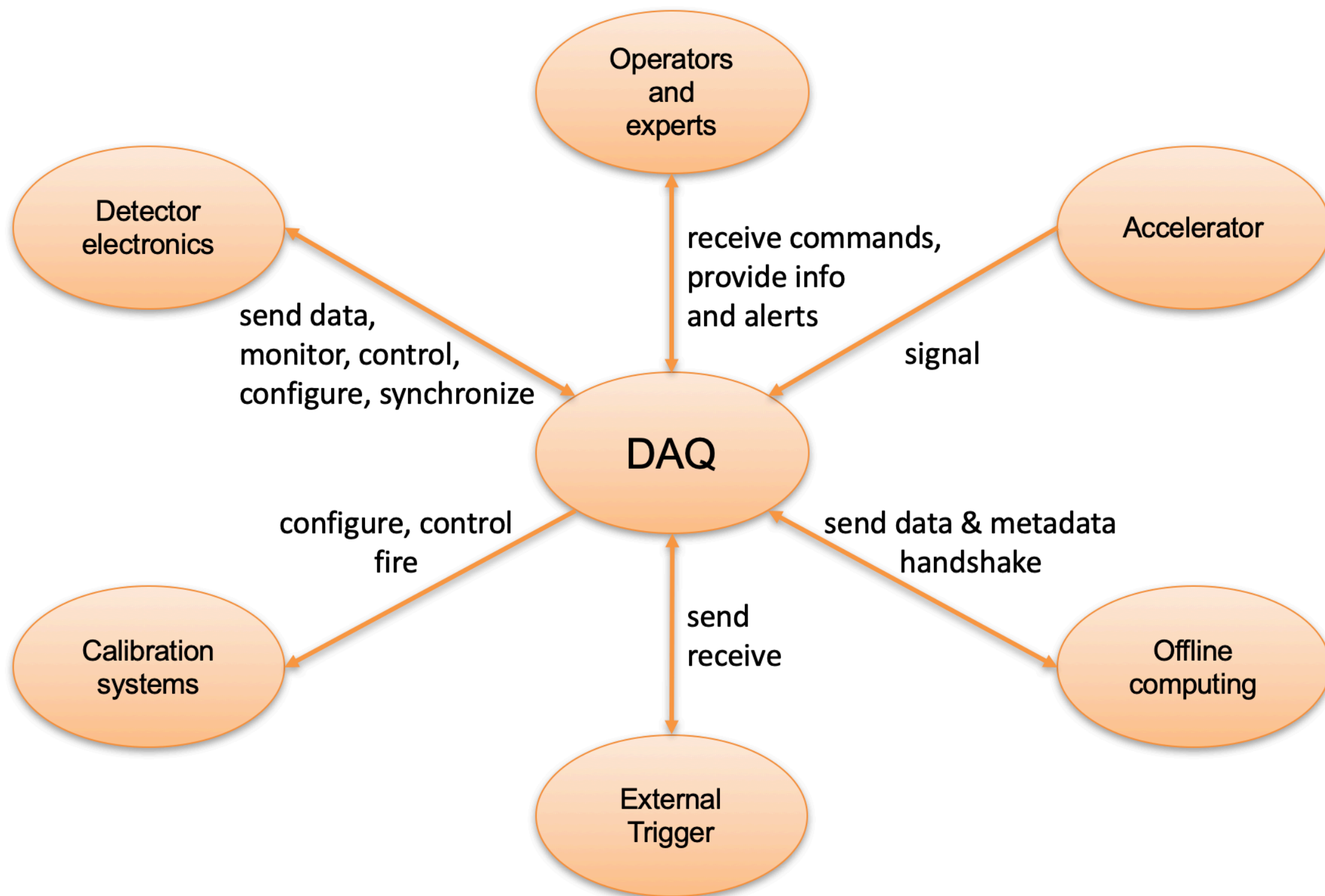
Asher Kaboth

23 Oct 2019

# Good News

This is a much less horrible  
problem than DUNE FD

(But this talk is more  
questions than answers!)



# Questions

- How unified should the DAQ be?
- What are the triggering modes?
- What are the data rates?
- What is the clock precision needed?
- What technology agreements needed between sub-detectors?
- What existing technology should we use/what new technology needs to be developed?

# DAQ Unification

## 1. Ar<sup>3</sup>+MPD+3DSTaK

- i. Maximize sharing opportunities
- ii. Maybe don't necessarily need unification with 3DSTaK—how much matching between Ar detectors is expected?

## 2. Ar<sup>3</sup>+MPD, 3DSTaK

- i. Potentially beneficial for PRISM
- ii. Technology divergence

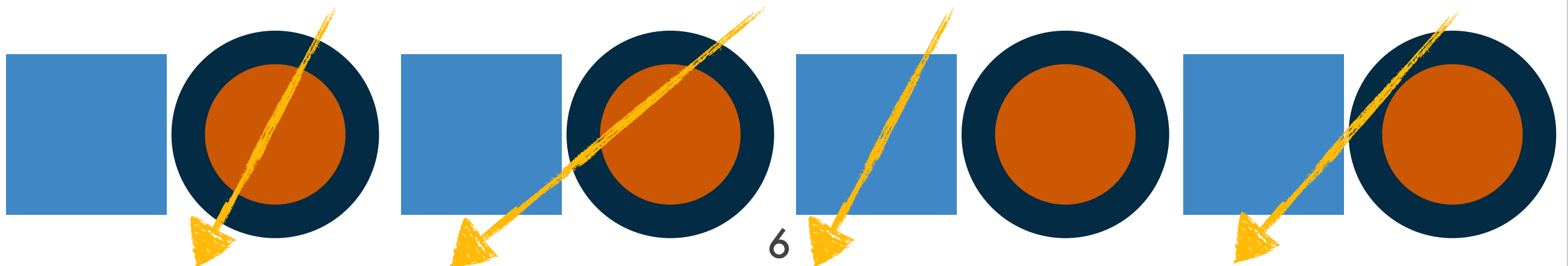
## 3. ~~Ar<sup>3</sup>, MPD, 3DSTaK~~

- i. This is probably dumb

**Middle way: All same technology but partitionable**

# Triggering Modes

- ◉ Beam—easy
- ◉ Controlled Calibration (e.g. light injection)—easy
- ◉ Untriggered—Ar<sup>3</sup> reads out literally everything
- ◉ Uncontrolled Calibration (e.g. cosmics)—harder
  - ◉ How much? What topologies?
  - ◉ How much buffer is needed?



# Data Rates

- ◉ Ar<sup>3</sup> has very low, but constant *rate* (zero suppressed!)  
—1.5 MB/spill (plus cosmics and Ar39 at 2.5 MB/s)
- ◉ Fast light system **not** zero suppressed—5 MB/spill
- ◉ HPTPC will likely be similar to Ar<sup>3</sup>
- ◉ ECal—dependent on final granularity
- ◉ 3DSTaK—0.12 MB/spill (Does not include low density and ECal)
- ◉ Final rates to be determined by final FEC designs and trigger choices

# Clock Precision

- What is the physics requirement for the clock precision?  $O(100\text{ ps})$ - $O(1\text{ ns})$
- Can all FECs handle this?



# Technology Agreements

- Need to agree on interfaces to *and* from FECs
- What hardware?
- What protocol(s)?

# Existing Technology

- ◉ FELIX
- ◉ White Rabbit
- ◉ DUNE-SP timing
- ◉ artDAQ
- ◉ EUDAQ
- ◉ Personal comment: reuse as much as possible!  
Save on expertise and on production!

# Slow Control

- **Also unspecified!**

# Suggestion

- Targeted exploratory group with limited lifetime over next few months to develop an initial plan
  - Initial plan by January CM
- Transition into full working group after this
- I will set up an email list and organize a doodle poll for an initial meeting