

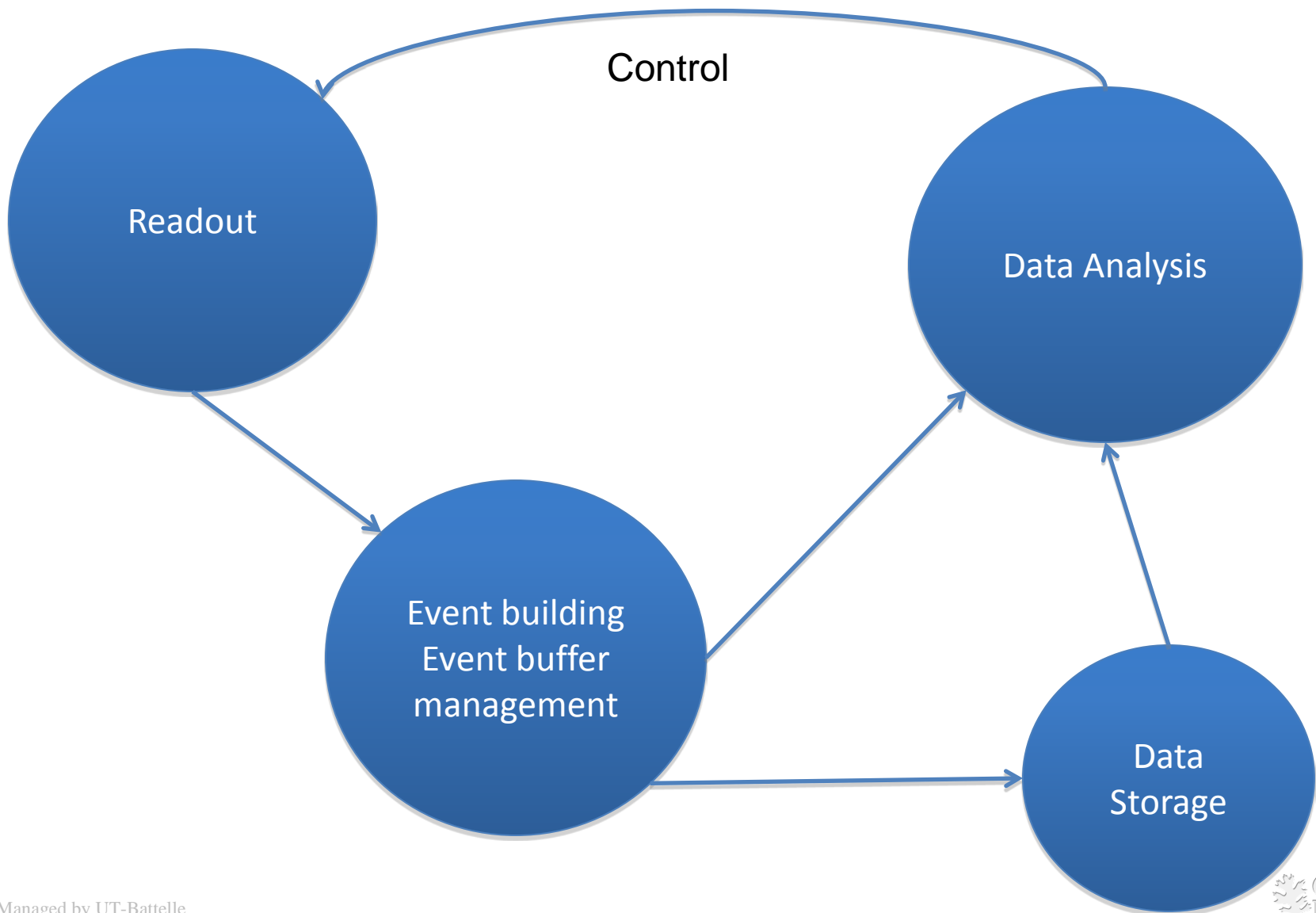
# Data Acquisition Working Group

## Summary

Mario Cromaz, LBNL  
Ron Fox, NSCL  
Ken Teh, ANL  
Robert Varner, ORNL (POC)



# What is the data acquisition system?



# Presentations

- Robert Varner – Introduction
- Mario Cromaz – New technologies affecting data acquisition
- Ron Fox – Development questions to enhance data acquisition for FRIB
- Discussion of data acquisition among all the participants

# Areas we need to examine

- Technology developments that drive the acquisition system development
- Nature of FRIB experiments
- Issues among physicists
- Is there a special character to FRIB experiments?
- How will data acquisition development improve the Physics?

# New technologies

- digital pulse-processing, pulse shape analysis
- fast, inexpensive, high-resolution digitizers
- large FPGA's; deep pipelines, memories
- high-speed, low-cost networking
- haptic interfaces
- CPU, memory costs continue to decrease

# Possible New Directions in Data Acquisition

- Embedded Readout
- Global Clocks
- Prompt Readout
- Distributed Trigger
- “Cloud” Computing
- Haptic Controls

# Standards

- Good standards lower implementation costs and increase reliability
- If the workgroups coordinate, FRIB is of sufficient scale to make standards worthwhile for the
  - experimental groups
  - vendors
- Standards should be applied only where useful

# Guiding Principles

- Much of what we know of FRIB Data Acquisition (DAQ) is speculative and requires a *lot* of community input.
- The further away from the event source the more we know... at least about which questions to ask.
- Hopefully getting these questions out into the FRIB community will:
  - Inspire other questions/concerns
  - Give the community some discussion starting points
  - Give us something to 'bite' on at an early stage that may be worth producing

# Reverse Path of Data

## Data

- Storage
- Data Analysis Software
- Data Management

## High level DAQ

- Distributed Control (DAQ)
- Slow Controls
- Event building
- Configuration Management

## Mid level DAQ

- Clock Distribution
- Trigger processing

## Low level DAQ

- Readout Systems/processors
- Digitization hardware



# Discussion

- Standards coordination with international community
- Need to identify some standards soon to be useful
- Examine state of detectors almost ready for deployment (GRETINA)
- What about small university groups?
- How distributed are the collaborations?
- How to support these distributed collaborations?

# First places to examine standards

- Interface between readout and event building
- Timestamp distribution to support event building
- Define what it means to control a run with many cooperating detectors

Consensus on Standards in these areas are needed to avoid chaos!

# Path Forward

- Dialog is needed to determine what needs to be done for data acquisition, to develop a plan and make the case for support.
- Affected working groups should appoint someone to participate in our conversations
- Small groups are a welcome part of this
- Check [http://fribusers.org/3\\_GROUPS/2\\_DAQ/daq.html](http://fribusers.org/3_GROUPS/2_DAQ/daq.html) for contact information