

TDAQ Subgroup White Paper Status Report

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Recall: TDAQ Paper Organization Meeting Nov.9

- Held our white paper kick-off and Snowmass reawakening meeting Nov.21: <https://indico.fnal.gov/event/51566/>
- Included a survey for people to express their interest in contributing to or leading a TDAQ white paper, and in what areas
- Meeting goals:
 - Get a sense of who will be submitting TDAQ white papers
 - Facilitate common white papers on topics of broad interest
 - Allow contributions from those who may not be able to commit to a full stand-alone white paper
 - Show community-driven input on pressing needs
 - Identify (co)-editors for these efforts
- Had about 18 participants, and one presentation on an already complete white paper (Fast ML)

The Proposed Common TDAQ White Papers

1. “Artificial Intelligence and Machine Learning in Trigger and DAQ”

- Big and popular topic, so depending on community feedback consider split to two white papers? e.g. “AI/ML at the edge” and “AI/ML in High-level triggers, event-filtering, and detector control”
- Work closely with **IF07** (especially on the former) and **computing frontier** (especially on the latter)

This area already has one white paper completed, as reported by Allison Deiana:

- **Applications and Techniques for Fast Machine Learning in Science**, [arXiv:2110.13041](https://arxiv.org/abs/2110.13041)
- Currently in press

The Proposed Common TDAQ White Papers

2. “Innovating Trigger and DAQ for the next generation of detectors”

- Include TDAQ architecture and infrastructure (e.g. streaming DAQ), fast computation on heterogeneous computing, fast timing, trigger-aware ASIC development (work with IF07)
- “Self-driving” triggers
- Natural place for ideas not specific to AI/ML (e.g. fast tracking triggers, fast spectral analysis), and a way to tie-in needs of future experiments

General catch-all for innovative ideas. David Miller, Catrin Bernius, Rainer Bartoldus kindly agree to coordinate and edit

3. “Readout technologies for future detectors”

- Include wireless readout, rad-hard links, multiplexed high-speed readout (**with IF07**)

Jinlong Zhang, Michael Beigel, Jonathan Eisch kindly agree to help coordinate

DAQ White Paper Status Meeting, Feb.10

<https://indico.fnal.gov/event/53123/>

- **TDAQ Readout technologies:**

- Started overleaf project and identified a few initial contributors.
- Will have a brief meeting once they have enough content to steer the scope
- Electronics group (IF07) will focus on detector readout transmission to next layer
- Need to stay synchronized on the content of IF04, IF07 white papers on link technology needs

- **Innovations in TDAQ:**

- Overview of abstract and outline shown and discussed
- Sketches out concepts, largely but not solely focused on collider physics, organized around LOIs but more thematically to give a more holistic approach
- Emphasizing also **operating** large scale systems in addition to designing and building
- Added a section to the white paper on **building and retaining domain knowledge and technical expertise**, even though there is not a specific LOI in TDAQ.
 - This is supported by the conveners as an important concern for TDAQ !

DAQ White Paper Status Meeting, Discussion

- We should keep track of which LOIs are incorporated into a white paper in some manner, and any TDAQ ones that are not
- Writers should let us know if any topics may cut across other groups or frontiers (e.g. wireless control of large-scale systems?), as it may strengthen the arguments for such R&D
- Conveners need to stay abreast of any overlaps with other frontiers, such as with computing, or topics that cut across frontiers, and ensure all are aware
- Some repetition in white papers in different domains would be okay, worse is to have something fall through the cracks.
- Bibliography file of LOIs: Wes has volunteered to do this.

Backup

Broad Timeline for white papers

- 19 Nov 2021: White paper kickoff for IF
 - Goal to share plans on white papers/advertise contributions
- ~~14-17 Feb 2022: White paper wrap up~~
 - ~~Part of CPAD workshop~~ [cancelled]
- New → 18 Feb: Virtual Snowmass IF community workshop
- 15 March 2022: White paper final deadline
 - An executive summary will be really helpful to us
 - Late papers may be considered, at discretion of conveners (Let us know if this ends up being the case)

What happens after that

- Preliminary topical group reports: end of May 2022
- Preliminary frontier reports: end of June 2022
- Snowmass community summer study: 17-27 July 2022 @ UW-Seattle
 - This then leads into the final executive summaries and group/frontier reports, to be finished by ~Oct 2022