LArSoft Steering Group Meeting Notes - 3/10/21

Attendees: Robert Wilson, Wesley Ketchum, Thomas Junk, Erica Snider, Katherine Lato

LArSoft Update - Erica Snider
- The primary focus of Project work is on thread safety and enabling efficient execution of LArSoft on all available platforms, including the dispatching of inferencing tasks to GPU servers from conventional computing nodes. The area of activity this year has centered on an effort by Mike Wang to make a DUNE workflow that includes the data prep and surrounding steps thread safe, and to implement multi-threading as needed. He has progressed on making essential LArSoft components of that workflow thread-safe, and will turn to multi-threading once the entire workflow is thread-safe.
- LArSoft is pursuing the migration of the build system to Spack. The first phase rolls out a system that is compatible with both Spack and the UPS-based system, while the second phase switches entirely to the new system. The Project has completed a portion of the first phase with the release of LArSoftObj, the art-independent components of LArSoft, under the backwards compatible system. The remaining work is expected to take a few months.
- Migration of the LArSoft wiki documentation to GitHub is almost complete. One on GitHub, all LArSoft documentation will again be completely public and open to Google searches.
- Effort discussion
  - Lost Saba Sehrish's contribution in January. She was working on thread-safety for LArSoft.
  - Kyle Knoepfel was awarded an LDRD, which will nominally occupy 40% of his effort. He has been one of central developers, architects, and designers for the past few years, with significant contributions to user support, architectural changes, and thread-safety work. We do not know exactly how this development will impact his contribution to LArSoft, although we expect that his ability to do development work will be greatly diminished.
  - The Project will continue to prioritize work in close consultation with the experiments. The major priorities remain unchanged.

ICARUS - Robert Wilson
- Event Display, finding it a major problem that ICARUS can't visualize the cosmic ray tagger (CRT). Just brought the top CRT online, and have calibrated the side CRTs. Need to be able to visualize this data in relation to TPC tracks. (They have tools to visualize the TPC alone.) The spokespeople are pushing hard for the experiment to find a solution. Don't have anyone on the experiment with that kind of background in Event Displays.
  - Erica: Will continue to bring it to the attention of the division. Historically, this is not an area that SCD has been willing to support.
  - Robert: It's a good example of where it's not been ICARUS's highest priority, but now is the time where it comes up every week in the trigger group and the reconstruction. Its absence is glaring.
- Preparing for production release. Will be merging CRT code into LArSoft. May be aspects in merging with LArSoft code that we need help with.
  - Erica: should have people available now who can help with that
- New request, ICARUS wants to simulate different electron lifetimes for the two cryostats which is not currently supported by LArSoft. Can LArSoft be modified to enable this configuration?
  - Erica: Met about this on March 9 and walked through a few issues with Kyle. Not a difficult problem to solve, and we have a proposal. Should be quick work once a person is identified.

- In one to two months, hoping for a lull in code development. Will then want help in CPU and memory optimization. Would be helpful to have LArSoft people involved at that point. But right now the focus is on getting core code developed and validated.

DUNE - Tom Junk
- Kyle's LDRD is LArSoft related, especially from DUNE's perspective. DUNE has to loop over data in the processing step. Some of that is framework and some is LArSoft. See Kyle's impact everywhere.
- Plan looks good. There are some things that are bubbling up from DUNE, some have to do with memory. People with HPCs and GPUs want DUNE to use their HPCs and GPUs. People who have GPUs want DUNE to use them. More a pull than a push (since conventional resources are still here). DUNE is interested in going down that road, but it's labor intensive to make things work on those platforms.
  - Erica: LArSoft will continue working in directions that we hope will make this easier
- Discovered last week that DUNE is storing all the recob::Wires uncompressed. It fills up memory. Want to get the WireCell workflow to operate on one AP at a time.
  - Note that ProtoDUNE is getting smaller (4 APAs), but can be used to exercise the necessary workflow changes, though the memory issues will not be stressed until the FD.
  - There is a step between data prep and WireCell. (?) Making this work is partly a LArSoft issue.
  - Erica: Mike Wang is working on this workflow. Should make sure that this is part of what he is doing.
  - Tom: Maybe as simple as making the Wirecell run in a loop over APAs?
  - Erica: Intra-event multi-threading is applicable here, and seems the perfect topic for what Mike is doing. Dispatch different APAs to different threads / CPUs
- GArSoft - considering a smaller near detector. Might just have TMS as a beam monitor if money is tight. Discussion about pixels in the work plan is good. Note that both TMS and pixel groups are working on home-grown, non-art and non-LArSoft software. Framework provides things people need (eg, provenance), so that will need to change. Noted that a lot of what now comes inside art-root files (eg. provenance database) will need to be in external databases with migration to HDF5. Using art has avoided this need.
- Neutrino event generator refactoring - DUNE wants that, but suggests not waiting until Spack is done as stated in the plan.
  - Erica: after discussing with the SciSoft team, we concur that the migration work is sufficiently far along that restarting the event generator refactoring makes sense.
- Looking at DUNE makefiles as suggested by Chris Green. A lot of typing is required. How much of this is being automated?
  - Erica: believe a lot of it already is. And migration script seems to know what it doesn't know, so will flag those to make them easy to find. Some of that plus cleanup may be required after running the migration script. Should just try the migration to see what happens. If it is systematically missing things, then provide that feedback to Chris Green, and he might be able to tweak the migration script.

SBN - Wesley Ketchum
- Waiting for shower rollup issue to be resolved in LArG4 which has been severely affecting SBN for two months. Not clear why SBN is still being asked questions when the proposed solution has been anticipated for weeks. If there isn't a plan that SBN has confidence in by the end of the week, they will find a way to get a passable solution and will need support for that to be expedited.
  - Erica: understood. Will continue to try to understand where we are with that work. We have a different plan for handling such projects moving forward. SCD has a commitment to support the refactored LArG4, so needs to make sure they are doing that.