LArSoft Steering Group

2017 LArSoft Collaboration work plan

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Introduction to the work plan

- Have developed a set of priorities for LArSoft collaboration work
  - Projects that have broad impact and benefit across the LArSoft community
  - Covers next 6 to 12 months
- The process
  - Take input from a variety of places
    - Problems identified by the core team
    - Issue tickets opened by experiment members or core team members
    - LArSoft Coordination Meetings
    - Offline Leads Meetings
      - Also dedicated a meeting to go over experiment goals and the implications for LArSoft
  - Core team developed a straw proposal
    - Started from consolidation of experiment input, current and “accepted” projects
  - Discussed and approved at December Offline Leads Meeting
  - **Now seeking approval from experiment spokes** in Steering Group

Organization of plan

- Priority projects for the short term
  - The set of projects that we propose to work on with highest priority
    - Will work to gather all necessary effort to complete them
      - Have identified preliminary resources, and in some cases the amount of effort needed
  - Some of the projects are already under way
    - **Proceeding in parallel** with resource from multiple sources
- Longer term priorities
  - Things we plan to work on next, or that have longer timelines
- Previous projects and milestones
  - Items still in progress from previous work period
- Accepted projects
  - Things we would like to pursue at a future time, or could do now with additional resources

Short term priority projects

(in no particular order)

- LArG4 re-factoring
  - Separate Geant4 functionality / interfaces from LArSoft-specific parts
    - Provides clean interface between material modeling vs detector effects
  - SCD will support Geant4 parts, LArSoft community the rest
- Track-fitting and related data product improvements
  - Store new fit information, better align structures with algorithm boundaries
    - Phased plan to **separate pattern recognition result from everything downstream** that can change, while providing a unified interface to all of it
  - Broker accords on what tracking algorithms need to produce
    - **Eliminate need for analyzers to use different code** to look at output from different algorithm workflows.
    - This work is part of a broader strategy to do this across LArSoft
  - Resources: Giuseppe Cerati, Gianluca Petrillo, Erica Snider

Short term priority projects

(in no particular order)

- ProtoDUNE and ICARUS integration
  - Provide code and interface changes needed by ProtoDUNE and ICARUS
  - Resources: Gianluca Petrillo, Erica Snider, Robert Sulej
- SPACK build system deployment
  - Migrate to a standard set of build tools with broad community support
    - **Addresses persistent portability concerns**, and provides compatibility with current Mac OSX security standards
  - Resources: Jim Amundson, Patrick Gartung, Lynn Garren
- Documentation improvements
  - Keep reference and educational materials up to date, extend coverage of documentation, highlight information produced within the LArSoft collaboration
  - Resources: Katherine Lato

Short term priority projects

(in no particular order)

- CI system improvements
  - Migrate to the second generation CI system
    - Provides improved reporting, allowing tighter integration into development cycle
  - To produce a second tier of tests aimed toward physics metrics
  - Resources: Vito di Benedetto, experiment contacts for CI tests
- Package NuWro for distribution
  - Make NuWro package more readily accessible to LArSoft community
  - Grew from a larger request to fully integrate NuWro (like Genie), which we are not pursuing
  - Resources: Lynn Garren

Longer term priority projects

(in no particular order)

- Concurrency
  - Introduce **multi-threading to address memory consumption** issues, and **vectorization to improve execution speed** where applicable
- Architecture changes for layered algorithms
  - Adopt common interfaces for layered algorithms, and re-structure them in order to **integrate experiment-specific code into core LArSoft**
    - Good example: signal processing code (simulation and reconstruction)
- TPC topology in the Geometry
  - Provide a method that will **quickly determine nearest-neighbor TPCs**
    - This is needed for all multi-TPC detectors

Expect all of the above to involve some experiment effort

Previous projects and milestones carried over

Work on these is proceeding at moderate to high priority.

- Phase II data product review to assess if changes are needed
  - On-going, long-term project
- Enable use of Kalman filter as final fitter for tracks
  - Almost completed
- Usability of art associations
  - Almost completed
- Develop recommendation for physics vector library

Projects that are “accepted”, but not scheduled

Projects we believe are of benefit, but have not yet scheduled due to resources and other priorities

- Standardize policies for reconstruction results
- Develop / implement error handling policy
- Standardize representation for PID results
- Remove obsolete code
- Read / write geometry from root file

On-going work

- User support
  - Handle issue tickets
- Code analyses
  - Targeted reviews of selected bodies of code
  - Has so far been extremely effective at identifying gains in speed
- **Annual workshop!!**
  - Topics for this year
    - Introduction to the SPACK build system + tutorial
    - Introduction to concurrency
      - Things useful to know before *art* deploys multi-threaded version
      - Vectorization (which can be done now)
    - Working session / tutorial on topic TBD (probably debugging / profiling)
  - Will be coupled to FIFE Workshop, as in past years

Resources

- Core LArSoft Team
  - Project lead
    - Erica Snider (50%)
  - Developers
    - Gianluca Petrillo (80%)
    - Saba Sehrish (40%)
    - Giuseppe Cerati (as needed)
  - Code and distribution management
    - Lynn Garren (25%)
    - Patrick Gartung (backup)
  - Project management + documentation
    - Katherine Lato (25%)
  - Continuous integration system operations
    - Vito di Benedetto (30%)

Resources

- Other SCD resources
  - Pull in additional resources from within SCD on a case by case basis
  - Examples
    - Geant4 team for LArG4 re-structuring / maintenance (K. Genser, H. Wenzel)
    - Experts for code analyses (e.g, C. Jones, J. Kowalkowski, M. Paterno, P. Russo)
    - Jim Amundson and Patrick Gartung for SPACK deployment
- Experiments
  - Many projects were advanced by experiments
    - Usually tied directly to short term experiment goals, so integrate experiment effort in very natural way
  - **Propose targeted effort from experiments**
    - Short duration, or as negotiated
    - Items of value to the entire LArSoft community
    - Suggest getting service credit with the experiment
    - Should also be of value professionally

Summary and conclusions

- LArSoft collaboration enjoys enormous support from experiments
- Core project team wants to ensure work is directed toward highest-impact projects
- Your participation, feedback and consent is essential!

The end