Reponses / comments on 2018 SCAP Panel Recommendations

Dear SCAP Panel

On behalf of the IceCube Collaboration and the ICNO management, I again thank you for the time you put into providing critical feedback and suggestions for improvement. I am providing responses to your recommendations below.

2018-1 IceCube high level management is strongly urged to review the organizational structure of the M&O software and computing domain. In particular, management is invited to name a manager dedicated to maintain and execute an overall, global vision of this area (a “Global Computing Coordinator” reporting to the IceCube Neutrino Observatory Director of Operations.)

2018-2 IceCube high level management is strongly urged to review the functions of the ICC committee pertaining to the coordination between computing and analysis. In particular, management is invited to define a small, dedicated coordination group, co-chaired by the Global Computing Coordinator and the Analysis Coordinator, which would be responsible for preparing issues and recommend actions and priorities, to be brought for review and approval by the ICC.

2018-3 IceCube high level management is strongly urged to empower the Global Computing Coordinator with the ability to dialog with responsibles of collaborating institutions in order to harvest additional resources for the software and computing domain. This should be done through the definition of specific work items to be accomplished within well-defined periods of time, in a spirit similar – but not limited to – the way the Software area has been recently refocused.

To these first three points we announce the hiring of Dr. Benedikt Riedel who began working again in IceCube in December 2018. Prior to that Benedikt spent many years working in OSG at UChicago. His vast experience with massive distributed computing and his familiarity with IceCube (he graduated with his PhD from UW-Madison on IceCube) make him an ideal leader for IceCube Computing. He is replacing the vacant position of Gonzalo Merino who left to become Director of the Port d’Informacio Cientifica in Barcelona. The first discussion of the expanded scope of responsibility of the position with the appointment of Benedikt took place at the last IceCube Collaboration meeting and will be put before the ICB during the upcoming meeting.

2018-4 The IceProd2 team is urged to complete the implementation of multi-user features, which should enable the inclusion of collaboration-wide activities. A wider use of an IceCube AAI framework should be considered, preferably in the direction of a single-sign-on for as many IceCube resources and services as possible.

We are evaluating several frameworks that allow SSO (single sign-on) and authentication and authorization. The current frontrunner is [COmanage](https://spaces.at.internet2.edu/display/COmanage/Home). We are also working on a new authorization scheme using JSON Web Tokens and SciTokens.

2018-5 Architectural and Technical frameworks should be defined to consolidate data management and metadata related activities. Evaluation of software products to support the architectural framework should be performed as focused, time limited activities.

See response to 7.

2018-6 The focused action scheme of the Software area should be brought into steady-state operation.

Several remedial actions to address these points are:

* Biweekly calls that happen even if there are no agenda items
* Themed code sprints: “Simulation Production”, “Reconstruction Performance”, Machine Learning Frameworks”
* Releases have a due date and are released on that date
* Monthly reviews of outstanding pull requests on calls
* Release cycle as a deadline
* Coding camps during Summer

2018-7 Science reproducibility and public data releases should be considered different aspects of a more global Data Management and Preservation framework. An end-to-end architecture, from DAQ to public data releases, should be arrived at, possibly in incremental steps which are coherently orchestrated. This should be coordinated with metadata-related activities.

A re: DOMA: this is a large, multi-year project because we need to create software and most likely deploy hardware. It includes several areas: I3Live, JADE, Long Term Archival, Data Center Infrastructure, SNDAQ, etc. We need to review the current DOMA strategy from pole to public data release. Data transfer from pole to Madison is on solid footing. The biggest issues are:

* Various different data sources that seemingly don’t talk to each other, e.g. Is there physics in the I3Live data? How users interact with I3Live data beyond monitoring shifts? etc.
* How do people access data?
* How can we move away from POSIX access?
* What to do about the file catalog
* How can we design data to be more accessible and better organized?
* How and when should we publish data?

A re: Reproducibility: Internally discussions have started for a grant proposal focused on reproducing IceCube results with new software and/or knowledge – Codename: Continuous Science. Question is how to staff and fund. We are considering [this CSSI solicitation](https://nsf.gov/pubs/2019/nsf19548/nsf19548.htm). The main goal is to make sure large (for start) changes to the codebase trigger a series of tests, such as redoing the HESE analysis, that facilitate high level checks, similar to sanity checkers.

2018-8 IceCube high level management should take note that fully establishing and maintaining these policies requires non-negligible human resources which are currently not identified.

As WIPAC embarks on future facility enhancements additional resources do become available. We are exploring the possibility to hire an additional developer and are considering experience with DOMA as a requirement.

2018-9 Efforts should continue in a highly focused manner in order to maintain workflows which can run efficiently on systems where IceCube can request resources. This requires work on the workflows themselves, but also on monitoring and job scheduling and on the handling of intermediate results.

IceProd2 is now stable and working well in production. We are adding new features including IceProd2 “campaign mode” to take advantage of supercomputer sites. In campaign mode a single dataset or large portions of a dataset would be produced at a single site.

2018-10 IceCube is encouraged to request time from research computing providers, such as OSG, XSEDE, supercomputers, etc. with a target of achieving within 18 months a computing power about 10 times higher than currently available. This should be done through WIPAC and through IceCube collaborating institutions around the globe, and the applications should receive maximum support from their principal investigators. The M&O team should be the catalyst that puts these resources to the best use for IceCube. This requires an immediate corresponding effort to scale the computing and data analysis infrastructure to be able to efficiently and robustly handle such an order of magnitude increase in resources.

In the US we have applied for and been awarded cloud credits through ECAS (Exploring Clouds for Acceleration of Science) and a Mid-Scale Research Infrastructure-1 proposal with the cryoEM group at UCSD for a GPU cluster hosted at SDSC. Allocations on existing and upcoming XSEDE resources, e.g. Frontera, are being pursued. In the the EU we are discussing with EU PIs the possibility to apply for EU computing programs such PRACE.

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