Globalization of HEP

Meeting Minutes

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1. Overview

This group is exploring the necessary steps to globablizing efforts in HEP. We want to find successful structures for international organization that maintain the importance of existing national laboratories and preserve the ability to work despite large distances from an experiment.

The following are minutes from the meeting of June 15, as written by Krane; and is subject to further changes by other subgroup members. The idea is to create the basis of the Snowmass pre-document from these minutes.

2. The Problem of Separation

How does spatially separation from an experiment impact a researcher's ability to do physics? Currently, the impact is very negative, especially for students. Whereas a student in residence at an experiment can walk down the hall and knock on a door to get help, remote scientists might have to funnel their communications through email or telephone conversations. As experiments grow in size, the need for "local" expertise grows. (I don't quite know how to phrase this sentence!) Remote researchers also need access to data, and access to meetings.

These issues are being addressed by the current generation of experiments, but it isn't clear that the current solutions will scale successfully to the next generation. There is much interest in sharing control of experiments with virtual control rooms to manage DAQ and monitoring of an experiment from an arbitrary distance. Accelerator control might also follow this model to form an accelerator grid system. The rest of this document discusses popular ideas on how collaborations can scale to international distances.

3. Regional Centers

The typical solution to all these problems is to create several regional centers for high energy physics. Although current technology has not achieved it yet, at the core of these centers lies a fast network connection that allows reliable remote control of several experiments and accelerators. This way, actual control could be passed from one center to another and back to the local control room without disruption. For offline work, the center would ideally have local data storage and processing farms also.

A Computing Division is essential for each regional center to develop and maintain these features. Implicitly, there will be visiting scientists from surrounding universities to make use of the facility. From here, the idea of a regional center can take two broad classifications.

3.0.1 National Laboratory model

In this scenario, the regional center has all the same divisions as a national laboratory. There will be experimental and theoretical scientists as part of the permanent staff, a technical division to build detector and beam components, a beams division, on site housing. In essence, one would provide several national laboratories with networked control rooms as described above. Likewise, other labs worldwide will upgrade so that they too can take on the duties of controling remote experiments and accelerators.

By necessity, this first class of regional center is very large, so there will be few of them. It has the advantage of reusing the infrastructure of existing laboratories. It also keeps the "culture" of high energy physics intact with interaction between physicists in various subfields.

3.0.2 Distributed model

This second type of regional center strips away most of the national laboratory divisions, leaving only what is essential to controlling experiments. There would be a computing division, and particle physics researchers as permanent staff. The remaining divisions can be present or absent, depending on the specific center. For instance, one center could have accelerator physicists but not the other centers. Once center might have a technical division but not other centers.

These regional centers are small, so there could be more of them. Most likely, each national laboratory will be a regional center anyway, but also three or four more could be built in other locations that are otherwise very far from a lab. The idea is to provide more direct university involvement and make travel easier and less expensive. Universities could form consortia to build these extra centers, which could be located at an existing campus or an entirely new site.

4. Summary

This document will grow as we learn more. Current work assignments include:

Véronique - explore UN of HEP, a board of governance
Gudrid - gather info on LCH's solutions and structure
Mark - info on the accelerator grid system
John - more research on regional center ideas
Manuel - read this document and let us know your ideas