FERMI NATIONAL ACCELERATOR LABORATORY

REMOTE ACCELERATOR OPERATIONS

Mau. R, FNAL, Batavia, IL 60510, USA

Including extracts and summaries of the Global Accelerator Network (GAN) Workshops

Fermilab is a U.S Department of Energy (DOE) research laboratory, operated under DOE contract by Universities Research Association (URA).

Abstract

In March 2000, ICFA set up a Task Force to study the proposal by Albrecht Wagner (DESY) for a Global Accelerator Network (GAN). This is a global collaboration to construct, commission and operate a large new accelerator facility, based on the experience of current large detector collaborations. The multiple tasks involved are carried out at the home institutions of the collaboration members; this allows active remote participation from laboratories dispersed around the world and maintains accelerator expertise and involvement in all of the collaborating institutions.

INTRODUCTION

The future large accelerators of the world will be too costly for any single nation to build. A consortium of nations will build future accelerators. One of the technical problems is how to build major components on one continent and still have access to experts from another continent. Do we have accelerator studies and commissioning only at the main site or can we do studies remotely across continents.

What is the feasibility and logic of actually operating the site by switching daily operations to remote sites?

In September of 2002 at Shelter Island, New York a group of 57 people including Operations personnel met to discuss such questions. This paper is a report on this meeting, on the operations experts' response to such questions, and to open a dialog for members of the WAO03 meeting with the hope of gaining further insight, expertise, feed back, and comments.

FUTURE ACCELERATOR

If it's true that future accelerators will be too large and costly for any one nation to build and operate, how will they be built? How would the international organization that controls and operates the large machine be set up? And how would nations be convinced to buy into such a large and costly project?

Why would any Nation want to get involved?

Here are only a few of the problems.

- How would governments convince their population to support sending large amounts of money and resources to another nation?
- What about the loss of prestige for the countries not having their own projects?
- What about the loss of national control for these projects?

The nation hosting project site would not have any of the above problems. This could prevent other nations from wanting to join the collaboration. How might this advantage be minimized? The obvious answer would be to minimize their power and authority.

The perceived answer is to give all partners equal status.

- An equal share in building the accelerator
- An equal share in commissioning the accelerator
- An equal responsibility in conducting studies
- An equal responsibility in operations
- An equal responsibility in maintenance
- An equal responsibility in trouble shooting

WHAT IS REMOTE OPERATION?

- The ability to commission an accelerator from any place or continent.
- The ability to conduct accelerator studies from any place or continent.
- The ability to switch control of the accelerator at any time to different places or continents. Here are three possibilities:
  a. Switch operations every eight hours.
  b. Switch operations every week.
  c. Switch operations every month.

The idea is to weaken the local site authority and then spread the authority to all the participating nations. There is a feeling that unless this type of equality is built in to the accelerator operation, the next large accelerator will not be built.

TECHNOLOGY

The Fermilab accelerator can be operated from outside of the Main Control Room (MCR), but it is allowed to occur only from on site locations.

MCR Operations allows people to examine computer parameters from off site.

Fermilab has chosen not to allow remote operations, but has the ability to do so.

Many telescopes are already operated remotely.

REMOTE OPERATIONS

The following information is either directly extracted or summarised from the published workshop reports.

HISTORY

In March 2000, ICFA set up a Task Force to study the proposal by Albrecht Wagner (DESY) for a Global Accelerator Network (GAN). This is a global collaboration to construct, commission and operate a large new accelerator facility, based on the experience of current large detector collaborations. The multiple tasks involved are carried out at the home institutions of the collaboration members; this allows active remote participation from laboratories dispersed around the world and maintains accelerator expertise and involvement in all of the collaborating institutions.

The Task Force had two Subgroups. Subgroup 1 was led by A. Astbury (TRIUMF) and studied general considerations of implementing a GAN, including:

1. How to maintain active interest and participation in the project in all member institutions.
2. Identify areas to be developed.
3. Work out mechanisms for cooperation, decision taking, project management, communication, sharing of responsibility
4. Develop an organizational framework for the new accelerator facility

Subgroup 1 met on two occasions, at CERN on 13th June 2001, and at Fermi National Accelerator Laboratory on 27th October 2001.

Subgroup 2 was led by F. Willeke (DESY) and studied the technical considerations and influence on the design and cost of the accelerator.

THE FIRST WORKSHOPS

The first workshop was held in March, 2002. "Enabling the Global Accelerator Network", at Cornell University was attended by 44 participants. The workshop is summarized in a FINAL REPORT. The Cornell workshop laid out the basic concepts of the role that Remote Operations play in the achievement of a Global Accelerator Network.

Another closely related one day workshop on this specialized topic, the Collaboration Tools for the Global Accelerator Network, was held at LBL on August 26, 2002. Deb Agarwal organized this workshop. The purpose of the Berkeley meeting was to focus on collaborative tools for the GAN and to provide input regarding reasonable collaborative environments to the Remote Operations Workshop at Shelter Island. The intent of the meeting was to explore the requirements, use cases, and collaborative tools available for use in the GAN environment. The meeting also developed a "strawman" proposal for the GAN collaborative tools environment. The final report from this workshop is available in PDF and DOC formats.

Mike Stanek from SLAC Operations gave a talk at this session.

THE SECOND REMOTE OPERATIONS WORKSHOP

This workshop was held September 17-20, 2002, at the Pridwin Hotel on Shelter Island. There were 57 participants. It was the second workshop in a series sponsored jointly by BNL, Cornell, and DESY, exploring the Global Accelerator Network (GAN). The generic GAN concept, as originally discussed in two ICFA Task Force Reports (December 2001), applies to any accelerator project that involves multiple laboratories.

THREE WORKING GROUP CHARGES

Group 1: Experimental and Accelerator Demonstrations

Group 1 discussed and evaluated concrete examples of remote operations, demonstration projects for accelerators, and experiments. They were to imagine how to remotely operate an accelerator and experiment not located at their laboratory. What tools would be needed to do this and what are the communication challenges?

The accelerators and experimental facilities with active remote operation projects include:

- CMS experiment (CERN)
- FNPL accelerator (FNAL)
- RHIC operations (BNL)
- SNS accelerator (ORNL)
- TTF accelerator (DESY)

In addition to these there are numerous astronomical and industrial projects of direct value.

Group 2: Communication and Operations Communities

Group 2 brought together an eclectic mix of experts and skills from information technology, experimental physics, accelerator technology, and commercial enterprise (building on the success of the Cornell workshop), to explore the scope of remote operations solutions, as well as the social and collaborative aspects. Included with this they considered the perspective of accelerator control groups.

Operations people were part of Group 2. A summary of their activities is at the end of this paper.

Group 3: Engineering Designs for Remote Operations

Group 3 examined in detail the remote operation of accelerator hardware subsystems in both commissioning and routine operations. They tried to answer the following questions:

- How would the presently designed hardware, such as power supplies and Klystrons, perform without experts on site?
- What additional design features need to be built in to these types of devices?
- What level of engineering expertise is necessary on site to assure effective operation of the facility?

A GROUP 2 WORKSHOP SUMMARY

Tuesday Morning

On Tuesday morning the three groups got together and discussed the following items:

- What people do in control rooms
- Security issues
- Social issues
  a. Privacy, trust, team building
  b. Training
- Compare the different operating modes from FNAL, SLAC, KEK, DESY

Tuesday Afternoon

The Operation people from Group 2 meet by themselves to discuss operational issues. Peter InGrassia will give a report on this at WAO03.

Wednesday Morning

The three groups discussed the following items:

- Access grid
  a. Video and Audio
  b. White boards and smart boards
- Collaboration tools
- VRVS demonstration
- E-logs
  a. Work flow
  b. Security

Wednesday Afternoon

On Wednesday afternoon the groups met individually for discussions.

Thursday Morning

On Thursday morning all three groups reconvened to hear and discuss the Operations group report. It was a very interesting discussion.

Thursday Afternoon

Group 2 discussed the following topics:

- Social Issues
  - Reciprocity
  - Trust
  - Ease of use
  - Agreed rules of the road
  - Culture
  - Adoption
  - Training
  - Informal meetings
    - A video wall?
  - Parties
  - Visiting other sites
- Security

Other Topics

- How many laboratories have remote (off site) read and control capabilities?
- What are your experiences?
- Do you have any experience using cameras to monitor control rooms and operators?
- What are some of your questions about such a mode of operation?
- If GAN can be made to work, Bob Mau wants to enter the next phase of discussed: How to move all accelerator operations to Tahiti.

REFERENCES

Remote Operations Workshops:
http://www.agsrhichome.bnl.gov/RemOp/docs/icfa_tforce_reports.html