Collaboration Tools for the GAN

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URL - http://www-itg.lbl.gov/Collaboratories/GANMtg/

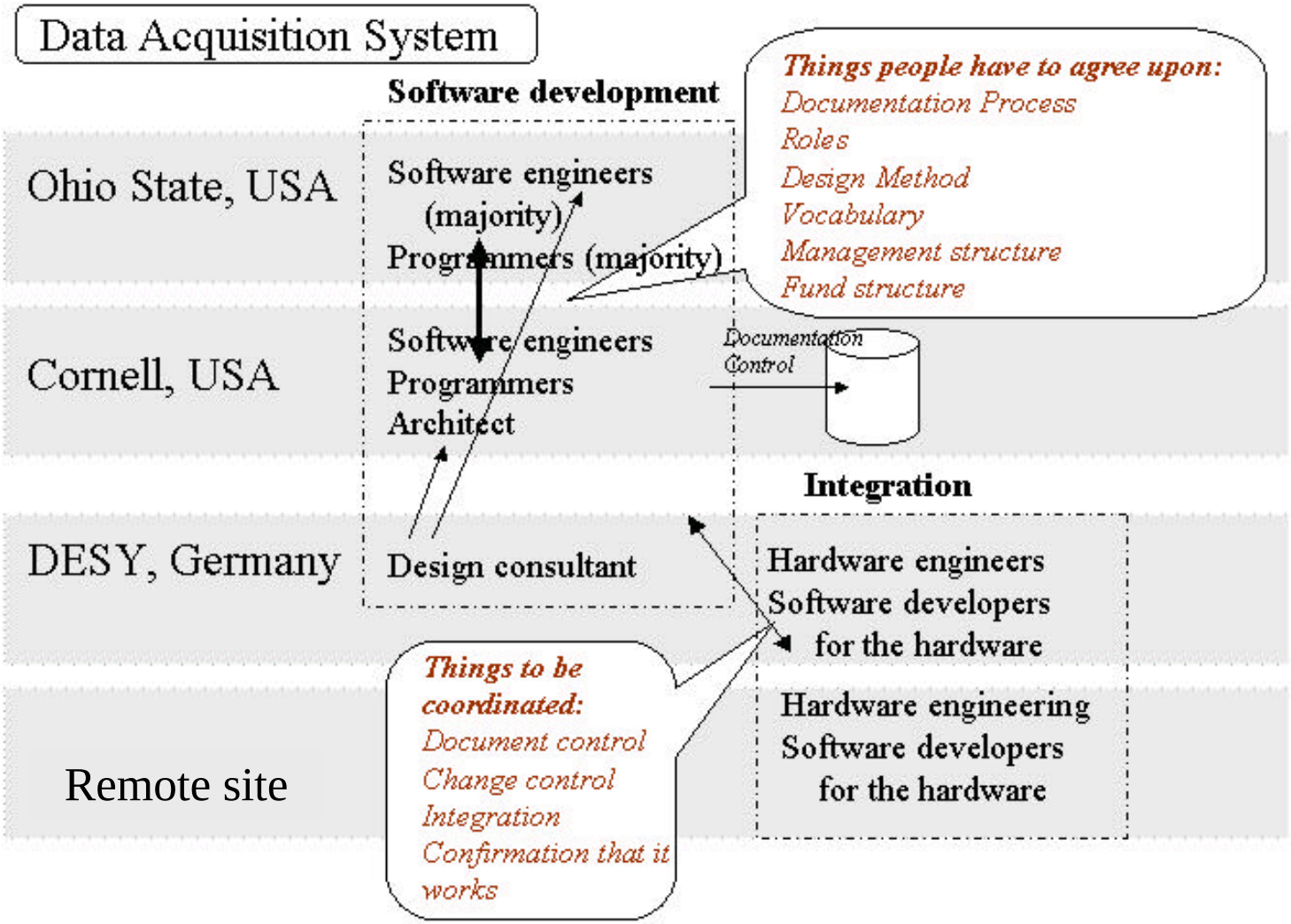
General GAN Observations

- Operations
  - Shift log
  - Measurement instrument readings/control
  - Meetings
    - Shift change
    - Status update (daily)
    - Maintenance coordination
    - Experimenter liaison
  - Control of accelerator components
  - Continuous status information
- Personnel!

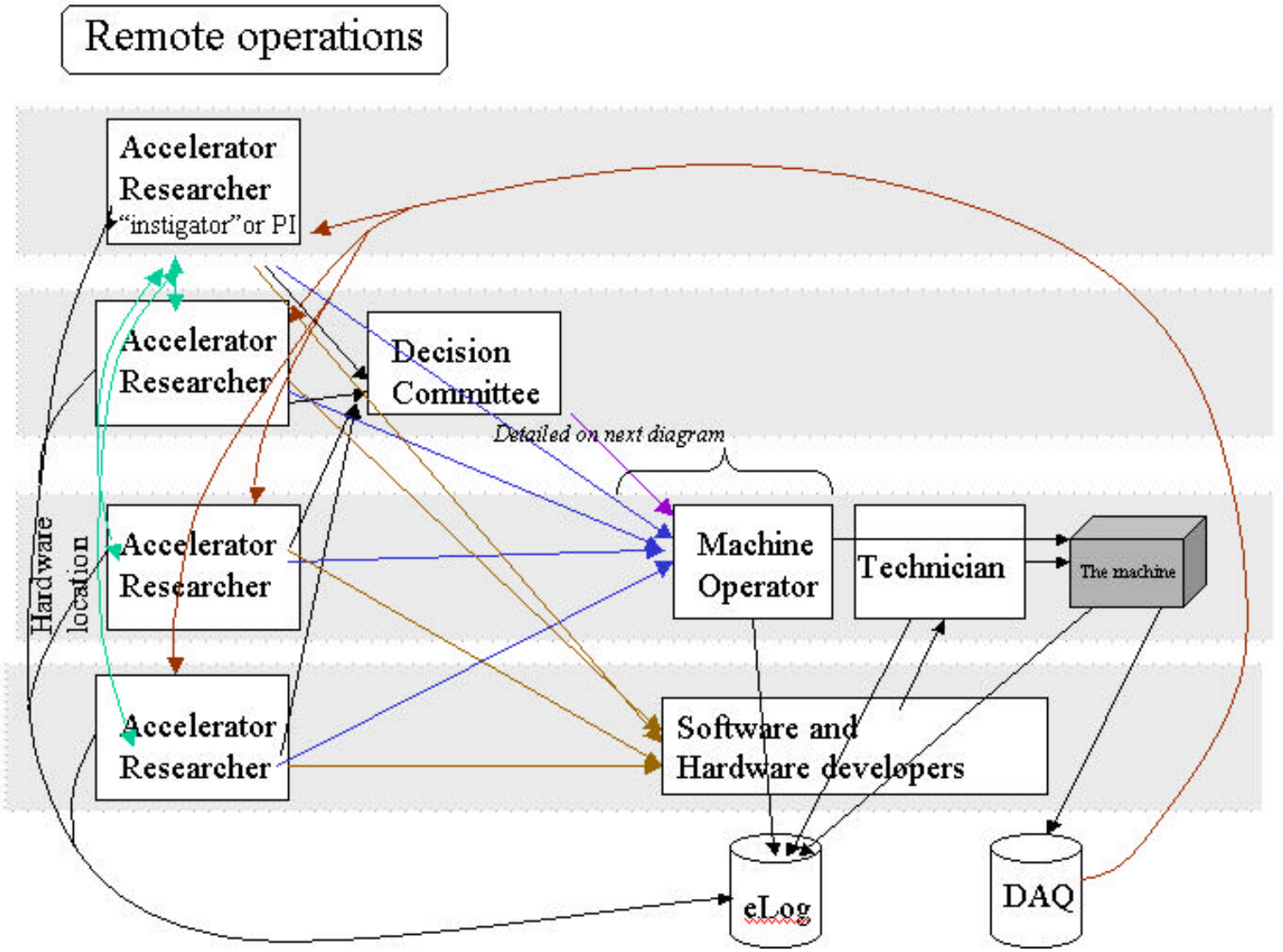
GAN scenarios

- TTF2
  - DAQ software design
  - Machine development studies
- RHIC/SNS
  - Remote control/diagnosis/commissioning
  - Machine development studies
  - Operations activity information monitor
- LHC
  - Machine development studies

Detailed scenario #1 DAQ



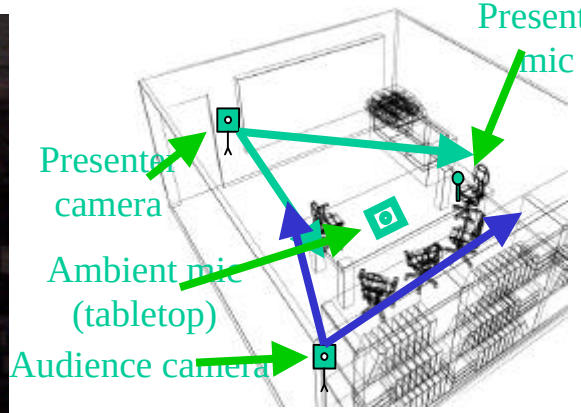
Detailed scenario #2
Machine Development Studies



Collaboration Technologies to support these scenarios

- Meeting support
  - Remote presentations
  - Shared applications/whiteboards
  - Annotation capabilities
  - Natural audio
  - Video of all
  - Easy setup
  - Captured for replay
  - Back channels

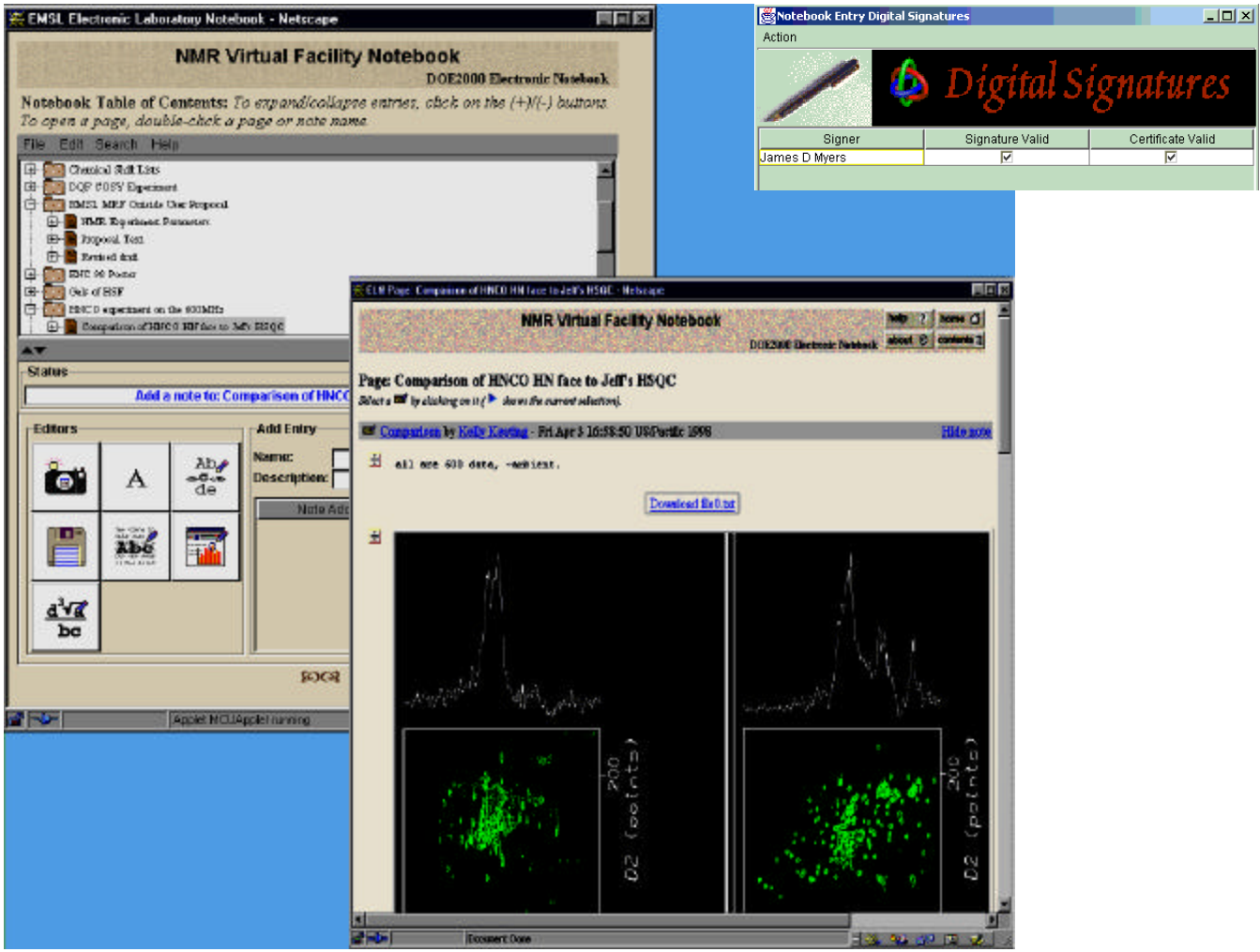
Access Grid Nodes (ANL)



Collaboration Technologies to support these scenarios

- Asynchoronous communication
  - Electronic notebook
    - Agendas
    - Open issues
    - Notes
  - Annotated capture of meetings
  - Annotated documents and data displays
  - Project management/workflow tracking

Electronic Notebook (PNNL)



TTF2

- During the next year the Tesla Test Facility at DESY in Hamburg Germany will be significantly upgraded in energy, to be called TTF2. TTF2 presents excellent opportunities for possible GAN prototypes. Cornell and DESY are both very interested in pursuing this idea. Cornell has a strong commitment to GAN because it will not be a candidate site for the eventual international Linear Collider (LC), they have an extensive background in accelerator physics and they already have experience with remote control and videoconferencing for the CLEO detector.

Development of the TTF2 data acquisition system ("DAQ") is a possible GAN prototype environment.

- The DAQ will be a distributed development project, based on experimental detector expertise from Ohio State, Cornell, and DESY. All three locations will be involved in code development. They plan to use a system to coordinate development of code at different locations, probably using CVS, and some mechanism to keep the documentation synchronized with the code management system. They envision also using a distributed whiteboard that allows sketches and diagrams to be seen and manipulated remotely, as well as a remote compilation and testing facility. This facility would first function locally, and then allow remote access as if on site.

A second GAN prototype scenario, requiring use of the DAQ, involving machine development studies, and emittance measurement is a likely subject of study.

- This is an important and difficult problem that must be solved for the LC. Team building will be critical for making this measurement effectively. It typically will require sufficient time on site, with many groups and individuals involved. This work has important security issues, with a high level of trust developed among the people and in the security of the communication mechanisms. Remote participants will use simulation extensively.

Machine Development, with emittance measurement as an example, involves:

- 1. Meeting with colleagues to agree on goals and plans of action.
  2. Design of any new equipment required, with access to survey data, geometry database, and CAD files, because the instrumentation has to be inserted *in* the accelerator, e.g., inside a vacuum. Everything has to fit. Stringent safety requirements also have to be met.
  3. Extensive software development
  4. Instrumentation manufactured both at home and at the site.
  5. Testing, first done at home, and then installation at the site.
  6. On-site testing with the installation team followed by remote testing.
  7. Operation of the accelerator, maintaining close communication with the on-site operator and the site shift responsible person.
  Acquisition of data and transmission to the remote site or
  Remote access to the on-site data store.
  Performance of preliminary data scans before ending the session to assure validity.
  Post-shift procedures and checklist.
  Analysis of results (both early and over time)
  Discussion of results with colleagues.

As for tools for these scenarios, we can see a need for video, application sharing, information portals and distributed program development, including remote control of the DAQ. Security is an important issue since these discussions will be conducted remotely. Notes and data will be kept in an electronic notebook, which is to have easy access and easy entry of information including automatic recording of measurements. They will need access to detailed hardware monitoring and diagnostics.

RHIC/SNS.

- They are currently trying some remote operations at RHIC, giving control/access to outlying support buildings. This trial is 2-4 months away. CERN is involved with potential collaboration with BNL in 4-18 months, coordinating through RHIC instrumentation. SNS remote diagnosis and the commissioning of the SNS ring will happen in 1-3 years.

A mini scenario:

- Dumping the collider store. People need to know 10 minutes in advance that the dump is going to happen. It takes about 40 minutes, during which time everyone would like to keep updated on general status and current estimate of completion time. The experimenters want to know what's going on, and want beam ASAP. Nobody has time to get on the phone to tell others what's going on. Status information should be collected "passively" and made available to the experimenters.

A second mini scenario:

- Beam study periods. In this, the participants need to compare and discuss screens or scopes. Currently, they place copies in an electronic logbook and discuss them over the phone. They would like to have continuous background voice connectivity with the remote locations.

During the beam study periods:

- They need ad hoc meetings, where access control is very important. They might have to rewrite code on the fly, with narrow-deep access at the site. It would be good to be able to share files, analysis codes and displays. Sometimes the data is taken and analyzed later, other times it is handed off to the night shifts to analyze. Often in this period, there is improvisation, with high levels of problem solving. These instrument tests often push the boundaries of the accelerators. Perhaps this coordination technology could be first tested with the Phaselock loop tunemeter commissioning.

A third mini scenario:

- SNS Startup and Ring Commissioning. In this, the experts are on call 24/7, and require remote access when requested. There is extensive collaboration, with broad/deep controls to access by BNL personnel. For example, the #1 power supply hardware examination/diagnosis involves coordination of onsite and offsite engineers. If at this point there could be “shoulder riding telepresence” and bi-directional audio, there is a great opportunity for training.

LHC.

- The US LHC Research Program (US LARP) involves commissioning, accelerator physics, beam instrumentation and upgraded Nb_3Sn IR quads R&D. The participating DOE labs are BNL, FNAL and LBNL. In the context of the US LARP, LHC machine development studies undertaken to improve the performance of the accelerator for physics experiments are a possible use of prototype GAN tools. Using GAN tools for remote participation in the LHC machine development studies and logging could help gain familiarity and acceptance of the full-blown GAN.

Benefit

- The benefit for the US LARP would be greater participation with less travel and cost and presumably CERN would benefit from this as well. However, it is not likely that GAN tools could be used successfully for LHC or any other accelerator facility until after a team culture has been established. The establishment of the team culture would require that most if not all of the participants work on site at CERN for a significant period of time (six months to a year). Maintaining the team culture would also very likely require periodic on site visits several times a year even after GAN tools were up and running.

Vision

- We can envision using GAN tools during LHC machine development studies and operation for physics experiments to run simulation codes and compare these with experimental results, for example for the electron cloud effect and beam-beam interactions. We will need flexibility in recording the suite of instrumentation needed for a particular machine design study.

Collaboration Technologies

- We do not believe the entire control room needs to be duplicated, merely what's on the screens. They wish two-way communication. If it looks the same to everyone, it is easy for everyone to deal with. Video is needed in order for everyone to see everyone, and it should be accompanied with high quality audio. In addition to the control room, there should be a meeting room for development and discussion of run plans, analysis, information exchange at shift changes, etc. They also need the electronic logbook, whiteboards visible at remote locations, and computers for logging data streams, analyzing and displaying summary data, and running simulations. In addition, they want everyone to be able to plug in their own laptops and participate from their laptops.