Report of the Task Force on Video Conferencing at DØ

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Introduction

The DØ collaboration has about 600 members listed on the masthead. Of these, only about 200 are permanent residents at the lab. Two thirds of the collaboration cannot regularly attend meetings in person. Because of this, and because of the wide spread geographic distribution of the collaboration (about 30 South Americans, 40 Asians, 250 Europeans and 250 Americans), we need to think of the DØ collaboration as a worldwide network of people, which are connected through the DØ detector at FNAL and which contribute to the success of the experiment in many different ways. DØ would not produce results without the work done offsite; the software that is written there, the hardware built there, the students that are supervised there, etc. In order to properly utilize this manpower, non-resident collaborators need to have full access to all information concerning the experiment. For this to happen, DØ needs to find ways to make communication easy and efficient between these people. There are many ways to promote efficient communication among widely scattered people. For example, by requiring written documentation of software and analyses at early stages, by requiring written minutes for meetings, we increase communication. Another important method is video conferencing.

Video conferencing, when it lives up to its potential and when run properly, is one of the most effective methods for communicating because it allows efficient visual communication. Visual information does not include only graphs and plots, but also the non-verbal forms of communication we use when we talk to another person face-to-face. This kind of personal connection among collaborators even helps to improve motivation and guidance. However, as anybody who has been at the "other end" of a video conference knows, it requires *commitment and strict enforcement of a set of rules* on the part of the people at the lab to make turn video conferencing from a way to waste time and get nauseous (from looking at blurry slides going in and out of focus) into a useful tool.

This video task force believes that DØ should provide the best possible technical facilities to allow active participation in meetings by remote collaborators. A basic set of rules should also be established for meetings, that again allows and encourages the participation of remote users. Unless we make this commitment, the manpower that is not based at the lab will be to a large part wasted. Unless the management of the experiment makes an active commitment to improving and put resources into video, we'll be effectively making a choice that is not in the best interest of the experiment.

As an added benefit, if we implement the suggestions for video conferencing described below, we will find our work is more carefully documented, and thus easier to turn into a paper when the work is finished. It will receive closer scrutiny at earlier stages, because it will be well enough documented to understand.

We make main recommendations as to what we consider "reasonable efforts". Our recommendations are based on personal experience (though note that only two members of our task force have extensive experience on being at the "other end") and on the results

of surveys sent both to other collaborations and to the DØ Institutional Board. We also make smaller but necessary recommendations on rules for meetings doing video conferencing and other desirable improvements in the hardware.   We note that there are 73 universities on the masthead. If each contributed $100, we would have a reasonable amount of money, if each donated $1000, we'd have real money.

Recommendations

Major Recommendations

1. Our principal recommendation is that speakers at the collaboration meetings, ID group meetings, or physics group meetings post an electronic copy of their talk at least 1 hour before the meeting.   It is necessary that the transparencies be posted 1 hour before the meeting, because many groups cannot afford laptops, and their video equipment is located in rooms without a pc with Internet connection. So, they need to print the talk before the start of the meeting.
2. Our second main recommendation is that the sound systems in the video rooms should be improved.
3. Third, we ask that DØ simultaneously connect to ISDN (our current system) and IP video conferencing systems (like VRVS). CERN does this already. We propose that a system like the system at CERN be set up in the 9th circle as soon as possible, as a trial.
4. Fourth, we ask for a system such as the one used by ATLAS (described below) that allows straightforward archiving and posting of talks. The implementation should include plenty of disk space (at least 500 GB). This will help make our first recommendation much easier to implement, and therefore more likely to occur.
5. Fourth, an FNAL technician should be assigned to be responsible for video conferencing equipment (helping to set up, maintaining it, keeping abreast of new developments, etc). CERN does this, and perhaps that's why CMS/ATLAS people report much greater satisfaction with video conferencing than FNAL users. Another reason such a person would be useful is this: right now, it is impossible to buy even inexpensive items to improve video conferencing (like laser pointers), because there is nobody "in charge".   This person would also be responsible for developing a short training course for the conveners.

Other Recommendations that don't cost anything

1. That the "suggested rules for meetings", listed later in this document, should be implemented.
2. The conveners should be in charge video conferencing for their group, including taking care of the camera, switching the camera, etc, and should be properly trained to do this. They may delegate this task to other people in their group, but they should be ultimately responsible and trained.

3. That a committee consisting of 5 people be a permanent task force to field video questions, and give advice to the lab. This task force should include strong representation from people who current reside offsite, and should include groups with limited financial resources.
4. Somebody should make one of those files that set the root defaults, with thick line widths and large fonts, and people should be encouraged to use this (perhaps when new accounts are created, it should be put their by default). Of course, if people don't like the values in the file, they can change them.
5. A set of instructions for operating the video system should be chained to the video system. These instructions should include the names and phone numbers of the people that should be contacted when there are problems with the equipment (Sheila Cisko, 722-9752 and Tom Marshall)

Other Recommendations

1. The public_html space for d0 users be increased to 0.5 GB per user. If people can just drag their talk into their public_html area, it makes it easy for them to post their transparencies before meetings. However, the current allocation for disk space is too small for most talks.
2. The main source of audio problems is the fans in the transparency projectors. Because of this, we recommend that we buy the highest quality wireless headsets and lapel mikes for all videoconference rooms. We recommend the headset, because this keeps the microphone always at the optimum distance from the speaker's mouth (and besides, its cool). Both should have battery level indicators. The location of spare batteries should be posted on the video equipment. This will reduce fan noise and is inexpensive.
3. We should buy only transparency projects with quiet fans.
4. Currently, 3 rooms are equipped with ISDN video conferencing, the 9th circle, the dog house, and the Far Side. We recommend that all these rooms be equipped with a lap top projector and a document camera. The lap top projector should have a light intensity of 1000-1500 lumens, and should have a resolution of at least SVGA. An example of such a system, which costs $4400, can be found at http://www.csd.toshiba.com/cgi-bin/tais/pc/pc_prodDetail.jsp?comm=ST&plin=Projectors&pfam=Projector%20Bundles&poid=188580&aoid=118022. This will greatly improve the quality of the image being broadcast to remote users. A laptop projector is essential if you want to encourage people to post their transparencies before the meeting. However, we recommend that FNAL always broadcast an image of the person giving the talk, because the fact that speakers also use non-verbal means of communication during their talk is one of the main reasons video as well as audio images are necessary.
5. We recommend that the equipment in the Far Side be replaced, since it is obsolete, and cannot be upgraded.
6. We make recommendations about rooms in a later section of this document..
7. We recommend that DØ buy 3 scanners for those people who absolutely insist on writing transparencies by hand.

8. We encourage remote users connecting via IP to download the software onto their own personal laptops, and to use headsets. We do not encourage remote users to set up "video room", in which a bunch of people use one pc and one sound system for the VRVS connection

Suggested Rules for Meetings

1. Offsite participants should be given a chance to identify themselves "a general welcome" at the beginnings of those meetings that are broadcast using ISDN. Unfortunately, the ISDN video systems only show the image of the last person who spoke, so people can attend the meeting without anybody at the lab realizing they are there (VRVS broadcasts the images of all the attendees, all the time).
2. The main source of audio problems is the fans in the transparency projectors. Because of this, we recommend that the speaker wear a wireless headset or a lapel mike, instead of using a mike sitting on the table. We recommend the headset, because this keeps the microphone always at the optimum distance from the speaker's mouth (and besides, its cool). This will reduce fan noise. The speaker should never use the mike sitting on the table, and nobody should ever move the mikes, and especially should never move them near fans or other noisy equipment.
3. We recommend they use PDF (preferably zipped) or Postscript format with font size 22 or 24. However, if the person writes their talk in some other format, like Powerpoint, work, or Staroffice, the original should also be made available, as Adobe Acrobat doesn't always translate these well, and Staroffice makes gigantic postscript files. Again, conveners should enforce these rules.
4. We advise that the overhead cameras be set on fixed focus, not automatic focus because when the automatic focus is used, a conventional pointer causes the screen to go out of focus just where the speaker is pointing.
5. We encourage people to use laser pointers (see the previous item).
6. When IP video conferencing (VRVS) is used, people at the remote end who are using flat mikes instead of headsets must aggressively mute (we encourage remote users to download the software onto their own personal laptops, and to use headsets. We do not encourage remote users to set up "video room", in which a bunch of people use one pc and one sound system for the VRVS connection.)

Recommendations on Video Hardware at the Lab

Rooms

Video conferencing is currently available in the 9th circle, dog house, and far side. PPD has provided limited funds for improving the video capabilities at D0. Several locations for a single new room have been considered including the DAB3 "clean room", DAB5 and 6, and DAB2. Given the limited funds we suggest keeping the current set of rooms with the following set of improvements:

1) Remove the AC from the Ninth Circle and Farside windows. Provide a quieter system using remote units and ductwork.
2) Add a quality audio system to the Ninth Circle with several microphones and a control box
3) Stiffen the floor under the transparency table.
4) Clean up the room (drywall, proper routing of cables, better tables …)
5) Add separate lighting controls for the screen area.
6) Add (necessarily low) risers to the Ninth Circle to improve viewing angles
7) Consider adding some fixed seating to improve the room's capacity
8) Extend the Doghouse into what is currently the Tata space.

This should fix some problems with the 9th circle, namely that the projector image bounces even when someone walks down the hall outside the room and the ceiling is so low that only ½ of the transparency can be seen by the audience.

Sound

Almost everybody who responded to the survey complained about the sound. It is imperative that we improve the sound system in the video rooms (9th circle, dog house, far side). It is extremely difficult to design a sound system for a large room that will pick up a speaker's voice from anywhere in that room and amplify it suitably, while at the same time eliminating feedback and background noise. (Note that the biggest complaint from CDF is still sound quality.) A design for the 9th Circle based on the CDF room has mikes for the speaker and mikes hanging around the ceiling for the audience. The cost was $14K. This $14K buys a large box of electronics that balances multiple mikes around the room to prevent feedback, while at the same time canceling background noise. CDF says it takes some careful readjusting as the seasons change and air circulation patterns change. Because of this, the system should be installed when we upgrade the room air conditioning. We think we should go forward with this design.

Tom Marshall made the following recommendations for each existing room.

DOGHOUSE

Now that the room has a quiet projector, the single flat mike does a fairly good job. I haven't heard many complaints about that room. If we make the room 50% larger, we can add a remote head mike for the speaker.

FARSIDE

Nothing can be done with this room unless we replace its current Picturetel system. It's current Picturetel system does not allow both a remote mike and room mike to be used. So, we should get a new system, and, a remote head mike for the speaker plus one or two flat mikes in series. This should work.

9th CIRCLE

Assuming we have to keep this as our large conference room, I would keep a good head mike for the speaker and the flat room mike for small audiences. For large audiences 2 or

3 unidirectional handheld mikes would be passed around the audience. These would have an off/on switch to avoid feedback problems. It might be possible to have all mikes amplified through a room speaker, so the main speaker and those in the audience as well could hear the comments by the remote users. There is equipment at Radio Shack that might achieve this.

However, the task force thinks would be better to go through with the full $14K design, described above, when the air conditioning in that room is fixed.

 USER EDUCATION
We will have to educate the users regarding mikes. The Polycom Flat table mikes are designed to sample background noise and cancel it. They are meant to remain stationary on a solid flat surface and positioned at least 10 feet away from other mikes in the system. I have found the mikes dangling form the ceiling, being hand carried by the speakers (that must have produced some Horrendous noise for the remote audience), or placed next to the cooling fan of the projector in an attempt to have one mike for the audience and the speaker. There is a great reluctance to use the remote mike. I believe it is not able to keep a steady pickup when blipped on to the speaker and the speaker turns his/her head away from the mike. When the battery gets low the mike screws up the other mike and nothing can be heard. The type of remote head mikes used by entertainers will remove this problem. All conferences require that comments from the audience be presented through a designated mike. If not the speaker must repeat the question or comment, but that is hard to enforce.

Discussion of Recommendations

Surveys and their Results.

We sent a survey to the DØ Institutional Board. 17 US and several non-US institutions responded to the survey. The US institutions were Iowa State, Kansas State, Arizona, University of Kansas, UC Riverside, Michigan State, Langston University, Oklahoma, UI Chicago Circle, LBL, NIU, Nebraska, Notre Dame, Northwestern, Indiana, Louisiana Tech, Rochester. The non-US institutions were Universidad San Francisco de Quito, Univ Buenos Aires, the Czech Institutions, CBPF, UERJ, the Dutch institutions, Munich, Saclay, Mainz, Strasbourg, Imperial, Aachen.

Even though the questionnaire did not specifically ask about IP video conferencing, all the non-US institutions expressed a desire for IP-based video conferencing, except USFQ, Mainz, Aachen, Strasbourg, and Saclay.   One mentioned that IP based video conferencing would allow them to connect from home to afternoon meetings at FNAL (when it is late in the night in Europe).   From the US responses, 7 groups want IP video conferencing (again, even though we did not specifically ask about this in our survey), one group does not like IP video conferencing, 8 groups commented on the poor sound quality, and 7 groups commented on the poor video quality, requesting either a document camera, or posting of the transparencies. Typical quotes (from the US and non-US

responses) are "the biggest problem is the sound. It is extremely bad!", "it sounds like you are in a helicopter", "quality of video of the transparency screen is almost always poor", "the typical problems we encounter is the inability to hear the speaker and the discussion, and the slides are also hard to see", "require that speakers have their slides available at least an hour before the meeting. Speakers should have thought about what they are going to say in advance. I have seen enough presentations with plots produced at the last minute that lead to infinite discussion, only to discover later there was an error in the plot", " Dzero has the worst system I have ever seen", "the farside is particularly bad", "Can we please have a web based option, as this would really bring the cost down for UK based groups...".

We also surveyed other collaborations, CDF, CMS, ATLAS, and BaBar.

Babar does not do video conferencing. Instead, they rely on phone conferences, with transparencies posted on the web. Plastic is almost never used. They require electronic copies of talks for almost all meetings. Usually, the talks are posted a few minutes before the meeting. Many people link to the meetings, participation from remote users is very active. (Some people at SLAC connect remotely because they are too lazy to walk down the hall!). However, users complain about the sound quality.

CDF requires electronic copies of talks for the CDF collaboration meeting, the CDF weekly meeting, physics group meetings, working group meetings, offline meetings, and reviews. But, they are required after the meeting, not before (strange, if its electronic, why not post before?) Their biggest complaints are again about the sound quality.

Both LHC experiments use both DCS and ISDN.   All the CERN videoconference rooms are equipped with a PC equipped with an optional ZYDACRON-ISDN board running an "ONWAN" software. This means all videoconferences are broadcast both ways. The system has a small problem; remote people on the ISDN side cannot talk to remote people on the IP end without feedback and with good audio quality unless the sound is done very carefully. Both experiments use IP video conferencing more than ISDN. They mostly use the IP video conferencing for sound, and look at transparencies posted on the web for the picture. Sound quality on IP video conferencing can be especially bad, because the remote site will often go cheap and get non-echo canceling speakers, and then forget to mute.

 CMS requires transparencies to be posted on the web in advance of the meeting for their physics group meetings, DAQ meetings, and software meetings. Other meetings do not have this requirement. One of the authors of this report (Sarah Eno) runs one of these meetings.

In ATLAS, they make sure to have a video projector in every room. This encourages everybody to write their talk on their lap top, then hook it up. This automatically leads to transparencies that can be posted at the start of the meeting. For software meetings, everybody does electronic transparencies. For hardware meetings, this is not true. They also have a fancy electronic meeting agenda and transparency archive system. People

can easily upload their talk to this system before the meeting. This also encourages people to post electronic copies, and most do post in advance of the meeting, and provides easy, convenient documentation for the meetings. To quote Srini Rajagopalan (an old Dzeroid) on this system

"For software meetings, almost everyone has electronic slides that they project. It has been over a year since I printed out transparencies. The meeting agenda is usually posted in the web. CERN has a very fancy web-based document management system that you should take a look at. When you set up a meeting, you get a password. The password is sent to people on the agenda who can upload their slides + any other comments they may have. The agenda page for ATLAS is on...http://documents.cern.ch/AGE/v2_0/displayLevel.php?level=2&fid=1l2
Look especially at Computing/software workshop (you cannot change it since you do not have a password, so you won't see all the functionality's). An additional feature you get for free is that it maintains the archives... I can refer to talks years old and not worry about users maintaining their links. People who give talks upload it themselves - given the password. The convener puts up the agenda and distributes passwords to the people speaking. Please see the web site above to get an idea. Usual format is .ppt - we recommend PDF as well: The page accepts multiple formats and provides format conversion services as well. "

Recommendations about posting presentations on the web

Our main recommendation is that speakers post their transparencies before meetings. People seem to think this requirement may be too difficult, that it may prevent DØ from obtaining results quickly and efficiently. However, we (politely) disagree. First of all, most people today already produce electronic copies of their talks. Very few people, especially in physics group meetings or ID meetings, show hand-written transparencies. However, once you have produced an electronic talk, why not post it? Everybody has a web area on d0mino (~username/public_html/d0_private). All they need to do is move their talk to this area (though, as we mentioned earlier, the disk space for this area should be increased), and send an email with the URL. People say they only start to write their talk one hour before the meeting. So, now they will have to write it 2 hours before the meeting. Will starting 2 hours before the meeting, instead of 1 hour, really hurt their productivity? Some older people do say it is difficult to write electronic transparencies. However, most people, once they get over the initial hurdle of learning powerpoint, tex, or some other tool, actually find it easier then writing by hand (a pen does not have a backspace key! And, if the talks are projected from a PC using a document camera, there will be no more panics due to printer jams just before the meeting!)   And, the posting of talks may actually improve our ability to publish. Making students post their talk will encourage students to show their talk to their advisor before giving a talk (they have that hour before the talk to discuss it with their advisor, and even if the advisor is remote, they can easily discuss it over the telephone).

IP video conferencing

IP video conferencing has several advantages. First of all, it is very cheap. Any person at a remote institution can get any old pc with a sound card, a headset at Radioshack, download free software from vrvs.org, and they are ready to go. The video conferencing itself is free, while ISDN video conferencing typically costs $50/hour. It is also convenient. You can sit in your office (or at home late at night, if you are in Europe), and connect via your laptop, without making any reservations, etc. Also, there have recently been problems with the ISDN video conferencing. If we also provided IP video conferencing at the same time, people would have an alternative path to the meeting. However, with IP video conferencing, the video image is poor. IP video conferencing works best if the talks are posted on the web. Also, people must aggressively mute their microphones to prevent feedback.

IP video conferencing is the only option for most non-US institutions. Therefore, we recommend that DØ start this project. CERN current has a system that can simultaneously do VRVS and ISDN video conferencing, which consists of a PC equipped with an optional ZYDACRON-ISDN board running "ONWAN" software. This system has one small problem. Remote users on the IP end cannot talk to remote users on the ISDN end unless the sound is done very carefully. However, for most meetings, this kind of communication is not common. Mostly, remote users speak to the lab.

We propose we try this system in the 9th circle. This system requires a new PC, and a card that costs about $1500 US dollars. We ask that an FNAL technician be assigned to try to implement this solution.

There is an alternative, but we recommend against it. ESNET (which does our current ISDN based video conferencing) has a plan to make IP video conferencing. They expect to have a version ready that does ISDN and IP simultaneously by May, but Sheila thinks it could easily slip to summer. This solution is a HARDWARE solution. It can not be run using a PC plus headset only, like VRVS. You need to buy a $300 piece of hardware from the Polycom company called "Viavideo" for each setup you want. Note that for VRVS, any old pc with a headset can instantly and freely become a video station. ESNET has thought about adding software solution interfaces to their work, via Netmeeting by Microsoft. (though, VRVS is free, we're sure net meeting is not?), but they are having problems doing it. They have a plan to make it possible to connect with VRVS, but Sheila doesn't expect this to happen this year.

D0 Video Conference Coordinator

In the past, D0 had a technician who was responsible for helping to maintain the video equipment, and train the users. This position has been unfilled for two years, and this

may in part explain the current dissatisfaction with the system. Among the responsibilities for the position were:

1. Being knowledgeable about the various types of video conferencing equipment used by D0 and possible future equipment.
2. Learning about microphones and various problems with the audio equipment.
3. Keeping up-to-date instructions on the use of the video conf. equipment in each D0 conference room.
4. Checking out the equipment in each room once a week (Wednesday morning might be a good time) to spot problems (old batteries, disconnected mikes...) before heavy video conferencing usage begins.
5. Respond to problems with video conferencing when they occur if possible. Otherwise check out E-MAIL complaints and send message back so the person knows someone looked at it.
6. Work with Sheila Cisko. When necessary to check out new future problems with Fermilab video conferencing.

This person could also develop a training course for the conveners, and work with them to make video conferencing more pleasant. They could also work on implementing the other recommendations, for example the ATLAS-like meeting organization software and the hardware to allow simultaneous ISDN/IP video conferencing.

Conclusion

If the people at FNAL are willing to put in a small amount of effort, they could greatly increase the productivity of those away from the lab. If each University group is willing to donate money, we could have a truly first rate video system. It remains to be seen if DØ has the will to do these things. Especially, the conveners play a crucial role. If they are willing to learn to use the video equipment, if they will enforce the rules, it will drastically change the usefulness of video conferencing (special thanks to the top conveners, who we are told already do this!) The remote users also bear a special responsibility. They must not be afraid or shy about speaking up when the video is having problems. They must politely insist that the problem be fixed before the meeting continues.

Appendix 1

SURVEY FOR IB MEMBERS

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Dear IB member,

The spokesmen have formed a task force for the purpose of making recommendations on how to improve video conferencing at D0, and have asked me, Ursula Bassler, Ronald Lipton, Gordon Watts, and Tom Marshall to be its members.

The charge to the task force is as follows:

* understand the needs for videoconferencing within D0
    and the problems with the present situation

* understand the technical issues to the extent that
    they constrain what we can or should do (for example,
    ISDN vs. IP conferencing, limits of ESNET)

* make recommendations to the spokespeople as to what
    D0's strategy should be for the next 12 months. This
    should cover recommended equipment purchases, possible
    improvements to the meeting rooms and configuration
    of the meeting room proposed for DAB, and sociological
    or organizational changes.

We would like input from your institution. Could you please answer this small survey?

1) how many times per two weeks (on+off week) does somebody from your institution
connect to d0 for a video conference?

2) if this is less than 1, why?

3) for your institution, how much per hour do the following cost:
ISDN connection? long-distance telephone call over regular phone system?

4) Do you ever have conflicts at your institution over the video equipment (more than 1
person wanting to use the equipment for different meetings, at the same time)
equipment (more than 1 person wanting to use the equipment for different meetings, at
the same time)

5) do you have any advice/opinions on video conferencing that you would
like to share with our committee.

Thank you,
Sarah Eno