# *SESSION 7*
# RESERVE

*Roger Bailey and Guy Crockford*
CERN, Geneva, Switzerland

**Abstract**
The reserve session was devoted to some issues that came up through the workshop, which were grouped into three main areas:

- The Global Accelerator Network
- Problems of stress and how to get organized to minimize them
- What should an operations group be responsible for?

This paper summarizes the discussions that took place.

## 1. THE GLOBAL ACCELERATOR NETWORK

Steve Peggs from BNL introduced the subject, which is motivated by the possibility that any major new machine will be on such a scale that it will require international and inter-laboratory collaboration not only to build it but also to operate it. This leads into the question of whether or not it is sensible to consider remote operation of a major facility, with responsibility shared between various laboratories. To address these issues, ICFA has initiated a feasibility study into such a Global Accelerator Network. The purpose of presenting it here was to get direct feedback from operations professionals and in the lively discussion the following points came out.

Accelerators do not operate 100% of the time; they are down for scheduled long periods (months) for installation, maintenance etc. and for unscheduled short stops (hours or days) for repairs. For both of these activities experienced on-site staff are needed, and for the long stops there has to be sufficient infrastructure on-site to support a large number of people and activities.

Moving on to the times when the machine is running, opinion on remote operation was mixed. So long as there are no analogue signals to accommodate, it was felt that the control room could be situated anywhere on site already today, as long as the function of the control room is only to control an accelerator. With the advances in telecommunications technology that will surely come in the next years, it should be technically possible to situate the control room far away from the machine. Remote intervention, by experts from home, is already a part of today's operation. The question of system security was raised, and this only gets worse with greater distance between control and facility.

Present control rooms, however, cover other functions than those involved with turning knobs. Informal, spontaneous communications is an essential part of accelerator operation, as anyone who has spent time in a control room will testify. Getting in touch with an expert, or a variety of different experts, is invaluable when facing a tricky problem. If these experts are scattered around the world, it could be a problem. More generally, the control room is a communication centre; if people want to know anything about machine operation they come to or call the control room. If the control room was far from the facility or the laboratory, these kind of functions would have to be performed differently, and here we are getting into sociological matters that should not be underestimated.

It was suggested that a low cost test would be a good idea. That is, set up the remote control of an existing accelerator from another laboratory. This would provide some immediate feedback on many of the problems, both technical and sociological.

Laboratories are interested to participate in major projects, but not as side players. A laboratory or a country would be more likely to be willing to contribute hardware to a project if, after installation and commissioning, that laboratory or country continues to operate the equipment. This seems to be far more attractive than to build and donate equipment for other people to run. In fact this is the way that large, modern accelerator experiments are built and operated already today.

Finally, it was realized that if we control a facility from 3 strategically placed control centres, the machine could always be operated during daytime. The suggestion made was for 8 hour shifts consecutively in CERN, SLAC and KEK, and with this we would not have to worry any more about shiftwork and associated problems!

## 2. PROBLEMS OF STRESS AND HOW TO GET ORGANISED TO MINIMISE THEM

At an earlier talk (session 3) the problems related to stress were presented and discussed, but with limited time for feedback from the floor. Is it really something we should worry about? If so where does it come from? These questions were asked and it was clear that stress is felt to be an issue in 24h operations. In order to try to bring out experiences, first group leaders and then operators were asked to publicly offer their opinions.

What do the group leaders see as the sources of stress?

- Multi-tasking. Dealing with too many things at once.
- Too much pressure from clients.
- Biological effects of working night shifts.
- Sociological effects of shiftwork.
- Many responsibilities but not enough authority.
- Everything done in control room is very visible. This can be positive, but a source of stress.
- Personal problems (outside the working environment).
- Conflicts with colleagues in the group.
- Communication problems with other colleagues in the laboratory.
- Poor management.
- Too many regulations from outside agencies.

What do OP group members see as (further) sources of stress?

- Problems during night shifts.
- Fear of waking up the wrong expert when outside help required.
- Disturbance in the control room.
- Disturbance from telephone calls.
- The 8:30 in the morning effect, when the control room is invaded.
- Stressful modes of operation, such as intensive collider operation.
- Concern for safety aspects of work (fear of getting a call on the red phone).
- Shift crew leader having too much administrative work to get through.

Immediately that the question was asked about how to deal with these sources of stress, the discussion turned towards how to get organized for shiftwork. This left many of the above problems not addressed; they could be considered at a future workshop.

The various laboratories had quite different solutions to shiftwork, ranging from fast rotation of morning, afternoon and night shifts to a system where operators worked months of days, then months of afternoons then months of nights. While the array of solutions was numerous, the following was clear; allow the operators the freedom, obviously within the constraints of the laboratory, to adopt a shift system that suits them.

Whatever system is adopted, it was felt that the minimum number of people per post should not fall below 7. This directly influences the number of shifts worked per unit time, and if this number is too high this is a serious source of stress. Cases were discussed where this had led to a vicious circle of too many shifts / stress / people leave / more shifts / more stress etc. Also, make sure that there are enough people on shift to perform the multitude of tasks that operations do.

One laboratory, DESY, does not formally have an operations group. Instead, machine operation is performed by personnel drawn from the equipment groups of the laboratory. The shift load is necessarily rather low, at 7 days per month, which brings the disadvantage that operators are away from the machine for quite long periods.

Getting organized for 24h operation has been discussed at some length in the first operations workshop in 1996. However, it was felt that this area is of sufficient interest to warrant a new exchange of ideas. It was suggested that the different laboratories could make available on the web information such as machine schedules, shift schedules, group organigramme etc.

## 3. WHAT SHOULD AN OPERATIONS GROUP BE RESPONSIBLE FOR?

In smaller laboratories, there is one control room, from where all operational functions are performed. In these cases at least it is clear what operations are responsible for; just about everything! This is a certain source of stress, and can lead to reduced efficiency for physics.

At the larger laboratories, there are several control rooms, which distributes the responsibilities but brings problems of communication between the different groups involved. These problems are exacerbated at times of major breakdown; it is important to establish clear procedures and priorities that all groups agree upon and follow.

For equipment faults, almost all operations groups attempt simple repairs. Different laboratories allow different levels of intervention, usually determined by the equipment specialists or by safety considerations. For example, interventions on high voltage equipment are never carried out by operations personnel.

Access into the machine is a particular area of concern. If machine operations supervises the access, this could lead to a conflict of interest because the same group also wants to get the machine going again as fast as possible. Corners could be cut, and safety could be compromised. On the other hand, if machine access is supervised by a separate group, safety is better assured but the price paid is a drop in efficiency. There is clear pressure (from the laboratory management) for a high level of efficiency, while safety is more a dormant requirement until something goes wrong. While there was plenty of discussion around this point, the general feeling was that, during periods of machine operation with beam, the operations group should take overall responsibility for access into the tunnel.