

The problem: As you all know, we have a serious problem with scheduling on the fMRI scanners. The current cancellation policy is quite unrestricted: a PI may sign up for as much time as they'd like, limited only by their total approved slots for the project, and as long as they cancel time-slots 2 days or more before they occur they have no responsibility for that slot. Unfortunately, this has now developed into a vicious cycle. Some investigators have been reserving much more time than they plan to use, and canceling what they don't need. This means that the schedule looks very full, with no available slots, but the number of slots actually used is much less. The problem is that there is not sufficient time for those cancelled slots to be taken by someone else. The vicious cycle grows as other PI's feel the need to also schedule many more slots than they need far ahead of time to insure they will be able to get on the scanner.

User's meeting suggestion: At the last User's Meeting we discussed the problem, and there was a strong feeling that a 30-day cancellation policy is needed. The suggestion was also proposed that it would be useful to be able to reserve a slot for 2 hours in order to pull together the team and the subject, but that such a "hold" could be cancelled without penalty. Subsequently there was concern over the idea of 30-day responsibility for reserved slots from groups who can't know that far ahead when their subjects will be available. However, the basic problem we have is that our actual usage does not fill the schedule, so our problem is not capacity but rather accessing that capacity in an efficient way. If we can break out of this vicious cycle of over-scheduling far ahead, there would be more time available to all studies.

Pilot hours: From the opening of the Center we have had a policy of providing free pilot hours to PI's in proportion to the number of scans they are doing. The goal of this was for the Center to provide a buffer to the PI's to cover time needed for piloting experiments and time lost due to subject no-shows, Operator errors that lead to bad data, and other problems that fall under the PI's responsibility. (In contrast, if there are technical problems with the scanners we consider that the Center's responsibility, and we never charge for scan time in those circumstances). To help deal with the cancellation problem, we are now changing this policy.

New policy: We are changing the cancellation policy effective for the month of June 2007 as described below. The goal of this plan is to make the PI's responsible for their actions, and also give them the maximum flexibility to plan their actions to best deal with the specific needs of their studies.

1. *Lost hours:* We define lost hours as time-slots that go unused but were previously reserved by a PI for more than 2 hours during the previous 30 days. The 2-hour clause provides the opportunity for a PI to hold a slot briefly to confirm that it can be used, and as long as the PI cancels the slot within 2 hours they incur no responsibility for that slot. If a PI cancels a reserved slot and another PI reserves the slot, the first PI no longer has any responsibility for that slot. Otherwise, the PI is responsible for lost hours attributed to that project. Each month the responsible lost hours will be tallied for each project.

2. *Used hours*: Each month we will also tally the hours used (either paid or pilot hours) by each project.

3. *Rewards and Penalties*: The disposition of pilot hours will then be determined by the ratio of lost/used hours for each project. We have targeted an acceptable level of lost hours as 25% of the used hours. If a project does better than this lost hours percentage, pilot hours will be added to the account. If a project performs worse than this ratio, pilot hours will be removed from the account. For the awards, pilot hours will be added such that the sum of reward pilot hours plus lost hours is 25% of the hours used. For the penalties, pilot hours will be removed such that lost hours minus the penalty pilot hours is 25% of the hours used. In other words, the center will absorb a loss rate of 25% for each project, and adjust pilot hours accordingly. (See examples below.)

4. *Reconciliation of accounts*. If a project consistently performs worse than the 25% level, it is possible for the pilot hour account to go negative. Periodically we will reconcile all accounts for a PI, removing pilot hours from their other accounts if necessary to offset the deficit in accounts that have gone negative. In this way, the average performance of the PI's full suite of projects is required to meet a lost hours percentage of no more than 25%. If a PI cannot meet this goal, then we will have to introduce new policies limiting that PI's freedom in scheduling. At this point we hope that will not be necessary.

Examples: For a project that uses 32 hours of scanner time, the maximum number of lost hours is 8. If the project has no lost hours, it will be awarded 8 pilot hours. For 5 lost hours, the project will be awarded 3 pilot hours. If the project is responsible for 10 lost hours, then 2 hours will be deducted from the project's pilot hour account. In the context of our old system of awarding pilot hours in proportion to paid hours, the initial award for a perfectly efficient study (no lost hours) is 4:1, as in our current plan. However, when those pilot hours are used they can bring in a further award of pilot hours if done without incurring lost hours. The net result for a perfectly efficient study works out to be equivalent to a 3:1 reward ratio.

Optimal strategy: With this policy it is to the PI's advantage to minimize lost hours attributed to their accounts. With no lost hours, the account can accumulate more pilot hours than under the current pilot hour policy (because the new reward pilot hours are based on total hours used, not just paid hours used). A PI may schedule and cancel as often as needed—there is no penalty for the number of cancellations. The penalty only depends on what eventually happens—was the slot used or not? It is also an advantage for PI's to work together to use slots that have been reserved. In short, everyone wins if there are no lost hours, because this will maximize the number of available open slots and maximize the number of free pilot hours awarded. And by maximizing the availability of slots, we hope to be able to fully utilize the capacity of the scanners.