

SCORE: Agile Research Group Management

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Working with and mentoring Ph.D. students is the central activity in running an academic research group. At the start of our careers as assistant professors, we took a fairly typical approach to managing student interactions: once or twice per week, we met with each of our students in pre-scheduled, roughly half-hour or hour-long slots. However, this approach started breaking down as we gained more students and our other responsibilities increased: our time became fragmented and inefficiently used; hard-earned lessons were not shared effectively among students; and our group lacked any real cohesion or identity.

In September 2006, we learned about Scrum (Agile Development Methods Inc. 2008), an “agile” software development methodology, and realized that we might be able to solve some of the problems we were having by adapting it to managing our research group.

In this viewpoint, we briefly describe the resulting process, which we call SCORE (“Scrum for Research”). We have been using SCORE for several years now, and we have discovered it has many benefits, some we intended and some which surprised us. While every situation is different, we hope that others may learn from our approach, in idea if not in form, and that this article might inspire further discussion of research group management strategies. A longer version of this article, as well as more information and space for feedback, is available at <http://www.cs.umd.edu/projects/PL/score>.

Score

The major feature of SCORE is its meeting structure, which consists of two parts.

Regular all-hands status meetings Several times a week (late mornings on Tuesdays, Wednesdays, and Fridays in our group), the group meets in a nearby conference room for a 15-minute, all-hands *status meeting*, modeled after the daily “scrum” meeting for which Scrum is named. During the meeting each person gives a brief update on (1) what they did since the last meeting, (2) what problems they encountered, and (3) what they plan to do for the next meeting. If someone cannot physically attend the meeting, they may conference-

call in, but physical presence is much preferred. Everyone stands during the meeting, to encourage brevity.

Though brief, status reports are information-rich. Students report on a wide range of activities, such as progress in implementing code, carrying out an experiment, reading a paper, working on a proof, writing up a result, or preparing a talk. We encourage students to present their status to the group, rather than just to the faculty. Students may also say there has been no change in their status, typically because of classwork or for personal reasons.

On-demand research meetings Whenever a student or one of us thinks a more in-depth, one-on-one meeting is needed, we schedule it *on demand*. Since only the status meetings are prescheduled, we are able to reserve large blocks of time (most afternoons) for holding on-demand meetings, and the meetings can be of varying durations—as long, or as short, as required. We often schedule on-demand meetings immediately following a status meeting, typically for the same afternoon.

We kicked off SCORE with a “research review day” of conference-style talks describing ongoing research projects, to provide context for the ensuing status reports. As needed, we inject some of these talks to inform the group of a new project or to “checkpoint” a recent major result.

To help increase group spirit further, we have a weekly lunch, and we also hold a reading group one day per week.

Why it works for us

Though simple, SCORE works remarkably well for us. After nine months of using SCORE, we surveyed our students for feedback, and their responses were very positive. Since then, colleagues at various institutions have adopted aspects of SCORE, and they have offered us feedback. From these and our own assessments, we have identified the following list of SCORE’s benefits. While none of these benefits is unique to SCORE, it is convenient that SCORE has them all.

More efficient time use for faculty. A major problem we had with pre-arranged meetings was schedule fragmentation. When a student had only a quick status update, the meeting slot was too long, and the remaining chunks of time were

hard to use. On the other hand, when a student had a deep technical issue to explore, the slots were too short. Because we had so many pre-scheduled meetings, subsequent discussion might have to wait a day or two, slowing progress. Moreover, context-switching frequently over the course of many meetings was very draining, reducing the meetings' effectiveness.

SCORE solves these issues very well by separating quick status reports from in-depth technical discussions. On-demand meetings have a clear purpose and are therefore much more productive than our weekly meetings used to be.

Improved productivity for students. By our own observations and those of our students, frequent student-adviser contact at SCORE status meetings has improved student morale and productivity. In response to our survey, one student said,

I like the frequency of the status meetings. Frequent meetings make incremental progress necessary: to have something to say at each meeting, you can't goof off for an extended period of time. Also, if you don't know where to go next, there isn't much time before another meeting, when you can get back on track. On the other hand, the frequency of the meetings means that, if something came up and you don't have anything to report for today, it's not a big deal; you'll have something for tomorrow or the next day.

Most graduate students struggle at some point—one study found that “At [UC] Berkeley, 67 percent of graduate students said they had felt hopeless at least once in the last year” (Fogg 2009). With thrice-weekly status meetings, we can identify struggling students quickly and therefore help them much sooner than we would have when meeting once per week.

Improved group identity and shared knowledge. By giving each person a window onto the activities of others, participants learn from others' successes and failures, which helps create a group sense of momentum and accomplishment. One student specifically commented he liked hearing about other students' progress:

I can follow other people's research and “daily research routine.” That helps because it's interesting and I learn things, but also because I can compare my productivity and have a better idea of how I fare.

More than half of the students surveyed specifically cited a “research community” or “sense of belonging” as a benefit of SCORE. The students said they feel the joy of their fellows' successes, which then creates further motivation and enthusiasm for their own work. At the same time, one student mentioned it was consoling to learn that other students hit slow patches, too: “It helped me with the realization that everyone has rough patches and that it is not a big deal.” Several students pointed out that regular social gatherings and proximate offices were also important in fostering this

sense of community. One student said, “Status meetings and the office atmosphere etc. make it worth my while to come to school.” Finally, group meetings remove faculty as the bottleneck to developing new ideas or solving technical problems, as students offer advice and begin collaborations with their fellows based on what they hear in the meetings.

Can Score work for you?

Every research group is different and must find its own process that works best. We hope that knowing about SCORE will prove useful to other groups, either as a new process to experiment with or as inspiration for other ideas. For example, instead of SCORE's status meetings there may be other good strategies to engender frequent contact and create opportunities for focused, in-depth meetings. Among others, some possible approaches are regular faculty “office hours” in a lab-space that co-locates many students; less formal “coffee hours”; or perhaps co-locating faculty with students. Lessons learned might be communicated more permanently by incorporating group mailing lists, wikis, or blogs. Pre-scheduled research meetings may also play a role, e.g., for external collaborators who do not attend status meetings.

SCORE can also be further improved, as it is silent about some important elements of running a research group. For example, SCORE has no specific process for generating and discussing research ideas. Currently we explore ideas during the on-demand meetings, but doing so does not take advantage of the perspective of the larger group, nor does it give students a broader view of this process.

We encourage interested readers to read the longer version of this article at the SCORE web page, <http://www.cs.umd.edu/projects/PL/score>, and to provide comments on the ideas and issues raised. The long version goes into more detail about running SCORE in practice, describes elements of SCORE that we tried but did not work for us, and reports more in-depth responses to our student survey. We look forward to further exploring strategies for mentoring and working with graduate students to produce high-quality academic research.

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