The Southwestern Center for Arithmetical Algebraic Geometry

Douglas Ulmer
University of Arizona

Dialog 2004
Washington, DC
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The Southwestern Center

• A DMS funded project with 10 PIs at 5 Universities (Arizona, UT Austin, UNM, USC, Berkeley)

• Funded by GIG in 1997, Infrastructure in 2002

• The focus is on training and research in arithmetical algebraic geometry (modern number theory).

• The most important activity is the Arizona Winter School.
The Arizona Winter School

- A 5-day instructional meeting for advanced graduate students and post-docs. Characteristics:
  - focused (4-5 courses of 4-5 lectures each on a carefully chosen topic of current interest)
  - top quality participants (Deligne, Katz, Mazur, Rubin, Sarnak, ... and students selected competitively from across the country)
  - very intensive (lectures and working session from 9 am to 10 pm and beyond)
  - very interactive (students work with a speaker on a project which they present at the meeting)
## Typical Schedule: Lectures

<table>
<thead>
<tr>
<th>Time</th>
<th>Saturday 3/9</th>
<th>Sunday 3/10</th>
<th>Monday 3/11</th>
<th>Tuesday 3/12</th>
<th>Wednesday 3/13</th>
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</thead>
<tbody>
<tr>
<td>9:00</td>
<td>Deligne</td>
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<td>Deligne</td>
<td>Villegas students</td>
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<td>10:00</td>
<td>Coffee</td>
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<td>10:30</td>
<td>Voisin</td>
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<td>Deligne students</td>
<td>Voisin</td>
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<tr>
<td>11:30</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<td>Lunch</td>
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<tr>
<td>2:00</td>
<td>PD: Hughes Hallet</td>
<td>PD: Takahashi</td>
<td>Free Time</td>
<td>PD: Velez</td>
<td>PD: Ulmer</td>
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<td>3:00</td>
<td>Villegas</td>
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<td>Villegas</td>
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<td>4:00</td>
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<td>Coffee</td>
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<td>4:30</td>
<td>Deligne</td>
<td>Voisin</td>
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<td>deJong students</td>
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Evening Working Sessions
There will be evening sessions with light refreshments from 7 to 10 pm on Friday, Saturday, Sunday, Monday, and Tuesday evenings. These sessions will provide students with an opportunity to discuss their projects with the speakers, as well as a chance for everyone to get more details or clarifications from the speakers. Active participation is strongly encouraged.

Professional Development Component
The professional development component will be on the use of technology (such as the web, spreadsheets, and a calculator based laboratory) in the classroom.
Evening Working Sessions

Here two speakers---Peter Sarnak and Kevin Buzzard---work late at night with their students and some post-docs. It’s past midnight in the Sarnak picture.
Student Presentations

Luis Finotti and Chris Hurlburt after their presentation at AWS 2000. See our site for more pictures.
One speaker’s experience

I was worked very hard---that is to say four days of active participation in lectures, giving lectures, mentoring students, etc. The activity started at around 9 am and finished at 1 am each day. When I think about it now it seems a bit crazy but I found the hard work very rewarding. I learned quite a bit myself and I believe the 10 or so students with whom I worked continuously over this period also learned a lot. ... Three of our Princeton students, who participated in projects with Clozel and Ramakrishnan and Mazur, learned more in this short period than in months under standard conditions at a place like Princeton. ... Had I not been part of and seen that such an intense activity could work, I would no doubt be quite skeptical about its possible success. However, I can vouch that it works and in fact very well ...

- Peter Sarnak
There were ~400 participants in the first 5 years, ~250 students, ~250 distinct individuals.

Many relationships have developed across geographic and age boundaries.

Our site has notes, course and project descriptions, streaming video of lectures, ...

Significant high-level research (published in Inventiones, the Annals, Duke, ...) acknowledges SWC support or inspiration.
Costs

- About $500K for the first 5 years
- About $544K for the next 3-4 years:
  - participant travel
  - significant honoraria to motivate notes, projects
  - support for organizers
  - other activities of the center (distinguished lecture series, visitors, a web server)
Remarks

- Multi-year, multi-PI (and so multi-institutional) support makes this project possible.
  - multi-PI: pooled talents, energies, connections
  - multi-year: experiments, refinements, momentum

- Choices of topics, organizers, speakers, participants are, among other things, funding decisions. Pushing these decisions out to the “grass roots” (PIs) is an efficient way to distribute NSF funds.

- This type of activity might scale well in a “network” model.
Some Issues

• Multi-institutional grants are hard to administer. Can DMS simplify this?

• Distributing rewards, in particular overhead, is a source of conflict. Again, can DMS help?

• What is the appropriate form of oversight for funding decisions pushed out to the “grass roots”?

• What are appropriate budgets, durations, and numbers of PIs for this sort of project?
Conclusions

• Topically focused, multi-institutional groups can have a large impact in research and training.

• A distributed funding model can be efficient.

• DMS can and should do more to encourage these types of activities.

More information about the Southwestern Center is available on our web site: http://swc.math.arizona.edu