UMIACS Faculty Presentation and Discussion on

Fostering New Research Initiatives

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Intro from Varshney:

- Research Mission - Brit Kirwan's memo, Aug 25, 1985 - conduct basic and applied research in computer and computer-related studies...the Institute is expected to foster interdisciplinary research.
- We are evaluated on:
    - New research directions we've come up with
    - How many research dollars we've brought to the campus
- Expect future funding to be hard, because of potential reductions in federal government (spending cuts). Many PMs expect research dollars to decrease over next few years. Moreover, Maryland depends on federal government heavily, so federal reductions could result in reduced state support.
- What can we do to prepare ourselves and seed new research areas in UMIACS?
- Guide discussion through three research efforts:
    - Computational linguistics - How did we become so successful in this? Can we clone this success story? (Weinberg)
    - Socio-cultural modeling - more recent success story. (Subrahmanian)
    - Cybersecurity - just starting up on campus. What are challenges, and how can we meet them? (Hicks)

Weinberg:

- Lab was started by young research scientists (all assistant professors).
- Did interdisciplinary research as grad student at MIT. Didn't initially think there was anyone else to work with at Maryland. UMIACS was essential to success.
- Why band together as a young researcher? Was clear at the beginning it allowed work on bigger problems. Not interdisciplinary for its own sake. Couldn't have tackled those types of issues alone in Linguistics Department. But not strict in tight integration between everyone – some close collaborations, some sharing at higher (infrastructure) level.
- Attitude from above that CLIP lab not just for college/UMIACS, but for university.
- UMIACS offered part-time appointments which gave time to pursue research.
- Three phases of lab:

- o AI phase - tightly coupled, multi-investigator research; small array of problems. Proximity to NSA helped with funding. Having linguists and computer scientists working together benefitted research. Gave a different perspective from other research groups.
  - o Statistical focus - Tried not to get set in their ways, wanted to challenge assumptions. Went broader. Switched to setting the stage for proposals, rather than just responding.
  - o Lab currently a bit less focused; researchers doing more separately.
- Collegiality important to making lab a good place to work; attracted students.
- Was large enough to "go big" with funding.
- Financial incentives were helpful for keeping lab cohesive. But not necessary---strong relationship to teaching program could help better preparation for grad students. Try to find at least small financial incentives.
- Higher-level administrators want to hear about big initiatives.

Subrahmanian:

- Started out a couple of years after 9/11. Clear Iraq and Afghanistan not going well. What can we do? Found a number of people who could attack relevant problems – manage large data, disparate data sets, reason about and make forecasts about adversaries, incentivize adversaries to change behaviors.
- Had good CS ideas, but not much idea how done in practice. Put together group of people to complement CS – reached across campus, to people who seem far outside of CS.
- Didn't get any funding from UMIACS. But did get lots of technical support.
- Went out and talked to lots of people (e.g., in national security sector, foreign governments, World Bank).
- Important to have research excellence.
- Quickly got funding for it, starting from seed grant and getting bigger after that.
- Think about how to be self-supporting after a couple of years of seed funding.

Hicks:

- Cybersecurity barely started.
- Cybersecurity is not a new thing. But recently it's become apparent that it's a problem. Lots of funding available now. DARPA has just started several programs: CRASH (reinventing computing from the group up), homomorphic encryption, verifying absence of security vulnerabilities in Android apps. People see cybersecurity attacks have economic consequences.
- Many faculty have an interest, perhaps nascent right now.

- To solve cybersecurity problems, need more than just technical computer science solutions.
- Opportunity to have impact now, since opportunity is growing and resources are available.
- What should we do to energize collaborative research in cybersecurity, to do new things?
- Education side of cybersecurity important. To solve many problems need to educate people about the risks and the costs, and find a range of solutions. Can we train new generation to avoid these kinds of problems?
- In last year, lots happened in cybersecurity center. 45 companies have been in contact with cybersecurity center, and want to be associated with the center in some way. So resources/financial incentives are sitting there.

Open discussion:

- Lots of exciting directions to go. Given budget, should we think about what to deemphasize to free up resources for new goals? Are there things in UMIACS that are at end of lifecycle?
- Hallmark of UMIACS is that success comes from the bottom-up. The cybersecurity center seems a little bit more top-down ("command economy"). UMIACS should focus on making it possible for people to do what they think is a big idea.
- UMIACS has had tremendous success. Successes were due to leadership of an individual in an area. The same thing should happen with cybersecurity center; need a leader who shows the way. Cybersecurity is on a screen of everyone. Must be a success at Maryland. Need to motivate individuals who work in cybersecurity to join the team.
- Q: How much of the work in natural language done in UMIACS is in use? A: Lots of students have positions in industry (e.g., Google). Tools have migrated into government. CLIP lab has had lots of influence. A: Applications of human language technology far beyond what it used to be. Applications of what CLIP researchers are doing have spread into a lot of different units. A: Subrahmanian and Nau's lab has done a better job of publicizing where ideas are getting used; CLIP lab has not been as good at that. A: Some people do more basic research and some people do more applied research. CLIP lab does more basic research, generally. Ideas are actually used widely. Suggestion: would be good to publicize that fact.
- One success of UMIACS was creation of CASL. Here because of CLIP. Shouldn't allow that to be counted as someone else's success. Should include things like this when we tell our story. iSchool benefits from UMIACS.
- Business school is best department on campus as far as stopping doing things. They close labs with great regularity, so that they can open new labs. Part of

innovation cycle. UMIACS doesn't do this, and it's not part of the culture. (We're not "proud" of closing labs.) Need to be more agile and innovative.

- Two success stories we heard were born small, and grew organically. Surprised that iSchool has members of the cybersecurity center. Fine to have people around who make small contributions; but who are the people who are making the big contributions. If you can't tell who's making the big contributions out of a long list of people, may not be good.
- Lots of other important UMIACS developments that have not been mentioned, e.g., LTS, library work, SeSync.
- Looks like lots of resources available for cybersecurity center. However, nervous about center. Need leadership and focus for the center, vision that's reasonably unique, rather than number of faculty working in disparate areas working in cybersecurity. From high-level campus view, seems like 70 faculty in cybersecurity; why do we need a director? Need smaller group to have a vision. Then most (though not necessarily all) resources should be channeled to support this vision.
- Key words people were saying: thought leadership, relationship building, mentoring, scale, vision, innovation. JaJa was a behind-the-scenes mentor, linking up junior and senior faculty. We have lots of smarts in the room in terms of mentoring, but we haven't scaled it up. Need mentorship of labs and visions, not just one-to-one. This may be something UMIACS director can provide.
- Q: Should we be seeding new areas or also trying to strengthen the areas we have? A: For areas that are already successfully, we know what it takes for those. What do we do to carry us forward in these coming challenging times?
- Was shocked that NSF funding was for UMIACS. Pleasant surprise how high NIH funding (campus as a whole has a problem with NIH funding). Might want to think about focus on patient-centered practice of medicine, which is receiving a lot of attention these days (e.g., electronic health records) as a strategic opportunity on the NIH side. Should think about how to get more NSF money to mitigate risk of serious decline in DoD money.
- NSF skewed because most NSF funding goes out of departments, since mostly single or maybe two investigators. But perhaps medium or large scale proposals would naturally fit in UMIACS.
- Next time we meet, could we see bar chart of all funding from UMIACS members, ignoring the location of the funding. Collective impact of UMIACS would look large if we incorporated that, and may be more balanced. May be challenging to figure out how to slice up multi-investigator grants.
- Impression is support from Deans has not been that great for UMIACS over last view years. Is that correct? Feel that level of respect for computing field among professors in other departments will not allow a Dean from computing. Do we have

a problem with respect within the college? Should we push forward a big science effort? Might increase respect and budget.

- It may just be a marketing problem, but scientific problems do sound more important than algorithms and information technology etc. Perhaps we should pay more attention to this, to show we're actually having a significant impact. CBCB seems like it hasn't quite gelled. May be an opportunity for UMIACS to do something better. A: Have been internal discussions about making CBCB more of a hub on campus, and are working on it. But impact of CBCB on outside community has been tremendous.
- Q: Has there ever been an NSF science and technology center funded through UMIACS? A: We had a few attempts but weren't successful in the past, but there are some things in the works.
- In past, UMIACS has included people outside of College Park. What is UMICAS position on this? A: Long history here; there are people from UMBC in UMIACS.