Developing Scientific and Technological Leadership and Human Capital: Impact of IUCRC Directorship on Career Paths and Achievement

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Goal & Framework

• NSF is interested in the career implications of the IUCRC director role

• Project goal:

  To determine the professional trajectories and achievements of IUCRC directors and the extent to which these outcomes can be attributed to their IUCRC experience and training.

• Scientific & Technical Human Capital perspective
  – Social capital: Networks and professional linkages
  – Human capital: KSA’s, leadership roles
Dr. John White
Center for Logistics GTU

- Assist. Director NSF Engineering
- Dean, GTU Engineering
- President, U of Arkansas
- NCAA Division I Board of Directors
- President of the Institute of Industrial Engineers
- National Science Board two terms
- Corporate boards
Dr. Richard McMillon, Software Engineering Research Center

- Assistant Director of NSF’s Computer and Computation Research Division;
- VP Bellcore
- VP and first CTO at Hewlett-Packard;
- Dean of Computing GTU
- Corporate Boards
Dr. Sara Rajala, Center for Advanced Computing & Communications

- Associate Dean for Academic Affairs and Associate Dean for Research, NCSU

- Department Head, Electrical and Computer Engineering at Mississippi State University

- Dean, Engineering at Mississippi State University

- President of the Society for Engineering Education
Theoretical Framework: S&T HC

  - *Also presented at the American Political Science Assoc. in 1999, and available online at:*
  - [http://www.rvm.gatech.edu/paperfiles/00-01/scitech-human/STHC_ampoli1.pdf](http://www.rvm.gatech.edu/paperfiles/00-01/scitech-human/STHC_ampoli1.pdf)

- “Our approach… gives less attention to the discrete products and immediate outcomes from scientific projects and programs and more attention to scientists’ career trajectories and their sustained ability to contribute and enhance their capabilities.”
• “Arguably, then, public R&D evaluation should center not on economic value or even improvements in state-of-the-art, but on the growth of capacity.”
  – Bozeman et al. (1999) p 8

• Key concepts
  – Other assessments (econometric, bibliometric) ignore or minimize the “socially-embedded nature of knowledge creation”
  – Human Capital
    » New knowledge and competencies, evolving with time
    » Tacit understandings of science and its application
  – Social Capital
    » Individual productivity occurs within a larger community of practice
    » ‘Capital’ resides in direct and indirect ties in a knowledge network
Project Method

• Population: IUCRC center directors
  – Current & former
  – Founding & succeeding
  – Center & site

• Sample frame
  – Tenured or tenure track faculty when role was assumed
  – Assumed role prior to ~2008
  – Estimated sample: 150-200
  – Access db of all (?) IUCRC center and site directors *99% completed

• Exploratory, qualitative
  – Focus group, interview

• Quantitative
  – CV Analysis: pre/post bibliographic
  – Short web-based survey

• Case study interviews
  – Selection criteria TBD, but something like…
    » Primarily an admin/managerial path
    » Primarily a technical/scientific path
Focus Group

• Method
  – In-person focus group
  – 5 current/ former IUCRC directors (plus 1 semi-structured phone interview)
  – The focus group explored;
    » Positive/ negative impacts on directors’ personally and professionally
    » Skills and competencies acquired
    » Changes in professional networks
    » Department climate w/ regard to director roles

• Findings, Emergent Hypotheses and Questions
  – Consistent with Literature: clear human and social capital impacts
  – Some surprises
    » All directors had received admin job offers but only one succumbed to the lure of mainstream university positions
    » Directors can become isolated from their home department
    » Reported vicarious impacts: exposing large numbers of students to ind.
    » Call to the NSF to help promote benefits of IUCRC to university administrators
Quotes: Changes in Social Capital

• “That's a really good question because in my field at least there are conferences and meetings that mostly academics go to I no longer go to them because that is not where my customer is. So I go where my customers are which is mostly industry. And most of my colleagues don't go to the same conferences unless we are paying for research.”

• “I guess on the positive side it really allows you to build bridges with many of the units of this whole multidisciplinary concept, for me has been tremendous because I think I have a network of 37 faculty members that I have collaborated with over the last eight years and so that was never ever possible outside of this, um, framework.

• “You don't go out for coffee with them as much you don't go drink beer on Friday afternoons or you don't go to somebody's seminar because you are off somewhere. And there is the potential, now I don't know if this is all centers, but certainly in my center. Particularly if the center is all of the sudden is physically located somewhere else there is that professional isolation. Yeah and there is a little bit of envy there sometimes too. You've got the money. You folks have twenty-five graduate students and the rest of the whole department only has ten.”
Quotes: Human Capital Impacts

• “The ability to learn about how you administer a group or center and also have overall management and fiscal responsibilities, I had no idea I would become an accountant. And you know these sorts of experiences don't come about, so I see that as actually a positive growth for me personally because it has made me a different person.”

• “Becoming a facilitator. Becoming someone who brings faculty together, faculty and industry together. Uh, becoming a lawyer (laughter) all the time. I know the law, the patent law better than OTT does. Being a tech transfer officer. Becoming a contracts and grants negotiator. I do all the negotiations before I hand it over to anybody. Because they will screw it up, nine times out of ten.”

• “And um, for some there is a significant loss of research productivity um, and less teaching activities because again you have to balance you administrative responsibilities verses all the other activities.”
## Beyond Dual Career Ladders

### 1. Administrative/Managerial
- **Associate professor**
- **Professor**
- **Dept head**
- **Dean**
- **Provost**

### 2. Scientific/Technical
- **Associate professor**
- **Professor**

### 3. Science-saturated administrative
- **Associate professor**
- **Professor**
- **Center director**

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- “I know that I have had actually two offers that I have turned down that I didn't seek because of the position that I have had. So there is potential possibility for growth again if one is interested.”

- “And then I was offered a dean position and then I went through with it because some friends asked me to look at it. I went through with it, I looked at it, and it really took me about half a day to say ‘no.’ And again I just am having fun. I think I am having a lot more impact; I think about the students that we are training, the industries that we are creating.”
Our interview preamble:

“There’s an assumption that being an IUCRC director requires faculty to learn and use different skills and meet challenges that a faculty member doesn’t typically deal with. Some believe these experiences might have an impact on the faculty member’s career path and opportunities. “

General Interview flow

• Confirm director position (role, start, center) in career trajectory
• Get original motivation for becoming a director
• Then, ask The “Money” Question
  – Consider your career since you first served as an IUCRC director; on a scale from 1 “No influence” to 10 “complete influence”, how has that position influenced you and your career? Explain.
  – Probe on:
    • Positive/ negative outcomes
    • New competencies
    • Most significant impact
    • Scholarly productivity
    • Recommendations to the NSF
    • Visibility in your field
    • Job offers
    • Change in research orientation
    • Network ties
Quantitative: Survey

Survey Structure and variable domains

1. Positions held AFTER director’s role
2. Career impacts- human capital
   » Knowledge / skills
   » Scholarly production
3. Network impacts- social capital
   » Relationships with students, faculty, researchers, and administrators
4. Enabling impacts: helping others solve problems or advance careers
5. Job offers and the influence of the IUCRC role
6. General perceptions about the IUCRC role (*next page*)
7. Open comments
## General Perceptions Battery

*Testing hypotheses from the focus group*

“Based on your experience as an IUCRC director, do you agree or disagree with the following general statements about the director’s role?”

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The IUCRC generates a lot of visibility for the director.</td>
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<td>2. The director's role comes with risk to one’s academic career.</td>
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<td>3. An IUCRC director will typically experience a decline in their own scholarly productivity.</td>
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<td>4. The director’s role can be especially challenging for a tenure-track faculty member.</td>
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<td>5. Administrators appreciate the value of the IUCRC to their university.</td>
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<td>6. An IUCRC director has significant impact on the graduate students that work in the IUCRC.</td>
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<td>7. Becoming an IUCRC director was a very positive career decision for me.</td>
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<td>8. The director’s role significantly changed the composition of my professional network.</td>
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Quantitative: CV

- MS Access, relational database (one director: many events).
- Influenced by Georgia Tech’s Research Value Mapping (RVM) project.

Capturing data on:
- Education
- Employment
- Awards
- Pubs
- Patents
Project website

- Link: http://www.ncsu.edu/iucrc/careers/

Career Impacts Study

Project Documents

As the Career Impacts Study continues, the project team produces research instruments and presentations that we make available on the website. Check back on a regular basis for new updates. Other documents remain confidential, such as focus group transcripts and notes, survey data, tabulated CV information, and IUCRC director lists.

<table>
<thead>
<tr>
<th>Link</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Survey Draft</td>
<td>This is a near-final draft of the online survey for Stage 2. We’ll likely make revisions before we field our data; scheduled for June and after IUCRC directors have completed their semester duties.</td>
</tr>
<tr>
<td>Presentation Slides</td>
<td>The Project team updated IUCRC stakeholders during the annual NSF-IUCRC meeting in January this year.</td>
</tr>
<tr>
<td>Focus Group Guide</td>
<td>Stage 1 of the project involved a focus group with IUCRC directors.</td>
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Timeline & Endgame

• Fielding delayed to accommodate directors’ Spring schedules
• Outputs:
  – Report w/ case studies
  – Causal model/ framework
  – Publications

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