Predictors of Graduated 
I/UCRC Success

Thesis Proposal Research 
by

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Background: Program Goals

- “develop long-term partnerships among industry, academe, and government.”
- “develop a plan to work toward self-sufficiency from NSF”
- “NSF intends to seed partnered approaches to ... research, not to sustain the Centers indefinitely. The Foundation intends for Centers gradually to become fully supported by university, industry, state, and/or other non-NSF sponsors.”
- “Over 80% of the Centers established continue on as successful centers without NSF funding”.

(NSF IUCRC website)
Purpose of Research

• To assess the extent to which the I/UCRCs become “successful” after graduation
• To assess the extent to which graduated I/UCRCs maintain fidelity to the I/UCRC model
• To determine what factors predict Center “success” post graduation from NSF support
What is known about the NSF’s track record of producing sustainable Centers?

- Lots of archival data while supported by NSF
  - Total budget, by source
  - Industry membership descriptors
  - Faculty and student stats
  - Center Director info
  - Degrees, hires, publications
- No info post-graduation
- Where did that 80% estimate come from?
- What does “success” mean?
Theoretical/Conceptual Literature: Social Entrepreneurship

NSF I/UCRCs bridge the gap between industrial and academic sectors, by (Dees, 2001):

- Adopting a mission to create and sustain industrial collaboration,
- recognizing and pursuing opportunities,
- engaging in a process of continuous innovation, adaptation, and learning,
- acting boldly without being limited by resources currently in hand
- and exhibiting heightened accountability to the industry, faculty, and university served and for technology transfers.

A typology of the construct (Peredo & McLean, 2006):

- **Integrated social entrepreneurship**
  - Double bottom-line: social & financial
  - Earned income activities themselves create social value
  - Hybrid organizational structure

- **Partnered social entrepreneurship**
  - Partnerships with for-profit entities make social value creation possible
  - Licensing, contracting, job creation

- **Market-based social entrepreneurship**
  - Social goals guided by market demands
  - Business orientation toward social value

Sector
- Private
- Non-profit
- Public
- Academic
Ailes, Roessner, & Coward (2000)

- **Goals:** To explore issues of self-sustainability, funding, cultural change for graduated ERCs
- **Methodology**
  - Interviews with Center leadership
  - $N = 16$, response rate = 100%, Centers from 5 cohorts, 1985-1990, Data collected year before graduation and year of graduation (11th year)
- **Results**
  - **Outcomes:**
    - All centers survived as research entities to some extent
    - Fidelity to ERC model varied
    - Changes in research focus
    - Negative effects
  - **Hypothesized Predictors:**
    - Infrastructure
    - Transition planning
    - Center management
    - Faculty involvement
    - Institutional factors
    - Research area
    - Industrial participation
    - Educational programs

Mujumdar (2005)

- **Goals:** Investigated what happened to ERCs after graduation, how Center’s changed, and the consequences of graduating form NSF support.
- **Methodology**
  - 22 item survey completed by Center leadership
  - $N = 10$, response rate = 62.5%, follow-up to Ailes et al. (2000) study
- **Results**
  - **Outcomes:**
    - Sources of Funding
      - University (75%)
      - Industry (100%)
      - Government (63%)
      - Other (89%)
    - Funding Range $500K - $27M
  - **Predictor Factors Identified**
    - Mission/Vision
    - Tech Transfer
    - Research
    - Education/Outreach
Research Questions

- What is the status of graduated I/UCRCs?
- How much fidelity to IUCRC model do graduated centers maintain?
- How “successful” are graduated I/UCRCs? How do you measure success?
- To what extent do pre-graduation archival data predict success?
- What transition strategies do Centers use to manage graduation? To what extent does transition strategy predict success?
Participants

• Any NSF I/UCRC that is beyond the 10th year of funding and …
  – graduated (completed funding cycle)
  – did not graduate but is no longer in the program
  – graduated and was absorbed by another Center
  – N = 69
**Status & Fidelity**

**Status:**
- Drop out – alive
- Drop out – dead
- Graduated – alive
- Graduated – dead
- Graduated – merged/absorbed

**Fidelity:** (high, medium, low)
- Industry support
- Consortial/membership format
- Shared research & IP
- Strong industrial influence

**Method:**
- Follow-up interview with director, evaluator, or other informant

**Analyses:**
- Descriptive

**Results**
- Survival rate at x years post-graduation
  - 1 year post-grad %
  - 3 years post-grad %
  - Etc.
## Graduated Centers

<table>
<thead>
<tr>
<th>Center Name</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Computer Graphics (RPI)</td>
<td>79-89</td>
</tr>
<tr>
<td>Research on Polymers (UMass)</td>
<td>80-96</td>
</tr>
<tr>
<td>Welding Research (Ohio State)</td>
<td>80-90</td>
</tr>
<tr>
<td>Applied Polymer Research (CWRU)</td>
<td>81-98</td>
</tr>
<tr>
<td>Robotics (U of RI)</td>
<td>82-87</td>
</tr>
<tr>
<td>Computing and Comm. (NCSU)</td>
<td>82-04</td>
</tr>
<tr>
<td>Ceramics Research (Rutgers)</td>
<td>82-98</td>
</tr>
<tr>
<td>Logistics Institute (Georgia IT)</td>
<td>82-02</td>
</tr>
<tr>
<td>Hydrogen Research (Texas A&amp;M)</td>
<td>83-87</td>
</tr>
<tr>
<td>Steel Research (Colorado SM)</td>
<td>84-98</td>
</tr>
<tr>
<td>Hazardous &amp; Toxic Waste (NJIT)</td>
<td>84-00</td>
</tr>
<tr>
<td>Optoelectric Devices Interconnects &amp; Packaging (U of AZ/Maryland)</td>
<td>84-03</td>
</tr>
</tbody>
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<tr>
<th>Center Name</th>
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<tbody>
<tr>
<td>Math. Modeling &amp; Comp./Petroleum Research (Wyoming)</td>
<td>84-88</td>
</tr>
<tr>
<td>Process Analytical Chemistry (UW)</td>
<td>84-98</td>
</tr>
<tr>
<td>Innovation Mgmt. Studies (Lehigh)</td>
<td>84-98</td>
</tr>
<tr>
<td>Engineering Tribology (NWU)</td>
<td>84-04</td>
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<tr>
<td>Electromagnetics (NEU)</td>
<td>85-98</td>
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<tr>
<td>Plastics Recycling (Rutgers)</td>
<td>85-94</td>
</tr>
<tr>
<td>Lymphocyte Tech. (UNC/Duke/NCSU)</td>
<td>85-89</td>
</tr>
<tr>
<td>Health Sciences (UT San Antonio)</td>
<td>85-92</td>
</tr>
<tr>
<td>Iron &amp; Steelmaking (Carnegie M.)</td>
<td>85-98</td>
</tr>
<tr>
<td>Chemical Process Modeling &amp; Control Research (Lehigh)</td>
<td>85-96</td>
</tr>
<tr>
<td>Glass Research (Alfred/MO/PennSt)</td>
<td>86-04</td>
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<td>86-89</td>
</tr>
<tr>
<td>Web Handling (OK State)</td>
<td>86-98</td>
</tr>
<tr>
<td>Software Engineering Research</td>
<td>86-04</td>
</tr>
<tr>
<td>Energetic Materials (NM Tech)</td>
<td>86-98</td>
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<tr>
<td>CAPPS (NCSU/UC Davis/Ohio St.)</td>
<td>87-04</td>
</tr>
<tr>
<td>Manufacturing Automation (USC/UC)</td>
<td>87-94</td>
</tr>
<tr>
<td>Simulation &amp; Design Optimization of Mechanical Systems (Iowa)</td>
<td>87-96</td>
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<tr>
<td>Microwave, Optical &amp; Digital Electronics (CU Boulder)</td>
<td>88-05</td>
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<tr>
<td>Biolosurfaces (SUNY Buffalo)</td>
<td>88-05?</td>
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<tr>
<td>Thin Films &amp; Interfaces (Brown/URI)</td>
<td>89-94</td>
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<tr>
<td>Information Mgmt. (GIT/U of AZ)</td>
<td>89-96</td>
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<td>Ultra High-Speed Integrated Circuits &amp; Systems (UCSD)</td>
<td>89-99</td>
</tr>
<tr>
<td>Electronics Packaging (Maryland)</td>
<td>89-92</td>
</tr>
<tr>
<td>Parallel &amp; Distributive Intelligence Systems Research (UPitt)</td>
<td>89-94</td>
</tr>
<tr>
<td>Analog &amp; Digital Integrated Circuits (WA State/UW/OR State)</td>
<td>89-04</td>
</tr>
<tr>
<td>Air Conditioning &amp; Research (UI)</td>
<td>90-01</td>
</tr>
<tr>
<td>Grinding Research (UConn)</td>
<td>90-98</td>
</tr>
<tr>
<td>Dimensional Measurement &amp; Control in Manufacturing (UMich)</td>
<td>90-01</td>
</tr>
<tr>
<td>Nanostructural Materials (North TX)</td>
<td>91-96</td>
</tr>
<tr>
<td>Coatings Research (East MI/SMS)</td>
<td>91-05</td>
</tr>
<tr>
<td>High Speed Image Proc. (UC Irvine)</td>
<td>92-94</td>
</tr>
<tr>
<td>Separations Using Thin Films (CU)</td>
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<td>92-01</td>
</tr>
<tr>
<td>Integrated Pest Mgmt. (NCSU)</td>
<td>92-01</td>
</tr>
<tr>
<td>Wireless Info. Networks (Rutgers)</td>
<td>92-01</td>
</tr>
<tr>
<td>Adv. Communications (Villanova)</td>
<td>92-01</td>
</tr>
<tr>
<td>Building Performance &amp; Diagnostics (Carnegie Mellon)</td>
<td>92-01</td>
</tr>
<tr>
<td>Corrosion in Multiphase Syst. (Ohio)</td>
<td>93-02</td>
</tr>
<tr>
<td>Machine Tool Systems (UI)</td>
<td>94-03</td>
</tr>
<tr>
<td>Polymer Biodegradation (UMass)</td>
<td>94-98</td>
</tr>
<tr>
<td>Emission Reduction (NJIT/Penn St/MIT/Ohio St)</td>
<td>94-98</td>
</tr>
<tr>
<td>Ocean Technology (URI)</td>
<td>94-97</td>
</tr>
<tr>
<td>Composite Design (Stanford)</td>
<td>94-96</td>
</tr>
<tr>
<td>Control of Energy &amp; Power Systems (CSM/AZ State)</td>
<td>94-99</td>
</tr>
<tr>
<td>Ergonomics (Texas A&amp;M)</td>
<td>95-02</td>
</tr>
<tr>
<td>Pharmaceuticals (Purdue/UConn/U of PR/Minnesota)</td>
<td>95-05</td>
</tr>
<tr>
<td>Particulate Materials (Penn State)</td>
<td>95-04</td>
</tr>
<tr>
<td>Packaging &amp; Resource Recovery (Rutgers)</td>
<td>95-95</td>
</tr>
<tr>
<td>Wireless Electromagnetic Compatibility (U of OK)</td>
<td>97-04</td>
</tr>
<tr>
<td>Quality &amp; Reliability Eng. (Rutgers)</td>
<td>97-03</td>
</tr>
<tr>
<td>Next Generation Video (RPI/NJIT)</td>
<td>99-02</td>
</tr>
<tr>
<td>Intelligent Biomedical Devices &amp; Musculoskeletal Systems (CSM)</td>
<td>99-03</td>
</tr>
<tr>
<td>Fundamentals &amp; Applications of Photopolymerization (Iowa/CU)</td>
<td>99-05</td>
</tr>
<tr>
<td>Earth Oceans and Space (UNH)</td>
<td>99-00</td>
</tr>
<tr>
<td>Tech. &amp; Innovation Mgmt. (NWU)</td>
<td>03-05</td>
</tr>
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How “successful” are graduated I/UCRCs?

Success Operationalized
- Survival as a research entity
- NSF minimum funding criteria
- Funding changes
  - Overall
  - By source
- Size
  - Faculty
  - Students
  - Projects
- Research focus & scope
- Technology transfer

Method:
- Interview/Survey with current director, last director of record, other informant

Analyses:
- Descriptive

Results:
- Funding changes
  - No change %
  - Increase %
  - Decrease %
- Size
  - No change %
  - Increase %
  - Decrease %
- Research focus & scope
  - Qualitative
- Technology transfer
  - Qualitative
  - No change %
  - Increase %
  - Decrease %
To what extent do pre-graduation archival data predict success?

**DV**s
- Status
- Success

**IV**s
- Director Structural Report
  - Funding at year 10
  - N of members
  - Change in members
- Process Outcome
  - Industry
    » Satisfaction
    » Research relevance
    » Etc
  - Faculty
    » Satisfaction
    » Commitment

* Controlling for age

**Method**
- Archival data
  - Director Structural Report
  - Industry Process Outcome
  - Faculty Process Outcome

**Analyses**
- Predictive OLS Regression
- Logistic Regression
- Event history

**Results**
- Correlations among variables
- % of variance in DVs accounted for by IVs ($R^2$)
**What transition strategies do Centers use? Do they predict success?**

**Strategic Planning**
- Plan exists
  - Components
    » Research
    » Member recruitment
    » Faculty recruitment
    » Other funding sources
    » IP & Tech. transfer
    » Other
  - Stakeholders involved
    » Center Administration
    » Faculty
    » Industry
    » University
- Plan does not exist

**Social Entrepreneurship**
- Ent behaviors
- Leadership
  - Bart’s variables

**Method**
- Interviews with Evaluator

**Analyses**
- Qualitative analyses of interviews
  - What contributed to success?
- Descriptive
- Regression

**Results**
- Strategic Planning
  - % using various tactics identified
  - % plan exists
  - % no plan
  - Correlation b/t planning IVs and post graduation DVs
Implications of Research

• Many government programs are designed to provide time-limited support

• Self-sufficiency is an explicit or implicit goal
  – ERCs, STCs, etc.
  – Various S&T and social programs

• This research may provide information that helps promote the success of Graduated Centers.

• It adds to the scholarly understanding of the life cycle for programs with time limited grant funding.
Timeline

- Approved
- Extended Lit Review
- Archival Data Cleaning
- I/UCRC Approval, Sample Identification
- Proposal
- Data collection
- Analysis and Reports

June, '06|July-Sept., '06|Oct.-Nov., '06|Jan.-Feb., '07|March, '07|April-June, '07|July-Aug., '07