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Inside the Black Box of Industry- University Research Center Relationships: Key Factors and Lessons Learned

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Agenda

- Brief Bio and Background
- Research Interests and Major Research Foci
- Study 1: Big Picture View of I/U Relationships
- Study 2: Closer View of What's Underneath the covers of I/U Relationships
- Conclusions & Discussion
- Implications for NSF Evaluators



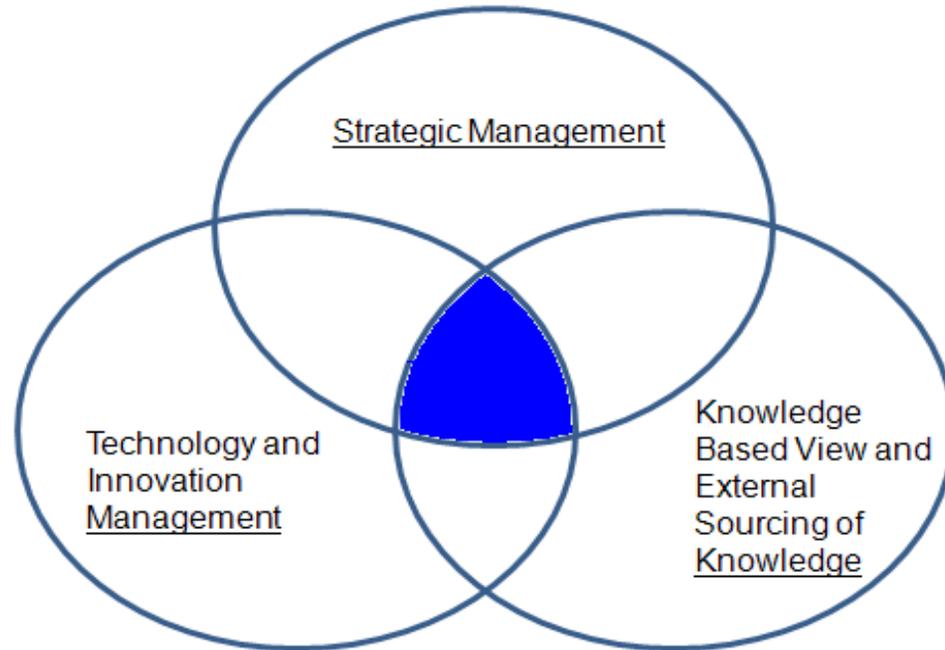
Brief Bio and Background

- BA in Education, 1973
- Connected with ADP right out of undergrad studies
- Spent 21 years with ADP in a number of middle and senior line and staff management positions
- Completed PhD in Organization Management in March 1998
- At Lehigh since August, 1998



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Research Interests & Major Research Foci High-Level View





Research Interests and Major Research Foci

More Detailed View

Industry – University Relationships

Major Focus:

- Corporate strategic objectives for establishing and sustaining URC relationships
- Key outcomes
- Processes

Key Publications:

- Research Policy
- Journal of Engineering & Technology Management (JET-M)
- IEEE Transactions on Engineering Management
- Journal of High Technology Management Research
- Research – Technology Management

Biotechnology – Pharmaceutical Firm Alliances

Major Focus:

- Types of uncertainties confronted
- Governance forms employed
- Impact s on firm performance

Key Publications:

- Strategic Management Journal
- Journal of Management Studies
- International Journal of Technology Management

European & US Multinationals Alliances

Major Focus:

- Use of strategic alliances versus mergers and acquisitions
- Divestitures
- Impact s on firm performance
- Newly developing line of research
- Presentation this August at Academy of Management annual conference



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Study 1: Big Picture View of I/U Relationships

What Firms Want . . . Strategic Objectives for
Collaborating with University Research Centers



Background

- Rapid technological change, shorter product-life cycles, intense global competition have radically transformed the competitive landscape
- Firms finding it difficult to advance knowledge, innovations and new technologies solely in-house
- Industry – university (I/U) relationships are one alternative
- University Research Centers have formalized structures and explicit missions to facilitate I/U relationships



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Research Questions

- What are industrial firms' strategic objectives for working with University Research Centers?
- To what extent do these strategies differ among firms?



Research Setting

- Focus on URCs – ERCs, IUCRCs and URCs without direct NSF support
- 21 URCs participated – provided lists of member companies – 421 firms in total
- Data collected via in-depth structured interviews and survey questionnaire
- 207 firms returned survey questionnaires; 189 with complete data
- 120 firms were high tech, 33 firms were capital intensive, 36 were resource/labor intensive



Table 1
Profile of Industrial Firm Cluster Groupings

Name	Collegial Players	Aggressive Players	Targeted Players
# of Firms	40 (22%)	84 (46%)	59 (32%)
Features of I/U Relationship	<ul style="list-style-type: none"> • Lowest intensity interactions • Lowest level of tangible outcomes 	<ul style="list-style-type: none"> • Highest intensity interactions • Highest level of tangible outcomes 	<ul style="list-style-type: none"> • Med/High intensity interactions • Med/High level of tangible outcomes
Firms' Strategic Objectives	<ul style="list-style-type: none"> • Major focus <u>not</u> to advance new technologies; being member of influential consortia is key • Privy to and influence pre-competitive research • Leverage consortia to build and enhance additional inter-organizational networks • Access to students and recent graduates • Influence university curriculum and training • Exchange technical info with other companies 	<ul style="list-style-type: none"> • Major focus to advance new technologies both <u>core</u> and <u>non-core</u> • Expect ROI by advancing a variety of new technologies • Strengthen skills and knowledge both <u>core</u> and non-core • Gain access to university facilities both <u>core</u> and non-core • Use consortia to link up to leading-edge core and non-core technologies 	<ul style="list-style-type: none"> • Major focus to advance new <u>core</u> technologies • Collaborative projects usually centered around firm's primary business • Expect immediate ROI by addressing firm's needs • Strengthen skills and knowledge for <u>core</u> areas • URC must be responsive to firm's immediate need(s) • Consulting possibilities
Size of Firm	Predominantly large firms	Mix of large and small firms	Predominantly small firms
Time Horizon	Primarily long-term	Both long and short term	Primarily short-term



Table 2
Profile of University Research Center Cluster Grouping

Name	Network-Oriented	Problem-Oriented
Number of Centers	11 (53%)	10 (47%)
Features of I/U Relationships	<ul style="list-style-type: none">• Less intense• Lower level of tangible outcomes	<ul style="list-style-type: none">• More intense• Greater level of tangible outcomes
Firms' Strategic Objectives	<ul style="list-style-type: none">• Collegial Players• Aggressive Players	<ul style="list-style-type: none">• Aggressive Players• Targeted Players
Size of Partnering Firms	Predominantly large firms	Mix of large and small firms
Affiliated University Ranking (U.S. News and World Report)	Primarily Tier 1 and Tier 2	Primarily Tier 2, Tier 3 and Tier 4

N = 21



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Implications

- Huge opportunity for University Research Centers to reach out and connect with the corporate community
- Different firms want different things – DUH
- Where you are matters . . . location and university prestige are advantages
- Not always about tangible outcomes; the soft-stuff sometimes matters



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Study 2: Closer View of What's Underneath the Covers of I/U Relationships

Role of Communications and Trust for
Advancing Knowledge and New Technologies
in Industry – University Relationships



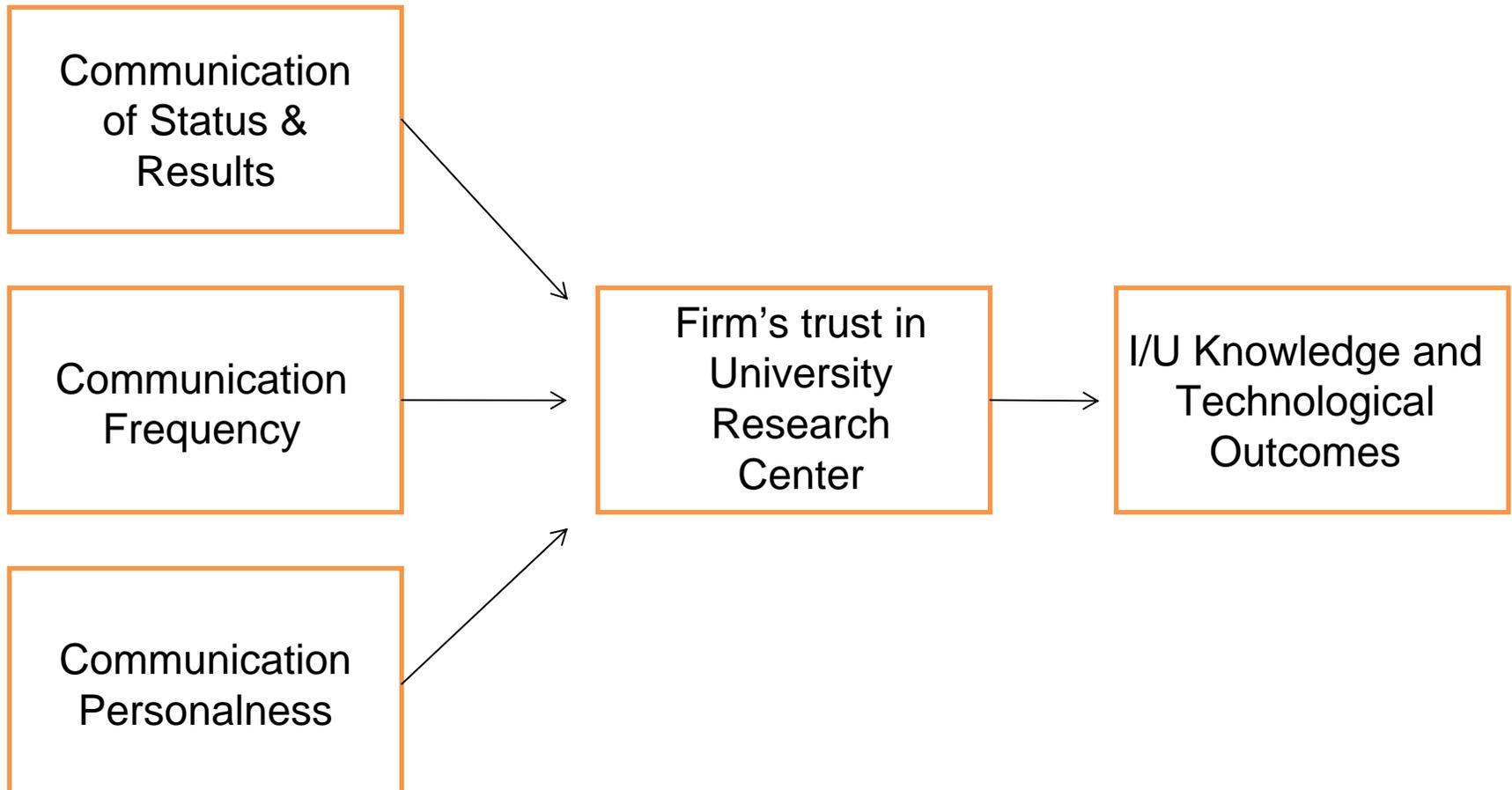
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Background

- Firms going beyond their boundaries to acquire new knowledge
- Knowledge transfer a key objective in I/U relationships
- Much research shows communications between partnering organizations important for knowledge transfer (e.g., Daft & Lengel, 1986; Santoro & Chakrabarti, 1999)
- Trust plays an equally important role (e.g., Zaheer, McEvily & Perrone, 1998)
- More work needed to examine the role of communication and trust for advancing knowledge and new technologies in I/U relationships



Conceptual Model





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Measures

Knowledge and Technological Outcomes

Asked each firm to examine their records and provide 1) number of research papers published 2) number of research papers presented at professional conferences 3) number of masters' theses and doctoral dissertations 4) number of patents, patent applications, and non-patented/non-licensed products and services.

URC Communication of status and results

Adapted from Lind & Zmud (1995), two items ($\alpha = .88$): 1) How effective is the URC in communicating the status of activities directly related to your relationship with the center? 2) How effective is the URC in communicating the results from activities directly related to your relationship with the center?

Communication Frequency

Adapted from Lind & Zmud (1995). Asked respondents to access records and provide total number of communication events by communication type (face-to-face, telephone, email, written/fax) during the most recent 12 month period.

Communication Personalness

Created index; face to face 4 points, telephone 3 points, email 2 points, written/fax 1 point. Scores were summed and divided by the total frequency of all communications during the most recent 12 month period.



Measures

Trust

Adapted from Mayer, Davis & Schoorman (1995), three items ($\alpha = .70$):
1) to what extent are you willing to share ideas, feelings, and goals with the URC? 2) to what extent do you doubt the URC's competence, motives, and fairness (reverse coded) 3) to what extent do you perceive the URC adheres to a set of principles your organization finds acceptable?

Firm Size

Continuous scale of number of employees

Length of Relationship

Continuous scale number of years firm has been active in relationship with this URC

Geographic Proximity

Used Yahoo! Maps to calculate the exact distance in miles between the firm's location and URC. Reverse score was used since interested in proximity.



Results of Multiple Regression

Variables	Model 1 Knowledge and Technological Outcomes	Model 2 Trust	Model 3 Knowledge and Technological Outcomes
<u>Step 1: Control Variables</u>			
Length of Relationship	.10	.09	.10
Firm Size	.04	.06	.04
Geographic Proximity	.23***	.16*	.22***
R ²	.12	.10	.12
<u>Step 2: Main Effects</u>			
Communication of Status & Results	.20***	.41***	.26***
Communication Personalness	-.15*	-.18**	-.10
Communication Frequency	.25***	.32***	.16*
R ²	.33	.36	.29
F	11.2***	13.8***	
<u>Step 3: Mediator</u>			
Trust			.21**
Δ R ²			.09***
R ²			.38
F			15.7***



Conclusions

- URC's can be effective mechanisms for transferring knowledge, advancing knowledge, and driving new technologies
- Knowledge transfer does not automatically “spill over” from universities to external constituents
- Flow of knowledge back and forth can be influenced, facilitated, or hindered
- Dynamics between communication and trust are complex and tricky
- There's a time and place for certain communication types



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Overall Implications for NSF Evaluators and Lessons Learned

- Large untapped market of potential industry sponsors. How can URCs better tap into that opportunity?
- Location matters, prestige matters, relationships matter, and the network of current members matter
- Some URCs may be better suited for some firms than for others due to philosophies, missions, cultures and strategic orientations... URCs must find their own voice
- The URC value proposition must be continually revisited and benchmarked
- Developing and growing URCs takes time