INNOVATION, SOCIAL CAPITAL AND DEVELOPMENT

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HELSINKI 2005

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Supported by Tekes, Sloan Foundation, and National Science Foundation
RESEARCH QUESTION
HOW UNIVERSITY CAN STIMULATE ECONOMIC GROWTH

SOME QUESTIONS:
1. HOW CAN UNIVERSITIES INTERACT WITH INDUSTRY?
2. WHAT DO THE FIRMS EXPECT FROM UNIVERSITIES?
3. WHAT BROADER ROLE UNIVERSITIES CAN PLAY IN ECONOMIC DEVELOPMENT?
4. WHAT ARE THE KEY TO SUCCESS OF UNIVERSITY INDUSTRY INTERACTION?
STUDY FOCUS

1. UNIVERSITY-INDUSTRY RESEARCH CENTERS IN THE US (22) IN THE US

2. REGIONAL STUDIES IN BOSTON AREA
   Southern New York State
   OULU, HELSINKI AND TAMPERE IN FINLAND
MEASURES OF SUSTAINABLE SUCCESS

UNIVERSITY: KNOWLEDGE GENERATION
EDUCATIONAL SERVICES (ENROLLMENT & GRADUATION)

ECONOMIC DEVELOPMENT: JOBS
NEW FIRMS
EXPANSION OF FIRMS
TAX BASE INCREASE
DIMENSIONS OF MEASURES
INDUSTRY/UNIVERSITY CENTER EFFECTIVENESS

I/U Relationship Effectiveness

Resource Input To The University Center
- General Research Support
- Targeted Financial Contributions

Participation In The Relationship Process
- Institutional Agreements
- Group Arrangements
- Joint Ventures
- Informal Interactions
- Consulting
- Technology Transfer

Outcomes From The Relationship

Explicit Knowledge Transfer
- Patents
- Licenses
- Publications
- Product/process development activities
- Use of facilities/equipment

Tacit Knowledge Transfer From Research Center
- Non-patented products/processes
- Cooperative education
- Hiring recent graduates

Tacit Knowledge Transfer From Peer Group
- Personnel exchanges
- Joint initiatives
- Informal conversations
INDUSTRY CONCERN

Technology Development

a) Research
b) Development
c) Commercialization
## INDUSTRY CONCERN

| Managing the Risk of Development | a) Risks of pre-competitive research  
b) Flexible technical agenda  
c) Improving likelihood of success |
| Human Capital Development | a) Training new employees (graduates)  
|                          | b) Continuing professional education  
|                          | c) Curriculum development |
| Access to Expertise and Facilities | a) Build and strengthen skills and knowledge  
b) Use of university facilities |
| Forum For Networking | a) Formalized structure  
|                      | b) Defined mission  
|                      | c) Critical mass of major organizations |
$ SUPPORT TO UNIVERSITY

RESOURCE INPUT

UNIVERSITY-INDUSTRY RELATIONSHIP

PROCESS

OUTPUT

EXPlicit, TACIT PEER TO PEER

KNOWLEDGE TRANSFER

PARTICIPATION OF FIRMS

DIMENSIONS OF EFFECTIVENESS OF UNIVERSITY INDUSTRY RELATIONSHIP

REF: SANTORO & CHAKRABARTI, 1999
<table>
<thead>
<tr>
<th>TWO TYPES OF UNIVERSITY CENTERS</th>
<th>NETWORKED ORIENTED</th>
<th>PROBLEM SOLVING</th>
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</thead>
<tbody>
<tr>
<td>UNIVERSITY REPUTATION</td>
<td>HIGH</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>INTERACTION LEVEL</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>NATURE OF OUTCOME</td>
<td>NOT TANGIBLE</td>
<td>TANGIBLE</td>
</tr>
<tr>
<td>NATURE OF CLIENT FIRMS</td>
<td>LARGE FIRMS</td>
<td>LARGE AND SMALL</td>
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</table>
NETWORKING

TRUST

DEVELOPMENT OF CORE TECH

DEVELOPMENT OF NON-CORE TECH

PROBLEM SOLVING

UNIVERSITY/INDUSTRY RELATION AND ITS EFFECT
UNDERLYING FACTORS FOR THE UNIVERSITY/INDUSTRY RELATIONS
UNIVERSITY-INDUSTRY COLLABORATION

COMPETENCE BUILDING

PROBLEM SOLVING

ANCILLARY

CORE

TECHNOLOGY CENTRALITY

RESEARCH SUPPORT

KNOWLEDGE TRANSFER

TECHNOLOGY TRANSFER

COOPERATIVE RESEARCH
KNOWLEDGE CREATION

- Trust-building
- Knowledge sharing & exchange
- Interaction
- Learning processes & communities of learning
- Social capital
- Socialization
DYNAMIC CAPABILITY

ABILITY TO INTEGRATE, BUILD AND RECONFIGURE INTERNAL AND EXTERNAL COMPETENCES TO ADDRESS RAPIDLY CHANGING ENVIRONMENT
LEARNING PROCESS
TO DEVELOP DYNAMIC
CAPABILITY
ACCUMULATION OF EXPERIENCE

KNOWLEDGE ARTICULATION

KNOWLEDGE CODIFICATION
SOCIAL CAPITAL DEFINITION

durable and institutionalized network of social relations (Bourdieu)
connections among individuals– social networks and the norms of reciprocity and trustworthiness (Putnam)
the sum of the actual and potential resources embedded within available through, and derived from the network of relationships (Nahapiet & Ghoshal)
networks and norms that enable people to work collectively (Woolcock)
CORE CONCEPTS

TRUST
SYMPATHY
FORGIVENESS

INFORMATION FLOW
INFLUENCE
POWER
ANCHORS IN SOCIAL CAPITAL

RELATIONSHIPS
- MARKET
- EXCHANGE PROCESS
- HIERARCHICAL
- AUTHORITY
- SOCIAL
- FAVOR/GIFT

NETWORK ASSETS
- EXTERNAL
- INTERNAL
LEVELS OF ANALYSIS

PAY
CAREER SUCCESS
JOB SEARCH

INTELLECTUAL CAPITAL
INTER-UNIT COMMUNICATION
PRODUCT INNOVATION
POOL OF RECRUITS
RESOURCE EXCHANGE

PRODUCTION NETWORKS
MAPPING DIMENSIONS OF SOCIAL CAPITAL WITH UNIVERSITY/INDUSTRY RELATIONSHIP

N&G DIMENSION

Woolcock

UNIVERSITY/INDUSTRY RELATIONS

NETWORKING

PROBLEM SOLVING

TRUST

STRUCTURAL

COGNITIVE

RELATIONSHIP

NORMS OF RECIPROCITY

INFO SHARING

TRUST
SOUTHERN NEW YORK

RURAL
DOMINANT FIRM: Corning Glass
University: Alfred University specialty Glass Science
Isolated Community
BOSTON Mass

Urban
Dominant University: Harvard and MIT
other Universities: Boston University, Northeastern
Tufts, University of Massachusetts

Home for High Tech Industry
Aerospace Industry
Dept of Defense Research Laboratories
Financial Institutions
FINLAND

✓ OULU  TAMPERE  HELSINKI

SOME POINTS ABOUT FINLAND

HOMOGENEOUS CULTURE
VERY HIGH EDUCATIONAL LEVEL
SMALL COUNTRY
GEOGRAPHICALLY ISOLATED
PROACTIVE POLICIES
### THREE FINNISH REGIONS

**OULU TAMPERE HELSINKI**

**OULU:** MOST ISOLATED  
CLIMATE IS SEVERE ARCTIC WEATHER  
SMALL TIGHTLY KNIT COMMUNITY  
UNIVERSITY OF OULU  
TWO DOMINANT FIRMS: NOKIA AND SONERA

**TAMPERE:** RICH INDUSTRIAL HISTORY  
MAJOR SHOCK IN EARLY 1990  
UNIVERSITY OF TAMPERE AND TAMPERE UNIVERSITY OF TECHNOLOGY  
DOMINANT FIRMS: NOKIA AND SONERA

**HELSINKI:** CAPITAL OF THE COUNTRY  
UNIVERSITY OF HELSINKI AND HELSINKI UNIVERSITY OF TECHNOLOGY  
HOME OF ALL MAJOR CORPORATIONS INCLUDING NOKIA AND SONERA
## COMPARISON OF THREE REGIONS

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>SOUTHERN NY</th>
<th>FINLAND</th>
<th>BOSTON</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLICY ORIENTATION</td>
<td>DRIVEN BY A STATE FUNDED AGENCY</td>
<td>DRIVEN BY MULTIPLE AGENCIES</td>
<td>NO DIRECT GOVERNMENT INTERVENTION</td>
</tr>
<tr>
<td>ORIENTATION</td>
<td>LOCAL</td>
<td>GLOBAL</td>
<td>NATIONAL</td>
</tr>
<tr>
<td>FINANCIAL NETWORK</td>
<td>POOR</td>
<td>GOOD THROUGH PRIVATE AND PUBLIC AGENCIES</td>
<td>GOOD THROUGH PRIVATE INITIATIVES</td>
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<tr>
<td>PEER SUPPORT NETWORK</td>
<td>ABSENT</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td>ROLE OF DOMINANT FIRMS</td>
<td>VERY LITTLE</td>
<td>IMPORTANT</td>
<td>ESTABLISHED FIRMS WERE MENTORS</td>
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</tbody>
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</thead>
<tbody>
<tr>
<td>ROLE OF THE UNIVERSITY</td>
<td>MINIMUM</td>
<td>SOURCE OF TECHNOLOGY</td>
<td>SOURCE OF TALENTS NODE IN THE NETWORK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOURCE OF TALENTS</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>NETWORK</td>
<td></td>
</tr>
<tr>
<td>INNOVATION MODEL</td>
<td>ANALYTICAL</td>
<td>INTERPRETIVE</td>
<td>INTERPRETIVE</td>
</tr>
<tr>
<td>SOCIAL CAPITAL</td>
<td>LOW</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
<tr>
<td>NETWORK STRUCTURE</td>
<td>POORLY DEVELOPED</td>
<td>HIGHLY ORGANIZED</td>
<td>SELF-ORGANIZED</td>
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# INNOVATION PROCESSES

<table>
<thead>
<tr>
<th>ANALYTIC PROCESS</th>
<th>INTERPRETIVE PROCESS</th>
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<tbody>
<tr>
<td>LINEAR PROCESS</td>
<td>NON-LINEAR</td>
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<tr>
<td>RATIONAL PROCESS</td>
<td>INTUITIVE PROCESS</td>
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<tr>
<td>EMPHASIS ON EFFICIENCY</td>
<td>EMPHASIS ON EFFECTIVENESS</td>
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<tr>
<td>LOW LEVEL OF UNCERTAINTY</td>
<td>HIGH LEVEL UNCERTAINTY</td>
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<tr>
<td></td>
<td>EMPATHY</td>
</tr>
<tr>
<td></td>
<td>TOLERANCE FOR DIVERSITY</td>
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</tbody>
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RICHARD LESTER & MICHAEL PIORE: INNOVATION: THE MISSING DIMENSION, HBS 2004