Critique of Current Network Studies: Not Measuring Complex Nodes, Project Integration and Gaps in the Idea Innovation Network

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Mapping Networks, Detecting Problems

➢ Relevance to crisis of innovation
   ➢ Help identify gaps in the (network)connections between scientific breakthroughs and industrial innovation

➢ Relevance to evaluation
   ➢ Checklists of what to map and what to measure for networks

➢ Relevance to theory
   ➢ Builds on idea innovation theory and tries to understand causes of gaps in the network
Why Should We Care About Networks?

• Advantages of networks are considerable (Brass et al, 2004)
  – Enhanced learning
  – More efficient use of resources
  – Increase capacity to plan for and address complex problems
  – Greater competitiveness
  – Better services

• Key structures for linking macro and micro and transfer of tacit knowledge
How Much Do We Know?

• Still relatively little known about overall functioning of networks (Provan and Kenis, 2008, Mote et al, 2007)

• Network functioning – process by which certain network conditions lead to network-level outcomes
  – Need to distinguish between the network and network outcomes.

• In RTD evaluation, need for a theory that encompasses networks in the national innovation system
Where do networks fit in?

Focus on the technology sector

• Mission and policy decisions are often sector specific (e.g. semiconductors)

• Policy impacts differ by sectors because sectors differ in:
  – Amount of investment by RTD arena
  – Rates of technical change

• Meso level connects macro with micro

• Bottlenecks can be spotted more easily here
Idea Innovation Network Theory

- Six arenas of RTD
- For successful introduction of new product/mission RTD advance can occur in one or more arenas
- Ideas move between arenas
- As RTD funding grows, knowledge becomes more differentiated and organizationally segregated
- Intra- and Inter-organizational networks transfer tacit knowledge

The idea innovation network:
Hage and Hollingsworth (2000), modifying Kline and Rosenberg (1986)
Mapping and Measuring the Idea Innovation Network

What to map and measure?

- Amount of money in each arena
- Number of researchers in each arena
- Number of linkages between researchers/research organizations within each arena
- Strength (and type) of linkages
What are the gaps in social network theory?

• Measurement
  
  – What are the appropriate ties for knowledge networks?
    • Collaboration, communication, project, etc?
  
  – Tends to overlook the strength of network ties
    • For example, collaboration, but how much and how measured?
  
  – Multiplexity
    • People exist in multiple networks, some times in conflict with each other, i.e. research networks and resource networks
What are the gaps in social network theory?

• Network Structure

  – Typically focus on egocentric networks, rather than overall network.
    • What is the overall network? Idea Innovation Network.

  – Not clear what optimal network structure might be
    • Do we need to know as long as linkages to all six arenas?
Meso level (network) questions – Performance and connectedness

Questions
- Technical achievement in real time in each arena (connected to sector performance)
- Overall sector socio-economic performance (new sales in product mix, speed to develop, how radical/broad)
- Strength of networks between differentiated arenas, among small organizations within arena

Given mission and technical/market opportunities, theory suggests
- Reasons for poor performance at 3 levels
- Where to increase transfer of tacit knowledge

Evaluation implications
- Build on existing output measures and peer review
- Gather comparative sector data to establish knowledge transfer with forms of connectedness
All these work together…Meso level (networks) is critical for achieving policy objectives and effectiveness

- High risk capital – available where
- Capabilities – Level, mix, availability
- Modes of coordination – effective?

**Macro- Institutional Rules as they affect the sector**

**Meso - Performance by sector and arena**

- Socio economic outcomes
- Technical progress
- Network connectedness

**Micro - funds allocation by arena and profile**

- RTD arenas – are there sufficient funds
- Portfolios - need more/ less radical, large scope?
- Organizational profiles – do attributes match the profile?

Jordan Hage Mote October 2007
Summary and Conclusions

• Strengths of our approach
  – Theories-based, using idea innovation network at meso level
    • Able to connect micro with macro levels
    • Indicators help identify network gaps and suggests how these occur
    • Raises questions, will help build theory, including effectiveness of market mechanism for transfer of tacit knowledge and ways to break path dependency

• Proposed framework indicates what might be done, and can guide further discussion and study on networks in evaluation.
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