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Complex Research Teams: What to Look For To Speed Innovation

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Innovation, Complex Research Teams, and Problems of Integration: The Missing Link

Presentation One: The Kinds of Complex Teams

- Relevance to crisis: the basic building block where innovation occurs
- Relevance to evaluation: provision of check lists of kinds of complexity and problems
- Relevance to theory: moves beyond the idea that there is one kind of complex team and avoids the panacea that these teams bring about innovation

Various ways a research team can be complex

√ Check list

1. different functional areas in management or in the doing of research such as methodologist, experimenter, theorist, statistician
2. different roles within these functional areas, e.g. idea woman, critic, specialist in dynamic modeling, etc.
3. different sub-specialties
4. different specialties
5. different disciplines
6. different arenas of research
7. different organizations, organizational cultures
8. different regional/national cultures

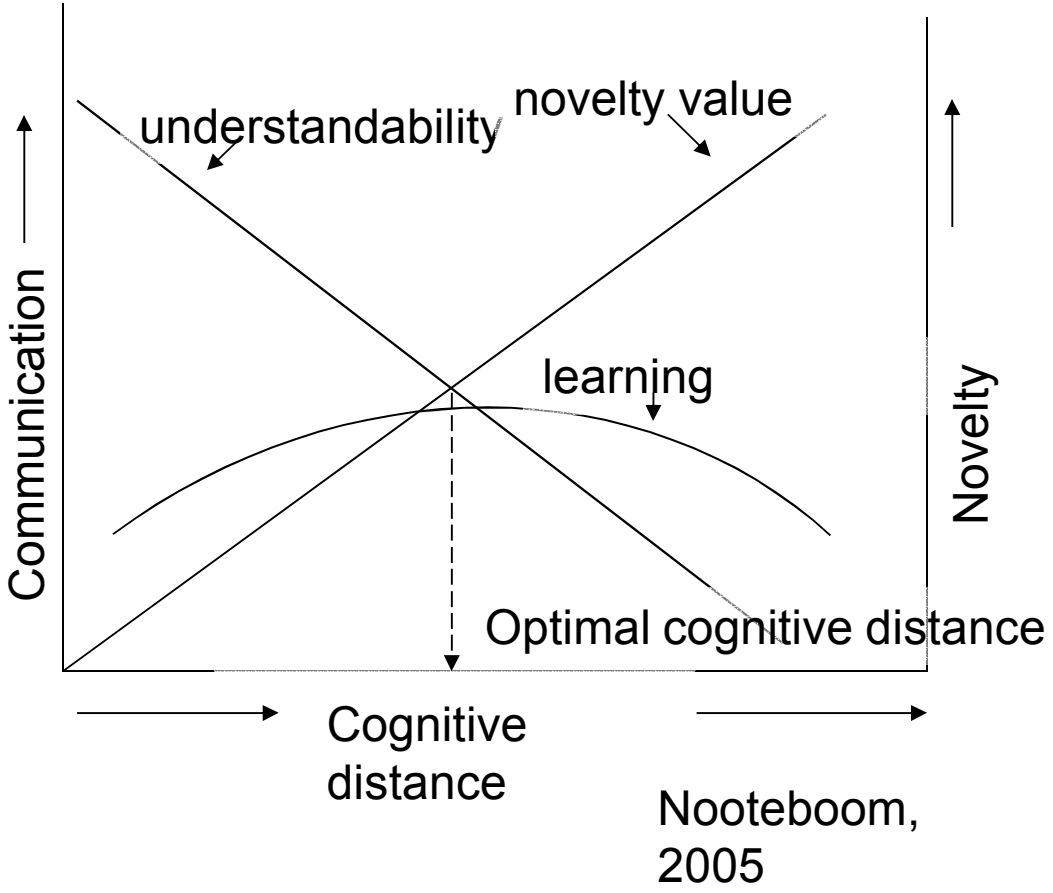
Three Degrees of Complexity

√ Check list

1. Small teams within an organization
2. Large teams within an organization
3. Inter-organizational teams working across types/arenas of research

A problem for any complex team -- communication requires overcoming cognitive distance

- Radical innovation is more likely the greater the cognitive distance
- BUT communication declines with cognitive distance
- Thus how to combine diverse perspectives is a challenge



The problems complex teams may have overcoming cognitive distance

√ Check list

- Time and resources to develop effective project communication (shared understanding, common language)
- Reward systems that recognize teams, as well as individuals
- Mechanisms to encourage collaboration inside the organization (overcome stovepipes, etc.)
- Building trust and culture where people are comfortable providing critical thinking for each other
- Managers who can add technical value across the diversity
- Systematic identification of opportunities for projects, partners, when team or objective is complex

Large teams – characteristics that add to problems of integration

√ Check list

- Have more people and resources involved
- Likely to have multiple sub teams
- Tackle broad-scoped projects which are complex
  - Number of parameters, systems, data collection facilities or schemes involved
  - Extent of conditions or number and diversity of fields/markets covered, and/or
  - Extremeness of conditions

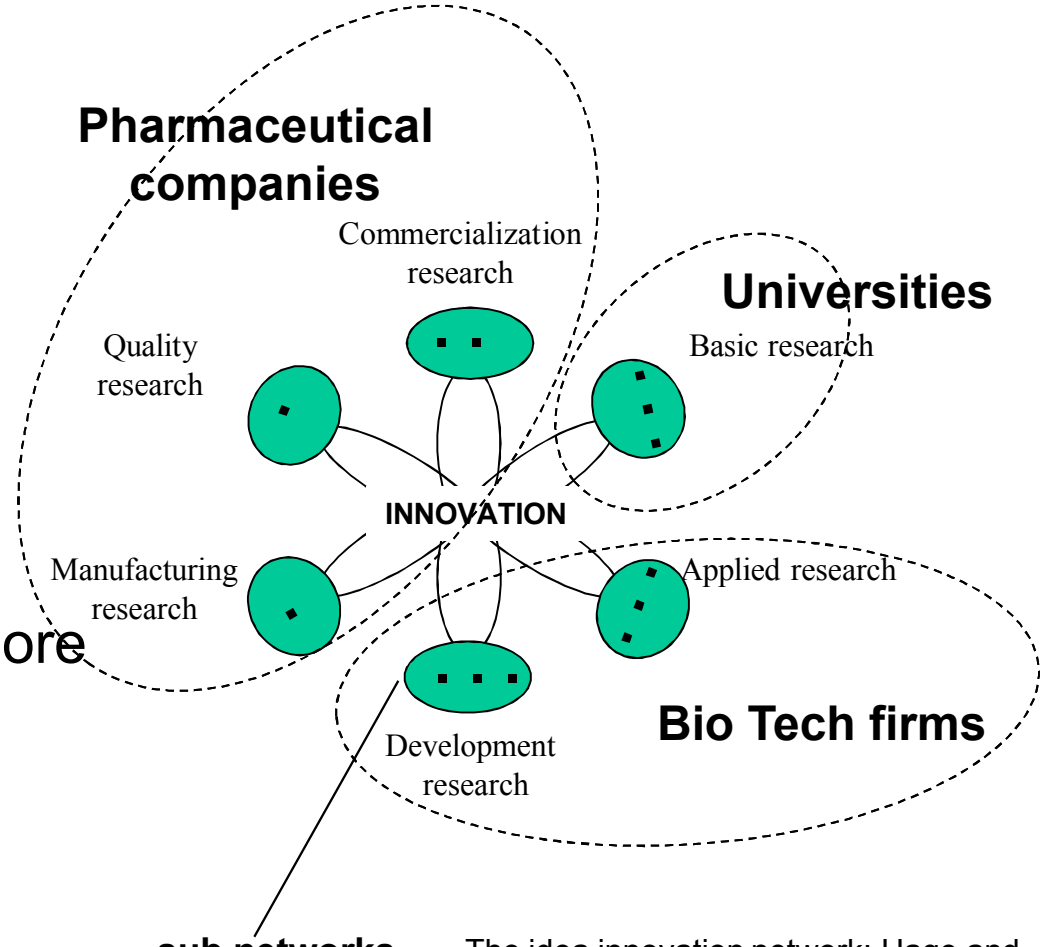
Problems of large complex, intra-organizational teams

√ Check list

- Integrating many parameters, conditions as well as knowledge sets
- Integrating teams as well as team members
- Integrating across intra-organizational boundaries (different goals, cultures)
- Broad scale requires sustained commitment of large resources, while remaining open to change
- More radical research needs autonomy but larger, more complex tasks also need coordination
- Managers must plan and execute given uncertainty

Successful innovation is seldom accomplished within one organization

- 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)

Additional characteristics of inter-organizational teams

√ Check list

- Differentiation means organizations don't do work in all areas anymore
- Teams located in different research contexts must bridge across research arenas
- Inter-organizational networks transfer tacit knowledge

Problems of inter-organizational complex teams

√ Check list

- Have to integrate across different organizations' processes, culture
- Tension between organizational autonomy and inter-organizational ties
- Ties with other organizations bring access to resources but questions over who owns the team's intellectual property

An example of integrating complex intra-organizational teams

- Built a new department doing basic and applied research for a manufacturing line
- Hired people who were flexible about different work styles
- New hires spent time defining their projects with required input from outside department
- Kept department small (12) but contracted with other departments for joint work
- Co-located people with product designers
- Very competent technical and emotional leadership

Case study example - continued

Our research environment survey showed

- Autonomy and resources to pursue new ideas were higher here than in another co-location pilot
- Challenge was lower (due to constrained choice of problems and approach)
- Time to think was higher

Interviews revealed that to achieve integration the manager

- Required presentations by external projects
- Paved way for joint projects
- Guided conflict resolution
- Promoted work outside department

Although a small case study, this illustrates some general principles for maintaining balance between diversity/complexity and integration.

Summary

- Complex teams have to integrate across diversity (cognitive distance) in order to accomplish innovation.
- Check lists were provided for characteristics of 3 degrees of complexity in teams.
- Lists of likely problems of achieving integration and innovation were provided for each degree.
- These check lists will help evaluators know what to look for in evaluations of complex teams and innovation.
- Evaluations using these lists will be more likely to contribute to knowledge that improves both management of teams and innovation, and also helps build theory.

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We welcome comments, suggestions, examples