# Knowledge, learning and innovation

## TU-E2110 Innovation in operations and services

Aalto University
School of Science

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# First peer feedback

**Comments? Issues? Was the matrix helpful?**

**Observations:**

- Varying formats but structured based on the evaluation matrix
- Rather convergent comments, plenty of good suggestions for improvement
- Some more positive than others → Still a good balance between positive and critical feedback

# Last week

1. **Definition of innovation**
   New and useful ideas carried into practice, benefitting the customers and developer, changing the surrounding system
2. **Framework for innovation management**
   Innovation process + resources, organization, strategy & system
3. **Approaches to innovation process**
   The R&D, rapid application and practice-driven models
   Managing the complexity of innovation process

# Innovation management topics

25.1. Introduction & innovation process

**1.2. Knowledge, learning and innovation**

8.2. Organizing innovation activities

15.2. Strategic innovation management

1.3. Systemic / institutional view to innovation

8.3. Summary of innovation management
+ instructing the individual assignment

# Purpose

**After today's session, you will be able to:**

1. **Understand knowledge as a concept**
2. **Describe key elements in the organizational learning process**
3. **Identify organizational factors that support organizational learning and innovation**

# Knowledge

# What is knowledge?

**Discuss in groups:**

1. **What is knowledge?**
2. **What types of knowledge are there?**
3. **How is knowledge related to innovation?**

**Time: 2-3min**

# Knowledge

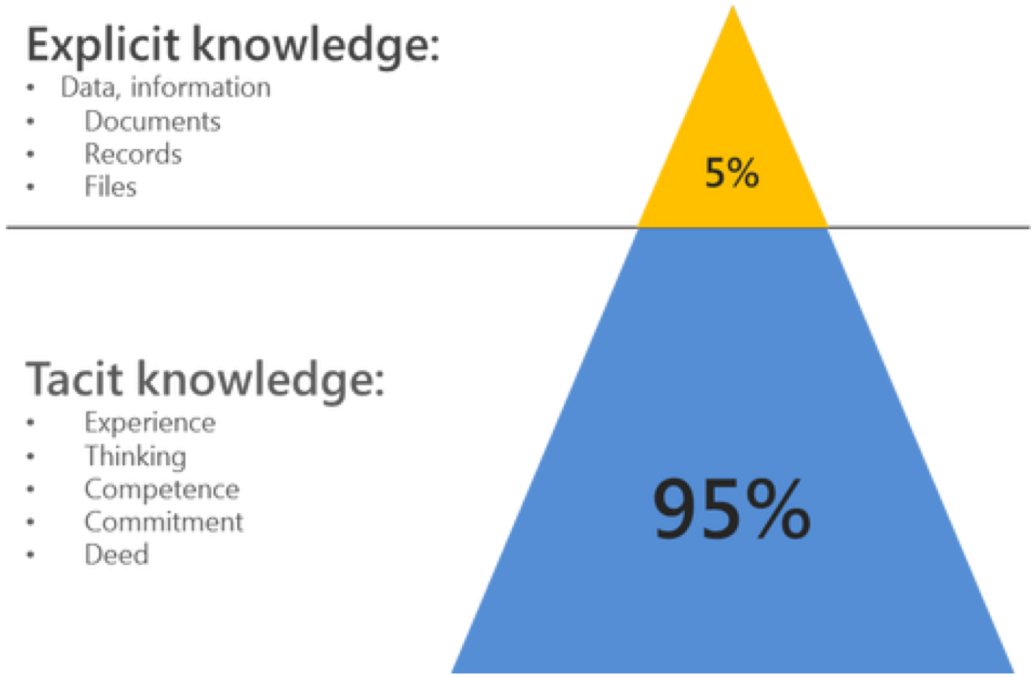
**“Facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject” (dictionary)**

**Multiple distinctions, generalizations:**

- Cognitive, bodily, social
- Tacit (procedural), explicit (declarative)
- Theoretical, practical
- Individual, collective
- Etc.

# Knowledge as multi-level concept


# Tacit vs. explicit knowledge






Polanyi (1966)
Nonaka & Takeuchi (1995)

# Organizational knowledge?

- Individual knowledge, skills
- Databases, archives
- Technology and arrangements of technologies
- Organizational structures, routines
- Informal norms, organization culture

# Social nature of knowledge

**Inseparability of knowledge, doing and learning**

- All situated in specific technical and social context

**=> Knowledge as situated in *practice***

- Individuals learn through participation within “communities of practice” -> ”absorption” of tacit knowledge

**Innovation challenge: epistemic boundaries**

- Integration of knowledge across groups with different understandings, skills, norms



Lave & Wenger (1990)
Brown & Duguid (1991, 2001)

# Social dynamics of knowledge creation

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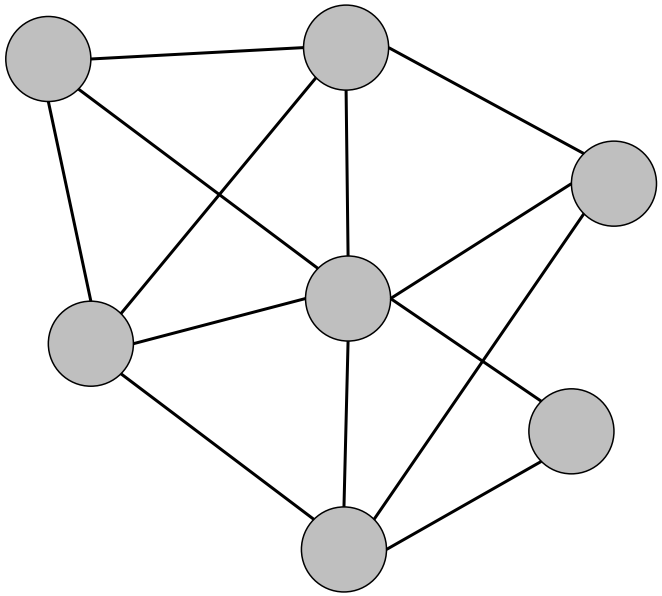
# Basic premise of knowledge creation

**New ideas created through the combination, modification and extension of existing knowledge (working definition)**

**Implications:**

1. **Learning a social process**
2. **Innovation profoundly combinatorial**

# Social networks and strong ties



**Growing density of ties:**

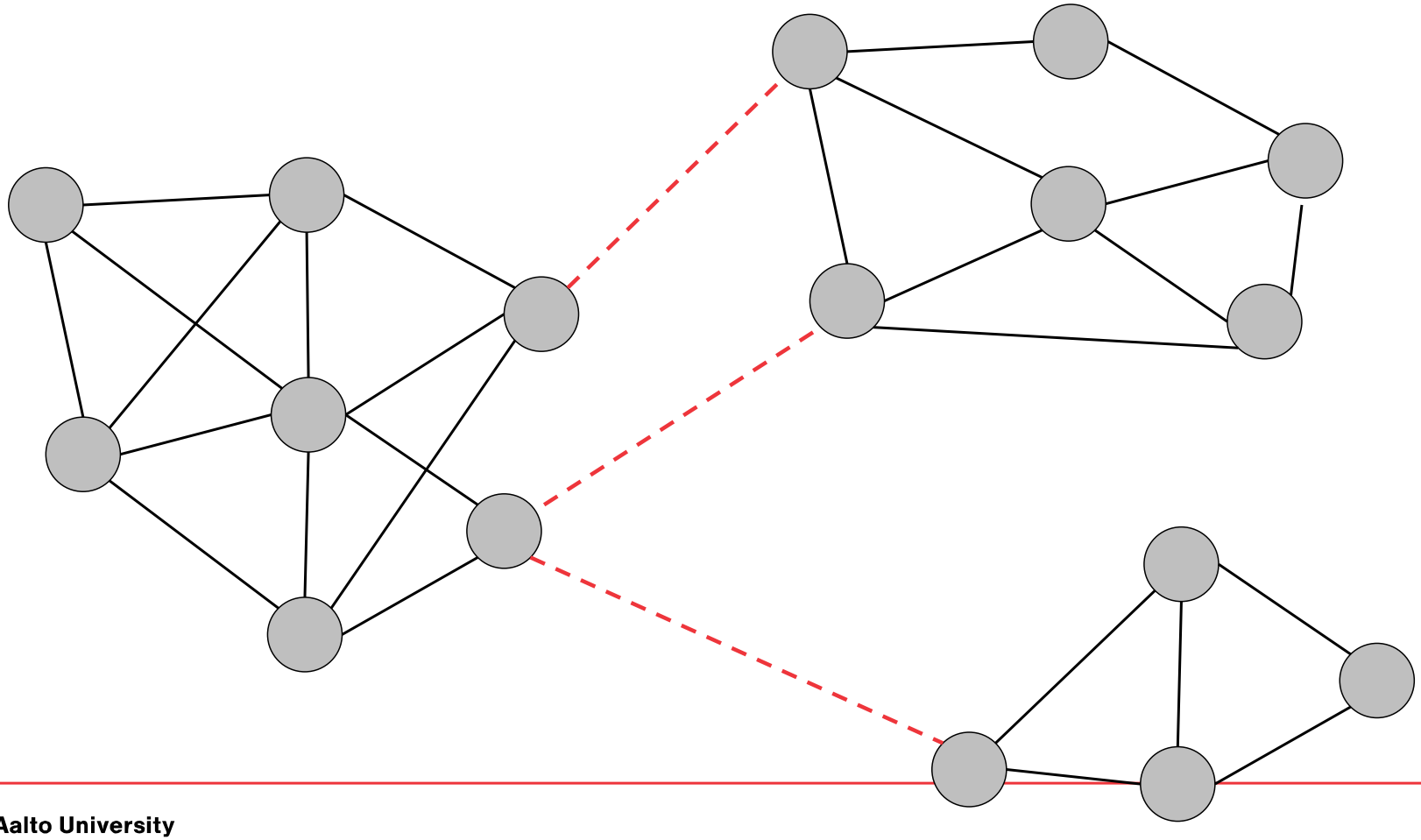
- Frequency of interactions and number of mutual friends increase likelihood of future interactions
- Increasing network density (number of interpersonal ties in a group) correlates with increasing similarity among actors
  E.g., shared understanding of problems and solutions

**= "Strong ties"**



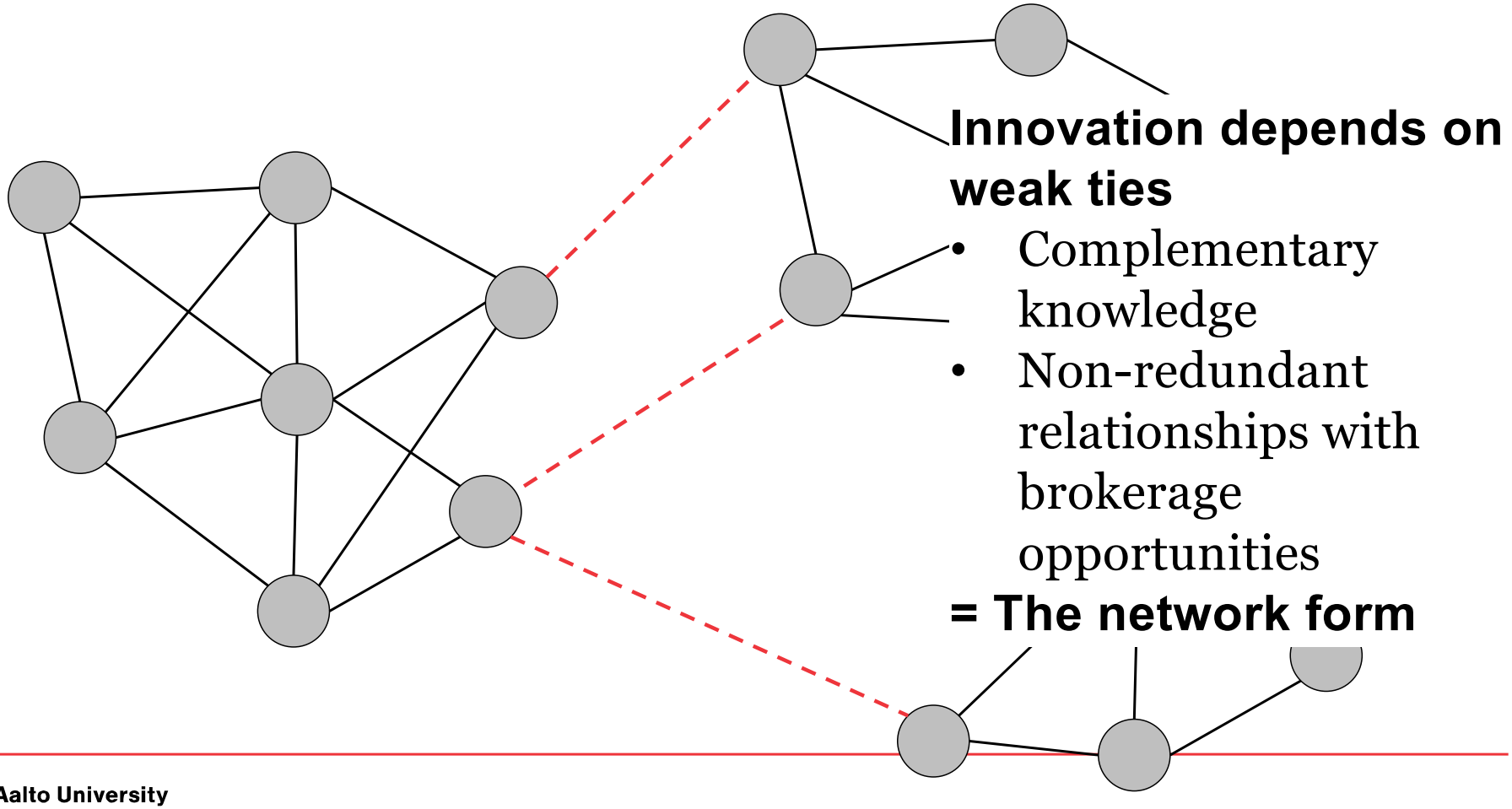
Granovetter (1973)

# Innovation: Strong & weak ties



Granovetter (1973)

# Innovation: Strong & weak ties



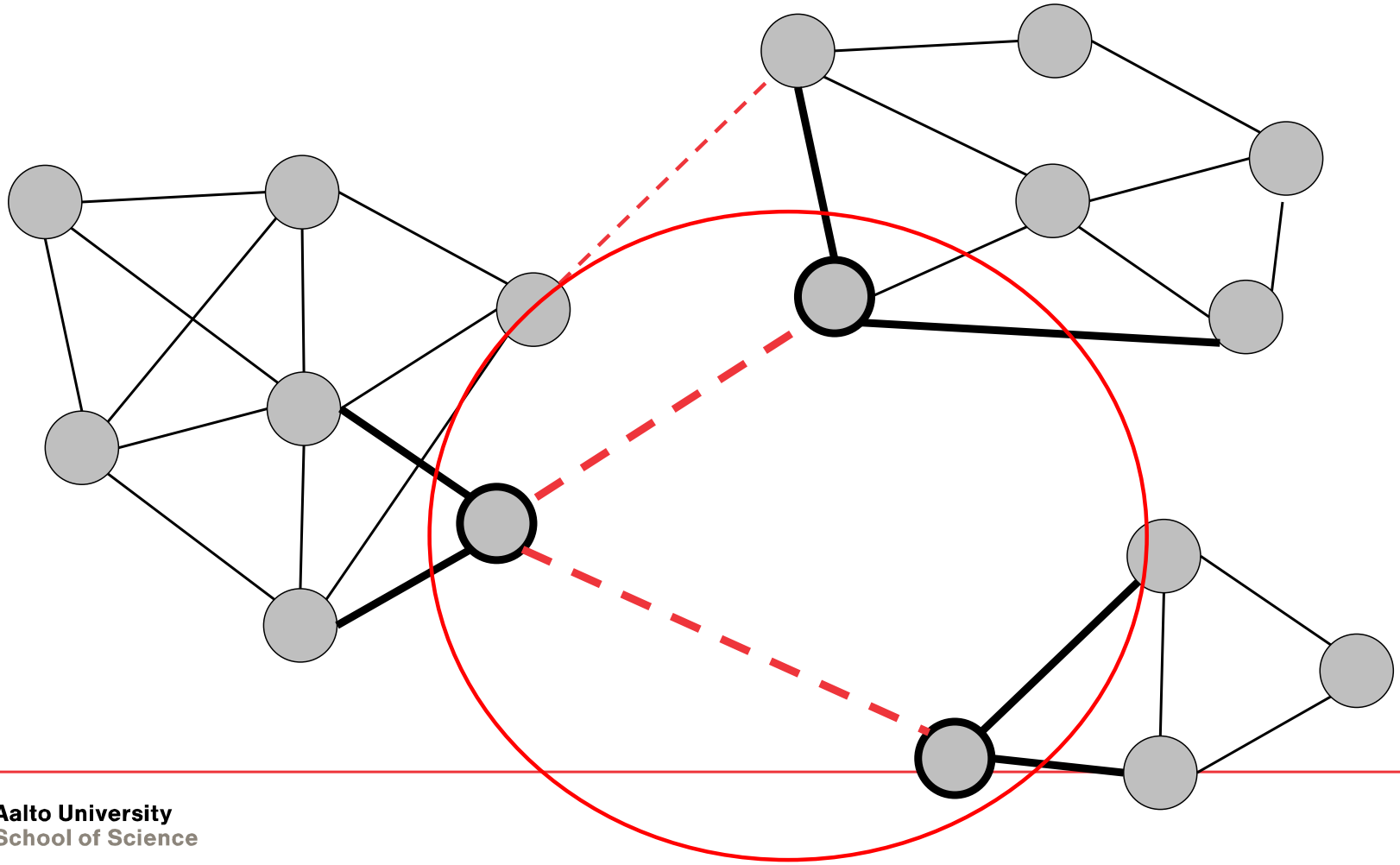
**Innovation depends on weak ties**

- Complementary knowledge
- Non-redundant relationships with brokerage opportunities

**= The network form**

Granovetter (1973)

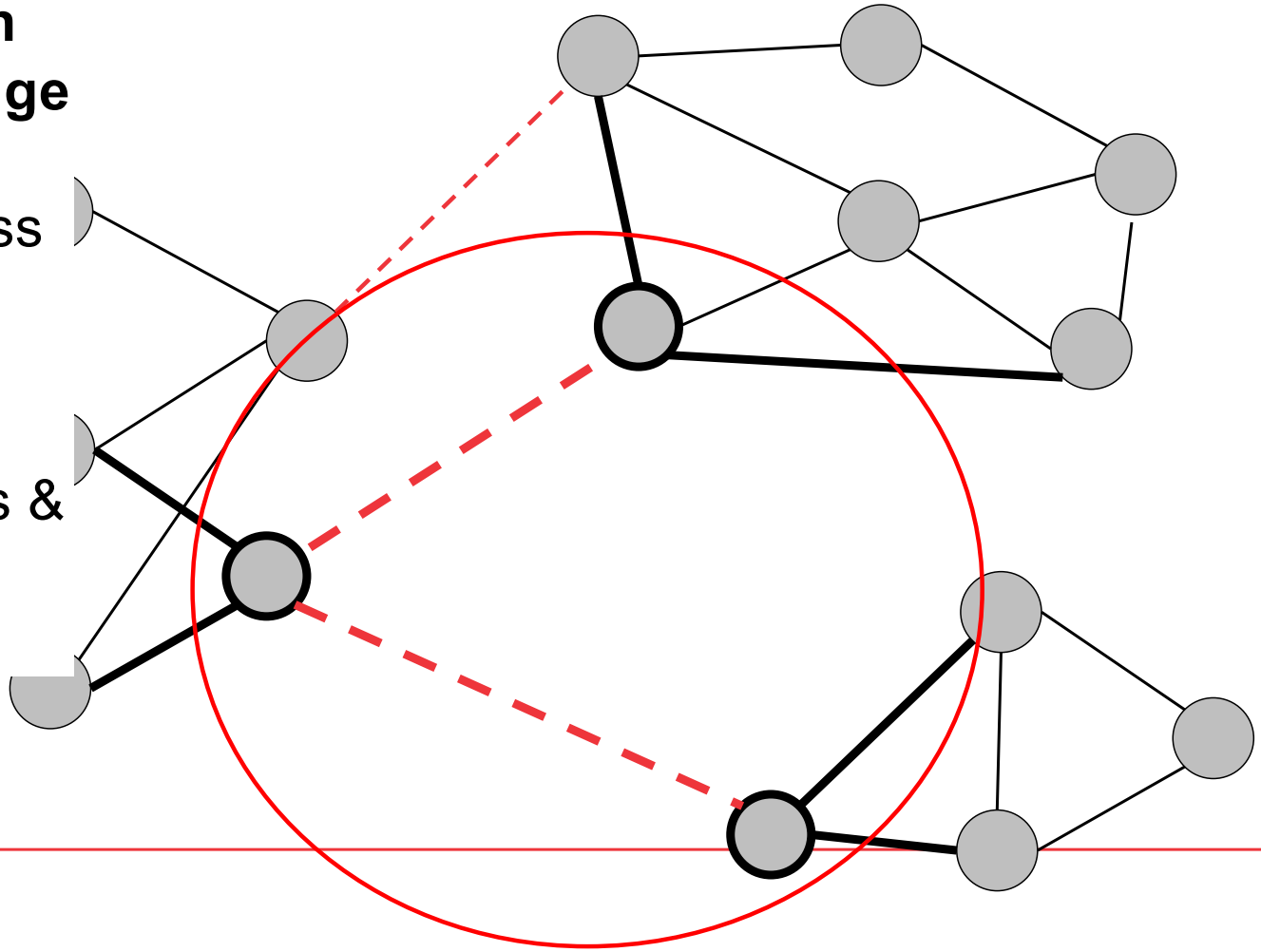
# Innovation: Brokerage



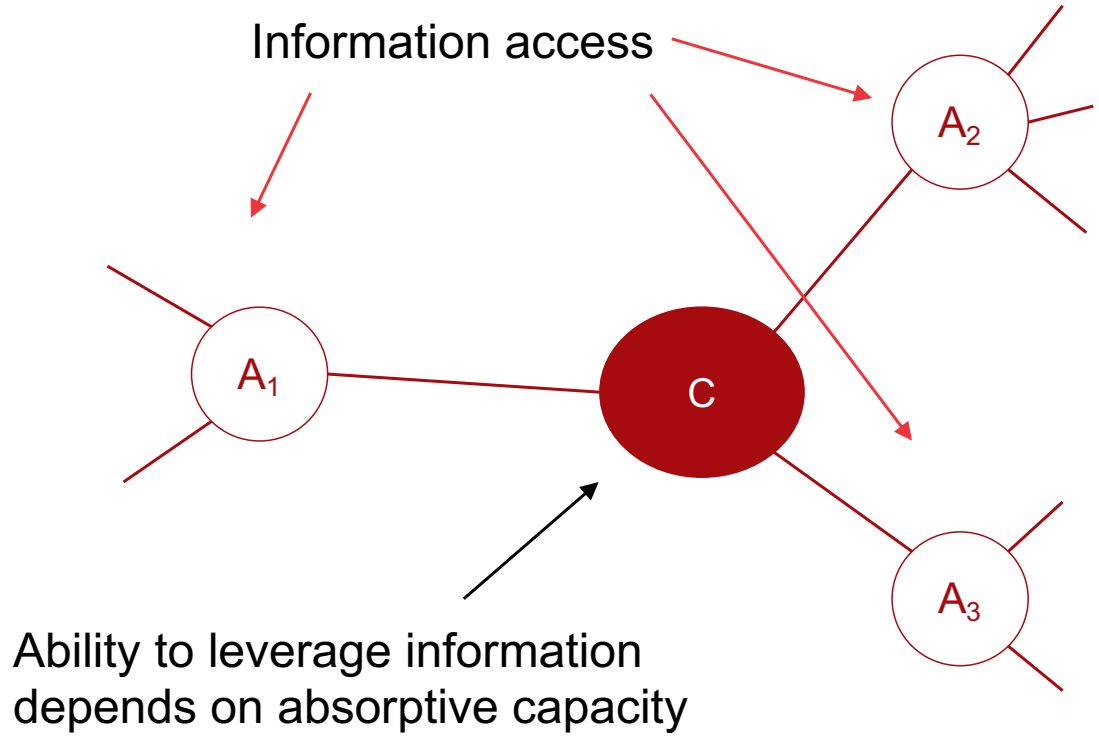
# Innovation: Brokerage

**Brokers between distinct knowledge domains**

- Ability to access knowledge before others
- Opportunity to bring problems & solutions together



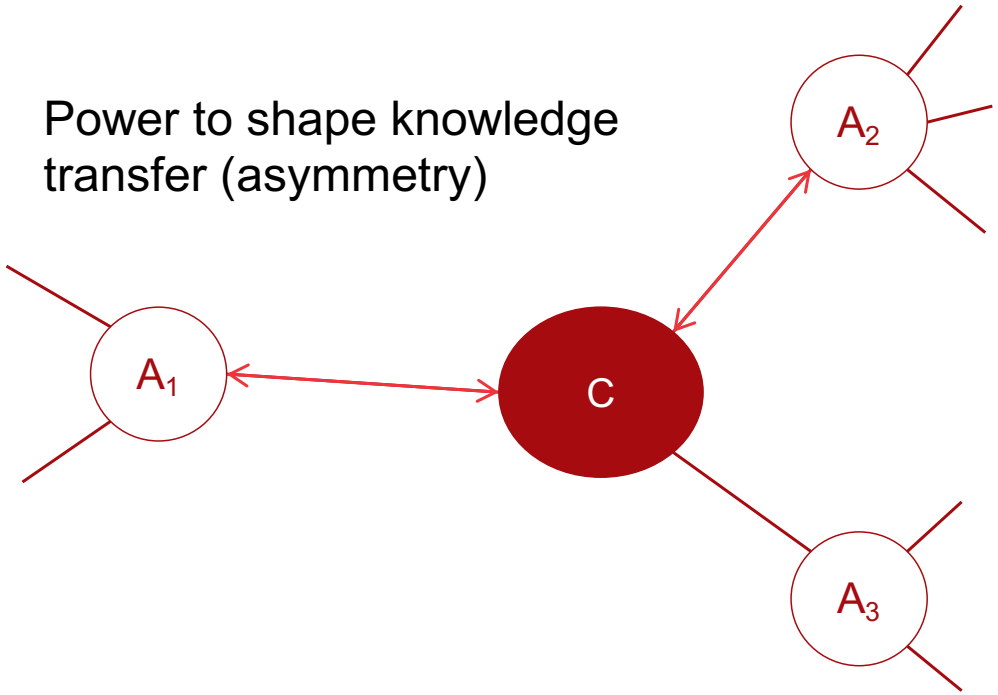
# Knowledge creation in interpersonal relationships






Tsai (2001)

# Knowledge creation in interpersonal relationships

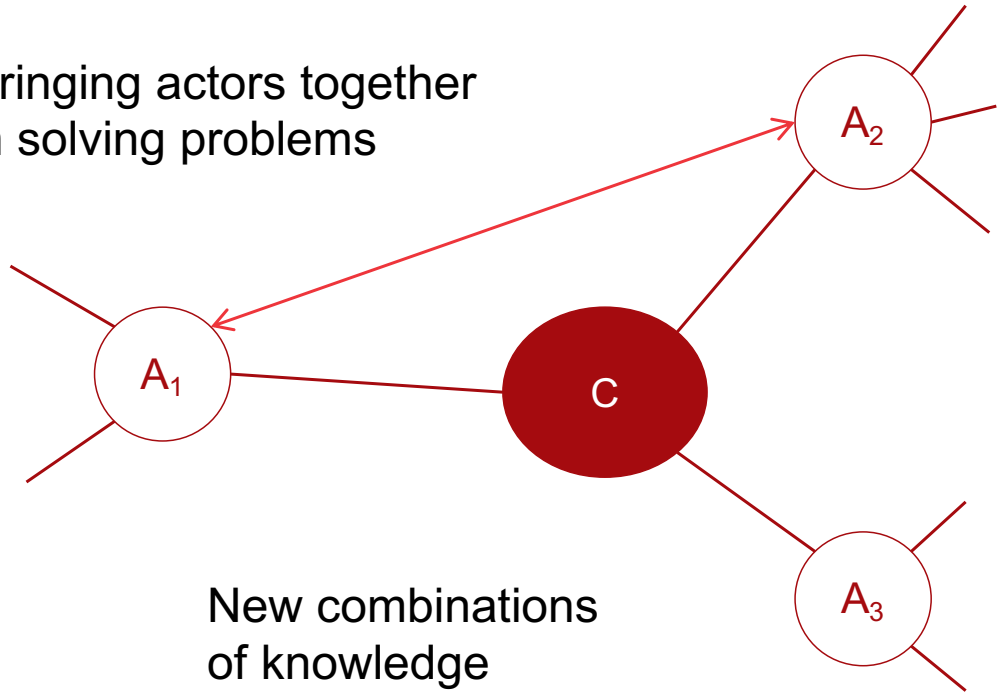





Burt (1992); Tsai (2001)

# Knowledge creation in interpersonal relationships

Bringing actors together
in solving problems




New combinations
of knowledge
=> innovation



Obstfeld (2005)

# Organizational learning process

# Learning and innovation

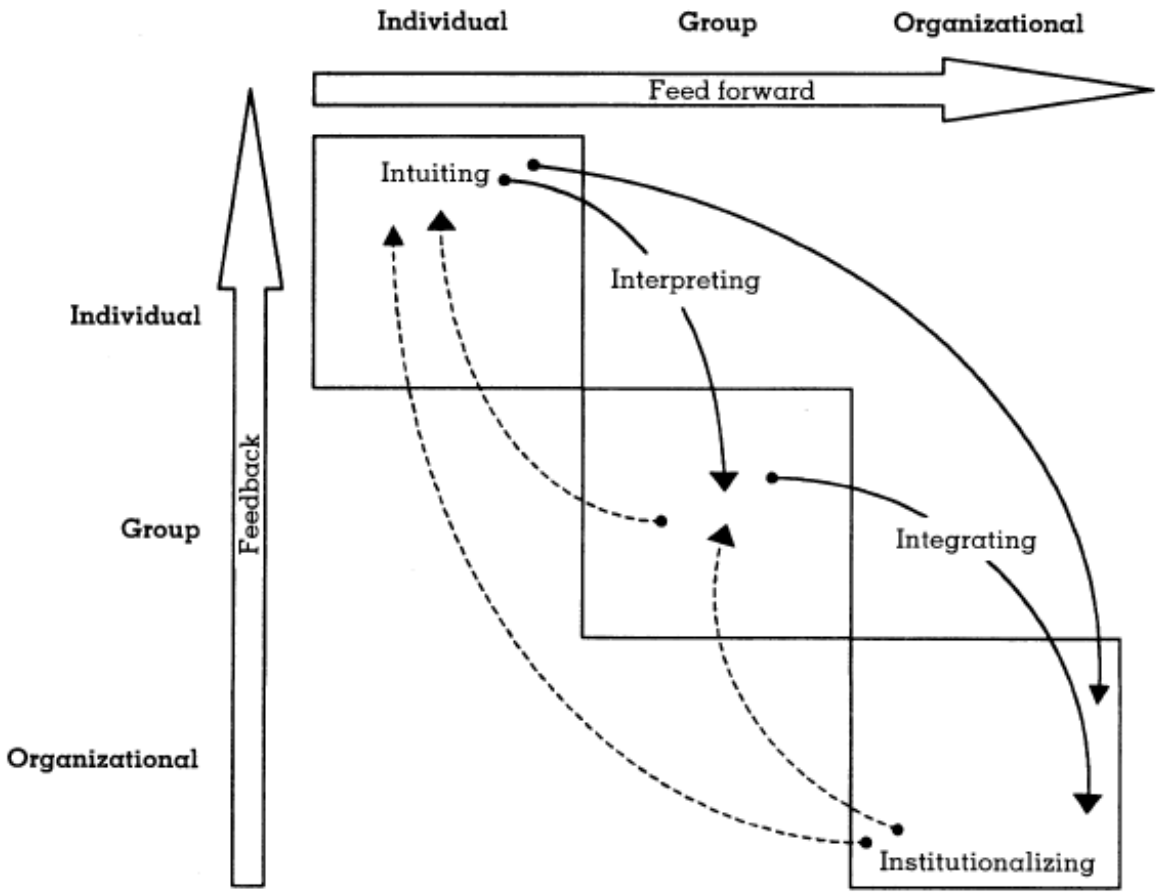
**Learning the basis of strategic renewal** (Crossan et al. 1999)

- New ideas replace existing knowledge as basis of organization's value creation efforts

**Two parallel learning processes:**

- Incremental: learning improves efficiency, consistency of current operations ("exploitation")
- Radical: learning produces new ideas that seed innovative solutions ("exploration")

# Organizational learning: multi-level process

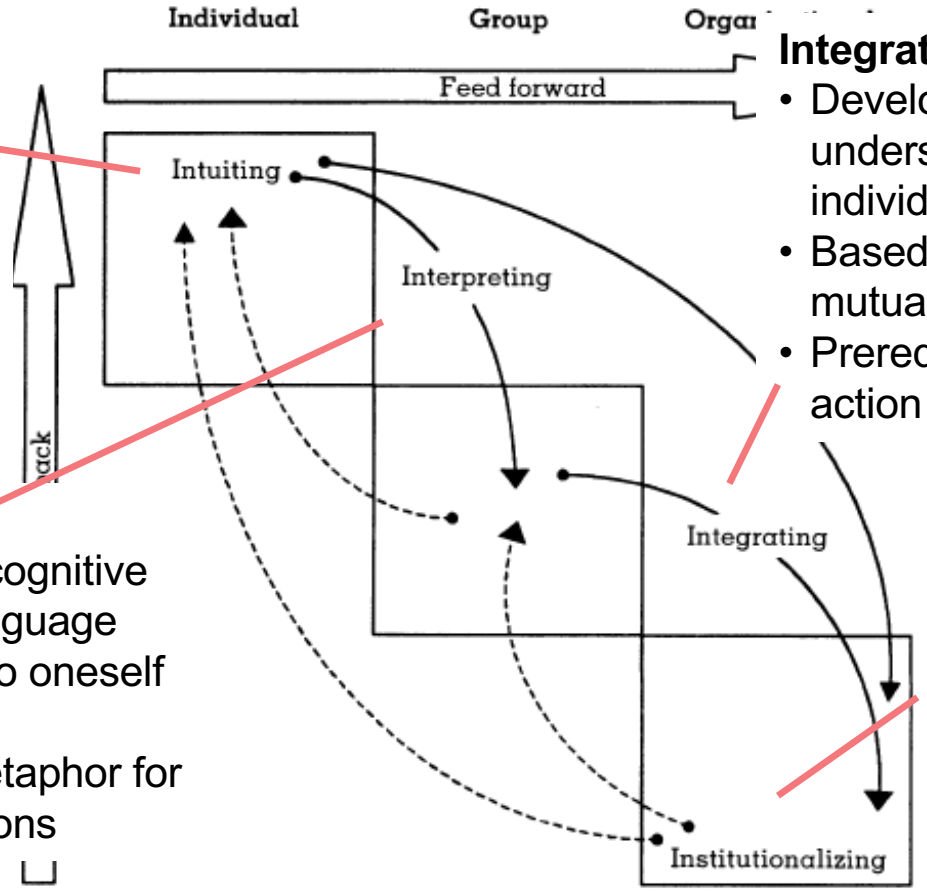



Crossan et al. (1999)

# Organizational learning: multi-level process

**Intuiting:**
- Pre-conscious recognition of patterns
- Based on past experience
- Basis of making new connections

**Interpreting:**
- Development of cognitive maps through language (explaining idea to oneself & others)
- Importance of metaphor for articulating intuitions




**Integrating:**
- Developing shared understanding among individuals
- Based on language, dialogue; mutual participation
- Prerequisite for collective action

**Institutionalizing:**
- Embedding learning into routines, rules and procedures
- Selective, punctuated and political process

Crossan et al. (1999)

# Management challenges

## I) From interpreting to integrating ("feed-forward")

1. A communication challenge: explicating one's largely tacit knowledge for others
2. A challenge of collective change: Changing other's understandings despite existing mental models to enable collective action

## II) From institutionalizing to intuiting ("feedback")

1. Overcoming the constraints of institutionalized structures and mental models on intuitive processes
2. But: absorptive capacity – previous knowledge also a prerequisite for assimilating new knowledge



Crossan et al. (1999)

# Crossing epistemic boundaries

**Knowledge creation requires crossing knowledge boundaries**

1. Syntactic: Similar knowledge, common lexicon, shared goals
   → Efficient *transfer* of knowledge possible
2. Semantic: Common goals but non-overlapping tacit knowledge, diverging interests
   → Requires knowledge *translation* (e.g., through prototypes)
3. Pragmatic: Competing goals, understandings
   → Necessitates knowledge *transformation* = reframe problems, solutions and the organization around a new idea



Carlile (2002, 2004)

https://www.youtube.com/watch?v=40meQNZl3KU&t=88s

# Overcoming learning challenges

**Discussion (5min):**

**What kind of means can companies use to overcome the learning challenges?**

### I) From interpreting to integrating ("feed-forward")

1. A communication challenge: explicating one's largely tacit knowledge for others
2. A challenge of collective change: Changing other's understandings despite existing mental models to enable collective action

### II) From institutionalizing to intuiting ("feedback")

1. Overcoming the constraints of institutionalized structures and mental models on intuitive processes
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# Summary: the learning organization

**Open culture**
- Sharing problems, admitting mistakes, supporting solutions

**Feedback loops**
- Systematic practices for feedback, reflection and learning

**Personal mastery**
- Responsibility and opportunity for developing one's own work

**Intelligent fast failure**
- Rapid testing of ideas, e.g., "minimum viable product" to test with users

**Mimic best practices**
- Study others, implement best practices fast

**Cultivate a common vision**
- Understanding one's role, drawing on vision in personal goal-setting and innovation involvement

# Building blocks of the learning organization

1. **Personal mastery**
   Continuous personal development, clarification & deepening of personal vision
2. **Mental models**
   Ingrained assumptions, schemas, that influence how we understand the world
3. **Shared vision**
   Aligning personal visions to foster commitment to shared goals
4. **Team learning**
   Dialogue, openness, mutual accountability in creative processes
5. **Systems thinking**
   Integration of other four, locating problems and opportunities in the complex system of interrelated parts



Senge (1990)

# Organizing knowledge creation: IDEO

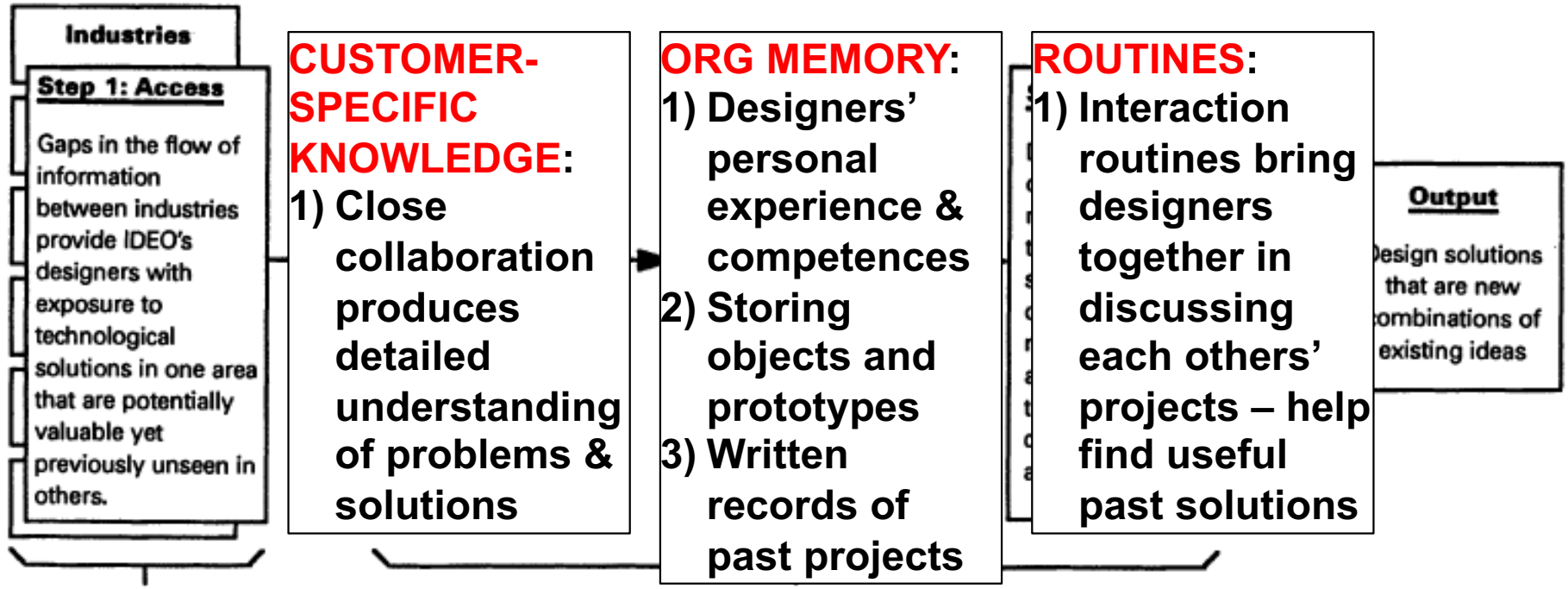
**Hargadon & Sutton (1997): How does IDEO sustain high performance in innovation?**

1. DIVERSE KNOWLEDGE BASE:
   Working in multiple (40) industries gives the design firm detailed knowledge of existing technological solutions
   Involving professionals from multiple disciplines
2. TECHNOLOGY BROKERING:
   This knowledge enables IDEO to introduce and adapt solutions from one context to another
3. ACCCESS TO "ORGANIZATIONAL MEMORY":
   Innovation enabled by individual designers' access to diverse solutions stored in organizational memory



Hargadon & Sutton (1997)

# Organizing knowledge creation at IDEO



# References


**Brown, J. S. & Duguid, P. (1991). Organizational learning and communities-of-practice: Toward a unified view of working, learning and innovation. Organization Science, 2(1), 40-57.**

Brown, J. S. & Duguid, P. (2001). Knowledge and organizations: A social-practice perspective. Organization Science, 12(2), 198-213.

Burt, R. S. (1992). Structural holes: The social structure of competition. Harvard University Press, Cambridge, MA.

Carlile, P. R. (2002). A pragmatic view of knowledge and boundaries: Boundary objects in new product development. Organization Science, 13(4), 442-455.

Carlile, P. R. (2004). Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries. Organization Science, 15(5), 555-568.

**Crossan, M., Lane, H. W. & White, R. E. (1999). An organizational learning framework: From intuition to institution. Academy of Management Review, 24(3), 522-537.**

**Hargadon, A. B. & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. Administrative Science Quarterly, 42(4), 716-749.**

Lave, J. & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge University Press, Cambridge, UK.

March, J. G. (1991). Exploration and exploitation in organizational learning. Organization Science, 2(1), 71-87.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. Organization Science, 5(1), 14-37.

Nonaka, I. & Takeuchi, H. (1995). The knowledge-creating company: How japanese companies create the dynamics of innovation. Oxford University Press, New York, NY.

Obstfeld, D. (2005). Social networks, the tertius iungens orientation, and involvement in innovation. Administrative Science Quarterly, 50(1), 100-130.

Senge, P. (1990). The Fifth Discipline.