

KNOWLEDGE MANAGEMENT & INNOVATION

ISEG – Lisboa

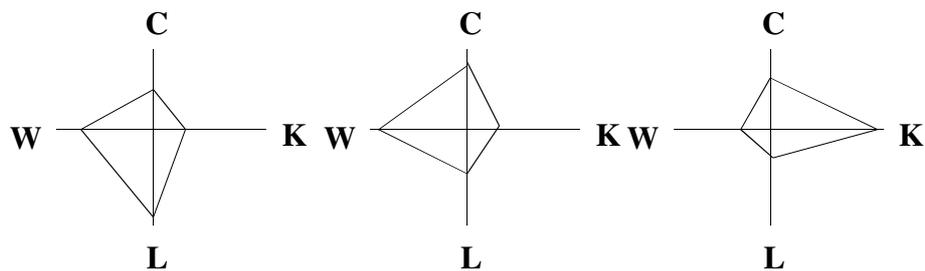
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Why is knowledge important (1)?

**Transition towards a Knowledge Economy:
Key factors of production**



Agricultural economy → Industrial Economy → Knowledge Economy

Source: Gorey & Dobat (1996) and Bueno (2010)

Why is knowledge important (2)?

Industrial economy versus Knowledge economy

- “Industrial era is the one of the physical world, the world of objects. Firms produce and distribute objects (physical products). Managers assign objects (capital) and invest in objects (equipments and production plants). In the industrial era, people are accesories and **objects are central**”
- “In the age of information and knowledge, the objects are accesories and **knowledge is central**. The main source of value for a firm is its knowlege, intellectual assets, and competencies. Those incorporated in people”
(Hamel, G. y Prahalad, C.K., 1994)

Why is knowledge important (3)?

Signs of change: evolution towards a knowledge economy

- Vertiginous rate of growth of the international commerce in knowledge-intensive industries (technological and scientific industries)
- Political objectives defined regarding knowledge for the European Union: “to become the most competitive and dynamic knowledge-based economy with more and better employment and higher social cohesion” (European Council of Lisbon, 2000) → *difficulties to achieve this goals due to economic crisis.*
- Bigger gap between market value and book value of the knowledge-intensive firms

Why is knowledge important (4)?

Market value versus Book value ratio for some companies

Company	Annual sales (billions \$)	Market value (billions \$)	Book value (billions \$)	Ratio market value vs. book value
E-Bay	0,4	13,9	0,9	15,4
Oracle	10,9	80,7	6,5	12,4
Microsoft	25,3	327,4	41,4	7,9
Intel	33,7	177	32,5	5,4
Nucor (Steel)	4,6	3,3	2,2	1,5
General Motors	184,6	30,5	20,6	1,5

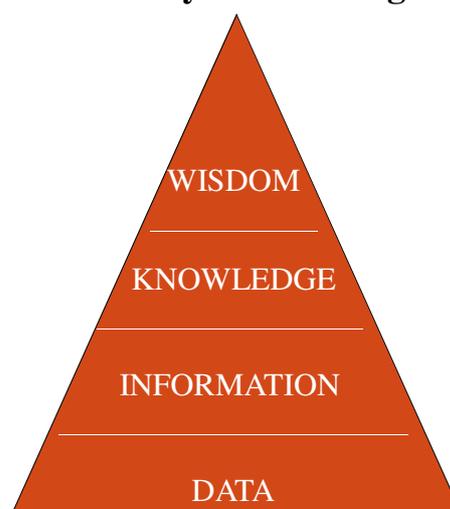
Note: market values to date November 5th. 2001

Increasing value of intangible assets as we move into 21st. century

What is Knowledge?

Hierarchy of knowledge

Personal,
contextual,
experience-
based



Transmittable,
appropriable,
storeable

Source: Kianto, A. (2009)

Types of Knowledge

	EXPLICIT	TACIT
Type of knowledge	Formalized and codified Know-what	Non-codified, intuitive, experience-based Know-how
Characteristics	Easy to identify, store, and retrieve	Context dependent, personal in nature
Management	Access; stored; reviewed, updated, or discarded.	Hard to communicate, commitment, involvement
Implications	Simple in nature	Most valuable, innovation and competitiveness
Where?	Databases, memos, notes, documents	Cultural beliefs, skills, and expertise

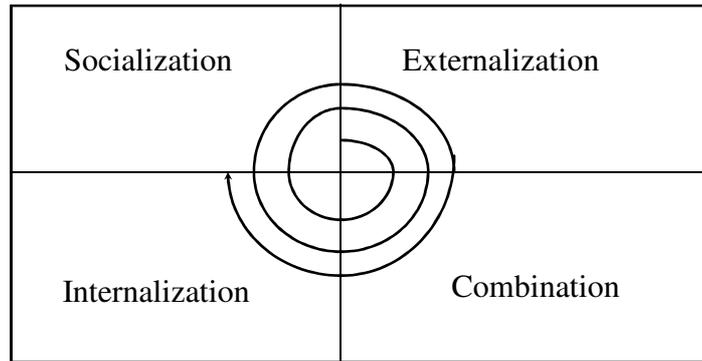
Types of Knowledge Conversion

(Nonaka & Takeuchi, 1995)

	TACIT Knowledge	EXPLICIT Knowledge
TACIT Knowledge	Socialization	Externalization
EXPLICIT Knowledge	Internalization	Combination

Knowledge Creation Spiral

(Nonaka & Takeuchi, 1995)



What is Knowledge Management?

Knowledge Management is about managing knowledge processes, i.e. the **acquisition, creation, distribution, storing, and retrieval of knowledge** in an organization. With the aim of increasing the efficiency in the use and exploitation of knowledge.

Knowledge Management: processes involved (1)

- **Knowledge creation:** generation of new knowledge in the organization
- **Knowledge acquisition and diffusion:** promoting spaces, learning processes, and technological platforms that allow knowledge acquisition and exchange
- **Knowledge storage and retrieval:** enabling organizational conditions and technological platforms that allow knowledge retention and retrieval
- **Knowledge measurement:** assessment of the knowledge acquired and created in the organization and incorporated in its intangible assets (intellectual capital)

Knowledge Management: processes involved (2)

Knowledge acquisition and diffusion

- **Learning from best practices**
- **Benchmarking** (internal and external): learning from others experience
- **Communities of practice:** mainly used for facilitating socialization processes
- **“Master-apprentice” system:** apprentice learns from master’s experience (mainly used for tacit knowledge transmission)
- **Interorganizational collaboration and collaboration with external agents:** knowledge diffusion among different entities

Communities of practice

Definitions of the Concept:

“They are self-organized groups who share work practices, interests, and objectives. They shape a common background of experience and joint problems resolution” (Davenport & Prusak, 2002)

“The community of practice is an active system in which participants share knowledge based on their daily work” (Lave & Wenger, 1991)

➔ Communities of practice are especially useful for promoting tacit knowledge sharing (exchange of experience)

Knowledge Management: processes involved (3)

Knowledge storage/retrieval

- “Knowledge repositories” creation: databases and information systems (explicit knowledge); firm’s philosophy and shared values; good practices (tacit knowledge)
- Visual representation of the extant knowledge in the organization:

- **Knowledge Matrix**
- **Knowledge tree**
- **Knowledge map**



Tree of Knowledge, by Lucas Cranach

Knowledge Matrix: Example

Technical IT Skills

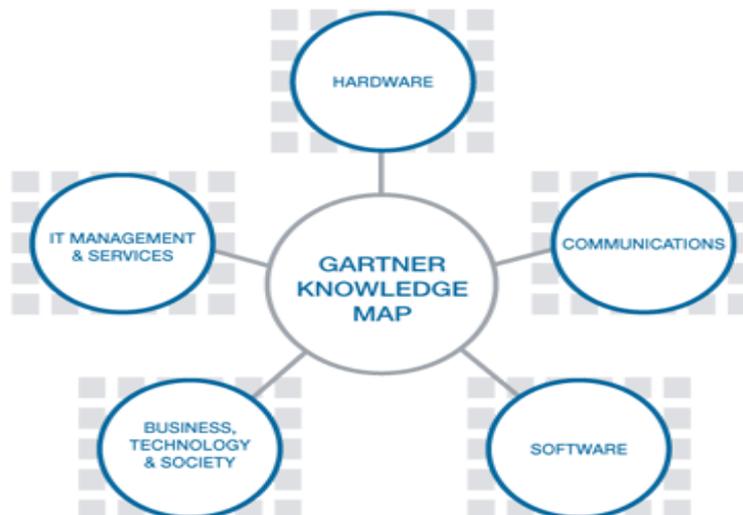
Roles	Architecture Board Member	Architecture Sponsor	Enterprise Architecture Manager	Enterprise Architecture Technology	Enterprise Architecture Data	Enterprise Architecture Applications	Enterprise Architecture Business	Program/Project Manager	IT Designer
Technical IT Skills									
Software Engineering	1	1	3	3	4	4	3	2	3
Security	1	1	3	4	3	4	3	2	3
Systems & Network Management	1	1	3	4	3	3	3	2	3
Transaction Processing	1	1	3	4	3	4	3	2	3
Location & Directory	1	1	3	4	4	3	3	2	3
User Interface	1	1	3	4	4	4	3	2	3
International Operations	1	1	3	4	3	3	2	2	2
Data Interchange	1	1	3	4	4	3	2	2	3
Data Management	1	1	3	4	4	3	2	2	3
Graphics & Image	1	1	3	4	3	3	2	2	3
Operating System Services	1	1	3	4	3	3	2	2	3
Network Services	1	1	3	4	3	3	2	2	3
Communications Infrastructure	1	1	3	4	3	3	2	2	3

Enterprise Architecture Skills

Roles	Architecture Board Member	Architecture Sponsor	Enterprise Architecture Manager	Enterprise Architecture Technology	Enterprise Architecture Data	Enterprise Architecture Applications	Enterprise Architecture Business	Program/Project Manager	IT Designer
Enterprise Architecture Skills									
Business Modeling	2	2	4	3	3	4	4	2	2
Business Process Design	1	1	4	3	3	4	4	2	2
Role Design	2	2	4	3	3	4	4	2	2
Organization Design	2	2	4	3	3	4	4	2	2
Data Design	1	1	3	3	4	3	3	2	3

Source: <http://www.eadynamicsuk.com/?name=blog>

Knowledge Map: Example



Source: http://www.gartner.com/technology/research/methodologies/research_kmap.jsp

Knowledge Tree: Example

OUR KNOWLEDGE BRANCHES



Source: <http://knowledgetreeschool.blogspot.com.es/>

Knowledge Management: processes involved (4)

Knowledge measurement

Development of **Intellectual Capital measurement models**:

- *Navigator* (Skandia): Edvinsson & Malone (1997)
- *Intangibles Assets Monitor*: Sveiby (1997)
- *Technology Broker*: Brooking (1996)
- Stewart (1997)
- *Intelect*: Club Intelect - Euroforum (1998)
- *Intellectus*: CIC (2003)

Knowledge Management: main approaches (1)

- **Technological approach**: emphasis is placed on **technologies** that facilitate the processes of knowledge acquisition, transmission, and storage (mainly ICT)
- **Managerial approach**: focused on **organizational and management conditions** that allow knowledge acquisition, transmission, and storage
- **Humanist approach**: focused on the **role of people** in knowledge creation and exchange processes
- **Innovation approach**: concerned about **new knowledge creation** and its enforcement

Knowledge Management: main approaches (2)

Advances in management research and practice

- The **Technological approach** has undergone a high development until now. Especially in the domain of **Information Technologies** that support the different knowledge processes
- The **Managerial and Humanist approaches** have achieved a lower level of development until now
- Moreover, the **innovation approach** – which emphasizes knowledge creation processes – has also achieved a lower level of development. Nowadays, it needs to be boosted

Knowledge Management: main approaches (3)

Technological approach

1) Technologies for knowledge acquisition and sharing:

- ✓ Internet/Intranet
- ✓ Blogs, Wikis
- ✓ Groupware (teamwork support tools)
- ✓ E-mailing
- ✓ Social media
- ✓ Best practices databases
- ✓ Workflows (work processes support tools)
- ✓ Neural networks ...

Knowledge Management: main approaches (4)

Technological approach

2) Technologies for knowledge storage and retrieval:

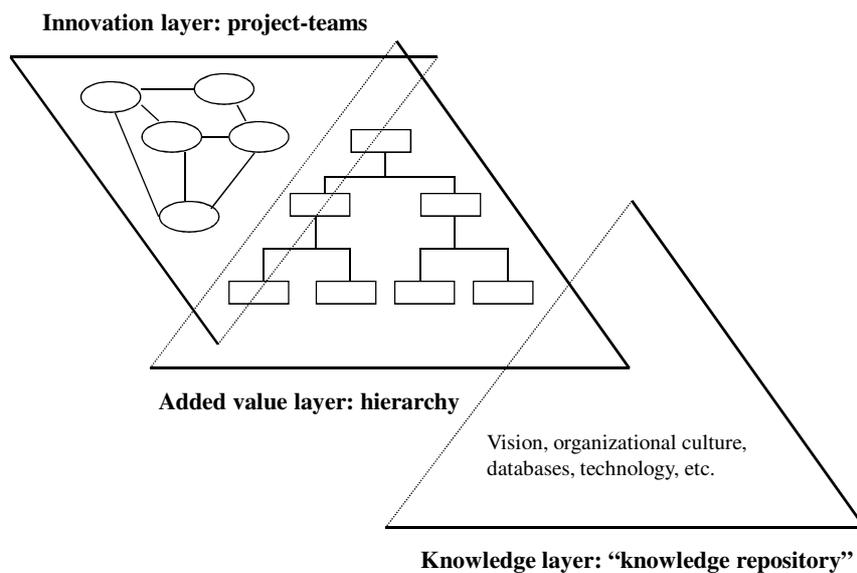
- ✓ Databases and relational databases
- ✓ Data Warehouse: data storage
- ✓ Intelligent agents: selective data search
- ✓ Document repositories (document management)
- ✓ Data Mining: search of high volumes of information

Knowledge Management: main approaches (5)

Managerial approach (organizational conditions)

- **Organizational units for Knowledge Management:**
departments of Knowledge Management (e.g. Siemens)
- Specific **management positions** on Knowledge Management:
(e.g. *Chief Knowledge Officer - CKO*)
- **Corporate University** (e.g.. Xerox): center for organizational learning and knowledge
- Organizational models that enable Knowledge Management:
“**Hypertext organization**” (Nonaka & Takeuchi, 1995);
“**Heterarchy**” (Hedlund, 1993)

Hypertext organization (Nonaka & Takeuchi, 1995) (1)



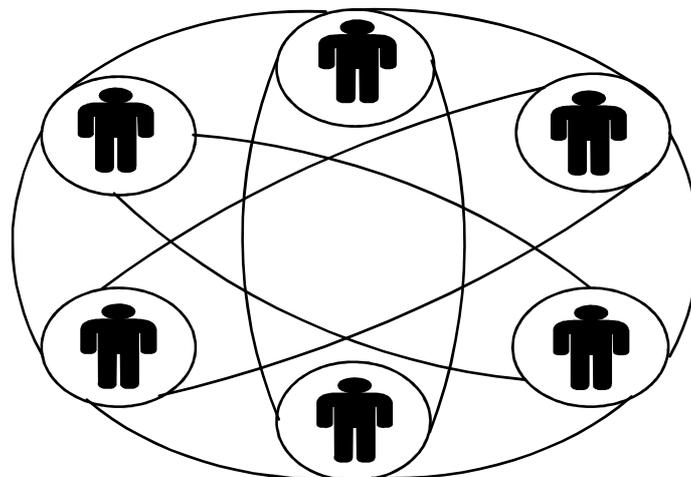
Hypertext organization (Nonaka & Takeuchi, 1995) (2)

- **Organizational layers:**

- 1) **Added value layer:** hierarchical part of the organization focused on the exploitation of organizational knowledge.
- 2) **Innovation layer:** structured around project-teams devoted to the generation of new knowledge (innovation). This new knowledge is incorporated into the added value layer for its application and exploitation.
- 3) **Knowledge layer:** “Organizational Memory” or “knowledge repository”. It involves systems and elements which support the storage of knowledge (information systems, technology, culture ...).

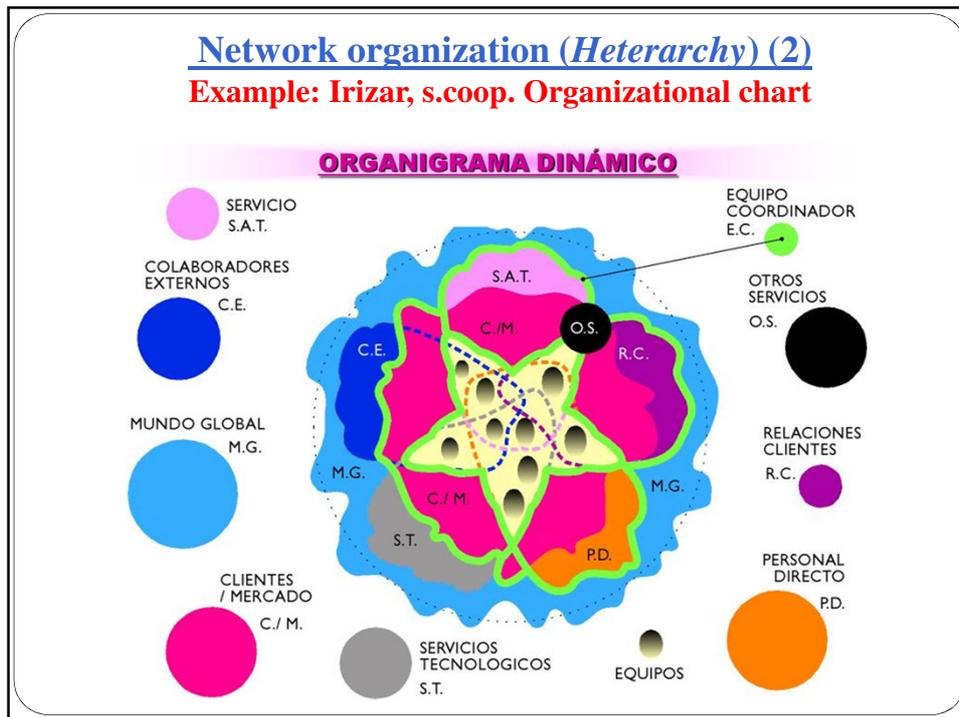
Network organization (Heterarchy) (1)

The **absence of hierarchy** and the **breaking of departmental barriers** facilitate knowledge sharing



Network organization (Heterarchy) (2)

Example: Irizar, s.coop. Organizational chart



Knowledge Management: main approaches (6)

Humanist approach (People)

- **Competence management:** identification and management of people capabilities and abilities.
- **Training plans:** fostering learning and knowledge acquisition processes
- **Professional career plans:** developing people future competencies.
- **Teamwork:** fostering knowledge sharing.
- **Communities of Practice:** e.g. Siemens.

Knowledge Management: main approaches (7)

Innovation approach

Is there any relationship between Knowledge and Innovation? (1)

- Innovation requires new knowledge and new combinations of knowledge (Eisenhardt & Martin, 2000).
- The capacity of an organization to innovate lies in its capacity to generate new knowledge (Nonaka & Takeuchi, 1995; Nonaka, Toyama & Byosière, 2003).
- Innovation depends on the accumulation and development of relevant knowledge of a wide variety (Fischer, 2001).
- Innovation as the generation of novel combinations from existing knowledge (Leiponen, 2006).
- Innovation is related to the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services (Plessis, 2007).
- “Innovation represents – by definition – something new and therefore adds to existing knowledge” (Lundvall & Nielsen, 2007, p. 214).

Knowledge Management: main approaches (8)

Innovation approach

Is there any relationship between Knowledge and Innovation? (2)

 to sum up:

Innovation implies the **creation of new knowledge** and/or **new combinations** of the extant knowledge

Knowledge & Innovation (1)

Knowledge as a source of Innovation

- Exploration versus Exploitation:

- **Exploration:** generation of new ideas/knowledge. It is the source of *radical innovation*.

- **Exploitation:** application of the extant organizational knowledge. It is a source of *incremental innovation*.

The ideal is to combine exploitation and exploration processes, in order to promote both types of innovation: incremental and radical.

For this purpose, it is possible to organize the firm differentiating two parts inside its organizational structure: the part dedicated to exploitation, and the one dedicated to exploration (**Ambidextrous organization**).

Knowledge & Innovation (2)

Knowledge as a source of Innovation

- **Ambidextrous organization:**

- In some companies it is solved through the creation of a specific business unit, detached from the rest of the organizational structure, that is dedicated to radical innovation (exploration). The rest of the structure is focused on incremental innovation (exploitation).

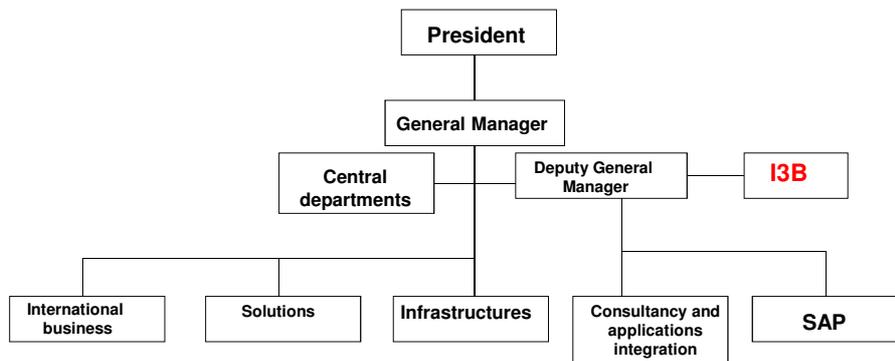
- This differentiated business unit has its own resources, culture, and management systems, that support creativity and innovation. In some cases, even its physical location is different from the rest of the structure.

- This business unit is isolated as regards the rest of the organization, with the aim to avoiding the influence of organizational routines that prevent radical innovation.

Knowledge & Innovation (3)

Knowledge as a source of Innovation

Ambidextrous organization – Example:
Organizational chart of Ibermática (simplified)



Source: annual report of Ibermática, 2008.

Knowledge & Innovation (4)

Knowledge as a source of Innovation

- **Sources of new knowledge:**
 - **Internal sources:** knowledge can be internally generated as a consequence of exploration processes.
 - **External sources:** new knowledge can be acquired from external sources. In this case, *absorptive capacity* is critical. New knowledge externally acquired is the base of *open innovation processes*.

Knowledge & Innovation (5)

Knowledge as a source of Innovation

- **Concept of Absorptive Capacity** (Cohen & Levinthal, 1990; Zahra & George, 2002; Todorova & Durisin, 2007):

Absorptive Capacity is the set of organizational routines and learning processes that allow the organization to recognize the value of **external knowledge** and to acquire, comprehend, integrate, and exploit it. Absorptive Capacity is a dynamic capability as it allows the organization to create, extend or modify its resource base.

Knowledge & Innovation (6)

Knowledge as a source of Innovation

- **Open Innovation concept:**

“Open Innovation refers to the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (Chesbrough, 2006:2).

Knowledge & Innovation (7)

Knowledge as a source of Innovation

- Some examples of external networks for innovation (**Open Innovation**):
 - **Intel**: 4 laboratories in university campuses in USA and UK to promote the connection with the University and facilitate the exchange of ideas between the University and the firm.
 - **IBM**: offers chips design services to some of its competitors.
 - **Procter & Gamble**: it had a macro department of R&D with 7.500 people. Now a half of the new ideas come from outside (only 10% in 2000).
 - **Microsoft**: it has a big internal research department, but it also collaborates with a lot of external organizations, having a wide network of partners around the world.
 - **Free software development projects**: creation of communities of software developers who collaborate for the development of software that they or their organizations need.

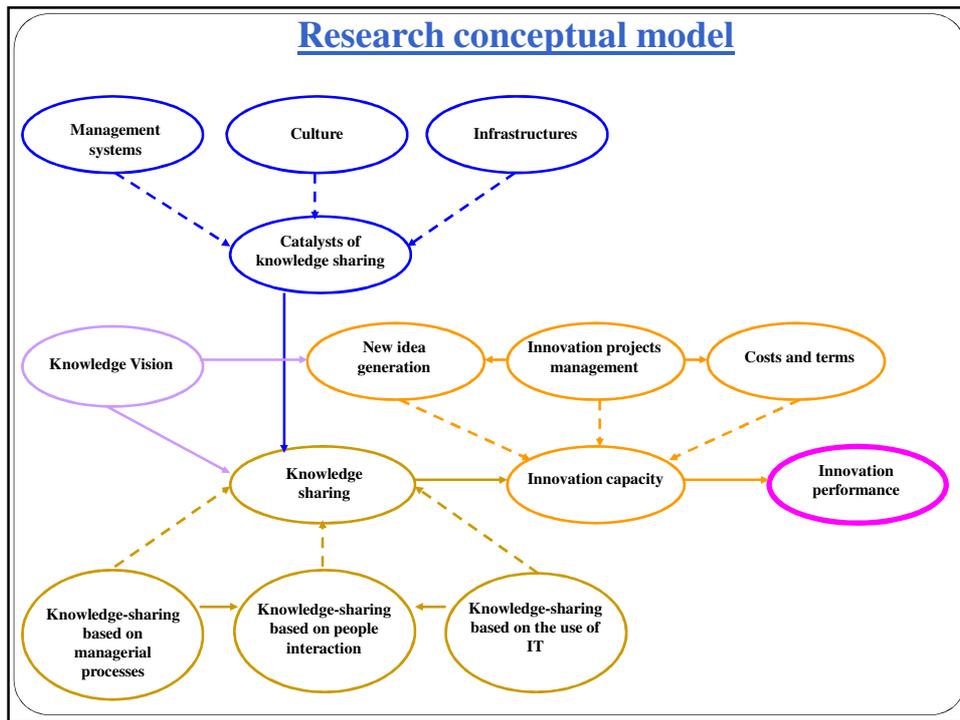
Knowledge & Innovation (8)

Knowledge as a source of Innovation

Pros and Cons of Open Innovation:

- **Pros:**

- Lower investment in internal structure: reduction of fixed costs associated to innovation.
- Higher flexibility/agility: according to the necessities of the innovation projects the firm allies with the most suitable partner. It is not necessary to have a fixed structure that can be adequate for some projects, but not for all of the projects. It is more expensive to eliminate a fixed structure when it is not useful.
- Increasing alternative options: when the firm allies with others, alternative ideas that couldn't emerge internally would emerge. When the network of partners is wider, the diversity and richness of alternative options increases.



Results of the research (1)

Dimensions of Innovation capacity		
New idea generation	Innovation projects management	Costs and terms
50.5%	33.0%	25.5%

The **new idea generation process** is the dimension of the innovation capacity in which knowledge sharing has most influence

Results of the research (2)

Dimensions of Innovation capacity

New idea generation	Innovation projects management	Costs and terms
1. Knowledge sharing based on the use of IT (0.264)	1. Knowledge sharing based on managerial processes (0.342)	1. Knowledge sharing based on managerial processes (0.268)
2. Knowledge sharing based on managerial processes (0.190)	2. Knowledge sharing based on the use of IT (0.267)	
	3. Knowledge sharing based on people interaction (0.210)	

Knowledge sharing based on the use of IT and on managerial processes are the types of innovation sharing which most influence innovation capacity

Research conclusions

- The research carried out shows that **knowledge sharing** is a critical factor in order to increase organizational innovation capacity.
- Although all types of knowledge sharing are relevant in order to promote innovation capacity, **knowledge sharing based on managerial processes** proves to be essential.
- Therefore, knowledge sharing hasn't to be understood as something to be managed through exceptional initiatives, but as something that must be **embedded in daily work**.