

# **KNOWLEDGE MANAGEMENT IN THEORY AND PRACTICE**

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Chapter 3: Knowledge Management Models

# Learning Objectives

At the end of this chapter, students will be able to:

1. Discuss the key tenets of the major knowledge management theoretical models in use today;
2. Describe the linkage of KM frameworks to key KM concepts and the major phases of the KM cycle; and
3. Explain the complex adaptive system model of KM and how it addresses the subjective and dynamic nature of content to be managed.

# Introduction

- A successful knowledge management initiative should have a robust theoretical foundation.
- Major KM activities in a KM cycle require a conceptual framework to operate within; otherwise these activities will not be coordinated and will not produce the expected KM benefits.

# Introduction

- KM models to be discussed are from Choo (1998), Weick (2001), Nonaka and Takeuchi (1995), Wiig (1993), von Krogh and Roos (1995), Boisot (1998), Beer (1984), and Bennet and Bennet (2004).
- These models present different perspectives on the key conceptual elements that form the infrastructure of KM.
- This chapter describes, compares, and contrasts each model in order to provide a sound understanding of the discipline of KM.

# Major Theoretical KM Models

## The von Krogh and Roos Model of Organizational Epistemology

- The von Krogh and Roos model of organizational epistemology (1995) is the first model that precisely differentiates between individual knowledge and social knowledge.
- This model, analyzes the following aspects:
  - a) Why and how the knowledge gets to the workers of an organization
  - b) Why and how the knowledge arrives at the organization
  - c) What does knowledge mean for the workers, as well as for the organization
  - d) What are the barriers or impediments of an organizational knowledge management

# Major Theoretical KM Models

## The von Krogh and Roos Model of Organizational Epistemology

- In this model, knowledge is regarded to exist within the people's minds and in the links between them.
- This model examines the nature of knowledge management from the perspective of:
  - a) Staff members
  - b) Communication and connection
  - c) Organizational structure and layout
  - d) Network between members and
  - e) Management of human resources

# Major Theoretical KM Models

## The von Krogh and Roos Model of Organizational Epistemology

- These five factors can impede the successful management of organizational knowledge to innovate, compete, and achieve goals.
- For example, if the knowledge contributors (i.e. staff members) are not highly evaluated and acknowledged by top management, they will not be motivated to innovate and develop new knowledge for the organization.
- Organizations need to put knowledge enablers (i.e. activities that encourage knowledge creation) in place that will stimulate the development of individual knowledge, group sharing of knowledge, and organizational retention of valuable knowledge-based content.

# Major Theoretical KM Models

## The Nonaka and Takeuchi Knowledge Spiral Model

- The Nonaka and Takeuchi model of KM is based on a universal model of knowledge creation and the management of coincidence.
- Knowledge Creation Process - always begins with the individual; the core of this model is to ensure that personal knowledge is available to others in the organization.
- It continuously occurs at all levels of the organization; happens in an unexpected or unplanned way.
- Organizational knowledge creation - a process that boosts the knowledge created by individuals and solidifies it as a part of the knowledge network of the organization.
- Knowledge creation is a social process between individuals in which knowledge transformation is interactive and spiral.

# Major Theoretical KM Models

## The Nonaka and Takeuchi Knowledge Spiral Model

- There are 4 different modes of KNOWLEDGE CONVERSION in the Nonaka and Takeuchi model of knowledge conversion:
  - a) Socialization (tacit to tacit) i.e. Indirect way,
  - b) Externalization (tacit to explicit) i.e. Indirect to Direct way,
  - c) Combination (explicit to explicit) i.e. Direct way, and
  - d) Internalization (explicit to tacit) i.e. Direct to indirect way.

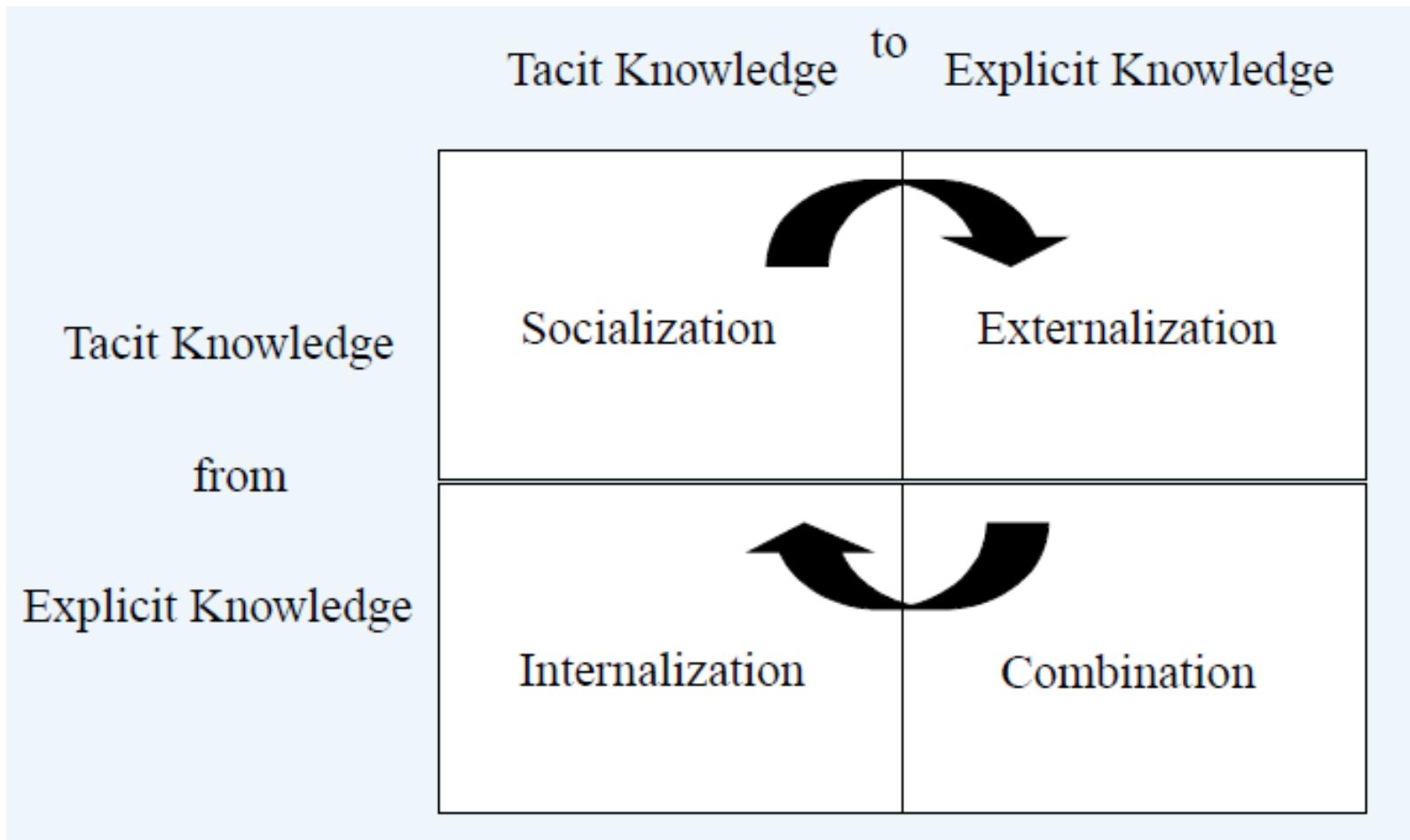


Figure 1. The Nonaka & Takeuchi model of knowledge conversion

# Major Theoretical KM Models

## The Nonaka and Takeuchi Knowledge Spiral Model

- **Socialization** - sharing tacit knowledge through observation, imitation, practice, and participation in formal and informal communities and groups; a process preempted by the creation of a physical or virtual space where a given community can interact on a social level.
- **Externalization** - expressing tacit knowledge into explicit concepts; as tacit knowledge is highly internalized, this process is the key to knowledge sharing and creation.
- **Combination** - integrating concepts into a knowledge system (e.g. synthesis in the form of a review report, a trend analysis, a brief executive summary, or a new database to organize content).
- **Internalization** - embodying explicit knowledge into tacit knowledge.

# Major Theoretical KM Models

## The Nonaka and Takeuchi Knowledge Spiral Model

- Organizations develop tools, structures, and models to accumulate and share knowledge; hence, the KNOWLEDGE SPIRAL shows how organizations articulate, organize and systematize individual tacit knowledge.
- Knowledge spiral - continuous activity of knowledge flow, sharing, and conversion by individuals, communities, and the organization itself.
- 2 steps in the knowledge spiral:
  - a) Externalization - conversion of tacit into explicit knowledge
  - b) Internalization – conversion of explicit into tacit knowledge
- Both steps require a high degree of personal commitment, and typically involve mental models, personal beliefs and values, and a process of reinventing yourself, your group, and the organization as a whole.

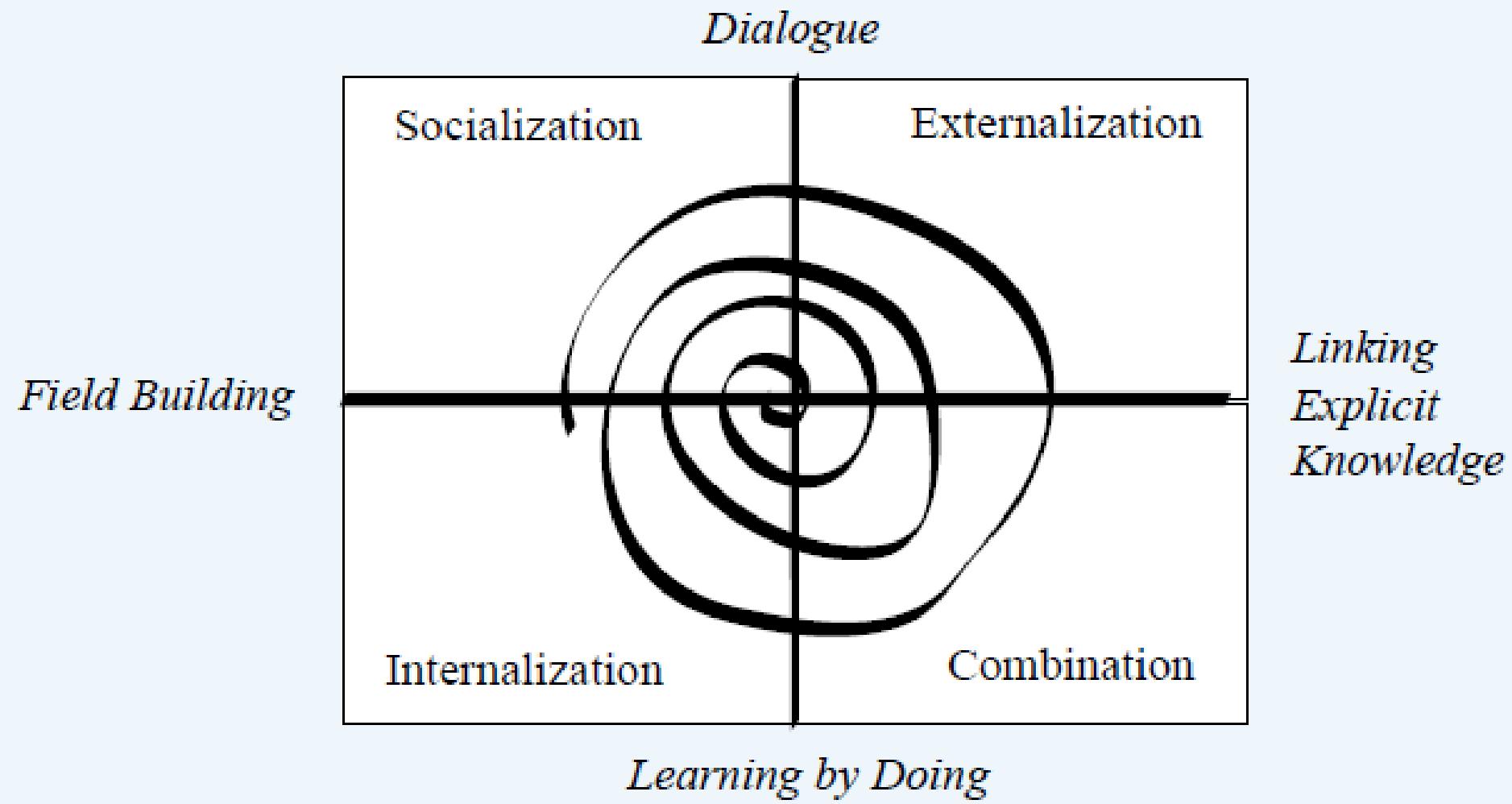


Figure 2. The Nonaka & Takeuchi knowledge spiral

# Major Theoretical KM Models

## The Choo Sense-making KM Model

- The Choo Sense-Making KM Model (1998) focuses on
  - a) Sense Making
  - b) Knowledge Creation
  - c) Decision making skills
- These 3 highly interconnected processes advances the organization's knowledge vision, its potential to knowledge creation, and its commitment to identify and evaluate alternatives.
- Organizational action results from the concentration and absorption of information from the external environment into each successive cycle.

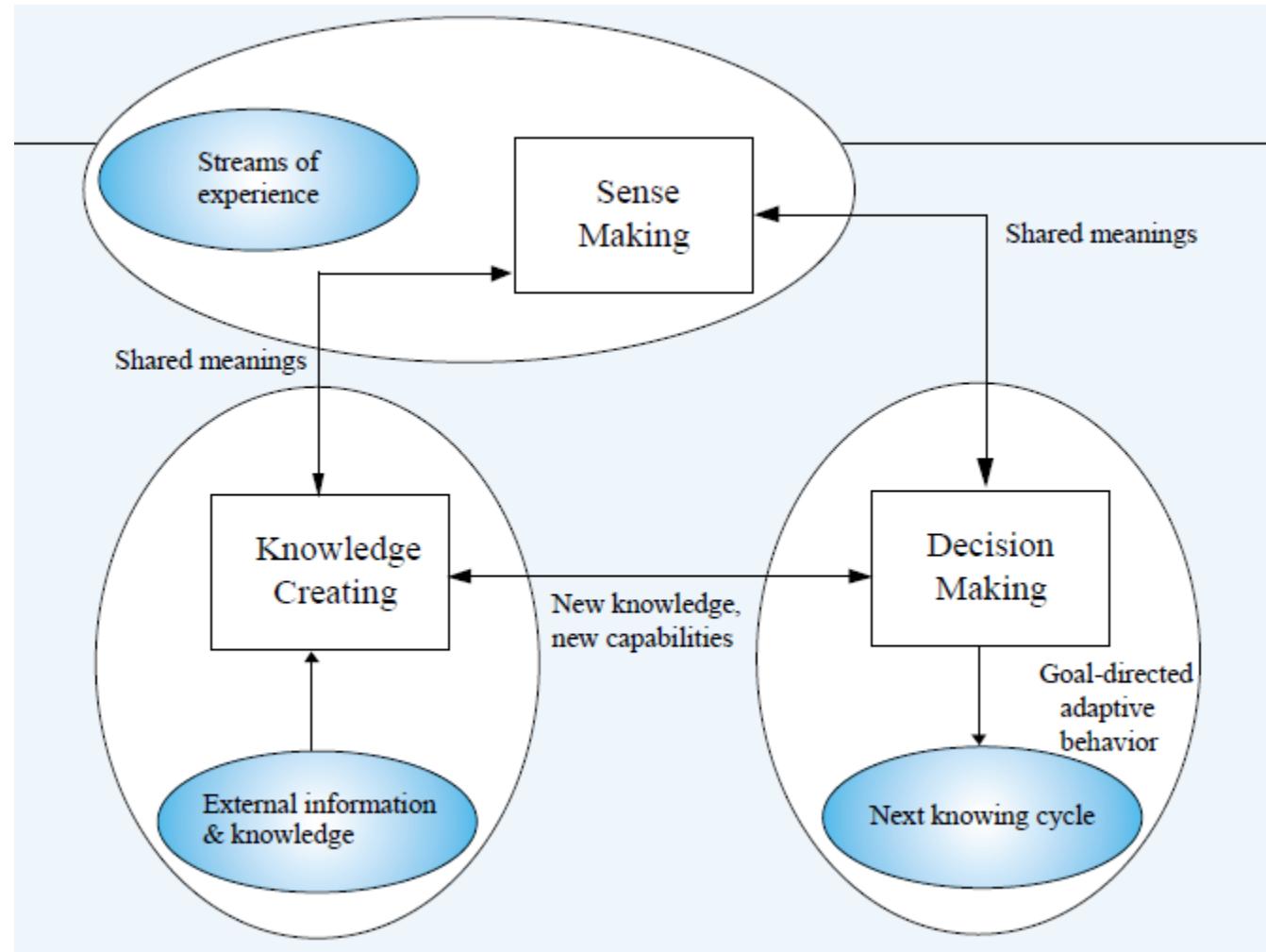


Figure 3. Overview of Choo's Knowledge Management Model (1998)

# Major Theoretical KM Models

## The Choo Sense-making KM Model

- **Sense Making** – has a long-term aim that warrants the organization to continuously adapt and prosper in a dynamic and complex environment via activities that research and interpret necessary information in understanding changes, trends and scenarios about clients, suppliers, competitors and other external environment actors.
- **Knowledge Creation** – allows an organization to create or acquire, organize and process information in order to generate new knowledge through organizational learning; newly-obtained knowledge enables the organization to develop new abilities and capabilities, create new products and new services, improve the existing ones, and redesign its organizational processes.

# Major Theoretical KM Models

## The Choo Sense-making KM Model

- **Decision Making** – the organization should choose the best option among the prospective choices and pursue it based on the organization's strategy; often constrained by the bounded rationality principle.
- This model focuses on how informational elements are selected and fed into organizational actions.

# Major Theoretical KM Models

## The Wiig Model for Building and Using Knowledge

- Karl Wiig KM model (1993) – implies that, in order for knowledge to be useful and valuable, it must be organized and synchronized.
- Some essential dimensions in the WIIGS KM model are:
  - a) Completeness
  - b) Connectedness
  - c) Congruency and
  - d) Perspective and purpose

# Major Theoretical KM Models

## The Wiig Model for Building and Using Knowledge

- **Completeness** – how much relevant knowledge is available from a given source; Sources may come from human minds to knowledge bases (like, tactic or explicit knowledge); first, it is important to know that the knowledge is out there and all information related to it are available; however, if no one knows of its existence, the knowledge cannot be of use.
- **Connectedness** – well-understood and defined relations between the different knowledge objects; very few knowledge objects are detached from the others; a better connected knowledge base means (i.e., the greater the number of interconnections in the semantic network), that the contents are coherent and have greater value.

# Major Theoretical KM Models

## The Wiig Model for Building and Using Knowledge

- **Congruency** – A knowledge base is congruent when all the facts, concepts, perspectives, values, judgments, and relational links and connections between the objects are consistent; concept definitions should be consistent, and the entire knowledge base needs to be constantly “fine-tuned” to maintain congruency.
- **Perspective and Purpose** – a phenomenon where we “know something” but often from a particular point of view or for a specific purpose, organization of knowledge using the concept of perspective and purpose (e.g. just-in-time knowledge retrieval or just enough—“on demand” knowledge).
- **Semantic networks** – a representation of different perspectives on the same knowledge content. Figures 4-8 show examples of different perspectives on the same knowledge object (“car”) using semantic networks.

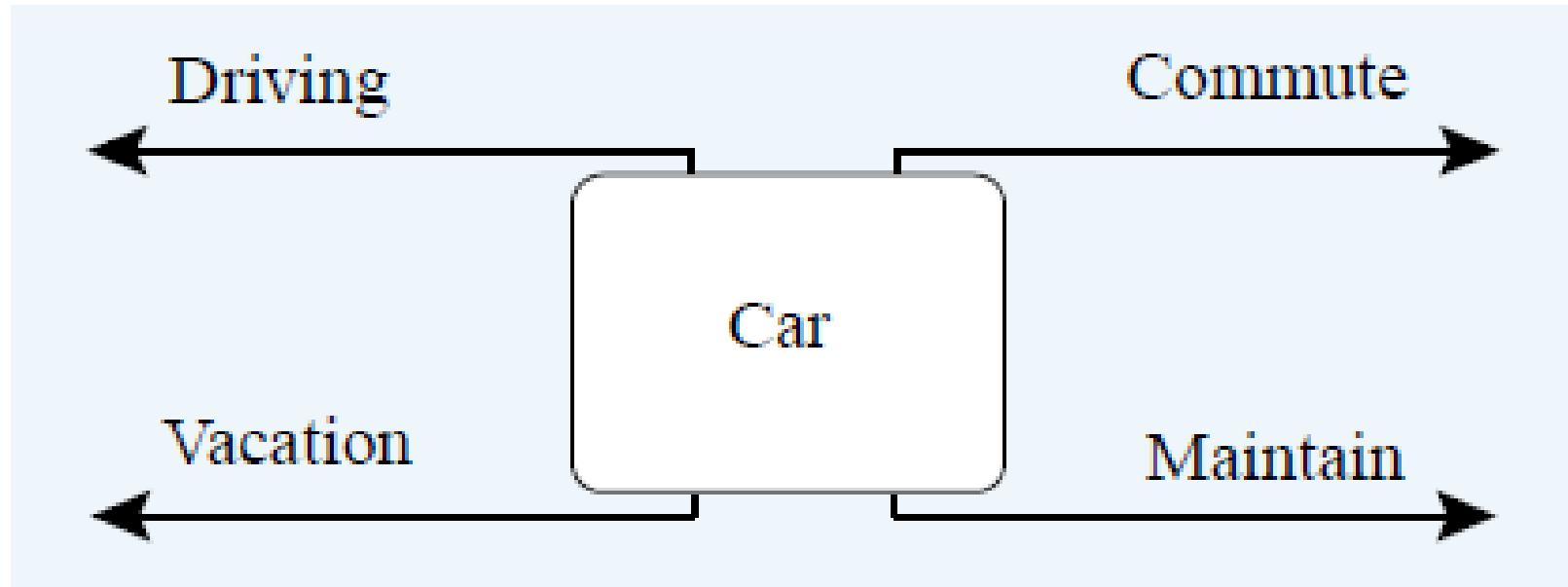


Figure 4. Example of a Semantic Network

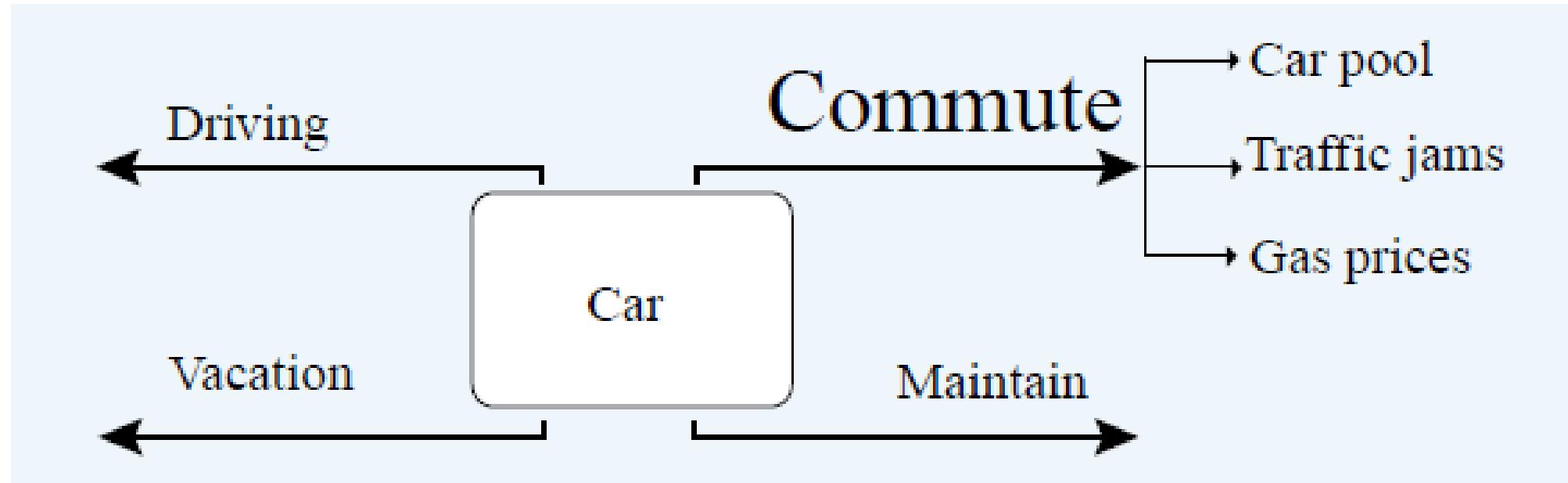


Figure 5. Example of a Semantic Network – A commute view

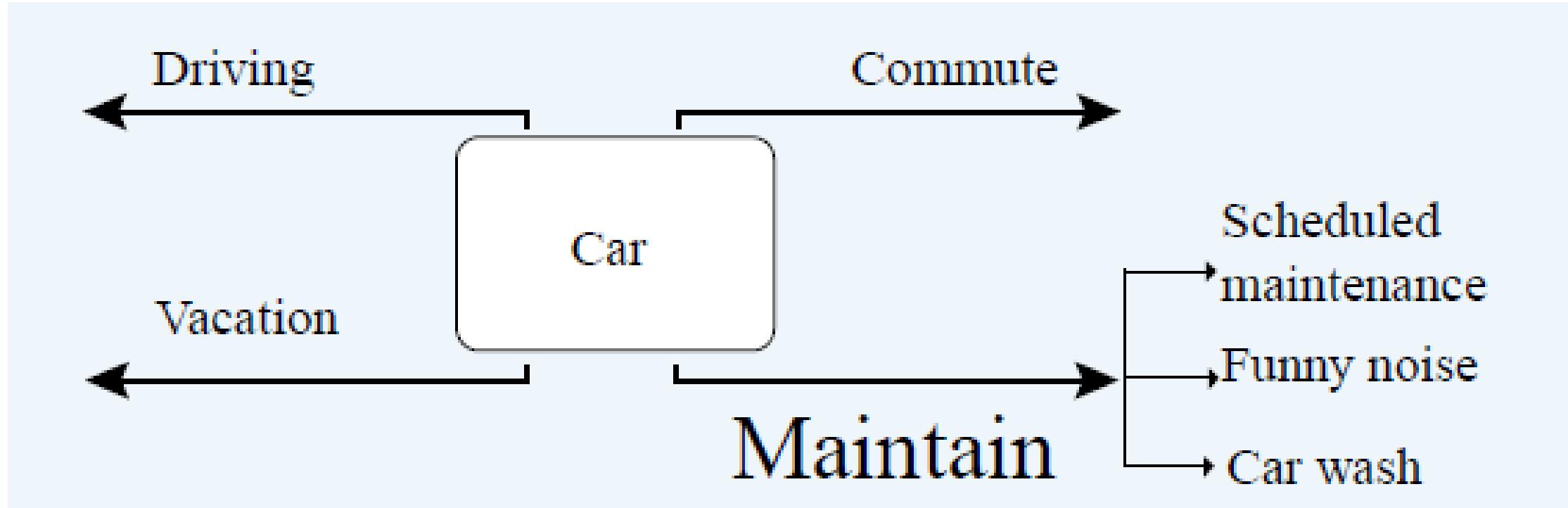


Figure 6. Example of a Semantic Network – A maintain view

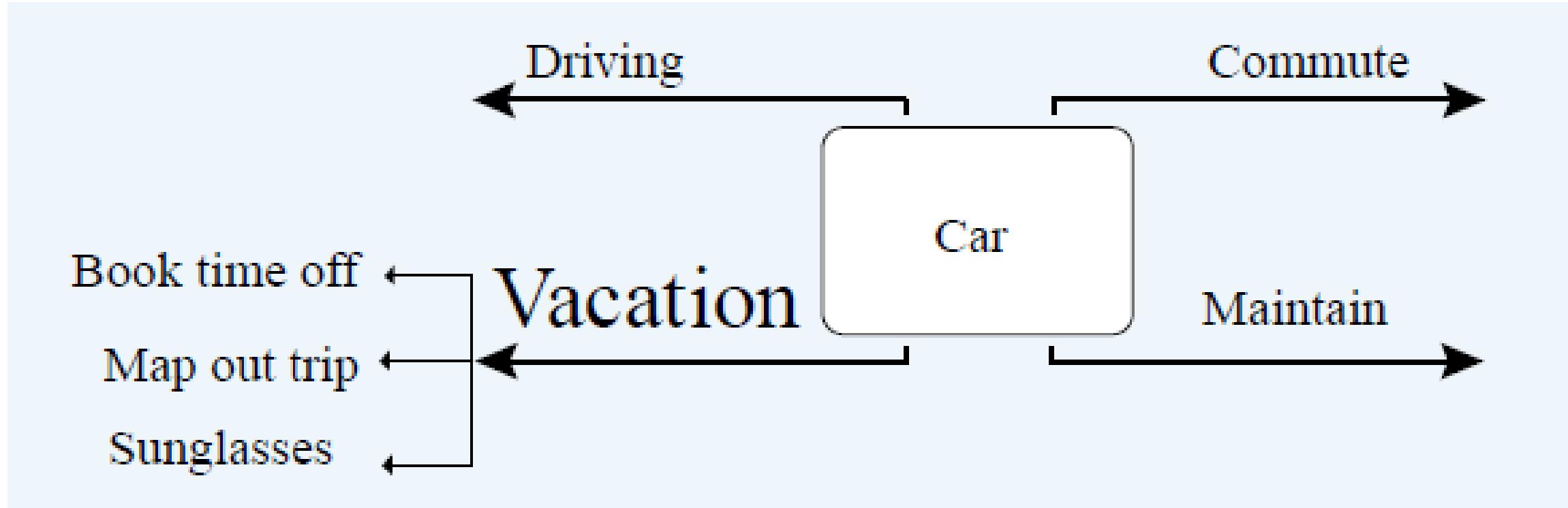


Figure 7. Example of a Semantic Network – A vacation view

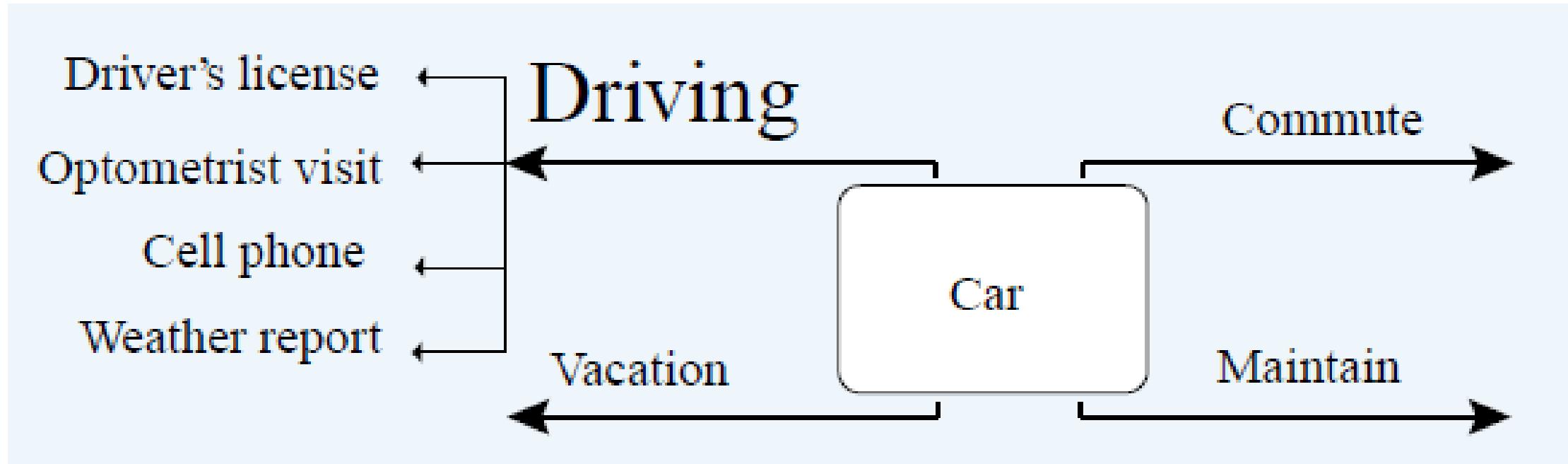


Figure 8. Example of a Semantic Network – A driving view

<b>Level</b>	<b>Type</b>	<b>Description</b>
1	Novice	Barely aware or not aware of the knowledge and how it can be used.
2	Beginner	Knows that the knowledge exists and where to get it but cannot reason with it.
3	Competent	Knows about the knowledge, can use and reason with the knowledge given external knowledge bases such as documents and people to help.
4	Expert	Knows the knowledge, holds the knowledge in memory, understands where it applies, reasons with it without any outside help.
5	Master	Internalizes the knowledge fully, has a deep understanding with full integration into values, judgments, and consequences of using that knowledge.

**Table 1. Wiig KM Model – Degrees of Internalization**

<b>Form of Knowledge</b>	<b>Type of Knowledge</b>			
	Factual	Conceptual	Expectational	Methodological
Public	Measurement, reading	Stability, balance	When supply exceeds demand, price drops	Look for temperatures outside the norm
Shared	Forecast analysis	“Market is hot”	A little water in the mix is okay	Check for past failures
Personal	The “right” color, texture	Company has a good track record	Hunch that the analyst has it wrong	What is the recent trend?

**Table 2. Wiig KM Matrix**

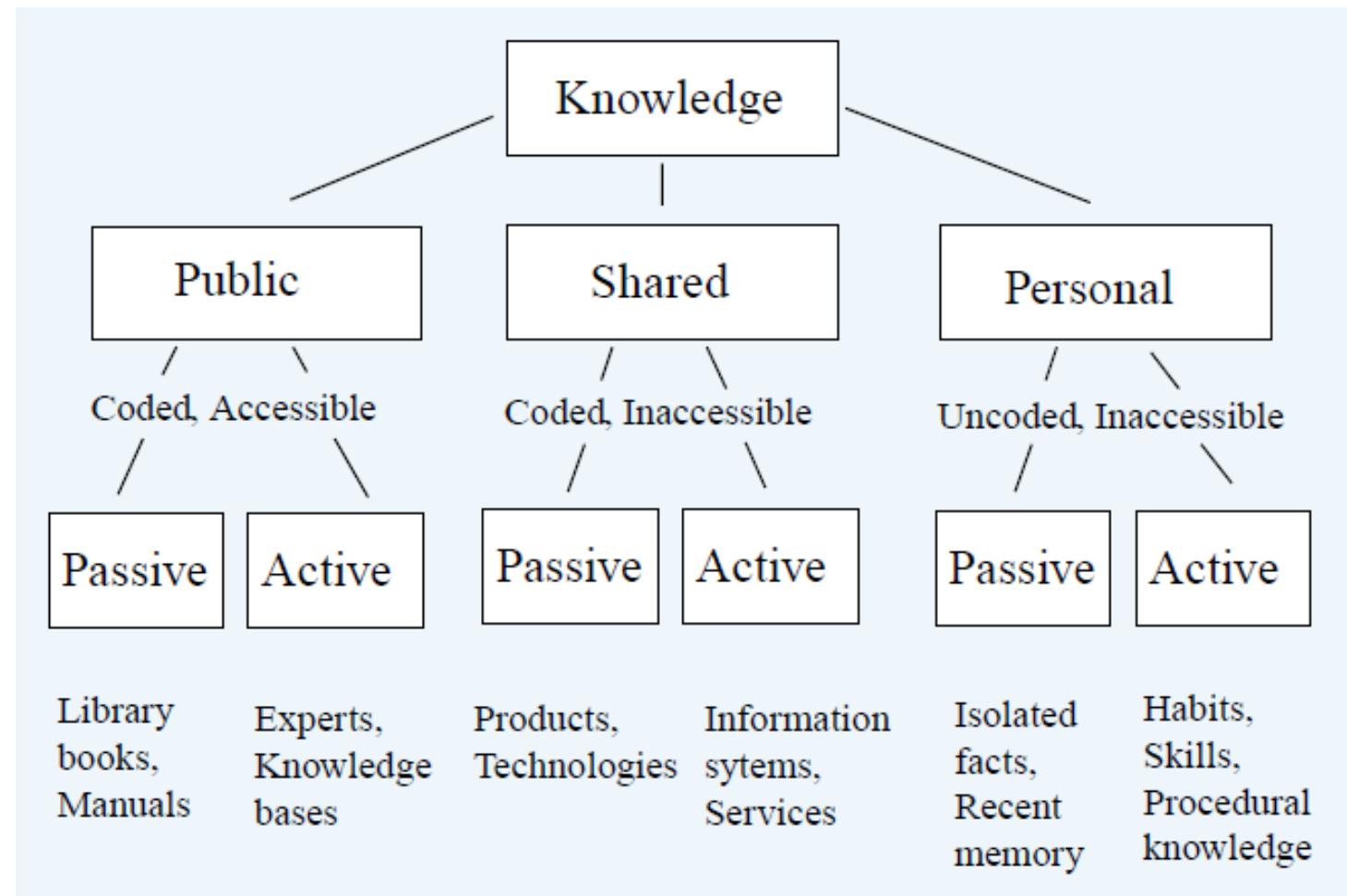


Figure 9. Wiig Hierarchy of Knowledge Forms

# Major Theoretical KM Models

## The Boisot I-Space KM Model

- This model is based on the key concept of an “information good” which differs from a physical asset.
- Difference between information and data - information is what an observer will extract from data as a function of his or her expectations or “prior knowledge”.
- An **effective transfer of information goods** depends on senders and receivers sharing the same coding scheme or language.
- A **knowledge good** - possesses a context within which it can be interpreted.
- An **effective knowledge sharing** requires that senders and receivers share the context as well as the coding scheme.

# Major Theoretical KM Models

## The Boisot I-Space KM Model

- Boisot's model can be seen as a 3D cube with the following dimensions:
  - a) From uncodified to codified
  - b) From concrete to abstract
  - c) From undiffused to diffused

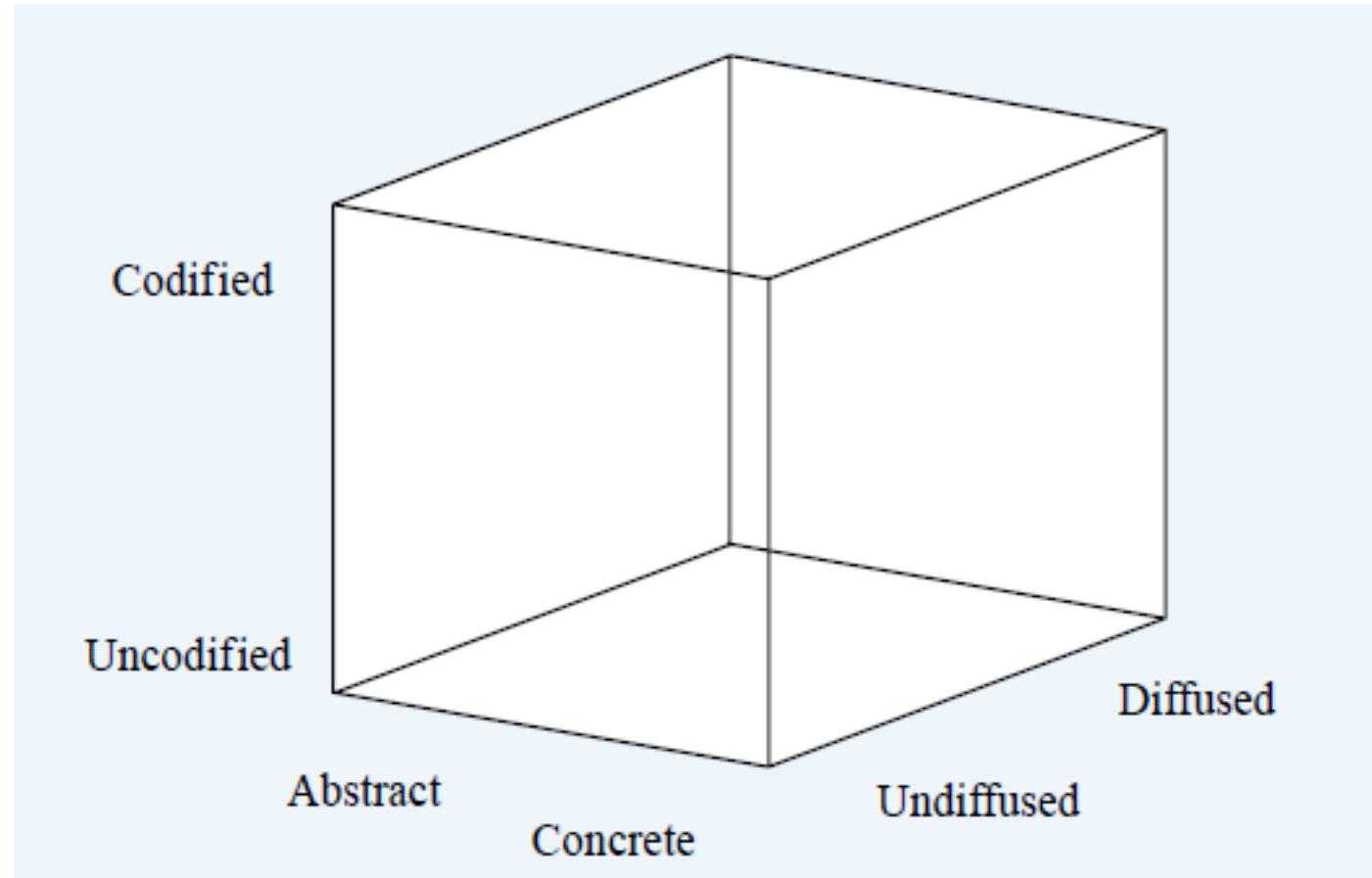


Figure 10. The Boisot I-Space KM Model

# Major Theoretical KM Models

## The Boisot I-Space KM Model

- Proposed a Social Learning Cycle (SLC) that adopts the I-Space to model the dynamic flow of knowledge through a series of six phases:
  - a) **Scanning** – Wisdom is gained from generally available or diffused data.
  - b) **Problem-Solving** – Problems are solved offering structure and coherence to these insights as knowledge becomes codified.
  - c) **Abstraction** – The newly codified wisdom is generalized to a wide range of situations as knowledge becomes more abstract.
  - d) **Diffusion** – the new wisdom are shared with a target population in a codified and abstract form as knowledge becomes diffused.
  - e) **Absorption** – The newly codified insights are applied to a variety of situations generating new learning experiences as knowledge is absorbed and produces learnt behavior and so becomes uncodified or tacit.
  - f) **Impacting** – Abstract knowledge becomes fixed in concrete practices, for example in artifacts, rules or behavior patterns as knowledge becomes concrete.

# Major Theoretical KM Models

## The Boisot I-Space KM Model

- This model views organizations as living organisms; their process of growing and developing knowledge assets is constantly changing.
- This means that organizations need to adopt a dynamic KM strategy which accommodates the dynamic nature of the organizational learning cycle.

# Major Theoretical KM Models

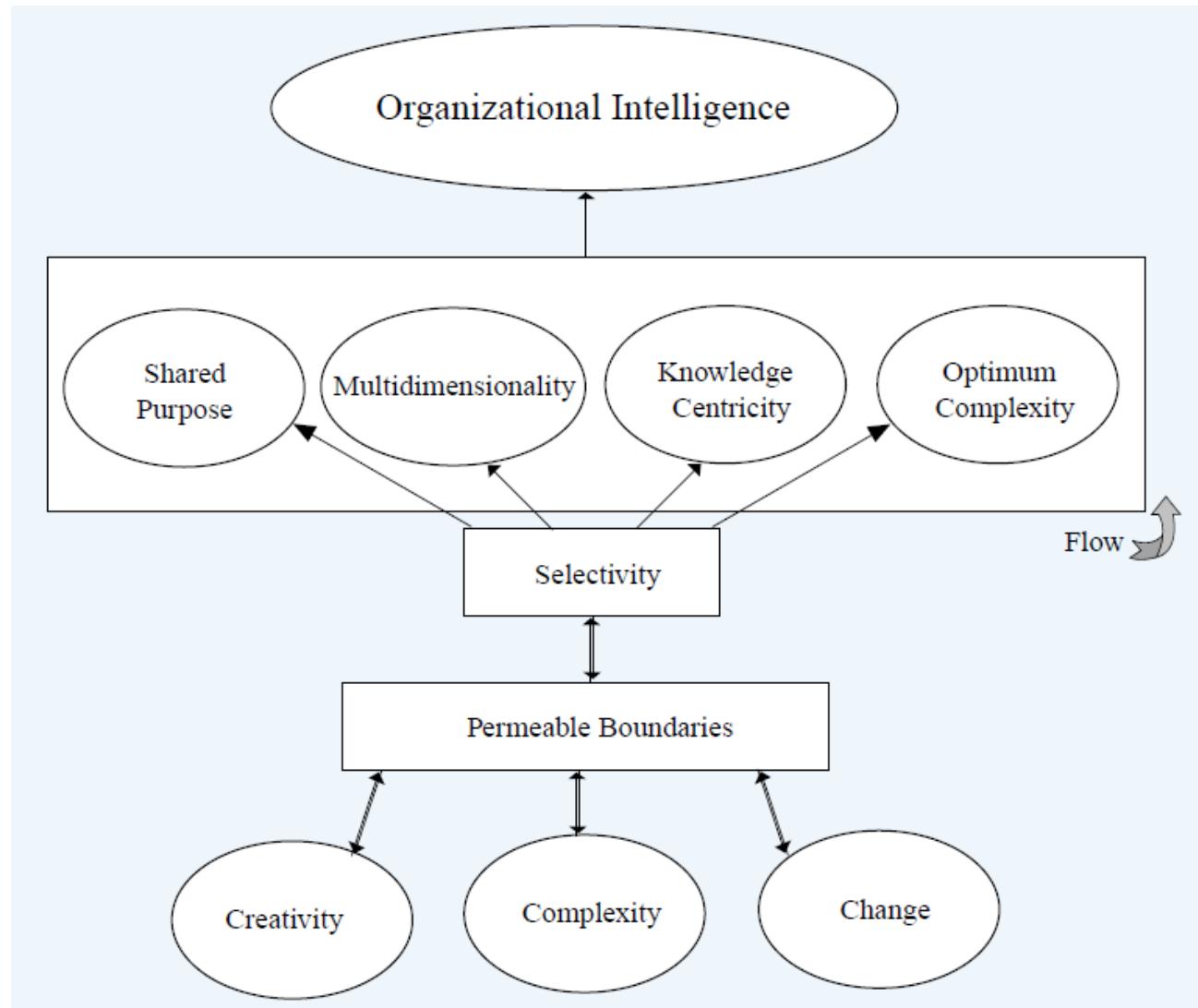
## Complex Adaptive System Models of KM

- ICAS (Intelligent Complex Adaptive Systems) theory views an organization as an adaptive, complex system.
- Complex adaptive systems consist of many independent agents that locally interact with one another which brings complex adaptive phenomena as a result of their combined behavior.
- These models contain a series of functions that ensures the viability of any living system in general and of specific organizations.
- ICAS systems are based on cybernetics principles, which uses communications and control mechanisms in order to understand, describe and predict what a viable organization should do.

# Major Theoretical KM Models

## Complex Adaptive System Models of KM

- The key processes in the ICAS KM model can be summarized as:
  - a) Understanding
  - b) Creating new ideas
  - c) Solving problems
  - d) Making decisions
  - e) Taking actions to achieve desired results
- Based on this model, to survive and successfully compete, an organization requires eight emergent characteristics: (1) organizational intelligence, (2) shared purpose, (3) selectivity, (4) optimum complexity, (5) permeable boundaries, (6) knowledge centricity, (7) flow, and (8) multidimensionality.



**Figure 11. Overview of the ICAS Model**

# Strategic Implications of KM Models

- Models help in piecing together information on different perspectives to give an in-depth understanding of each concept/component and the totality of the KM model.
- Models supplement the concept analysis approach, discussed in the previous chapter, to understand it more; KM models are still fairly new to the practice but they represent the way ahead.
- A coherent model of knowledge-driven processes is crucial to the KM initiatives' ability to address strategic business goals.
- Although KM could not solve all organizational problems, knowledge-intensive work and intellectual capital development that are amenable to KM processes provide a solid foundation in understanding KM, what the key KM cycle processes are, and how these fit in to a model that enables us to interpret, to establish cause and effect, and to successfully implement knowledge management solutions.

# Practical Implications of KM Models

- The KM models' key roles:
  - a) Ensures that a certain level of completeness or depth in the practice of KM is achieved;
  - b) Ensures that all critical factors have been addressed;
  - c) Enables a better description of what is currently happening and provides a better prescription for meeting organizational goals; and
  - d) Explains what is happening now and provides a valid blueprint or road map for leading the organizations where they want to be through their knowledge management efforts.

# Key Points

- KM covers data, information, and knowledge (collectively as “content”) and addresses both tacit and explicit forms of knowledge.
- The von Krogh and Roos KM model takes an organizational epistemology approach and emphasizes that knowledge resides both in the minds of individuals and in the relations they form with others.
- The Nonaka and Takeuchi KM model focuses on knowledge spirals that explain the transformation of tacit knowledge into explicit knowledge and vice versa as the basis for individual, group, and organizational innovation and learning.

# Key Points

- Choo and Weick KM models adopt a sense-making approach to model KM that focuses on how information elements are fed into organizational actions via sense making, knowledge creating, and decision making.
- The Wiig KM model is based on the principle that in order for knowledge to be useful and valuable, it must be organized through a form of semantic network that is connected, congruent, and complete, and that has perspective and purpose.
- Complex adaptive systems are particularly well suited to model KM as they view the organization much like a living entity concerned with independent existence and survival. This approach describes the cohesiveness, complexity, and selective pressures that operate on intelligent complex adaptive systems (ICAS).

# Discussion Points

1. Compare and contrast the cognitivist and connectionist approaches to knowledge management. Which approach more suited to the case study? What are the strengths of this approach? What are its weaknesses? Use examples to make your points.
2. Describe how the major types of knowledge (e.g., tacit and explicit) are transformed in the Nonaka and Takeuchi knowledge spiral model of KM. Use a concrete example to make your point (e.g., a “bright” idea that occurs to an individual in the organization).

Consider the case study:

- a) Which transformation would prove to be the most difficult? Why?
- b) Which transformation would prove to be fairly easy? Why?
- c) What other key factors would influence how well the knowledge spiral model worked within a given organization?

# Discussion Points

3. In what ways is the Choo and Weick KM model similar to the Nonaka and Takeuchi KM model? In what ways do the two models differ?
  - a) How does the integration of a bounded rationality approach to decision making strengthen this model? Give some examples.
  - b) List some of the key triggers that are required in order for the sensemaking KM model approach to be successful.
4. How is the Wiig KM model related to the Nonaka and Takeuchi model? In what important ways do they differ?
  - a) List some examples of internalization to illustrate how each of the five levels differs.
  - b) How do public, private, and shared knowledge differ? What are the implications of managing these different types of knowledge according to the Wiig KM model?

# Discussion Points

5. Outline the general strategy you would use in order to implement the Boisot I-Space KM model. Where would you expect to encounter difficulties? What would be some of the expected benefits to the organization of applying this approach?
6. What is the major advantage of a complex adaptive system approach to a KM model? What are some of the drawbacks?
  - a) Provide an everyday example of requisite variety. Next, apply this to the case study. What are the key elements needed in order to successfully regulate a complex adaptive system? Why?