CSS3133 Knowledge Management

Unit 03: The Knowledge Management (KM) Models

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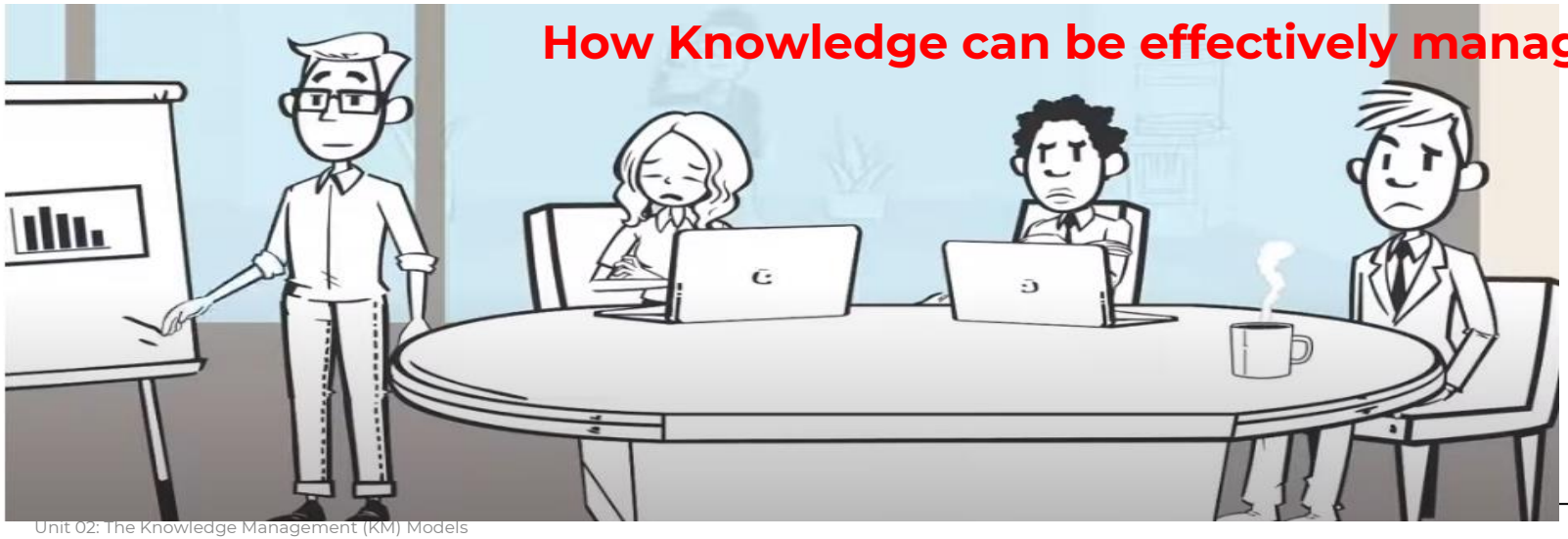
Learning outcomes

- Describe the key tenets (principles) of the major KM theoretical models in use today
- Correlate the KM models to key KM concepts and phases in the KM cycle
- Identify the strengths and weaknesses of each KM model

Introduction

- To succeed, a knowledge management initiative must have a robust theoretical foundation.
  - Major KM activities require a conceptual framework to operate within; otherwise the activities will not be coordinated and will not produce the expected KM benefits.



Data, information & knowledge – a recap

- Data:
  - A set of discrete, objective facts about events.
- Information:
  - A message, usually in the form of a document or an audible or visible communication.
- Knowledge:
  - A fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information.
  - It originates and is applied in the minds of knowers.
  - In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms.

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DATA

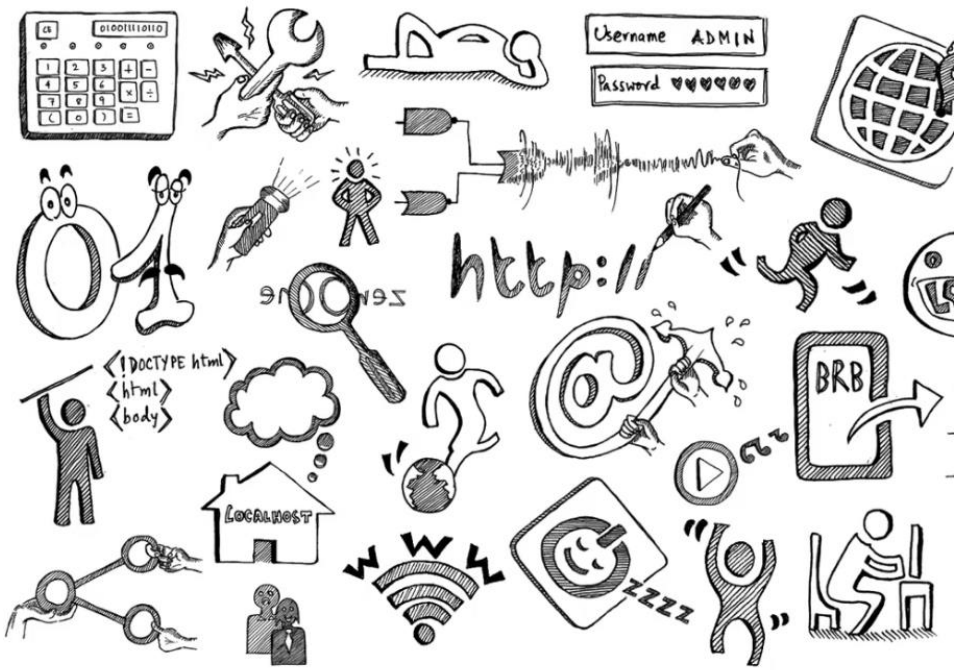
Raw facts

NO MEANING

REQUIRES PROCESSING

CAN'T UNDERSTAND IT

UNFILTERED



The Baumgardner Family
3927 West Broadway
Apt 101
Robbinsdale, MN 55422

The Crosbie Family
13233 Revere Ln N
Champlin, MN 55316

The Dooley Family
4656 West Broadway
Robbinsdale, MN 55422

The Haberle Family
7351 40th Ave N
New Hope, MN 55427

The Judovsky Family
2526 Brookdale Ln N
Brooklyn Park, MN 55444

The Magstadt Family
5748 Elmhurst Ave N
Crystal, MN 55428

The Moser Family
5307 Edgewood Ave N
Crystal, MN 55428

The Peterson Family
100 Clydesdale Trl
Apt 325
Hamel, MN 55340

The Brittingham Family
602 Constitution Ave
Washington, DC 20002

The Paine Family
PO Box 10033
Green Bay, WI 54307

The Sousa Family
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The Huffaker Family
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Las Vegas, NV 11111

The Duerstine Family
123 1st St E
Mpls, MN 55555

The Palmer Family
123 Main St E
Langly, WA 98260

The Schaeffer Family
101 Burnsville Pkwy W
Burnsville, MN 55337

The Springer Family
1318 Longworth
Washington, DC 20515

The Wittman Family
7114 Cople Hwy
Hague, VA 22469

The McMichael Family
PO Box 97275
Raleigh, NC 27624

Information

Processed data

Is useful

Has meaning

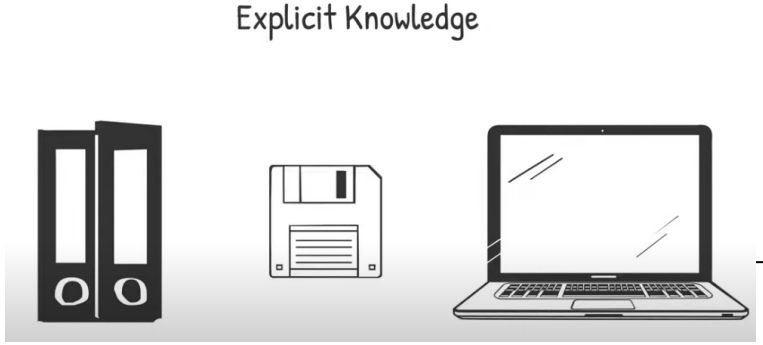
Provides answers

Has structure

Can be understood

Tacit & explicit knowledge – a recap

- **Tacit knowledge** is not easily expressed ir formalized ways, and is context-specific, personal, and difficult to communicate.
- **Explicit knowledge** is the codified one, expressed in formal and linguistic ways, easily transmittable and storable, and expressible in words and algorithms, but it represents only the tip of the iceberg of the entire body of knowledge.



Major theoretical KM models

How Knowledge can be effectively managed?

- **The following models were selected because they possess the following critical characteristics**:
  1. They represent a holistic approach to knowledge management (i.e., they are comprehensive and take into consideration people, process, organization, and technology dimensions).
  2. They have been reviewed, critiqued, and discussed extensively in the KM literature, by practitioners, academics, and researchers alike.
  3. The models have been implemented and field tested with respect to reliability and validity.

Major theoretical KM models

- Our focus :
  - ❑ The von Krogh and Roos Model of Organizational Epistemology
  - ❑ The Nonaka and Takeuchi Knowledge Spiral Model
  - ❑ The Choo Sense-making KM Model
  - ❑ The Wiig Model for Building and Using Knowledge
- The Boisot I-Space KM Model
- Complex Adaptive System Models

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The von Krogh and Roos Model of Organizational Epistemology (1)

- This model distinguishes between individual knowledge and social knowledge, and take an epistemological approach to managing organizational knowledge: the organizational epistemology KM model.
  - Epistemology: the theory or philosophy of knowledge
- Issues addressed:
  - How and why individuals within an organization come to know.
  - How and why organizations, as social entities, come to know.
  - What counts for knowledge of the individual and the organization.
  - What are the impediments in organizational KM.

The von Krogh and Roos Model of Organizational Epistemology (2)

- The model takes a connectionist approach.
  - The brain is not assumed to sequentially process symbols but to perceive "wholeness" (i.e. global properties, patterns, synergies, and gestalts)
  - Learning rules govern how various components of these whole networks are connected.
  - Information is not only taken in from the environment but also generated internally.
  - Familiarity and practice lead to learning.
  - Individuals form nodes in a loosely connected organizational system
  - Knowledge is an emergent phenomenon that stems from the social interactions of these individuals.
- In this perspective, knowledge resides not only in the minds of individuals but also in the connections among these individuals.
- A collective mind is formed as the representation of this network, and is the core of organizational knowledge management.

The von Krogh and Roos Model of Organizational Epistemology (4)

- The model examined KM in organizations in terms of:
  - The mind-set of the individuals
  - Communication in the organization
  - The organizational structure
  - The relationship between the members
  - The management of human resources

The von Krogh and Roos Model of Organizational Epistemology (5)

- The five factors could impede the successful management of organizational knowledge for innovation, competitive advantage, and other organizational goals.
- Therefore, organizations need to put knowledge enablers in place that will stimulate:
  - the development of individual knowledge
  - group sharing of knowledge
  - organizational retention of valuable knowledge-based content.

Learning and Training Program
Knowledge Sharing Platform
Recognition & Rewards
Community of practise

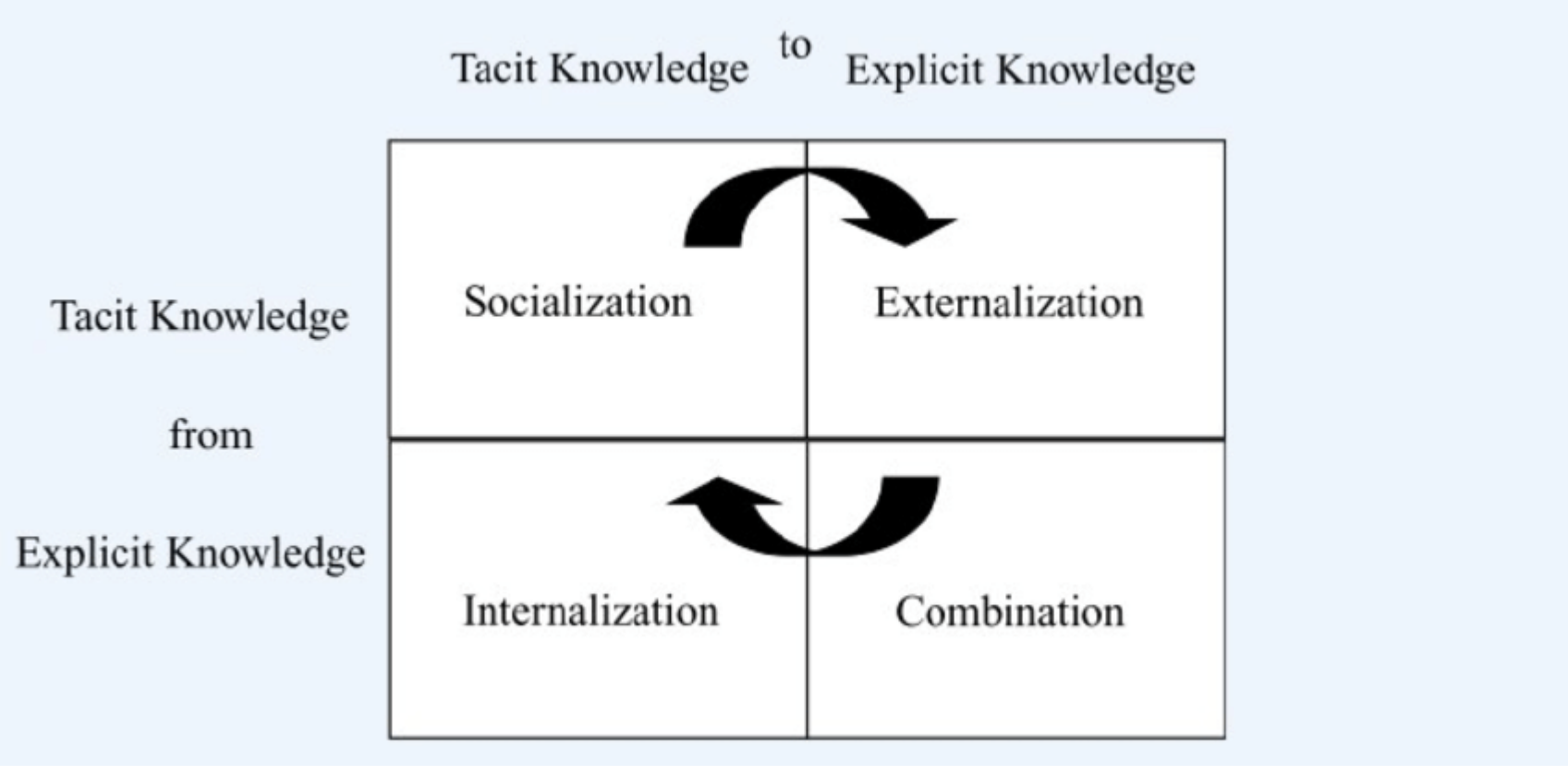
The Nonaka and Takeuchi Knowledge Spiral Model (1)

- **The Knowledge Creation Process:**
  - Knowledge creation always begins with the individual.
  - An individual's personal, private knowledge (predominately tacit in nature) is then translated into valuable, public organizational knowledge.
  - Making personal knowledge available to others in the company is at the core of this KM model.
  - This type of knowledge creation process takes place continuously and occurs at all levels of the organization.
  - In many cases, the creation of knowledge happens in an unexpected or unplanned way.

The Nonaka and Takeuchi Knowledge Spiral Model (4)

- **Knowledge Conversion:**
  1. From tacit knowledge to tacit knowledge: the process of **socialization**.
  2. From tacit knowledge to explicit knowledge: the process of **externalization**.
  3. From explicit knowledge to explicit knowledge: the process of **combination**.
  4. From explicit knowledge to tacit knowledge: the process of **internalization**.

The Nonaka and Takeuchi Knowledge Spiral Model



The Nonaka Takeuchi Model Of Knowledge Conversion

The Nonaka and Takeuchi Knowledge Spiral Model

- **Socialization (tacit-to-tacit):**
  - Sharing knowledge in face-to-face, natural, and typically social interactions.
  - Arrive at a mutual understanding through the sharing of mental models, brainstorming to come up with new ideas, apprenticeship or mentoring interactions.
  - Among the easiest forms of exchanging knowledge because it is what we do instinctively.
  - The greatest advantage of socialization is also its greatest drawback:
    - Knowledge remains tacit, it is rarely captured, noted, or written down anywhere, only in the minds of the original participants.
  - While it is a very effective means of knowledge creation and sharing, it is of limited means, being very difficult and time-consuming to disseminate all knowledge.
  - Practical application of socialization: brainstorming meetings.

The Nonaka and Takeuchi Knowledge Spiral Model

- **Externalization (tacit-to-explicit):**
  - Gives a visible form to tacit knowledge and converts it to explicit knowledge.
  - Tacit knowledge can now be written down, taped, drawn, or made tangible in some manner.
  - An intermediary is often needed to transform one type of knowledge into another → the knowledge journalist.
  - Once externalized, knowledge is tangible, permanent and can be shared more easily with others and leveraged throughout the organization.
  - It is particularly important not to lose attribution and authorship information, therefore there is a need to codify the metadata along with the actual content.

The Nonaka and Takeuchi Knowledge Spiral Model

- **Combination (explicit-to-explicit):**
  - It is the process of recombining discrete pieces of explicit knowledge into a new form.
  - No new knowledge is created per se.
  - Combination occurs when concepts are sorted and systematized in a knowledge system.
  - Examples: review reports, trend analyses, and executive summaries.

The Nonaka and Takeuchi Knowledge Spiral Model

- **Internalization (explicit-to-tacit):**
  - Occurs through diffusing and embedding newly acquired behavior and newly understood or revised mental models.
  - Internalization is strongly linked to “learning by doing”, (converting or integrating shared and/or individual experiences and knowledge into individual mental models).
  - Once internalized, new knowledge is then used by employees who broaden it, extend it, and reframe it within their own existing tacit knowledge bases.
  - The new knowledge is manifested as an observable change, i.e. they now do their jobs and tasks differently.

Fill in the blanks! The conversion of tacit and explicit knowledge.

The Nonaka and Takeuchi Knowledge Spiral Model

- Knowledge, experiences, best practices, lessons learned, and so on go through the knowledge conversion process but they cannot halt at any one of its stages.
- When knowledge is internalized into individuals' tacit knowledge bases:
  - It becomes a valuable asset to the individual, their community of practice, and the organization as a whole.
- However, the entire conversion process has to begin all over again for organizational knowledge creation to take place.

The Nonaka and Takeuchi Knowledge Spiral Model

- Knowledge Spiral:
  - Knowledge creation is not a sequential process.
    - Rather, it depends on a continuous and dynamic interaction between tacit and explicit knowledge throughout the four quadrants.
  - The knowledge spiral shows how organizations articulate, organize and systematize individual tacit knowledge.
    - It is a continuous activity of knowledge flow, sharing, and conversion by individuals, communities, and the organization itself.
  -

The Nonaka and Takeuchi Knowledge Spiral Model

- The two steps in the knowledge spiral that are the most difficult are those involving a change in the type of knowledge, i.e. externalization and internalization.
- These two steps require a high degree of personal commitment. will typically involve mental models, personal beliefs and values, and a process of reinventing yourself, your group, and the organization as a whole.
- All of these vehicles are good models for representing a consistent, systematic, and logical understanding of content without any contradictions.

The Nonaka and Takeuchi Knowledge Spiral Model

- The Nonaka and Takeuchi model has proven to be one of the more robust ones in the field of KM, and it continues to be applied in a variety of settings.
  - One of its greatest **strengths** is its simplicity—both in terms of understanding the basic tenets of the model and in terms of being able to quickly internalize and apply the KM model.
  - One of its major **shortcomings** is that, though valid, it does not appear to be sufficient to explain all of the stages involved in managing knowledge.

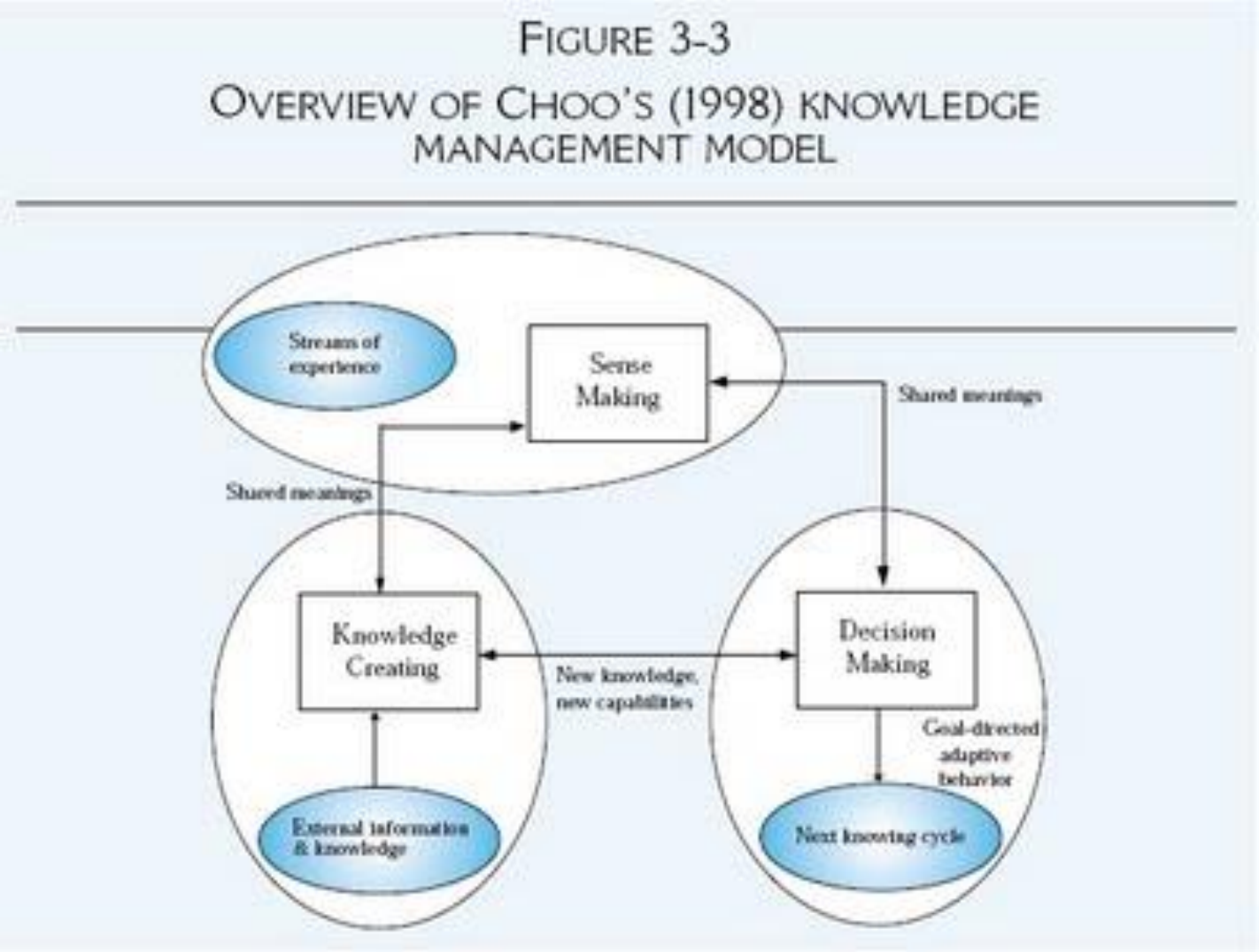
The Nonaka and Takeuchi Knowledge Spiral Model (15)

- The Nonaka and Takeuchi model focuses on the knowledge transformations between tacit and explicit knowledge
- But the model does not address larger issues of how decision making takes place by leveraging both forms of knowledge.

The Choo Sense-making KM Model (1)

- This is a model of knowledge management that stresses on:
  - sense making
  - knowledge creation
  - decision making
- It focuses on how information elements are selected and subsequently fed into organizational actions.
- Organizational action results from the concentration and absorption of information from the external environment into each successive cycle.
- Each phase has an outside stimulus or trigger.

The Choo Sense-making KM Model (2)



The Choo Sense-making KM Model (3)

- **Sense Making:**
  - attempts to make sense of the information streaming in from the external environment.
  - Priorities are identified and used to filter the information.
  - A loosely coupled system is a term used to describe systems that can be taken apart or revised without damaging the entire system.
    - Loose coupling permits adaptation, evolution, and extension.
    - Sense making can be thought of as a loosely coupled system whereby individuals construct their own representation of reality by comparing current with past events.

The Choo Sense-making KM Model (4)

- Sense making in organizations consists of three integrated processes:

1. **Ecological change** - change in the environment that is external to the organization and triggers an ecological change in the organization.
2. **Enactment** – attempts to construct, rearrange, single out, or demolish specific elements of content.
3. **Selection & retention** - the phases in which individuals attempt to interpret the rationale for the observed and enacted changes by making selections.

The Choo Sense-making KM Model (5)

- **Knowledge Creation:**
  - the transformation of personal knowledge between individuals through dialogue, discourse, sharing, and storytelling.
  - directed by a knowledge vision of “as is” (current situation) and “to be” (future, desired state).
  - widens the spectrum of potential choices in decision making by providing new knowledge and new competencies.
  - The result feeds the decision-making process with innovative strategies that extend the organization’s capability to make informed, rational decisions.

The Choo Sense-making KM Model (6)

- **Decision Making:**
  - Used to identify and evaluate alternatives by processing the information and knowledge collected to date.
  - Individuals can be bound in a decisional process by a number of factors such as:
    - Limits in knowledge, skills, habits, and responsiveness.
    - Availability of personal information and knowledge.
    - Values and norms held by the individual, which may differ from those of the organization.
  - They will therefore analyze, evaluate and process using limited information, shortcuts and rules of thumb (sometimes called heuristics), and “satisficing” behavior (not be fully optimized but it is good enough).

The Choo Sense-making KM Model (7)

- One strength of the Choo KM model is the holistic treatment of key KM cycle processes extending to organizational decision making, which is often lacking in other theoretical KM approaches.
- This makes the Choo model one of the more "realistic" or feasible models of KM, for the model represents organizational actions with "high fidelity."
- The Choo KM model is particularly well suited to simulations and hypothesis- or scenario-testing applications.

The Wiig Model for Building and Using Knowledge (1)

- According to this model, in order for knowledge to be useful and valuable, it must be organized.
- Furthermore, knowledge should be organized differently depending on what use will be made of the knowledge.
- Knowledge organized within a semantic network can be accessed and retrieved using multiple-entry paths that map onto different knowledge tasks to be completed.
- Some useful dimensions to consider in Wiig's KM model:
  1. completeness
  2. connectedness
  3. congruency
  4. perspective and purpose

The Wiig Model for Building and Using Knowledge (2)

- **Completeness:**
  - Addresses the question of how much relevant knowledge is available from a given source.
  - Sources may be human minds or knowledge bases (i.e., tacit or explicit knowledge).
  - We first need to know that the knowledge is out there.
  - The knowledge may be complete in the sense that all that is available about the subject is there, but if no one knows of its existence and/or availability, they cannot make use of this knowledge.

The Wiig Model for Building and Using Knowledge (3)

- **Connectedness:**
  - refers to the well-understood and defined relations between the different knowledge objects.
  - Very few knowledge objects are totally disconnected from the others.
  - The more connected a knowledge base is (i.e., the greater the number of interconnections in the semantic network), then the more coherent the content and the greater its value.

The Wiig Model for Building and Using Knowledge (4)

- **Congruence:**
  - refers to when all the facts, concepts, perspectives, values, judgments, and associative and relational links between the knowledge objects in a knowledge base are consistent.
  - There should be no logical inconsistencies, no internal conflicts, and no misunderstandings.
  - Most knowledge content will not meet such ideals where congruency is concerned.
  - However, concept definitions should be consistent, and the knowledge base as a whole needs to be constantly "fine-tuned" to maintain congruency.

The Wiig Model for Building and Using Knowledge (5)

- Wiig's KM model goes on to define different levels of internalization of knowledge.
- Its approach can be seen as a further refinement of Nonaka and Takeuchi's fourth quadrant, internalization.
- In general, there is a continuum of internalization:
  - starting with the lowest level, the novice, who "does not know he does not know", who does not have even an awareness that the knowledge exists
  - and extending to the mastery level where there is a deep understanding not just of the know-what, but the know-how, the know-why, and the care-why (i.e., values, judgements, and motivations for using the knowledge).

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The Wiig Model for Building and Using Knowledge (6)

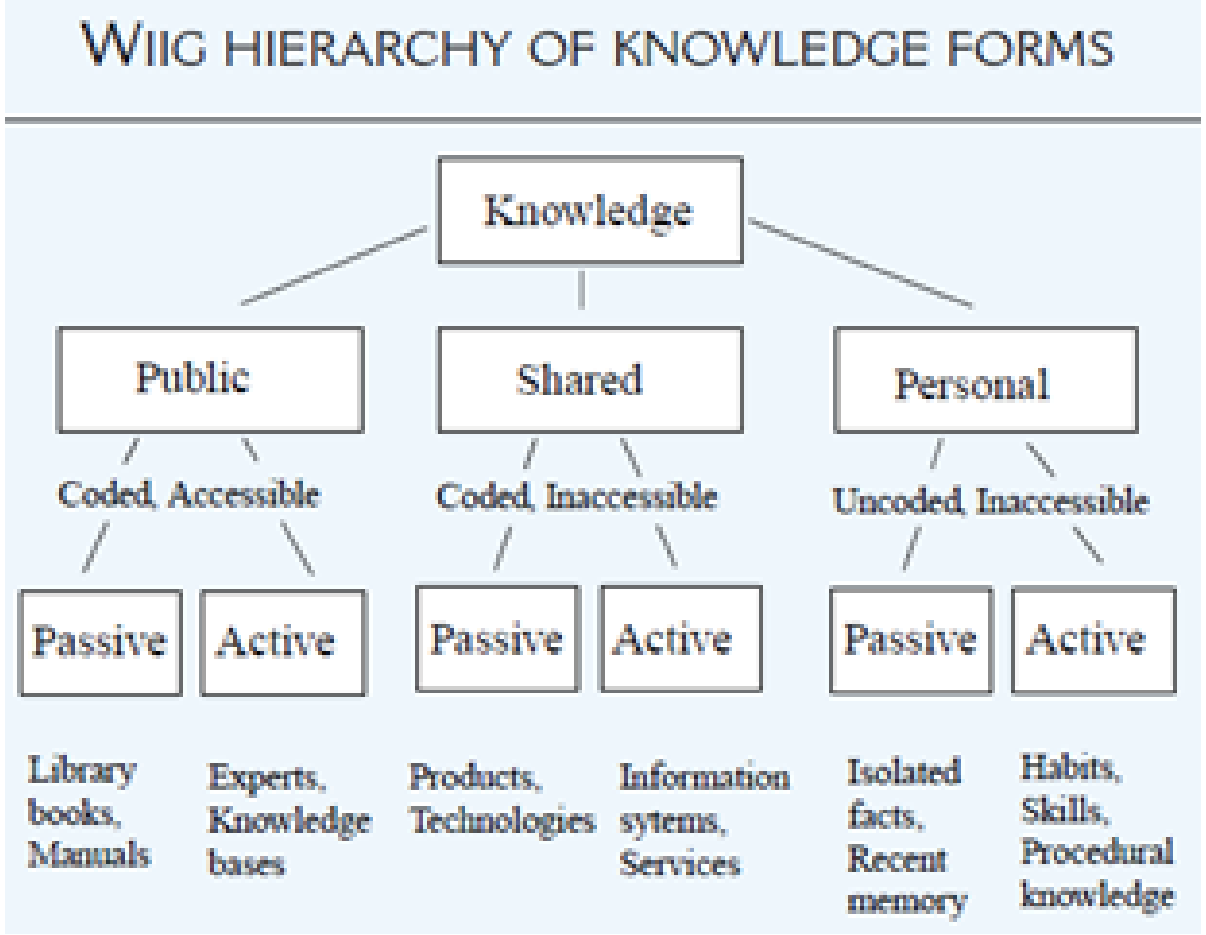
WIIG KM MODEL—DEGREES OF INTERNALIZATION

Level	Type	Description
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.

The Wiig Model for Building and Using Knowledge (7)

- The model defines three forms of knowledge:
  - **Public knowledge:**
    - explicit, taught, and routinely shared knowledge that is generally available in the public domain.
  - **Shared expertise:**
    - proprietary knowledge assets that are exclusively held by knowledge workers and shared in their work or embedded in technology.
    - This form of knowledge is usually communicated via specialized languages and representations, and would be common in communities of practice and among informal networks of like-minded professionals who typically interact and share knowledge in order to improve the practice of their profession.
  - **Personal knowledge:**
    - the least accessible but most complete form of knowledge.
    - It is typically more tacit than explicit and is used nonconsciously in work, play, and daily life.

The Wiig Model for Building and Using Knowledge (8)



The Wiig Model for Building and Using Knowledge (9)

- The model also defines four types of knowledge:
  - **Factual knowledge** – deals with data and causal chains, measurements, and readings, typically includes directly observable and verifiable content.
  - **Conceptual knowledge** – involves systems, concepts, and perspectives (e.g., concept of a track record, a bullish market).
  - **Expectational knowledge** – concerns judgments, hypotheses, and expectations held by knowers (e.g. intuition, hunches, preferences, and heuristics that we make use of in our decision making).
  - **Methodological knowledge** – deals with reasoning, strategies, decision-making methods, and other techniques (e.g. learning from past mistakes or forecasting based on analyses of trends).

The Wiig Model for Building and Using Knowledge (10)

- Together, the three forms of knowledge and the four types of knowledge combine to yield a KM matrix that forms the basis of the Wiig KM model.

Form of Knowledge	Type of Knowledge			
	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?

The Wiig Model for Building and Using Knowledge (11)

- The major strength of the Wiig model is that, despite having been formulated in 1993, the organized approach to categorizing the type of knowledge to be managed remains a powerful theoretical model of KM.
- The Wiig KM model is perhaps the most pragmatic of the models in existence today and can easily be integrated into any of the other approaches.
- This model enables practitioners to adopt a more detailed or refined approach to managing knowledge based on the type of knowledge but goes beyond the simple tacit/explicit dichotomy.
- Its major shortcoming is the paucity of research and/or practical experience involving the implementation of this model.

Strategic implications of KM models

- Models help us to put the disparate pieces of a puzzle together in a way that leads to a deeper understanding of both the pieces and the ensemble they make up.
- Models supplement the concept analysis approach outlined in order to take our understanding to a deeper level.
- KM models are still fairly new to the practice or business of knowledge management, and yet they represent the way ahead.
- A coherent model of knowledge-driven processes is crucial to the KM initiatives' ability to address strategic business goals, even if only partially.
- This is not to say that KM is a silver bullet or that it will solve all organizational problems.
- Those areas of knowledge-intensive work and intellectual capital development that are amenable to KM processes, on the other hand, require a solid foundation of understanding
  - what KM is
  - 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.

Summary

- All of the models presented in this chapter are relevant, and each offers valuable theoretical foundations in understanding knowledge management in today's organizations.
- What they all share is a connectionist and holistic approach to better understand the nature of knowledge as a complex adaptive system that includes:
  - Knowers
  - The organizational environment, and
  - The "bloodstream" of organizations – the knowledge-sharing networks.

Unit checkpoint

1. Compare and contrast the cognitivist and connectionist approaches to knowledge management. Why is the connectionist approach more suited to the von Krogh KM model? 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).
    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?
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 sense-making KM model approach to be successful.