

Knowledge Management

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IT 383
Knowledge Management

Lecture 3



Knowledge Engineering Knowledge Acquisition

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Knowledge Acquisition



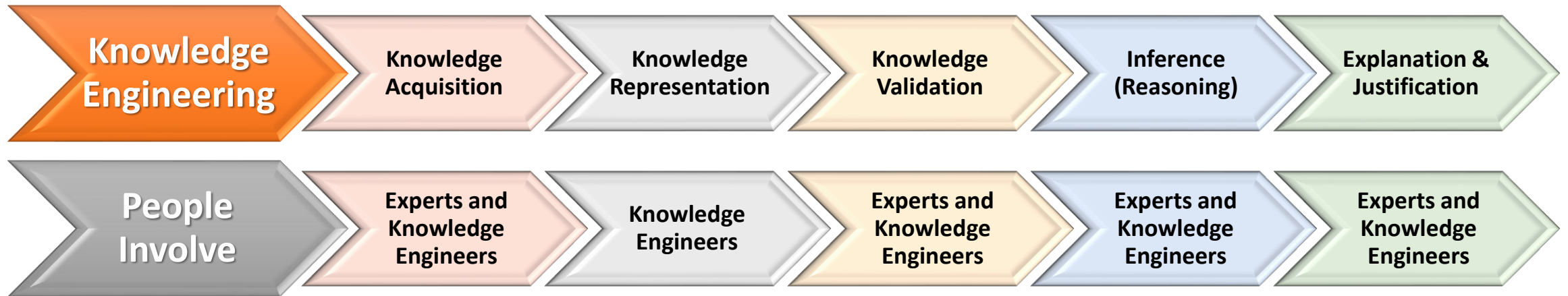


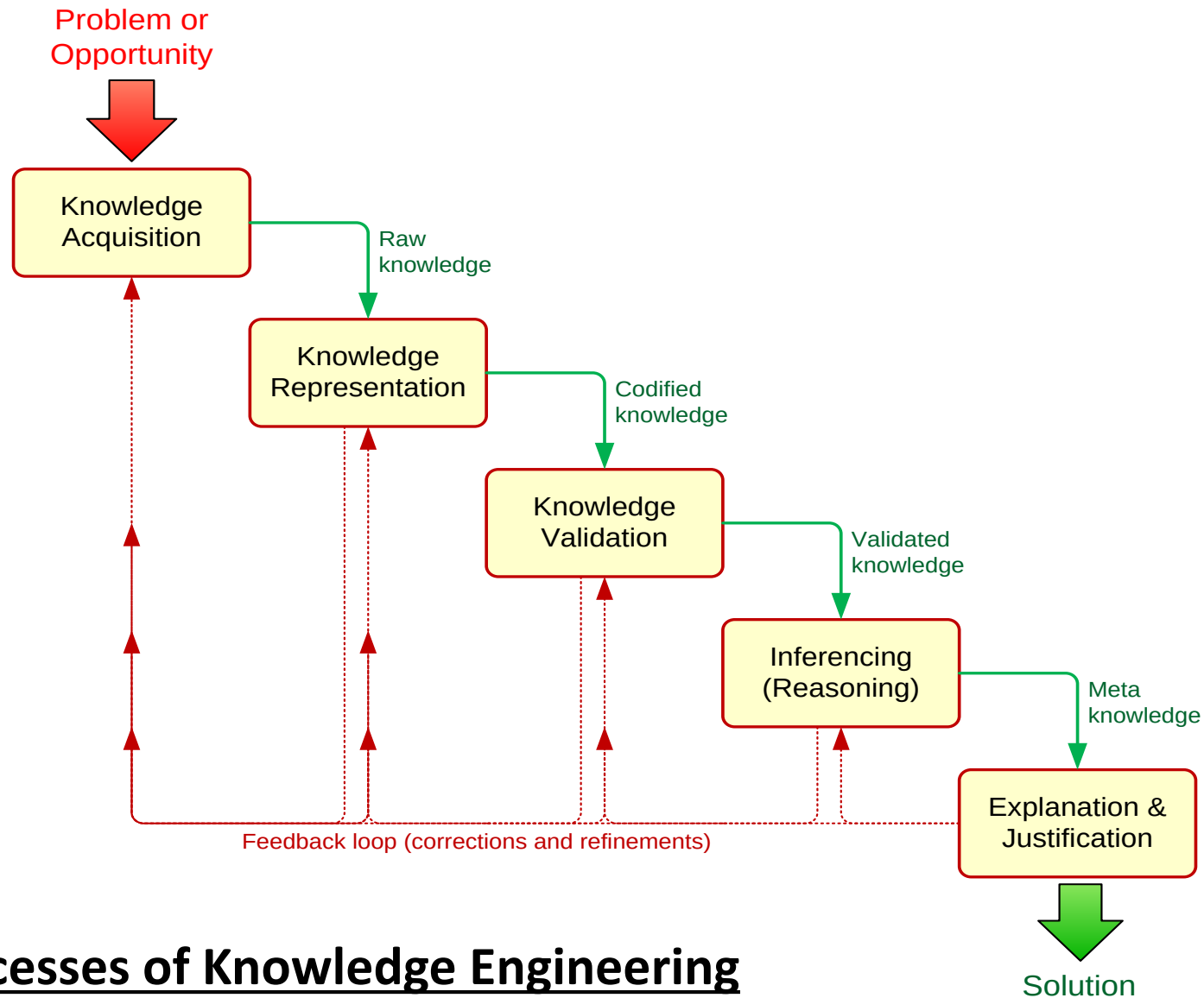
Chapter Objectives

- **Identify knowledge Engineering activities.**
- **Understanding knowledge acquisition.**
- **Understanding The roles of knowledge engineer and experts.**
- **Identify The types experts.**
- **Understanding the pros and cons of using single and multiple experts.**
- **Identify the tools of knowledge acquisition.**

➤ **What is knowledge Engineering?**

A set of intensive activities involved in building, maintaining and using knowledge-based systems.



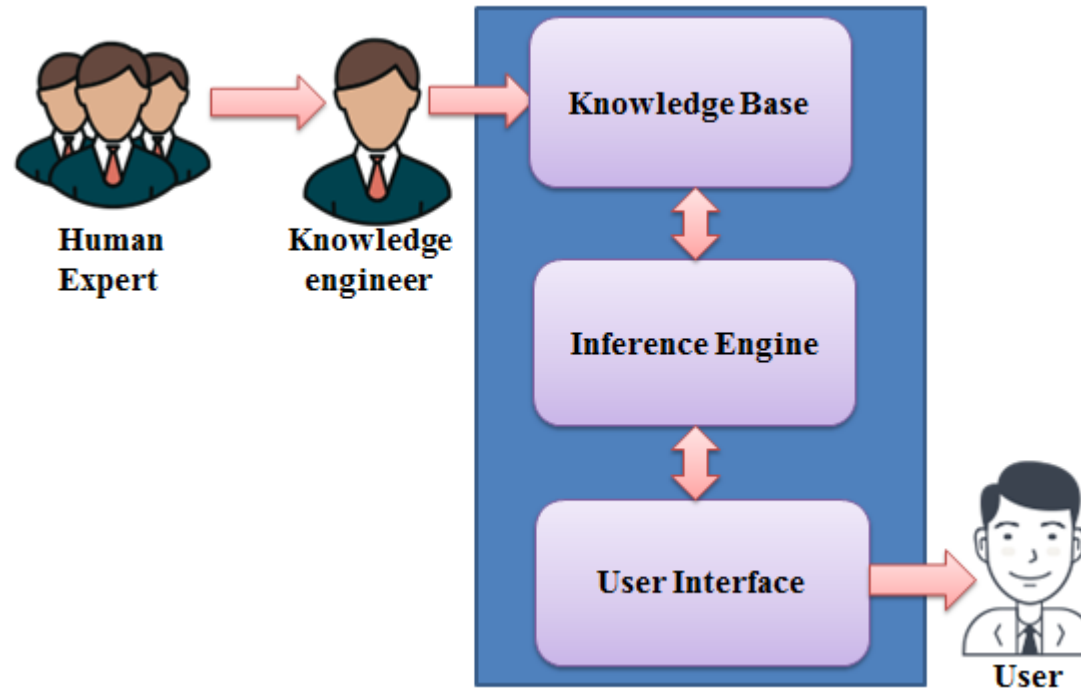


The Processes of Knowledge Engineering

Knowledge acquisition

➤ What is knowledge acquisition?

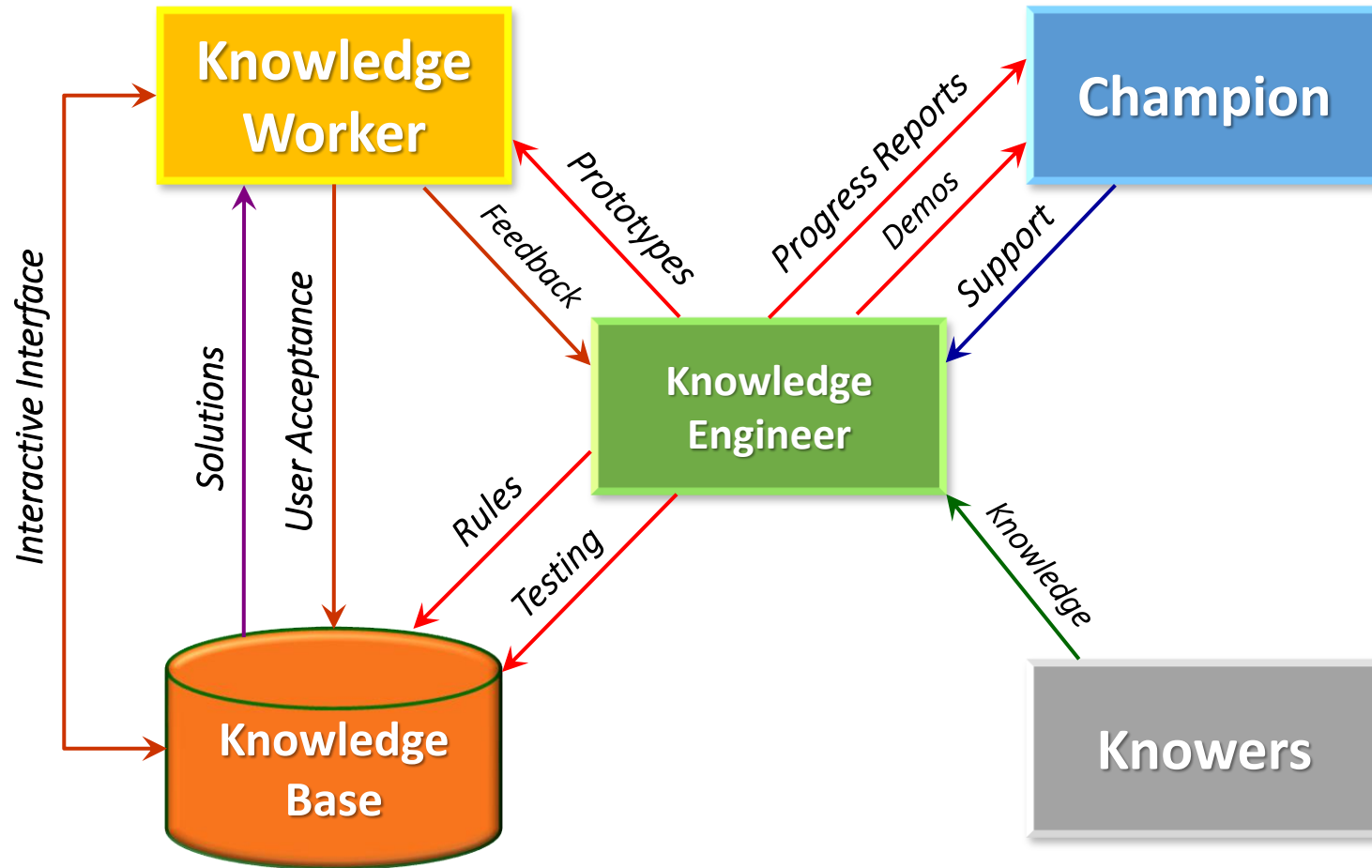
The tools and techniques used to capture knowledge from human experts (and other information sources).



➤ Role of the Knowledge Engineer:

- Identifies the problem domain.
- Captures the knowledge, he/she should be familiar with knowledge capture tools, conceptual thinker, tolerance for ambiguity, ability to work with other professionals and experts.
- Codified the knowledge.
- Validate the knowledge along with the experts.
- Coordinates the entire project from beginning to end. He/she can make or break the project.

Knowledge acquisition



Role of the Knowledge Engineer

➤ Roles of selecting the experts:

- **They Have the Experience**, their experiences and knowledge set them apart and enable them to serve as resources to others within the organization.
- **They Understand User Needs**, they understand the problem domain and can offer the solutions.
- **They Implement Best Practices**, their passion motivates them to reexamine best practices and shape new techniques.
- **They are Proactive**, their experiences enable others to learn and produce results quickly and accurately.

Knowledge acquisition

➤ Types of experts:

➤ Procedure type of experts:

Logical and procedure oriented. This expert shows a methodical approach to the solution.

- The knowledge engineer does not have to encourage the expert to talk but should focus the expert's explanations on the problem domain.

➤ Types of experts:

➤ Salesperson type of experts:

Spends most of the time dancing around the topic, explaining why his solution is the best.

➤ The knowledge engineer role is to redirect the conversation and try to promote straight answers.

➤ Types of experts:

➤ Storyteller type of experts:

Focuses on the content of the domain at the expense of the solution.

➤ **Knowledge engineer must use structured interviews with such type of experts.**

➤ Types of experts:

➤ Godfather type of experts:

By nature of position and personality, has a compulsion to take over the session.

➤ This expert will wrest control from the knowledge engineer. No single prescription works every time for this situation.

➤ Advantage and Disadvantage of Using a Single Expert:

➤ Advantages:

- Single expert is ideal when **building a simple KM system**.
- A one-on-one interactive relationship between a single knowledge engineer and a single expert promotes close ties and **quickly speeds the knowledge capture process**.
- A single expert facilitates the logistics aspect of coordinating arrangements for knowledge capture. One can more **easily arrange meeting times** than if multiple experts are involved.

- Problem-related or **personal conflicts are easier to resolve**. With single expert, communications are usually easier.
- Single expert tend to **share more confidentiality** with project-related information than do multiple experts.

Knowledge acquisition

➤ Disadvantages:

- Sometimes the expert's **knowledge is not easy to capture**, if the expert has difficulty explaining or communicating procedures.
- Single experts provide **a single line of reasoning**, which makes it difficult to evoke in-depth discussion of the domain
- Single experts more likely to **change scheduled meetings** than experts who are part of a team.

➤ Approaching Multiple Experts:

- One of the challenges in tacit knowledge capture among multiple experts is deciding the appropriate approach. Three approaches are most often used:

➤ Individual approach:

The knowledge engineer holds a session with **one expert at a time**, making it easier for the expert to offer knowledge freely while assuring privacy.

➤ **Primary and secondary experts:**

Gathering knowledge from the secondary experts first and then consult the primary expert to check the reliability of knowledge.

- This bottom-up approach is useful when the primary expert cannot devote full time to the project.

➤ Small groups approach:

This approach requires experience in assessing knowledge, as well as perception and cognition skills.

- Experts gathered in one place to discuss the problem domain and provide a pool of information.
- Each expert tested against expertise of others in the group. the knowledge engineer can decide which expert is more believable.
- The knowledge engineer must deal with the power problem. **For example** how does a “junior” expert openly contradict the senior expert?

Knowledge acquisition

➤ Advantage and Disadvantage of using multiple Expert:

➤ Advantages:

- Multiple expert is ideal when **building a complex KM system**.
- Working with multiple experts **stimulates interaction** that produces synthesis of experience.
- Listening to a variety of views allows knowledge engineer to consider **alternative ways of representing knowledge**.

➤ Disadvantages:

- Scheduling difficulties.
- Disagreements frequently occur among experts.
- Requires more than one knowledge engineer.
- The overlapping mental processes of multiple experts can lead to “process loss”, sometimes determining which expert is the closest to the solution is difficult.

➤ Developing a Relationship With Experts:

- Create the right impression and use psychology, common sense and technical skills to gain the expert's attention and respect.
- Do not underestimate the expert's experience.
- Prepare well for the session, especially the first session.
- Plan what you do and Do what you planned and decide where to hold the session.

Knowledge acquisition

➤ Knowledge acquisition tools:

➤ Interview:

- Commonly used in the **early stages of tacit knowledge capture** and verify its validity (Validity of a given question means its logically correct and is understood the same way by different people)
- Interviewing as a tool requires **training and preparation**, “The knowledge engineer must be well **trained to observe and analyze motions, facial movements, body language**, etc. and **create a friendly, non-threatening atmosphere** and reveal any fear or criticism **to experts**.”

➤ Types of Interviews:

➤ Structured Interviews:

Questions and responses are definitive. Used when specific information is wanted, varieties of structured questions:

➤ **Multiple choice questions(MCQ) and Yes/No questions;** offer specific choices, and less bias.

➤ **Ranking scale questions;** “ask the expert to arrange items in a list in order of their importance

Knowledge acquisition

➤ Semi-structured Interviews:

Predefined questions are asked but allow expert some freedom in expressing the answers.

➤ **Example;** *Knowledge engineer*; what would be your first question to the patient?, *Diabetic expert*; where is the pain?

➤ Unstructured Interviews:

Neither the questions nor their responses specified in advance. Used when exploring an issue.

➤ Guide to a Successful Interview:

➤ Set the stage and establish rapport.

➤ Properly phrase the questions, Question construction is important.

➤ Listen closely and avoid arguments.

➤ Evaluate session outcomes.

Knowledge acquisition

➤ Things to Avoid:

- Taping a session without advance permission from the expert.
- Converting the interview into an interrogation.
- Interrupting the expert.
- Asking questions that put the domain expert on the defensive.

Knowledge acquisition

- **Losing control of the session.**
- **Pretending to understand an explanation when you actually don't.**
- **Bring items not on the agenda.**
- **Try to be specific, rather than general.**
- **Stay away from using technical terms just to show off.**

Knowledge acquisition

➤ On-Site Observation:

- Process of observing, interpreting, and recording problem-solving behavior while it takes place by experts.
- In addition, the knowledge engineer asks the expert questions about the problem solving process.
- The protocol of observation is more listening than talking.
- Avoid giving advices to expert while observing.

- In comparison to the interview, observation places the knowledge engineer closer to the actual process, steps, and procedures used to solve the domain problem.
- The problem here is that some experts don't like to be observed. Experts fear of 'giving away' their experience in a quick look.

➤ Brainstorming:

- **Unstructured approach to generating ideas about a problem; invites two or more experts into a session in which discussion are carried out.**
- **The primary goal of brain storming is to think up creative solutions to problems.**
- **All possible solutions are considered equally and everything is valued.**

- Questions can be raised for clarification, but no evaluation is made at the moment.
- Idea generation, followed by idea evaluation.

➤ Protocol Analysis:

- Think-aloud method; Expert keeps talking, speaking out loud while solving a problem.
- Unlike other techniques, knowledge engineer never interrupt or ask questions.
- Provides wealth of information that is very useful to knowledge capture and representation.

Knowledge acquisition

➤ Example for Protocol Analysis:

A father, mother and their daughter have a combined age of 70 years. The father is 3 times as old as the daughter, the mother is the same age as father. How old is the daughter, father & mother?

The Expert thinks aloud like;

This sounds complicated, I will give it a shot.

- Assume F for father, M mother, D daughter.
- $F+M+D = 70$
- F is 3 times D
- $M = F$
- So far I have 3 questions and 3 unknowns
- $D+3D \text{ (or F)}+3D \text{ (or M)} = 70$
- $7D = 70$
- $D = 10$
- Ages of father and mother total $70 - 10 = 60$
- Because M is same age like F then Father is 30 and M is 30.

Summary

- **knowledge Engineering definition.**
- **Understanding the knowledge acquisition.**
- **Understanding The roles of knowledge engineer.**
- **Understanding The roles of experts.**
- **The types of experts.**
- **Understanding the advantage and disadvantage of using single and multiple experts.**
- **Identify the tools of knowledge acquisition.**



Thank You