

Chapter 5

DMS Design Case Study

Computer has been used as a tool to solve a problem in complex system. Both hardware and software have been applied to power system problem. Most system at the first generation was rule-based in nature. The system then suffers from the limitation of robustness (cannot solve unexpected cases), the difficult representation of available knowledge, and the difficulty of maintaining large knowledge bases. The second generation using model based reasoning tends to relieve these limitations. It has an automated knowledge acquisition and learning capabilities, multiple levels of abstraction, multiple knowledge representation and generic task architecture. There are many application of knowledge base system in power engineering [38]. These are forecast and planning, design of electrical plant and system, condition monitoring, alarm processing, event and fault diagnosis, and operation and control. Moreover, there are a number of researches and developments in the following area of power system operation and control, planning, and network analysis.

The chapter will present four case studies for DMS design in this research which the details of each case will describe in the following section.

5.1 Case 1 Base Case

General Description

Technical assistance service of the consult is usually hired by utility in SCADA/DMS project because of its specialized technology. Utility then have to know how to design it by:-

- Technical Training
- Technical Visit
- Consultant Services
 - Question

- Site Visit
- Study
- Discussion Meeting
- Report

This case will review consults methodology for DMS design from the report and then structure the DMS design knowledge model (figure 4.3) and use it as base case for discussing with the other.

Discussion Issues

First, the organization knowledge retention is important and it will be considered in this case. Hence, the utility officers within the organization are mainly considered in order to notice that there is any useful design knowledge within the organization. Then 'how' to manage DMS project is also discussed and used as the base case.

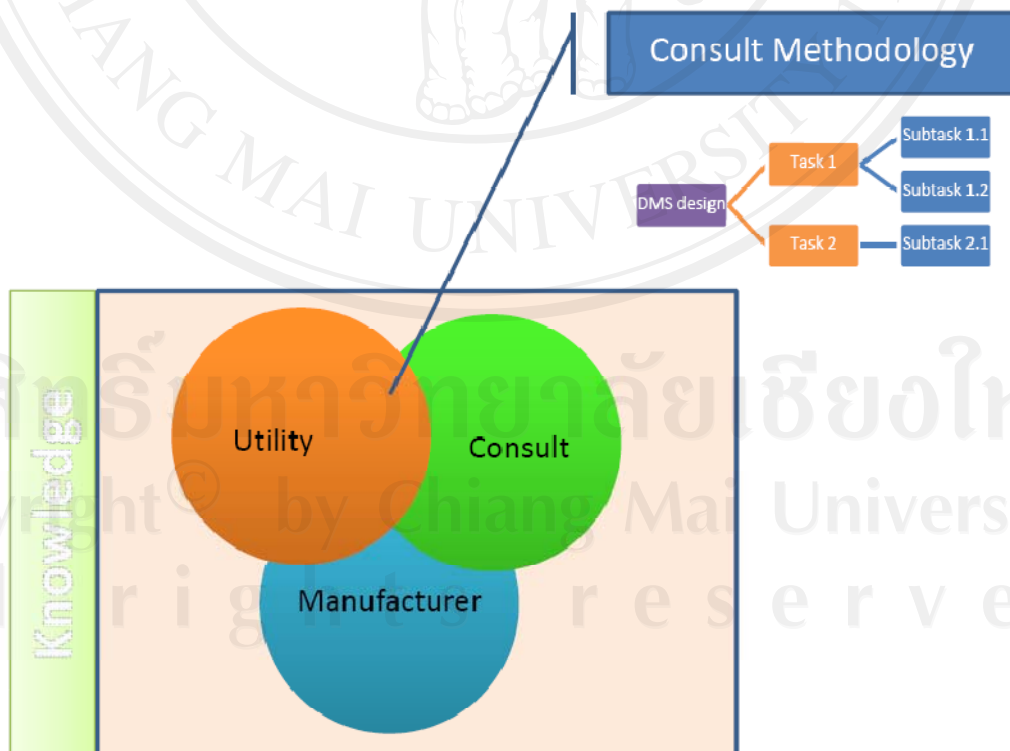


Figure 5.1: Base Case

5.2 Case 2 Propose DMS Design Knowledge Model

General description

The design stage is the heart of DMS project. Individual design (tacit) knowledge in the design team is a dynamic knowledge resource which is essential to transfer throughout the organization in order to explicitly develop and maintain this common design best practice within the utility. Therefore this second case will apply CommonKADS 'propose and revise' template to structure an alternative DMS design knowledge model shown in figure 4.2 which knowledge can be identified in the following procedures:-

- *Knowledge elicitation*: capture knowledge and requirement both heuristic and tacit
- *Knowledge analysis and creation*: determine DMS function and architecture from requirement
- *Knowledge utilization*: customize and get appropriated design from the skeleton design
- *Design validation*: approve and evaluate the design

Then this DMS design knowledge model will be compared with the first case and use it as a guideline to construct knowledge management system for DMS design in the future.

Discussion issues

DMS design knowledge structured and modeled by this template will be compared with the first case model in the area of knowledge quality and project management. The discussion will focused on both short term and long term organization knowledge management.

5.3 **Case 3 Propose DMS Design Communication Model**

General description

By using communication technique from CommonKADS communication plan, transaction worksheet, and information exchange specification with the second case, organization learning can be created within the DMS design life cycle project. At this stage, knowledge and requirement from consult and utility can be transparency captured to knowledge model within the organization. After signing contract with supplier, the same communication model (figure 4.4) can further be used to capture more knowledge or rationale from the suppliers. Together with the DMS design context analysis; this case is an effort of knowledge engineer to facilitate the DMS project communication, to visualize an individual reasoning decision, and to guide the system developer to implement an appropriate knowledge management system for DMS design organization team (consult, utility, and supplier).

Discussion issues

The communication of DMS design can help utility to manage project management in short term, to create more robust DMS design knowledge, and to support a system developer in implementing knowledge management system for DMS design in the future.

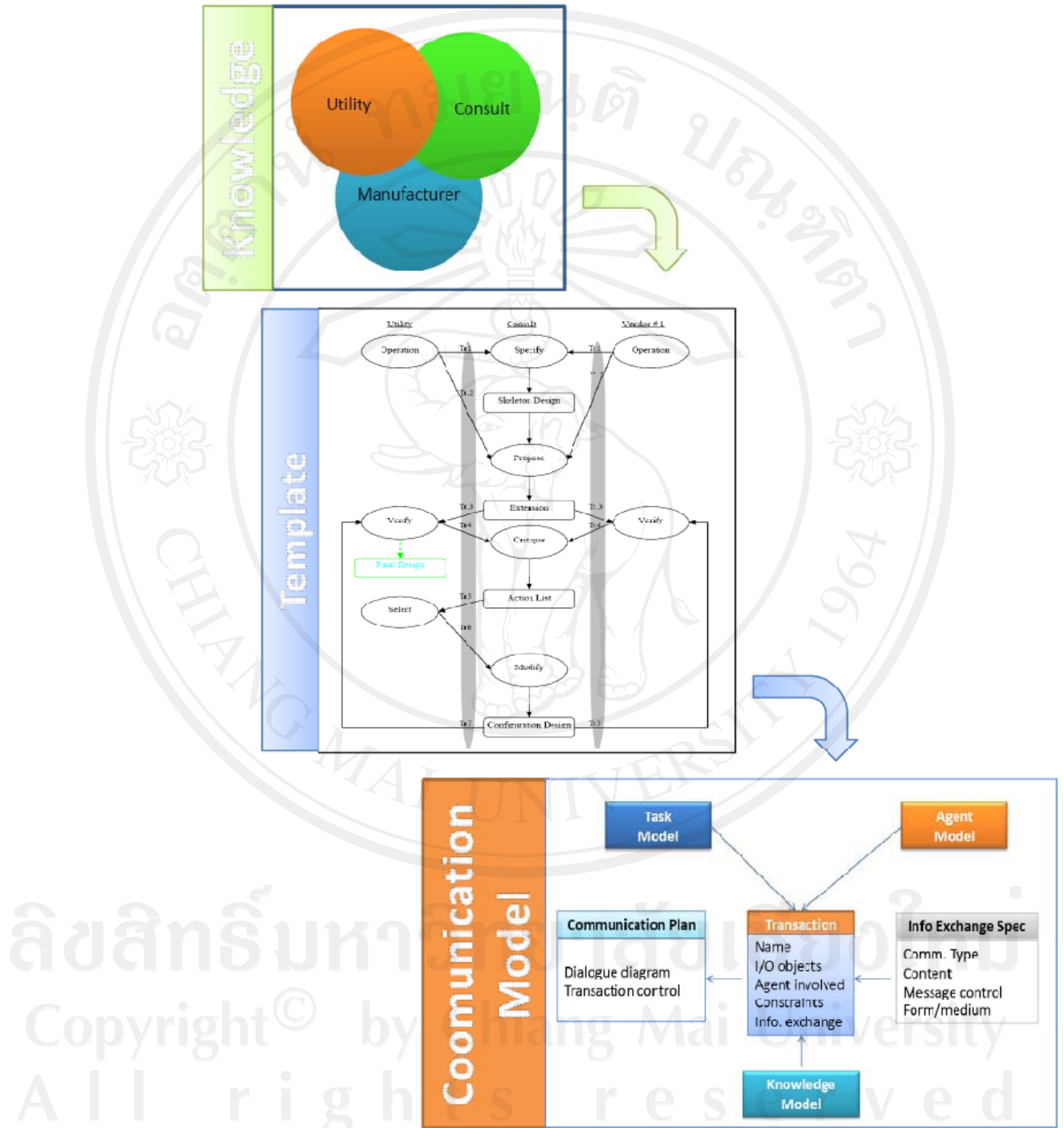


Figure 5.3: Propose DMS Design Communication Model

5.4 **Case 4 Propose DMS Knowledge Management System (Mockup)**

General description

Knowledge Management System (KMS) including useful, relevant taxonomy for DMS design can be initially developed for integrating DMS functions, checking standard compatibility, and selecting system architecture. Consequently, by applying already developed KMS with the knowledge management theory, a man-machine collaboration tools to create, acquire, and disseminate DMS knowledge within the organization can be initiated. Finally, the propose DMS configuration is then designed and verified with their requirements in order to get the organization design best practice. By using knowledge engineering technique especially CommonKADS 'Propose and Revise' framework, KBS on DMS design can be generated, utilized and reused. This case will specify KMS for DMS design in order to create, facilitate, utilize, and validate their own organization knowledge in the future.

Discussion issue

The knowledge quality item in the DMS design project life cycle should be identified for future work. The results and analysis of these cases will be presented in the next chapter.

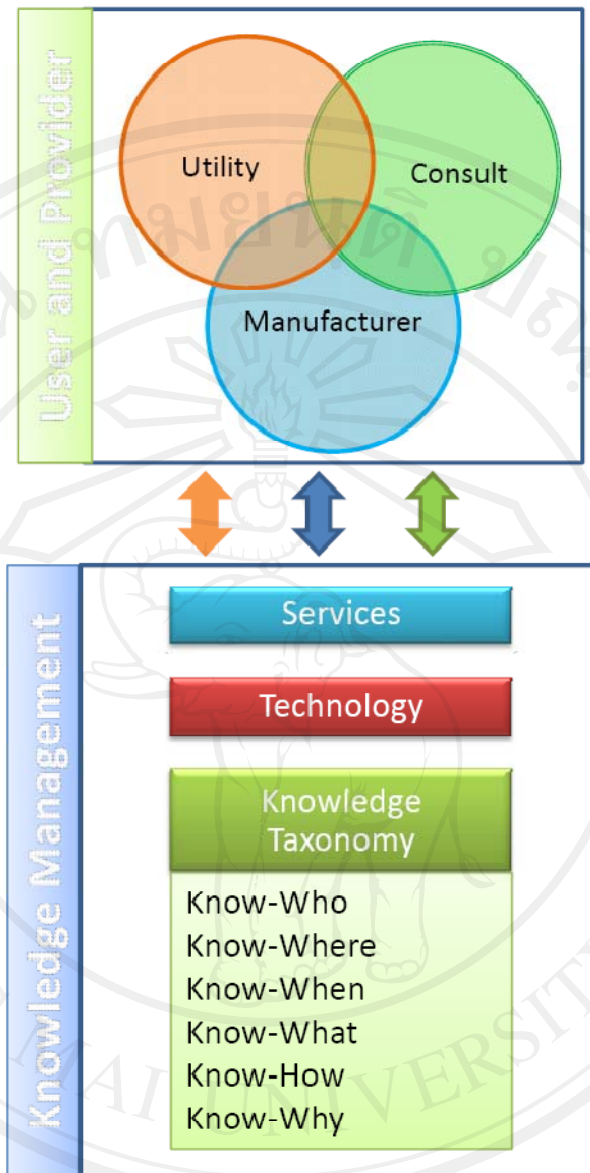


Figure 5.4: Propose DMS Knowledge Management System