Chapter 9

Meta-Synthesis Knowledge System: Basics and Practice

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ABSTRACT

Meta-synthesis knowledge system (MSKS) is based on the meta-synthesis system approach and knowledge science. This article introduces the basic theory of meta-synthesis knowledge system like DMTMC system, model integration, opinion synthesis, consensus building and expert mining. Similar MSKS systems are illustrated. Case studies and examples are also explored in this article.

INTRODUCTION

Dealing with the different complex systems problems systems researchers developed a lot of various systems methodologies we may classified them as hard system methodologies, soft system methodologies and oriental system methodologies. The latest had been developed in the end of 1980’s and the start of 1990. Within them author wishes emphasized the meta-synthesis system approach (MSA), which was developed by Qian, Yue and Dai in 1990 for solving the open giant complex systems problems. From 1999 Gu involved in a major project supported by NSFC (Natural Science Foundation of China) related to MSA. At the May of 1999 Gu joined School of Knowledge Science in JAIST (Japan Advanced Institute of Science and Technology), continued this project research on MSA. But under the influence of atmosphere of knowledge science and author had learnt a lot of theories in knowledge science from Nonaka and his colleagues. As a system researcher Gu just wishes combine this knowledge science and systems science (especially theory of MSA). In
this School of Knowledge Science all professors come with the knowledge backgrounds from three aspects: natural science, engineering science and social science, so the school leaders wish them run research from multidisciplinary to interdisciplinary, then once in a school seminar Gu proposed colleagues to go forward from interdisciplinary research to interdisciplinary research with meta-synthesis (see Figure 1). Around 2001, Gu and Tang had proposed the Meta-synthesis knowledge system (2001a), which wishes use the help of a system with computer and a group of experts to integrate and synthesis all knowledge, which usually are used separately and individually.

META-SYNTHESIS SYSTEM APPROACH

Meta-synthesis System Approach is a Chinese system approach for solving problems related to the open, complex giant systems. MSA stands for combining the data, information, model, expert experience and wisdom. MSA helps people to utilize, discover and create knowledge combining with the computer.

The Essentials of MSA

1. Integrate data, information, knowledge, model, experiences and wisdom (D, I, K, M, E, W)
2. Combine human brain and computer (Man-Machine)
3. Synthesize all opinions from experts (Group knowledge)
4. Combine the left brain and right brain (Quantitative and Qualitative analysis)
5. Combine the reality and virtual reality (Reality and Virtual)
6. Combine the macroscopic and microscopic views (Macro and Micro)
7. Combine the reduction and holism (Analysis and Synthesis)

Meta-Synthesis Methods

MSA methods for different subjects we may use different methods (Gu, Wang, & Tang, 2007), see also Table 1.

Hall for Workshop of Meta-Synthetic Engineering (HWMSE)

HWMSE or discussion hall is an important tool for implementing the Meta-synthesis System approach. It consists of three systems: Knowledge system; Machine system; Experts system. Now in