

Chapter 8

Discrepancies and Analogies in Artificial Intelligence and Engineering Design Approaches in Addressing Collaborative Decision–Making

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ABSTRACT

One of the trends in the decision-making field in the past 20 years has been the migration from individual decision-making to collective one. Several changes of working conditions influenced this trend: geographical dispersion due to the business internationalisation, concurrent work in order to satisfy time delays, facilitation of the information sharing induced by the development of local area networks (LAN), and internet. This study examines the discrepancies and analogies in addressing the collaborative decision making in two scientific fields: artificial intelligence and engineering design. These two fields have different considerations and approaches in view to the decision-making support. This paper exposes a comparative study concerning two research studies, both decision support oriented: the first one concerns the collaborative decision-making in early design stages in vehicle development projects (Jankovic, Bocquet, Stal Le Cardinal, & Bavoux, 2006) and the second one concerns the development of an architecture of a Cooperative decision Support Systems (CDSS) (Zaraté, 2005).

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1. INTRODUCTION

One of the trends in the decision-making field in the past 20 years have been the migration from individual decision-making to collective one (Shim et al., 2002). We can state several changes of working conditions that influenced this trend: geographical dispersion due to the business internationalisation, concurrent work in order to satisfy time delays, facilitation of the information sharing induced by the development of local area networks (LAN) and the internet.

Several research fields address the issues of group, cooperative and collaborative decision-making. In this study we particularly focus on two fields: artificial intelligence and engineering design. These two fields have different definitions concerning these types of decision-making and different approaches when addressing the problem of decision support. Therefore, we explore two research studies in order to make a comparative study of results and discuss further implication leading towards a more integrated approach. The first study concerns the collaborative decision-making in early design stages in vehicle development (Jankovic, Bocquet, Stal Le Cardinal, & Bavoux, 2006). The main objectives of this study are: 1) identifying key parameters for collaborative decision making in order to support the design team and 2) proposing an adequate support tool integrated into project management tools, already existing. The second study concerns a Cooperative Decision Support Framework (CDSF) (Zaraté, 2005). This framework is under development at the IRIT laboratory and was partially used in industrial context (i.e. Airbus).

Main objective of this research work is to identify the discrepancies and analogies in addressing the decision-support concerning the two proposed research studies. Therefore, the authors try to address: (1) key parameters or data that are identified and supported by both approaches and (2) differentiating elements with the aim of discussing potential further developments con-

cerning decision-support tools. Identifying these discrepancies and analogies might be relevant in order to propose more integrated approaches and identify the difference in decision-making processes in different domains.

Therefore, to address these issues we propose to discuss the definitions and approaches concerning cooperative and collaborative decision making, mostly in the field of artificial intelligence and engineering design. In the second part of this paper, we expose the characteristics and specificities of collaborative decision-making in early design stages, i.e. conceptual design. The third part of the paper gives an overview of the proposed cooperative decision support framework. At the very end of this paper, we propose to discuss these two approaches and conclusions concerning the differentiating elements in these two studies.

2. LITERATURE REVIEW

The necessity of using the information technologies for supporting business processes and decision making has been growing in the past two or three decades (Kim, Godbole, Huang, Panchadhar, & W., 2004). Moreover, the development of the World Wide Web has been accelerating this process, introducing new application. For example, decision-support tools integrating different consensus management techniques to develop a solution (Kim, Godbole, Huang, Panchadhar, & W., 2004). This development of information technologies and the change in working organisations have also been raising interest for supporting group decision-making and developing cooperative decision support systems (CSDS) (Zaraté, 2005).

Nevertheless, the research literature does not give a uniform definition and characterization of different types of decision making, especially when it comes to cooperative and collaborative decision making. We can observe that difference between the artificial intelligence (AI) field addressing the decision-support systems and

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