2.6
A comprehensive semantic-indexing schema for ARCON

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In order to formally and systematically address the elements in the ARCON models for CNs, a schema of their unique identification needs to be developed. This chapter introduces an approach for comprehensive and semantic “indexing” of both meta-elements, e.g. the Componential dimension of the Endogenous sub-space of ARCON’s reference modeling framework, and each individual element, e.g. the specific resource or market strategy belonging to the ARCON reference model of the CN. The main contribution of the introduced semantic indexing-schema is to the formalization process of the ARCON m. Furthermore, the indexing schema facilitates: (1) dynamic systematic evolution, (2) organized physical storage, (3) semi-automated processing and derivation of both elements and meta-elements of ARCON.

1. INTRODUCTION

A comprehensive abstract model representation for Collaborative Networks (CNs) is strongly required for the new paradigm of CN that is widely emerging in the market and society. An earlier work in this area (Camarinha-Matos, Afsarmanesh, 2006) provides the following definition for the CNs:

A Collaborative Network (CN) is a network consisting of a variety of entities (e.g. organizations and people) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals, but that collaborate to better achieve common or compatible goals, and whose interactions are supported by computer network.

CNs are complex systems, emerging in many forms and in different application domains. They consist of many facets whose proper understanding requires the contribution from multiple disciplines [Camarinha-Matos, L. M., Afsarmanesh, H., 2007]. As addressed in Chapters 2.3 and 2.5 of this book, a number of different types of CNs can be identified, however research in the area has mostly concentrated on the description of the Collaborative Networked Organizations (CNOs), which itself consists of the long term strategic alliances such as the Virtual Organizations Breeding Environments (VBEs) (Afsarmanesh, Camarinha-matos 2005), (Afsarmanesh, et. al. 2007), and Professional Virtual Communities (PVCs) (Bifulco, 2006), as well as the sort-term goal-oriented consortiums such as the Virtual Organizations (VOs) (Ollus, 2006), and the Virtual Teams (VT) (Bifulco, 2006).
Development of the CN reference framework, such as ARCON, facilitates the understanding, instantiation, management, and simulation of the CNs (Tolle, M., Bernus, 2003) (Katzy et al, 2005). It shall also facilitate the development of information systems and the required supporting software tools both for the existing and for the emerging CNs.

In (Camarinha-Matos, Afsarmanesh, 2007) the reference framework for ARCON is introduced. The ARCON (A Reference model for COLlaborative Networks) is developed as an evolving system, which itself constitutes of two parts:

- *ARCON reference modeling framework*, which in this chapter is referred to as generic **ARCON meta-model**, and

- a set of *ARCON reference models* generated within this framework to represent different kinds of CNs, for instance the VBEs, VOs, VTs, etc., which in this chapter are referred to as **ARCON models**.

![Figure 1 – ARCON Reference modeling framework](image)

The ARCON meta-model comprehensively addresses the heterogeneous elements of different CN environments from three different near-orthogonal perspectives, namely the Environment Characteristics perspective, the Life Cycle Perspective, and the Model Intent perspective, constituting the three axes of the ARCON three dimensional (3D) matrix, as also illustrated in Figure 1. Furthermore, the organization of this matrix is further clarified in Table 1. Please note that the concepts presented in Table are further heavily used in section 2. This chapter however does not cover the detailed definitions of all concepts introduced in the ARCON meta-model, since except for the concept of “Nature of elements” that is