

New Federated Collaborative Networked Organization Model (FCNOM)

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ABSTRACT

Formation of Collaborative Networked Organization (CNO) usually comes upon expected business opportunities and needs huge of negotiation during its lifecycle, especially to increase the Dynamic Virtual Organization (DVO) configuration automation. Decision makers need more comprehensive information about CNO system to support their decisions. Unfortunately, there is no single formal modeling, tool, approach or any comprehensive methodology that covers all perspectives. In spite of there are some approaches to model CNO have been existed, these approaches model the CNO either with respect to the technology, or business without considering organizational behavior, federation modeling, and external environments. The aim of this paper is to propose an integrated framework that combines the existed modeling perspectives, as well as, proposes new ones. In addition, it provides clear CNO boundaries. By using this approach, the view of CNO environment becomes clear and unified. In addition, it minimizes the negotiations within CNO components during its life cycle, supports DVO configuration automation, as well as, helps decision making for DVO, and achieves harmonization between CNO partners. The proposed FCNOM utilizes CommonKADS methodology organization model for describing CNO components. Insurance Collaborative Network has been used as an example to proof the proposed FCNOM model.

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1. INTRODUCTION

New forms of Collaborative Networks (CN) have been emerged as response to changes in the business environment and the novelty of cloud and grid computing [18]. On the other hand, many collaborative forms and patterns of collaborative behavior are emerging, not only in industry, but also in service sector. While the aims are becoming clearer, the concept of Virtualization Technology (VT) and its components needed to be understood and commonly agreed with CN.

One of collaborative networks classes is Collaborative Networked Organization (CNO), which is a dynamic, temporary, and logical aggregation of autonomous heterogeneous entities (companies, people, government institutions, etc.) with different competences. CNOs join, efficiently combine, and coordinate their collective resources (i.e., knowledge, skills, capital, assets, etc.) for a period of time in order to achieve a common objective, and use VT to coordinate, develop, and support their activities. One of the instances of CNOs is the Dynamic Virtual Organization (DVO) [18].

Unfortunately, there is no single formal modeling, tool, approach or any comprehensive methodology that covers all perspectives for CNO [10]. Formation of dynamic virtual business systems usually comes upon business opportunity and needs huge of negotiation during its lifecycle to increase the DVO configuration automation. Decision makers need more comprehensive information about CNO system to support their decision. In addition, there is lack of the number of countries working on the virtual organization term; the number of projects in this context is limiting [19].

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For instance, some recent research papers have dealt with forming of CNO management methodology. Matos et al. [18] cover other challenges such as competency management, system metrics, and trust management. Chituc et al. [4] have dealt with technological, semantic, social, and business perspectives for the CNO.

The aim of this paper is to propose an integrated framework that combines the existed modeling perspectives, as well as, proposes new ones. The proposed perspectives are *organizational behavior*, and *CNO federation modeling*. In addition, some *external environment perspectives* have been proposed.

This framework allows us to:

- a. Have more clear and unified view of CNO environment;
- b. Minimize negotiations within CNO components during its life cycle.
- c. Support DVO configuration automation.
- d. Accurate decision making for DVO.
- e. Achieve harmonization between CNO partners.

This paper is organized as follows; section two handles the CNO and its boundaries. In section three, the proposed "Federated Collaborative Networked Organization Model (FCNOM)" which concerning some perspectives within the CNO lifecycle (e.g., *Organizational Behavior Perspectives, CNO Federation Modeling Perspectives, and External perspectives*) is described. Applying FCNOM approach to the Insurance Collaborative Network as a case study to proof its behavior has been introduced in Section 4.

2. CNO Boundaries

Setting up the CNO boundaries is considered an important step towards identifying its members during the lifecycle. Having such boundaries would support the DVO specification automatically by the following:

- a. Determining how the allocation of regulated tasks,
- b. Allocating tasks within the DVO
- c. Allocating roles to enterprise actors,
- d. Helping security management
- e. Determining the degree of automation.
- f. Process integration, and information flows within and across DVO components.

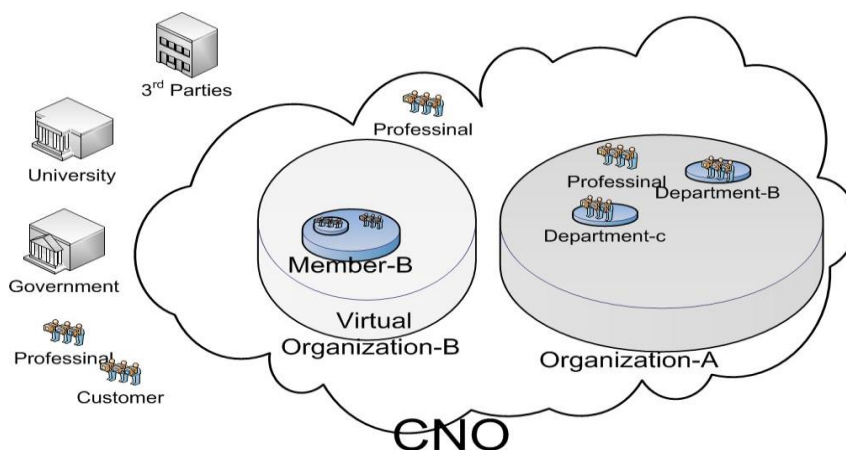


Figure 1. The CNO boundaries

Figure 1 shows an example of the generic CNO boundaries. It illustrates the members that might be included within business environment, where;

- I. **Professional:** people who perform technical actions.
- II. **Organization:** This may be a real one or VO, which has a particular role to support the DVO.
- III. **Sub-organization:** Department or part of an organization team.
- IV. **Collaborative networks:** Formed to collaborate in virtual communities and may participate in other CNO.
- V. **Outer Environment:** Any entity all over the universe surrounds the CNO, which affects and concerns its lifecycle (e.g., Government, Non-Government, academia, and many Business related organizations).

2.1. CNO Components Description

CommonKADS Methodology is a leading methodology to support structured knowledge engineering. Schreiber et al. [21] illustrate the organization model, which takes related elements from various sources, and integrates them into to a logical and comprehensive package. The construction of this model is done by using worksheets. The model' components have to be filled in using the current and the future situations.

3. FCNOM Model

A complex entity such as a collaborative network can be observed and analyzed through different perspectives. In spite of there are some approaches to model CNO have been existed, these approaches model the CNO either with respect to the technology, or business without considering *organizational behavior, federation modeling, and external environments*. These perspectives have been included in the proposed FCNOM.

3.1. Organizational Behavior

Forming DVO needs to have complete analysis of its behavior that support the decision maker to yield governance rules that drive or constrain the behavior of the CNO and its members. In the same time, the behavior differences within CNO' members might be happen, these differences are important to be concerned during the CNO lifecycle.

Organizational Behavior (OB) perspectives should cover many OB issues such as; *collaboration principles between CNO members, rules of activities, issued contracts between collaborated CNO members, conflict resolution policies, etc...* Such issues have the implication for the use of the OB perspectives in the context of collaboration across several disciplines. The OB issues help the CNO business analyst to define the behavioral norms such as, *organizational relationships norms, decision norms, constraints, and conflict resolution policies*.

3.1.1. Organizational Relationships Norms

CNO is a complicated entity because it has both internal and external organizational relationships. These relationships have to be determined during the configuration process. On the other hand, the organizational relationships are the set of rules, which help people in an organization to understand which actions are considered acceptable/unacceptable (e.g., rules of conformity and problem solving focus.). Organizational relationships help group's members to answer; how they define the considered relationships, and How to convey these relationships. The following guidelines might help the analyst to complete this task:

- Describe organization structure.
- Analysis organization global task layout, such that it is input and output, preconditions and performance criteria. As well as, the needed recourses and competences.
- Describe the organization business flow.

3.1.2. Decision Norms

By forming new CNO, new regulation needs to be defined. In business context, this bylaw is called decision norms. In other words, decision norms are term, which used to refer to the used guidance during the problem solving process especially for the important and critical business issues like conflict resolution and cases that need cooperation between CNO members. Decision norms help group's members to answer; How to make decisions, and How to established proper agreement between them. The following guidelines might help answering these questions:

- Outline the steps in the rational decision making model.
- Describe the actions of the decision-making.
- List and explain the common decision biases or errors.
- Identify the conditions in which are most likely complete the decision.
- Contrast the ethical decision criteria.

3.1.3. Business Constraints

DVO decision makers must define the business constraints, which may limit the business operation of the CNO. These Constraints should prevent, restrict, or dictate the action. Some of business constraints are scope, time, and budget. Business constraints can be internal or external to the CNO.

- External constraint such as rules of relationship and specific “marketing” policies (e.g. attraction factors, which produce more than the market will bear, or specific aspects).
- Internal constraints such as recruiting the skilled people, Policy, Limitations in time, space, access, quality, etc.

3.1.4. Conflict Resolution Policies

Conflict Resolution Policies is to provide a framework for resolving conflicts that may be happened within CNOs lifecycle. CNOs conflicts are considered complicated by its natural, where the members have different interests, backgrounds, and missions, methods of operation, stakeholder, and degrees of power. In addition, the ways to manipulate the complaints of CNO members and non-members is addressed. However, CNO must consider their member has needs, as well as, the goals and define formal or informal conflict resolution policy. The following guidelines might help to describe that:

- Define conflicts.
- Contrast task, relationship, and process conflict.
- Outline the conflict process.
- Describe the conflict-handling objective.
- Identify the steps in the negotiation resolution process.
- Describe cultural differences in negotiations.

3.2. Federation Modeling

The concept of federation has been emerged in different areas, such as the database, the information management, and the web services communities [28]. CNO networks consist of distributed, autonomous, and heterogeneous resources (e.g., data/information or services). The CNO’ resources have to be transparent and available to the CNO’ stakeholders, without any considerations about the resource distribution or the used communication mechanisms.

The success of the modeling of large and complex CNO systems among many perspectives needs to be proved. Multi-contexts architecture should deal with integration, interoperability, and collaboration problems within and between enterprise, heterogeneity, and incompatibility systems [7]. Typically, the complete specification of the structure, and behavior of a complex CNO system is obtained through a combination of model perspectives. The CNO architecture must explore role models and their relationship to classify instance models. Thus, increasing the number of those contexts will increase the overall complexity of CNO. In addition, multiple views for modeling CNO should be concerned even for the very particular case of traditional supply chains, a quit simple case of CNO [6].

CNO is integrated from existing organizations, to form new organizational capabilities and competencies. Therefore, by linking CNO agility with more effective utilization of existing resources will create an important source of competitive advantage.

3.2.1. CNO Federated Model Components

Forming DVO must follow the CNO federated model components, which may be illustrated as follows:

- Members: A mix of Identity Provider and Service Provider interests.
- Federation operator: Metadata, enterprise-proofing, etc.
- Policy Contexts:
 - Among members
 - Between members and federation operator
- Attribute and authentication coordination among members.

3.3. External Environment

External environment is one of the perspectives that we suggest to be studied while forming DVO. During analyzing external perspective decision makers' aim to have an abstract representation of the CNO from the outside overview, including: *market norms*, *cultural and socialized norms*, and *community norms*.

3.3.1. Market Dimension

During market analysis, the analyst covers all issues regarding the target business market, including product types, quality, market common law, political risk, standard of living, etc.

3.3.2. Community Dimension

During business analysis the analyst covers all issues regarding the target community, including community economic and consumers patterns, segmentation" of communities, etc.

3.3.3. Cultural and Socialized Dimension

During business analysis the analyst covers all issues regarding the cultural and socialized for the target market people, including urbanization, level of education, religious beliefs, uncertainty avoidance etc.

4. Case Study

The insurance is considered one of the main sectors of the financial services. In most cases, insurers need to form partnerships with governments, communities, and Non-Governmental Organizations (NGOs) [27]. NGOs may be able to identify opportunities and support initial business distribution. In the traditional insurance cases without non-automated processes, is considered human resource cost, storage cost, paper work, and turnaround time overheads. Due to these, the insurers' reputation might be affected and further induce financial losses or even legal consequences would be taken place. With the beginning of CNO, most of the insurance activities are linked together to streamline the workflow for processing a new application/judge claim. The following subsections describe how to apply the FCNOM perspectives in this domain.

4.1 Insurance Collaborative Networked Organization Boundaries

As described in section two, the insurance domain boundaries consist of:

- **Professional**; e.g., underwriter, claim adjustor
- **Organization**; e.g., **insurers**, intermediaries, reinsurance
- **Sub-organization**; e.g., underwriting department, claim adjusting department.
- **Outer Environment**:
- **Insurance-related services**; e.g., risk management consultants, claim management consultants,
- **National community and other international development players**; e.g., York Antwerp rules, P&I Culps, Lloyd's register.
- **Governmental authorities**; e.g., Money laundering, financial services authority

- **Non-Government;** e.g., Egyptian Insurance Union
- **Academia;** e.g., Auctorial Institute

4.2 Insurance CNO Components Description

As stated in section 2.1, the CommonKADS organization model is utilized to describe the insurance CNO. Four worksheets are needed for this purpose.

Worksheet OM-1:

Identifying knowledge-oriented problems and opportunities in the organization as describing in Table one.

Table 1. Worksheet OM-1 Identifying knowledge-oriented problems and opportunities in the organization

Organization Model	Problems and Opportunities Worksheet OM-1
<i>Problems and opportunities</i>	<ul style="list-style-type: none"> - Insurance market has been changed and businesses have to be adopted with new technology quickly to remain competitive. - Insurers need to integrate their processes and operations to reduce risk and provide products to meet customers' needs and improve services. - The size of insurance information systems, the complexity of their underlying data models and processes. - The heterogeneity of technologies involved by legacy systems. - Keep transaction records for long time. - The exchange of information is time consuming and is subject to errors. - Heterogeneous database, inter-company trust, ontological differences. - The rise varying of insurance products.
<i>Organizational context</i>	<p>The insurance is varied in terms of functional coverage with many different business lines involved life and non-life. These lines are valid for both personal and commercial environment and can be distributed directly by the insurance company or via intermediaries' sales members.</p> <p>Insurance CNO is connected with the national community and other international development players (e.g. York Antwerp rules, P&I Culps, Lloyd's register) globally.</p> <p>External Factors</p> <ul style="list-style-type: none"> <input type="checkbox"/> Government rules and regulations <input type="checkbox"/> Public opinion <input type="checkbox"/> Professionals opinion

Worksheet OM-2:

Description of organizational aspects that have an impact on and/or are affected by chosen knowledge solutions as describing in Table 2.

Table 2. Worksheet OM-2: Description of organizational aspects that have an impact on and/or are affected by chosen knowledge solutions.

Organization Model	Variant Aspects Worksheet OM-2
<i>Structure</i>	Figure1
<i>Process</i>	Figure2
<i>People</i>	Insured person 3 rd party Staff Administrative Staff Other Staff Required

Organization Model	Problems and Opportunities Worksheet OM-1
<i>Problems and opportunities</i>	<ul style="list-style-type: none"> - Insurance market has been changed and businesses have to be adopted with new technology quickly to remain competitive. - Insurers need to integrate their processes and operations to reduce risk and provide products to meet customers' needs and improve services. - The size of insurance information systems, the complexity of their underlying data models and processes. - The heterogeneity of technologies involved by legacy systems. - Keep transaction records for long time. - The exchange of information is time consuming and is subject to errors. - Heterogeneous database, inter-company trust, ontological differences. - The rise varying of insurance products.
<i>Organizational context</i>	<p>The insurance is varied in terms of functional coverage with many different business lines involved life and non-life. These lines are valid for both personal and commercial environment and can be distributed directly by the insurance company or via intermediaries' sales members. Insurance CNO is connected with the national community and other international development players (e.g. York Antwerp rules, P&I Culps, Lloyd's register) globally.</p> <p>External Factors</p> <ul style="list-style-type: none"> - Government rules and regulations - Public opinion - Professionals opinion
<i>Resources</i>	<p>3rd party's detail Computers resources Relationship of 3rd party information systems</p>
<i>Knowledge</i>	<p>Insured person Information Insured subject Information 3rd party Information Government Laws Insurance industrial union rules</p>
<i>Culture and Power</i>	<p>Every staff member is cooperative and friendly. Insured person has the right to become more actively involved in their insured subject and take more decisions of their own. Administrator of policy issue has power to control the services of this system and update the insured' information. 3rd party provider has power to accept or reject the appointment with the insured.</p>

Worksheet OM-3

Description of the process in terms of the tasks it is composed of, and their main characteristics as describing in Table 3.

Table3. Description of the process in terms of the tasks it is composed of, and their main characteristics

Organization Model		Process Breakdown Worksheet OM-3			
No	Task (Task name)	Performed by (Agent)	Where? (Location)	Knowledge asset	Knowledge Intensive?
1	Information collection	Insured person	At home	Insured person information	Yes
2	Insured subjects status	System	At web portal	Insured subjects information	Yes
3	Allocating slot/Book Appointment	Insured person	At home	3 rd party schedule	Yes

Worksheet OM-4

Description of the Knowledge component of the organization model and its major characteristics as describing in Table 4

Table4. Description of the Knowledge component of the organization model and its major characteristics

Organization Model		Knowledge Assets Worksheet OM-4				
Knowledge Asset (See OM-3)	Possessed by Agent (see OM-3)	Used in Task (See OM-3)	Right Form? Yes/no	Right Place? Yes/no	Right Time? Yes/no	Right Quality? Yes/no
Insured person information	Insured person	Information Collection	Yes	Yes	Yes	Yes
Insured subjects information	System	Insured subjects status	Yes	Yes	Yes	Yes
Doctors Schedule	Insured person	Allocating slot/Book Appointment	Yes	Yes	Yes	Yes

4.3 FCNOM Implementation for the Insurance Collaborative Network

FCNOM Model declares the CNO Boundaries. In addition, some perspectives have to be concerned within the CNO lifecycle such as *Organizational Behavior*, *CNO Federation Modeling*, and *External perspectives*. According to The FCNOM approach, these perspectives are as follows:

4.3.1 Insurance CNO Organizational Behavior Perspectives

Sub-cultures differences may be occurred across the collaboration boundaries within members include elements such as principles of collaboration and rules of conduct, contracts, and conflict resolution policies are defined as follows:

Organizational Culture Norms

An insurance company features could be viewed as a hierarchical structure and the experience philosophical changes. In addition, it may be involved in business projects with a big international company. Therefore, CNO analyst must determine the possible actions that would follow this profile, and define the most urgent dimensions.

Decision Norms

The underwriter, who is one of the decision makers at the insurance field, has to figure out the different risk factors associated with his vision. Some Principles for Underwriting to select risk factors should consider the following [22]:

- Evaluate contract individually in view of the balance between risk and return.
- Examine screening underwriting result of decline occasionally and reflect the result in the policy.
- Evaluate the exposure quantitatively utilizing models to underwrite natural catastrophic risks
- Diversify the portfolio to avoid significant accumulation or very rough distribution of coverage over countries or regions.
- Monitor reinsurance market trends closely and respond to the changes of the market without delay.

Previous studies have not deal with those norms. But, by assessing the impact of norms on decision making, insurance argues that the norms influence are selected by providing reasons rather than by being causes for action. Depending on the severity of the guidance, these norms are provided at a decision,

Constraints

There are many constraints that could be applied in this domain. One example of these constraints is the amount of organization liquidity needs. This constrain will affect the decision of claim payments timing and financial planning. For instance, if the liquidity needs is high and if there is significant interest rate then we need to keep cash reserve that will reduce the rate of money investments.

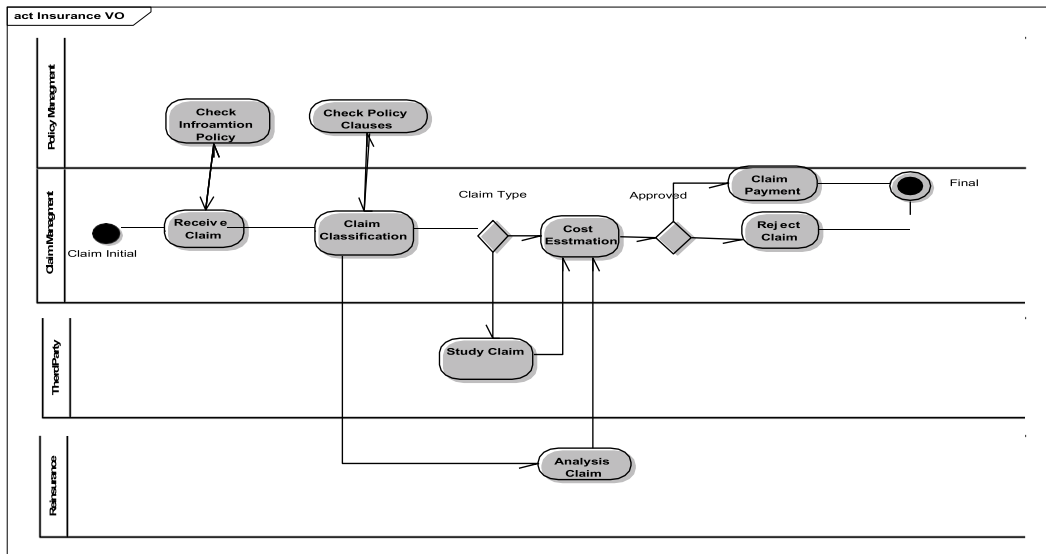


Figure 2. Insurance Virtual Organization Portion Activity Diagram

4.3.2 Insurance CNO Federated Model Components

Insurance CNO federated model components may be illustrated as follows:

- **Members;** A mix of insurance service provider (e.g., Underwriter, claim adjustor)
- **Federation operator;** Insurance Metadata Model, etc.
- **Policy Contexts;** Defining and identifying insurance standards.
- **Attribute and authentication** coordination among members

4.3.3 Insurance CNO External perspectives

Carol [2] [3] has summarized the hypothesized relationships between non-life insurance consumption and explanatory variables. Insurance has sensitive relations with market and the community, and with the cultural and socialized parties, the previous studies have not deal with those norms. The following are some of these perspectives:

During market analysis, the analyst covers all issues regarding the target:

- Business market, including market focus, common law, political risk, demand for insurance and income per person.
- Community, including community' economic consumers' patterns, and segmentation of communities.
- Market people cultural and socialized, including urbanization, level of education, religious beliefs, uncertainty avoidance etc.

5. CONCLUSIONS AND FURTHER WORK

The aim of this paper, FCNOM approach has been proposed. According to FCNOM, the importance of the organization behavior, federal views on CNO and some external perspective on a CNO have been underlined. In addition, it provides CNO boundaries in clear manner. In addition, it minimizes the negotiations within CNO components during its life cycle, supports DVO configuration automation, as well as, helps decision making for DVO, and achieves harmonization between CNO partners. The proposed FCNOM utilizes CommonKADS' organization model for describing CNO components. Insurance Collaborative Network has been used as an example to proof the proposed FCNOM model.

The real and specific problem to build a DVO, that underlies the grid-computing concept to coordinated resource sharing and problem solving in dynamic, multi-institutional [25]. Ian Foster et al. [Foster, 2011] thought the Grid and Cloud computing convergence, which enables a new approach towards CNO. In addition, he has stated that the two communities' convergences enable scalability and more efficient use and comprise a complexity of many issues (e.g. federation, security...) [23].

The main key to realize the grid-cloud vision is standardization to create interoperable, portable, and reusable components and systems. Open Grid Services Architecture (OGSA) [26] facilitates the using of Service-Oriented Architecture (SOA), and adopts framework for distributed system integration, virtualization. In addition, OGSA manages the interfaces requirements, behaviors, resource models, and bindings.

Mapping CNO enterprise to grid-cloud convergences relies on the need of collaboration among involved partners. There is a need to enlarge that collaboration by sharing the software services based on Software- as-a-Service (SaaS) model, which helps CNO clients to be more confident when accessing services from CNO members, and CNO members to have a support on how their services should be properly developed and made available to CNO clients.

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