

## Decision-Making Methods for Public Organizations: A Complex Adaptive System Approach

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To begin with, science shapes the way people view reality and helps them interpret the events around them, by providing paradigms and metaphors (Psek et al, 1997). With the term 'paradigm' we refer to an internalized framework that shapes the interpretation of reality as well as the way we deal with it. Hence, a paradigm is not only the lens with which we see our world, but it also influences the means we use to intervene to the latter.

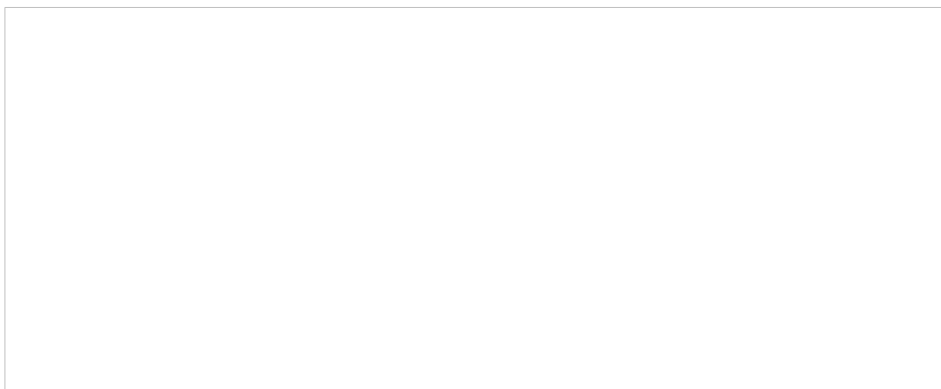
The Newtonian Paradigm is related to closed systems and assumes isolation and rigid boundaries between the system and its environment. The building block of the Newtonian paradigm is the metaphor of a machine. From the organizational point of view, the assumptions of the mechanistic metaphor are obvious in the structure of some organizations. Furthermore, organizations adopting the Newtonian paradigm use linear management (Burns and Stalker, 1961).

In a world that is in a constant flux, where the technology is dynamic and agility is the path to success the Newtonian/Mechanistic Paradigm is not valid. Such enterprises cannot be managed using linear methods, as the boundaries between the interconnected parties are not so rigid (Atkinson et al, 2005). We need to find a new metaphor that can not only describe the complexity of the organizations but also provide more appropriate ways of managing this complexity.

Science has once again paved the way. The science of complexity is radically altering the way people view organizations and their management. A Complex Adaptive Enterprise (CAE) seems to be a better representation of a complex public organization. As Chapman triggers out "Large public organizations are a mess" (2002) referring to the complexity and uncertainty that they deal with.

The operational model of the complexity paradigm is a Complex Adaptive System (CAS), i.e. a system that is made of a large number of parts (agents) with many interactions (Simon, 1996) characterized by nonlinear behaviors that cannot be predicted. Examples of CAS might be natural, such as ecologies, or social, such as organizations and cultures (Dooley, 1996).

All characteristics of a CAS and the dynamic relationship with its environment can be depicted as follows (Choi et al, 2001):



Furthermore, Public Organizations can be seen as a Complex Adaptive Enterprise, i.e. an organization that functions as a CAS, consists of many interacting agents and learns and adapts to its constantly changing environment (Fotgieter et al, 2005). As Rhodes points out public service delivery is no longer a simple linear domain but a complex system of public organizations that have to work together, of private organizations in a form of partnerships and of consumers or citizens in the domain of operation. If we recognize the complexity of public organizations and the need to be managed as a complex rather than as a linear system then there are many issues concerning the role of management in such enterprises. As Lissack (2005) illustrates, complexity theory challenges the traditional management assumptions by pointing out that human action allows for the possibility of emergent behavior. To be more specific, some fundamental assumptions of traditional management are being challenged:

- If the causes and effects are not linked and emergent properties come out of the blue, then how can 'planning' make predictions?
- What are the processes and strategies that can enable adaptation and evolution, rather than stopping progress and flexibility?
- What are the tools that enable effective **decision making** in a complex and uncertain environment?

The main concern of our analysis is to find appropriate decision making tools in the context of a CAE. Traditional optimization techniques, Decision Trees, mathematical programming and engineering Decision Analysis are mostly based on the assumptions of the mechanistic paradigm (Schmitt, 1996). Traditional OR tools rest on rationality and the key assumption that the decision maker has all the information needed available. (Lembert, 2002). The role of OR and traditional DS is to find the best or the optimum solution to a problem assuming that predictions can be made.

The four golden rules of the Newtonian paradigm, linearity, order, predictability and determinism, have been obvious in most OR traditional techniques but even in modern decision analysis tools the philosophy has not changed. **Multi Criteria Decision Analysis (MCDA)** is a useful tool that takes into account options, criteria and weights simplifying however the process of decision making. The goal is always to find the best solution assuming that there is one.

As Rosenhead (2001) explains simulation and mathematical tools and traditional decision theory assume predictions and aim to find the best solution. However, when the level of complexity is increasing and the interconnected agents change constantly their view of the environment then the formative decision situation is to decide what the problem is.

Over the last decades the complexity of the organizations as mentioned above has been recognized by many researchers and academics. Some methods that try to incorporate complexity, uncertainty and the cognitive aspects of the agents have been developed.

These methods can be referred to as the **Soft Operational Research Methods** and according to Rosenhead and Mingers (2001) as the Problem Structuring Methods. These methods are not exactly adapted to the paradigm of CAS but it is an effort to recognize and accept the uncertainty and emergence of decision making.

Such methods are: Soft Systems Methodology (SSM) a method proposed firstly by Checkland (1985), Strategic Choice SC which deals with the interconnectedness of decision problems and focuses on possible ways of managing uncertainties as to what to do next, (Friend and Hickling, 1997), Drama Theory (Howard, 1994), Decision Conference (Phillips, 1990) and many more.

The aim of our research is to examine some Problem Structuring Methods (PSM) under the lenses of complexity theory and find the ways to combine them with MCDA. Our goal is to analyze possible combinations of PSM and MCDA in order to find the one that best accepts the complexity and the emergence of the nowadays environment. In this analysis emotional, psychological and cognitive aspects of human nature will be taken into account.

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