

## Complexity Management Overview

In this section we will start with a brief review of the reductionist approach to management, before moving on to try and gain an overview to the area of complexity management.

As we saw in the previous section, reductionist management rests upon a core set of assumptions that it inherited from modern science and applied these to the management of organizations during the industrial age. We can summarize these underlining principals as follows. Firstly, following on from the mechanistic view of classical physics, the world is seen to be relatively orderly, knowable, predictable, and organizations are designed to operate as some kind of stable equilibrium. Secondly, organizations are seen essentially as no more than a set of parts. Thus, we can break them up into isolated, well-defined, static components, and that our focus should be primarily upon these components whilst the relations and processes that interconnect them are seen to be secondary in importance. Thirdly, that these components can be controlled through the manipulation of the simple linear cause and effect interactions that govern their behavior. They can be measured and optimized according to one primary metric. And lastly, that in order to achieve the global coordination of these components, it is necessary to create a hierarchical structure with one centralized location of authority beneath which is a direct line of command to all areas of the organization.

This theory to the management of organizations has proven highly successful and remains relevant whenever we are dealing with stable environments that require the large-scale production of standardized products and services in a predictable fashion. But whenever we are dealing with organizations and environments that are volatile, uncertain, interconnected and heterogeneous, these assumptions begin to break down and this is where complexity management comes in. Complexity management is the application of complex systems theory to the management of complex organizations and environments. Complex organizations are systems composed of many parts that are diverse, highly interconnected and capable of autonomous adaptation. Examples of these might be international political organizations, multinational corporations, supply chain networks or large-scale industrial projects such as the building of airports, electrical power grids or cities. We will now take an overview to some of the most important factors in managing these complex systems, but we will be going over all of this again later on in the course in more detail.

**Firstly Uncertainty:** In this world of complex systems, things are not so orderly. The level of inter-connectivity can be so deep and the pace of change can be so fast that the capacity for human oversight is relatively shallow, making the future not only unknown, but in fact fundamentally unknowable and rendering our rational analytical methods no longer functional. Within the complexity paradigm, the future emerges. It is uncertain, and no amount of data or analysis can change that.

**Secondly Adaptation:** In this world of uncertainty the only response is to prepare the organization by making it resilient and adaptable to change. In volatile and uncertain environments that are subject to systemic risk, it is no longer the accumulation of a mass of resources that ensures survival, but the capacity to adapt to a changing environment. Organizations need to be agile and sufficiently diversified to ensure their resilience and sustainability.

**Thirdly Network:** Within these highly interconnect and interdependent organizations, it is no longer the properties of the static components that define the system as a whole, but increasingly the relations and processes that interconnect them. Thus, complexity management creates a model of the organization, not so much as a well bounded closed system with a well-defined structure, but more as an open network of relations between nodes that are loosely coupled and dynamic as they evolve over time.

**Lastly Self-organization:** Complex systems are composed of autonomous agents. Global coordination within these systems is an emergent property that derives from the self-organization of elements on the local level. This means there is no centralized mechanism for controlling the output to the system. We can create the context that might enable an individual or group to be productive but we cannot make them be productive. This would remove the autonomy of the elements and by definition reduce the organization to a simple linear system. These basic premises of complexity management appear to defy the notion that we can in fact manage complex systems at all, given the fact that the future is fundamentally uncertain, that there is no well-defined boundary to the organization, and that we cannot even intervene to directly control the elements within the system. And thus, the managing of complex organizations requires a re-conceptualization of what the practice of management is, away from its traditional definition and towards the function of management as understanding the environment, identifying challenges and creating a context that enables elements to co-create solutions through networks, whilst designing feedback connections that self-regulate the system with the ultimate aim of creating systemically efficient, resilient and sustainable organizations.

We have covered a lot in this section but we will be going over it all in more detail later on. The main aim has been to get a broad outline of the two different theories to management. On the one hand, we have the reductionist approach to management that is focused upon a well-bonded, relatively static organization that is divided up into a set of components that can be centrally controlled. On the other hand, we have complexity management that sees the world as uncertain, where organizations are open networks of relations that need to be adaptable and resilient to inevitable and unpredictable change. From this you can see how complexity management is fundamentally an alternative paradigm to our traditional view of management. I hope at this stage you have a general idea for what we are dealing with when we talk about managing complex systems and we can move on.