

Sustainability

The concept of sustainability has risen over the past few decades from obscurity to the center of our collective conscience, and today represents a paradigm shift in our understanding of the world and our place within it. This changing paradigm of environmental sustainability is set to have a fundamental effect on how we manage and design systems in the 21st century.

The paradigm of sustainability is just as all encompassing as that of globalization and the information age. It, too, contextualizes the times we live in as a deep transition period in human civilization, pointing to the graphs of exponential growth in almost all areas of human activity from population increase to natural resource consumption, that began during the industrial revolution, and have sharply increased over the past few decades in a way that is clearly unsustainable.

The vision presented by the paradigm of sustainability places us in a world at the center of which is a fundamental set of contradictions between how we operate and what is feasible, given our environment's carrying capacity. In the face of this, inaction or incremental action is unviable, and thus, it necessitates radical change in how we design and manage our systems.

The challenge of sustainability reveals the inherent limitations of our industrial systems of organization, not just technological and economic but also political and even cultural. In the face of these inherent failures of our industrial systems of organization to respond to the challenges of sustainability, it places responsibility and action on the local level of the individual and private organizations, asking us to redesign and re-imagine not just things but systems as a whole, as it induces a shift from our modern reductionism view of the world as a machine to one of ecosystems and organic evolution.

The net result of this epic vision of the world that we inherit is on the one hand a set of challenges that seem almost insurmountable, whilst on the other an exhilarating set of possibilities for recreating almost every area of our socio-technical world. Big, hairy, rule-breaking ideas and bold vision are the order of the day here.

In this section, we will look at some of the key drivers of complexity that this volatile and uncertain world of climate change and natural resource depletion is creating.

Firstly, it is driving a shift from a linear to nonlinear economic model:

The industrial economic model is a linear system of production and consumption in a world of infinite resources where the aim is to maximize throughput to the system by expanding its scale and access to resources. The growing awareness to the finite nature of the planet's resources, and increasingly the actual economic reality of peak oil and commodity price increases is changing this linear model to a circular model where energy and resource efficiency are central and everything becomes part of a lifecycle. This nonlinear lifecycle view to products and services necessitates a more complex, holistic view of the systems we design and manage. One that looks for the synergistic connections works with feedback loops and whole systems instead of discrete once-off products.

Secondly Increased factors in design and management: Sustainability increases the complexity of designing and managing systems by increasing the number of factors involved. Whereas previously, systems were managed and designed according to one primary factor – typically some monetary metric – today, the so-called triple bottom line of people, profit and planet is being increasingly adopted by enterprises as a more complex nonlinear set of metrics that developers of products and services need to be able to balance and find solutions to the constraints of each of these parameters, often pull in different directions and convert what were previously simple linear systems with one optimal profit maximization solution into more complex nonlinear challenges.

Thirdly volatility of climate change: Human-induced activity is resulting in unprecedented change in some of earth's most fundamental systems upon which our real economy is deeply connected and dependent. It is almost impossible for us to predict the nonlinear effects that these changes will have, leaving us in a world of increasing volatility, uncertainty and systemic shocks. The only way to respond to this without becoming reactionary is to change how we design and manage systems to make them more adaptable and resilient to change.

Lastly dematerialization and services economy: Whereas materialism and material consumption was a major part of the industrial economic model, in a post-industrial information society, increasingly what people really want are not so much more things and more products but solutions. The 21st century presents us with a host of problems that are difficult to avoid. People want solutions to these problems both big and small and are eager for services that deliver them. Information technology is enabling the sharing, exchanging and connecting of resources into ecosystems of services that deliver real value whilst using pre-existing resources, with limited material demand.

The paradigm of sustainability is rising rapidly to have a pervasive and systemic effect on the make-up of our technology and economies in the 21st century. Real solutions to environmental problems require us to think outside the mechanistic box that we have inherited from the industrial age as developing the solutions that are required will take us into the much more complex environment of designing and managing integrated social-ecological systems.