

Systems thinking: an introduction

System thinking is a way of describing the world in a more holistic manner based upon the model of a system, but lets start from the beginning.

We can understand the world as things, that is parts or components and their relations, that is how they are connected or fit together.

So take a car for example, it is made up of parts, car parts such as engine, wheels and so on and these parts are put together or organized in a specific way so as to make them function as a vehicle of transportation.

Now we call a group of things that are not organized in this way a set. So we would call a group of cups on a table a set of cups because unlike the parts to our car they have not been designed to serve some collective function.

Because the group of cups is simple the sum of its parts we would describe them by describing the individual properties of the each cup and this would tell us everything we needed to know about them.

This approach to describing thing is called analysis or reductionism, reductionism is the traditional approach taken within modern science that tries to describe complex phenomena in terms of their individual parts.

Now take the human body that is highly organized through a complex set of relations between its parts. Out of the arrangement of these parts in a specific way we get the overall functioning of a living organism.

Because the parts are so strongly defined by their connections and function within the body as an entirety, to properly describe the parts we need to first understand the functioning of the whole body.

This approach to describing things that is that we can best describe things by understanding their place within the function of the whole that they are apart of is called synthesis and synthesis is the foundations of systems thinking.

Thus we have two different approaches to describing thing, analysis that is interested in describing the individual components and syntheses that talks about the relationship between these components and their functioning as a whole.

Ok so now that we know a bit about system thinking lets put our new found knowledge to use

say a car manufacturing company has employed us to design their next great model. Now we could take two different approaches to this problem, applying analytical thinking or our friend systems thinking.

If we approached the problem for a traditional perspective we would start by analyzing the car and looking for ways to optimize it, we might come up with a design that minimizes the car's drag by reducing its height by a few centimeters to increasing its fuel efficiency.

Now if we applied systems thinking to this problem, we would start by identifying the car's function, that is personal transportation and the system it is apart of, the transportation system. From this perspective we might not even need to design a new car. But end up designing some services that connects preexisting resources to provide the same desired functionality.

From this example we can see how systems thinking is often employed when the current paradigm or way of doing things has reached its limit and giving us a fresh perspective on things.

Systems thinking is the beginning of another closely related area called systems theory that goes on to give us a whole suit of tools for analysis and modeling systems and their interaction and dynamics as they evolve over time.

So we can wrap up by saying that systems thinking is an emerging paradigm within many areas for science to engineering and business management, that presents an alternative to our traditional modern analytical methods of enquiry by emphasizing the need for a more holistic and contextualized understanding of the world.

but how do we actually do it ? we start by asking what is the function of the thing I am interested in. Like perform the function of photosynthesis, cars transport people and business produce products. By identifying the function that these things perform with in a broader system we are given the primary context within which to understand them.

By understanding the whole system, the other elements within it and its relationship to them we can understand what uniquely defines the thing we are interested in. This is why systems thinking is also called holistic thinking, because it starts with an understanding of the whole and works backwards to understand the individual elements.

Once we have this context of understanding the elements function we can apply the model of a systems to identify its inputs and out puts and reason about its efficiency

As a ratio between the resources it process and the wait produced during its operation