Systems Innovation Toolkit

Systems Innovation Toolkit is a set of tools for enabling systems-level change within complex organizations, it is designed to enable organizations of all kind to transform how they both think and operate. It brings together in an accessible way key ideas from complexity thinking and applies them to enabling systems-level change. Systems innovation is a practical activity, this toolkit should be seen as a guide book and not a finished solution.

New Context

With the rise of globalization, information technology, and an unfolding environmental crisis the world has changed in quite radical ways in the past decades alone. Issues have gone from the national level to the global level, at a whole new scale and scope, they have gone from relatively isolated to highly interconnected and interdependent, while the pace of change has increased by an order of magnitude. As a consequence, we are challenged to evolve new organizational structures and capabilities that are currently significantly absent.

New Challenges

Many of today's strategic challenges, from security and terrorism to migration and water scarcity, can be better thought of as complex adaptive systems, continuously recreated through the ongoing choices, actions, and interactions among numerous players operating across dense networks. Such systemic phenomena require a whole new strategic approach if we are to have any real impact in shaping the world we live in. There is growing awareness that these systems are in fact fundamentally complex and thus require a different approach - they demand a more holistic, networked, emergent and evolutionary approach.

New Approach

Systems innovation is a new systems-based approach to enabling change within complex organizations. It is a holistic approach that looks at the underlying dynamics and root causes of the issue, working with the innate evolutionary potential of complex adaptive systems to enable transformative change in their structure, behavior and functional capabilities.

New Technologies

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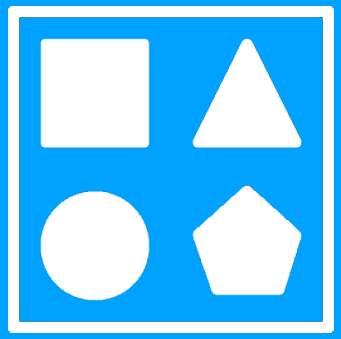

Building Blocks

This toolkit consists of four main elements designed to facilitate your thinking and doing during your design innovation process. Don't forget, innovation is a practical activity not a theoretical one, a craft where theory should continuously intertwine with practice. The elements of this toolkit should be thought of not in the abstract but in context of the specific issues you are trying to deal with.

Systems Thinking

System thinking is critically important in enabling us to see the world differently, to change the paradigm, to understand what you do as a system instead of just a collection of parts. It works to elevate our thinking so as to see new possibilities and change how the organization operates.

Systems Mapping

System mapping is about developing an overall model for the specific system we are dealing with and how it changes over time. Systems mapping gives us the tools to map out the basic elements and relations within a system or environment and how they interrelate to create the system's structure and behavior.

Systems Change

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Systems Design

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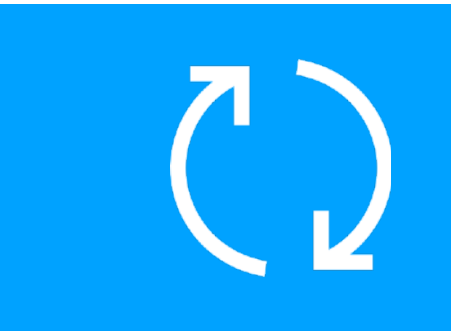
Systems Innovation

Section 1

Systems innovation can be understood as a combination of systems thinking and the process of innovation so as to enable transformative change within a complex system.



Systems Thinking

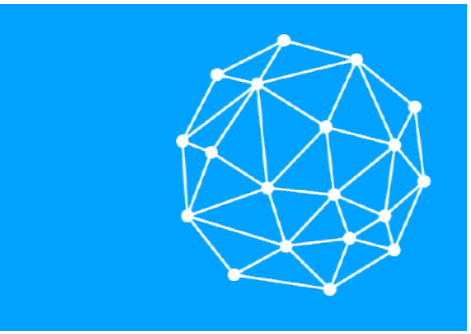
Systems thinking is a way of looking at the world, it is what we would call a holistic paradigm meaning that it enables us to look at, analyze and talk about whole systems rather than simply looking at their parts. It is the opposite of our traditional analytical ways of reasoning where we break things down into separate parts and try to manage them individually.

Systems thinking looks at the world in terms of connections; patterns of organization and how the system behavior emerges out of those patterns. Systems innovation is different because it is innovation not in things but in connections and organization - it is aimed at changing the basic structure of an organization.

Innovation

Innovation is about the creation of something that is both new and of value, however, it is also about its adoption and implementation so as to change some established way of doing things. It is the creation of something new and useful but also its adoption and usage within society so as to enable real change in the world around us. Ultimately innovation is simply about maintaining relevance in a changing environment, the faster the environment changes the more important innovation becomes.

Whereas management is generally about doing what we did in the past, the point of innovation is change; to not do what you are doing again. Systems innovators aim to transform the system in which they operate so as to no longer have a job, as there is no longer a problem to fix.



Complex Systems

Typically when we talk about innovation we think of things - some kind of a technology, like a mobile phone, an electric bike, an app or some other new product. This type of innovation is focused on parts; building a better car, which is just one part in the transport system; making a better solar panel which is just one part in an energy system; creating a better medical device, which is one part in the health system.

System innovation is about innovation in these whole complex systems. A complex system is typically a large-scale system composed of many interdependent parts that are relatively autonomous. All of the large-scale systems we are interested in our economy are complex adaptive systems; food systems, energy systems, political systems, health systems, financial systems etc.

Systems Change

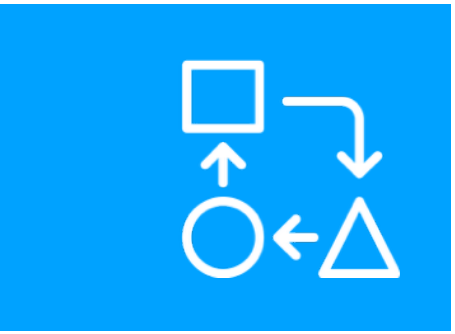
Systemic issues - wicked problems - can not be solved by isolating and changing one part of the system, because they are systemic they require somehow changing the basic structure and mode of operation for the whole system. Systems change is about changing the paradigm, the structure, and connections within the organization so as to realize new emergent outcomes. Systems change is about a reconfiguration of how things are done so that something new emerges that makes the old system and old issues irrelevant because the whole system is now doing something different.

Systems Change

Section 2

The aim of systems innovation is to change systems. So what is systems change? Systems change is about enabling transformation in the structure and interrelationships of the parts within a complex organization so as to realize the emergence of new behavior and functionality required for that organization to operate successfully within its environment.

"Systems change is about addressing the root causes of social problems, which are often intractable and embedded in networks of cause and effect. It is an intentional process designed to fundamentally alter the components and structures that cause the system to behave in a certain way." - Rachel Wharton



Whole Systems Change

Systems thinking is about looking at the underlying dynamics within the system and how that creates the system's observable behavior. Systems change is about identifying and surfacing the core contradictions in the system rather than the symptoms created by those contradictions.

Systems represent patterns of organization and self-reinforcing feedback loops that create the typical behavior of the system. For example in a political system, we might see politicians saying one thing and then doing another. Initially, we may think it is a problem with the specific attributes of the individual in that position, but after seeing that if we swap out the individual and put in another we get the same behavior we will start to see that is the behavior of the system caused by its underlying dynamics. In such a case altering any of the parts - for example, electing a new president - will not solve the issue. We have to understand the behavior of the system that is creating it and change the system in some way instead of just changing any of the parts.

Whether analyzing, water pollution within a community, family conflicts, or food security the key to tackling such issues is understanding their underlying structures and the complex patterns that help support them.

"The critical point for contemporary management, it is the following, when you improve each part of the system taken separately, you do not improve the performance of the system taken as a whole and are very likely to hurt it or decrease it and that is completely counterintuitive"

- Russell Ackoff.

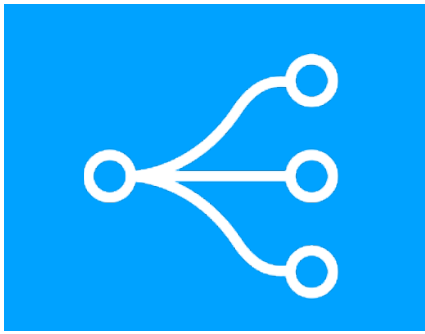
With our traditional analytical reductionist ways of thinking, if we see that there is something wrong with an organization we believe that failure must derive from one of the parts. The obvious consequences of this thinking is that we try to trace back the problems the system has to some specific component. Often we ascribe systems level dysfunctionality to a specific part in the system.

If there is an issue in our healthcare system, our education system our political system we try to trace the problem back to the medical staff, the lack of finance, the funding of campaigns etc. We then try to fix that problem, but because system level functionality and features are a product of the way the parts are interrelated we do not solve the problem. When we try to solve problems like this we just move them around.

Complex systems are often described as counter-intuitive. When we take our traditional ways of thinking that apply to simpler systems and project them onto these more complex organizations we often get counterproductive results because they do not apply.

The first lesson to learn about complex problems, they are not a function of any part in the system they are a product of how the system is structured and thus we have to change our way of tackling them from parts to the whole.

Evolution



A critical factor that is changing today is that we are going from designing relatively simple systems like chairs and houses - where it is small enough and simple enough that we can impose our design on it - to dealing with systems that are much greater than we are. In a simple world you can change the system, in a complex world no one actor gets to change the system they are a part of, however, every actor has an influence on the system's evolution, you can choose to have a greater or lesser influence on its evolution.

Complex systems change through an evolutionary process and thus systems change is really all about evolution. If we look at the really major changes that have transformed societies we will see that no one person or organization created that change. Take as an example the movement of Western Society from a feudal system into the modern world, which certainly qualifies as a major change within a complex adaptive system. No one director chose to make that change, no one caused it to happen. It was a process of cultural, social, economic and technological evolution.

The second most important thing to learn is that you can not directly change a complex organization, you can directly affect changes within parts but not the whole system.

The job of the system innovator then is to understand the system and its potential for change and to create the context for those variants that may be successful to grow and become more prevalent within the system, thus influencing it in a certain direction. This process of systems change can then be seen to be very much analogous to the way an ecosystem adapts to its changing environment through the process of natural selection and evolution.

These are the two most important things to learn in systems innovation. Firstly that it is not about the parts but the structure of the whole system. Secondly that you cannot impose a design pattern on a complex adaptive system and get the results that you expect. Unfortunately, it typically takes us as individuals, as organizations, and as societies massive amounts of wasted time, energy, and resources to learn these basic principles of systems change

Wicked Problems

Section 3

Wicked problems are highly complex problems. They are unstructured, open-ended; they are multi-dimensional, systemic and may have no known solution. Examples of wicked problems include climate change, inequality, environmental degradation, terrorism, global financial instability, multicultural integration or cyber security. Wicked problems may be understood as systemic dysfunctionalities within a complex system. In all cases, the problem can not be isolated and separated from the system. Because wicked problems are systemic in nature, they can be understood as an emergent phenomenon of how the local components interact, of how the system works, and not simply one part of the system, that can be isolated, tackled and solved in a traditional linear fashion.

"Complex issues are multidimensional and whenever you try and reduce them to a single dimension you are on the verge of making a dramatic mistake because by prescribing a solution that is unidimensional you are about to make the problem even worse" - Jocelyne Bourgon

Emergent Problems

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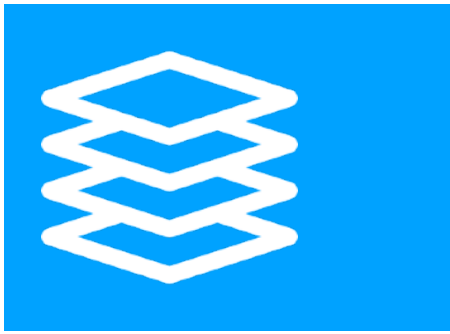
As an example, we can think of the issue of bribery within a society. If individuals across a network exchange bribes and corruption take hold as a systemic pattern, it will create the incentives for even more individuals to adopt similar behaviors, while limiting those who might still wish to not engage. As more individuals accept this corruption as part of normal behavior, it will gain traction. This pattern is not a fixed structure with a single identifiable cause, it is rather a dynamic outcome of a multiplicity of distributed interactions. The pattern is continuously created on a daily basis through a network of interactions.

Multidimensional



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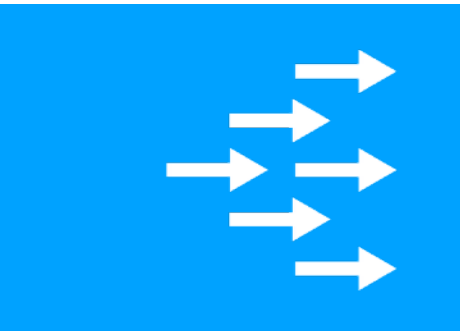


Multi-Solving

Complex systems are multidimensional and multi-layered and multi-scaled. You have to look at it from all of these dimensions and develop a solution on the different levels and across the different dimensions, solving for one dimension or one problem will not be sufficed.

This is why we talk about systems innovation and system change because with a complex problem you actually have to change the whole system by affecting multiple different areas. This is the idea of multi-solving, which says maybe all these issues aren't separate where we have to pit them against each other and see the issues as separate creating a new working group to go and tackle each one, we can instead step back and look at the whole system,
how the parts are interrelated and a change in one will affect another domain; looking for synergistic solutions that will solve for many factors.

A nexus-based approach tries to reduce trade-offs and build synergies across sectors recognizing that it may not be possible to solve a problem within one domain without solving an interrelated one in another domain. Thus it aims to increase opportunities for mutually beneficial responses and enhancing the potential for cooperation between and among all sectors. As with all interdisciplinary approaches it recognizes that interdependencies lead to the need for a collaborative approach, the need to develop multi-stakeholder platforms.

Innovation Process

Section 4

"The energy of the creative process comes from this gap, how do you generate the gap? Obviously, when you start to articulate a vision you generate that energy, but just as much when you start to see more clearly the current reality, that also generates tension. There are two fundamental ways to generate creative tension, one is by articulating and getting committed to a vision and the other it is about getting clearer about what is, so to put it simply two sources of creative tension are aspiration and the truth." - Peter Senge

Creative Tension

Innovation is the process of creating and introducing a new solution to a given challenge. At its heart innovation is a creative process; an inherently disorganized and messy one. Systems thinkers argue that interventions do not always produce orderly, sequential and contained outcomes; instead an ongoing process of action, learning and adaptation is needed to bring about systems change.

The origins of this process is discontent with what is. Innovation starts with a discontent for what is if you are happy with the way the world is you will never change much. It is our discontent with some aspect of our world that drives us to conceive of a different better world.

Real change is as much about accepting what is, as it is about envisioning a different future. To go through the creative process is to hold those two that create the contradictions, to live with them and use them as the fuel to your creativity and eventually create some resolution to them. It is that resolution to the constraint or contradiction that will then work as a generic solution that others can use without having to go through that full process.

We can say then that if you do not feel uncomfortable with yourself about something you are fundamentally not creating. It is when you put yourself into a space that is uncomfortable for you, then there is opportunity for innovation and change.

The innovation process requires deep insight, prolonged analysis, systems design, and development.

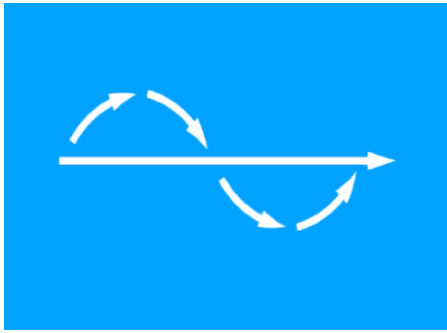
Insight

If you want to innovate in a system it is not just necessary that you understand the current form of that system but also understand it in the abstract - to change the paradigm by understand what you do as a system. Understanding the system in the abstract shows you the full set of possibilities for that system and it is that set of possibilities that creates the space for innovation. By understanding what you are dealing with as a system you will be able to see what its function is and that provides some rationale as to what is better and what is worse

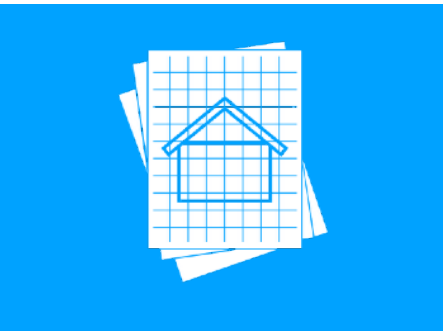
Analysis

To actually understand what is going on requires deep and prolonged analysis of how the parts interrelate to create the system's behavior. All complex systems have a history that shapes their present and future, it is critical to understand how the system has evolved to its current state and the evolutionary potential that exists within the system now which will enable it to move forward.

Transition



It is only during transitions when the system is in a state of crisis and exponential change that it has the potential to adopt a new way or model of organization. It is only during phase transitions that there is enough positive feedback to drive exponential change and qualitative changes in structure. System change is about enabling these nonlinear transitions. To do systems innovation is to understand the basic structures of the current system and the potential to evolve to a higher level of organization along some set of trajectories. This requires us to map out those potential processes of change.



Development

Complex problems require a prolonged effort by a multiplicity of actors, to coordinate that effect requires the building of a platform that can support a network of actors to coordinate around the given issues. One genius sitting in a room is not going to solve the problem, these complex problems require a form of innovation which is fundamentally democratized and distributed but also coordinated and working together over a prolonged period.

Examples of Systems Innovation

3D Printing

Distributed manufacturing is a reorganization of the whole manufacturing system that is different to the way it was done in the past and one that will lead to it exhibiting new dynamics and behaviors. It reorganizes the system in such a way as to address fundamental issues so that the new model will not go on creating the same kind of problems as before.

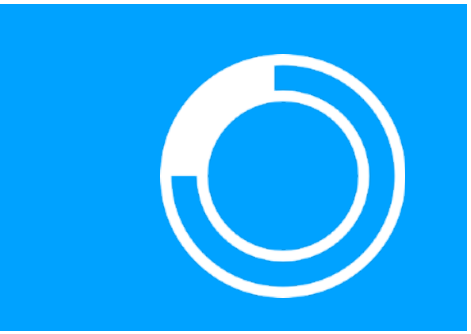
Distributed Ledgers

DLTs represent a change on probably the most fundamental level of economic organization, i.e. how we record the ownership and exchange of valued assets of all kind. Changing the structure of how we define record and exchange value would rewrite very fundamental structures underpinning our modern economies.

Systems Insight

Section 5

The same old thinking will create the same old solutions - to realize systems level change we have to change our thinking from seeing not just the static parts but the dynamics of the whole - this is system thinking. We have to let go of existing solutions, constraints and assumptions about the system and try to build a model of it in the abstract so as to see the full set of possibilities. Abstract theories open our eyes to possibilities and solutions that we would otherwise bypass, they enable us to see and search a broader space in order to find solutions that we otherwise could not even imagine.



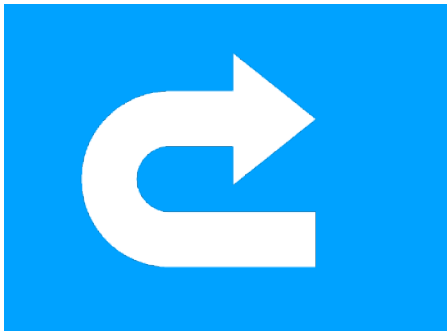
Systems Theory

Theory first then the constraints of application come later - we often take the last steps first, fearful of idealism or are just too lazy to put in the work. We skip over the initial phases of building up real insight into the workings of the system and jump into practicalities. We take for granted the vision, the goal and the current manifestation of the system as just the way it is. Of course, by doing this we are throwing out the very opportunity to reinvent it.

Whether we like it or not complexity means that we have to move to higher levels of abstraction, we can not do complexity without theories and models. We can not be afraid of embracing abstraction and letting go of practicalities, if you start with budget constraints or stakeholder analysis we will not get very far, there is a place for those things but it is later on, once the theory is figured out.

Our basic premise here is this; you can't improve a system without understanding it. The problem is that most people do not understand the system they are a part of. This is a key issue we have, most of us have an idea for what a system is, many of us know something about systems thinking or even ascribe to being systems thinkers, but actually very few of us are able to understand the organizations we operate within in a systemic way and this is the starting point for real system change.

Reflexivity



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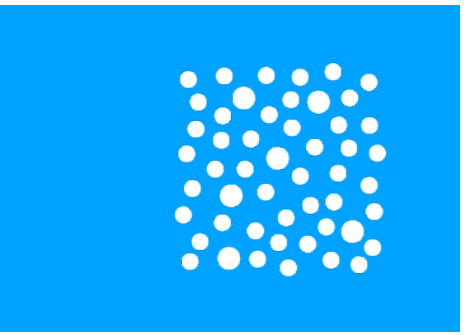


Space of Possibilities

System innovation is about starting not with the specific problems that you are currently facing but instead starting with the system as a whole so as to make a change on that level that will make the current issues no longer relevant. We do not worry about overuse of fossil fuels because if we could make real innovation in the whole system we probably would not even need them, a better way of doing things would emerge.

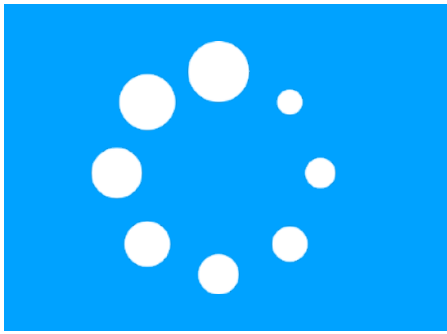
By going to this very abstract level we start to see the full set of possibilities and break out of thinking that only what exists is possible. We have to start from a clean slate and then later re-introduce the practical limiting constraints. By doing this we can break out of our assumptions.

Systems Thinking

Section 6

Systems thinkers typically come to the conclusion; that the way we organize our world is a product of the models that we use and if there is something fundamentally dysfunctional with our organizations then it is unlikely to be out there but instead a product of our reasoning and modeling. The imbalances in the world are typically traced back to imbalances in our reasoning; the position that an excess of a particular mode of reasoning - called analytical reductionism - has resulted in an imbalance to how we understand, design and manage our world. Thus to innovate in whole systems we need to go back to the beginning and rebalance our ways of thinking by reintroducing holistic thinking into our view of the world.

Reductionism & Holism



Systems thinking recognizes two broad and qualitatively different processes of reasoning that guide our decisions and the actions we take; what is called synthetic holism and analytical reductionism. It is important to understand these two modes of reasoning as much of what is talked about in systems and complexity theory follow from them.

Analytical reductionism is a process of reasoning where we try to understand something by removing it from its environment, decomposing it into individual parts, studying the properties of those parts and then putting them back together so as to derive an account of the whole as some combination of these individual building blocks. It is based upon the assumption that the system is nothing more than the sum of its parts and that the system is relatively closed.

In contrast, synthetic holism is a process of reasoning where we try to understand something by looking at it in relation to the whole system or environment that it forms part of, its interaction with other systems and how it is shaped by those interactions and the overall context.

Synthesis and analysis are very fundamental paradigms of reasoning and thus lead to very different ways of viewing, acting and organizing our world. Both are equally valid but both are equally incomplete without the other. The systems thinking perspective posits that we need a balance in our reasoning between these two paradigms.

Balance

The analytical approach downplays the importance of the relations between things, it sees the world as fundamentally a set of parts that can simply be moved around and recombined without taking account of the specific forms of relations between those parts that might alter how they behave. An excess of this mode of reasoning can leave us in a fractured compartmentalized world without the capacity to integrate and overcome differences. A society or organization that has become too differentiated may have exceptional specialized capabilities but it will lack the capacity to overcome its divides and integrate as a whole organization when necessary.

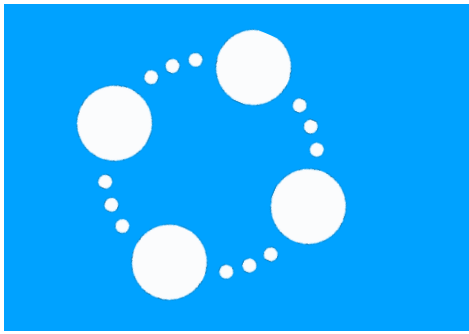
Although the reductionist approach has brought us specialization with the many great achievements that have followed from that it has also resulted in excessive compartmentalization and as a consequence inert. The solution to that is integration, connecting horizontally across those subsystems to integrate them into a whole, that is a very different dynamic to what we have been doing for the past centuries and it requires a different mode of thinking, systems thinking, to look at how the parts interconnect into a whole. Organizations inevitably go through different stages in their development of integration and differentiation but if you want a functioning system, this is one that has achieved a balance between the two paradigms. It is the only way we can hope to develop truly sustainable systems that work better than the ones we have created to date.

Systems Modeling

Section 7

In order to do systems change we have to understand whatever it is we are trying to change as a system and this requires that we actually create a systems model of it. We are trying all the time to elevate our thinking about a problem from seeing only parts to seeing the system's structure and behavior that creates those issues. To do that we need some kind of model of the whole system no matter how crude that overall insight might be. Systems Theory provides us with a basic language with which to describe any form of system.

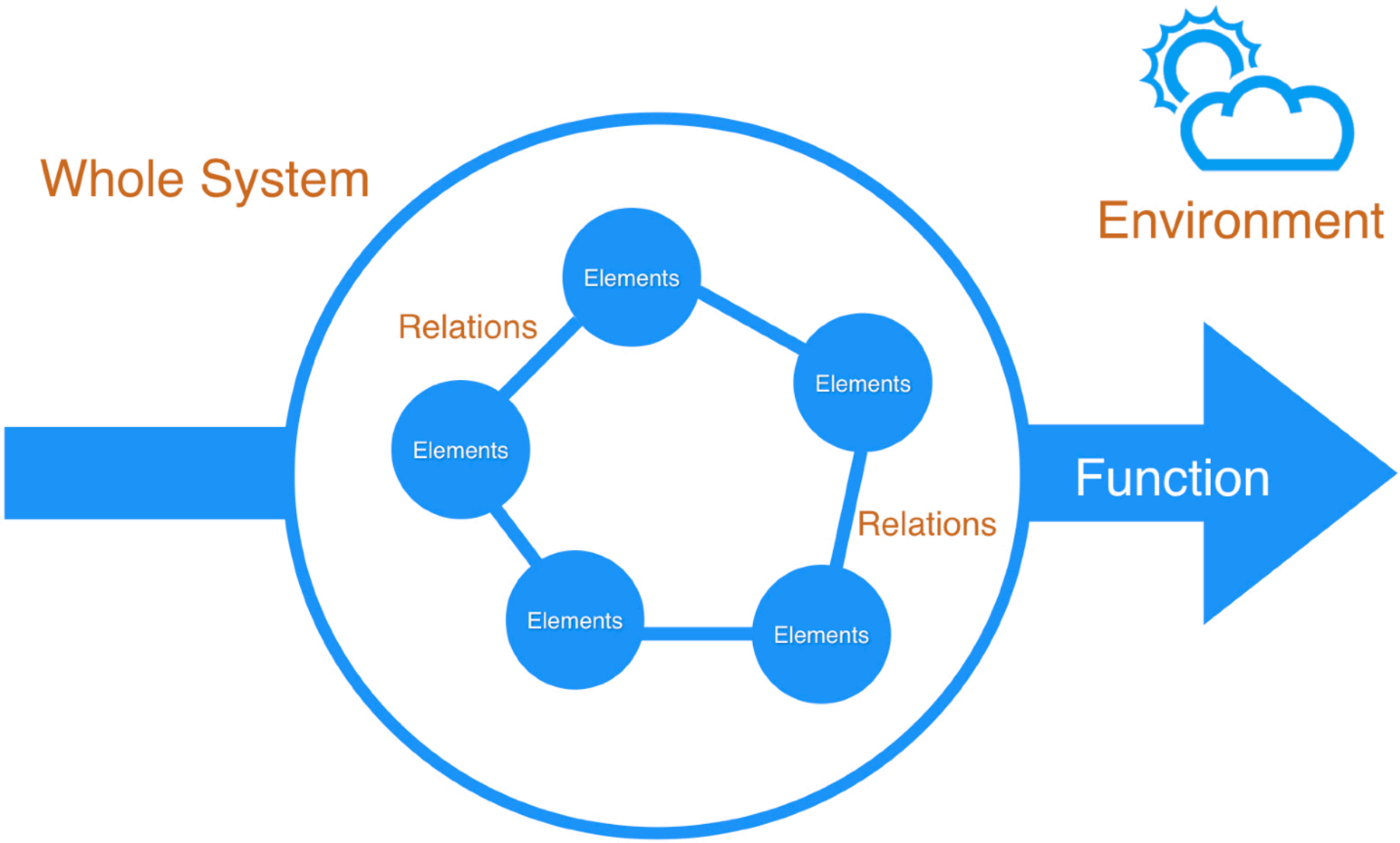
Systems & Sets

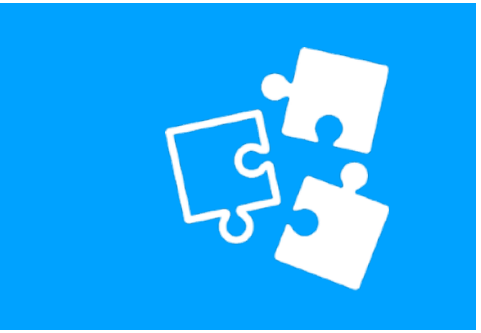


A system is a set of parts that are interrelated to perform some collective function. There are just two types of composite entities in the world; sets, and systems. Sets are a collection of elements that are independent because they are independent they cannot function together to achieve anything more than the sum of their effects in isolation. A pile of stones is just a set because they are not organized and interrelated towards a common function. The weight of the whole pile will be equal to the sum of the weights of all the stones taken separately. To call something a system is to say that the set of elements are interdependent in effecting some joint outcome. Every kind of organization in our economies that we are interested in is a system.

A model of a system needs to capture and take account of a few key aspects. It has to define the elements within the system, the types of relations between those component parts, how those parts interrelate into a whole system that performs some function and how the whole system interacts with its environment, adapts and evolves over time.

Say for example we are dealing with a local food system, we would first have to identify the different elements and their properties; the farmers, the natural resources, agribusiness, the government regulators etc. Then identify the types of relations between them; the farmers require water, the agribusiness lobby government regulators that provide grants to the farmers etc. We need some understanding of how the whole food system interrelates to create a certain functional pattern; what does this food system produce at the end of the day? How does it interact with the broader environment of the economy, society, culture, political system, ecosystem and how is this whole dynamic changing over time

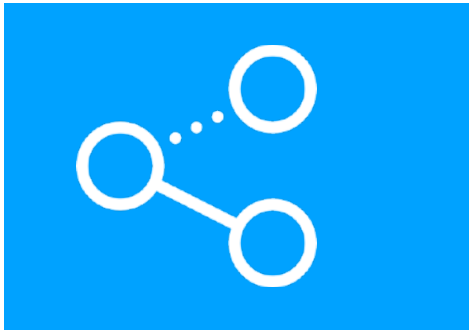

Whole System
Environment
Elements
Relations
Elements
Elements
Relations
Elements
Elements
Function



Components

All systems are composed of elements which are the basic building blocks; elements are things, like people, banks, computers or cities. They can have properties associated with them. They can be larger or smaller, they can be part of a certain category of things, like advanced economies or emerging economies. You have to identify the basic units, their essential distinctive characteristics, and properties which will create the categories to give your model some structure.

Relations

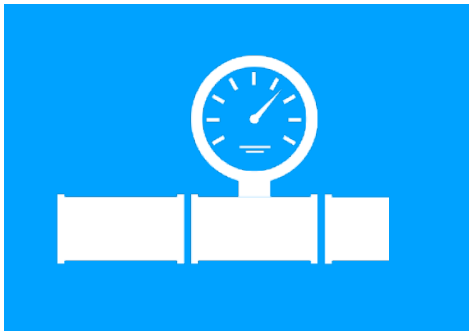


A systems model consists of a set of elements with relations between those elements through which they are interdependent. Relations can have many attributes but the most fundamental one is the type of synergy. Do the components interact in a fashion that is constructive or destructive, adding value to the whole or depleting value from the whole? The relation between bees and flowering plants is an example of a positive synergy, that is to say, they work together in a constructive fashion adding some value to the whole greater than that of the parts. The runoff pollutants from a factory and a river ecosystem interact through a negative synergy, when combined they have a destructive effect on the whole environment.

Emergence

The overall functionality of the system will be a product of the constructive or destructive synergies between the parts, a functioning system is one that has more positive synergies than negative synergies because the parts are interrelated in a fashion that enables the emergence of overall functionality. A dysfunctional system is one that has many negative synergies so that the parts are interfering making them incapable of delivering an overall function. Positive synergies lead to the mergence of new levels of overall organization

Function



All of the systems we are interested in perform some function, or else we would not be interested in them. Thus a critical part of understanding any system is to ask what is the function of this system? The answer to that question is not always as obvious as it may seem. An understanding of the functioning of the system gives us an answer to the question "why" why do we use or need this system. By refining that question we can come to define some metric of what is functional and of value and what is dysfunctional, what we might call entropy. By understanding the functioning of the system within its environment we have some criteria for assessing it as a whole. This enables us to let go of any specific instantiation of the system, to start from the beginning by asking what is the function and what is really needed to deliver that function. By looking at organizations as being fundamentally open, systems thinking can help us with identifying those real outcomes.

Dynamics

Finally, we need some model for how the system exists within its environment and how it adapts to changes within that environment; how the whole system evolves over time as a consequence of the feedback interaction with its environment. In these large complex systems no one gets to define a linear process of development, but instead, they just evolve. This evolution involves a process where new variants are produced, selected for, and duplicated. Evolution is how whole societies, cultures, economies or technology infrastructure develop over time and we need some model to account for that.

Complex systems exist on many different levels and scales, as we try to model the system we should spend some of our time from a vantage point that lets us see the whole system, not just the problem that may have drawn us to focus on the system to begin with. In our analysis, we should be zooming in and out across all the scales and levels to the system; actively focusing on specific details of importance but also taking time to step back and passively observe the whole. This looking at the system on various scales helps to identify how the way the parts interrelate create the whole pattern and how that macro pattern then feedbacks to shape how the parts act. This micro-macro feedback dynamic is critical to understanding the overall dynamics of the system as it changes over time.

Iceberg Model

Section 8

The are a few basic models that are very helps for thinking about system change, one of the most popular of this is what is called the iceberg model. The Iceberg Model tries to illustrate the various level of abstraction to a situation or organization, from the observable events to underlying patterns that generate these, to the supporting structure and ultimately the mental models used by an organization.

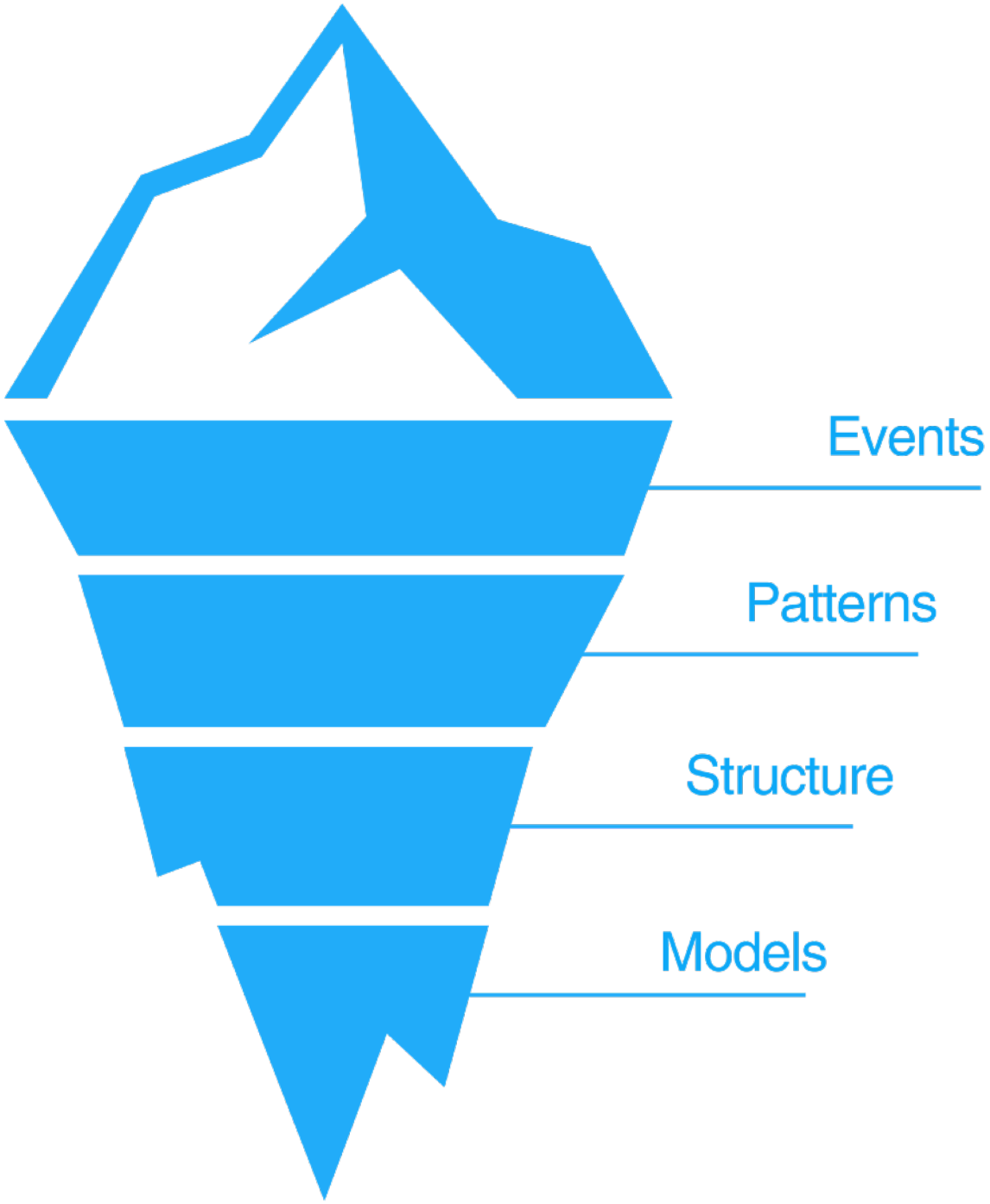
The Iceberg Model helps individuals and organizations to expand their perception of a situation to see it within the context of the whole system and not limit themselves to looking at just a single activity or event. It is designed to help people to step back and identify the different patterns that, the event is part of, the possible structures that might be causing it to occur, and

Model

An iceberg is used as an analogy to represent the underlying structures generating perceived events and issues, as it is known to have only 10 percent of its total mass above the water while 90 percent of it is underwater. The expression “tip of the iceberg” is used to connote that what one can see is only a small part of a whole situation, i.e. there is much more below the surface and what it looks like may be surprising. Just like with an iceberg, a large percentage of what is going on in our world is hidden from view and the Iceberg Model tries to make this explicit by depicting it as a series of layers that sit beneath the everyday phenomena observed.

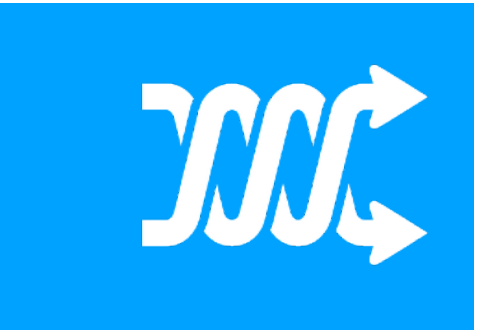
The Iceberg Model argues that events and patterns, which are observable, are caused by systemic structures and mental models, which are often hidden. A fundamental systems thinking concept is that different people in the same structure will produce similar results, that is to say, structure causes 80 to 90% of all issues; not so much the people. Thus to understand behaviors, we must first identify and then understand the systemic structures and underlying mental models that cause them.

The Iceberg Model typically identifies four basic levels to situations. Events, which represent the manifest components and actions observable to us. The patterns of behavior beneath this describe trends over time. System structure describes how the parts are interrelated to influence the patterns. Finally, the mental models that support everything else in the system through a set of beliefs, values, and assumptions shaping people's perception.



Events

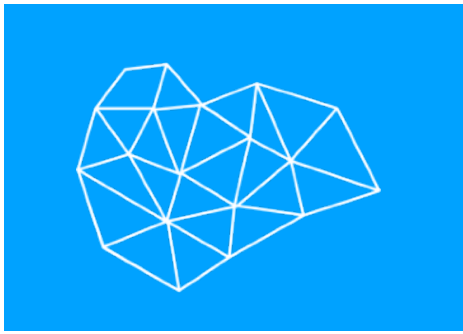
Above the waterline are the events. Events are markers in time where multiple variables are observed. They are the “what’s happened,” or “what we saw.” They are discrete activities or facts about the state of things in the system, like catching a fish. If we apply the Iceberg Model to global issues, we could say that at the tip, above the water, are events, or things that we see or hear about happening in the world every day. The events that we hear about in the news represent the iceberg tip. Most of us spend most of our time at the event level. It is how we perceive the world in a superficial way while we are otherwise occupied with day to day activities.



Patterns Of Behavior

Patterns are the changes in variables that occur over time. They are the trends that we perceive taking place over time. If we look just below the waterline, we often start to see patterns or the recurrence of events. This might be for example recurring oil spills or one’s computer periodically breaking down. Patterns are important to identify because they indicate that an event is not an isolated incident. Patterns answer the questions, what’s been happening? or what’s changing? When we get to the pattern level, we can anticipate events, plan, and forecast. It allows us to adapt to problems so we can respond more effectively to them.

System Structure



The structure supports, creates and influences the patterns we see in the events. Structures are rules, norms, policies, guidelines, power structures, distribution of resources, or informal ways of work that have been tacitly or explicitly institutionalized. They answer the question, what might explain these patterns? It may not be easy to see the structure, but the patterns we can see tell us that the structure must be there. Structures are composed of cause-and-effect relationships. These are connections between patterns. For example, a farmer might say, “If I increase the number of cows, I will get more milk.” When you look at root causes, you can start to understand and address long-term, sustainable solutions and alternatives.

Mental Models

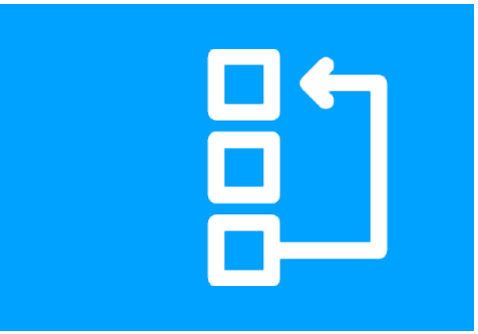
The mental model used to perceive the world is ultimately what generates the structures, patterns and events. Below the structures are the mental models. These define the thinking that creates the structures that then manifest themselves in the patterns of events. Mental models are people’s deeply held assumptions and beliefs that ultimately drive behavior. There is typically not just one pattern or structure or mental model at play; there can be many. Mental models are the attitudes, beliefs, morals, expectations, values or culture that allow structures to continue functioning as they are. Mental models are ultimately what keep the structure doing what it does. Mental models are typically difficult to identify in that they engender many assumptions that are never made explicit.

Leverage Points

Section 9

A leverage point is a place within a system where small changes can have large effects. The lower we go in the iceberg, the more leverage we have for transforming the system. For example, changing structures and influencing mental models has a broader, more far-reaching effect than reacting in the moment and firefighting discrete events. Thus the only real way to find high leverage points is to first find the root causes.

Systems change requires affecting the organization at high leverage points to resolve root causes. This approach is required on difficult problems since problem solvers can exert only limited amounts of force on a large system. If that force is applied at low instead of high leverage points, it will be overcome by the forces of the innate dynamics of the system that arise from the root causes.



Levels

Events & Reaction: If we only look at events, the best we can do is react. Something happens, and we fix it. For some superficial events, this approach can work well, but will clearly fail if an issue is more systemic as we are merely dealing with the symptoms of the problem.

Pattern & Anticipation: When we start to notice a pattern of those events, we have more options. We can anticipate what is going to happen, and we can plan for it. When we start noticing patterns, we can begin to consider what is causing the same events to happen over and over again.

Structure & Design: When we start to look at the underlying structures, we begin to see where we can change what is happening. We are no longer at the mercy of the system. We can begin to identify the thinking and the mental models that are resulting in those structures taking the form they do.

Mental Model & Transform: Changing the model that an organization uses is the highest leverage point, it can lead to real transformation, with the possibility to totally restructure the system and overcome even the greatest of challenges.

Quality - Quantity

Leverage points are often not intuitive or if they are, we intuitively use them backward, systematically worsening whatever problems we are trying to solve. For example, if we were to take a political system and look for the leverage point we would likely look to the top of the hierarchy, thinking that if we could just change what the leader is doing then this would affect everyone else. But of course, the leader is just an actor in the system who is responding to events.

Where this analysis fails is that it looks for the leverage points all on one level - the event level - but just like the Iceberg model the leverage points are in abstraction, you have to remove the successive layers of detail before you will get to the fundamentals where the leverage really is. Looking for leverage points on the event level will lead you astray.

Our non-systematic ways of thinking lead us to focus on low leverage changes: we focus on symptoms where the stress is greatest - trying to accumulate a large number of resources or get into positions of authority so as to remove or ameliorate the symptoms. However, leverage follows the principle of economy of means: where the best results come not from large-scale efforts but from small well-focused actions.This is the idea of social acupuncture which "explores how analyzing the deeper interactions sustaining patterns can be used to identify leverage points; and how small accumulative interventions across such points can be used to disrupt and transform them."

Real systems change comes from a change in quality. The high leverage points are really in the qualitative factors of the system, they are the things that are not being measured or accounted for and thus they go largely unnoticed.

Places to Intervene in a System - in increasing order of effectiveness.

By Donella Meadows

9. Constants, parameters, numbers.

8. Regulating negative feedback loops.

7. Driving positive feedback loops.

6. Material flows and nodes of material intersection.

5. Information flows.

4. The rules of the system (incentives, punishments, constraints).

3. The distribution of power over the rules of the system.

2. The goals of the system.

1. The mindset or paradigm out of which the system

Systems Analysis

Section 10

Innovation is about creating something that is relevant to the current context and doing that requires a deep analysis of the current system you are dealing with; past and present. Vision and motivation are important but just as important is realism; a deep appreciation for the complexity of the systems we live in. We need to appreciate that these systems that we are trying to effect change within are vast complex networks of adaptive nodes making decisions locally according to the information they receive. You have to understand not just the system in the abstract but also in its specific form. If you want to change a system you have to understand where it is coming from - its history - where it is now and form that what is its evolutionary potential for future change.

"Before you disturb the system in any way, watch how it behaves. If it's a piece of music or a whitewater rapid or a fluctuation in a commodity price, study its beat. If it's a social system, watch it work. Learn its history." - Donella Meadows

Potential

The reason that many of our interventions - based upon traditional thinking - fail is that these complex adaptive systems are much larger, much more complex than the people who want to change them and they have a life of their own - there are a great many agents in the system that have local interests and will respond to the intervention in different ways, often simply resisting as the attempt for change grinds to a halt.

This is why the most important thing to learn is that you can not change a complex adaptive system all you can do is observe it, understand how it works how it is changing over time and work with that evolutionary potential.

Rather than trying to arrive at an ideal end situation, our role is to assess the many forces shaping a certain situation and detect patterns in this environment that can be favorable to system change and the general direction we wish to move towards. We are seeking potential, identifying existing emerging trajectories and how to best position ourselves to take advantage of them.

Systems Analysis

Systems analysis is a science and an art, it involves aspects of formal modeling, but just as importantly it involves the skills of a good investigative journalist or an ethnographer. You want to follow things wherever they lead drawing upon any and all relevant information like a good investigative journalist. Likewise, we want to get out of our own perspective of the system and into that of others, like a good ethnographer. Defy traditional disciplines and boundaries and expand thought horizons.

A complex system that works is invariably found to have evolved from a simpler system that worked, as a complex system designed from scratch rarely works. As a consequence all complex adaptive systems are shaped by their evolution and are a product of it, this is captured in the term historises. In a very general sense historises means that history matters; that the opportunities and possibilities going forward are a product of what happened to get to this point.

Studying this history of the system helps to shift our understanding of it and the issues into one of dynamic change rather than a static snapshot. Moving our questioning from “what’s wrong?” to “how did we get here?” and "where is the momentum to move forward?" It also helps to move from a focus on the problem at hand to focus on the system behavior over time as the creator of the problems. As Donnel Meadows writes "starting with history discourages the common and distracting tendency we all have to define a problem not by the system’s actual behavior, but by the lack of our favorite solution."

Systems Stakeholder Analysis

Section 11

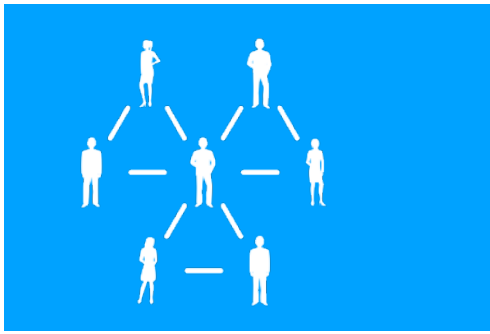
Virtually every problem we will encounter our there in the world can ultimately be traced back to a socio-cultural one. If you dig far enough into the water crisis, environmental degradation, inequality, or cybersecurity you will find that it is not really about lack of water, lack of land, lack of money or computer code, as it may appear, it is really about people and how they see the world, how our thinking constrains us to a certain subset of solutions. All of these systems that we might be interested in changing are created by us and ultimately every problem can be traced back to the human condition.

In this respect, one of the biggest mistakes we make is getting too focused on the technical dimension of a system and forgetting about people; we think that cybersecurity is all about code and computers and we forget there are real people with interests and motives behind those computers; we think that transport is about cars and roads when really it is a socio-technical system; we think that food is about farms, tractors and produce when really it is a socio-ecological system.

Social Dimension

Probably our biggest blind spot today is people. By adopting an analytical approach we try to shift everything into the technical realm. We try to do away with the humans in the system and we do this by moving them into the technical realm by assuming that they are rational. This blind spot creates a huge new space for innovation and potential for systems change, but, as always, before we can use it we have to understand the system we are dealing with and this requires some form of stakeholder analysis, which simply means understanding the people in the system. We have to understand how the culture and social structure of an organization works to understand its potential for change.

Game Theory

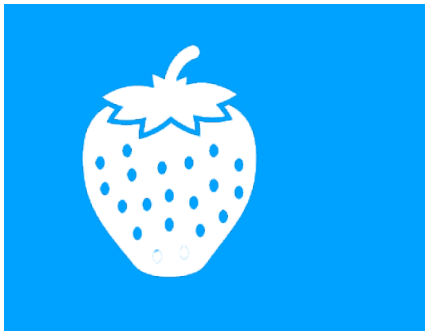


This is a basic idea in game theory, that we study the structure of incentives that the actors are operating within as a game. In a general sense, we are trying to look where the forces and stresses are in the system. If we take a mechanical system like a chair, we will see that it has a particular structure that is designed to channel and disperse a certain physical force that is placed on it, we can see how the gravitational forces exerted by someone sitting on it is channeled through the structure of the system. There are critical points where a lot of the force is being borne and other areas where there is none. The same is true for institutions there are forces of incentives and responsibility. Some people are heroes and they are the ones who defy the incentive structures placed on them, but most people are not they will follow the course of least resistance and let the structure of the incentive around them shape their behavior that is why we have to study and try to map out those incentive structures.

Actions Rather Than Words

Systems should be judged by their behavior and outcomes not by rhetoric. People say what they are incentivized to say objectively, they do what they are incentivized to do subjectively. We all find ourselves in roles as part of objective systems of organization and in our interaction with others, we are incentivized to play that role. But when we are not interacting with others we experience a different set of subjective incentives. Because our societies are populated by closed organizations this creates the possibility for the gap between the two. Thus with any closed organization, one has to understand the distinction between those two and how they shape the difference between what people say and what they will do. Donella Meadows states it clearly when she says, "Purposes are deduced from behavior, not from rhetoric or stated goals."

Changing Incentives



Changing the incentives of agents is a hugely powerful leverage point, but what really matters are local subjective incentives not necessarily global objective incentive systems, one has to keep in mind the difference between them or ones interventions can easily become distorted, and result in all sorts of unintended consequences - this can be called the "Cobra effect" when an attempted solution to a problem makes the problem worse, because of perverse incentives. The cobra effect illustrates why ethnography is so important in systems analysis. Ethnography is an approach where the researcher attempts to observe an organization or culture from the point of view of the subject of the study. Ethnographic studies help us to understand the system from the perspective of an individual acting within it, this helps us understand the subjective influences, experiences, and incentives that the individual is under locally, thus working to mitigate the mismatch between subjective and objective incentives structures.

Systems Dynamics

Section 12

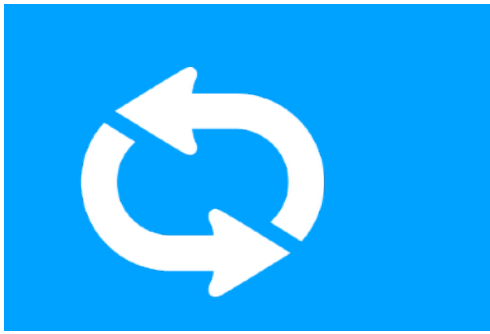
To do system innovation we have to work with the system's structure of relationships and that requires us to create some kind of model for those linkages or connections. An ideal modeling method for this is system dynamics. Over the past several decades system dynamics has proven to be a very effective and useful tool for mapping out the relationships and basic dynamics within complex organizations.

System dynamics is a branch of systems theory that tries to model and understand the dynamic behavior of complex systems as they change over time. The basic idea behind system dynamics is that of feedback loops that try to capture the interactions between the parts and how they lead to a certain overall pattern of behavior over time. Diagrams of the primary feedback loops in the system are often converted into computer simulations to model how changes in one part of the system may affect others and the overall pattern of development.

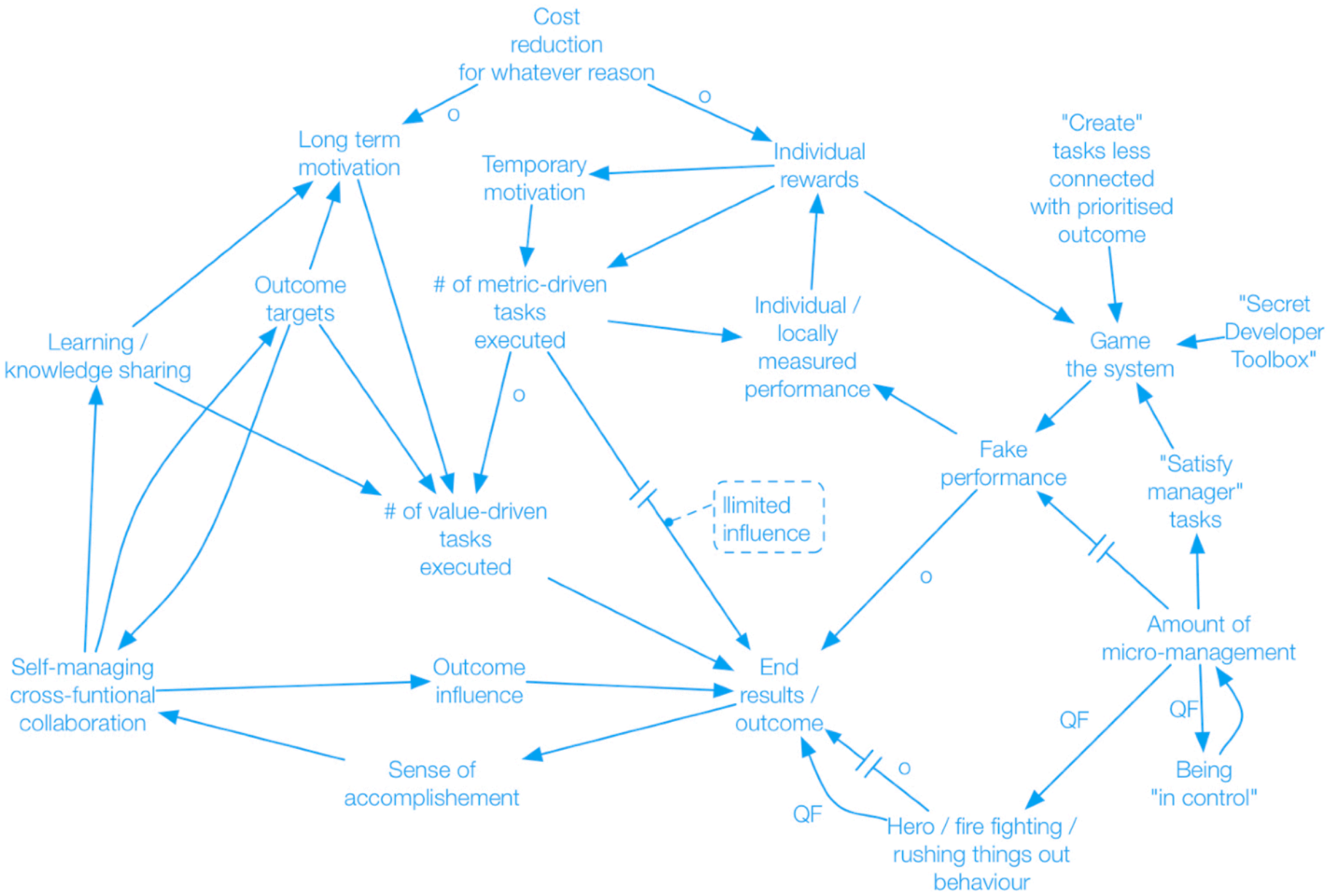
Interdependence

In our more traditional ways of thinking, we often look at situations in terms of linear cause and effect, system dynamics helps us to look at and model the feedback loops through which an event may cause another event that then feeds back to create more or less of the same behavior. The basic idea is that of interdependence; that whatever you do does not disappear but in fact has some effect in the greater system which will over time feedback to affect the cause, with that feedback loop creating certain patterns over time - System dynamics uses what are called causal loop diagrams to do this.

Causal Loop Diagram

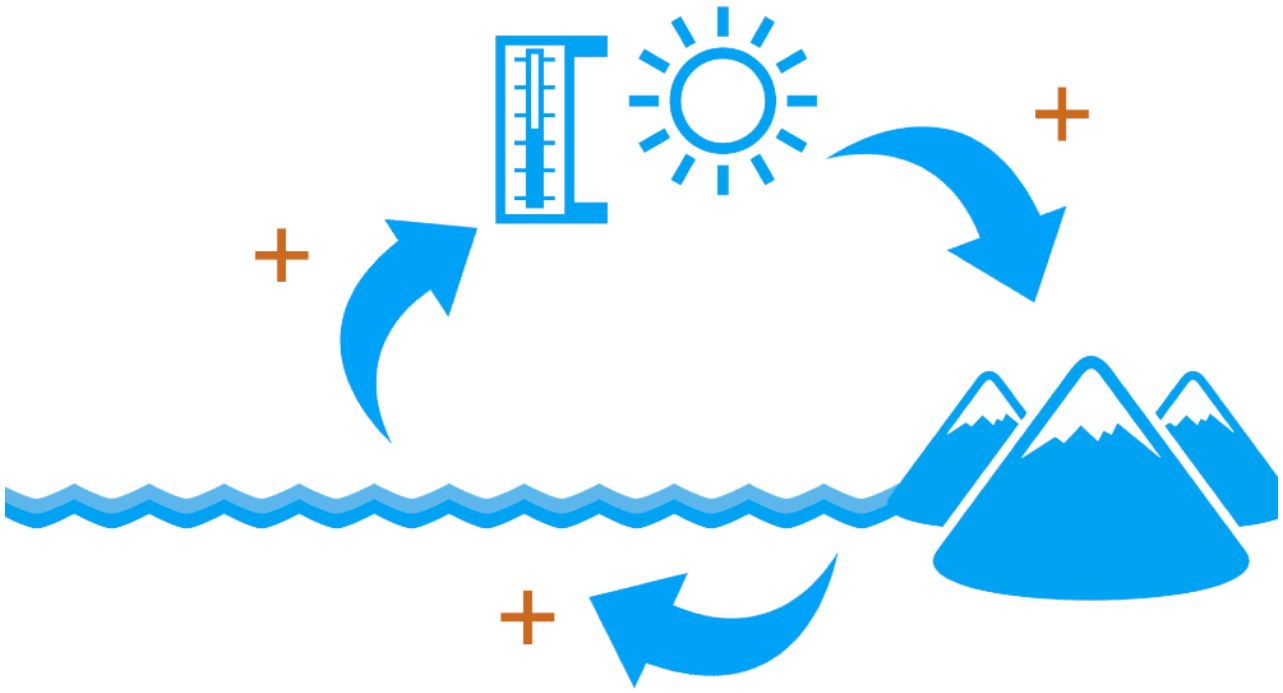


A causal loop diagram is a simple map of a system with all its constituent components and their interactions. By capturing interactions and consequently the feedback loops, a causal loop diagram helps to reveal the basic structure of the system. Feedback, in general, is the process in which changing one quantity changes the second variable, and the change in the second variable, in turn, changes the first. These feedback loops can be of two qualitatively different kinds, either positive or negative.


Cost reduction for whatever reason
o
o
Long term motivation
Temporary motivation
Individual rewards
"Create" tasks less connected with prioritised outcome
Outcome targets
# of metric-driven tasks executed
Individual / locally measured performance
Game the system
"Secret Developer Toolbox"
Learning / knowledge sharing
o
Fake performance
"Satisfy manager" tasks
# of value-driven tasks executed
Ilimited influence
o
Amount of micro-management
Self-managing cross-funtional collaboration
Outcome influence
End results / outcome
QF
QF
Sense of accomplishement
o
Being "in control"
QF
Hero / fire fighting / rushing things out behaviour

Positive Feedback

A Positive feedback loop means that values associated with the two nodes within the relation change in the same direction. So if the node in which the loop starts decreases, the value associated with the other node also decreases. Similarly, if the node in which the loop starts increases, the other node increases also. For example, the dynamics of the earth's climate have many feedback loops that work to balance or change the system. One positive feedback loop driving climate change can be identified as such: when ice melts, land or open water takes its place. Both land and open water are on average less reflective than ice and thus absorb more solar radiation. This causes more warming, which in turn causes more melting, and this cycle continues.



Negative Feedback

A negative causal link means that the two nodes change in opposite directions, if the node in which the link starts increases, then the other node decreases, and vice versa. Negative feedback is what works to hold the system in its current state. Whereas positive feedback tends to lead to instability via exponential growth, oscillation or chaotic behavior, negative feedback generally promotes stability.

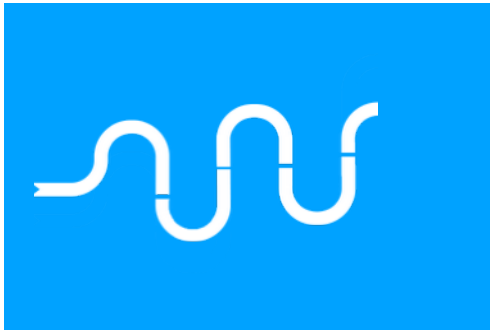
The core supply and demand mechanism within a market is an example of negative feedback; when demand goes up this creates more demand than supply meaning producers can set higher prices, which then feeds back to affect consumers to purchase less, which then induces suppliers to reduce production. This feedback stays playing out until the system reaches some equilibrium where supply and demand are matched and the system will stay close to that until there is some change.

Sustainability

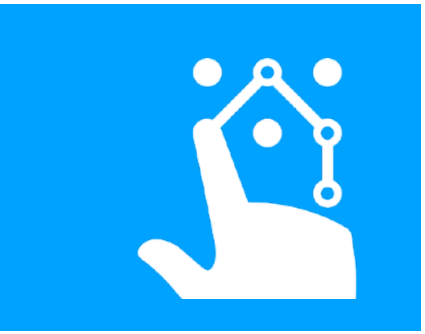
Negative feedback is what makes systems sustainable because it means that the system is "paying its own bills" so to speak. What is being gained from the action that you take is feeding back to be taken from you again; like when you purchase an item, you get what you want but the consequence of that is that you have to pay for it.

Positive feedback is always unsustainable because it is drawing in resources to fuel itself from somewhere external to the system, this will however only last for a brief period of time and then it will be over. The solution to negative externalities and un-sustainability is to close the positive feedback loop and convert it into a negative loop which makes the system self-sustaining. As this is a key part to developing sustainable solutions we will talk further about it in a coming module.

Stock & Flow Diagrams



To perform a more detailed quantitative analysis, a causal loop diagram is transformed to a stock and flow diagram, which helps in studying and analyzing the system in a quantitative way, typically through the use of computer simulations. A stock is a term for any entity that accumulates or depletes over time. A flow in contrary is the rate of change in a stock. So an example of a stock might be a water reservoir. It is a store of water and we can ascribe a value to the volume it contains. Now if we put an outlet on the side of our reservoir and started pouring water out of it, this would be an example of a flow. Whereas a stock variable is a measure of some quantity, a flow variable is measured over an interval of time.



Interventions

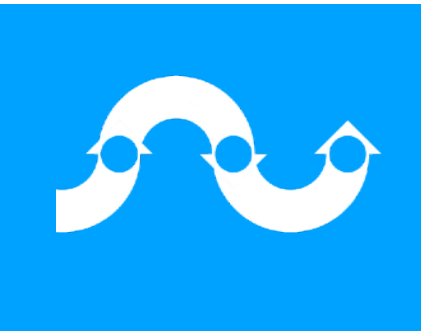
System dynamics not only helps us to understand the dynamics driving the behavior of the system but this also gives us insight into where to best intervene in the system, it helps to identify leverage points. Identifying positive and negative feedback within a system is critical to systems analysis because it tells you about the system's potential for change. In general complex systems do not change when there is a lot of negative feedback, the only chance for systems change is when there is a large amount of positive feedback. It is this period of exponential change driven by positive feedback that we can call phase transitions, and we will pick this topic up again in the next section.

Transitions

Section 13

The only time we really get to do large-scale system change is when a system is in transition. When a system is in its normal state one's capacity to alter the whole organization will be close to zero; as long as an organization is in or near its normal state of operation it will strongly resist systemic change. If there is no sign of crisis in the system you will not be able to alter it on a systemic level.

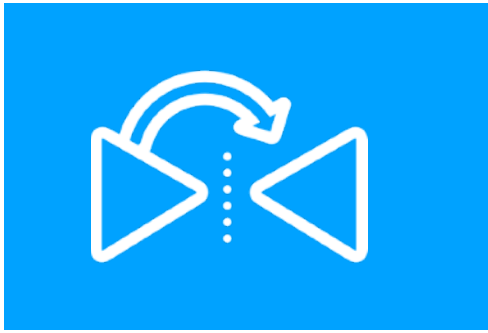
Your only chance for effecting systems change in a large-scale complex system is when the current paradigm is no longer working; not only this but the system will have already had to have faced a number of critical issues that the old model has manifestly being proven incapable of solving before the mainstream of the organization will be ready for any form of major transformation. As systems innovators it is important that we understand the state of the system and the dynamics to these periods of transition.



Transition Processes

With complex systems we never really get to redesign some new system, system change is really about enabling transitions within an organization. A transition is a process or a period of change from one condition to another. Transitions are pervasive in nature, many different types of systems undergo rapid change before emerging in a new form or state of semi stability on the other side. Children become adults, seeds become plants, a town becomes a metropolis, but the classic example of a transition is the metamorphosis of a caterpillar into a butterfly.

Phase Transitions



Transitions are different from normal periods of change, during normal periods of change the whole structure of the organization stays the same while the parts change, things typically grow or decay in an incremental fashion as one thing builds on top of another. Stable existing structures provide the context within which the parts change with this change happening in a proportional fashion where only big events cause big changes, with small events only able to cause small changes.

Transitions are different from normal linear processes of change where there is only a change in the individual parts, with phase transitions, new macro-level structures emerge. For example, as ice goes through a phase transition to become water the overall structure of the substance changes without any of the individual atoms or molecules being changed. During a transition, the parts may stay largely unchanged but the context around them changes fundamentally.

Qualitative Change

Major systems change comes about as a function of a qualitative change in the system, not a quantitative change. Qualitative change is a systems-level change because it is not about the system doing what it does better, fast or more efficiently, it is about the system doing something different. It is a change in the context within which the system exists, a change in the understanding of the end objective of the system and the function it performs and as a consequence the enabling structures and organizations required to enable that function.

Unsustainability

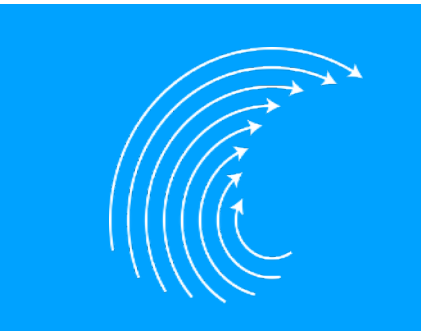
If a system is not in crisis then it is not going through a systemic transformation. A crisis is one dimension to a systemic transformation. A systemic transformation implies that the system cannot go on doing what it did in the past, this is exhibited as a form of un-sustainability. In a transition the system cannot go on operating as it did in the past and likewise it can not stay where it is because it is consuming too many resources, it has to and will change, the only question is will it degrade to a lower level or integrate to a higher level. That is the only thing that is really relevant, thinking about going back, staying where you are or envisioning a future that looks similar to the present is no longer relevant. By definition, a transition implies that the system will change and the future state will not be similar to the past. We will pick up on this theme in the next section as we talk about attractors and bifurcations.

Nonlinear Change

Section 14

Complexity theory has taught us that there are universal patterns for how complex nonlinear organizations change over time. This process of change is the same for any complex system, for ecosystems, for change in technology, for changes in culture, economy or society, or large enterprises. The general model is based around feedback loops, attractors, bifurcations, phase transitions, self-organization, and emergence. By understanding this process we can better use it towards enabling organizational change.

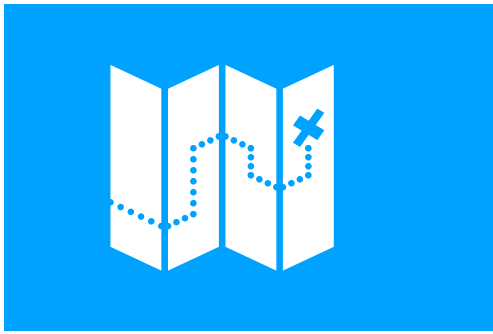
Feedback loops within a system are central to understanding its dynamic behavior over time. Negative feedback works to dampen down change while positive feedback works to drive exponential change. When a system is in a strong negative feedback regime it will be very difficult if not impossible to change it. The resilience and capacity of a system to resist change is largely a function of its networks of negative feedback that balance and stabilize it. Nonlinear change happens when positive feedback takes over.



Attractor

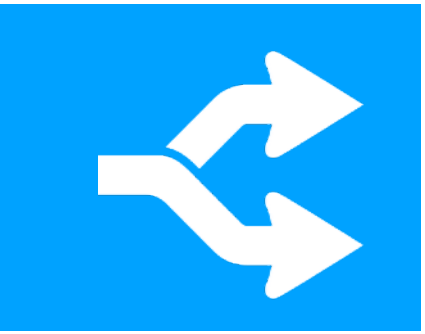
This normal state to a system behavior is what we call an attractor, which is a set of states towards which the system will naturally gravitate, as these balancing feedback forces work to constantly pull it back to its normal state of operations. For example, the fact that most adults have to work so as to support themselves creates a certain pattern in their behavior over the course of a week. Most adults have a work and leisure pattern, we work only so long and then we relax, once relaxed we are ready for work again the next day. We can't go on relaxing for too long because we have to pay the bills for it. This creates a balancing loop that pulls us back to that dynamical pattern of behavior that follows a regular set of states; this is an attractor created by negative feedback.

Change



Change happens when these negative feedback loops become eroded and positive feedback starts to become more prevalent. Every time a negative feedback loop is broken this reduces the strength of the forces influencing the elements to remain within that pattern and make it more likely that some will stray off into other patterns of organization.

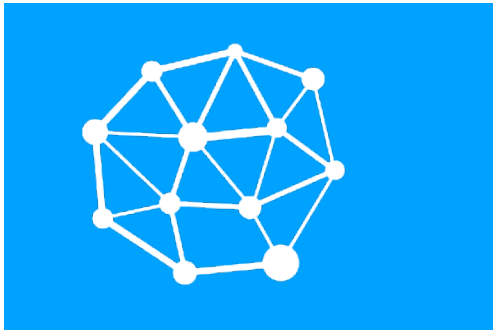
A transition implies that the system will not stay in its current form, the transition will take it into a new way of operating. Transitions do not last longer than a short period of time because they consume large amounts of energy, typically systems cannot go on consuming that much energy for long. During a transition, the global structures or basin of attraction that supported the system previously disintegrate and new attractors emerge.



Bifurcation

Nonlinear processes of change are characterized by what are called bifurcations. A bifurcation is when something divides into two branches or parts. In this case, it is a divide between the old structures and the new ones that emerge. This involves the splitting off of the system into two or more qualitatively different trajectories of development.
When an organization is in a normal state there will be one dominant basin of attraction represented by a very strong and large mainstream at the center of the organization and a relatively small fringe that has little direct impact on the mainstream. When the system enters into a transition another basin of attraction forms and the system is split between two different modes of operation.

Emergence



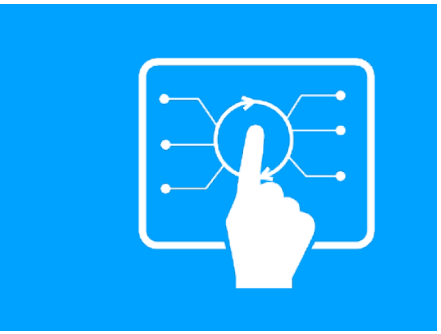
During a transition the centralized structures that supported the system in the previous regime become no longer functional, they can no longer be depended upon to deliver the required solutions to problems that extend beyond their level of structural complexity; in the face of such problems, they appear at best paralyzed. In order for the system to maintain its level of functionality or evolve into a new form, new functional structures have to emerge out of the distributed parts. Previously latent functions and capabilities become revealed and become critical to the organization's future success, this is unlike during normal periods when it is manifest capabilities that are valued. These are times when small actions can have huge implications for the future trajectory of the system and are thus critical points in systems change.

Digital Transformation

Section 15

To enable real large-scale systems to change we are going to have to tap into and work with the deep structural transformations that are taking place in our world today. Probably the deepest and most profound of these transformations is the move into the so-called information age. The advent of information technology some sixty to seventy years ago marked a long process of change taking us into an age of information. This information revolution is a major systemic transformation in the economy, similar to that of the rise of agriculture or industrialization, with similar all-encompassing implications.

Today an extraordinary technological revolution is underway at high speed. Society and economies are being drawn along by constant changes in information technology that are having an ever-larger impact on the socio-economic fabric. While most organizations are still trying to catch up with innovations that happened ten years ago, even more powerful technologies are still yet to be unleashed as tech-driven disruption has become the new norm. Although for most people information technology is the driver of change in our world, as systems innovators it is more constructive to see information technology as simply a tool for implementing a new design paradigm.



New Tools

Today an extraordinary technological revolution is underway at high speed. Society and economies are being drawn along by constant changes in information technology that are having an ever-larger impact on the socio-economic fabric. While most organizations are still trying to catch up with innovations that happened ten years ago, even more powerful technologies are still yet to be unleashed as tech-driven disruption has become the new norm. Although for most people information technology is the driver of change in our world, as systems innovators it is more constructive to see information technology as simply a tool for implementing a new design paradigm.

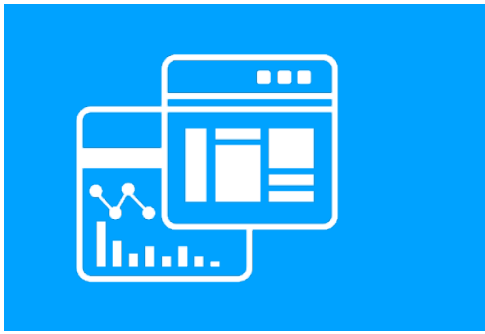
Organizations

Information on a very fundamental level is about organization, and information technology is really a technology of organization; it enables us to fundamentally create new structures and forms of organization that were previously not possible due to physical constraints. The information revolution works to change our systems of organization from being based around physical constraints to being based upon information. Traditionally we have organized our world around the constraints of physicality; culture is based upon our geography, political organization is based around the limitations of space and territoriality, work happens in offices and factories, education is done within the walls of schools etc. Shifting these systems from being based around their physical constraints to being based around information offers huge potential for systems-level innovation and structural redesign.

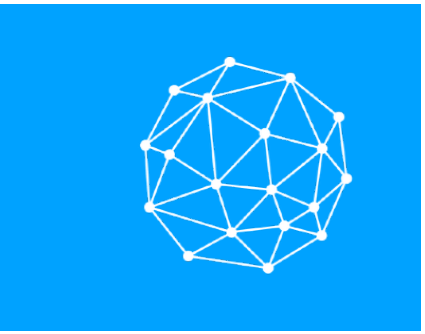
Information

Information is all about organization. The shift from the physical world to the information world marks a shift in our understanding of systems, technology and enterprises from thinking of them in terms of their physical attributes to thinking of them in terms of organization. It used to be all about the building blocks now it is about how you put those building blocks together, how your organize parts into systems. The making of building blocks becomes a commodity and the value shifts to information which is used for the coordination and organization of those components. The largest taxi company owns no cars, the largest media companies produce no media content, the largest temporary accommodation service owns no rooms; what they do do is organize things through information.

Information Systems



Systems are not things they are the invisible connections and interactions between those things, thus if you want to change systems you are designing organizations and that is done via information networks. If you are doing systems innovation you have to forget about the things, what we are trying to do is reorganize the system and that reorganization takes the form of information. Information and ideas are powerful tools if you are not using them then you will not be able to move whole systems, you will just be pushing parts around. So in systems innovation when it comes to actually building something, that starts with building an information system first. Healthcare, food, transport, finance etc. it is all first and foremost about organization and information, the form that organization takes and your job as a systems innovator is to change the system's structured by changing the flow of information, the required physical changes will follow from that.



Networks

Whereas organizations based around physicality create boundaries and centralized systems, organizations based on information are about connections and thus take a networked structure. With the rise of information technology, the proliferation of connectivity and networks has been rapid and pervasive as it increasingly affects all areas of the economy. This revolution in information has many profound consequences but possibly the most important is the shift that it enables from closed centralized systems of organization to open networked organizations. Industrial age systems of organization selectively favored the concentration of resources, capabilities, and intelligence within closed centralized systems where economies of scale could be leveraged to achieve high productivity, efficiencies in throughput, and profitable returns on investment.

Platforms

But heightened connectivity is breaking down these boundaries to our organizations, connecting people directly peer-to-peer as power shifts fundamentally from the formal, closed, centralized organizations that form the backbone to our industrial economy, to new forms of networked organizations enabled by information technology, as a whole new mode of production is emerging within society. Organizations are shifting from being defined by a set of formal fixed positions and fixed assets to becoming defined by connectivity; networks of connections that are enabled by online platforms.

Self-Organization

Information technology puts powerful tools of collaboration in the hands of many which is enabling a radical reduction in transaction cost with people now able to set up their own networks of collaboration as informal self-organizing systems have come to present an alternative to our traditional top-down model. This is working to enable the emergence of new forms of organization where previously there was none; it is enabling a much higher level of coordination between people and technologies as they become networked into larger systems of organization.

Whole Systems Design

On the level of design and implementation to do system innovation and change today means to take an organization that is currently closed and centralized and convert it into a decentralized network. We can call these decentralized networks platforms. To innovate in finance is to build a financial platform that connects people directly via an information network and automates the basic management of the network. To do system change in energy is to build a smart grid platform; an information network that connects end users directly peer to peer and automates that exchange; the same for healthcare, for food networks, logistics networks, education networks etc.

Systems change today means restructuring the basics of our organizations by building information-based networks that tap into the new potential of this global telecommunications network and analytical computational capacities of digital computers to coordinate human activities in new ways. This technology gives us the capacity to do re-design on a whole systems level, across whole enterprises, industries, and sectors of the economy - to realize systems change.

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