Overview

This guide is an overview of how to use leverage points for systems change. The idea of leverage points was introduced by Donella Meadows in a paper where she proposed a scale of places to intervene in a system that would result in varying degrees of change within the overall organization. She started with the insight that there are levers or places within a complex system where a "small shift in one thing can produce big changes in everything."

Going beyond these original ideas this guide will introduce you to a set of theories and practices that are based on the leverage points method. These include systems aikido, systems acupuncture, and system gardening. These are all approaches to changing complex organizations that involve working with its innate evolutionary potential for change; approaches that aim to make small, but intelligent and well-gauged interventions to influence flows within a system and thus its future development.
Why Leverage Points?

When we stand outside the system observing it we can at least try to see the whole but when we go to make interventions we have to choose specific points in the system to intervene. There are countless places within a complex system to place yourself where what you will do will have almost zero effect, worse than this the points that look like they have the highest impact initially are often those with the lowest systemic effect.

Systems change requires affecting the organization at high leverage points to address systemic issues. 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 its structure of feedback loops.
Counter Intuitive

The manifest positions of power in the system, such as the position at the top of a hierarchy, appear to have power and influence because of linear cause and effect, however, such linear effects have little overall systems change capacity. We need to place ourselves in the system and influence it at points where the minimal effort and resources will create the largest long term influence - the leverage points.

It is firstly important to know that leverage points are counter-intuitive. Leverage is not found in the centralized points of the greatest manifest power in the system but is found rather in abstraction. By abstraction, we mean shifting up from the manifest observable everyday phenomena to look at information flows and mental models. Understanding these different levels of abstraction is done through the iceberg model.
Guide Contents

Influence Points
Systems Aikido
Social Acupuncture
Systems Gardening
Influence Points
Abstraction

The nonlinear nature of complex systems means that their behavior is somewhat counterintuitive to us. Leverage points are likewise not intuitive. Our common sense leads us to search for them in the most obvious but superficial places. For example, if we were to take a large organization 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. However, this person is just an actor in the system who is responding to events, when if we want to change systems we need to change the structures that the actors inhabit.

Where our intuition fails us is that we look for the leverage points all on one level, the event level, unfortunately this will lead us astray. The real points for systems-level influence are in abstraction; we have to remove the successive layers of detail before we get to the fundamentals where the leverage really is. The iceberg model is designed to help us with just this.
The iceberg model is a model used in systems thinking to illustrate the various levels 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. 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 observable phenomena.
Events
The observable actions and phenomena

Patterns
Describe trends over time

Structure
How the parts are interrelated to influence the patterns

Models
The mental models that support everything else in the system
Seeing System Structure

The Iceberg Model not only illustrates the different dimensions of an issue but also offers insight into how to enact change most effectively. 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 see the systems structure.
Symptomatic Responses

The iceberg metaphor helps to illustrate that if we somehow altered the event on top without finding a solution to the cause, the buoyancy of the ice underneath would simply push up to recreate the tip again. As such only the most superficial of issues can be resolved at this higher level. Symptomatic responses attempt to push on the system at low leverage points to resolve immediate causes. This works on easy problems because on simple problems the forces arising from systems structure are small enough to be overcome by pushing on low leverage points.
Events

Above the waterline are the events. Events are markers in time where multiple variables are observed. They are the “what I saw” or “what just happened.” Events are individual activities or facts about the state of things in the system. The one minute snapshot of a current affair that we might see in the evening news is an example of an event within the Iceberg model; such as a new motorway being built.

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 everyday; that there is a new president in Italy or that the price of commodities is up. The events that we hear about in the news represent the iceberg tip. Most of the world spends its time at the event level. It is how we perceive the world while being occupied with our daily activities.
Events & Reaction

If we only look at events, the best we can do is react. Something happens, and we fix it. This is typically our response the first time an event occurs. We do not shift our thinking in any way, we just act swiftly to fix the immediate problem using pre-existing solutions that have worked in the past. 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.
Patterns

Patterns are the changes in variables that occur over a period of 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 make a statement like “it seems to be getting warmer in winter” or “the price of gas is going down” these are patterns that we are observing, a series of relationships between events. When we get to the pattern level, we can anticipate, plan, and forecast. It allows us to adapt to problems so we can react more effectively to them.
Pattern & Anticipation

When we start to notice a pattern to these 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

The structure supports, creates and influences the patterns we see in the events. Structures can be understood as the “rules of the game.” They can be written or unwritten; they can be physical and visible or invisible. They 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, the underlying structure of a problem such as recurring oil spills might be our dependence on fossil fuels. But if you look at the root cause of such spills, you can start to understand and address long-term, sustainable solutions such as developing alternative energy sources that do not rely on oil shipment.
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 Models

The mental model used to perceive the world is ultimately what generates the structures, patterns and events. Our models 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 which allow structures to continue functioning as they are. Mental models are ultimately what keep the structure doing what it does. They are the thoughts and processes of reasoning that need to exist to cause the structure to be the way it is. Mental models are typically difficult to identify in that they engender many assumptions that are never made explicit.
Mental Models & 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.

It is possible that events can change behavior, which changes elements which change relations, function, and models, but it is not often. In contrast, if you go the other direction and change the paradigm and function of the system you will almost certainly get major changes.
An example of the iceberg model may be seen in one’s health.

**Event**
Catching a cold would be an event.

**Pattern**
Catching colds more often when we are tired is a pattern.

**Structure**
The systemic structures or causes for getting tired might include a lack of rest from excessive work.

**Models**
This structure may be created by our mental model surrounding our identity as a hard-working person.
Leverage Points

Adapted from Leverage Points: Places to Intervene in a System

- Transcend paradigms
- Alter mindsets
- Change goals
- Alter structure
- Change rules
- Information flows
- Positive feedback
- Negative feedback
- Length of delay
- Material flows
- Buffer stability
- Quantitative parameters

System

Leverage points are strategic points in a system where interventions can have a significant impact. Here are some points to consider:

1. **Transcend paradigms**
2. **Alter mindsets**
3. **Change goals**
4. **Alter structure**
5. **Change rules**
6. **Information flows**
7. **Positive feedback**
8. **Negative feedback**
9. **Length of delay**
10. **Material flows**
11. **Buffer stability**
12. **Quantitative parameters**

These points are places to intervene in a system to achieve desired outcomes.
List of Leverage Points

Original source Leverage Points: Places to Intervene in a System

12. Constants, parameters, numbers - such as products sold, number of employees, etc.
11. The sizes of buffers and other stabilizing stocks, relative to their flows.
10. The structure of material stocks and flows - such as transport networks, population age structures.
  9. The lengths of delays, relative to the rate of system change.
  8. The strength of negative feedback loops, relative to the impacts they are trying to correct against.
  7. The gain around driving positive feedback loops.
  6. The structure of information flows - who does and does not have access to information.
  5. The rules of the system - such as incentives, punishments, constraints.
  4. The power to add, change, evolve, or self-organize system structure.
  3. The goals of the system.
  2. The mindset or paradigm out of which the system - its goals, structure, rules, parameters - arises.
  1. The power to transcend paradigms.
Systems
Aikido
Overview

Systems change themselves and our approach as systems innovators should be one that works with that change rather than against it. This strategy is akin to the philosophy of aikido. Aikido is a modern Japanese martial art, it is a way of defense or non-resistance, where we are learning not how to fight, but how to not fight; we are trying to make use of the opponent’s energy and directing them in a particular direction. This approach applied to systems change involves first identifying the forces in the system where there is energy for change and then making the small interventions needed to influence that energy to be directed towards the needed changes.
Aikido

When you watch aikidoists practicing, you don’t see a typical adversarial battle between aggressor and defender. It appears more like a dance than combat, more like a physical exchange between two people giving and receiving energy. In life, the aikido metaphor is realized when you transform challenges into opportunities and adapt to new circumstances with ease - "going with the flow" instead of struggling against it. You are practicing aikido whenever you listen with interest to an opposing perspective or search for common understanding.
Origins

Alex Penn of the University of Surrey adapted this philosophy to create "systems aikido" which is an approach to systems change based upon the principles of aikido. She recognizes that most of our current approaches involve putting lots of energy into changing systems against their innate drive. A classic example being intensive monoculture "in which every year we're plowing, we're digging, we're putting in fertilizers herbicides pesticides, huge amounts of energy to make this system run… we're putting in energy to constantly bring the system back, to hold the system... we're constantly pushing a rock up a hill only to have it roll back down again."
She equates this approach to that of karate: "in karate you put a lot of energy into forcing your opponent to do something." She goes on to contrast this approach with that of aikido: "in aikido, you intervene when your opponent comes at you, and tip them using their own momentum so that they fall. You're using very little energy, but it takes a lot more understanding in order to intervene effectively."

As Alex Penn notes: "When you have lots of oil or coal or chemicals, as we have done since the Industrial Revolution, you'll have the energy and resources to keep karate-chopping your systems into submission. But when fuel becomes scarce or expensive, or we want to reduce CO2 emissions and pollution, the Systems Aikido philosophy comes into its own."
Tip from Donella Meadows

"The future can’t be predicted, but it can be envisioned and brought lovingly into being. Systems can’t be controlled, but they can be designed and redesigned. We can’t surge forward with certainty into a world of no surprises, but we can expect surprises and learn from them and even profit from them. We can’t impose our will upon a system. We can listen to what the system tells us, and discover how its properties and our values can work together to bring forth something much better than could ever be produced by our will alone."
Working with the System

Systems aikido can be seen as similar to the agricultural approach of permaculture. Bill Mollison, the "father of permaculture," described it as "a philosophy of working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labor; and of looking at plants and animals in all their functions, rather than treating any area as a single product system." With the aikido approach, we would have to put in less work to sustain the system, because that is where the system is going anyway.
Motivations

It may be of value to note that the origins of these two approaches lie with our subjective motives to change the system in the first place. A motive to change the system simply because we don't like the current state of it will inevitably lead to us specifying a desired state and putting a lot of energy into realizing that state that suits us better. In contrast, when we are trying to enable the system to develop in a productive direction this opens us to a different approach that works with its innate development rather than against it.
Working With Externalities

If our initial motive is to change the system because we don't like it those motives will constrain our possible set of actions and we will not be successful. A valid reason to undertake systems change is if the system does not work. If a system is dysfunctional it will create negative externalities. Those negative externalities will accumulate over time rendering the system unsustainable. It is important to be aware of this dynamic because it should be a central part of our strategy to change the system. Our system innovation should be one that solves for these externalities and thus take the system to a new equilibrium.
Feedback Loops

The very thing that we object to about the system - the negative externalities - is what will lead to its downfall and it is this core dynamic and pattern that we should be working with. It is only when a system becomes destabilized that we will get the chance to have a large scale impact on it through agile interventions at strategic leverage points.

In its normal operating state and environment, the system will have many strong negative feedback loops that will resist our influence, it is only when the environment changes and it becomes destabilized that there is enough positive feedback for our small interventions to work with that positive feedback and drive the system into a new state.
Key Takeaway

Trying to change a system when it is in a strong negative feedback regime is like doing Karate, it requires huge amounts of resources. To be strategic in our change initiative we have to wait and look for where the destabilizing positive feedback is and then work with that; build structures that can channel it in new ways. This is systems aikido. The key takeaway: let the system overexert itself doing Karate; don’t exhaust yourself by trying to work against this. Find the new pathways, new energy and build channels to direct it in new ways.
Social Acupuncture
Overview

In general, there are no linear solutions for a complex problem, rather with partners we have to identify what are blockages and bottlenecks in the system — which may be political, economic, environmental, etc — and where can we intervene to influence current behavior. Thus systems change is somewhat analogies to the practice of acupuncture. Professor Orit Gal suggested 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."

Networked Approach

Many of today’s most complex challenges can be better thought of as the emergent outcomes of a complex adaptive system; patterns that are continuously re-created through the ongoing decisions, actions and reactions among numerous players embedded within multiple networks. This perspective has huge advantage as it lets us start to work with this complexity.

Instead of our traditional linear approaches that are constantly pushing against complexity - by creating boundaries and focusing on small sections of these networks - systems acupuncture reveals an approach that harnesses and utilizes complexity to our advantage.
Working with Complexity
Start with a network perspective
Ask how things are connected and flow
Influence leverage points
Alter flows of information & ideas
Work with context
Create attractors for emergence

Traditional Approach
Divide organization into domains
Ask how to optimize those boxes
Change parts via linear causality
Alter material flows
Manage for quantitative metrics
Similar to systems Aikido, social acupuncture draws insight from ancient practice, in this case, that of acupuncture to provide a strategy for system change. In general, acupuncture is an age-old healing practice of traditional Chinese medicine in which thin needles are placed at specific points in the body. Acupuncture seeks to release the flow of the body's vital energy or "chi" by stimulating multiple points along energy pathways. As such it sees the bodily system's health as a network of flows and aims to intervene at certain points to release blockages. The ultimate aim is to help the system flow back into balance.
Insight from Orit Gal

"The manner in which money, information, behavior, skills, ideas flow through a certain network will ultimately determine its overall well-being. When we recognize really successful Ecologies, that could be a peaceful community, a successful education system, or just a great city vibe, what we actually recognize is a certain pattern it's a kind of just-right Goldilocks mix of structures and flows and while these channels can't be engineered they can be actively promoted."
Resilient Systems

This approach analyzes dynamic flows rather than specific static conditions. It then designs sets of low-intensity interventions whose sole aim is to strengthen or disrupt these very patterns. The interventions themselves, in this case very thin needles, do not insert new resources into the environment, they do not even take control over any key functions, they simply temporarily provide the system with information to reorganize itself. In this sense when we think about what is a healthy system or an overall state of well-being it is more about resilience through the many functional flows of resources and information across the network rather than a specific equilibrium state.
Reconfiguring Flows

Orit Gal talks about systems acupuncture as working by analyzing existing flows across a certain ecology, we then design actions that make small accumulative interventions usually away from the core to strengthen or disrupt a given pattern. The idea behind this is that over time the dominant paradigm we aim to disrupt will be gradually undermined and subverted so that the system will gain the needed momentum to tip into a new basin of attraction - a new equilibrium state of behavior.

The system is not directly restructured but is simply nudged to evolve in different directions. The role of intervention is not to physically shift or push the system it is simply to add information into the network; to alter routing logic. This is about signaling to the network how to reconfigure dysfunctional relations and flows.
Influencing Initial Conditions

The objectives of our interventions are two-fold. They can be aimed at either disrupting or enhancing existing flows identified across the system's network to divert them into new and hopefully more productive configurations. The rationale of systems acupuncture is that effective interventions can better be instigated upstream. Here physical resistance is least, potential propensities are at their foremost, and the impact could resonate throughout the system via indirect effects. This approach aims to work with the concept of the butterfly effect and "sensitivity to initial conditions" where small changes in initial conditions can create highly divergent outcomes in the long run.
Insight from Adrian Bejan

The Constructal Law is a term recently coined by Adrian Bejan to describe the natural tendency of flow systems - such as rivers, trees, lungs, tectonic plates - to generate and evolve structures that increase flow access. It holds that shape and structure arise to facilitate flow. The designs that happen spontaneously in nature reflect this tendency: they allow entities to flow more easily, to measurably move more resources further and faster per unit of useful energy.
Systems Gardening
The Systems Gardener

Complexity science informs us that we cannot hope to know a priori what a complex adaptive system will do, nor know specifically how to achieve optimal outcomes, never mind control. A design cannot be completed on paper and executed in an orderly and predictable fashion, past attempts to do this have rarely succeeded. As such a new understanding of "management" is required. This alternative complexity inspired approach is more akin to the job of the gardener rather than the manager of today - who thinks of their organization as being more like a machine rather than a living social system. The aim of the systems gardener is to not so much specify outcomes, it is more about creating the context for emergence to take place.
Insight from Paul Plsek

"[When dealing with complex adaptive systems] it is more helpful to think like a farmer than an engineer or architect... Engineers and architects need to design every detail of a system. This approach is possible because the responses of the component parts are mechanical and, therefore, predictable. In contrast, the farmer knows that he or she can do only so much. The farmer uses knowledge and evidence from past experience and desires an optimum crop. However, in the end, the farmer simply creates the conditions under which a good crop is possible. The outcome is an emergent property of the natural system and cannot be predicted in detail."
Shifting Context

Systems thinking is about looking at the context within which things exist. When we translate this through to systems change we can see it as a strategy that aims to create environments or contexts that are conducive to the emergence of new patterns of organization. As such the management of complex systems uses oblique methods for altering a system via its environment or context to create the conditions for new properties, elements, and phenomena to emerge.

Thus we are thinking about systems change not as an issue or a person that needs to be fixed but instead as the set of conditions that surround that issue. The aim is to work on shifting the conditions that hold the problem in place, i.e. the context. As gardeners, we don’t spray the plant with lots of chemicals when something goes wrong but ask maybe we need to develop a better soil substrate or place the organism in a better environment with more light and other plants, etc.
David Snowden illustrates the systems gardener approach well with his allegory of the children's party where he talks about how to organize a child's party based upon the principles of complexity theory/systems change. We start by drawing a line in the sand that is a boundary or limit. We inform the children they are free to play within that boundary condition. An important thing that he notes is that one of the things you learn quickly as a rule maker is the value of flexible negotiable boundaries because rigid boundaries have a habit of becoming brittle and breaking catastrophically.
Probing

We then introduce probes, safe to fail experiments, a football, video, a barbecue, a computer game, we wait to see if a patent forms. If it does we call this an "attractor". If it is beneficial other kids will get attracted to it, they will start to play. At this point, if it is productive we do not take resources away or we, in fact, give it resources, if it is negative this is where we need the fire hoses. David Snowden summarizes this approach when he says: "We manage the emergence of beneficial coherence within attractors, within boundaries and that allows locally valid solutions to emerge."
Systems Gardening - How it works

Create context with boundaries for the emergence of beneficial patterns within attractors that can be dampened or amplified depending on their benefit.

1. Create Boundary
Define limits to the system, thus setting the context within which self-organization can take place

2. Probing Experiments
Introduce probes that attract members creating safe to fail experiments

3. Dampen & Amplify
Dampen down or amplify the attractors depending if they are beneficial to the whole system or not
In complex adaptive systems, we cannot just transpose a solution that worked in one place to another as each context is unique. This is why we need to look at and operate on the pattern level and not deal with the specific details. As D. Snowden notes: "You've got to have that ability to actually see patterns and respond to positive or negative patterns, different things will work at different times." This is the general nature of complex systems they are always conditioned by their context or environment, meaning they change from one context to the next.
Insight from David Snowden

“Dispositional, not causal, that's the basic lesson of complex adaptive systems, you haven't got a system with linear cause, you can't say if I do this then that will happen, you can say at the moment the system is disposed to evolve like this and it's not disposed to evolve like that, the minute you break that causal link everything becomes easier.”
One approach to changing a system is to first outline, generally, the attributes and qualities of the new paradigm and then look in the present for seeds that embody those values and qualities. We can use these "pockets of the future" that exist in the present as a way to tangibly demonstrate the new possibilities and help to give the emerging paradigm a sense of being realizable.

These pockets of the future can be defined as the observable behavior, patterns or ideas, that are marginal in the present moment but has the potential to become more prevalent and impactful. These are weak signal emerging patterns that we can try to support and grow to become a new attractor. Our strategy here as systems gardeners is to simply shine a light on the new and demonstrate the viability of the theory or paradigm in practice; we foster them with the needed resources, connectivity, and required capabilities. One example of this approach would be the startup incubator.
Seeding Transitions

The systems gardener seeds transitions by identifying, connecting, supporting and spotlighting pioneers of the new system. By watering the seeds of new ideas the change agent enables transformation through emergence. This "emergence" happens when separate local efforts are connected to form communities of practice and once this happens systems-level change can actually be catalyzed. The connector creates connections and learning cycles between the different systems levels and geographic locations.
From his experiments with chaotic chemical process, Ilya Prigogine had a key insight for systems changers: "In an unstable complex system, small islands of coherence have the potential to change the whole system.” Change starts with a small group of people who form what we might call a "creative integrity" who are willing to stand for something, maintain commitment and energy over the time that it grows. Our systems gardening strategy is to find these niches and "nourish" them with the resources they need. Like looking after plants, you might have to give them water to grow, but you may also have to alter the broader context they exist in so that they get enough light or are not crowded out by other plants, or maybe they have to be put in contact with other creatures to create synergies.
Takeaways

The key to understanding complex systems lies in their dynamic nature. The patterns that characterize them emerge through endless individual interactions, a process known as self-organization. Over time, accumulated individual interactions form some repeating regularities that develop into systemic patterns. Once emerged, these patterns incentivize certain behaviors and constrain others. We call these patterns attractors.

The aim of systems change is to shift the system to a new equilibrium. This new equilibrium is an attractor, a set of self-reinforcing feedback loops that will stabilize the system within a new pattern. The key take away from this module is that a systems state is really an emergent state, it cannot be pre-specified or designed at will, it can only be nourished, and this nourishing is the job of the systems gardener. We support the new pockets of the future and try to build them into viable attractors.
Reference & Resources


Steele, R. (n.d.). Identifying Leverage Points - a systems thinking perspective and approach Expert Consultation on Implementing the 2030 Agenda for SD in Asia Pacific Implementing an integrated and transformative agenda at the regional and national levels. [online] Available at: https://www.unescap.org/sites/default/files/Session%202.%20Identifying%20leverage%20points_0.pdf.

