How to Find "Structure"

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You're driving home on the highway. Coming over a rise... Nuts! Look at that traffic jam ahead. It's a parking lot! Since we're stuck here, maybe this is a good time to think about that "Systems Thinking" material we're trying to apply at work.

We know to look for Events, Patterns, and Structure, but you may have found it difficult when you tried it on real problems. The lines get blurred between patterns and structure. Structure is harder to see. I teach systems thinking regularly and see learners encounter these difficulties. This article is about how to see structure.

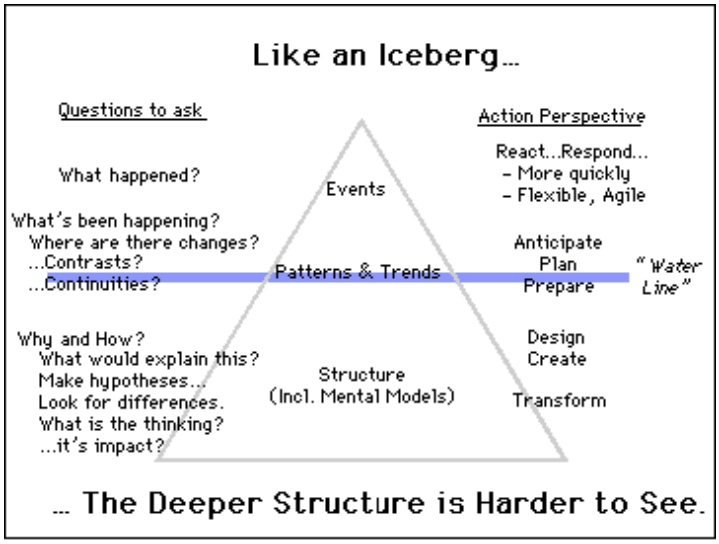
The usual explanation of the Events/Patterns/Structure hierarchy goes like this:

"One can look at the world in three different ways...

"If we see the world in terms of events, then the best we can do to be effective is *react*. We are more effective by reacting more quickly, being more flexible, lighter on our feet... To see the world in terms of events we simply observe or ask, `What happened?'" Even at the events level, we *can* become more aware, we can see more; story telling in a group is an excellent way to become more aware of the events around us... *if* we listen. Next time you are in a traffic jam, just see how much you can notice!

The explanation continues, "If we can see beyond the individual events... if we can see patterns and trends, then we can *anticipate*... Along with this is the ability to *plan* and *forecast*. To see patterns, ask, `What's been happening?'"

The explanation is given with a simple three level diagram... Events... Patterns... and Structure. A few years ago, I began drawing an iceberg around the three level diagram, saying, "Like an iceberg, the underlying structure is harder to see... The `water line' divides what's easy to see (the press of events) from what's harder to see (the underlying structures that cause the events). We can see some of the patterns, but some are not so obvious."



When we ask you to look at all three levels, we are trying to encourage looking more deeply for the underlying structure to help understand what's going on and why. Then, solutions will be better informed.

OK, so where's the problem? The trouble starts when we ask for examples of structure... You may approach this as, "OK, what's causing things?" and answer are in terms of the forces and factors responsible. The answers for the traffic jam might be, "decaying road surface" or "high speed" or "drivers in-attentive," but these are the same things we would identify as trends. You may frown and ask, "What distinction are you trying to make when you ask about structure?" What distinguishes "structure" from everything else?

We might try to help by saying, **"Structure is that which channels human energy; that which affects what happens."** I feel this is closer to the mark because it's getting at the causal connection.

Or, we might say, "Yes, structure is quite important, but what's really important are the mental models; these are an even deeper kind of structure," and new learners work to identify mental models which are held by the people involved in the system. These call these "internal" structures.

Finally, we say, "**Structure is the network of relationships of things, not the things themselves; that's why it's harder to see."** This network of relationships might be depicted with causal loop diagrams.

Since structure is about relationships between things, so a structural observation must include a *causal connection*, not just naming the factors, forces, or elements of the system.

Instead of thinking of the iceberg in terms of different *kinds of things* that exist in the world, think of it as showing different *ways of seeing* the world. That is, focus on *seeing* structures, seeing causal connections, seeing relationships that would start to explain what's happening.

I'll pick up where we left off with my explanation of the iceberg...

"If we can see beyond individual events and notice changes, this is seeing trends and patterns. To see the world at the patterns level ask, 'What's changing? Where are there differences? ...contrasts? ...or continuities over time?' If we can see these patterns and trends, then... (same as above)...

"The third level of seeing the world is seeing structural explanations... And the heart of this is noticing causal connections. Ask, 'What would explain these patterns?' Make a hypothesis (so you can test it in the data). Look for differences that make a difference. Draw a causal loop or dynamic systems model.

"So, for example, it is a structural observation when we notice `The compensation system is causing people to be short-term oriented' or `The highway ramps and exits cause drivers to make a lot of lane-changes.'

"It may be useful to distinguish between internal structure (causal relationships involving our mental models) from external structure (other causal relationships). The examples above are external structure.

"Internal structures (causal relationships that involve mental models) are usually the most important structural elements in a system. In order to make a structural insight, we have to notice not just the mental model, but also the cause and effect linkages. Just the fact that someone holds a mental model is an event. When we observe that the mental model is common or is changing, that's an insight at the trend/pattern level. When we observe that `because people think this way, their behavior tends to be that way,' this is a structural insight. And, when we notice, `this is what is causing people to think this way' that's also a structural insight."

If you're having trouble seeing structural relationships, having trouble making hypotheses, go back to the patterns level and look at data. Look for differences and changes. When you ask, "What would explain these patterns?" this will stimulate structural observations.

Here is a worksheet to stimulate thinking:

Events/Patterns/Structure Worksheet

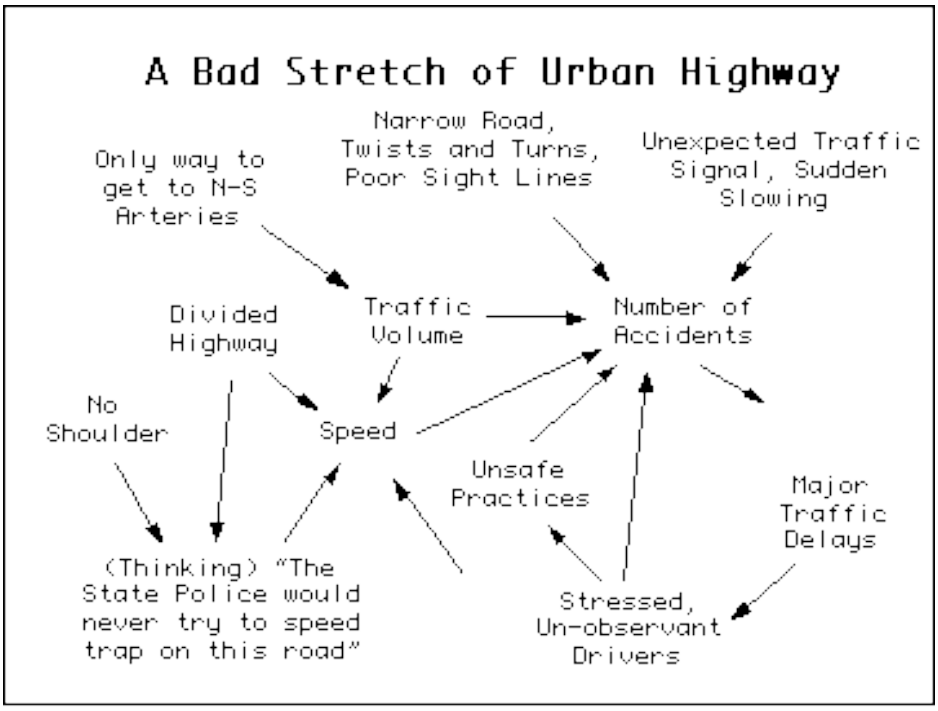
Events -- What happened?
Patterns & Trends -- Where are there changes? ... contrasts? ...or continuities?
Structure -- Why and How? What would explain the patterns? Make hypotheses. What is the thinking, and what is it's impact?

Example Worksheet

I live in downtown Boston and we have a famous stretch of highway... Storrow Drive. You may have been stuck here trying to get to the airport. I'll apply the hierarchy to my experiences on this road:

Seeing at the Events Level: There is an accident on Storrow Drive, traffic is backed up to Arlington Street, the State Police are on the scene and the ambulences are on the way. A driver caught in the tangle thinks, "Damn! I'm goinna miss dinner again! I never should have come this way!" (Imagine the the 6 O'Clock News with the reporter on the overpass and the sirens and traffic mess in the backgound... "And, now back to you at the station.")
Seeing at the Trends and Patterns Level: There are *always* accidents on Storrow Drive! Also, there are daily and weekly patterns of traffic, rush hours and slack times. Drivers during rush hour are more stressed and have more on their minds than drivers at other times of day. Drivers are most concerned with getting someplace quickly and avoiding traffic tickets; they don't notice their own driving practices.
Seeing at the Structural Level: 1) The road is old, narrow, and has poor sight lines causing more accidents when traffic is heavy. 2) Most traffic to the major North and South routes has to use this road making the traffic even heavier. 3) The ramps and exits cause drivers to make lane-changes. 4) Drivers think that the State Police won't enforce speed limits on this road (police cruisers would cause major traffic tie-ups), so they tend to drive faster (50-60 mph), causing more accidents. 5) Because drivers are in a hurry and don't notice their own driving practices, they do unsafe things (cutting in, tail-gating, excessive speed, etc.) There are probably additional causal factors; make a list of causal linkages for a troublesome highway that you know.

Good systems thinking practice is to take the structural observations and place them in a diagram with arrows to indicate the causal relationships. This is to help us keep track of complexity and help us see how the structural elements operate together to produce an overall result. Usually when we put things on a diagram, we'll see even more connections. Here's a diagram constructed from the roadway example above:



The purpose of all this is to stimulate seeing, thinking, and insight. Of course we want not just to see and understand but to act and intervene for better results. I've focused on seeing and understanding in this article because I believe understanding is the basis for more effective action. (See my other article "Going Deeper(TM): Moving from Understanding to Action") for more about the linkage to action.) The world we deal with is very much like an iceberg... There's a lot hidden beneath the surface, and one of the aims of systems thinking is help discover it!

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