Home Page

Quote of the Week

Products & Services

Customers

Modeling Language

MGT Team

Weak Signal® Research

Part III: Sampling, Uncertainty and Phase Shifts in Weak Signal Evolution

Bryan S. Coffman

January 21, 1997

back to Part I: Introduction
back to Part II: Information Theory

Overview

Sampling refers to the manner in which weak signals are searched for and studied. Uncertainty pertains to the ability of the organization to broaden the scope of possible scenarios it can willingly entertain for the future of particular weak signals. The section on phase shifts introduces the challenge of keeping different vantage points within the organization requisite with one another while implementing efforts to take advantage of possible weak signal scenarios.

Sampling

Recall from Part I that from the enterprise's point of view, a weak signal may be a single instance of communication of some novel idea or process. More often, however, the "weak signal" may not be one individual signal at all, but a number of signals transmitted over time and from different sources across various channels. The receiving organization must have Associator algorithms for sorting through all of this and revealing the patterns that will indicate something novel and valuable on the horizon. Communications engineers would argue that I'm talking about multiple signaling events, not just a single one, and therefore the term "weak signal" does not literally apply. That's correct; I'm using the term metaphorically with respect to the enterprise. This section on sampling, uncertainty and phase shifts will exhibit diagrams showing a "signal" propagating through some medium over time. It should be understood that I'm now looking at a series of communications over time, probably from various sources, and treating them as if they were part of one intermittent communication event. And not only an event whose timeline lies in the past only, but extends out into the future as well. For though we're interested in the history of weak signals, the money is bet, made and lost on the future.

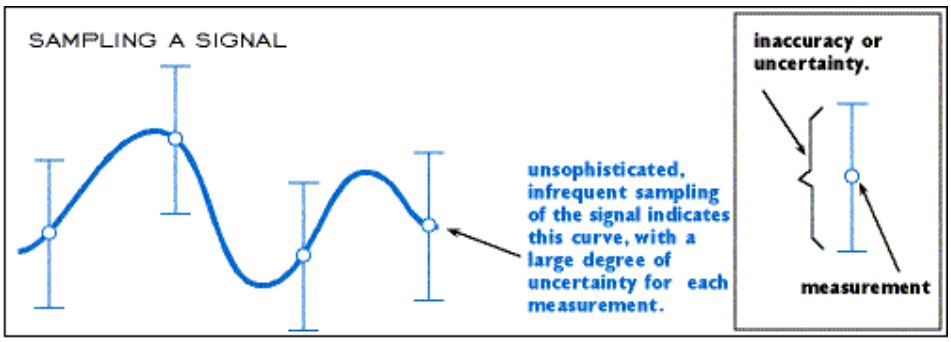
This means that we're interested in the shape of the curve: is it rising, falling, stable? How fast is it changing? Is it's long term behavior cyclic? If so, when will the next cycle begin and end?

Investment in Weak Signal Research

If we were investigating the shape of real electrical signals, we would choose a piece of equipment to track and map the signal, and decide on how many times per second, minute, hour we wanted to sample the signal with our equipment. In other words, how much time do we want to devote to paying attention to the signal, and what degree of sophistication do we wish to bring to the task?

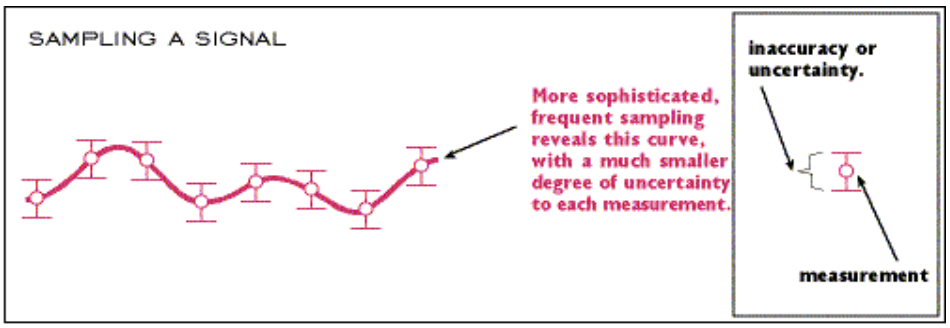
The more sophisticated the equipment, the greater the accuracy we'll get in each measurement we take (how high or low the signal is at that instant). The more samples per unit of time that we take, the better sense we'll get of the shape of the signal--its rise, fall and its period if it's cycling.

Here's a simple diagram showing the use of relatively unsophisticated equipment on an infrequent basis.



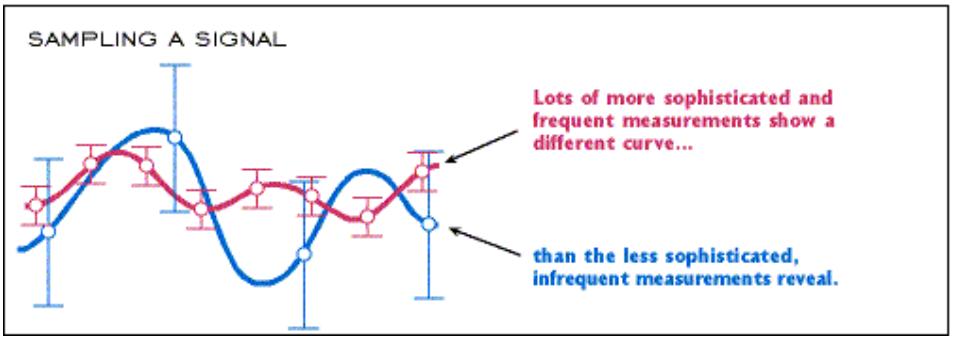
Notice that, although I've drawn a curve connecting the midpoints of each measurement, there's a great deal of uncertainty concerning the actual position of the curve at any moment in time. All that the four measurements really reveal is that the curve rises, falls and then begins to rise again.

Here's a diagram showing the use of sophisticated equipment and frequent sampling of the same signal.



These samples reveal a much different shape to the curve--something much less volatile. If the amplitude of the curve were critical to decision making, then the first sampling technique would have completely missed the mark and the organization would have scrambled around for no reason.

Finally, a diagram showing the two curves superimposed for comparison.



Getting the "Equipment" Together

A communications engineer presumably can refer to a catalog for a list of equipment to do his scanning with. There will also be a budget of some sort that will constrain the time that can be devoted to the activity. But what about the enterprise that wants to seriously engage in weak signal research? The budgetary issues are straightforward, but what is the metaphorical equivalent of the equipment?

The equipment consists of all of the subsystems required for processing messages and assigning value to them so that they become information. For a complete description of these sub-systems, refer to Miller's Living Systems model. But I'll mention a few here: the Input Transducer, Decoder, and Associator.

The Input Transducer is the eyes of the organization. It includes not only the technical means of "seeing" signals in the environment, but also determines what it is POSSIBLE to see. Remember that this subject was discussed in Part II.

The Decoder changes signals into messages. Think about the text on this page that you're viewing. You're using Input Transducers to see the letters. But if you did not know English, you could not decode the letters into words and sentences. The Decoder executes this function and makes it possible for the Associator to do its work further down the chain.

The Associator is the model builder of the organization. It sorts through all of the messages and assembles them into patterns based on an accepted library stored in Memory. These patterns represent value or meaning to the organization and are used to influence behavior so that the organization can thrive.

An enterprise can concentrate on these three areas alone to develop a good design for creating a culture and policies that encourage weak signal research. The following matrix includes some questions to ask during the design process.

	People	**Tools and Processes**	**Environment**
Input Transducer	Who's good at sensing the outside environment, and what skills can be passed on to others?	What routine and non-routine mechanisms are employed to search out new messages from the environment? What implements are used? And	All of these activities take place somewhere in real space or cyberspace. The combination of furniture, lighting, accessories, equipment such as monitors, etc. can

		what channels are investigated?	strongly influence the success or failure of a weak signal research program. Environments invite us unconsciously to certain activities. Courtrooms, churches, libraries, theaters all influence behavior by the cultural values that are built into their architectural features.
Decoder	Who understands the basic content of diverse messages from the environment, most of which will not be in the language of the enterprise or its industry?	Who are the subject matter experts? What's the process for learning about things you don't understand? How is such investigation welcomed and supported?	
Associator	Who's good at assembling diverse sets of messages into compelling scenarios or stories, augmented by simulations, illustrations and diagrams?	What modeling tools are used? Simulators (not just software-based, but real life immersions as well). How is every associate in the enterprise taught to execute the role of the Associator?	

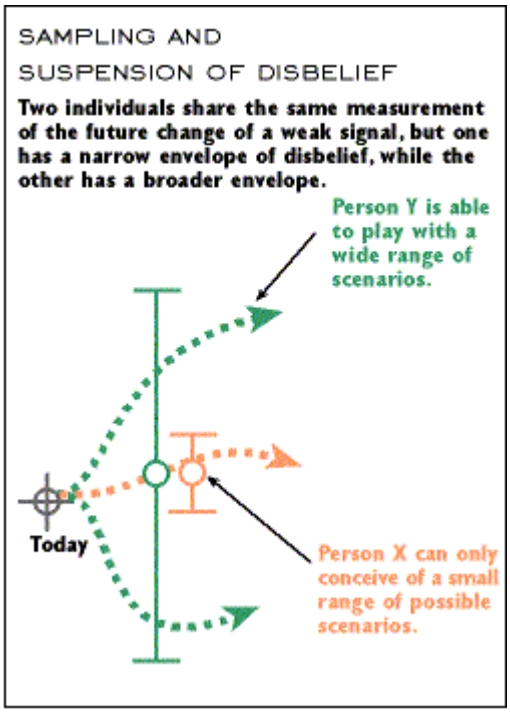
SETI

The Search for ExtraTerrestrial Intelligence project is an interesting case study for conduction weak signal research, and also for how this research is changing in method and mode. Once a federally-funded, centrally controlled project, it has had to innovate in order to survive. Now, for a few thousand dollars, anyone can purchase the equipment that allows them to scan a portion of the sky in the search for weak signals that might indicate an intelligent source. The equipment is not terribly difficult to learn to operate and the project will help individuals get up and running, stay connected, and coordinate their efforts. Chances are, as a network the project will both survive, gain greater credibility, and possibly more popular support. There is an article about SETI in the January issue of Wired magazine, and the home page for the SETI League, Inc. can be found here.

Uncertainty and Suspension of Disbelief

Sampling really concerns gathering messages from the past so that they can be aggregated and modeled in a search for value and meaning. The modeling undertaken by the Associator, however implies making projections into the future. This is best done via simulation and scenario building.

In the diagram to the left, I'm using the same symbols that were used above to indicate the accuracy of a measurement. In this diagram, though, they stand for a measure of the creative playfulness of the modeler.

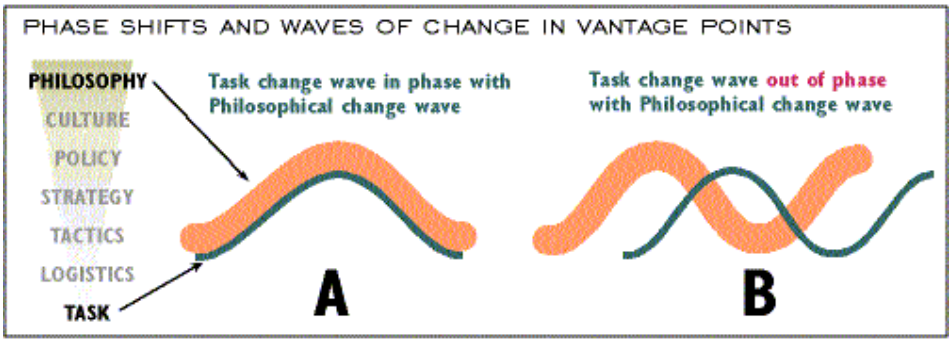


In the diagram, both of the people tend to believe that the future of the weak signal lies along the path indicated by the green and orange circles. There the similarity ends. Modeler "X" believes not only that his estimate of the future is right, but is extremely confident in that estimate--he admits little or no uncertainty. Predictions outside of this narrow envelope of possibilities are met with dismissal. It's important to note that X's beliefs are probably supported by a great deal of historical precedent and experience and by perhaps very sophisticated models. Modeler "Y", on the other hand, is quite able to suspend disbelief concerning the path that a certain set of weak signals might take, and investigates possible paths well away from what he believes the most probable path to be. He says to himself, "if such a divergent path were true instead of the most probable path, what else--in a non-linear way--would I have to look for as validation? In other words, he formulates a hypothesis and then sets out to search for other messages in the environment that corroborate (or deny) it. He will find both affirmation and denial because trends in human affairs are not quite as tidy as they are in more scientific fields of study. The challenge then is to build convincing scenarios given that the hypothesis is true, and then investigate the costs and benefits of redesigning the enterprise with the flexibility to respond to this possibility, should it actually occur.

I'm not implying that modelers and Associators engage in purely fanciful journeys into the imagination (although some of these might prove at least as accurate than the traditional numerical, linear forecasting methods). There should be a discipline brought to the process. This is not a casual brainstorming method, but rigorous research. After disbelief is suspended for the purpose of building scenarios, and the scenarios have been completed, they should be examined and evaluated, and neither casually accepted or rejected.

Phase Shifts in Waves of Change

An enterprise--from society to company to individual--can be thought of from seven different Vantage Points from Philosophy to Task. Assume that the enterprise has accepted a weak signal scenario and is at work to implement changes to its structure, processes, tools and environment to capitalize on the scenario (actually, to promote its occurrence). This acceptance is usually made at the Policy or Strategy level, and propagates up and down the model from there. The shifts implied in such a change usually creates stresses in the enterprise, and one or more of the vantage points can get out of phase, or out of cycle with the rest. For example, Philosophy may lag Tasks, as shown in "B" of the diagram, below.



Here's an illustration. The number and type of tasks required for an individual to know in order to maintain his or her house today prohibits most of us from accomplishing the feat. In fact, it prohibits most of us from even understanding enough of the issues to make an intelligent decision when offered conflicting solutions from subcontractors and repair people. Yet there is a persistent philosophical undertone that still glorifies the ability of a man or a family to be self-sufficient in this area. What's missing are the intervening logistics, tactics, strategies, policies and culture that would allow the tasks to be brought into phase with the philosophy.

The same difficulty can occur in organizations. And it can also occur in the broader society. Often, the cause of the problem is a growing ecosystem of new weak signals that are causing one of the vantage points to shift out of phase. The Internet--no longer a weak signal by any means--has so changed the logistics of publishing as to cause disruption up and down the model. It was fine for speech to be free as long as certain constituencies managed the vast majority of signals, channels and messages. Now that anyone with a few dollars can publish nearly anything, all sorts of philosophical and cultural norms are being challenged. Everyone's engaging in various strategies and tactics to develop policies to sway things one way or another. And there's a great focus on tasks as well--encryption, anonymous E-mail, sting techniques. All of this--despite the personal feelings you may have about it--is for the purpose of sorting things out so that the seven vantage points may come back into phase. When the vantage points are in phase, they have the greatest potential to amplify each other (instead of dampening each other out) and thus present the strongest front and generate the most steady profit. Organizations that have their vantage points in phase are resilient. Organizations that can systematically set their vantage points out of phase and then bring them back into phase for the purpose of innovation and radical improvement are evolutionary.

Being in phase is not necessarily pleasant for the individuals living in the envelope of a certain set of vantage points. After all, the "easiest" no-brainer way to bring the vantage points into phase is to dictate them and ruthlessly enforce them. So, Isaac Asimov writes in his book *Foundation*, "Violence is the last resort of the incompetent." As long as they remain in phase, no matter what the suffering, the vantage points have the ability to reinforce one another. Therefore, even a people in fairly austere circumstances may vigorously resist change.

Part IV: Evolution and Growth of the Weak Signal to Maturity
Part V: A Process Model for Weak Signal Research

Other material on Weak Signal Research on this website

- *Miller's Living Systems model for information processing*

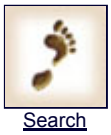
- *Playing 'Spoze*
- *Glossary of Weak Signal Research Terms*
- *Appropriate Response Model*

home parent page

19970121220121.web.bsc


Index of Archives


Index of This Site


Search


Contact MGT


Terms & Conditons

iteration 3.5