Horizon Scanning
Why is it so hard?

By
Dr. Peter Bishop
University of Houston

September 2009

Introduction

Surprise is an odd emotion. We like to be surprised–an unexpected visit from a friend, a gift from our spouse, a beautiful spring day. Sometimes we even pay to be surprised–at the fair or the cinema. But surprise is not a good thing at work. Being surprised means that we expected something to happen that didn't or something to not happen that did. It's just not right even when the surprise is a good thing,. We are supposed to know what is going on and what is about to happen all time--to know and be prepared for everything that occurs. We are never supposed to be surprised.

Of course that is unreasonable. Everyone is surprised even at work, even though we try not to show it when it happens. So we basically cover-up--never let them see you be surprised, even when you are.

But rather than just wait, we can take steps to reduce surprise even if we cannot eliminate it altogether. Horizon or environmental scanning warns us about change coming in the future. The term evokes images of lookouts on old ships or modern-day radar scanning the horizon. Lookouts and radars report sightings or signals from objects that are far off before they have the chance to harm to a vessel, a plane or a fortified encampment. It takes time for the objects to get to the lookout's or the radar's location, time that people can use to prepare. The farther away the object is, the longer it takes for the object to arrive and the more time there is to prepare.

At the same time, most potentially threatening objects at sea or in the air pass off to one side or the other without interacting with the ship or plane. But woe to the lookout who does not report the object anyway. He would not be doing his job if he only reported objects that were about to hit the ship. He is allowed a lot of "misses," objects that have no consequence in the end, but not even one "hit."

The horizon scanner is to the future what the lookout is to the sea. Most change does not occur suddenly, out of the blue, even if it appears that way at first. When we look back, we usually find precursors, signs that the change is coming. Of course those signs are not as clear as the outline of a ship or the blip on a radar screen. In fact, the signs are often so weak that we ignore them completely, until it is too late. And most signs do not amount to anything anyway, so it is usually safe to ignore them. As a result, we develop the bad habit of ignoring all signs of change. "Oh, that's nothing. That will never come to anything." And being right almost all the time reinforces the habit. The signs do not come to anything, usually, until, of course, they do!.

Horizon scanning attempts to break the habit of ignoring the early signs of change. It forces people to look at the novelty happening around them and report those signs that *could* have a significant impact on the enterprise, not just those that are sure to have an impact. Horizon scanning is part of strategic foresight because it recognizes the inherent uncertainties in preparing for the future and allows people to report plausible outcomes rather than just lock-solid certainties.

Despite its obvious utility, horizon scanning is many times more difficult than being the lookout on the ship, however. And that is what this paper is about.

Work to date

Aguilar opened the literature on environmental scanning in 1967 with his book *Scanning the Business Environment* (Aguilar, 1967). A well-known student of the field, James Morrison at the University of North Carolina-Chapel Hill, made his contribution to the field with his popular 1984 book *Futures Research and the Strategic Planning Process* (Morrison, 1984). Morrison has also ably summarized the mainstream literature on environment scanning in his two articles (Morrison, 1992; Morrison, 1995) He reviews different types of scanning and provides tips on how to do scanning well. Little more needs to be said about that here since both articles are readily available.

Another thread of work in horizon scanning comes in the search for wildcards, low probability-high impact events that have significant consequences. The primary contributor to the understanding of wildcards is John Peterson who has been hunting wildcards for decades. His book *Out of the Blue* contains an extensive taxonomy and system for evaluating the importance of different wildcards.

Wildcards were also the subject of the 2007 blockbuster *The Black Swan* by Nassim Nicholas Taleb. The title of the book is derived from a previously well-known scientific fact that "All swans are white." That was true for a while in Europe because all the swans in Europe are white, but *Cygnus atratus*, discovered in Australia in 1697, is black. Taleb argues that Europeans had no way of knowing that their "fact" was wrong. In an extension of this principle, he argues that wildcards are essentially unknowable before they occur. They are random events that no amount of forecasting can prepare for—not a very happy conclusion for the field of horizon scanning!

The best current treatment of how to do environmental scanning is George Day and Paul Schoemaker's book *Peripheral Vision: Detecting the Weak Signals that Make or Break Your Company*. Day and Schoemaker offer a common sense seven-step process from identifying the right scanning sources to acting on the results, complete with many business examples that illustrate how scanning works (or doesn't, as the case may be).

The basics

One would think that, having been at horizon scanning for so long and with so much written about it, we would be better, but that is not the case for a number of reasons.

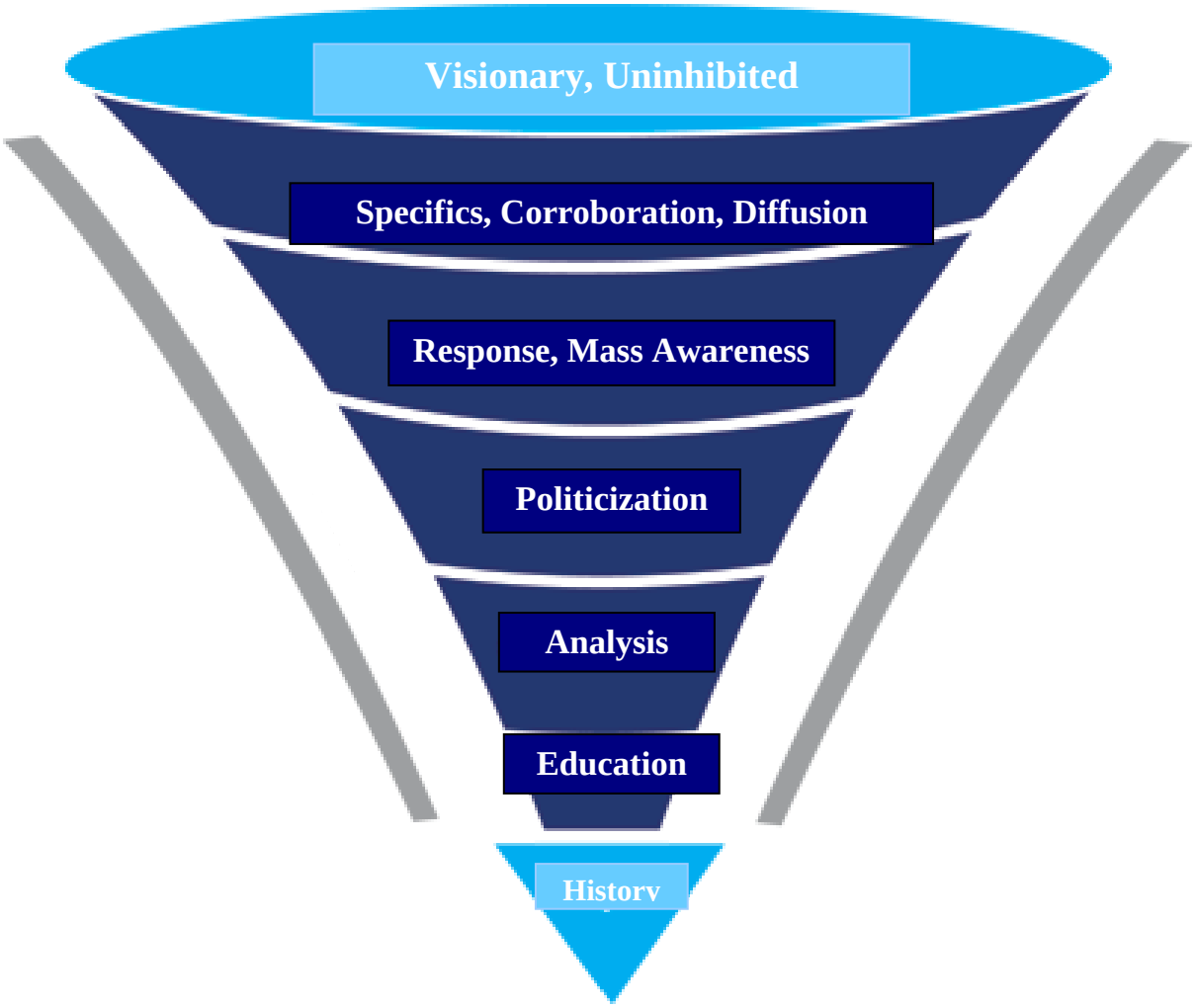
A weak or early signal of change is called a scanning hit—an event or a new piece of information that signals that change is coming. The hit itself is something new or different, something out of the ordinary, a discrepancy in the pattern. It is not itself a significant change, but it could someday develop into a major change with important consequences for a domain or an enterprise. But what is new, extraordinary or discrepant to one person is not to another. Therefore, what counts as a scanning hit depends on what that person already knows and expects to happen. Discrepancies are only discrepant compared to some background pattern. Scanners therefore are sensors comparing new items on the horizon with their knowledge and experience of what is usually there. Thus scanning is inherently subjective, making it very hard to teach or practice with any degree of repeatability. It is also difficult to achieve credibility as an objective function since a significant event to one person may not be significant to another..

A second reason that scanning is difficult is that the weak signals are, well, *weak*. The signal to noise ratio is very low. Strong signals are widely reported in the media. While a scanner might draw novel implications from a widely reported news story, the event or information itself is not special or unusual since everyone knows it already. The best hits are those that are not widely reported. The problem is that they appear in an ocean of information of no consequences whatsoever.

Graham Molitor developed a list of data sources many years ago (Molitor, 2003):

Visionary	Art, fiction
Uninhibited	Fringe media, underground
Specifics	Notes, speeches, monographs
Corroboration	Tech journals, stat documents, abstracts
Diffusion	Popular tech journals, insider newsletters
Response	Intellectual magazines, general newsletters
Mass awareness	General interest pubs, books
Politicization	Surveys, government reports
Instant analysis	News, radio, TV, Internet
Education	Education journals, textbooks
History	Doctoral dissertations

The sources can be arranged in the form of a funnel, with the wide mouth of the funnel at the top and narrowing toward the bottom. So even though the best hits are at the top, so is almost everything else. The signals are there, but they are surrounded by noise. Finding the signal amidst the noise is the difficulty.



A third reason that scanning is difficult is that early signals are also *early*. They take a long time to develop into full-blown change. While early is good because it gives time to prepare, early also allows time for a lot of other things (or in fact no things) to happen. So the signals are not that reliable; they may not result in any change at all. And the earlier they are, the more likely they are to produce no change at all.

So on balance scanning involves one or more individuals, picking up weak and early signs of change, and making subjective judgments based on their knowledge and experience by selecting what what they believe are real signs of change in a sea of noise, most of which will probably not amount to anything anyway. Now we understand the monumental task for horizon scanners!

In fact, the task is so difficult that most of us have taught ourselves to ignore almost all signs of change. We simply don't have time to comb through the ocean of new information looking for real signals. When we do find what we think is a real signal, we have to wait to see what effect it has, which is usually nothing. So horizon scanning takes a lot of time that usually does not result in real change anyway. Not only is horizon scanning difficult, therefore, it probably does not get the attention or respect it deserves because the number of hits that result in real change is quite small. The lookout on the ship reports every object that comes over the horizon whether or not it is on a collision course or not. The horizon scanner is held to a different standard, an impossibly

high one, in fact, namely "only report the signs of change that will have real consequences for the enterprise. Don't bother us with the rest." Since the standard is impossible to meet, very few people do it. As a result, the enterprise is essentially blind to the real signs of change out there and surprised when that change suddenly comes upon them .

So is it worth doing? Let's put it another way. Should a driver pay special attention to the road on a foggy, misty day? Should we be on the lookout for wild animals in a dense forest? Should we be careful not to bump into furniture in a dark room? The answer, of course, is that we should and that we should be extra careful the foggier, the denser and the darker things get. There is a point of diminishing returns, of course, where the added benefit does not out weigh the added cost, but the benefit-cost ratio is almost certainly positive in a modest effort to scan the future horizon. Simply closing our eyes to the signs of change would simply not be prudent in a turbulent time like our own.

Techniques

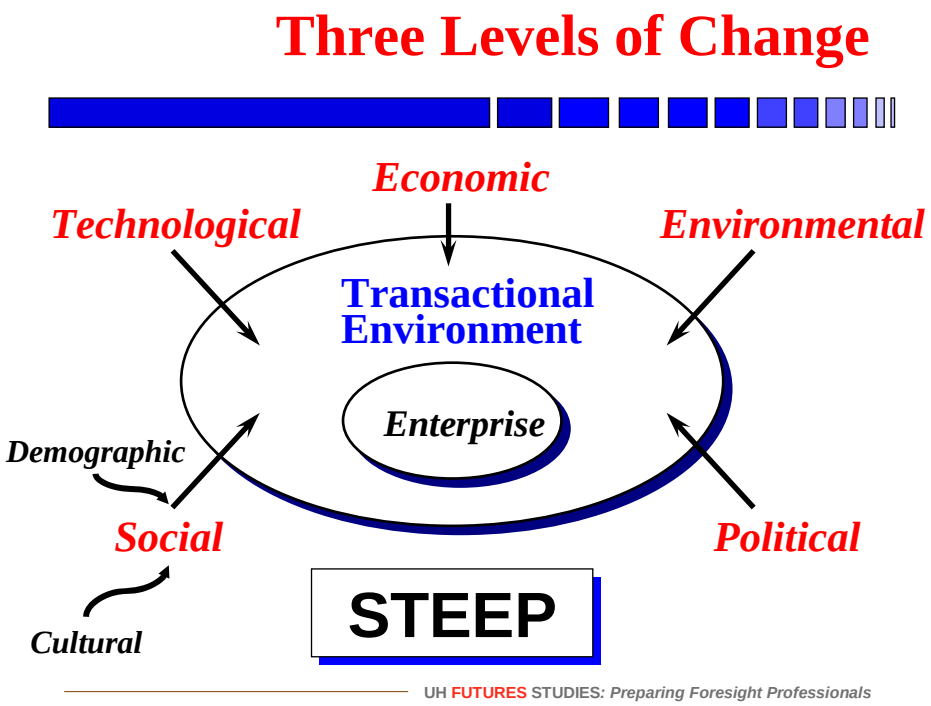
So as hard as it is, we must do it anyway and teach others to do it as well. So here are some of the techniques of scanning that we teach students at the University of Houston.

Definitions

Scanning items come in the form of *hits*. The best scanning hits are events or solid pieces of information that indicate a plausible change in the future. Items of opinion or speculation may be included, but with care. People are speculating about the future all the time, few with any solid rationale for the speculation. Sometimes those speculations are truly valuable. New ideas and perspectives have to start somewhere. Usually, however, they add little to our image of the future. The best hits are attached to a solid *news hook* that can actually change the future. They are changes, really new things in the world, that can cause additional change down the line.

Levels

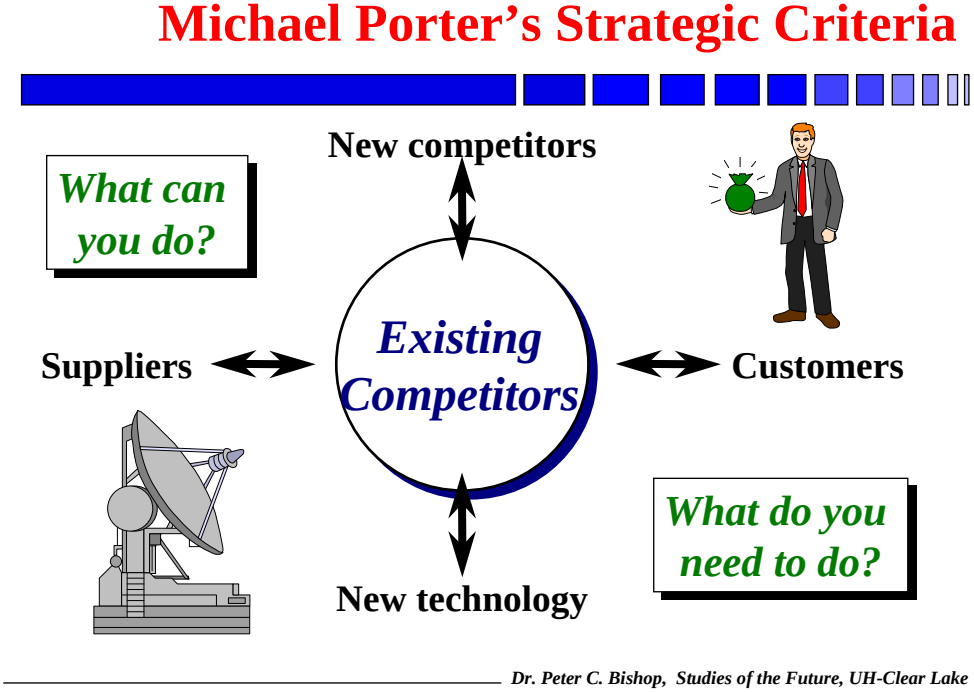
Scanning involves three levels of the domain and from five to eight distinct sectors. The levels are depicted in Figure 1.



The three levels are defined as follows:

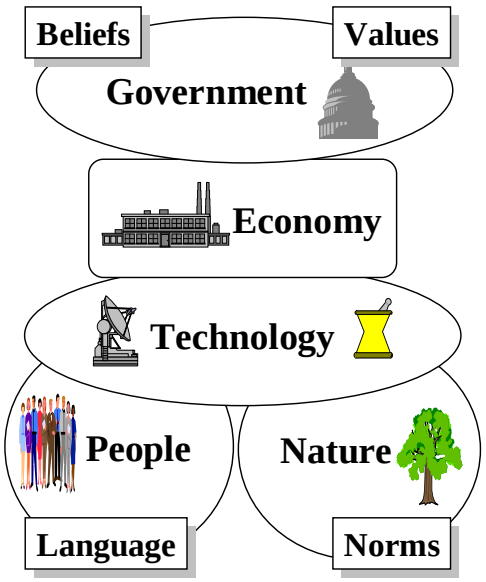
Level	*Definition*	*Examples for a university*
Enterprise	The individual, family, group, organization or community that the scanning is for	Faculty, administration, facilities, equipment, policies, procedures
Immediate environment	Factors that affect the future of the enterprise directly in the short-term	Students, employers, academic disciplines, other universities, State and Federal government
Global environment	Factors that affect the future of the industry indirectly in the long-term	Population, technologies, the general economic and political climate, public opinion

The enterprise is the center of the diagram, surrounded by the immediate environment. The immediate environment affects the enterprise directly; and for that reason, most enterprises know their immediate environments better than any general futurist would. Michael Porter has proposed what is probably the most common set of categories for the immediate environment, that of a business enterprise at least (Figure 2). One could also use the STEEP taxonomy described below applied to the immediate environment.



Just the enterprise knows its immediate environment better than anyone, so the futurist knows the global environment, that collection of forces of change that affect the enterprise only indirectly and over the long term through changes in the immediate environment. The most common list of sectors for the global environment comes from the pronounceable acronym STEEP which stands for Social, Technological, Economic, Environmental and Political. The author divides the Social category into Demographic and Cultural, although that acronym is not pronounceable. Other acronyms used are PEST (Political, Economic, Social, Technological) and EPISTLE (Economic, Political, Informational, Social, Technological, Legal, Environmental).

The Domains of Change



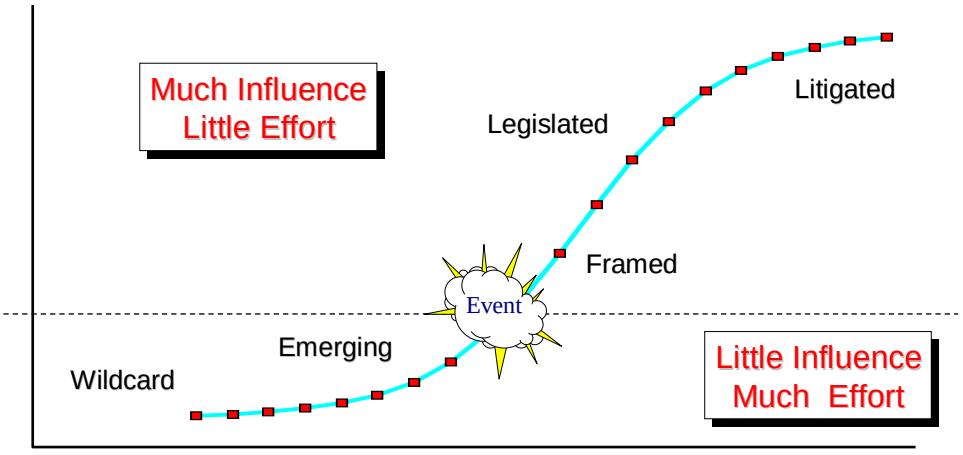
People	Number, place, sex, age, ethnic
use technology	Agriculture, energy, material, construction, manufacturing, transportation, information, communication, military, biotechnology
to transform resources	Air, water, land, materials, energy
into economic goods	Food, shelter, clothes, vehicles, other goods, services
(and waste products)	Air, water, solid, hazardous
under government oversight	Local, state, federal, international
in a cultural context	Traditions, customs, beliefs, values

The diagram in Figure 4 begins at the bottom with *People* in a natural *Habitat.* Humans are species like very other living thing, and they ultimately depend on the physical world to supply their needs. Humans are special, however, because they can use *Technology* to manipulate that habitat to get resources from the world and put them to more productive use. The technologies that get developed and the products and services that they produce are determined the *Economy*. The economy itself operates within the larger frame of *Government,* the mechanism that society uses to make collective decisions. Government, in turn, operates in the largest frame of all, *Culture* which includes the language, beliefs, values and norms that are prevalent in a society at any one time.

All of these sectors are changing, and changes in one affect all the others over time. So technology affects population (the contraceptive pill) which affects the economy (more women and older workers in the workforce) which affects government (laws on sexual harassment and the provision of Social Security) and on and on. It is impossible to catalogue all of these interactions, but recognizing that change comes in all of these sectors in a good beginning. Most people use the STEEP categories more as a checklist than as a comprehensive causal diagram. In order to prevent neglecting or discounting change from any sector.

Those indirect effects take time to affect the enterprise so they are some way off into the future. As a result, most people discount those effects, believing that they do not have time to deal with them now. But the effect of preparing for them can be quite important. Figure 2 is the issue life cycle curve originally proposed by Graham Molitor.

Issue Emergence



In the diagram, *Wildcards* are those very low probability but high impact events that could have enormous consequences for the enterprise. Even more important are *Emerging Issues*, just below the surface of general public awareness. The emerging issues are known, but they do not get much attention because they have not popped above the surface yet. They do so when an event occurs that puts the issue on the public agenda, a process called *framing.* Once an issue is framed, watch out. It becomes a focus of intensive media attention; political leaders sensing danger or advantage begin to be involved, and finally lawyers take over to settle the score. The point is that no enterprise wants to be caught on the wrong side of a framed issue.

Horizon scanning is the obvious solution to becoming aware and acting before an issue explodes. The problem is that there are an uncountable number of possible wildcards and a very large number of emerging issues, all of which cannot be monitored at once. Good scanning nevertheless involves being generally aware of many emerging issues and being sensitive to changes in the issues that could lead to framing. As described before, most emerging issues do not get framed, and they recede from view. But those that do can have significant consequences so getting even a few right puts an enterprise in a better position than just letting the issues be framed without any preparation.

The levels themselves are not mutually exclusive, nor is it necessary to be sure to get the "right" scanning item at the "right" level. The purpose of identifying the levels is to be sure to cover them all in some fashion—that is, not concentrating so narrowly on the industry itself that one misses items of change in the larger, global environment.

Quality

Scanning hits come in three types, with each type having a different effect on the framework:

Type	*Definition*	*Example* *Parenting domain*
Confirming	A change that indicates that the baseline forecast is more likely	A report that shows an increase in mothers going to work
Creating	A change that indicates that a new alternative future is more plausible	A lawsuit by non-parents in the work place contesting the family benefits offered to parents
Disconfirming	A change that makes an alternative future less plausible	New supreme court justices that continue to support *Roe v. Wade*

Unfortunately, almost all scanning hits are confirming hits that support the baseline. While it is good to know that the baseline is still the expected future, it does not take many of these hits to confirm that. Confirming hits should therefore be reported sparingly.

The real value lies in the creating and disconfirming hits--those that modify the plausible alternatives. Even more important are those hits that elevate one of the alternatives to the baseline itself, but these are extremely rare. The fall of the Soviet Union was a discontinuous event that changed the baseline for all sorts of domains. Advanced warning of such discontinuities are some of the most important items to come from the scanning function since they have a profound impact on the forecasting framework.

At a more detailed level, good scanning items range from best to worst according to a set of criteria. Those criteria are described in the following list.

Credibility	Is the source reputable? Has the source reported good hits before?
Novelty	Is the hit new? Or has it been widely reported? Is it new to the client/audience?
Likelihood	Will the hit amount to something over time? Could it change the future?
Impact	If it does, how big a change will that be? Will it change the framework document, our current image of the future?
Relevance	How important is that change to the client or the domain? Is the change direct or indirect?
Timeliness 1 (time to awareness)	How long before this information is widely known? When will it appear in a mainstream newspaper or magazine?

Timeliness 2 (time to prepare)	How long before this hit begins to change the future? Is it too late to do anything about it? Or is it so far off that action now would be premature?

Using these criteria, then, the best scanning hit is an event or a new piece of information, from a credible source, that is unknown to the client or audience and that has a high likelihood of changing the future, in a relevant way, and for which there is some time before it is generally known and some time left to do something about it.

These criteria apply to scanning in a particular domain for a particular client or audience. A second and shorter set of criteria are more appropriate for general scanning hits--i.e., events or information that could change the future in a general way. In that case, a good scanning hit needs to be *novel* (it is generally unknown or unexpected) and *important* (it could have a measurable impact on the future).

Sources

Timeliness is one of the important criteria for a good scanning hit. Finding something out a few hours before it runs on CNN is not particularly useful. At the same time, the lead time might be so long that it is irrelevant for any meaningful future today.

Graham Molitor, perhaps the most experienced scanner in the futures field, has developed a more detailed taxonomy of sources that ranks them on how much lead time they offer:

Aesthetic, poetic works
Science fiction
Fringe media, underground press, Usenet
Unpublished notes and speeches
Monographs, treatises, individual's web pages
Scientific, technical, professional journals
Highly specialized, narrow viewpoint publications
Statistical documents, social indicators, statistical services
Abstracting journals, services
Data search services, scouts
Egghead journals (*Science, Scientific American*)
"Dopesheets," product safety letters
Popular intellectual magazines (*Harper's, Atlantic)*
Network communications, small-time newsletters, pamphlets
Journals for the cause (*Consumer Reports*)
General interest publications (*Time, Newsweek*)
Compilations of general literature (*Reader's Digest*)
Poll data, public opinion, behavioral and voter attitudes
Legislative, governmental services, reports
Books -- fiction, novels, social analyses of the times
Books -- nonfiction, pull together discordant themes in poorly understood areas
Newspapers (*New York Times, Washington Post, early Southern rural papers*)
Radio-TV networks

Education journals
Significance Historical analysis
Selectivity Doctoral dissertations

The sources are ranked from the most novel to the most significant. Each level selects certain things from the previous level to report and filters out the rest. So new items appear at the top of the list and filter their way down the list until they become major issues reported in the mainstream media. Identifying items early at the top of the list increases the lead time. Unfortunately, keeping up with the vast sources at the top of the list particularly difficult. And now the Internet, with all its new web pages, listserves and newsgroups, only adds another layer of complexity to the whole mess. The "right" items are out there. Finding, identifying, selecting and reporting them is the trick.

The list also displays the gamut of what one might call risk. Risk is the probability that a scanning hit will *not* change the future. The further up the list one scans, the longer the lead time and the higher the risk that the item will "pass off the side" without ever changing the future. One must assess one's own or one's client's "risk tolerance"--i.e., how "far out" the scanning hits should be on likelihood or impact. Different situations call for different levels of risk tolerance.

Storing and reporting

No simple system exists for capturing, storing and reporting scanning hits. The most widespread public service for doing so is *Shaping Tomorrow*. *Shaping Tomorrow* is a massive database of up-to-date scanning hits with lots of features for reporting and analysis.

Another tool for scanning is the form used for capturing and reporting hits at the University of Houston (Appendix). The form contains all the possible characteristics of a good scanning hit. It may not be necessary to collect all this information in actual use, however. The form is used for education and training to encourage students to think of all aspects of the scanning hit. Organizations that collect scanning hits on a systematic basis would probably use a subset of these attributes.

The single biggest problem to enterprise level scanning is to encourage members of the enterprise to contribute to the database. While a rich source of scanning hits benefits the whole enterprise, it is hard for individuals to justify spending much time making the contributions in the face of many other pressing demands on their time. While the mechanisms of open source and crowd sourcing have produced volumes of information on the Internet in the form of computer programs, blogs, Facebook pages, etc., the routine collection of scanning hits or other pieces of intelligence at the enterprise level is a still a goal to be achieved.

Conclusion

So scanning is hard, but also necessary. That much we know. It is hard because finding the truly novel requires knowledge of experience in the domain, but the most experienced people are often the most locked into the current mindset which filters out anything new. Scanning is also hard because the signals are weak--looking for a needle in a haystack; And finally, they are early—

even most good hits do not amount to much in the long run. So in the end, asking experienced people to look for novelty in a sea of noise most of which will not change the future anyway. No wonder we tend to ignore the future!

But scanning is also necessary if we are to be prepared for change, particularly for sudden and surprising change. The saving grace for scanning, however, is that we do not have to get the future "right" for scanning to be useful. The obvious benefit of scanning is to pick up an early signal of change, evaluate its implications and prepare contingency plans in case it does occur. But even scanning hits that do not occur are valuable because they sensitize the enterprise to the fact that some change is guaranteed to happen. The current era will not go on forever because nothing goes on forever. So those who look for signs of change have already implicitly bought into the concept that the enterprise needs to be ready for change no matter where it comes from. So we are more ready to deal with the implications of change even if we are surprised, than if we first have to realize that the past is over.

As a result, scanning for change should be part of every enterprise's portfolio of strategic activities.

Resources

Aguilar, F. (1967). *Scanning the business environment*. New York: Macmillan.

Coates, J. F. (1996). *Issues management : how you can plan, organize and manage for the future.* Mt. Airy MD: Lomond.

Day, P., & Shoemaker, G. (2006). *Peripheral Vision: Detecting the Weak Signals that Make or Break Your Company*. Cambridge MA: Harvard Press.

Fahey, L., King, W. R., & Narayanan, V. K. (1981). Environmental scanning and forecasting in strategic planning: The state of the art. *Long Range Planning*, 14(1), 32-39.

Molitor, G. T. T. (2003). *The Power To Change The World: The Art of Forecasting*. Potomac MD: Public Policy Forecasting, Inc.

Morrison, J. L., Renfro, W. L., & Boucher, W. I. (1984). *Futures research and the strategic planning process: Implications for higher education* (ASHE-ERIC Higher Education Research Report No. 9). Washington, DC: Association for the Study of Higher Education. (ERIC Document Reproduction Service No. ED 259 692)

Morrison, J. L. (1992). Environmental scanning. In M. A. Whitely, J. D. Porter, and R. H. Fenske (Eds.), *A primer for new institutional researchers* (pp. 86-99). Tallahassee, Florida: The Association for Institutional Research, http://horizon.unc.edu/courses/papers/enviroscan/.

Morrison J. L. (1995). Environmental Scanning. in George T. Kurian and Graham Molitor (Eds), *Encyclopedia of the future*. New York NY: Simon and Shuster. http://horizon.unc.edu/bios/Morrison/papers/6.html.

Petersen, J. L. (1997). *Out of the blue: Wild cards and other big future surprises : how to anticipate and respond to profound change,* Madison Books.

Taleb, N. N. (2007). *The Black Swan: The Impact of the Highly Improbable*. Random House.

Appendix

The form was originally developed by Wayne Pethrick while he was a student at the Univesity of Houston-Clear Lake. Wayne is now a futurist with Pitney Bowes.

Title		**Author**	
Brief source		**Date**	
STEEP Category/s		**Keywords**	
URL			

Type *(bold one)*	Actual event New trend New cycle New plan Potential event New information New issue					
Brief description of the item						
How could the future be different as a result?						
What are the potential implications for…?	**…Stakeholder name:**					
Overall effect *(bold one)*	Confirming (baseline scenario) Creating (a new scenario) Resolving (between two scenarios)	**Impact** *(0-5)*		**Plausibility** *(0-5)*		
Baseline, new or resolved scenario(s)		**Novelty** *(0-5)*		**Timeliness** *(0-5)*		
Scanner		**Date Submitted**				

Category definitions:

Title	The title of the piece
Author	The primary author of the piece
Brief source	The name of the journal or organization that released the piece
Date	The date the piece appeared
STEEP categories	The one or more STEEP categories the piece relates to
Keywords	Other important terms that describe the piece
Full citation	The full journal or book citation or the URL

Types:	
Actual event	An event that has already happened, but which few people know about and whose implications are not fully developed
New trend	Consistent increase or decrease, more or less of something over time
New cycle	Recurring increase and decrease, more and then less of something over time
Potential event	A potential happening or occurrence
New information	Information that has just been released
New issue	Debate, conflict, decision, "Should we/they…"

Brief description	A short paragraph describing the event or the new piece of information. What happened or what new information appeared?
What could be different about the future?	A brief comparison about the future before and after this event. How does the future change a result?
What are the implications for …?	Future consequences of this event for a specific person, group or domain. State the person, group or domain that would be affected.
…Name	The name of the person, group, organization, community, country or domain
Overall impact	**Confirming** – confirms the baseline future; supports an existing condition, trend or plan **Creating** – creates a new scenario or plausible alternative future **Resolving** – shows that one scenario is becoming more probable compared to others
Baseline, new or resolved scenario(s)	The scenario that is confirmed (baseline) or created (new) or made more probable (resolved) by this scanning hit.
Impact (0-5)	How much is this event or information likely to change the future for that person, group or domain?
Plausibility (0-5)	How likely will this change actually affect the future?
Novelty (0-5)	How new is this event or piece of information to those involved?
Timeliness (0-5)	How much time do those involved have before this item becomes public or is framed in some way?
Scanner	The person submitting the hit
Date submitted	The date the scanning hit was submitted