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Glossary

Useful Strategic Foresight Terms

This is a crowd-built glossary of terms useful to strategic foresight practice, education and research. As you come across important new terms, get the best definition you can, then place them here, either in **alpha order** in the list (if you have a good definition) or **at the bottom** (if you aren't sure/want it checked).

Many of these terms are from the foresight glossary of the polymath futurist **Dennis List** of Audience Dialog. Dennis graciously allowed us to reprint them just before he passed away in 2007.



3P's foresight model

Probable, Possible, and Preferable ("3P's) futures. Widely considered to be three basic types of futures. Coined by futurist Roy Amara (Institute of the Future). See also DCM foresight skills model, for a skills-based version of this model.

Alternative futures

The idea that there is not a single future, but a range of futures, all of which might occur at the same time in different environments or for different people, as well as a range of possible futures, which are influenced by human choice today. A **pluralistic** view of the future, generally accepted among futurists.

Alternative history

The history of what might have happened but didn't. A great way to illustrate the power of choice in shaping the future. Also called a **counterfactual**. What if World War III had broken out in the 1960s? What if Napoleon had conquered the USA? What if Jesus Christ had never been born? These are counterfactuals, and stories exploring them are alternative histories.

Anticipation

If you can't predict the future correctly, what's the use of futures studies? Answer: even if you don't know what's going to happen, or when it's going to happen, you can at least **anticipate** a range of possibilities, and prepare for them.

Anticipatory action learning

An extension of action research into the area of futures studies - pioneered by Tony Stevenson and Paul Wildman, of Australia.

Assumption surfacing

A method of revealing underlying assumptions - proposed by Mason and Mitroff in 1981, which asks people to list their own assumptions. However, in our own experiments with this method, only trivial assumptions surfaced. As they say, "the fish cannot see the water." We've found this works better when two people, from different backgrounds, engage in a dialogue, and each is asked to discover the other's implicit assumptions. We're also working on a new method of surfacing assumptions by caricaturing their extremes. **Autopoiesis**

The way a living system continually renews itself by redefining the boundary between itself and its environment. From the Greek term for "self-production." Another way of putting this is that an organization's identity is defined by its relationship with the outside world. For example, a business might realize that it needs to grow in a certain direction in order to remain viable. From Chilean biologists Maturana and Varela.

B-curve

A generic **change curve**, seen in many types of biological systems, that involves an S-curve of growth followed by decline of capacity over time, and ultimate recycling and death. Looks like a "b" laid down on its long side. The impact of an individual over time, or any idea or system that eventually goes extinct or gets recycled, follows such a curve.

Baby boomers

People born between the end of World War II and the early 1960s (when the advent of the contraceptive pill dramatically lowered the birthrate in Western countries.) Often just called **Boomers**.

Backcasting

Working backwards from a possible future state to determine how it might unfold.

Bellwether

Much the same as a **precursor**: a social group that adopts trends earlier than most others. For example, it is often said that California is a bellwether state of the USA, because trends appear there first. The danger of such assumptions is that bellwethers can change. Try to imagine:

- a cosmopolitan place, which is attracting well-educated young people.
- a political and social climate that doesn't hold back change.
- a conduit for news to the rest of the world (because a trend can't be a precursor unless people elsewhere become aware of it).
- a thriving arts scene: permitted by (b) and encouraging (a) and (c). For example, in the early 21st century, Ireland qualifies on (a) and perhaps (c), Finland on (a) and (b) but probably not (c). Other possibilities are New York (still?), Hong Kong, and Prague.

Biodiversity

This term is normally used to imply that the diversity of plant and animal species should be maintained, and that extinction is undesirable, because you never know when a species might be useful. The idea can be extended beyond its biological reference to human cultures and languages. Their biodiversity might be important too.

Boundary spanning

People who pass information from one social group to another are called **boundary spanners**, because they span the boundaries between different groups. It's through boundary spanning that **diffusion** can take place effectively.

Butterfly effect

The idea, often expressed in writings on **chaos theory**, that small changes in one part of a system can produce

unpredictable large changes in another part - thus a butterfly flapping its wings in South America might trigger a snowfall in New York.

Causal Attribution

People seem impelled to assign causes to anything that happens: this seems to be some kind of deep psychological need. But if they assign the wrong causes, this belief can be difficult to change, and sometimes leads to bloodshed - for example, when one social group blames another for causing problems. Think of the Israelis and the Palestinians, the Catholics and Protestants in Northern Ireland, the Hutus and the Tutsis in Rwanda, and the Catholic/ Orthodox/ Muslim struggle in the former Yugoslavia. Causal attribution is a powerful force - so can it be reshaped? (See also **fundamental attribution error** and **ultimate attribution error**.)

Causal layered analysis (CLA)

A futures analysis approach developed by futurist Sohail Inayatullah: that the forces driving history can be subdivided into a number of layers, operating at different layers of social consciousness. He distinguishes four levels: most superficially, the "litany" (as expressed by populist media). Secondly, social causes (with a more quantitative emphasis, as found in more academic literature). Thirdly, "worldview" and the cultural structures that support them. Fourthly, and least accessible, the layer of myth and metaphor: archetypes, the collective unconscious, with an emotional rather than intellectual emphasis. To understand forces shaping the future, you must consider all four of these levels. For more information, see Sohail's website www.metafuture.org

Chain scenario

A scenario which describes a chain of events (probable or not) leading to some future. For example the futurist Herman Kahn in his book *On Escalation: Metaphors and Scenarios*, 1986 outlines chains of events that would lead to World War III. **Backcasting** is the construction of a chain scenario in reverse (from the future rather than from the present). Compare **snapshot scenario** for the more common alternative type of scenario.

Change curve

A curve that charts the change in number, capacity, or performance change in the growth, development, or decay of some system over time. There are several generic types (generic change curves) and a broad range of possible individual types. See **S-curve**, **B-curve**, and **J-curve** for some generic types. See also **linear change**, **exponential curve** and **superexponential curve** definitions.

Chaos theory

Misleadingly labelled: this is the concept that patterns which appear to be chaotic can be quite predictable, because a small change in one measure can lead to a major change in another. So if you understand the mechanisms, the apparent chaos disappears. Water changing to steam when it boils is almost an example of such "chaos". See **Butterfly effect**. The book *Chaos* by James Gleick is a clear introduction to chaos theory.

Cohort

A group of people, born during the same period. For example, the **baby boomers** are a cohort, born c.1945-1960. The term "generation" is sometimes used in a similar way, but a cohort can be much less than a generation. For example, people born in a single year are a cohort, but not a generation.

Conjecture / speculation

A thought about the future that falls short of a **prediction**. A low **probability** is implied: a conjecture is something that seems unlikely to happen.

Constructive technology assessment (CTA)

Anticipating the effects of a new technology by having meetings with a wide range of stakeholders, who foresee problems with the new technology and find improvements to it. CTA is not a specific research method, but an approach to sustainable technology development; a wide range of consensus methods can be used.

Counterfactual

A future as seen from the past: the mainstay of much science fiction. What if World War III had broken out in the 1960s? What if Napoleon had conquered the USA? What if Jesus Christ had never been born? These are counterfactuals.

Critical futures studies

A recent approach to studying the future, centred around identifying and questioning assumptions that people hold, sometimes unconsciously. A leading exponent is Sohail Inayatullah, the developer of **Causal Layered Analysis**. Critical futures is related to (but different from) **integral futures studies**.

Critical uncertainty

A type of **uncertainty** that makes a major (i.e. critical) difference to the future of the entity being studied. Often related to a discontinuity. Used in dimensional analysis. Morphological analysis is in some ways similar.

Cross-impact analysis

To do cross-impact analysis, first list the main forces that can affect the future of the system being studied. Then compare every force on the list with every other, and ask "if these two forces happen together, will the effect on the system be about the same as if each happened separately, or more, or less?" The practical problem with cross-impact analysis is that if you think of 50 forces (a typical number, in many situations), that's 1225 comparisons to be made ($50 \times 49 / 2$). For 100 forces, the number of comparisons jumps to 4950. With such large numbers, it's hard to find time to consider each pair in enough detail.

Cyclical patterns

Some experts, such as the economist Kondratieff, believe in a theory of "long waves" - i.e. that economic cycles repeat themselves every 55 to 60 years. Though a lot of (retrospective) evidence has been amassed to support this theory, and some highly respected experts support it, I'm skeptical. Why 55 years, and not 45? Is it a "clogs to clogs in three generations" effect? If so, why isn't the cycle length increasing in parallel with the growing generation span? To me, such data, without an explanation, is suspect.

There are at least three different issues mixed together here:

- (1) Do repeated economic cycles exist - or are the fluctuations of the world economy effectively random variation?
- (2) If waves exist, do they have about an equal amplitude? (If not, how can you distinguish a main wave from a sub-wave - bearing in mind the principles of Fourier analysis?)
- (3) Even if waves clearly exist, of about the same amplitude, is the periodicity roughly constant?

DCM foresight skills model

Discovering (or Predicting), **Creating** (or Envisioning), and **Managing** (or Guiding) the future. Adaptation of the 3P's Foresight Types Model, using skills/actions. Discovering/Predicting is about probable futures, what you expect to happen based on your knowledge of the world. Creating/Envisioning is about bringing forth or imagining possible futures, which may or may not last or work out (like a new product in the marketplace). Managing/Guiding is about preferable futures (working toward a future that you or others desire). For more see Graham May, *The Future is Ours*, 1996.

Decomposition

Making a numerical forecast more accurate by decomposing the figure into a set of separate trends. For example, Fred Collopy and Scott Armstrong (in 1996) decomposed an apparently random graph of annual highway deaths in the UK into two factors: traffic volume (which was irregularly rising), and death rate (steadily falling).

Delphi method

A way of estimating future measures by asking a group of experts to make estimates, recirculating the estimates back to the group, and repeating the process till the numbers converge. Often used for estimating when an event might occur - e.g. "In what year will the majority of households in OECD countries have broadband internet access?" Developed in the 1950s by Harold Linstone and Murray Turoff, and widely used, specially in Japan.

Determinism

The philosophy of destiny: that the course of history is predetermined, and there's nothing that anybody can do to change that. This leads to fatalism.

Diachronic

The view of history as a narrative, or sequence of events, with the implication that you are looking for causes in the chain. The counterpart of synchronic.

Diffusion

The way in which an innovation begins with a small group of people, then gradually spreads to a wider population. The rate of diffusion often (roughly) follows an S-curve. See the work of Frank Bass, and Everett Rogers' book *Diffusion of Innovations*.

Dimensional analysis

A common method of producing scenarios. This involves seeking the critical uncertainties - i.e. the two or three main dimensions on which the future under consideration is most uncertain, and creating scenarios around the extremes of those dimensions. Clear examples can be found in *Window on the Future: a Scenario Planning Primer* by South Wind Design, Michigan, 2001. **Discontinuity**

A sudden historical change, making it difficult to compare what came before and after. The sudden extinction of the dinosaurs is an example. However, because people focus on the recent past, a discontinuity may not be noticed till well after it happens. Thus whether the dinosaurs became extinct in a month or a thousand years is not relevant to us now, and what we currently see as discontinuities may be seen by later generations as minor changes in a broad trend. Similar to a wildcard event. See also surprise and innovation (discontinuous).

Discount rate

A concept first used by accountants: that income in the future is worth less than income now. The higher your discount rate, the less willing you are to make long-term investments. In practice, many people heavily discount the future, such that a benefit now (to you, for example) is worth many times more than a benefit in a few decades' time (to your children).

Driver

A broad term for any force causing change, whether brought about by persons, organizations, or STEEPS3 conditions.

Dystopia

The opposite of Utopia - an account of an undesirable future. Novels such as George Orwell's *1984*, Aldous Huxley's *Brave New World*, and Eugene Zamiatin's *We* are considered dystopias - which makes

them dystopic. Emergence

When complex results arise from a combination of simple causes. An idea much liked by chaos theorists, who like to build simple computer models and imply that reality is equally predictable. Though this may work for (e.g) predicting the shape of ants' nests, it doesn't work for human society, partly because of reflexivity. See also self-organization - a very similar concept. **Emerging issue analysis (EIA)**

Similar to environmental scanning, but tries to pick up trends much earlier in their lifespan - hence the name "emerging issues". Futurist Graham Molitor has written a lot about this. The key to EIA is to find precursors: people, places, organizations, and writing that is ahead of the rest of the world. One of Molitor's main findings is that new ideas often begin at the fringes of society, and slowly work their way toward the mainstream.

Endogenous

Caused from within. For example, if a manufacturer decides to stop making one product and make another instead, the change is endogenous if the decision is a completely internal one. But if they decide to change because the market for the old product was disappearing, the decision might be endogenous, but the influence would be exogenous (the opposite).

Environmental scanning / Horizon scanning

Also known as horizon scanning, often abbreviated to just **scanning**. A systematic method of looking for drivers that influence the future. The process can be passive or active, continuous or occasional. "Environmental" here is not restricted to the natural environment, but covers all types of environment - see **STEEPS3** foresight categories model.

Episteme

In the sense used by the French philosopher Foucault: the collective worldview of a particular culture, in a certain place and time. An episteme structures the way people think, and determines what is discussable. Not quite linguistic limitations, not quite social desirability, but something in between.

Event sequence analysis

Studying sequences of historical events to determine the extent of repetition. This area has been explored not by historians or futurists, but by sociologists. See pattern language.

Exogenous

Caused externally. For example, when an industry, or an area changes due to pressures from outside the industry, that's an exogenous change. The opposite of endogenous.

Exponential curve

A generic **change curve**, $x(t) = ce^{kt}$, seen in many types of physical systems when the growth (or decline) in number, capacity, or performance is a function of the number present at any time. Think of population growth in a resource-unlimited environment, or exponential decay. Also seen in the growth of velocity under a force (gravitational and other acceleration), and perhaps, in the growth in computing power in local areas of the universe over time (**law of accelerating returns**). The shape of exponential curves look the same at every point along the curve. Compare to **J-curve / superexponential curve**.

Extended present

Elise Boulding's idea that the "present" is not just the moment when you are reading this word, but extends several generations before and after that, perhaps 100 years from now in each direction. For geologists, the extended present might be plus or minus a million years from now. To think of the present as longer-lasting helps put our present time

into a larger perspective. **Extrapolation**

A method used in forecasting - much the same as projection. If you drank one cup of coffee yesterday and two today, then you will drink 3 tomorrow (by arithmetical extrapolation: adding one each time) or 4 (by geometric extrapolation - doubling each time). You can do this with letters too. A little puzzle: what comes next, after A H I M ?

Event tree

Think of a tree as having a trunk, that spreads out into a number of branches above and a number of roots below. If the trunk represents an event, the roots are the causes and the branches are the effects. Used in **inmidcasting**, to create interlinked networks of event trees. This concept is an adaptation of the problem trees used in ZOPP.

Evolutionary development / evo devo / evo-devo

A new academic discipline, evolutionary developmental biology, or "evo devo" (see *Endless Forms Most Beautiful: The New Science of Evo Devo*, Sean Carroll, 2006) that examines the relationships between embryonic development and evolutionary change, despite the radically different time scales of these two processes. More generally, it is the recognition that both processes occur on long timescales, using very different dynamics. See also **universal evolutionary development**.

Factor X

...where X is a number, usually 10 or 20. It represents the increase in efficiency needed in rich countries' use of the earth's resources to attain sustainability a few decades in the future. When X is 20, it means we need to reduce resource usage to 5% of the present figure. It will have to happen - and it won't be that difficult. More detail at www.factor10-institute.org **Fatalism**

The psychological counterpart of **determinism**: the belief that the future will happen anyway, and there's nothing that anybody can do about it. It follows that it's useless to try and improve the human condition. The concept of **fate** is not quite so fatalistic: the endpoint may be predetermined, but the routes to it may not. See also **determinism**.

Feedback

The process by which the effect of an event can also cause that event. There are two forms: **positive feedback** (strengthening the event) and **negative feedback** (weakening it). Simple examples of feedback are hard with audio systems. If a microphone picks up the sounds from a loudspeaker that it's connected to, positive feedback amplifies some of the sounds, and the result is a high-pitched screech. When an audio amplifying system works as intended, it uses negative feedback: the (loud) output signal of an amplifier is compared with the (soft) input signal, and automatically modified so that it becomes an accurate reflection of the input, but louder.

Field anomaly relaxation (FAR)

A concept developed by Russell Rhyne, used in **morphological analysis**. It involves a systematic approach to reduce the number of combinations of future possibilities to a manageable level, by excluding combinations that are implausible.

Four-box scenarios

A scenario development method popularized by futurist consulting firm **Global Business Network**. Involves taking two "important but uncertain" dichotomies or dimensions of possible outcome, such as whether the economy will grow or not over the coming decade, whether individual actors or collective policies will have more influence, or whether virtual or physical firms will be more productive (that's three, but only two of these would be picked to four-box the outcomes) and charting the four possible combinations of the two dichotomies/dimensions. Each combination is then made into a scenario, leaving four possible futures. See **dimensional analysis** for more.

Force-field analysis

This method, developed in the 1950s by psychologist Kurt Lewin, compares the forces helping and the forces hindering a desired outcome. One set of forces tries to change the status quo, and the other tries to keep it. Identifying these opposing forces helps people to plan ways of dealing with them. **Forecasting**

Predicting that an event will happen, to a defined extent, and sometimes with a defined probability. For example "there's a 50-50 chance that at least 1 millimetre of rain will fall in this area tomorrow" is a forecast. Forecasts are usually applied to short-term futures - no more than a few years ahead. A forecast is considered to be less certain than prediction, but more certain than conjecture or anticipation.

Foresight

A broad term covering all methods of envisaging the future, but with an emphasis on the **alternative futures** concept. Most writers on foresight - those who do **foresighting** - consider it to include some element of action or decision, so forecasting alone is not enough to qualify as foresight, though it is a part of it. Compare with **future/s studies**.

Foresight development

Improving our human ability to think about the future *and* to act effectively now to build a better future. Foresight development thus includes **futures studies plus** foresighted thinking and behaviors. Assumes that the human response to the future is both a mental/psychological skill that can be improved (like hindsight or insight) and a set of behavior habits (like organizing, predicting, planning, investing, insurance, etc.) that can be strengthened with study and practice. These are often divided into various skillsets (eg., **CDM foresight skills model**). **Framing**

A psychological setting that gives specific meaning to a statement. For example, a child might be scared by a horror film, so a parent will say "don't be afraid, it's only a movie." Originally proposed by Gregory Bateson in "A theory of play and fantasy", in *Steps to An Ecology of Mind*. When you are thinking inside a frame, and aren't aware of it, you won't realize that it can change. See also **reframing**.

Future

This common word is mentioned here because it actually has two meanings, which could be called future-as-time and future-as-image. If you ask "when is the future?" the answer is that it's some time ahead, but probably not this year. But if you ask "where is the future?" the present tense gives it away: it's inside people's heads, and as such it's here right now. These two different meanings can cause confusion.

Future memory

When you have mentally prepared for a situation in advance, you recognize the early warning signs (precursors) that you had anticipated. In that sense, you are remembering your earlier vision of the future. This enables you to quickly put your plans into action.

Future shock

The idea that people are traumatized by the speed of change. Popularized by the 1970 book of the same name by Alvin Toffler.

Futures studies

The study of the ways in which futures could happen. Note the plural: this makes it clear that at least some aspects of our futures are not predetermined. Futures studies is an emerging academic discipline that reflects on how today's changes and continuities become tomorrow's reality. It attempts to analyze the sources, patterns, and causes of change and stability in order to develop foresight and to map alternative futures. Unfortunately, use of the plural

"futures" causes some confusion with market trading of commodity futures - perhaps a reason for the use of the alternative word **foresight** to describe the study of the future/s. See Wikipedia def.

Futures triangle

A triangle is used to help discern the plausible future and develop strategy. The three points of the triangle represent the pull or image of the future (visual), the push or drivers of the present (quantitative) and the weight or barriers of the past (deep structures). There are dominant and contending images, with various weights. This method was developed by Sohail Inayatullah; see *Causal Layered Analysis*.

Futures wheel

Beginning from the present, consider a number of possibilities that might occur. From each of those possibilities, what other possibilities follow? Continue this process, in the form of a diagram (similar to a mind-map), and it will take a shape resembling a wheel.

Futurectecture

Architecture that is very modern, futuristic, daring, sustainable, artificially intelligent, or otherwise inspiring.

Futurable

A possible future. The term comes from Bertrand de Jouvenel, in *The Art of Conjecture*, one of the earliest books on future studies - first published in English in 1967, in French a few years earlier.

Futurist

One who looks to and analyzes the future. Futurists usually look out more than just a few years ahead. Fortune tellers and prophets don't qualify, because they have no scientific basis for their predictions. Most forecasters don't qualify either, because their focus is short-term and focused on just a few measures. Futurists at the *Acceleration Studies Foundation* have described twelve common futurist types--six social types, and six methodological types. See *Twelve Types of Futurist* def. See Wikipedia def.

Futurology

An older term for the study of the future, used mainly in the US around the 1960s. The "ology" ending has connotations that the future is scientifically predictable. These days, the more neutral term "futures studies" is preferred, and experts in this area are called Futurists, not Futurologists.

Futurtechure

Architecture that does one or all of the three following things. It employs lateral thinking, it uses a futuristic style, or it solves a future problem.

Generations X and Y

These are supposed to be people born in the decades after the baby boomers: perhaps the 1960s for Generation X and the 1970s for Generation Y. A theory often mentioned by "pop futurists" and marketing gurus. It might be worth considering - if it could be established that all people born in a certain decade have characteristics in common that do not relate to their age group at the time. In other words, this is a type of cohort theory. Be suspicious!

Generic growth scenarios / SBJ scenarios / Dator's Four Futures

Four classic growth alternatives for complex systems, told in scenario format: Continuation, Limits and Discipline, Decline and Collapse, and Transformation. The four outcomes are represented by different parts of the S-, B-, and J-curves. All four of these outcomes probably operate in various parts of complex systems as any major change occurs. Each is a very important perspective on the process of change. First described by futurist Jim Dator in 1979.

Compare to **Four-box scenarios**.

Gestalt

A holistic perception of something - seeing it as a whole.

Hindsight

The opposite of **foresight**: the ability to review the past, to say what has happened, and why. Hindsight is a lot easier than foresight. Looking back into the past, you can say "How can anybody have been so stupid as not to see that X would happen?" But if you wanted to be critical about hindsight, you could dismiss it as post-hoc rationalization - reinterpreting history to suit your purpose.

Holistic

Considering a system as a whole, not as a collection of parts. (That would be considered **atomistic**.) Atomistic views of you include your separate roles as (perhaps) employee, consumer, mother ... - or as head, arms, torso ... - or as skin, bone, blood ... - and so on. Though there are many kinds of atomistic view, there is only one holistic view: of you as an entire person. Compare with *gestalt*.

Holon

A holon is a system that contains other systems, and is itself contained within a larger system. For example, you are a holon, because your body contains a number of systems (nervous system, digestion system, brain, etc) but you are part of a larger system (a family), which is also part of a larger system (a settlement) ... and so on. This useful concept was originated by Arthur Koestler, in his 1967 book *Ghost in the Machine*.

Image

A mental picture of the future - similar to vision.

Incasting

Imagining yourself to be living in a particular future scenario, and working through its implications. A method developed mainly by futurists Jim Dator and Wendy Schultz.

Innovation

A confusing term, because innovation surveys use various definitions, as explained in the OECD's Oslo Manual (90-page PDF). The key points are (a) that invention is not innovation, but the *use* of invention is, (b) innovation can be a process as well as a product, and (c) an innovation is new in its context, not necessarily in all world history. In the 1930s mirrors were not an innovation in Europe, but they caused much surprise in the highlands of New Guinea. Innovation can be considered either incremental or **discontinuous**. An incremental innovation is an improvement to an existing system - such as the move from videotape to DVD, while a discontinuous (or radical) innovation is something quite new - such as the move from nothing to videotape. But whether an innovation is classed as incremental or radical depends on the context you see it in. For television audiences, videotape was discontinuous. For recordists it was an incremental advance from audio to video, but for maintenance people the helical scanning technology made it discontinuous.

Institutionalization

Making change semi-permanent by building it into a country's institutional structure: a step that some governments try to take, so that their policies will continue after they are voted out.

Integral futures

An approach developed by leading futurist Richard A Slaughter. The label "integral" applies to the use of individual and internal futures, as well as social and political. It emphasizes that the future is brought about as much by people's inner

(mental) worlds as by external events. You could say that it's people's interpretation of events, not the events themselves, that create "the future." Slaughter, based on the work of Ken Wilber, distinguishes four types of "world" that create the future: subjective intentions, subjective culture, objective social, and objective behaviour. For a more detailed explanation, see Slaughter's paper Knowledge creation, futures methodologies, and the integral agenda, and his website www.foresightinternational.com.au. See also critical futures, above.

J-curve / superexponential curve

A generic **change curve**, seen in special physical systems, where at some point in capacity or time, known as the "knee of the curve," the growth (or decline) in number, capacity, or performance rapidly turns a corner, and becomes effectively asymptotic (goes vertically up or down). See **technological singularity** for an example. Compare to **exponential curve**. Superexponential curves and processes may have exponential growth as a baseline, but with additional positive (or negative) feedback cycles that push the curve steeper than exponential. In *The Age of Spiritual Machines*, 2000, futurist Ray Kurzweil proposed that computer performance growth has been gently superexponential over the last 110 years because computer capacity seems to grow exponentially on average over time, yet as computer power grows in an absolute sense, the computer industry becomes more useful to society, and more resources (including people and computers) are used to generate the next generation of computers, pushing the growth superexponential.

Judgemental forecasting

Making a numerical forecast using expert judgement or intuition, not only mathematical formulas. (Though of course the assumptions built into those formulas also make them somewhat judgemental.) Much the same as subjective forecasting or qualitative forecasting.

Lacandecinal[adj.] {lack-can-dess-in-all}

Describes someone both apathetic and ignorant, mostly used as derogatory, somewhat obscure.

Lagging indicator

A measure, usually economic, that occurs after others. The opposite of a **leading indicator**. Examples of lagging indicators are unemployment rates (because unemployment rises late in the standard economic cycle), and official statistics (lagging in a different sense, because they can take years to be published).

Law of accelerating returns

The proposal by futurist Ray Kurzweil that Moore's law of exponential growth in computer power and technological ability can be extended back to the beginning of computing technology. Whenever a technology approaches some kind of a barrier, according to Kurzweil, a new technology is invented to allow us to cross that barrier. He cites numerous past examples of this to substantiate his assertions. He predicts that such **paradigm shifts** have and will continue to become increasingly common, leading to "technological change so rapid and profound it represents a rupture in the fabric of human history." See **technological singularity**.

Leading indicator

A measure, often economic, that occurs before others. For example, the numbers of job advertisements and new housing approvals are leading indicators of economic growth. The opposite of a **lagging indicator**.

Lead time

The time it takes for something to happen, between planning and implementation. For example, the lead time for a major construction project may be many years.

Limits to Growth

The concept that the world will run out of essential minerals before long. From a book of the same name (1972) by Mesarovic and Pestel. A type of **Malthusian view**.

Linear change

Arithmetic change ($y = Mx + b$) in a system over time. Compare to **exponential change**.

Macrohistory

Studying history on the largest scale, looking at the whole world over centuries, and discovering broad patterns - some of which may continue into the future.

Malthusian

The theory of Thomas Malthus (c.1780), who believed that the world's population would increase to the threshold of starvation. Cf **Limits to Growth**. **Mechanism**

A method through which social change occurs; a way in which a cause is expressed. For example, a well known mechanism is that the public becomes disturbed about an issue, and votes in a new government, which changes a law, which is generally obeyed. On a smaller scale are mechanisms that apply to individuals, such as Freud's defence mechanisms. **Midcasting**

A scenario-building method developed by Dennis List (of Audience Dialogue), part of **scenario network mapping**. It involves defining a set of possible futures, and a set of present situations (as seen by different actors), and using event trees to envisaging scenarios that create paths between the presents and the futures.

Mindset

A person's habitual way of thinking or perceiving, similar to **worldview**, but perhaps changing in different situations or roles. You can use one mindset as a driver and another as a pedestrian, but both will spring from the same worldview.

Modelling

Creating a model of what might happen in the future, using a set of equations that relate inputs to outputs - a mathematical model, that runs on a computer. Special software is available for creating these models, or you can simply use a spreadsheet, setting up a series of formulas in cells that reference one another. The difficulty lies in verifying the assumptions embodied in the equations - often not a mathematical process at all.

Mode-locking

Much the same as path dependence, but this term is used by physicists and related scientists.

Moore's law

The observation by Gordon Moore (co-founder of Intel) in 1965 that the number of transistors on an integrated circuit (and by proxy, its computing power) doubles predictably every 18 months. Later revised up to 24 months. This 24 month doubling has been seen in many measures of computing and network performance (memory, instructions per second, clock cycles, wired and wireless bandwidth, network speed, etc.), for longer periods in some cases than in others.

Morphological analysis

A way of looking at the future, by dividing it into logically exclusive possibilities. First proposed by the medieval theologian Ramon Lull. A trivial example: what will the weather be at midday tomorrow? Looking at all possible combinations of sun, cloud, rain, and wind, not all of these are possible, and some conditional predictions can safely be made: e.g. there will not be both sun and rain in the same place unless it is windy. The website of the Swedish Morphological Society (www.swemorph.com) has a lot of information on this approach. The relevance tree and Field

Anomaly Relaxation are related approaches, as is critical uncertainty.

Multiple perspectives

Considering a problem from a number of different viewpoints, either the viewpoints of different actors, or using different metaphors. The TOP approach of Harold Linstone is one of the best known multiple perspectives methods: looking at something from a Technological, Organizational/societal, or Personal/individual perspective. T emphasizes problem-solving or production; P emphasizes process and action; and P emphasizes influence and power (P). The 1993 book *The Unbounded Mind* by Ian I Mitroff and Harold A Linstone is one of the clearest explanations of multiple perspectives.

Normative

A normative scenario is one that describes a preferred future. (That's the futurists' sense of the word; it has a different meaning in psychological testing, where it refers to comparing individuals.)

Odds

Another way of expressing probability, often used in betting on sports. If an event has a 10% probability of happening, there are 9 ways it can happen for every 1 that it can't, so the odds are expressed as "9 to 1 against".

Paradigm

A set of assumptions that are so widespread in a particular society that people hardly notice they think that way.

A **paradigm shift** is a change in a paradigm - often not noticed till it's well under way. Paradigm shifts take years to happen - for example, the gradual acceptance of Darwin's evolutionary theory, superseding religious creation theories.

Path dependence

When it's hard to escape from a state you're in. For example, if you're used to the arrangement of keys on the standard QWERTY typewriter keyboard, it will be difficult for you to learn the more efficient Dvorak keyboard, with the letters differently arranged: you are path-dependent. Much the same as mode-locking.

Pattern language

A concept originated by the architect Christopher Alexander. It refers to a set of repeated patterns, on a wide range of scales, that apply in urban design and architecture. In the 1990s this idea was taken up by software developers, who found repeated patterns in the software they were writing. The same concept can be applied to time: though history never repeats itself exactly, the same general patterns occur again and again. Thus there can be a pattern language of events. See event sequence analysis.

Pluralism

The condition of being multiple or plural. A condition in which numerous distinct ethnic, religious, or cultural groups are present and tolerated within a society. The belief that such a condition is desirable or socially beneficial. In philosophy, the belief that no single explanatory system or view of reality can account for all the phenomena of life.

Positive-Sum Game / Non-Zero Sum Game / Win-Win Game

A game or interaction which is designed in such a way that all participants can profit from it in one way or another.

Either the number of desirable outcomes or the size of the whole resource grows by playing the game, so that even if one's percentage return decreases from year 1 to year 2, one's absolute return may go up. Compare this to a **zero-sum game** where only one or a few can win, and where one's getting more must always involve another's getting less.

Capitalism, democracy, fair laws, and moral/ethical codes are all often considered examples of positive-sum games that are "played" heavily by most societies on Earth today. Because playing these games (following their rules) makes certain resources more available over time, more people can "win" more every year compared to last year, even as they compete for the same things. Consider the way the size of a capitalist economy grows over time, or the way access to citizen services grows over time in a healthy democracy. See Nonzero, Robert Wright, 2001 for an acclaimed book on the way these games have evolved over human history and where they may go in the future.

Precursor

When social trends happen earlier in some places, among some groups of people, the latter are called precursors - and studying them may provide leading indicators. Places such as Scandinavia and California are often considered precursors, as are well-educated young adults. Since the 1960s, the baby boomer generation has been a precursor group in a wide range of ways. Similar to bellwether. Used in emerging issues analysis.

Prediction

A specific statement that something will happen in the future. "It will rain tomorrow" is a prediction, and so is "If the wind is westerly and I sleep till after 8am, it will rain tomorrow" - but "it may rain tomorrow" is not a prediction.

Probability

The likelihood that an event will occur, on a scale ranging from 0 (no chance at all) to 1 (or 100% - totally predictable). Related to odds.

Prognosis

A set of expectations for a future that seems likely to occur - e.g. if world interest rates decline this year, the prognosis is that share prices will increase. A prognosis would be less certain than a prediction but more certain than a forecast.

Projection

A term used in forecasting, similar to extrapolation. For example, if the population of a city was 90,000 last year and 100,000 this year, the simplest projection would be for a population of 110,000 next year. These days, forecasts often produce multiple projections, depending on various assumptions. For example, an assumption of high economic growth for the city might lead to a projection of 115,000, while low economic growth might give a projected population of 105,000.

Prospective (Ia)

A term used by French futurist Michel Godet to label a set of scenario-based methods he has developed for examining the future. *La prospective* (pronounced **prospectEEV**, as in French) involves assessing the likely motives and actions of all actors involved in a situation, and produces numerical results.

Prospective evaluation

Evaluating the success of a project that hasn't yet begun. Can take the form of **environmental impact analysis** or **social impact analysis** - but cost-benefit analysis and cost-effectiveness analysis are not usually regarded as prospective evaluation.

Qualitative forecasting

Much the same as judgemental forecasting.

Reflexivity

One reason why forecasting, in human affairs, doesn't work very well. If people know they are expected to behave in a certain way, they're likely to change that way, and spoil the forecast. Stock exchanges are a good example of reflexivity, with the investors trying to out-anticipate one another. Bandwagon and underdog effects are also examples of reflexivity. **Reframing**

Looking at a situation or problem in a different way, or from a different point of view, often using multiple perspectives. For example, consider what's missing from a situation instead of what's present, or ask "How would a Martian visitor

describe this to other Martians?" As people often can't see their own viewpoints - particularly in an organization they're immersed in - it helps to bring in an outsider - perhaps even a Martian. See also framing and episteme.

Relevance tree

A hierarchical way of representing all possibilities in a situation. For example, a relevance tree for an organization in ten years' time might be

1. Will it exist or not?
2. If it exists, will it be in the same form as now, or a different form?

As each question has several possible answers, the tree splits into several branches at each question. If the logic is rigorous, every possibility must be covered. However the shape of the tree depends on the order in which the questions are asked, and this is reliance on judgement is this method's weakness. See Morphological analysis, which is related.

Risk

Do you already know what risk is? But perhaps you're not aware that it has two senses: the negative and the positive. Risks are usually seen as threats - the risk of something bad happening - but they can also be opportunities. To perceive risk only as a threat is a recipe for inaction: "We'd better not do X because it has risks." A balanced view of risk can be more helpful in making decisions.

S-curve

Also called a **sigmoid** or **logistic curve**. A generic **change curve**, seen in many types of natural and social systems: they begin very slowly, gradually accelerate, then slow down again as penetration approaches 100% of the population. Think of population growth in a finite environment, adoption of consumer products, the growth in types of knowledge, etc.

Scanning

Abbreviation for environmental scanning, used when there is no ambiguity. **Scenario**

Normally (in futures studies) this refers to brief description of a possible future. This is known as a snapshot scenario, because it's like a snapshot or photo of the future. A slightly different meaning, also used in futures studies, is that a scenario is a description of the route from now to a possible future. This is known as a chain scenario. Unlike a forecast, which predicts future values of a few specific variables, a scenario is more descriptive than numerical. Dennis List's Scenario network mapping is a variant of scenario planning, more similar to Causal Layered Analysis.

Scenario planning / scenario learning

What do you do with scenarios when you've created a set of them? There are two main uses. You could use them to make a plan, perhaps to help with your strategic planning. Alternatively, you could focus on the learning process among the people who created the scenarios. Of course, many scenario ensembles are used for both purposes.

Self-fulfilling prophecy

A prediction that helps itself to come true: for example, the belief that the price of a company's shares will drop is often self-fulfilling. The opposite, maybe more common, is the **self-defeating prophecy**: for example, Herman Kahn's books outlining scenarios for nuclear war (though not exactly prophecies) perhaps convinced US and Soviet government officials that nobody would gain from such a war, thus helping to prevent it. **Self-organization**

Similar to emergence - what happens when a group of people (or animals) spontaneously organize themselves for some purpose, without any control from "above". This covers everything from birds flying in formation to spontaneous independence movements.

Simulation

Modelling with an element of time, using either a computer program or a game with human players. A series of events is simulated, to find out what's likely to happen next.

Snapshot scenario

A scenario, usually written in the present tense, describing an environment at some time in the future as a fait accompli (an accomplished event), but *leaving out the steps* by which this environment emerged from the present day. Most published scenarios are of this type. See **chain scenario** for the alternative.

STEEPS3 foresight categories model

(Pronounced: "**Steeps three**"). A way of looking at the future in terms of eight general subject categories:

- Science (abbreviated "**S zero**"),
- Technology & Information ("**T**"),
- Environment, Energy, Resources, and Global Issues ("**E one**"),
- Economics, Globalization & Capitalism ("**E two**"),
- Politics, Security & Democracy ("**P**"),
- Society (Big): Culture, Media, Education & Religion ("**S one**"),
- Society (Medium): Business & Organizations ("**S two**"), and
- Society (Small): Personal & Career ("**S three**").

One advantage of STEEPS3 over other foresight category models is that, for those who wish to see it this way, it roughly stacks the change **drivers** in the order of fastest, most powerful, most fundamental, or most irreversible first. If you don't know what's happening in the relevant science labs and theory, then you can't adequately evaluate technology and information futures and options, and so on down the list. It is a bias to consider STEEP drivers as either faster, more powerful, more fundamental, or more irreversible than S3 (big, medium, and small society), and to believe that these drivers can often shape and constrain society's options even more than society shapes and constrains them, and it is not necessary to accept this view to use the STEEPS3 model. But in a world of accelerating sci-tech change, this may be a relatively accurate view. Human society not fully controlling science and technology, but is rather partially controlling it, and helping it to become more powerful, relative to nontechnological humanity, every day. STEEPS3 is ASF's expansion of the older but less useful "**STEEP**" Foresight Categories Model, where S is Society (considered as all one type), and Science is lumped in with technology (two very different beasts). One danger of all categorical foresight models is that after considering each of the 8 (or 5, or whatever) change drivers and how they interact, you may stop looking for influences. Such models are helpful for starting an **environmental scanning** process, but you always need to consider "What else?"

Strategic intent

Statements of Strategic Intent - much the same as **Strategic Purpose** - are becoming popular with large organizations. These are shorter and looser than a strategic plan, but more detailed than a mission or vision statement. They describe what the organization is trying to accomplish, in practical terms.

Strategic planning and scenario planning

The differences between strategic planning and scenario planning:

- Strategic planning is about one organization; scenario planning usually has a broader scope, e.g. an industry or a geographical area.

- Strategic planning implies that the organization can set and achieve its targets regardless of its environment; scenario planning takes a broader range of factors into account, sometimes implying that the organization has no control over its environment.

Scenario planning is often done as an input to strategic planning - but rarely vice versa.

Subjective forecasting

Much the same as judgemental forecasting. The result is still expressed in numerical terms, but human judgement is involved in predicting the correct numerical outcome, taking into account factors that a forecast based solely on past trends will not reflect. For example, if a new government policy is likely to change the demand for a product or service, its effect can only be assessed subjectively.

Surmise

Similar to Conjecture - a recognition that something may happen, and what might follow from that. A famous example, from a poem by Keats: Like stout Cortes when, with eagle eyes He stared at the Pacific, and all his men Looked at each other with a wild surmise, Silent upon a peak in Darien. - though actually it was Balboa, not Keats, who was the first European to see the Pacific.

Surprise

When a gap suddenly arises between your perceptions and your expectations of a situation, that's surprise. It can happen either because your expectations were unrealistic, or your perceptions are wrong. As expectations gradually adjust, the level of surprise fades away. Managers of organizations dislike surprises, regarding them as bad news, but for young children, surprises (often stage-managed by parents) are good news. Is there room for rapprochement here? See also *wildcard* and *discontinuity*.

Notice that "surprise" has two different meanings - it's both a cause and an effect - a surprise [cause] surprises [effect] you. The surprise that you then feel is an effect. Failure to notice this distinction has caused some confusion in writings on surprise.

Sustainability

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This elegantly succinct definition comes from the Brundtland Commission of 1983.

Synchronic

The view of history as a set of situations (rather than events) occurring at the same time and influencing one another.

The counterpart of *diachronic*. **Synergy**

When two factors are combined, something can happen that doesn't happen with either of them separately. For example, with two-pack epoxy glue, the glue doesn't work until the two liquids are mixed. And nichrome alloy (steel, nickel, chromium) is tougher than any of its three component metals. And it takes both a woman and a man to produce a baby. The inventor Buckminster Fuller defined synergy concisely as "the behaviour of whole systems unpredicted by the behaviour of their parts."

System dynamics

An approach popularized by Jay Forrester and the Club of Rome in the 1970s with its controversial book *Limits to Growth*. Social change is described in terms of stocks and flows, with loops of positive and negative feedback, and various time lags. This is a quantitative method. Numbers are attached to the various inputs, and software calculates outputs - which are often not intuitive. Not so well suited to situations that can't be readily quantified.

Systems thinking

Thinking about things as if they are **systems** - with inputs, processes, and outputs, and boundaries. Systems often contain subsystems, and/or are part of larger systems (see *holon*). It's important to realize that systems are a human's view of the world, not intrinsic properties of a world, so (specially for social systems) boundaries are usually arguable. Even something seemingly as immutable as the Solar System can be redefined - e.g. with the recent decision that Pluto is not a planet after all.

Technological singularity

The point at which machine intelligence becomes generally human-surpassing (general artificial intelligence) not just in very specific areas of intelligence (a has already occurred today), but in a generalized sense, and including all our "higher" mental features (imagination, creativity, emotion, empathy, morality, linguistic ability). Alternatively, the point at which machines *successfully* claim to be conscious (perhaps in a court of law), even if they are not yet human-surpassing in all aspects of their intelligence.

Another more scientific/physical definition of the singularity is a phase change (phase transition) in a complex system (like Earth's human-machine intelligence system), like the move from gas to liquid or from liquid to solid. New dynamical models, both different from and at least partially unpredicted from their predecessors, emerge. A third definition, perhaps the weakest, is based on the human-observed pace of technological change, which is ever-increasing. When the observed rate of change starts to look infinite or instantaneous to today's unaugmented human observers, a singularity may be said to have occurred. See Wikipedia def. See also **superexponential change**.

Technology foresight

A term normally used in a public policy context: planning for sustainable technology development. Futures methods such as Delphi are commonly used in technology foresight. See *Constructive technology assessment*. **Technology roadmapping**

When a new invention goes into production, there are often many suppliers and intermediaries who need to be coordinated. Technology roadmapping (TRM for short) is becoming a popular method for doing this; the end result is a timetable-like graph showing who needs to do what, at what point on the time-line.

Terminal scenario / developmental attractor

A **scenario** describing a future situation that no longer changes substantially because it is in some way terminal, or an endstate. In *The End of History*, 2006, Frank Fukuyama popularized the idea that capitalist social democracy may be an endstate scenario for all civilized governments of humans, by humans. Universal evo devo theory would call such endstates developmental attractors, as they may be "ideal" configurations for complex systems in our universe, discovered independently by many, most, or all life forms throughout our universe, even as they each take different evolutionary paths toward the endstates.

Time horizon

How far into the future a person or organization considers possibilities. If a company has a 3-year plan, and never looks beyond that, its time horizon is three years.

TINA: There Is No Alternative

An expression of determinism, first used by the Thatcher government in the UK in the 1980s, then applied to globalization, and generalized to the concept of unstoppable forces driving the future.

TOP: Technological, Organizational, Personal

An acronym used in multiple perspectives thinking, examining the world using three broad kinds of perspective: the Technological, the Organizational, and the Personal. A concept developed by Harold Linstone and Ian Mitroff.

Trend

A measure that has been changing steadily. "The trend over the last 20 years has been for more and more people to go to university."

Trend Blindness

Lack of political, business, or social awareness of an obvious trend. Dan Burrus describes baby boomer needs as an obvious example. The baby boom started in 1946, lasted to 1964. At first, there weren't enough hospitals. Then not enough schools. Now not enough social security and health care. The trend was obvious, but we were repeatedly blind to its implications. Coined by foresight professional Daniel Burrus, *Flash Foresight*, 2011,

UGSOP foresight systems model

A way of looking at the future in terms of five complex systems, moving from larger to smaller: **Universal**, **Global**, **Societal** (Socio-Economic, Socio-Political, Socio-Cultural), **Organizational**, and **Personal**. Different issues and dynamics operate at each system level.

Uncertainty

Contrasts with a trend. A trend is something that's gradually happening. An uncertainty is a trend or event that has a reasonable chance of happening. If it does happen, and it will make a major difference, it's known as a critical uncertainty. But a wildcard usually isn't considered a critical uncertainty, because it's too unlikely. A wildcard is that the earth could be hit by a giant comet next week. Though this might cause a problem or two, it wouldn't be considered a critical uncertainty.

Universa evolutionary development / universal evo devo

An emerging discipline in systems theory, theoretical biology, and astrobiology (see *Development and Evolution*, Stan Salthe, 1993 and *Life's Solution*, Simon Conway Morris, 2004) that explores the relationship between processes of evolution and development at universal scales. The process of "convergent evolution" may be seen as a process of universal development at these scales, and much can be learned from the emerging science of evolutionary developmental biology and applied to universal scales. See **evolutionary development**.

Utopia

A perfect future society (though sometimes not so perfect when examined closely!) The most famous example is the book *Utopia* by Sir Thomas More (1516). For more, see the *Faber Book of Utopias* (1999) edited by John Carey. There is also **eutopia** - a place that's not perfect, but good enough, or better than the present.

Vision

A vision is a clear view of the future, usually one that an organization is working toward achieving for itself. Note that a vision is usually singular: an organization with a unified **vision statement** is not thinking about alternative futures.

VUCA: Volatility, Uncertainty, Complexity, Ambiguity

A U.S. army way of describing a difficult situation. Iraq today, perhaps. "We live in times of VUCA."

Weltanschauung

A German word, often used in English, meaning **Worldview**.

Wildcard

An event which is highly unlikely to happen, but would have a huge impact if it did. An example might be an asteroid colliding with the earth. But though the probability of any one wild card event is very low, so many different wild cards are possible that the combined chance of one of them happening - somewhere in the world, over some time extended period - can be quite high. Though winning a lottery is an example of a positive wildcard, they are usually bad news - unpleasant surprises. Similar to **discontinuity**.

Worldview

The way in which people see the world, with an emphasis on their unconscious assumptions, mindsets, and the principles that they will not question. Similar to **paradigm**. See also **mindset**.

Zeitgeist

German for "spirit of the times". A concept that people implicitly believe in for years, without realizing it, or being able to express it in words. Usually the zeitgeist becomes obvious only when it changes.

Zero-Sum Game / Win-Lose Game

A game or interaction where one's winning must come at the cost of another, because the desired resources or outcomes are scarce and can't be easily substituted with an alternative. Games like tic-tac-toe, and chess (where only one can win), and many political contests over scarce resources are zero-sum games. Curiously, the more futures-oriented and long-term the view the politician, the more often they are able to see and support the growth of total resources over time, and therefore the more they are willing to change their interactions into **positive sum (win-win) games**.

ZOPP

Ziel-Orientierte Projekt Planung (in German) - in English, Objectives- Oriented Project Planning (**OOPP**). A complex method of planning projects in the developing countries, based on Logical Framework Analysis, and created by the German aid agency GTZ,. Explained further on GTZ's website at www.gtz.de. Part of ZOPP is the **problem tree**, which can be converted into an event tree for use in futures work.

New Glossary Additions / Words to Be Defined

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