Futures studies

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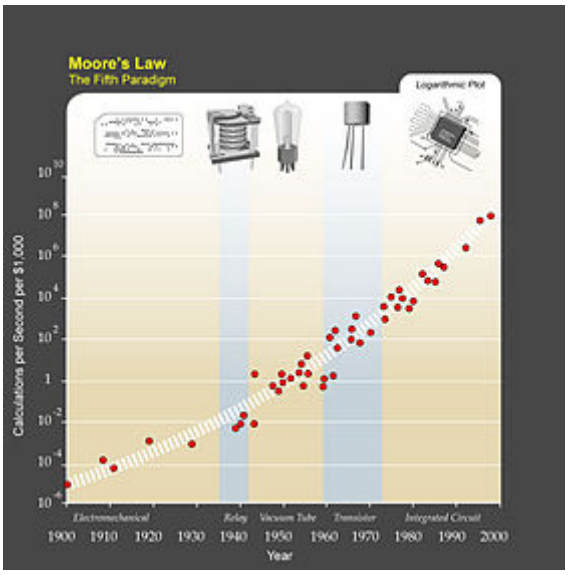
Futures studies (also called **futurology**) is the study of postulating possible, probable, and preferable futures and the worldviews and myths that underlie them. There is a debate as to whether this discipline is an art or science. In general, it can be considered as a branch of the social sciences and parallel to the field of history. History studies the past, futures studies considers the future. Futures studies (colloquially called "**futures**" by many of the field's practitioners) seeks to understand what is likely to continue and what could plausibly change. Part of the discipline thus seeks a systematic and pattern-based understanding of past and present, and to determine the likelihood of future events and trends.[1] Unlike the physical sciences where a narrower, more specified system is studied, futures studies concerns a much bigger and more complex world system. The methodology and knowledge are much less proven as compared to natural science or even social science like sociology, economics, and political science.



Moore's law is an example of futures studies; it is a statistical collection of past and present trends with the goal of accurately extrapolating future trends.

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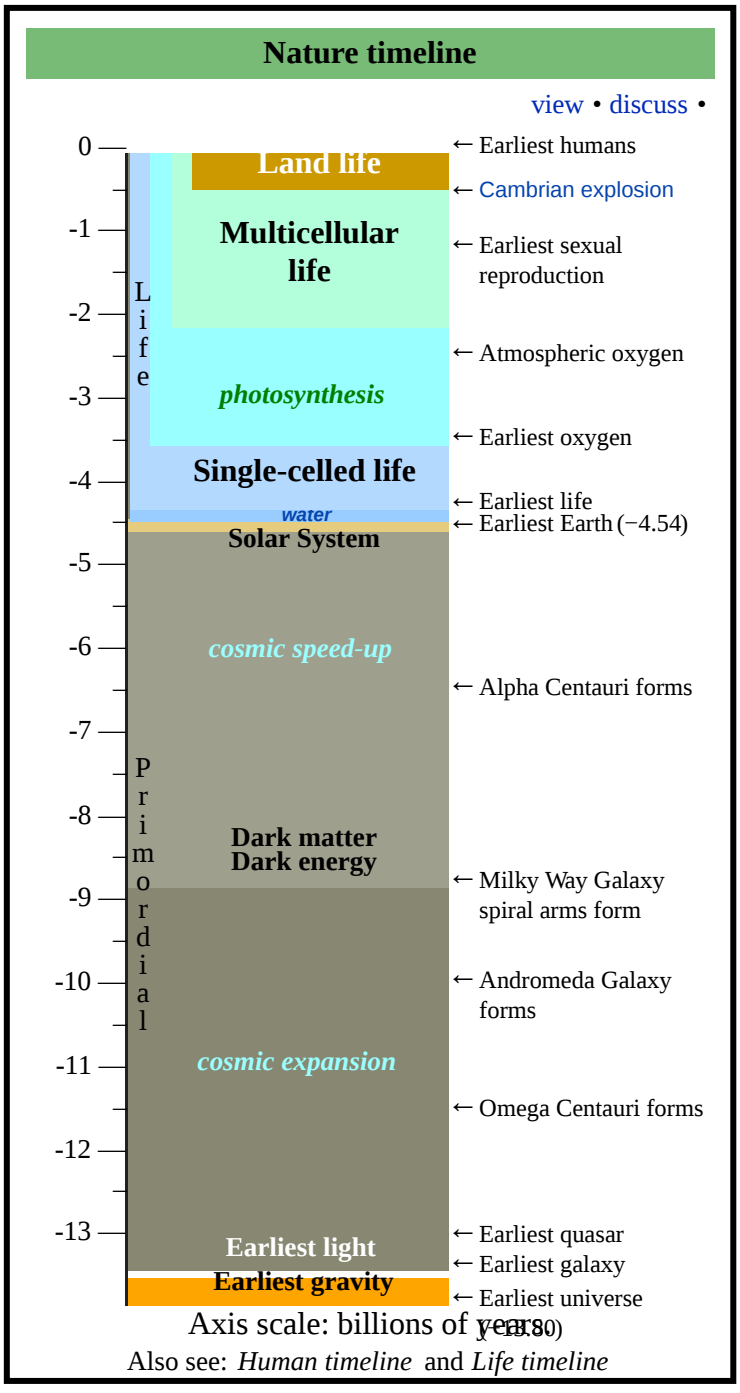
Overview

Futures studies is an interdisciplinary field, studying yesterday's and today's changes, and aggregating and analyzing both lay and professional strategies and opinions with respect to tomorrow. It includes analyzing the sources, patterns, and causes of change and stability in an attempt to develop foresight and to map possible futures. Around the world the field is variously referred to as **futures studies**, **strategic foresight**, **futuristics**, **futures thinking**, **futuring**, and **futurology**. Futures studies and strategic foresight are the academic field's most commonly used terms in the English-speaking world.



Foresight was the original term and was first used in this sense by H.G. Wells in 1932.[2] "Futurology" is a term common in encyclopedias, though it is used almost exclusively by nonpractitioners today, at least in the English-speaking world. "Futurology" is defined as the "study of the future."[3] The term was coined by German professor Ossip K. Flechtheim in the mid-1940s, who proposed it as a new branch of knowledge that would include a new science of probability. This term may have fallen from favor in recent decades because modern practitioners stress the importance of alternative and plural futures, rather than one monolithic future, and the limitations of prediction and probability, versus the creation of possible and preferable futures.

Three factors usually distinguish futures studies from the research conducted by other disciplines (although all of these disciplines overlap, to differing degrees). First, futures studies often examines not only possible but also probable, preferable, and "wild card" futures. Second,

futures studies typically attempts to gain a holistic
or systemic view based on insights from a range of different disciplines, generally focusing on the STEEP[4] categories of Social, Technological, Economic, Environmental and Political. Third, futures studies challenges and unpacks the assumptions behind dominant and contending views of the future. The future thus is not empty but fraught with hidden assumptions. For example, many people expect the collapse of the Earth's ecosystem in the near future, while others believe the current ecosystem will survive indefinitely. A foresight approach would seek to analyze and highlight the assumptions underpinning such views.

As a field, futures studies expands on the research component, by emphasizing the communication of a strategy and the actionable steps needed to implement the plan or plans leading to the preferable future. It is in this regard, that futures studies evolves from an academic exercise to a more traditional business-like practice, looking to better prepare organizations for the future.

Futures studies does not generally focus on short term predictions such as interest rates over the next business cycle, or of managers or investors with short-term time horizons. Most strategic planning, which develops operational plans for preferred futures with time horizons of one to three years, is also not considered futures. Plans and strategies with longer time horizons that specifically attempt to anticipate possible future events are definitely part of the field. As a rule, futures studies is generally concerned with changes of transformative impact, rather than those of an incremental or narrow scope.

The futures field also excludes those who make future predictions through professed supernatural means.

History

Johan Galtung and Sohail Inayatullah[5] argue in *Macrohistory and Macrohistorians* that the search for grand patterns of social change goes all the way back to Ssu-Ma Chien (145-90BC) and his theory of the cycles of virtue, although the work of Ibn Khaldun (1332–1406) such as *The Muqaddimah*[6] would be an example that is perhaps more intelligible to modern sociology. Some intellectual foundations of futures studies appeared in the mid-19th century; according to Wendell Bell, Comte's discussion of the metapatterns of social change presages futures studies as a scholarly dialogue.[7]

The first works that attempt to make systematic predictions for the future were written in the 18th century. *Memoirs of the Twentieth Century* written by Samuel Madden in 1733, takes the form of a series of diplomatic letters written in 1997 and 1998 from British representatives in the foreign cities of Constantinople, Rome, Paris, and Moscow.[8] However, the technology of the 20th century is identical to that of Madden's own era - the focus is instead on the political and religious state of the world in the future. Madden went on to write *The Reign of George VI, 1900 to 1925*, where (in the context of the boom in canal construction at the time) he envisioned a large network of waterways that would radically transform patterns of living - "Villages grew into towns and towns became cities".[9]

The genre of science fiction became established towards the end of the 19th century, with notable writers, including Jules Verne and H. G. Wells, setting their stories in an imagined future world.

Origins

According to W. Warren Wagar, the founder of future studies was H. G. Wells. His *Anticipations of the Reaction of Mechanical and Scientific Progress Upon Human Life and Thought: An Experiment in Prophecy*, was first serially published in *The Fortnightly Review* in 1901.[10] Anticipating what the world would be like in the year 2000, the book is interesting both for its hits (trains and cars resulting in the dispersion of population from cities to suburbs; moral restrictions declining as men and women seek greater sexual freedom; the defeat of German militarism, the existence of a European Union, and a world order maintained by "English-speaking peoples" based on the urban core between Chicago and New York[11]) and its misses (he did not expect successful aircraft before 1950, and averred that "my imagination refuses to see any sort of submarine doing anything but suffocate its crew and founder at sea").[12][13]

Moving from narrow technological predictions, Wells envisioned the eventual collapse of the capitalist world system after a series of destructive total wars. From this havoc would ultimately emerge a world of peace and plenty, controlled by competent technocrats.[10]

H. G. Wells first advocated for 'future studies' in a lecture delivered in 1902.

The work was a bestseller, and Wells was invited to deliver a lecture at the Royal Institution in 1902, entitled *The Discovery of the Future*. The lecture was well-received and was soon republished in book form. He advocated for the establishment of a new academic study of the future that would be grounded in scientific methodology rather than just speculation. He argued that a scientifically ordered vision of the future "will be just as certain, just as strictly science, and perhaps just as detailed as the picture that has been built up within the last hundred years to make the geological past." Although conscious of the difficulty in arriving at entirely accurate predictions, he thought that it would still be possible to arrive at a "working knowledge of things in the future".[10]

In his fictional works, Wells predicted the invention and use of the atomic bomb in *The World Set Free* (1914).[14] In *The Shape of Things to Come* (1933) the impending World War and cities destroyed by aerial bombardment was depicted.[15] However, he didn't stop advocating for the establishment of a futures science. In a 1933 BBC broadcast he called for the establishment of "Departments and Professors of Foresight", foreshadowing the development of modern academic futures studies by approximately 40 years.[2]

Emergence

Futures studies emerged as an academic discipline in the mid-1960s. First-generation futurists included Herman Kahn, an American Cold War strategist who wrote *On Thermonuclear War* (1960), *Thinking about the unthinkable* (1962) and *The Year 2000: a framework for speculation on the next thirty-three years* (1967); Bertrand de Jouvenel, a French economist who founded Futuribles International in 1960; and Dennis Gabor, a Hungarian-British scientist who wrote *Inventing the Future* (1963) and *The Mature Society. A View of the Future* (1972).[7]

Future studies had a parallel origin with the birth of systems science in academia, and with the idea of national economic and political planning, most notably in France and the Soviet Union.[7][16] In the 1950s, the people of France were continuing to reconstruct their war-torn country. In the process, French scholars, philosophers, writers, and artists searched for what could constitute a more positive future for humanity. The Soviet Union similarly participated in postwar rebuilding, but did so in the context of an established national economic planning process, which also required a long-term, systemic statement of social goals. Future studies was therefore primarily engaged in national planning, and the construction of national symbols.

By contrast, in the United States, futures studies as a discipline emerged from the successful application of the tools and perspectives of systems analysis, especially with regard to quartermastering the war-effort. These differing origins account for an initial schism between futures studies in America and futures studies in Europe: U.S. practitioners focused on applied projects, quantitative tools and systems analysis, whereas Europeans preferred to investigate the long-range future of humanity and the Earth, what might constitute that future, what symbols and semantics might express it, and who might articulate these.[17][18]

By the 1960s, academics, philosophers, writers and artists across the globe had begun to explore enough future scenarios so as to fashion a common dialogue. Inventors such as Buckminster Fuller also began highlighting the effect technology might have on global trends as time progressed. This discussion on the intersection of population growth, resource availability and use, economic growth, quality of life, and environmental sustainability – referred to as the "global problematique" – came to wide public attention with the publication of *Limits to Growth*, a study sponsored by the Club of Rome.[19]

Further development

International dialogue became institutionalized in the form of the World Futures Studies Federation (WFSF), founded in 1967, with the noted sociologist, Johan Galtung, serving as its first president. In the United States, the publisher Edward Cornish, concerned with these issues, started the World Future Society, an organization focused more on interested laypeople.

1975 saw the founding of the first graduate program in futures studies in the United States, the M.S. program in Futures Studies at the University of Houston–Clear Lake,.[20] Oliver Markley of SRI (now SRI International) was hired in 1978 to move the program into a more applied and professional direction. The program moved to the University of Houston in 2007 and renamed the degree to Foresight.[21] The program has remained focused on preparing professional futurists and providing high-quality foresight training for individuals and organizations in business, government, education, and non-profits.[22] In 1976, the M.A. Program in Public Policy in Alternative Futures at the University of Hawaii at Manoa was established.[23] The Hawaii program locates futures studies within a pedagogical space defined by neo-Marxism, critical political economic theory, and literary criticism. In the years following the foundation of these two programs, single courses in Futures Studies at all levels of education have proliferated, but complete programs occur only rarely. In 2012, the Finland Futures Research Centre started a master's degree Programme in Futures Studies at Turku School of Economics, a business school which is part of the University of Turku in Turku, Finland.[24]

As a transdisciplinary field, futures studies attracts generalists. This transdisciplinary nature can also cause problems, owing to it sometimes falling between the cracks of disciplinary boundaries; it also has caused some difficulty in achieving recognition within the traditional curricula of the sciences and the humanities. In contrast to "Futures Studies" at the undergraduate level, some graduate programs in strategic leadership or management offer masters or doctorate programs in "strategic foresight" for mid-career professionals, some even online. Nevertheless, comparatively few new PhDs graduate in Futures Studies each year.

The field currently faces the great challenge of creating a coherent conceptual framework, codified into a well-documented curriculum (or curricula) featuring widely accepted and consistent concepts and theoretical paradigms linked to quantitative and qualitative methods, exemplars of those research methods, and guidelines for their ethical and appropriate application within society. As an indication that previously disparate intellectual dialogues have in fact started converging into a recognizable discipline,[25] at least six solidly-researched and well-accepted first attempts to synthesize a coherent framework for the field have appeared: Eleonora Masini's *Why Futures Studies?*,[26] James Dator's *Advancing Futures Studies*,[27] Ziauddin Sardar's *Rescuing all of our Futures*,[28] Sohail Inayatullah's *Questioning the future*,[29] Richard A. Slaughter's *The Knowledge Base of Futures Studies*,[30] a collection of essays by senior practitioners, and Wendell Bell's two-volume work, *The Foundations of Futures Studies*.[31]

Probability and predictability

Some aspects of the future, such as celestial mechanics, are highly predictable, and may even be described by relatively simple mathematical models. At present however, science has yielded only a special minority of such "easy to predict" physical processes. Theories such as chaos theory, nonlinear science and standard evolutionary theory have allowed us to understand many complex systems as contingent (sensitively dependent on complex environmental conditions) and stochastic (random within constraints), making the vast majority of future events unpredictable, *in any specific case*.

Not surprisingly, the tension between predictability and unpredictability is a source of controversy and conflict among futures studies scholars and practitioners. Some argue that the future is essentially unpredictable, and that "the best way to predict the future is to create it." Others believe, as Flechtheim, that advances in science, probability, modeling and statistics will allow us to continue to improve our understanding of probable futures, while this area presently remains less well developed than methods for exploring possible and preferable futures.

As an example, consider the process of electing the president of the United States. At one level we observe that any U.S. citizen over 35 may run for president, so this process may appear too unconstrained for useful prediction. Yet further investigation demonstrates that only certain public individuals (current and former presidents and vice presidents, senators, state governors, popular military commanders, mayors of very large cities, etc.) receive the appropriate "social credentials" that are historical prerequisites for election. Thus with a minimum of effort at formulating the problem for statistical prediction, a much reduced pool of candidates can be described, improving our probabilistic foresight. Applying further statistical intelligence to this problem, we can observe that in certain election prediction markets such as the Iowa Electronic Markets, reliable forecasts have been generated over long spans of time and conditions, with results superior to individual experts or polls. Such markets, which may be operated publicly or as an internal market, are just one of several promising frontiers in predictive futures research.

Such improvements in the predictability of individual events do not though, from a complexity theory viewpoint, address the unpredictability inherent in dealing with entire systems, which emerge from the interaction between multiple individual events.

Methodologies

In terms of methodology, futures practitioners employ a wide range of approaches, models and methods, in both theory and practice, many of which are derived from or informed by other academic or professional disciplines [1], including social sciences such as economics, psychology, sociology, religious studies, cultural studies, history, geography, and political science; physical and life sciences such as physics, chemistry, astronomy, biology; mathematics, including statistics, game theory and econometrics; applied disciplines such as engineering, computer sciences, and business management (particularly strategy).

Given its unique objectives and material, the practice of futures studies only rarely features employment of the scientific method in the sense of controlled, repeatable and verifiable experiments with highly standardized methodologies. However, many futurists are informed by scientific techniques or work primarily within scientific domains. Borrowing from history, the futurist might project patterns observed in past civilizations upon present-day society to model what might happen in the future, or borrowing from technology, the futurist may model possible social and cultural responses to an emerging technology based on established principles of the diffusion of innovation. In short, the futures practitioner enjoys the synergies of an interdisciplinary laboratory.

As the plural term “futures” suggests, one of the fundamental assumptions in futures studies is that the future is plural not singular.[2] That is, the future consists not of one inevitable future that is to be “predicted,” but rather of multiple alternative futures of varying likelihood which may be derived and described, and about which it is impossible to say with certainty which one will occur. The primary effort in futures studies, then, is to identify and describe alternative futures in order to better understand the driving forces of the present or the structural dynamics of a particular subject or subjects. The exercise of identifying alternative futures includes collecting quantitative and qualitative data about the possibility, probability, and desirability of change. The plural term "futures" in futures studies denotes both the rich variety of alternative futures, including the subset of preferable futures (normative futures), that can be studied, as well as the tenet that the future is many.

At present, the general futures studies model has been summarized as being concerned with "three Ps and a W", or possible, probable, and preferable futures, plus wildcards, which are low probability but high impact events (positive or negative). Many futurists, however, do not use the wild card approach. Rather, they use a methodology called Emerging Issues Analysis. It searches for the drivers of change, issues that are likely to move from unknown to the known, from low impact to high impact.

In terms of technique, futures practitioners originally concentrated on extrapolating present technological, economic or social trends, or on attempting to predict future trends. Over time, the discipline has come to put more and more focus on the examination of social systems and uncertainties, to the end of articulating scenarios. The practice of scenario development facilitates the examination of worldviews and assumptions

through the causal layered analysis method (and others), the creation of preferred visions of the future, and the use of exercises such as backcasting to connect the present with alternative futures. Apart from extrapolation and scenarios, many dozens of methods and techniques are used in futures research (see below).

The general practice of futures studies also sometimes includes the articulation of normative or preferred futures, and a major thread of practice involves connecting both extrapolated (exploratory) and normative research to assist individuals and organizations to model preferred futures amid shifting social changes. Practitioners use varying proportions of collaboration, creativity and research to derive and define alternative futures, and to the degree that a "preferred" future might be sought, especially in an organizational context, techniques may also be deployed to develop plans or strategies for directed future shaping or implementation of a preferred future.

While some futurists are not concerned with assigning probability to future scenarios, other futurists find probabilities useful in certain situations, such as when probabilities stimulate thinking about scenarios within organizations [3]. When dealing with the three Ps and a W model, estimates of probability are involved with two of the four central concerns (discerning and classifying both probable and wildcard events), while considering the range of possible futures, recognizing the plurality of existing alternative futures, characterizing and attempting to resolve normative disagreements on the future, and envisioning and creating preferred futures are other major areas of scholarship. Most estimates of probability in futures studies are normative and qualitative, though significant progress on statistical and quantitative methods (technology and information growth curves, cliometrics, predictive psychology, prediction markets, crowdvoting forecasts,[31][*better source needed*] etc.) has been made in recent decades.

Futures techniques

While forecasting – i.e., attempts to predict future states from current trends – is a common methodology, professional scenarios often rely on "backcasting": asking what changes in the present would be required to arrive at envisioned alternative future states. For example, the Policy Reform and Eco-Communalism scenarios developed by the Global Scenario Group rely on the backcasting method. Practitioners of futures studies classify themselves as futurists (or *foresight practitioners*).

Futurists use a diverse range of forecasting methods including:

- Anticipatory thinking protocols:
- Causal layered analysis (CLA)
- Environmental scanning
- Scenario method
- Delphi method
- Future history
- Monitoring
- Backcasting (eco-history)
- Cross-impact analysis
- Futures workshops
- Failure mode and effects analysis
- Futures wheel
- Technology roadmapping
- Social network analysis
- Systems engineering
- Trend analysis
- Morphological analysis
- Technology forecasting
- Theory U

Shaping alternative futur es

Futurists use scenarios – alternative possible futures – as an important tool. To some extent, people can determine what they consider probable or desirable using qualitative and quantitative methods. By looking at a variety of possibilities one comes closer to shaping the future, rather than merely predicting it. Shaping alternative futures starts by establishing a number of scenarios. Setting up scenarios takes place as a process with many stages. One of those stages involves the study of trends. A trend persists long-term and long-range; it affects many societal groups, grows slowly and appears to have a profound basis. In contrast, a fad operates in the short term, shows the vagaries of fashion, affects particular societal groups, and spreads quickly but superficially.

Sample predicted futures range from predicted ecological catastrophes, through a utopian future where the poorest human being lives in what present-day observers would regard as wealth and comfort, through the transformation of humanity into a posthuman life-form, to the destruction of all life on Earth in, say, a nanotechnological disaster.

Futurists have a decidedly mixed reputation and a patchy track record at successful prediction. For reasons of convenience, they often extrapolate present technical and societal trends and assume they will develop at the same rate into the future; but technical progress and social upheavals, in reality, take place in fits and starts and in different areas at different rates.

Many 1950s futurists predicted commonplace space tourism by the year 2000, but ignored the possibilities of ubiquitous, cheap computers. On the other hand, many forecasts have portrayed the future with some degree of accuracy. Current futurists often present multiple scenarios that help their audience envision what "may" occur instead of merely "predicting the future". They claim that understanding potential scenarios helps individuals and organizations prepare with flexibility.

Many corporations use futurists as part of their risk management strategy, for horizon scanning and emerging issues analysis, and to identify wild cards – low probability, potentially high-impact risks.[32] Every successful and unsuccessful business engages in futuring to some degree – for example in research and development, innovation and market research, anticipating competitor behavior and so on.[33][34]

Weak signals, the future sign and wild cards

In futures research "weak signals" may be understood as advanced, noisy and socially situated indicators of change in trends and systems that constitute raw informational material for enabling anticipatory action. There is some confusion about the definition of weak signal by various researchers and consultants. Sometimes it is referred as future oriented information, sometimes more like emerging issues. The confusion has been partly clarified with the concept 'the future sign', by separating signal, issue and interpretation of the future sign.[35]

"Wild cards" refer to low-probability and high-impact events, such as existential risks. This concept may be embedded in standard foresight projects and introduced into anticipatory decision-making activity in order to increase the ability of social groups adapt to surprises arising in turbulent business environments. Such sudden and unique incidents might constitute turning points in the evolution of a certain trend or system. Wild cards may or may not be announced by weak signals, which are incomplete and fragmented data from which relevant foresight information might be inferred. Sometimes, mistakenly, wild cards and weak signals are considered as synonyms, which they are not.[36]

Near-term predictions

A long-running tradition in various cultures, and especially in the media, involves various spokespersons making predictions for the upcoming year at the beginning of the year. These predictions sometimes base themselves on current trends in culture (music, movies, fashion, politics); sometimes they make hopeful guesses as to what major events might take place over the course of the next year.

Some of these predictions come true as the year unfolds, though many fail. When predicted events fail to take place, the authors of the predictions often state that misinterpretation of the "signs" and portents may explain the failure of the prediction.

Marketers have increasingly started to embrace futures studies, in an effort to benefit from an increasingly competitive marketplace with fast production cycles, using such techniques as trendspotting as popularized by Faith Popcorn.

Trend analysis and forecasting

Mega-trends

Trends come in different sizes. A mega-trend extends over many generations, and in cases of climate, mega-trends can cover periods prior to human existence. They describe complex interactions between many factors. The increase in population from the palaeolithic period to the present provides an example.

Potential trends

Possible new trends grow from innovations, projects, beliefs or actions that have the potential to grow and eventually go mainstream in the future.

Branching trends

Very often, trends relate to one another the same way as a tree-trunk relates to branches and twigs. For example, a well-documented movement toward equality between men and women might represent a branch trend. The trend toward reducing differences in the salaries of men and women in the Western world could form a twig on that branch.

Life-cycle of a trend

When a potential trend gets enough confirmation in the various media, surveys or questionnaires to show that it has an increasingly accepted value, behavior or technology, it becomes accepted as a bona fide trend. Trends can also gain confirmation by the existence of other trends perceived as springing from the same branch. Some commentators claim that when 15% to 25% of a given population integrates an innovation, project, belief or action into their daily life then a trend becomes mainstream.

Life cycle of technologies

Because new advances in technology have the potential to reshape our society, one of the jobs of a futurist is to follow these developments and consider their implications. However, the latest innovations take time to make an impact. Every new technology goes through its own life cycle of maturity, adoption, and social application that must be taken into consideration before a probable vision of the future can be created.

General Hype Cycleused to visualize technological life stagesof maturity, adoption, and social application.

Gartner created their Hype Cycle to illustrate the phases a technology moves through as it grows from research and development to mainstream adoption. The unrealistic expectations and subsequent disillusionment that virtual reality experienced in the 1990s and early 2000s is an example of the middle phases encountered before a technology can begin to be integrated into society.[37]

Education

Education in the field of futures studies has taken place for some time. Beginning in the United States of America in the 1960s, it has since developed in many different countries. Futures education encourages the use of concepts, tools and processes that allow students to think long-term, consequentially, and imaginatively. It generally helps students to:

1. conceptualize more just and sustainable human and planetary futures.
2. develop knowledge and skills of methods and tools used to help people understand, map, and influence the future by exploring probable and preferred futures.
3. understand the dynamics and influence that human, social and ecological systems have on alternative futures.
4. conscientize responsibility and action on the part of students toward creating better futures.

Thorough documentation of the history of futures education exists, for example in the work of Richard A. Slaughter (2004),[38] David Hicks, Ivana Milojević[39] to name a few.

While futures studies remains a relatively new academic tradition, numerous tertiary institutions around the world teach it. These vary from small programs, or universities with just one or two classes, to programs that offer certificates and incorporate futures studies into other degrees, (for example in planning, business, environmental studies, economics, development studies, science and technology studies). Various formal Masters-level programs exist on six continents. Finally, doctoral dissertations around the world have incorporated futures studies. A recent survey documented approximately 50 cases of futures studies at the tertiary level.[40]

The largest Futures Studies program in the world is at Tamkang University, Taiwan. Futures Studies is a required course at the undergraduate level, with between three and five thousand students taking classes on an annual basis. Housed in the Graduate Institute of Futures Studies is an MA Program. Only ten students are accepted annually in the program. Associated with the program is the *Journal of Futures Studies*.[41]

The longest running Future Studies program in North America was established in 1975 at the University of Houston–Clear Lake.[42] It moved to the University of Houston in 2007 and renamed the degree to Foresight. The program was established on the belief that if history is studied and taught in an academic setting, then so should the future. Its mission is to prepare professional futurists. The curriculum incorporates a blend of the essential theory, a framework and methods for doing the work, and a focus on application for clients in business, government, nonprofits, and society in general.[43]

As of 2003, over 40 tertiary education establishments around the world were delivering one or more courses in futures studies. The World Futures Studies Federation[44] has a comprehensive survey of global futures programs and courses. The Acceleration Studies Foundation maintains an annotated list of primary and secondary graduate futures studies programs.[45]

Organizations such as Teach The Future also aim to promote future studies in the secondary school curriculum in order to develop structured approaches to thinking about the future in public school students. The rationale is that a sophisticated approach to thinking about, anticipating, and planning for the future is a core skill requirement that every student should have, similar to literacy and math skills.

Futurists

Several authors have become recognized as futurists. They research trends, particularly in technology, and write their observations, conclusions, and predictions. In earlier eras, many futurists were at academic institutions. John McHale, author of *The Future of the Future*, published a 'Futures Directory', and directed a think tank called *The Centre For Integrative Studies* at a university. Futurists have started consulting groups or earn money as speakers, with examples including Alvin Toffler, John Naisbitt and Patrick Dixon. Frank Feather is a business speaker that presents himself as a pragmatic futurist. Some futurists have commonalities with science fiction, and some science-fiction writers, such as Arthur C. Clarke, are known as futurists. In the introduction to *The Left Hand of Darkness*, Ursula K. Le Guin distinguished futurists from novelists, writing of the study as the business of prophets, clairvoyants, and futurists. In her words, "a novelist's business is lying".

A survey of 108 futurists found that they share a variety of assumptions, including in their description of the present as a critical moment in an historical transformation, in their recognition and belief in complexity, and in their being motivated by change and having a desire for an active role bringing change (versus simply being involved in forecasting).[46]

Applications of foresight and specific fields

General applicability and use of for esight products

Several corporations and government agencies utilize foresight products to both better understand potential risks and prepare for potential opportunities. Several government agencies publish material for internal stakeholders as well as make that material available to broader public. Examples of this include the US Congressional Budget Office long term budget projections,[47] the National Intelligence Center,[48] and the United Kingdom Government Office for Science.[49] Much of this material is used by policy makers to inform policy decisions and government agencies to develop long term plan. Several corporations, particularly those with long product development lifecycles, utilize foresight and future studies products and practitioners in the development of their business strategies. The Shell Corporation is one such entity.[50] Foresight professionals and their tools are increasingly being utilized in both the private and public areas to help leaders deal with an increasingly complex and interconnected world.

Fashion and design

Foresight and futures thinking are rapidly being adopted by the design industry to insure more sustainable, robust and humanistic products. Design, much like future studies is an interdisciplinary field that considers global trends, challenges and opportunities to foster innovation. Designers are thus adopting futures methodologies including scenarios, trend forecasting, and futures research.

Holistic thinking that incorporates strategic, innovative and anticipatory solutions gives designers the tools necessary to navigate complex problems and develop novel future enhancing and visionary solutions.

The Association for Professional Futurists has also held meetings discussing the ways in which Design Thinking and Futures Thinking intersect and benefit one another.

Imperial cycles and world order

Imperial cycles represent an "expanding pulsation" of "mathematically describable" macro-historic trend.[51] The List of Largest Empires contains imperial record progression in terms of territory or percentage of world population under single imperial rule.

Chinese philosopher K'ang Yu-wei and French demographer Georges Vacher de Lapouge in the late 19th century were the first to stress that the trend cannot proceed indefinitely on the definite surface of the globe. The trend is bound to culminate in a world empire. K'ang Yu-wei estimated that the matter will be decided in the contest between Washington and Berlin; Vacher de Lapouge foresaw this contest between the United States and Russia and estimated the chance of the United States higher.[52] Both published their futures studies before H. G. Wells introduced the science of future in his *Anticipations* (1901).

Four later anthropologists—Hornell Hart, Raoul Naroll, Louis Morano, and Robert Carneiro—researched the expanding imperial cycles. They reached the same conclusion that a world empire is not only pre-determined but close at hand and attempted to estimate the time of its appearance.[53]

Historian Max Ostrovsky, specializing on macro-historic trends and their projection into future, analyzed the inner mechanism at work in the process and applied the results to the conditions of the global system. The work confirmed the inexorable trend towards a world empire. He found that the development of the world order in history and its projection into future follows a hyperbolic trajectory. The research was published in 2007 titled: *Y = Arctg X: The Hyperbola of the World Order*.[54]

Education

As foresight has expanded to include a broader range of social concerns all levels and types of education have been addressed, including formal and informal education. Many countries are beginning to implement Foresight in their Education policy. A few programs are listed below:

- Finland's FinnSight 2015[55] - Implementation began in 2006 and though at the time was not referred to as "Foresight" they tend to display the characteristics of a foresight program.

- Singapore's Ministry of Education Master plan for Information Technology in Education[56] - This third Masterplan continues what was built on in the 1st and 2nd plans to transform learning environments to equip students to compete in a knowledge economy.

Science fiction

Wendell Bell and Ed Cornish acknowledge science fiction as a catalyst to future studies, conjuring up visions of tomorrow.[57] Science fiction's potential to provide an "imaginative social vision" is its contribution to futures studies and public perspective. Productive sci-fi presents plausible, normative scenarios.[57] Jim Dator attributes the foundational concepts of "images of the future" to Wendell Bell, for clarifying Fred Polak's concept in Images of the Future, as it applies to futures studies.[58][59] Similar to futures studies' scenarios thinking, empirically supported visions of the future are a window into what the future could be. Pamela Sargent states, "Science fiction reflects attitudes typical of this century." She gives a brief history of impactful sci-fi publications, like The Foundation Trilogy, by Isaac Asimov and Starship Troopers, by Robert A. Heinlein.[60] Alternate perspectives validate sci-fi as part of the fuzzy "images of the future."[59] However, the challenge is the lack of consistent futures research based literature frameworks.[60] Ian Miles reviews The New Encyclopedia of Science Fiction," identifying ways Science Fiction and Futures Studies "cross-fertilize, as well as the ways in which they differ distinctly." Science Fiction cannot be simply considered fictionalized Futures Studies. It may have aims other than "prediction, and be no more concerned with shaping the future than any other genre of literature." [61] It is not to be understood as an explicit pillar of futures studies, due to its inconsistency of integrated futures research. Additionally, Dennis Livingston, a literature and Futures journal critic says, "The depiction of truly alternative societies has not been one of science fiction's strong points, especially" preferred, normative envisages.[62]

Government agencies

Several world governments have formalized strategic foresight agencies to encourage long range strategic societal planning. Most notably Singapore's Centre for Strategic Futures as part of the Strategy Group reporting directly to the Prime Minister. Their mission is to position the Singapore government to navigate emerging strategic challenges and harness potential opportunities.[63] Sheikh Mohammed bin Rashid, Vice President and Ruler of Dubai announced in September 2016 that all government ministries were to appoint Directors of Future Planning. Sheikh Mohammed described the UAE Strategy for the Future as an "integrated strategy to forecast our nation's future, aiming to anticipate challenges and seize opportunities". It was launched under the directives of the President, Sheikh Khalifa.[64] More broadly in the UAE, the Ministry of Cabinet Affairs and Future is mandated with the portfolio of future of UAE and developing a strategy that ensures all sectors' readiness for the future's variabilities. The ministry works on employing the relevant tools to shape the future, which helps governments in forecasting opportunities, trends, challenges and future implications, analyzing their impact, developing innovative solutions and providing alternatives. The MOCAF is responsible for crafting the UAE Strategy for the Future. This strategy is focused on building future models for the health, educational, developmental, and environmental sectors, the harmonization of the current governmental policies, in addition to building national capacities in the field of future foresighting, establishing international partnership, laboratories and launching research reports on the future of the various sectors in the country.[65]

Risk analysis and management

Foresight is also applied when studying potential risks to society and how to effectively deal with them.[66][67] These risks may arise from the development and adoption of emerging technologies and/or social change. Special interest lies on hypothetical future events that have the potential to damage human well-being on a global scale - global catastrophic risks.[68] Such events may cripple or destroy modern civilization or, in the case of existential risks, even cause human extinction.[69] Potential global catastrophic risks include but are not limited to hostile artificial intelligence, nanotechnology weapons, climate change, nuclear warfare, total war, and pandemics.

Research centers

- Graduate Degree in Foresight, University of Houston[70]
- Copenhagen Institute for Futures Studies
- The Foresight Programme, London, Department for Business, Innovation and Skills
- The Futures Academy, Dublin Institute of Technology, Ireland
- Hawaii Research Center for Futures Studies, University of Hawai‘i at Mānoa
- Institute for Futures Research, University of Stellenbosch, South Africa
- Institute for the Future, Palo Alto, California
- National Intelligence Council, Office of the Director of National Intelligence, Washington DC
- Machine Intelligence Research Institute (MIRI), Berkeley CA (Previously known as the Singularity Institute)
- Tellus Institute, Boston MA
- World Future Society
- World Futures Studies Federation, world
- Future of Humanity Institute

Primary programs (English)

- Swinburne U. of Technology, Aus. Graduate School of Entrep. MS,PhD in Strategic Foresight (Bus. Admin.)[71]
- Ontario College of Art and Design, MDes in Strategic Foresight and Innovation[72]
- Aarhus University, School of Business and Social Sciences. PhD in Corporate Foresight[73]
- U Malta, U Potsdam, University of Turku. MSc in Strategic Innovation and Future Creation.[74]
- Turku School of Economics and Finland Futures Academy. MS, PhD in Futures Studies (Econ. and Bus. Admin.).[75]
- European Business Schl & Inst for Futures Studies & Knowledge Mgmt. MSc,MBA,PhD in Corporate Foresight.[76]
- Corvinus U. of Budapest. Futures Studies Dept. MS,PhD in Mgmt and Bus Admin (w/ specialization in Futures Studies) [77]
- U. of Stellenbosch, Econ & Mgmt Sci. and Inst. for Futures Research. M.Phil,PhD in Futures Studies (Econ/Mgmt).[78]
- Tamkang University, Coll. of Ed. and Graduate Inst. of Futures Studies. MA in Futures Studies (Education).[79]
- California College of the Arts, MBA in Strategic Foresight (Bus. Admin).[80]
- Regent University, DSL in Strategic Leadership, Strat. Foresight Concentration (Bus. Admin.).[81]
- U. of Hawaii at Manoa, Dept. of Pol. Sci. and Hawaii Rsrch Ctr for FS. MA,PhD in Alternative Futures (Pol Sci).[82]
- U. of Houston, College of Technology. MS in Foresight (Technology).[83]

Primary programs (other languages)

- External University of Colombia, MS in Strategic Thinking and Foresight (Bus. Admin.).[84]
- CNAM, Dept of Management, Innovation, and Prospective. PhD in Strategic Foresight (Bus. Admin, Engrg).[85]
- Free University of Berlin. and Institute of Future. MA in Future Studies (Interdisciplinary).[86]
- University of Kerala. Dept. of Futures Studies. MPhil and Ph.D.Phil in Futures Studies (Applied Sciences & Technology).[87]
- Imam Khomeini International University. PhD in Futurology (Faculty of Engrg and Technology).[88]
- University of Tehran. PhD in Futures Studies (Faculty of New Sciences and Technologies).[89]
- Leonardo Da Vinci Online University, G. d'Annunzio U. MS in Scenarios for Innovation Mgmt (Bus. Admin.).[90]

- Monterrey Inst. of Tech, EGAP Center for Govt & Public Policy. MS in Strategic Foresight (Govt & Public Policy).[91]
- Technical U. of Lisbon, ISEG (School of Econ & Mgmt), MS in Foresight, Strategy & Innovation (Bus. Admin.).[92]
- Fo Guang University, Graduate Inst. of Futures Studies, MA in Futures Studies (Sociology).[93]

Notable futurists

- Daniel Bell
- Wendell Bell
- Peter C. Bishop
- Nick Bostrom
- Arthur C. Clarke[94]
- Jim Dator
- Leonardo da Vinci (Flight)
- Nicolas De Santis
- Peter Diamandis
- Walt Disney
- Mahdi Elmandjra
- Jacque Fresco[95]
- George Friedman
- Hugo de Garis
- Ben Goertzel
- Arthur Harkins
- Stephen Hawking[96][97]
- Aldous Huxley ("*Brave New World*")
- Sohail Inayatullah
- Mitchell Joachim
- Bill Joy
- Robert Jungk
- Herman Kahn
- Michio Kaku
- Ray Kurzweil
- Max More
- George Orwell ("*Nineteen Eighty-Four*")
- David Passig
- Kim Stanley Robinson
- Michel Saloff Coste
- Anders Sandberg
- Peter Schwartz
- Mark Stevenson ("*An Optimist's Tour of the Future*")
- Alvin Toffler ("*Future Shock*")
- Jules Verne ("*From the Earth to the Moon*")
- Natasha Vita-More
- H. G. Wells (World Brain)
- Eliezer Yudkowsky
- Ziauddin Sardar
- Ashis Nandy

Books

Association for Professional Futurists list of most significant futures works

APF recognizes the most significant futures works for the purpose of identifying and rewarding the work of professional futurists and others whose work illuminates aspects of the future. [98]

- *L'Art de la conjecture (The Art of Conjecture)* (Bertrand de Jouvenel) (2008)
- *The Limits to Growth* (Donella Meadows) (2008)
- *The Art of the Long View* (Peter Schwartz (futurist)) (2008)
- *Foundations of Futures Studies* (Wendell Bell) (2008)
- *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* (Ray Kurzweil) (2008)
- *Futures Research Methodology Version 2.0* (Jerome C. Glenn, Theodore J. Gordon, eds.) (2008)
- *Collapse: How Societies Choose to Fail or Succeed* (Jared Diamond) (2008)
- *The Knowledge Base of Futures Studies* (Richard Slaughter, ed.) (2008)
- *State of the World (book series)* (Worldwatch Institute) (2008)
- *The State of the Future* (Jerome C. Glenn, Theodore J. Gordon) (2008)
- *The Black Swan (Taleb book)* (Nassim Nicholas Taleb) (2012)
- *The Biggest Wake up Call In History* (Richard Slaughter) (2012)
- *Prosperity Without Growth* (Tim Jackson (economist)) (2012)
- *2052: A Global Forecast for the Next Forty Years* (Jørgen Randers) (2013)
- *Food for the City* (Stroom den Haag) (2013)
- *Teaching About the Future* (Andy Hines and Peter C. Bishop) (2014)

- *The Five Futures Glasses: How to See and Understand More of the Future with the Eltville Model* (Pero Micic) (2014)
- *Future: All that Matters* (Ziauddin Sardar) (2014)
- *Rambunctious Garden: Saving Nature in a Post-Wild World* (Emma Marris) (2014)
- *What Works: Case Studies in the Practice of Foresight* (Sohail Inayatullah) (2016)

Other notable foresight books

- *Physics of the Impossible: A Scientific Exploration into the World of Phasers, Force Fields, Teleportation, and Time Travel* (Michio Kaku)
- *Physics of the Future: How Science Will Shape Human Destiny and Our Daily Lives by the Year 2100* (Michio Kaku)
- *The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind* (Michio Kaku)
- *The Age of Intelligent Machines* (Ray Kurzweil)
- *The Singularity Is Near: When Humans Transcend Biology* (Ray Kurzweil)
- *Abundance: The Future Is Better Than You Think* (Peter Diamandis)
- *Brave New World* (Aldous Huxley)
- *The Next 100 Years: A Forecast for the 21st Century* (George Friedman)
- *Future Shock* (Alvin Toffler)
- *Thinking About the Future* (Andy Hines and Peter C. Bishop)
- *The Third Wave* (Alvin Toffler)
- *Futurewise: Six Faces of Global Change* (Patrick Dixon)
- *Our Final Hour* (Martin Rees)
- *The Revenge of Gaia* (James Lovelock)
- *The Skeptical Environmentalist* (Bjørn Lomborg)
- *Surviving 1,000 Centuries Can We Do It?* (Roger-Maurice Bonnet and Lodewijk Woltjer)
- *Paris in the Twentieth Century* (Jules Verne)
- *The Communist Manifesto* (Karl Marx and Friedrich Engels)
- *An Anarchist FAQ* (Iain McKay)

Periodicals and journals

- Futures (journal)
- Foresight journal[99]
- Journal of Futures Studies
- World Futures Review[100]
- Technological Forecasting and Social Change
- International Journal of Forecasting
- The Futurist (magazine) (World Future Society)

Organizations

Foresight professional networks

- World Future Society
- World Futures Studies Federation
- Association of Professional Futurists
- The Millennium Project

Public-sector foresight organizations

- National Intelligence Council
- NASA Institute for Advanced Concepts
- Government Office for Science (United Kingdom)

Non-governmental foresight organizations

- RAND Corporation
- Hudson Institute
- Club of Rome
- Institute for the Future
- Copenhagen Institute for Futures Studies
- Tellus Institute
- Global Business Network
- The Arlington Institute

- Global Scenario Group
- The Venus Project
- Long Now Foundation
- TechCast Project
- Machine Intelligence Research Institute
- Strategic Foresight Group
- Future of Humanity Institute
- Project 2049 Institute
- World Future Council, Germany
- Acceleration Studies Foundation [1]

See also

- Accelerating change
- Biocultural evolution
- Foresight (psychology)
- List of emerging technologies
- Human genetic engineering
- Human overpopulation
- Human timeline
- Intelligence assessment
- Life timeline
- Nature timeline
- Outline of future studies
- Planning (forethought)

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