

The Art of Forecasting and Futures Planning



"What can be more palpably absurd than the prospect held out of locomotives traveling twice as fast as stagecoaches?"

– *The Quarterly Review, England, 1825*

"This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."

– *A memo at Western Union, 1876*



1876

1883

"X-rays will prove to be a hoax."

– *Lord Kelvin, President of the Royal Society, 1883*



"...so many centuries after the Creation it is unlikely that anyone could find hitherto unknown lands of any value."

– *Advisors to King Ferdinand and Queen Isabella of Spain regarding a proposal by Christopher Columbus, 1486*

1825

1838

"Men might as well project a voyage to the Moon as attempt to employ steam navigation against the stormy North Atlantic Ocean."

– *Dr. Dionysius Lardner, professor of Natural Philosophy and Astronomy at University College, London, 1838*



1486

"I also lay aside all ideas of any new works or engines of war, the invention of which long-ago reached its limit, and in which I see no hope for further improvement."

– *Roman engineer Julius Sextus Frontinus, cAD 84*

cAD 84

"There is not the slightest indication that nuclear energy will ever be obtainable. It would mean that the atom would have to be shattered at will."
— Albert Einstein, 1932

"A rocket will never be able to leave the Earth's atmosphere."
— New York Times, 1936

1911



"Airplanes are interesting toys, but of no military value."
— Marshal Ferdinand Foch, future WWI Supreme Commander of the Allied Armies, 1911

1932

"Where a calculator on the ENIAC is equipped with 18,000 vacuum tubes and weighs 30 tons, computers in the future may have only 1,000 vacuum tubes and weigh only 1.5 tons."
— Popular Mechanics, March 1949

1936

1949



"Two years from now, 'spam' will be solved."
— Microsoft chairman Bill Gates, 2004

2004

Peering into the crystal ball can yield images that are cloudy and even upside-down. Still, everyone seems compelled to look. People are more than just curious to know what the future holds—we obsess over weather forecasts, stock market predictions, and the odds on the *big game*.

The art of futuring has been practiced in various forms over the course of human history. Today's forecasters, professionally called futurists or futurologists, may rely on statistical models run through massive supercomputers, but their quest to foresee the future is little different than it was for oracles, soothsayers, and prophets of yore. Although knowing what to expect might make it possible to change the course of human events, tempting fate can be a futile exercise, even in modern times. Often, the best that can be hoped

I predict...

"...four or five frigates will do the business without any military force."
— Lord North, British Prime Minister, debating imposing the Stamp Act on the American Colonies, 1774

"How, sir, would you make a ship sail against the wind and currents by lighting a bonfire under her deck? I pray you, excuse me, I have not the time to listen to such nonsense."
— Napoleon Bonaparte, when told of Robert Fulton's steamboat, 1800s

"Rail travel at high speed is not possible because passengers, unable to breathe, would die of asphyxia."
— Dr Dionysius Lardner, professor of Natural Philosophy and Astronomy, University College London, 1828

"It's a great invention but who would want to use it anyway?"
— Rutherford B. Hayes, US President, after a demonstration of Alexander Bell's telephone, 1877

for is to glimpse the future and try to prepare for it.

On technology's horizon, numerous scenarios considered inevitable today were practically inconceivable a generation ago. Fuel cells, nanobots, unmanned vehicles, metamaterials, and telepathic communication are already finding their way into practical use. Time travel, invisibility cloaks, cyborgs, quantum computers, and human clones might not be all that far off.

Futuring helps us imagine the unimaginable and anticipate the unforeseen. In a world rapidly transformed by technology, the unimaginable can suddenly turn into crisis and the unforeseen the status quo. To prevent being taken by technological surprise, it is essential to anticipate the unexpected. Industry relies on technology forecasts to set production goals, order

commodities, and schedule expansion. For the intelligence community, the stakes are much higher.

A variety of futuring techniques are used to predict the world of tomorrow. Occasionally, a single event or discovery or even an idea changes everything. In those cases, human imagination is best suited to pierce the veil of the unknown.

Change, however, is usually incremental. A line drawn from the past and through the present can be extended into the future to point to a logical expectation. More deterministic methods of prognostication can be used to construct forecasts on the extrapolated data points of such trend lines. Trend analysis might miss the unexpected, but it provides a foundation for making decisions. If you know the local department store has held a “white sale” every Presidents Day for the past 10 years, you’re likely to put off buying that set of Egyptian cotton sheets until February.

With technology, no gauge for tracking a trend is more popularly watched than Moore’s Law. What started as a general observation about the pace of growth in computing power has come to set benchmarks for maintaining that pace. But even forecasts are fair game for forecasters to speculate on their sustainability. In the case of Moore’s Law, predictions about the trend in computing power coming to an end have been consistently proven wrong, however, with the original forecast trumping subsequent forecasts to the contrary.

Reading the tea leaves of statistical data is a tricky business that yields different conclusions depending on how the cup is tipped. Opinions among subject matter experts and respected pundits are often at odds. Divergent views can be useful for contingency planning, but to develop an overall strategy for

▶ “When the Paris Exhibition closes, electric light will close with it and no more will be heard of it.” – *Erasmus Wilson, Oxford professor, 1878*

▶ “The phonograph has no commercial value at all.” – *Thomas Edison, 1880s*

▶ “We are probably nearing the limit of all we can know about astronomy.” – *Simon Newcomb, astronomer, 1888*

▶ “Fooling around with alternating current is just a waste of time. Nobody will use it, ever.” – *Thomas Edison, 1889*

▶ “Heavier-than-air flying machines are impossible.” – *Lord Kelvin, President of the Royal Society, 1895*

▶ “Radio has no future.” – *Lord Kelvin, former President of the Royal Society, 1897*

▶ “The ordinary ‘horseless carriage’ is at present a luxury for the wealthy; and although its price will probably fall in the future, it will never, of course, come into as common use as the bicycle.” – *Literary Digest, 1899*

▶ “I must confess that my imagination refuses to see any sort of submarine doing anything but suffocating its crew and foundering at sea.” – *H.G. Wells, 1901*

▶ “The horse is here to stay but the automobile is only a novelty—a fad.” – *The president of the Michigan Savings Bank advising Henry Ford’s lawyer, Horace Rackham, not to invest in the Ford Motor Company, 1903*

▶ “I confess that in 1901, I said to my brother Orville that man would not fly for fifty years.... Ever since, I have distrusted myself and avoided all predictions.” – *Wilbur Wright, 1908*

▶ “...the automobile has practically reached the limit of its development is suggested by the fact that during the past year no improvements of a radical nature have been introduced.” – *Scientific American, 1909*

▶ “The coming of the wireless era will make war impossible, because it will make war ridiculous.” – *Guglielmo Marconi, 1912*

future development, a targeted approach depends on agreeing on what the future is most likely to look like.

Through visioning exercises organizations decide which potential future scenarios are most desirable, and they develop goals and the strategies to achieve them. Just as professional athletes *see* themselves powering through a fastball or executing a perfect dive, an enterprise can collectively envision the ideal customer experience, and an institution can foresee realizing its ultimate objectives. To this end, activities such as surveys and polls are used to arrive at a consensus. Consensus forecasting can be conducted as casually as by a roundtable discussion or through more formal techniques such as a methodical Delphi exercise.

For modern futurists new technologies and algorithms are providing innovative tools for generating more precise and reliable forecasts. Computer simulations are often used to model behaviors ranging from interactions among quantum dots to cosmic expansion after the Big Bang. Some of the largest supercomputers have been designed for just such purposes. The video game industry has also contributed to behavioral forecasting by providing platforms for experimenting with complex social and environmental interactions. All things considered, orcs in *World of Warcraft* don’t act that much different than travelers waiting in queues for airport security screening.

No matter how accurate, deterministic projections merely set the stage for scenario forecasts, painting the backdrop and furnishing a few basic props. Although statistical models might be useful for calculating actuarial tables, more random, or stochastic, futuring approaches are needed to animate a

→ “The cinema is little more than a fad. It’s canned drama. What audiences really want to see is flesh and blood on the stage.” – *Charlie Chaplin, 1916*

→ “The idea that cavalry will be replaced by these iron coaches is absurd. It is little short of treasonous.” – *Comment of Aide-de-camp to Field Marshal Haig at a tank demonstration, 1916*

→ “There is no likelihood man can ever tap the power of the atom.” – *Robert Millikan, physicist and Nobel Prize winner, 1923*

→ “The wireless music box has no imaginable commercial value. Who would pay for a message sent to no one in particular?” – *Associates of David Sarnoff responding to the latter’s call for investment in the radio in 1921*

→ “It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow.” – *Robert Goddard, 1927*

→ “Who the hell wants to hear actors talk?” – *Harry Warner, Warner Bros., 1927*

→ “There will never be a bigger plane built.” – *A Boeing engineer, after the first flight of the 247, a twin engine plane that holds ten people, 1933*

→ “...any one who expects a source of power from the transformation of these atoms is talking moonshine...” – *Ernest Rutherford, physicist, 1933*

→ “Atomic energy might be as good as our present-day explosives, but it is unlikely to produce anything very much more dangerous.” – *Winston Churchill, First Lord of the Admiralty, then soon-to-be British Prime Minister, 1939*

→ “The name of Igor Sikorsky will be as well known as Henry Ford’s, for his helicopter will all but replace the horseless carriage as the new means of popular transportation. Instead of a car in every garage, there will be a helicopter...” – *Harry Bruno, aviation publicist, 1943*

complex scene. There is, perhaps, nothing more stochastic than human imagination.

Science fiction writers often provide the earliest and most vivid depictions of the future. The tomorrows imagined by visionaries such as Jules Verne and Robert Heinlein may have seemed incredible when they were first published, yet many of their predications have come true only decades later. And it took thousands of years of invention before the flight of Icarus was realized. Can we be certain that the age-old ambitions of turning lead to gold or reanimating a corpse are unobtainable?

Fiction is frequently steeped in the myths and legends of human history. A common and effective way to project the future is to filter it through the past. Historical analysis provides a forecasting method that benefits from hindsight to get a glimpse of tomorrow. Much can be learned by applying the lessons of history, as well as by reimagining momentous events in the past. By asking, “What if?” historical fiction can cast new light on current affairs that might prevent a repeat of prior mistakes.

Forecasting methods are as varied as the reasons for wanting to know “What’s next?” Futurists can apply their craft to sound a warning to prepare for impending change; they can have a hand in shaping the future, as well. Kings have turned to futurists to foretell their fates. Generals to predict success in battle. Adventurers to invoke good fortune. Modern forecasting methods may be based in scientific principles, but the desire to see into the future is as old as dreams.

“We are limited, not by our abilities, but by our vision.” – *author unknown* 📖

→ “[Television] won’t be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night.” – *Darryl Zanuck, movie producer, 20th Century Fox, 1946*

→ “Television won’t last. It’s a flash in the pan.” – *Mary Somerville, pioneer of radio educational broadcasts, 1948*

→ “It would appear we have reached the limits of what it is possible to achieve with computer technology.” – *John von Neumann, computer scientist, 1949*

→ “It will be gone by June.” – *Variety, commenting on rock ‘n roll in 1955*

→ “Nuclear-powered vacuum cleaners will probably be a reality in 10 years.” – *Alex Lewyt, president of vacuum cleaner company Lewyt Corp., in the New York Times, 1955*

→ “Space travel is utter bilge.” – *Dr Richard van der Reit Wooley, Astronomer Royal, space advisor to the British government, 1956*

→ “The world potential market for copying machines is 5000 at most.” – *IBM, to the eventual founders of Xerox, 1959*

→ “Before man reaches the moon, your mail will be delivered within hours from New York to Australia by guided missiles. We stand on the threshold of rocket mail.” – *Arthur Summerfield, US Postmaster General, 1959*

→ “There is practically no chance communications space satellites will be used to provide better telephone, telegraph, television, or radio service inside the United States.” – *T. Craven, FCC Commissioner, 1961*

→ “It will be years—not in my time—before a woman will become Prime Minister.” – *Margaret Thatcher, October 26th, 1969*

→ “For all predictions do to this belong: That either they are right, or they are wrong.” – *John Tulley’s Almanac for 1688*