

SURVIVING THE TECH STORM

STRATEGY IN TIMES OF
TECHNOLOGICAL UNCERTAINTY

NICKLAS BERGMAN



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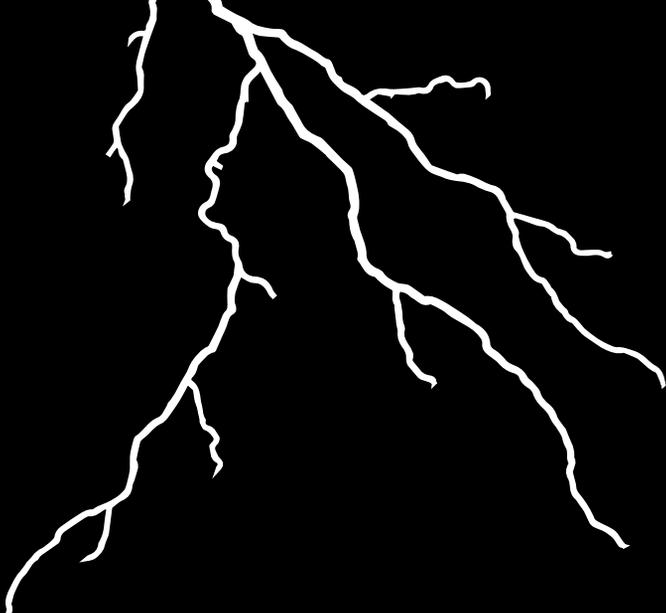
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FOREWORD

Are we living, today, in a more exciting, dangerous, dismaying, encouraging time than any other in history? We really do not know, but we do know that each new era and technological paradigm shift presents particular challenges and opportunities. It is a constant struggle to keep up with the fast changing times in which we live, and it is only a minor comfort to realize that, during the 19th century, humankind already felt left behind and overwhelmed by information overload, globalization and technological progress. One of the main reasons people react in this way is that technological developments create opportunities and challenges, simultaneously this is questioning and challenging existing perceptions and behaviors.



My grandmother, Selma Olsson, was born in 1900, and gave birth to 17 children between 1920 and 1944. Quite apart from that marvelous achievement, by the time she passed away in 1992, she had also experienced close to a century of amazing technological development. Among other things, she witnessed the mainstream adoption of the telephone and electricity, the arrival of radio and television, new means of transportation with cars and air travel, the conquering of space, as well as the invention of the computer. She lived her whole life in the countryside off the Swedish west coast, and although she was a curious and open minded person, she never really embraced all



My grandmother Selma Olsson, circa 1920.

Credit: Private

the new technologies, instead being very content with her way of living. The lives of my children, born at the beginning of the 21st century, could not be more different. We are entering an era in which technology will redefine who we are, and it is no longer just a question of what technology can do for us, but what should we allow technology to do.

For more than 20 years I have worked as an entrepreneur, technology investor and futurist, focusing mostly on investments and business development in emerging markets, web services, nanotechnology, computing, new materials and new media art. Currently, I have approximately 15 direct and indirect technology investments. The constant challenge is to choose a technological path and to time development and/or market introduction. This involves identifying key indicators that can be of help in these decision-making processes; often the companies or projects end up having to make major decisions based on very limited information.

Over the past 10 years, I have spent a significant amount of time and energy trying to gain some deeper understanding of the decision-making processes under these complicated circumstances. This book is an attempt to create a framework for how we relate to these times of enormous technological turbulence. By combining a historical perspective with technological curiosity and strategic business insight, it is possible to gain a clear view of both the



With fellow board members on a visit to the MC2 clean room at the Chalmers University of Technology in Gothenburg, Sweden.

Credit: M Shafiq Kabir

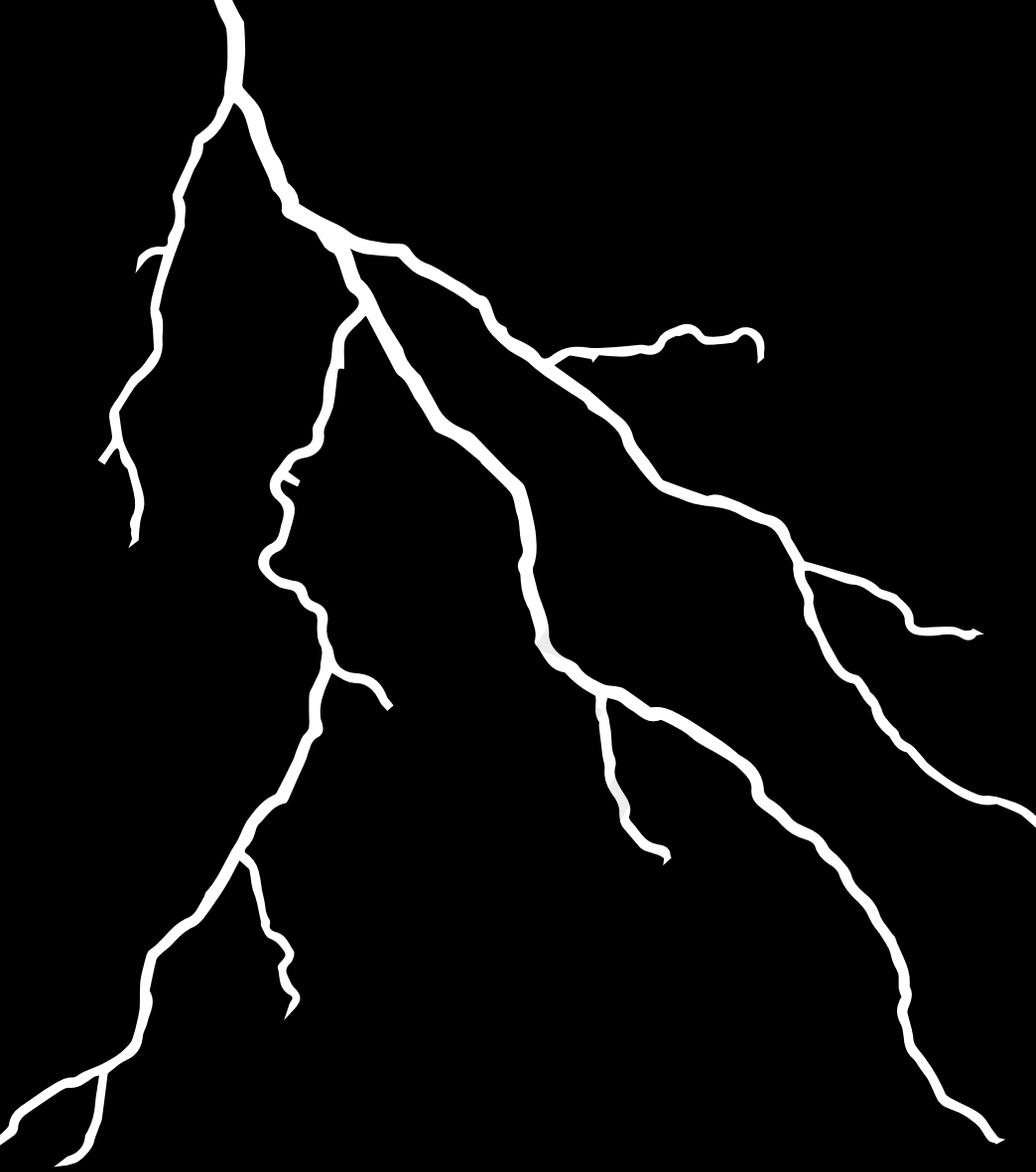
opportunities and challenges coming out of the approaching techstorm.

Enjoy the read, and please let me know if you have any comments or suggestions. E-mail me at write@nicklasbergman.com

Stockholm, November 2015

**MEGATRENDS
AS DRIVERS
OF CHANGE**





Over the next 50 years, society will need to respond to myriad issues relating to the proper use and consequences of unprecedented developments, and the insights these provide. With every technological advance mankind makes, there are potentially thousands of questions that will be generated, the majority concerning the appropriate uses and application of that technology and determining whether the benefits are worth the price the planet ends up paying. In the coming years and decades, it will no longer be a question of what technology can do for us, but rather what we should allow technology to do. It will be increasingly important that society, taking account of individual beliefs as well as joint values, discusses and agrees on our technological future. It's an ongoing revolution, and we have to take control.

A stylized white lightning bolt graphic is positioned on the left side of the text box, extending from the top to the bottom of the box.

In the coming years and decades, it will no longer be a question of what technology can do for us, but rather what we should allow technology to do.

Technological development is the most powerful of all megatrends, and the one that often fuels development in others; a healthier population, with people living longer; the global environmental challenge; a more global and connected

world and a power shift in the global economy. The goal must always be to understand the megatrends of today, to gain insight into the different societal and technological, but also ethical, dimensions that come from innovations, new systems and practices. The ultimate goal is not to destroy technology and remove it from society, but rather to help with the advancement of a technological society that does not sacrifice morals and ethics for the sake of having the technology. Megatrends bring significant changes that affect society in powerful ways and the goal of those who study these trends is to understand the potential impacts.

HEALTHIER AND OLDER DEMOGRAPHY

There is no doubt that technology is developing very rapidly, faster than most people know how to make use of it. The technological revolution we are facing today makes it all the more vital and necessary for people to understand the impact megatrends have on the world as a whole. The demography of cities, regions and countries changes all the time and these developments are largely influenced by the societal changes and advancements that are made. Demography is more than just the data and numbers of who is

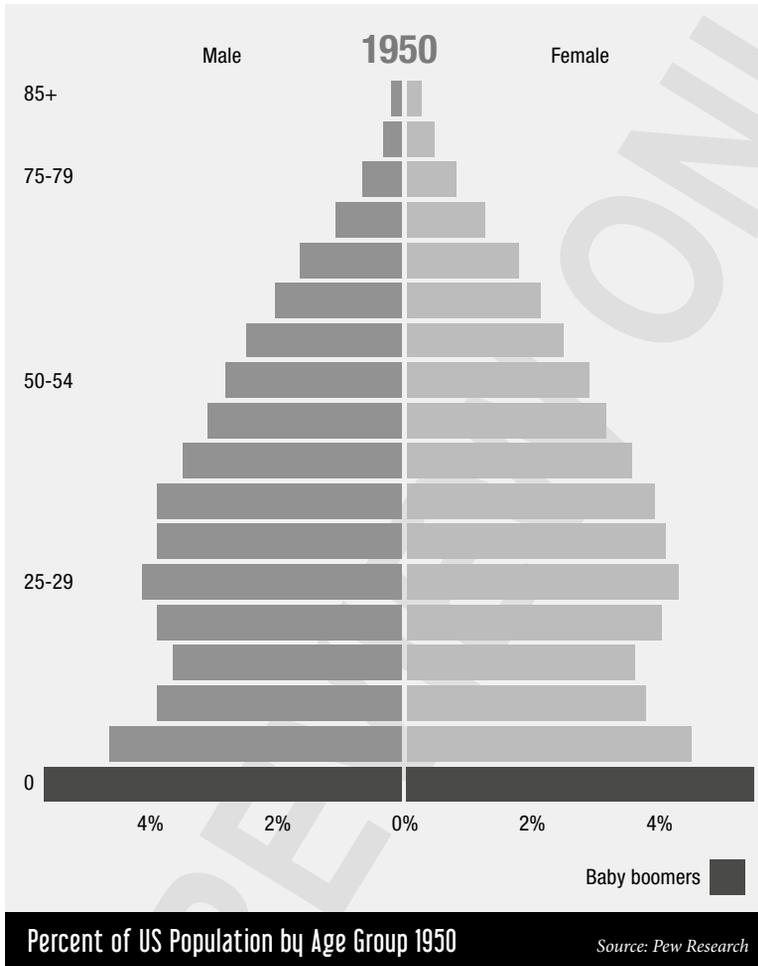
Demography is more than just the data and numbers of who is who in a given area, it is about understanding what happens to them and why.

who in a given area, it is about understanding what happens to them and why. The way people live, work, and develop as a society is the basis for the study of this megatrend; it is virtually impossible to separate changing demographic patterns from the other megatrends.

In the areas of demographics and technology, there are four key developments that need to be addressed: Ageing; improving standards of health; empowering individuals and harnessing their power; and recognizing trends and developments and keeping a watchful eye on what the future holds.

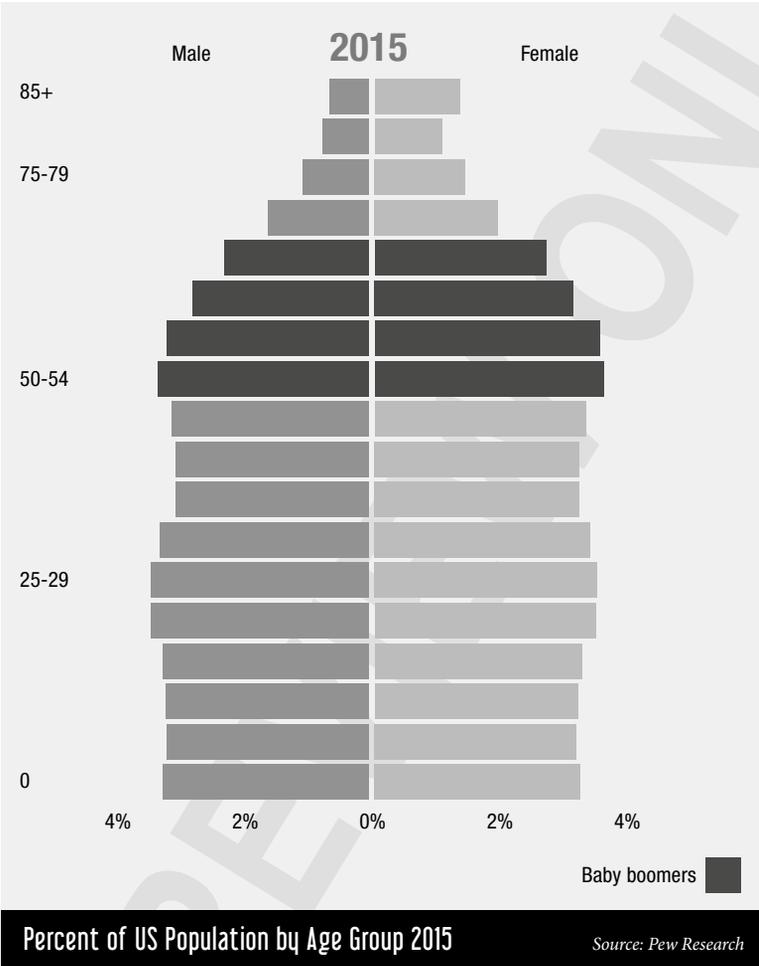
AGEING POPULATION

“The so called ‘baby boom’ generation (people born between 1946 and 1964) is already having an effect on the healthcare system and this is expected to increase as the century progresses. The number of American citizens aged 65 and over (35 million people in 2000) will rise by more than 19 million to 54 million by 2020. From 2000 to 2050, the number of people aged 65 and older will increase from 12.5% to 20% of the US population.”¹ In the US, more than 10 000 people celebrates their fiftieth birthday every day. Proportionally, the size of the older population is growing at a faster rate than the younger population. In Japan, the number of people who are aged 75 and over has grown by almost 40% between 2005 and 2015.

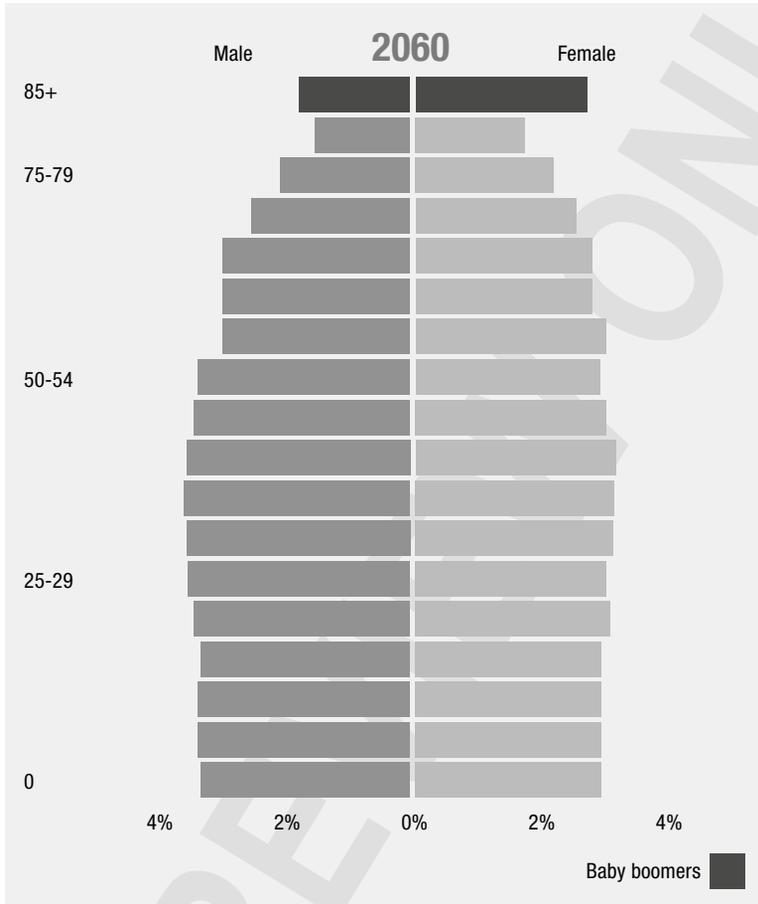


Trends like these are the same across the globe and bring to light a fact that cannot be ignored: the world's population is aging. That brings a whole new list of issues that must be addressed and dealt with.

The impact of this shift in population demographics is far reaching and spans many industries.

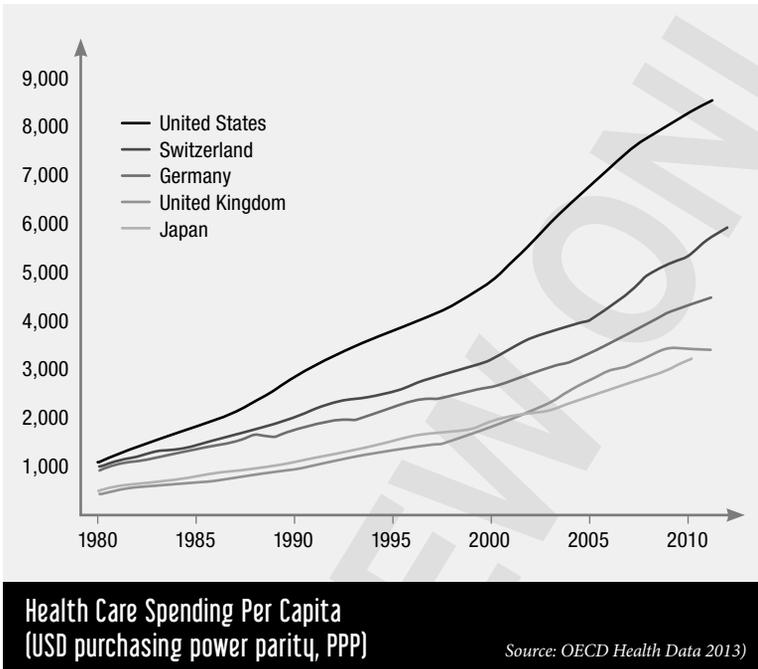


Aging populations affect all areas of health and social care, and the impact is felt not only by the older population itself, but by the coming generations who must help to support and care for them. Medical advances have been made and new medicines and treatments are being developed, but the needs of the ageing population are also growing at a rapid rate.²



Percent of US Population by Age Group 2060 *Source: Pew Research*

Since diseases such as dementia, diabetes, cancer, age-related health problems and other chronic conditions become more prevalent as people live longer, the burden that is placed on the healthcare industry, as well as all members of society, increases.



IMPROVING HEALTH

“The \$414.3 billion in healthcare expenses for the elderly in 2011 was over \$100 billion higher than inflation adjusted expenses for 2001. ... The average annual [medical] expense per person was about \$1,000 higher in 2011 than 2001.”³ This data comes from the US, and although the country has the highest healthcare spending per capita in the world⁴, figures like these are showing up time and time again in surveys, medical studies and reports from many other countries. It is little wonder that the aging population of the world struggles to get the care they need to have full and valuable lives.

Up until quite recently, at least from a history of humanity perspective, famine, pestilence, war and natural disaster were control mechanisms limiting population growth. Lower birth survival rates and higher death rates slowed the population increase. With recent advances in medicine, this is no longer the case and as populations swell, communities are facing the challenge of both supporting the young, the working population and older people, in need of care, for longer and longer periods of time. This put enormous stress on the welfare system, and is one of the most pressing issues concerning politicians today.⁵



The Millennium Project, along with many others like it, measures the guiding principles that are thought to be the most influential in shaping, for example, ethical decision-making, both now and in the future.

THE POWER OF ONE

Our understanding of how to use technology and the way technology impacts society will change year on year. What's "right" today may not be "right" five years from now. However,

there are certain constants that seem likely always to play a factor in determining how technology should be used.⁶

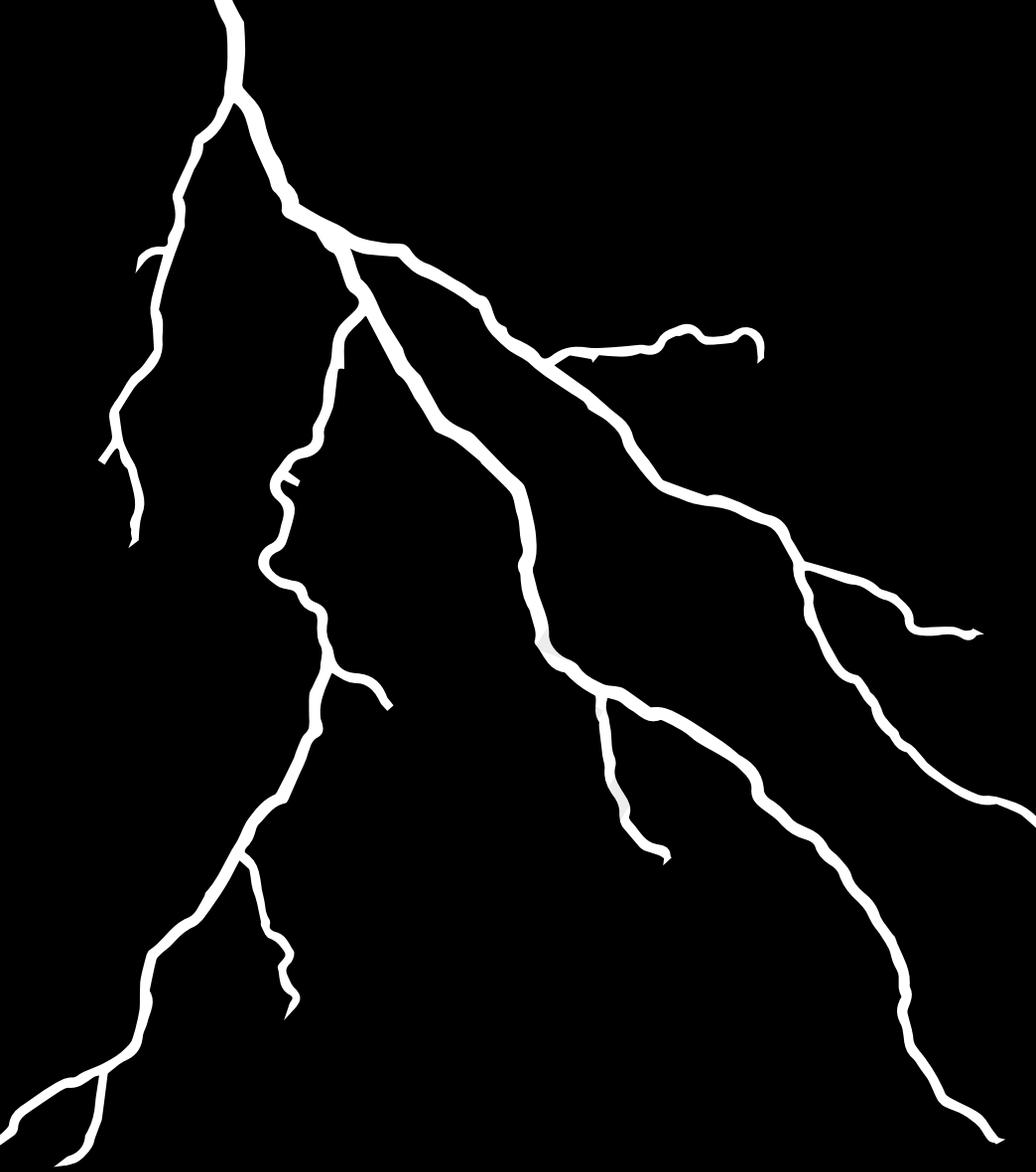
This applies to the concept that has come to be called “the power of one” because it focuses on how an individual’s needs, goals, and actions can lead to bigger advances. Every person can create a ripple effect in an interconnected world. The power of one focuses on the change that happens in a society where trends, fads, and acceptable norms are in flux; there is a constant ebb and flow that helps govern societies and dictate accepted norms and values. There is still power in the individual and even one person can make a difference. A few united minds can be enough to fuel serious change and revolutions. The Millennium Project, along with many others like it, measures the guiding principles that are thought to be the most influential in shaping, for example, ethical decision-making, both now and in the future. What many similar studies have uncovered is that the needs and values of a population are not continuous but fluid. Some of the most important values and needs of today will not be considered important in a few decades. Examples are changes in societal norms, changes in the needs and desires of the population, changes in health and lifespans, current events that shape the way groups view the world, and the ever changing interests and convictions of individuals.

TRENDS IN DEMOGRAPHIC ETHICS

While these principles do not directly explain how megatrends impact society, or how these advances and changes should be used, they are elements that are generally agreed upon in the process of making ethical decisions. Technology usage and social norms that potentially threaten human survival, for example, do not fit into ethical usage. Society will have to adjust its views on certain topics and issues involved.⁷ While it is true that changes in demographic trends mean there is a greater demand for resources, supplies, money, healthcare, and so on, this does not mean that the world is doomed to a future of scarcity and an everyday battle for basic necessities. What it does mean is that there must be a shift in how people see and approach these trends and how society adheres to these changes. Demographic trends are connected to every aspect of society, including, but not limited to, environment, culture, job markets, and financial stability.

**BROADEN
YOUR
TECHNOLOGY
PERSPECTIVE**



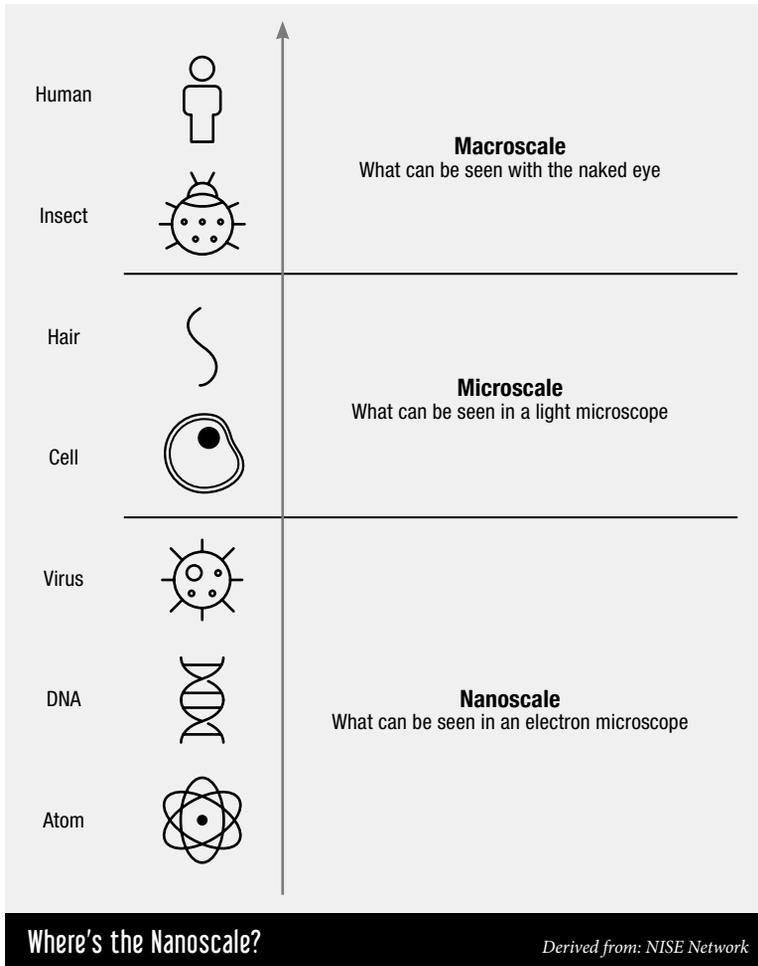


THE FUTURE OF TECHNOLOGY

Precisely what the future has in store for business and society is unclear, but the development of emerging technologies gives a great glimpse into just how the world might develop in the coming decades. As scientific advances in nanotechnology, genomics, and neuroscience continue, the world seems, paradoxically and simultaneously, more complex and simpler.

To get a clearer picture of where this emerging techstorm will take us, it is necessary to try to understand what the next GPT is. As we have seen in the past, it is the GPTs that drive the major technological waves that lead to these vastly different societies that wouldn't even be clearly recognizable to previous generations.

There is little doubt that the next GPT that will lead us into the sixth wave already exists. While this GPT is still in its infancy, it has given way to many emerging technologies that will also shape the different possible courses of the future. The GPT that seems most likely to bring us into a vastly different world is nanoscience,



miniaturization and our ability to understand and interact on molecular and atomic scales.

MINIATURIZATION - THE NEXT BIG THING

Nanoscience is a rapidly growing field that has the potential to create an entirely new generation of scientific and technological approaches.⁴¹

With nanoscience, there is a completely new understanding of the atomic scale and how it can be used. By focusing on the atom and how it can be manipulated and used, nanoscience opens the doors for many fresh possibilities in IT, materials science, medicine, and life itself. Nanoscience refers to the study of objects that fall in the nanometer scale, which ranges from 1 to 100 nanometers, and includes studies of viruses, DNA and material properties on the atomic scale. The ability to study and understand objects on such a small scale certainly is an impressive feat that will greatly enhance the understanding of the world around us.

While nanoscience may be something that is far beyond the grasp of understanding for the average person today, this developing GPT is something that will put us on the course to a dramatically different understanding in the future. According to the US National Nanotechnology Initiative, “The emerging fields of nanoscience and nano-engineering are leading to an unprecedented understanding and control over the fundamental building blocks of all physical things. These developments are likely to change the way almost everything is designed and made.”⁴² This new understanding of the way things work will allow for a future in which everything can be made differently.

A COMBINATION OF SCIENCES

Although the term “nanotechnology” was introduced by physicist Richard Feynman in 1959,

nanoscience is a relatively new field. Fueled by innovations in imaging and interaction on the atomic scale during the end of the twentieth century, the field has seen tremendous development in the past 15 years and its role as a GPT is already becoming solidified. Nanoscience is also unique in that it combines physics, chemistry, and biology in a way that scientific fields have not generally done before.

WHY SO SMALL?

One of the biggest questions concerning nanoscience is why things need to be broken down to such a small scale. The very idea of nanoscience requires objects to be very small. “Smaller is better” could actually be a principle of nanoscience, at least in certain terms and to a certain extent. Computers are an excellent example of this principle. The massive increase in the speed of computers has not been accompanied by larger devices. In fact, it is the smaller device that allows the computers to be faster. By exploring smaller avenues, we are able to put more and more power into a smaller chip, thus giving us something much faster without having to increase size. Without nanoscience, this shrinking of computers would have been impossible.

By granting the ability to study objects of such small sizes, nanoscience allows for greater understanding and analysis. In turn, this allows for advancements in manufacturing, modification, and many other areas. Nanoscience as a GPT has many applications and has already led,

and will, in the coming years, continue to lead to incredible progress in many emerging fields and technologies.

The great advance in computer processing power also makes it possible to study microbiological and neural systems at a much more detailed level, completing the connection between four major branches of science. Combining IT with nanotechnology, neuroscience and biotechnology and medicine, is popularly referred to as "BANG technologies": bits, atoms, neurons and genes.

The small scale used in nanoscience has led to significant advances in medicine. By exploring cells at their natural level, scientists are able to create more effective methods of interacting with cells. Instead of using larger instruments to affect the behavior of cells, nanoscience has allowed for the usage of tiny particles, no bigger than the cells themselves. In doing so, nanoscience creates better ways to fight complex health problems such as viruses and cancer. The answer to defeating cancer isn't by attacking it with something bigger; it's a matter of getting down to the right size to explore, analyze, and combat it most effectively.

IS NANOSCIENCE REALLY THE NEXT GPT?

In order to consider nanoscience as a GPT, it must have four basic characteristics. First, nanoscience is a single generic technology. While nanoscience itself can be hard to classify into one definition, it is essentially the study and use of objects on a very

small scale. All advances in nanoscience involve looking at these very small building blocks. Therefore, it is a single technology. It is generic in scope in that it can apply to the study of any small particles. Nanoscience does not refer to only a specific study but rather a broad one.

A stylized white lightning bolt graphic is positioned on the left side of a grey rectangular background. The bolt is jagged and extends vertically, with several smaller branches extending horizontally and diagonally.

Nanoscience is pushing us into a new technological wave that will leave our world unrecognizable to our current minds.

The second question, whether or not nanoscience has scope for improvement and development, is simple to answer. There are billions of small objects to be explored in a variety of fields, and nanoscience has only scraped the surface so far, although the technology is developing quickly. The advances already have made a significant impact on society and everyday life, but the potential for improvement seems virtually unlimited at this point. Computers can be made faster, fuels more efficient, and bodies stronger and more resistant to viruses and diseases. The key to achieving all this is nanoscience.

The third characteristic of a GPT is that it must be used widely and have multiple uses in its mature state. Nanoscience is still maturing, but its many uses are already apparent. From biology to computer processing, to environmental systems, to

manufacturing, nanoscience seems to have the ability to reach nearly every field. As nanoscience continues to mature and develop, more and more uses seem inevitable.

The final characteristic of a GPT is the requirement for spillovers into other areas of society and economy. As seen already, nanoscience has the potential to affect all areas of society. From a potential economic impact of trillions of dollars, to a healthier society that can manufacture its own goods to exact specifications, there seems to be no limit to the reach of nanoscience.

There is virtually no doubt that nanoscience meets all the necessary characteristics to qualify as a GPT. The only question that then remains is whether or not this is the GPT that will lead the next technological wave.

SMALL BUT FAR REACHING - CROSS POLLINATION

As much as nanoscience has already changed our lives, its potential is far from realized. With the possibilities of cures for cancer as well as the prospects of artificial intelligence, new materials with unique properties, and many other things we cannot yet imagine on the horizon, nanoscience is pushing us into a new technological wave that will leave our world unrecognizable to our current minds.

Nanoscience may deal with only the very small, but its impact is going to be very big. Maybe the

most fascinating aspect of nanoscience is that it spans many disciplines and creates interesting interactions. The concept of cross-pollination between different disciplines is one of the most exciting aspects of science today. This is also happening between science and the arts, for example the CERN (European Organization for Nuclear Research) particle accelerator creates scholarships for artists-in-residence, physicists use modern dance to find new metaphors for quantum dynamics and (on a more applied level) material scientists are finding inspiration from biological systems – shark skins for low friction wet suits and gecko “toes” for upgraded adhesives.

ENVIRONMENTAL ASPECTS OF NANOSCIENCE

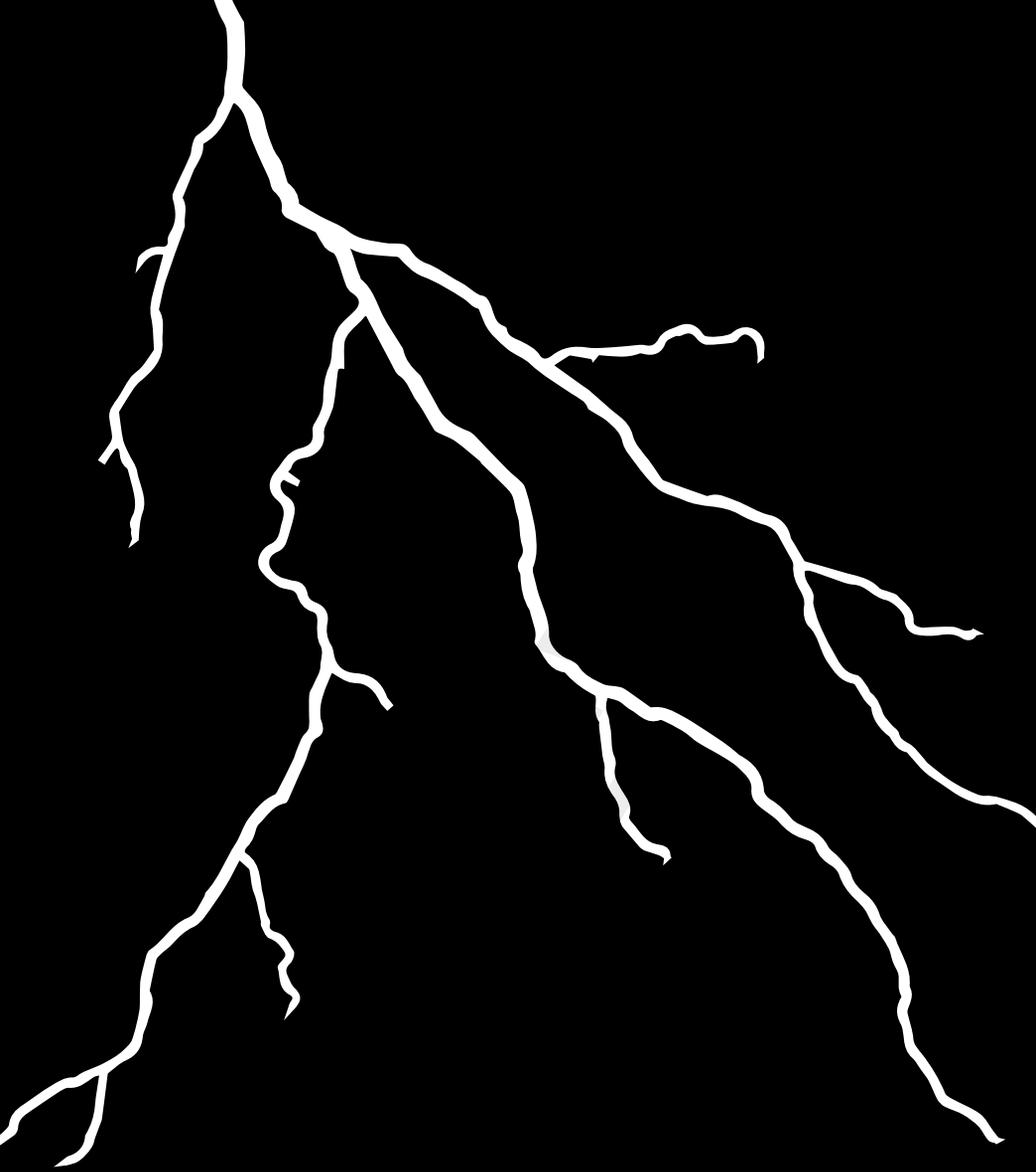
While the emergence of nanoscience has created some concerns about the future of the environment, it also has the potential to provide solutions. Research into nanoparticles and their potential effects on the environment is currently limited, but studies concerning other small particles, including airborne pollutants, suggest the possibility of some major impacts that may also be seen with nanoscience. The main questions regarding nanoparticles and the environment center on how these small particles will behave in existing environmental systems. It is possible that nanoparticles could enter into the food chain and interfere with certain biological processes. In order to use nanoscience to help the environment, it will be essential to understand and address these issues.

The growth and development of nanoscience and nanoparticles points to more good than harm for the environment. However, it appears possible to use nanoparticles to make pollutants into less harmful chemicals. Because of the size and volume of nanoparticles, they take on a reactive nature that can speed up chemical reactions. This has already been put to use in the US, with nanoparticles being explored as a way to remove pollutants from ground water and soil.

There are certainly many unanswered questions about just how nanoscience will impact the environment in the future, but current developments suggest that the benefits will be very positive for the world. By creating more efficient energy sources and doing a better job of eliminating pollutants, this emerging area of technology has great potential to solve some of the biggest problems facing the world today.

CASE STUDIES



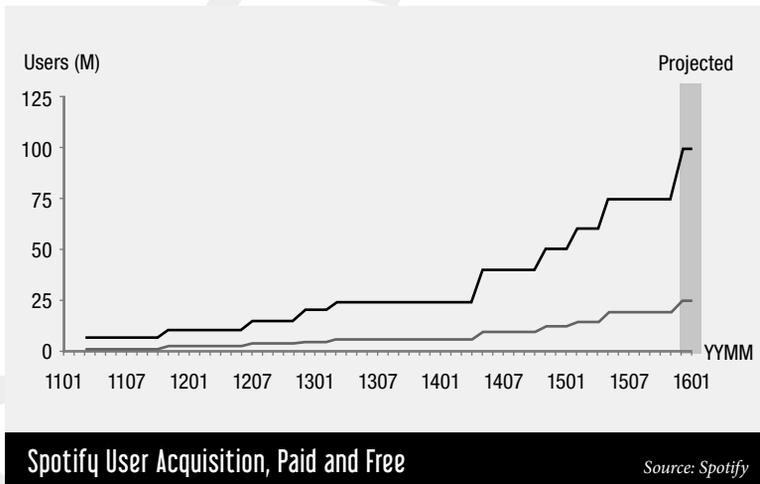


RESCUING THE MUSIC INDUSTRY - SPOTIFY

Right at the peak of the very bullish and bubbly market of 2007, I was affiliated with a large Scandinavian venture capital company. In early spring of that year, an old college friend pitched his new music startup to me. When visiting their office, I remember a couple of things from that first meeting. First, the coffee shop on the ground floor made great espressos. Second, they had a server rack with non-copy righted music in a closet filled with almost a dozen table fans to remove excess heat. Third, that it was a great idea, and for the next couple of months I was pushing hard to make the investment at an incredibly high valuation for a non-user, non-revenue startup.

The entrepreneurs were definitely on to something, but it was impossible for me to comprehend and convince my colleagues fully that the future of music was streaming access to an almost infinite music catalogue paid for by advertising, not purchasing individual songs or albums and downloading them to your laptop. We passed on the investment, and the company, Spotify, is today one of the most well respected music services with a global reach and a rapidly growing user base. By mid-2015 Spotify had 75 million users, of which 20 million were paying subscribers⁵⁶, annual revenues north of US\$2.5 billion⁵⁷ and a unicorn valuation of more than US\$8 billion.⁵⁸

Spotify was founded in late 2006 by Daniel Ek, a young entrepreneur and music geek with a hacker background, and Martin Lorentzon, a highly successful entrepreneur who, the year



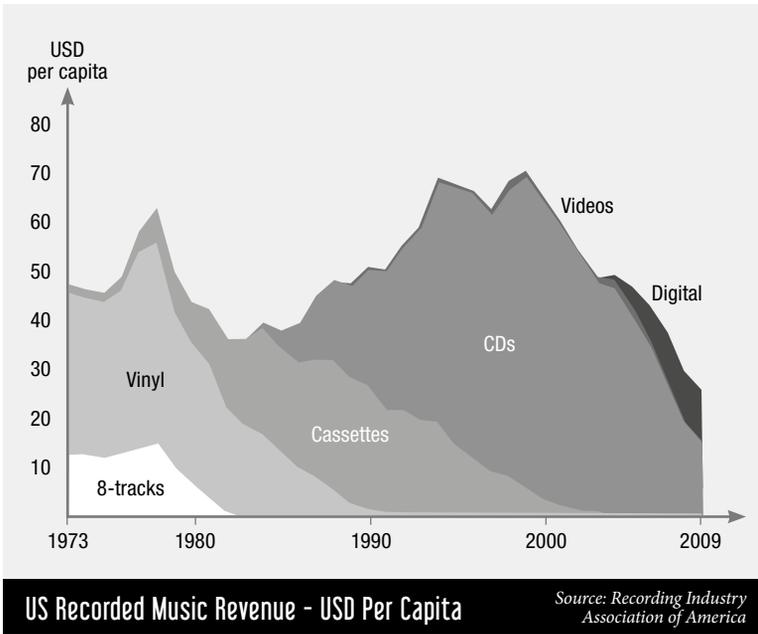
before, had taken his first start-up public at a US\$750 million valuation.

Initially, their idea was nothing more than to make money from advertising. All they needed was to find something to attract a large audience. Soon it dawned on them that the music industry was in really bad shape. Remember that this was in the mid 2000s with an already large, and rapidly growing, music piracy community, a place where all computer-literate music fans hung out. The music industry was in desperate need of a new business model, one that could withstand the coming deadly wave of digitization.

The scope for Spotify was clear from the beginning. Reinvent the music industry with inspiration from hacker culture and music piracy, but with a sustainable revenue model. Also, the goal was to create a streaming music service a lot better than existing peer-to-peer torrent based solutions out there. Speed was of the essence, and Ek and Lorentzon recruited the best programmers available. The first time



The music industry was in desperate need of a new business model, one that could withstand the coming deadly wave of digitization.



I met the company they were just weeks from releasing the first beta version. The prototype was fast and slick, the concept was intriguing, and it was very clear that they were onto something.

Quite apart from the fact that the founders of Spotify were great visionary entrepreneurs with a total commitment to their cause, they also managed to get the technological timing right. Already in 2006 when Spotify was founded, they saw what was coming:

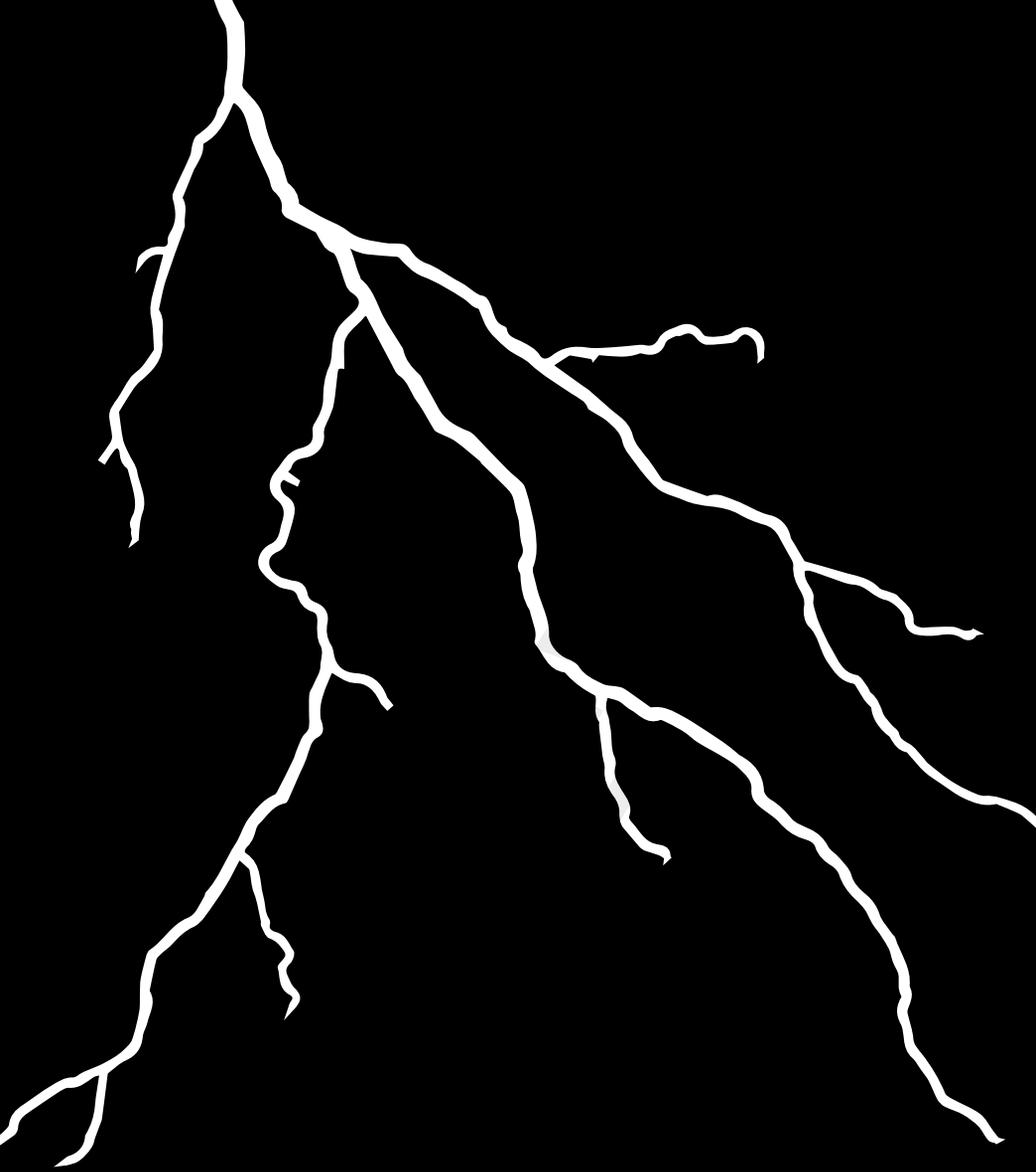
- a move from downloading to streaming
- the move from desktop to laptop to mobile
- algorithms to analyze and deliver better music recommendations
- cloud based storage of each individual music catalogue

Subscription is at the core of Spotify's business model. Initially, the focus was only on advertising revenues, but after tough negotiations and great pressure from music labels, a paid premium version was introduced.

With giants like Apple and Google having entered the market in recent years, competition is fierce nowadays. Spotify has a large war chest (albeit smaller than its competition), and has forever changed the way we listen to, and pay for, music. Still, only time will tell whether the market position is sustainable in the long run.

**CREATE
A NEW
FRAMEWORK**





ADAPT TO UNCERTAINTY

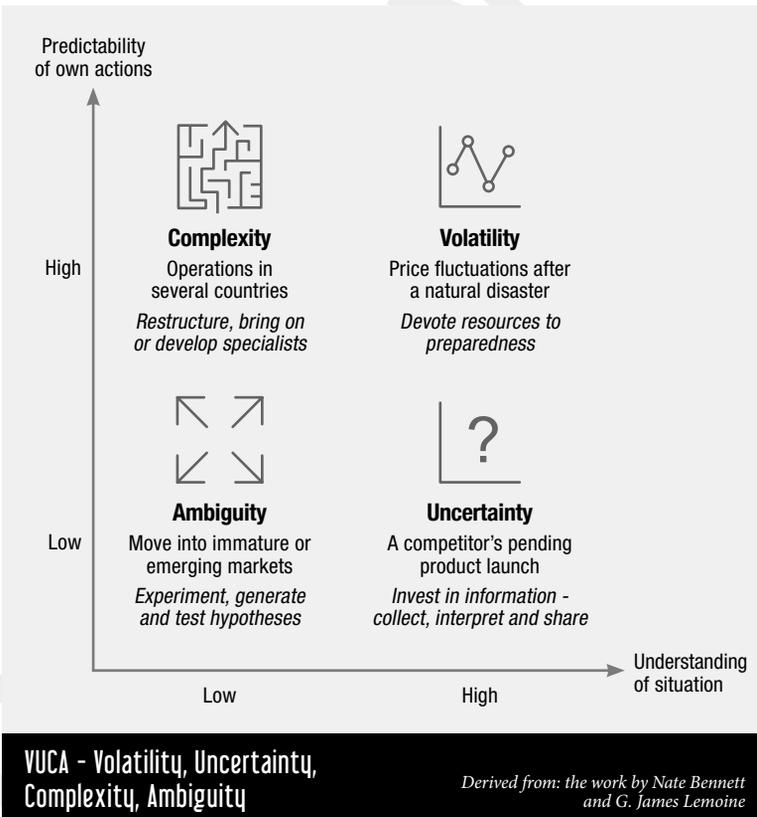
In recent years, organizations have become more and more aware of the fact that “uncertainty is the new normal”. It is likely that the business world we used to know, where strategic planning was simply extrapolating a trend, based on the past couple of years, has come to an end. Instead we see the emergence of a new understanding and acceptance of the fact that different perspectives on uncertainty and ambiguity are essential for future success.⁸²

As with many other management approaches, this field has its roots in the military. In the 1990s, the acronym VUCA was introduced, short for vulnerability, uncertainty, complexity and ambiguity.⁸³ The original purpose of this approach was to address strategic foresight and insight as well as include a behavioral perspective on groups and individuals.

To give an overview of the field, consider the graph opposite⁸⁴ where the two perspectives are “understanding of the situation” and “predictability of your own actions”. This will provide

four alternative scenarios where the VUCA perspectives fit well.

- **Volatility**, a situation that is unstable and may be of unknown duration, but often with available information.
- **Complexity**, a situation with lots of variables, some predictable but the sheer scope of information is often overwhelming.
- **Uncertainty**, a situation with lack of information and unknown cause and effect. Unclear if the situation is stable.



- **ambiguity**, a completely unclear situation with very limited (if any) information. Also the results of your actions are unclear.

With the above in mind, this section will deal with uncertainty and ambiguity, mainly because these are two of the most relevant perspectives when discussing emerging technologies from a strategic business perspective. Volatility and complexity are also of interest, but more relevant when your own actions are predictable, at least to some extent.

UNCERTAINTY AND AMBIGUITY

Every industry, technology, and investment involves a certain level of risk. Often, though, the exact level of risk involved in a given venture is quite uncertain. With any emerging technology, it is impossible to predict fully what the impact will be. This is true both of the new technology and of the technology being replaced. When a new technology develops and people choose whether or not to invest in it, one of the biggest concerns lies in what will happen to the old technology. For both the new technology and the old technology, there are many possible futures. It is with these potential futures that risk, uncertainty, and ambiguity come into play.

DEFINITIONS OF UNCERTAINTY AND AMBIGUITY

Although uncertainty and ambiguity overlap when it comes to investment decisions, there are clear distinctions between the two terms. The

outcome of a sporting event is an example of uncertainty. While we may be able to calculate odds regarding which team will be victorious, this is not a clear cut case of probability. There is certainly risk involved in betting on a sporting match, but the probabilities of the potential outcomes are based on vague factors rather than known factors. Ambiguity refers to a specific type of uncertainty in which there are no clear beliefs regarding the probabilities of any given outcome.

THE RISK OF NEW TECHNOLOGY CAN BE CAUSED BY UNCERTAINTY

Part of the uncertainty involved in a new technology relates to the likelihood that it will succeed on its own, and on how quickly that success will occur. For any business dealing with the old technology, there will come a time when they have to make a decision to continue in their current direction, jump ship and invest in the new technology, or find a balance between the old and the new. Take the music industry, for example. When digital music and file sharing first made a big splash, record companies had to make a decision either to embrace the new technology or to continue to produce and release music in the ways it had done previously. While all companies struggled through this transition, the ones that embraced the newer technology and found a balance between both were the ones that succeeded best. Others held on to the old technology out of fear of the risk and uncertainty of the new.

While digital music is obviously at the forefront of the industry today, when it was first made available, there was plenty of uncertainty. How could anyone have known for sure that digital music would have such a drastic impact on the physical media? The outcome that occurred was one of many possible futures.

TO INVEST OR NOT TO INVEST?

Risk falls when the known probability that something will happen increases, but waiting too long to make an investment could also result in less profit. As the adage goes, the more you risk, the greater the potential reward. The risk involved in an investment relates directly to the probability of any given future and indirectly to the uncertainty that is inherent in anything still in the development stages. The simple fact is that no one is certain that a new technology will “work.” It may function as it is intended, but will it actually work in the sense that society will adopt it?

Investing in new technology often involves a relatively short-term risk that blossoms into a long-term reward. It may take months or years before this technology pays off. In the mean time, profits may be minimal or non-existent. However, if the technology does in fact take off and boom in a way that complements the investment strategy, then the long term reward will be plentiful. Of course, if the new technology flops, then the loss increases exponentially.

Investing in the old technology, on the other hand, often produces more of a long-term risk and a short-term reward. As the new technology waits in the wings while society makes its judgment, the old technology may even get a boost. There is often a mentality of gobbling up what we think we might not be able to have any more. However, if the new technology succeeds, the business may fail because it waited too long to invest. Of course, that does not mean that every new technology is a wise investment.

AMBIGUITY

There is also a sense of ambiguity with any emerging technology. It is often unclear exactly what the new technology is and where it might go, which will lead to potential futures that are almost impossible to predict. There is a basic understanding of that technology, but there are many questions about where it will overlap and how exactly it will be used in the future. We may be able to predict futures based on the information available, but there is no way to determine the probability that some of these particular futures will occur. The only thing known is that these futures are possible, or at least we think they are.

When a new technology emerges, the existing technology may not be rendered obsolete. Therefore, choosing to invest entirely in one technology or another may not be the only avenue available. Without a firm understanding of the long-term success and effect of the new technology, it may be difficult to make a full commitment.



During the course of any business' life, there will inevitably be new technologies that present uncertainty about the future of both that company and the industry as a whole.

STRATEGIC UNCERTAINTY

Every business, or at least every business that wishes to succeed, routinely implements strategies in order to ensure growth and stability. Market research, competitor analysis, and other traditional tools can help a business create a strategy. However, these traditional tools are only effective when the business environment and economy are facing stable conditions. In today's rapidly developing world, this is hardly the case. Today, technological uncertainty is a major issue that all businesses must face. Therefore, strategic uncertainty has become a necessary factor in order for a business to survive ultimately.

Any new and developing technology creates some level of uncertainty. With a new technology, there are often many different futures for which to prepare. Planning for this uncertainty involves using the right tools to create the right strategy. When probabilities are unknown,

creating an investment or business strategy requires innovative thinking. When planning in uncertain conditions, there are many factors that must be considered. In order for a business venture to succeed, resources have to be put into the right areas. A solid strategy in uncertain conditions takes forward thinking, the right tools, and the smartest moves.

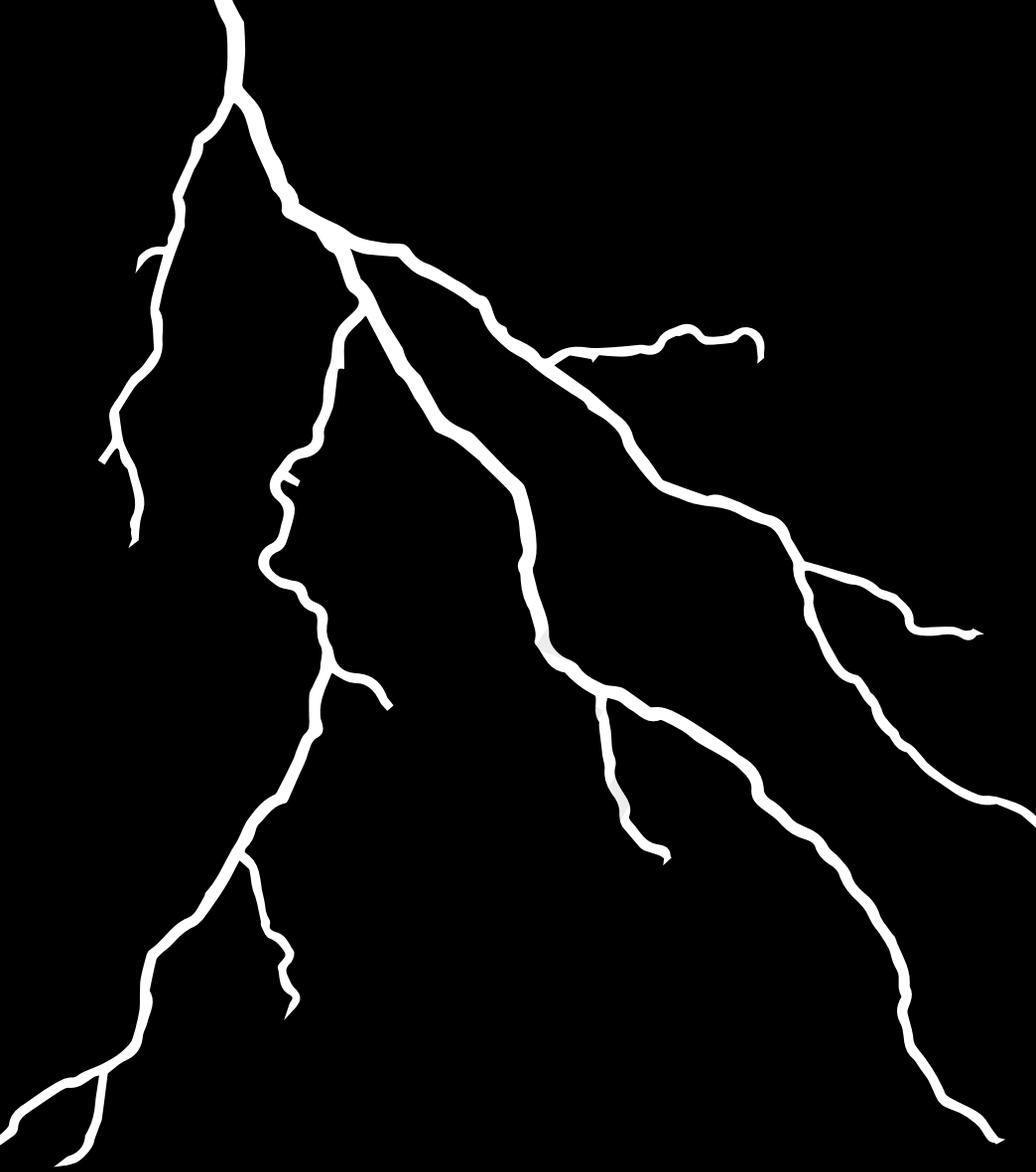
DEALING WITH UNCERTAINTY AND SURVIVING DISRUPTION

Strategy under uncertain conditions essentially involves three basic steps: determining strategic options, selecting a strategic posture, and building a portfolio of strategic moves.⁸⁵ These steps require a thorough analysis of the potential futures, the goals of the company, and the types of moves that can get the company to that point. Of course, in order to deal with uncertainty, one first must gain some idea of the factors involved. In other words, one must determine as much as possible about the uncertain conditions. This may sound on paper like an exercise in futility, but it is a rational process that allows for real strategic thinking and action.

During the course of any business' life, there will inevitably be new technologies that present uncertainty about the future of both that company and the industry as a whole. Therefore it is important to determine the level of uncertainty involved and to plan how to deal with these technologies that can present a missed opportunity for the current business model.⁸⁶

**EXECUTE
IN TIMES OF
UNCERTAINTY**





In today's world, there are few things that can be considered constants. There is a reason the saying about change being the only constant is quoted so often. Every major change brings us into a time of uncertainty, fear, and, at times, pure chaos. The fact that technology has advanced so rapidly in the past 50 years means that we are almost always reinventing the status quo. Today's smartphones are faster and more powerful than top of the range computers were a mere two decades ago. It is more than the fact that we have new gadgets to play with – we have to continue to determine how to use this new technology ethically, something that is often heavily debated. Without some guiding principles in place, we only add to the chaos.⁹²

We will look at four different key areas that will help us work through the uncertainty created by technology and by other, more traditional forms of uncertainty. These areas include leadership, innovation, organization, and sustainability. While each area can be tackled on its own, the four cannot truly be separated: in order for a business to survive periods of uncertainty, all four of these areas must be addressed.

LEADING IN TIMES OF UNCERTAINTY

During times of uncertainty we truly see what our leaders are capable of doing. In 2008, the recession showed that some business leaders simply didn't know how to handle a crisis of that magnitude. Even those who did lead their companies through the recession and out the other side in relatively good shape found themselves questioning their decisions and their ability to handle future disasters. The fact is that no one can see the future, but it is still possible to plan for a crisis. Scenario planning has been used by the army since the 1950s⁹³, and many businesses and other organizations have adapted this type of crisis planning. However, even with these scenarios, there is always a chance that something unexpected will occur.

How can our leaders better prepare themselves to face uncertainty and the chaos that comes with it? There are a few different ways that have

been used in the past to direct a business, organization, or even a government successfully during times of chaos.

CREATING ROLES

One of the most important aspects of any organization is the role played by each constituent member. This can (again) be seen clearly in the military, where every rank and position has specific duties. In a business, there may be a single leader in the CEO or board chairman, but rarely does this single individual control every aspect of the company. Leadership is decentralized. This provides a resilience to the business that makes it much easier to deal with uncertainty and with negative consequences⁹⁴, especially true in today's global market. It is difficult, if not impossible, for a CEO in China to be fully aware of the situation in the corporation's North American branch. By allowing different divisions of the company to have their own leaders and their own leadership models, these leaders have more freedom to respond to unexpected events.

Of course, decentralization does not mean each division is an island unto itself. It does not create a company made up of independent smaller companies. Coordinated decentralization is a resilient, strong way of dealing with uncertainty, as long as the various divisions communicate and work together towards common goals and follow common principles. When they do not, the leaders are not leading effectively.

STABILITY, NOT AGILITY

Some businesses, such as hedge funds, can move into and out of markets very quickly. They are stable yet very agile, able to drop a whole market in an instant. This gave some leaders the idea that being an agile business was the way to go.⁹⁵ However, this might set up the business to fail. Very few companies can change their direction that quickly, especially when they have gone to great lengths to establish their presence in a market. Purchasing office or factory space, providing the paperwork to operate in that area, and hiring employees, makes it very difficult simply to pull up roots and leave.

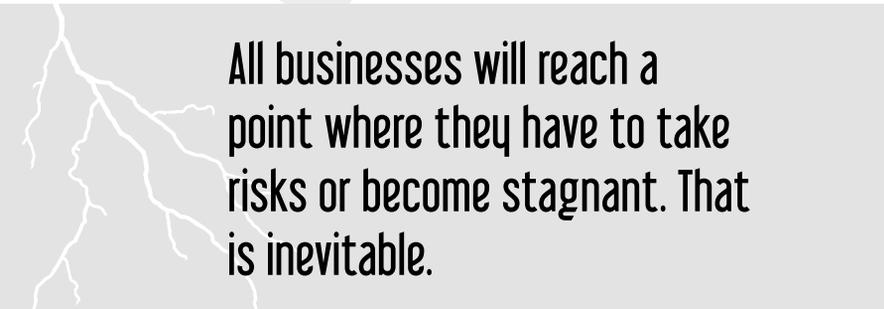
It also creates a negative reputation for the company. Pulling out of a market does not mean simply leaving the consumer without the products or services the company provides. It also means laying off employees and removing the income the company brought to the community. This is bound to make the business look bad in the eyes of many. A strong leader is going to know how to move the company in the right ways while maintaining relationships or, in times when hard choices have to be made, will take into account how decisions affect more than just their business, also a form of agility.

BATTLING AGAINST TRADITION

In times of uncertainty, it is easy to fall back on tradition: “This is how it’s always been done, and since that’s always worked, let’s keep doing it!”⁹⁶ Those who are poor leaders will often cite tradition

as the reasoning behind their decisions, and they will pull out a number of examples to back up their theory. However, as mentioned earlier, technology is changing so quickly and affecting so much that it is hard to apply any previous case to today's world. Taking a single event or activity out of the context and applying a traditional approach is setting up the business to fail.

One of the biggest “traditional” methods of success that today's leaders must learn to work against is the idea that a business must always try to grow and expand. Trying to expand simply for the sake of expanding is actually very counterproductive.⁹⁷ Instead, leaders have to recognize that no business can grow successfully without a very stable foundation. This is especially true in times of uncertainty. Even businesses that are not trying to expand may fail during these chaotic periods because they are not stable enough. Trying to expand while in a period of uncertainty can lead to a wide number of consequences that will damage the business in many different ways and could even lead to its total collapse.



All businesses will reach a point where they have to take risks or become stagnant. That is inevitable.

Of course, all businesses will reach a point where they have to take risks or become stagnant. That is inevitable. However, a good leader will know when to take a risk and when to hold back. Here is an area in which technology can help leaders make a more informed decision even if it has created the uncertainty that's threatening the business. Models, gathered data, and the ability to create dynamic scenarios all assist leaders, as does the fact that the business is decentralized. Those that follow the idea of decentralized leadership will be able to take more risks because the majority of the business will be protected. Even if a division of the company fails, it is only a setback, not a total defeat.

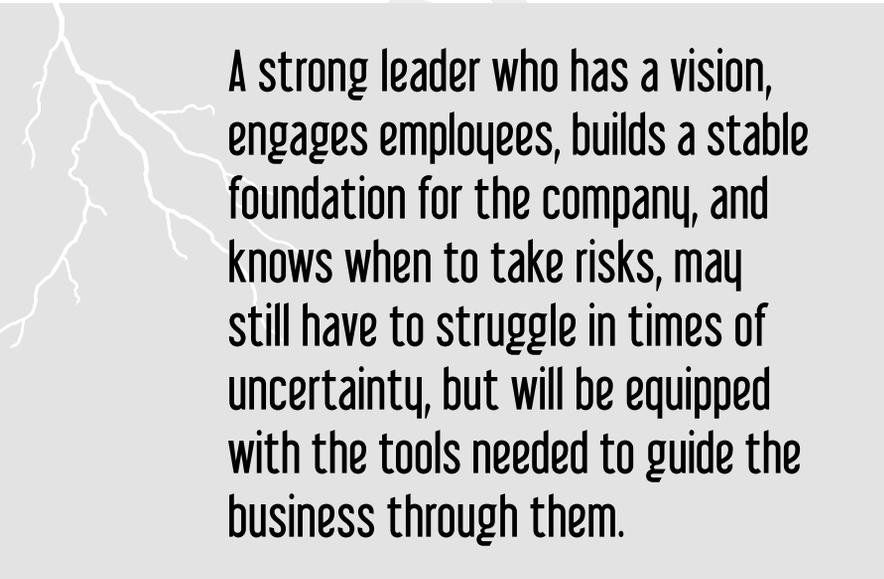
UNDERSTANDING THE ROLE OF TECHNOLOGY

The idea of becoming a leader, who successfully deploys technology to bring about stability and transformation, is relatively new.⁹⁸ However, being a digital master can make a business more profitable than its competitors. The thinking encompasses a number of different points, but one of the main ideas is meshing the past with the present and the future. This goes back to learning from traditional approaches, but also being wise enough to know when those approaches are going to fail because the context is different.

Those who become successful leaders in today's technological world have to have a vision for where they want their company to go. This is more than simply coming up with a marketing plan or saying that the business should bring in

a specific amount of money by the end of the year. It's about having an understanding of technology, clear intentions and specific, measurable outcomes. It is also about evolving. While a business must have a stable foundation from which to build, it must also be flexible and ready to make changes. A good leader knows that his or her vision for the company needs to evolve as the world changes in order to survive in times of uncertainty.

Engagement is another important aspect of leading in the digital community. Leaders know how to engage their employees with, and through, technology. Today's technology gives every employee a voice through social networking and other ways of connecting. This, in turn, allows leaders to hear what their employees want and



A strong leader who has a vision, engages employees, builds a stable foundation for the company, and knows when to take risks, may still have to struggle in times of uncertainty, but will be equipped with the tools needed to guide the business through them.

need. Executives who are consistent in their communication and maintain an open, ongoing dialogue will not just be a boss, they will be an active leader who has a workforce that feels valued and truly wants to do the best work possible.⁹⁹

BEING A GOOD LEADER IN TIMES OF UNCERTAINTY

The overall takeaway from this is that leading during a time of uncertainty is by no means easy, but it also does not have to mean leading from a position of weakness, fear, or pure reaction. A strong leader who has a vision, engages employees, builds a stable foundation for the company, and knows when to take risks, may still have to struggle in times of uncertainty, but will be equipped with the tools needed to guide the business through them. Those who simply retreat to their offices and hope that everything will work out for the best will find themselves captaining a sinking ship.

LEADERSHIP TOOLBOX

In a situation where uncertainty is the new norm, lots of pressure is put on the leader of an organization. Again, looking at leadership in a VUCA environment, Colonel Eric G. Kail, artillery officer with three combat tours, a Ph.D. in organizational psychology and now course director for military leadership at West Point, gets straight to the point with addressing leadership challenges from a VUCA perspective in a series of posts on www.hbr.org.

Three ways to lead more effectively in a volatile environment:

1. Ask your team to translate data into information

Focus all communication on the right, usable information, not raw data that the receiver has to analyze and extract.

2. Communicate clearly

Get rid of the buzz words and one-liners. Be clear, concise and straight to the point.

3. Ensure your intent is understood

If your intent is clear, then your team will be able to handle volatile situations by themselves.

Three ways to lead more effectively in an uncertain environment:

1. Get a fresh perspective

Challenge your individual and collective perceptions, preferably by using a devil's advocate. Make sure you rotate this role in your team.

2. Be flexible

Have a strategy and operational plan, but include flexibility and options to handle an uncertain reality.

3. Glance back, look ahead

Focus on what you can do better in the future, not what you did wrong in the past.

Three ways to lead more effectively in a complex environment:

1. Develop collaborative leaders

Make sure that your co-workers see the big picture and value in a collaborative mindset.

2. Stop seeking permanent solutions

In complex environments, focus must never be on finding a 100% solution to a problem, as then you will miss other opportunities.

3. Train tomorrow's heroes now

Set aside the proper resources to develop young leaders. Successful in-house talent development is a necessity in any organization.

Three ways to lead more effectively in an ambiguous environment:

1. Listen well

Someone asking, "What's our goal?" is signaling that you need to be clear in your communication. Do not just hear what you want to hear.

2. Think divergently

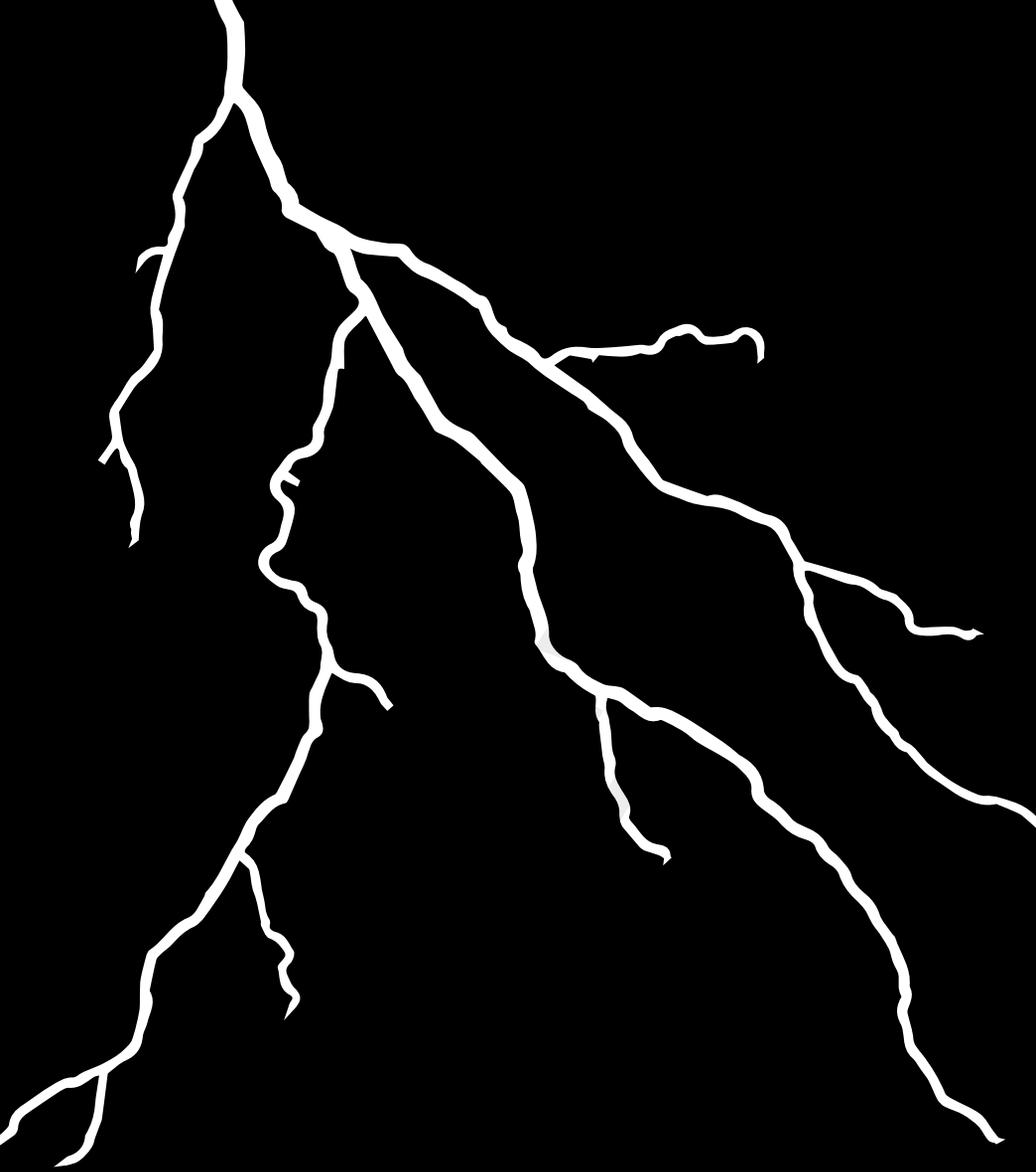
Be open to new ideas, and realize that, in an ambiguous environment, there is not only one best solution to a problem.

3. Set up incremental dividends

It is hard to celebrate reaching milestones in an ambiguous environment, but it is an important way to build and maintain momentum.

THE TECHSTORM PLAYLIST





I think and write best when I listen to music, different music depending on where I am in the process. Below is a compilation of the music that was essential for this book project.

The Techstorm Playlist can, of course, be found on Spotify.

username: survivingthetechstorm

Enjoy!

Author and Punisher

Band of Horses

Beastie Boys

Bob Hund

Daft Punk

David Bowie

Dr Dre

Esbjörn Svensson Trio

Fläskkvartetten

Frank Zappa

Hansson & Karlsson

The Hellcopters

The Hives

Imperial State Electric

The (International) Noise Conspiracy

Jack Johnson

Jack White

Jason Mraz

King Crimson

The Knife

Kraftwerk

Mando Diao

The Mars Volta
Neighbourhood
Oddjob
Oskar Linnros
Parliament
Phish
Primal Scream
Prominent
Refused
Rollins Band
Samson For President
Shout Out Louds
Silverbullit
Snoop Dogg
The Soundtrack of Our Lives
Stonefunkers
The Strokes
Thelonius Monk
Thomas Rusiak
Thåström
Veronica Maggio
The White Stripes

AN INTRODUCTION TO NICKLAS BERGMAN



Nicklas Bergman spends his days living and breathing high tech, searching for new opportunities arising from the ever-changing technological landscape. As a futurist, he tries to understand where we are heading, and if society will be able to handle the upcoming techstorm.

He is also the Scandinavian advisor to the TechCast Technology Think Tank in Washington DC, working amongst a world-wide network of scientists, policy makers and business executives with the aim of understanding the impact of disruptive technologies.

Through the combination of his entrepreneurial endeavors and technology investments, Nicklas Bergman is uniquely suited to act as a guide to the future of business and technology combined. As a futurist he takes a holistic approach, trying to understand and communicate not only what we might expect from a technological perspective, but also how this possible future and technological development will affect us as individuals, corporations and society as a whole.

www.nicklasbergman.com

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