INEVITABLE SURPRISES

Thinking Ahead in a Time of Turbulence

PETER SCHWARTZ

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While it is inevitable there will be many surprises in the future, the driving forces that will actually shape these surprises can be studied now. By understanding these driving forces, you not only increase your ability to respond to whatever changes ultimately eventuate but you also pick up on the emerging commercial opportunities you could otherwise miss. Thus, to better prepare for the future, understand the critical factors which will shape the commercial environment of the future.

In particular, there are seven inevitable surprises that will play out over the next 25 years:

1. The average person’s life span will increase dramatically.
2. New and disruptive patterns of migration will emerge.
3. The global economy will enter into a long term uptrend.
4. The nations will separate into three large alliances.
5. Geopolitical conflicts will continue to disrupt world events.
6. Impressive science/technology breakthroughs will be made.
7. Environmentalism will become a dominant theme worldwide.

Since all of these surprises can be anticipated now, even if all of their flow-on effects are not yet clear, it makes good sense to start preparing for these future realities earlier rather than later.
The average person’s life span will increase dramatically

Over the next three decades, older people will become much more integrated into mainstream society. Instead of being isolated or forced into retirement, far more people will lead active and productive lives well into their eighties and nineties. Businesses will need to adjust their offerings for this change in demographics.

This trend is the natural result of three different developments:

1. **The average human life span will continue to increase** – in just the same way as the average age at death has increased from 60 in 1950 to around 77 in 2003. Medical advances now mean people will live 5- to 10-percent longer than the previous generation. Within the next thirty or so years, the average life expectancy will move towards the 120 years mark as many of the diseases that drain vitality in older people (like cancer, Alzheimer’s, diabetes, cerebral palsy and heart disease) become treatable through the mapping of the human genome and other advances.

2. **The health of older people is improving dramatically** – as nanotechnology, biogenics and pharmacological research continues to move forward at an accelerating pace. A number of antiaging medicines have been found as unexpected results of clinical trials being undertaken in a number of fields, and these developments will continue to come at an accelerating pace. It is also feasible that machine implants and other breakthroughs will make it possible to provide effective long-term treatments for many age related ailments in the near future. As a result, very few people will feel the need to retire from work at age 60, and many will be able to work productively for another twenty or thirty years past that point.

3. **The economics of aging is under pressure** – as older people who are still vigorous will be able to make positive contributions to society, either as mentors or as direct participants. Many of these people have pensions or superannuation schemes that provide for their living expenses, so these senior citizens are not so driven by a need to generate money but more by a need to contribute. As a result, the very concept of “retirement” is being vigorously debated in many nations. The idea of a formal retirement age – which loomed large when people were physically worn out after a career of manual labor – is losing credibility. Governments will support the raising of or elimination of a mandatory retirement age because they will be under fiscal pressure to fund pension programs. The people themselves will also fight against being compelled to retire. Both of these pressures combined will push back the commonly accepted age of retirement worldwide.

At the same time as the average life span is lengthening, the average birth rate is falling in many countries, as many women start bearing children later in life which naturally leads to less children being born. A decrease in the size of the youth group in turn leads to a lowering of the ability of young people to dominate a society and set the social agenda as they did in the past. This change in the dominance of youth in the popular culture will also have some other natural consequences of interest:

- Whereas at one time employers were reluctant to hire older people, in the future employers will try and hire more. Why? Older workers will need less training, be generally more productive and exercise better judgement when dealing with customers.
- Many knowledge workers will start new careers at age 50 or older. They will bring to their new disciplines all the skills and talents developed in their earlier careers – generating vigor and perspective that will be very beneficial.
- Many older people will supplement their retirement incomes by going into business for themselves. This will give a new burst of entrepreneurial enthusiasm for small businesses the length and breadth of the economy.
- More older people will become active in managing their own health care – which could mean they choose to live out their lives in a hospice rather than being admitted to a hospital where heroic measures are attempted to extend their lives for another few weeks at best. More people will choose quality of life over intensive care.
- The generation currently in its seventies and eighties will bequeath $10 trillion to its children – resulting in a huge increase in philanthropy and “angel” investments in early stage business enterprises.
- Businesses that cater to older people will boom. This will hold true right across the spectrum from high-end vacation packagers right through to those who construct homes that cater to medically assisted living. And cars, clothes and entertainment offerings that appeal to people over 50 will have a strong and growing market.
- The widespread employment of older people will become a driver of productivity gains in all countries that encourage it.

“The graying of society is by now a familiar story in much of the developed world. There are ever-larger numbers of senior citizens in absolute terms: the numbers are even more significant when elders are tracked as a proportion of the population. A series of specialized businesses have developed over the past twenty-five years that cater directly to them, from retirement homes to private health care to travel and resort businesses. And through their bequests, trusts and gifts, they are one of the most important sources of capital and philanthropy in the world. And yet, for all of that, people over 65 are still largely isolated from mainstream society, and ignored by most of it. The population at large is used to thinking of its elders as people who have checked out of the productive workforce, who live separately and have different priorities. All of that is about to change. During the next three decades older people will become far more integrated into the rest of our culture than they have been since World War II. This shift has already started to take place; it’s already a factor, I suspect, in everyone’s daily lives.”

– Peter Schwartz

“In the past, people leaned toward being more conservative as they grew older, in part because they became more accustomed to an established way of looking at the world. Now we will have a massive older generation with unprecedented wealth and health – people used to continuous learning, who have reinvented and uprooted themselves several times during a lifetime. They will dominate many institutions, probably including most political institutions. I believe most of the elderly people of the future will be more adventurous and experimental.”

– Peter Schwartz
In the future, there will be a permanent and unstoppable flood of people moving from poorer nations to richer nations which offer more opportunities. This migration of humanity to North America, East Asia and Europe will either be a huge driver of growth or an immense disruptive force. It isn’t yet clear which of these two scenarios will play out.

At its very heart, migration is about cultural change. People go from one country to another where they think they can enhance the quality of their life. No border patrols, immigration policies or other controls really work effectively, because people will still find a way to move from one country to another (legal or otherwise) if they are determined.

The three predominant destinations for migrants in the next twenty-five years are:

1. China

Two great immigration trends are playing out in China at present:
1. As a result of the now discontinued one-child policy, there are now millions more Chinese men than Chinese women for them to marry. As a result, many of these men go to other countries like Pakistan, the Philippines, Malaysia and India to find wives. These families are then returning to China to raise their children, generating a huge inflow of new migrants.

2. Millions of Chinese are moving from the farmlands into the cities in search of work. In the space of a few years, around 60-percent of China’s population of 1.2 billion people will make just such a move.

Taken together, China is attempting to emulate the example of Singapore. It is trying to develop well designed and well managed cities where the people can move off their farms and where the new immigrants can settle. But this will be an exceptionally difficult process. If China can get it right, the country’s economic growth rate (currently around 7-percent per year) will leap forward generating a huge new middle class. But if China’s leaders cannot manage this transition well, the social pressures unleashed may be far reaching.

2. The United States

By 2025, whites will be in the minority in the United States. Latins, Asians and other ethnic groups who immigrated to the United States in previous generations will have moved through the educational system and into positions of power and influence. They will become the leaders of large corporations, nonprofits and the government despite the best efforts of those currently in power.

The United States will face a challenge to become a true multiracial society, ideally where the best elements and values of these immigrants get added to the traditional “American values”. This will be even more difficult by the fact even amongst immigrants, there is a wide range of personal values which are quite different. Matching American ethics with those of other cultures will be difficult as many immigrants will be forced to see their old-world values in a new context.

One element which will not, however change, will be the predominance of English. The U.S. will always remain an English-speaking country. Phrases, terms and ideas from other languages might get grafted into the American vocabulary in just the same way as many Spanish elements are now well known in the English language, but English will remain the common language of the United States.

“Just as it did in China, migration offers a test for the United States. Can we develop a truly multiracial society with no majority culture? Can we get past the kind of splintered society in which various ‘identity groups’ manage their own part of the community? Can we create a society in which people from different ethnic backgrounds, racial backgrounds, and perspectives create a social milieu together without having to be the same? This is a novel test, and it is already underway; one can be optimistic about how America will meet it.”

– Peter Schwartz

3. Europe

Since the 1960s, millions of people have migrated from the Muslim world to Europe. Many millions more would like to come, and will continue to do so, either through legal or illegal channels. By 2025, there will be very large Muslim communities in every major city of Europe. The real question is how well these new migrants will assimilate into the populations of the countries they are moving to.

Europe, unlike the United States, has little experience in integrating migrants into its mainstream society. On the contrary, anti-immigrant feelings and political tensions run high in Europe as a general rule. Therefore, expect that in the future, most Europeans will become polarized between two extremes: those who are for the idea of a ‘multiracial’ society and those who are openly anti-Muslim or anti-migrant.

With this in mind, European business and political leaders should:

1. Avoid denying the problem – and start developing strategies to deal with the inflow of immigrants.
2. Work hard at raising the quality of the new population – by investing in their education, both adult and childhood.
3. Recognize that some immigrants will be productive and others will not – so you need to have structures in place which allow you to support the productive immigrants and ideally deport those who have no desire to contribute.

“Finally, the best way to deal with the immigration problem is to make people want to stay home in the first place. Which means stimulating economic growth, prosperity and freedom in the former colonial countries from which emigrants are coming. You can best help these falling countries by helping them become more successful. Incidentally, this is the official U.S. Policy toward Mexico and it appears — since the advent of NAFTA in 1994, at least — to be having an effect.”

– Peter Schwartz

“When the tide of migration becomes a flood, as it is today, then it represents a test of our theories of opportunity. Do you believe in the theory of unlimited potential: that wealth creates more of itself, and can grow indefinitely? If so, then implicitly you are in favor of migration. People coming into a country will help it grow. Or do you believe that there is a limited quantity of wealth in a society – that there will always be some people on the top and some on the bottom. If so, then you will necessarily see migration as an evil, because for every immigrant family that betters itself, an established family will be forced further down the ladder.”

– Peter Schwartz
Economic productivity is genuinely increasing

1. why the long boom will be back:

   There are three fundamental reasons why the long boom will be back:

   1. **Economic productivity is genuinely increasing** – as managers are becoming smarter at harnessing computers to get more done. Almost every industry in the world is steadily improving quality and reducing costs. Studies have shown productivity is currently increasing at 2.3-percent a year – which is enough to double living standards every 25-years. These gains are generated not only by computers but also by enhanced communication capacities, credit cards, global positioning satellites and even new credit and investment vehicles which make it easier for entrepreneurs to obtain financing. Managers and retailers are also become better educated and more innovative.

   2. **Globalization actually works** – in that as more nations broaden their base by integrating their trade and employment, everyone gains. Globalization is allowing many more countries to catch up to the traditional free market leader, the United States. As more countries document the gains globalization brings, there will be even greater trust in the concept in the future, which will in turn lead to still more economic benefits.

   3. **The world’s infrastructure is improving** – meaning it is becoming easier for companies to be more productive in a number of countries. Improvements in the business infrastructure increase business confidence and allow innovation to flourish.

   To be productive, most companies require:
   - A dependable electricity supply.
   - Access to air travel as required.
   - A workable road transport and freight system.
   - Access to financial expertise and banking services.
   - A good communication system for voice and data.

   Today, these elements are available to businesses around the world instead of just in the industrialized nations. That means more people are able to generate products and services that can be sold to others. It also creates larger markets for the businesses to sell into, increasing sales revenues.

   Together, these three factors guarantee that the world economy will continue to grow steadily over the next 25 years. The long-term trend is undeniably positive, even if there are a few down periods along the way. As more countries learn from others how to ramp up their productivity, harness globalization and improve their business infrastructure, they will grow even faster. A positive feedback cycle will be created, where the benefits gained today will fuel even greater gains which will be realized in the immediate future.

   Of course, a long boom does not mean there won’t be major financial crises from time to time. These will continue to come along on a regular basis. The stock market will continue to have years when equities track upwards and other years when equities fall. As old industries get transformed by new technologies, there will continue to be winners and losers. These should all be seen as the normal workings of the capital system rather than signs of systemic weakness.

   “Short-term gains or losses are not inevitable; it’s hard to know what the economy will do in the short term, because there are too many intermingled players with short-term influence and constantly shifting short-term goals. But the long-term trend is still inevitable. The underlying factors that created the boom in the first place are still in place, and still evident. They never went away. If you spend some time, as I have, watching these forces at play, you will see why the ‘Long Boom’ economic scenario of the mid-1990s – in which we enter a great global economic expansion that allows literally millions of people to move into middle-class lifestyles around the world – is still on track to occur.”

   – Peter Schwartz

   “In a world of surprises, what can we count on? There are many things we can rely on, but three of them are most critical to keep in mind in any turbulent environment:

   First, there will be more surprises.

   Second, we will be able to deal with them.

   Third, we can anticipate many of them. In fact, we can make some good assumptions about how most of them will play out. We can’t know the consequences in advance, or how they will affect us, but we know many of the surprises to come.”

   – Peter Schwartz

   “In the coming decades we face many more inevitable surprises: major discontinuities in the economic, political and social spheres of our world, each one changing the ‘rules of the game’ as it is played today. If anything, there will be more, not fewer, surprises in the future, and they will all be interconnected. Together, they will lead us into a world, ten to fifteen years hence, that is fundamentally different from the one we know today. Understanding those inevitable surprises in our future is critical for the decisions we have to make today – whether we are captains of industry, leaders of nations, or simply individuals who care about the future of our families and communities. We may not be able to prevent catastrophe (although sometimes we can), but we can certainly increase our ability to respond, and our ability to see opportunities we would otherwise miss.”

   – Peter Schwartz

   “When an inevitable surprise confronts us, there are two different types of natural reactions. Both of them can lead to poor decision making. The first is denial – the refusal to believe that the inevitabilities exist. Denial is perhaps the most dangerous response one can make when evidence of an inevitable surprise presents itself. The second natural reaction to any turbulent crisis is defensiveness. The people who get past denial and defensiveness become masters of their own fate in a world full of surprises. The first step in making that transition is to pay attention to the inevitable surprises of the future, and to develop strategies for dealing with them. The greatest challenge before us – on the personal, organizational and societal levels – is to master our own accelerating power, without being swept away by it.”

   – Peter Schwartz
The nations will separate into three large alliances

Over the next few years, all the nations of the earth will align themselves into three general alliances:
1. The United States as the sole superpower.
2. A consortium of nations bound by a common law.
3. A set of disorderly nations who support terrorism.

This alignment will solidify a genuine “New World Order”.

The geopolitics of the future will be determined and dictated by how these three groups of nations interact with each other:

1. The United States and its allies
2. A consortium of nations bound by a common law
3. Disorderly nations

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<th>U.S.A.</th>
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<td>The sole remaining military and economic superpower</td>
<td>Countries which agree to a common law and set of behaviors</td>
<td>Countries which ignore international law requirements</td>
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The United States is now the only country with the military muscle to wage war on other nations. For that reason, it has moved to a preemptive stance where the U.S. feels entitled to wage war against enemies that are perceived as a future threat rather than waiting to be attacked first. This is a reversal of the U.S.’s historical doctrine of respecting the rule of law (at home and abroad) and never waging preemptive war. It is also the direct result of the terrorist strike on the United States on September 11, 2001. America has become the first global “rogue superpower” – a country with so much power and wealth it overrides international councils like the United Nations. The perception of the United States in the future will be based on how it rises to the challenge of using its power and influence as the sole remaining superpower.

“Willingly or not, the United States will be drawn into the role of high-tech global policeman. This is a role that the U.S. is not necessarily well suited for, because nobody is well suited for it, and nobody else has ever had to do it. Politically, the U.S. won’t be able to establish a police state within its own boundaries, but it may well establish one throughout the rest of the world. It’s already moving in that direction; the avowed policy of the U.S. government is that international surveillance is necessary to prevent terrorism. In fact, it may well be.”

– Peter Schwartz

The second group will be the orderly nations of the world. These are the nations which are willing to abide by international order. Their approach is to avoid war by talking out matters amongst themselves. These nations will have stable, self-sufficient economies yet will realize they will be better off as part of an integrated alliance rather than going it alone. Most likely, it will start with an expansion of the European Union into Russia, India and China and then the other prosperous small nations of the world will agree it makes good economic sense to join the alliance. The growth engine for this alliance will be the 400-500 million people who will ultimately become China’s middle class and the 300 million people who will become India’s middle class. Many nations will align themselves as suppliers of products and services to these huge emerging markets.

“The orderly nations will not always agree. Tensions among them—between, for example, China and India—will still exist. But these will no longer be ideological differences. They will be conflicts of interest, the seeking of advantage within a larger international system. The large international system will possess more moral authority than any of its members. Europe lost its moral authority through colonialism; the U.S. through scandals and arrogance; Russia and China through communism; India and Pakistan, through war; and the developing world and Middle East, through corruption and mistreatment of their own people. Over the next five to ten years, there will be far more pressure on the United Nations to live up to its ideals than there has been in the past. The UN will no longer be propelled by majorities of member nations. It will be propelled by the orderly nations. If the UN does not serve their interests, they will create an alternative to it.”

– Peter Schwartz

The last group of nations will be those who choose not to be ruled by international law. It will consist of those countries which are too corrupt, too torn by internal conflict or too moribund to join the community of orderly nations. These disorderly nations may not even have physical boundaries as such, but may be made up of organizations like Al Qaeda. Since they are unconcerned about needing to provide for the health, well-being or lives of their people, these nations will not hesitate to choose weapons that no established nation would ever use—such as terrorism, chemical warfare, bioterror or nuclear devices. And like Al Qaeda’s September 2001 attack, these disorderly nations will become highly adept at using America’s own technologies—infrastructure or commercial airplanes—against itself.

“If you have hopes of living in a future safe from terrorist attack, you should put those hopes aside. There is no plausible future in which terrorism has been permanently neutralized—especially when suicide attackers are involved. Osama bin Laden’s September 11, 2001 attacks have changed history irretrievably. It is now evident, for the first time, that a small group of determined individuals, so long as some of them are willing to die in the cause, can do enormous damage to great and sophisticated systems. And in so doing, they can elevate themselves to power and influence in the arenas they care about.”

– Peter Schwartz

“The best answer to terrorism is to ignore it. Otherwise, the terrorists win. Unfortunately, ignoring it isn’t always possible. And that is the inevitable surprise facing us from a large, virulent, and increasingly disorderly nonindustrial world.”

– Peter Schwartz

“All of us who live in America or the orderly nations will be paying a ‘bin Laden surtax’ for years to come: the extra costs of military spending, the extra time spent at airports and traffic checkpoints; the costs of maintaining those checkpoints (and other new security measures like inspections of container ships) and the extra disruption and anxiety that increased safety measures create for all of us.”

– Peter Schwartz

“Development only works when a nation chooses to develop itself, because development requires the kind of policies that require fine-grained implementation, and these can only be established from within, not imposed from above.”

– Peter Schwartz
5. The countries of the Caspian Sea region – Azerbaijan, Turkmenistan, Kazakhstan, Tajikistan and Kyrgyzstan – will have to decide whether to join the orderly nations or continue to be run by crime lords. All these countries have huge oil reserves which are as yet undeveloped. It will be difficult for oil companies to decide whether they should do deals with the existing government of each country or instead wait until a more stable government emerges. The disintegration of the USSR has left no bureaucracy in place in many of these countries.

6. Most of the African nations (except South Africa) will drop out of the global economy – and return to a tribal way of life. This will generate a human tragedy of enormous size, which may well spark a United Nations managed effort to recolonize the continent and start all over again.

The most likely consequences of the existence of a pool of disorderly nations are:

1. Terrorism will persist in a number of forms – as the most unpredictable force in the world. It will literally paralyze the rest of the world as anxiety will affect citizens. There will be calls for action but nothing substantial or far reaching will be achieved. Terrorism – or the threat thereof – will remain a major destabilizing force in the world.

2. A radical form of the Islamic religion will emerge – especially in Saudi Arabia, Egypt and Pakistan where the rulers have used unsavory, authoritarian and downright corrupt practices for many years. Islamic coups will be attempted to seize control of the governments of these countries and the oil revenues that entails. One or more of these coups will succeed – forcing the world to try and figure out which government to support in those nations.

3. Evangelical Christianity will make huge inroads in the disorderly nations of Africa, Latin America and Asia – sparking a genuinely ugly war between those who are pro-Islamic and others who are pro-Christian in each nation. More than a war of words, this has the potential to ignite civil wars that may encourage each nation to devolve into still smaller sovereign nations in the future. Again, in this situation, the United States and the orderly nations would have a very difficult time deciding which faction to back.

4. Mexico will have to decide whether to progress towards becoming completely orderly or become a key player in the drug industry – which will have major consequences for the United States since its economy and Mexico’s economy are so intertwined. If Mexico makes progress, it will grow impressively in the next 25 years. If, on the other hand, narcotics smuggling and production become Mexico’s predominant economic activity, the nation will follow the same downward spiral as Columbia and Peru.

5. The countries of the Caspian Sea region – Azerbaijan, Turkmenistan, Kazakhstan, Tajikistan and Kyrgyzstan – will have to decide whether to join the orderly nations or continue to be run by crime lords. All these countries have huge oil reserves which are as yet undeveloped. It will be difficult for oil companies to decide whether they should do deals with the existing government of each country or instead wait until a more stable government emerges. The disintegration of the USSR has left no bureaucracy in place in many of these countries.

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7. AIDS will become to be a substantial problem in Africa, China, Russia and India – as many millions of orphans will be created by the ravages of this disease. Furthermore, over time, the most at-risk groups will forget or neglect safe-sex or safe-needles practices and the deadly cycle will start all over again. Hundreds of millions of orphans will constitute a huge incentive to shock the orderly nations or the United States into financing better health practices and standards in the disorderly nations.

In short, rather than becoming a calmer and more pleasant world, disorder will inevitably increase. A number of nations will vacillate between becoming part of the global economy and dropping out. How the American government acts towards the governments of these nations will be a major political battle. If the United States ignores the concerns of these small nations, tensions will grow and the balance will shift towards greater levels of disorderliness. Conversely, if the United States and other orderly nations work to increase integration with these smaller nations, a new and improved world order might emerge in which the global economy will expand, which will be good for commerce.

“Show me where globalization is thick with network connectivity, financial transactions, liberal media flows, and collective security, and I will show you regions featuring stable governments, rising standards of living, and more deaths by suicide than murder. These parts of the world I call the Functioning Core, or Core. But show me where globalization is thinning or just plain absent, and I will show you regions plagued by politically repressive regimes, widespread poverty and disease, routine mass murder and—most important—the chronic conflicts that incubate the next generation of global terrorists. These parts of the world I call the Nonintegrating Gap, or Gap.”

— Thomas Barnett, economist

“It is not predetermined that the future will be limited by the past. Disorder and its terrible effects are inevitable. Some places, like Africa, are almost inevitably doomed to suffer disproportionately. Others have a more uncertain future. Most Latin American nations, for example, regularly cycle back and forth between increasing order and increasing disorder. The next twenty years may determine which end up in which camp, once and for all. It’s impossible to predict which countries will navigate the transition, but there are some important leading indicators to watch. For example, how well is the country dealing with AIDS? Another good indicator is the behavior of overseas students. Enormous numbers of students go to the United States to study, from all over the world. How many of them return to live in their countries of origin? Finally, the behavior of the American government towards various nations is a strong indicator. The United States, because of its wealth and military power, has a disproportionate stake in how many nations become orderly, versus how many become chaotic. If the tensions between the United States and other nations grow, so will the amount of disorder. If, on the other hand, the United States and other participants in the orderly work together, to increase integration, to help bring more countries out of the disorderly world, and to feed that process of global acceleration and integration, one can imagine a more benign future. There is always reason to hope, because there are factors pushing the United States to be more open and resilient as well.”

— Peter Schwartz
Inevitable Surprise #6

Impressive science/technology breakthroughs will be made

The next 25 years promises to be a golden era in science and technology breakthroughs. In just the same way as pure science has pushed out the envelope over the past 25 years, many profound and impressive breakthroughs will be made in the next 25 years. At this stage, we can only speculate where these breakthroughs will take society.

Breakthroughs in science and technology have always been made in history whenever four factors are aligned:

1. **Scientific anomalies are noticed** – which occurred in 2000 when it was found the universe was expanding faster than expected. This points to the existence of forces stronger than gravity.
2. **New instruments become available which can detect phenomena never before measured** – like orbital telescopes and better devices for detecting gamma and x-rays.
3. **Rapid and effective communication can occur between scientists** – which the Internet excels at.
4. **There is a political and economic framework which values scientific research and rewards people for it.**

Today, all four of these factors are present, which creates momentum for genuine and far-reaching breakthroughs to be made. So where will these breakthroughs come? They will come in three stages:

**Stage 1 – Breakthroughs from research now under way**
- **Nanotechnology** – will provide sensors and drug delivery systems that will revolutionize medicine. Nanotechnology will also provide new materials and alloys that will be able to change color, shape, texture or form on command. The commercial uses of nanotechnology will be huge.
- **Speech recognition** – will finally become commonplace. At the same time, computer display screens will be able to be printed on cloth and taped to the wall. And computers will continue down the path of Moore’s Law meaning they become twice as powerful per dollar every eighteen to twenty-four months.
- **Computers and sensors will be linked** – so governments can monitor all forms of human activity at all times. This will have a profound effect on the ability of criminal organizations to break the law. It will also generate much heat in the debate about the right to privacy.
- **Medicine will gain control over the human aging, reproduction and disease prevention fields** – meaning people will be able to dictate all of these elements in much finer detail than is achievable at present.

**Stage 2 – Breakthroughs from new science**
- **A large number of new bioindustrial processes will become available** – which will enable businesses to grow new materials, fabricate new chemicals and construct buildings using revolutionary new materials. All of these processes will use molecular engineering. The same science will also be used to regenerate or repair human tissue, allowing people to grow new organs and body parts to replace those lost through accident or disease. This will have far reaching and substantial commercial consequences.
- **Biochemistry will be extended down to the molecular level** – allowing for “designer” molecules to be built that would normally require very high energy consuming reactions. All sorts of materials will be produced cheaply and easily, leading to a new age industrial revolution.
- **Quantum computers will probably become available** – which will be as revolutionary as the leap from transistors to microchips. Quantum computers will be an order-of-magnitude faster than existing computers allowing the hard mathematical problems – controlling very complex systems, protein folding, gene design, modeling the climate and artificial intelligence – to finally be calculated accurately. If quantum computing is viable, the average computer of 2020 will be one hundred million times as powerful as the average computer of 2003. The implications of this much computing power are yet to be envisaged fully.

**Stage 3 – Energy, reality and space**
- **If a cosmic force exists which counterbalances gravity, it may become possible to tap into this source of energy with a small device** – allowing us to power every electrical device at minimal cost and with no environmental impact. If this happens, the concept of energy technology would change dramatically. This would also have huge implications for the energy industry of today.
- **Information theory and physics could merge using the power of quantum computers** – allowing us to understand the “code of reality” in more detail. If we better understand how reality unfolds, it may become possible to reprogram the world in which we live. Theoretically, this could make possible teleportation. At the very least, however, it would provide the means whereby mankind could reverse all the environmental damage which has been caused to the Earth’s ecosystem.
- **Space travel will enter a renaissance** – as the cost of propulsion systems to move people and materials outside of Earth’s atmosphere plummet. It is entirely plausible that by 2030, there will be tourist facilities on the moon and the wealthy (at least) will be able to take vacations in space. It is also likely that a number of nations will get involved in space exploration, far more than at present.

“in fifty years time knowledge of physics, biology, chemistry, astronomy, and maybe earth science will be immensely different from knowledge today – far more different from today’s knowledge than ours is from that of fifty years ago.”

– Peter Schwartz

“Be definition it is impossible to provide all the details of a scientific revolution that is not yet born.”

– Peter Schwartz

“A mission to Mars could be a great unifying factor, drawing all of the orderly nations of the world into a massive multilateral project. And if the physics has advanced enough, then we may be able to dream even grander dreams than colonizing Mars. Astrophysicists have abandoned the premise of star flight, because of the inescapable constraint of the speed of light. Current physics tells us no faster speed is possible; thus it would take far too long to reach even the closest solar system. A new physics paradigm might just possibly tell us that faster speeds are possible and allow us to plausibly conceive of (and develop means of) travel to other stars. No such paradigm is on the horizon right now, but in pure science, the horizon always shifts.”

– Peter Schwartz
Inevitable Surprise #7

Environmentalism will become a dominant theme worldwide

Surprisingly, this is a good news area. There is a growing amount of evidence the Earth is becoming healthier every year as we rise to the environmental challenges. This doesn’t mean we can relax, however, as there are still some very substantial and testing challenges in this area that are coming into focus on the horizon.

Over the next 25 years, these environmental and health crises will take center stage:

- The population of the Earth will peak at 9 billion and then fall – meaning all the dire predictions about being unable to grow enough food will not eventuate.
- The richer a country becomes, the cleaner it will become – because the people will demand their governments do something about environmental issues. There is also more capital available to invest in newer, cleaner technologies. The challenge, therefore, will be to help the poor nations become cleaner and greener.
- There will be a number of severe price spikes in the price of energy and boom-or-bust cycles – but the use of renewable energy sources will finally start to become far more prevalent. Wind, solar, biomass and hydrogen-based fuel cells will all make their way into the mainstream as green energy sources.
- Small-scale power plants will become commercially available – meaning commercial buildings and small communities will generate their own sources of power through fuel cells, turbogenerators or miniplants. At the same time, methanol-powered fuel cells will become the norm for powering portable electronic devices.
- Nuclear power plants will overcome their technical disadvantages and come back into widespread use.
- Governments will be pressured to make the environment their top priority – and will use tax breaks, low-interest loans and other tax incentives to encourage manufacturers to upgrade to more environmentally friendly technology. Consumers will help by buying green products.
- Dramatic global climate changes will occur – partly as a consequence of the accumulation of greenhouse gases and partly as a part of a long-term evolution of weather patterns. Despite all the talk of “global warming”, nobody really has an accurate idea of precisely what will happen – only that something significant is due to occur as the interglacial period comes to an end. This will, however, impact on:
  - Transportation and infrastructure systems.
  - Our ability to grow food.
  - The likelihood of chronic flooding.
  - The incubation of more viruses and diseases.
  - The disruption of shipping affecting trade.
  - The sea level impacting on low lying countries.
  - The migration patterns of entire nations.
  - The need to produce power for human heating.

- New infectious diseases could emerge – producing a global plague comparable to the outbreak of influenza in 1918 (which killed between 20 and 50 million people worldwide) and AIDS (which has by 2003 killed over 100 million people). These diseases could have a huge impact on society.
- Sooner or later, an asteroid will hit the Earth – with potential global consequences.

So how should we prepare for a future filled with these and other inevitable surprises? While there is nothing specific that can be done, common sense suggests some reasonable actions to take are:

1. Build a good intelligence system – where you note and discuss with colleagues the world events which unfold.
2. Cultivate your sense of timing – and look at how rapidly events are coming. That way, you can prepare in a sensible manner beforehand rather than after the fact.
3. Set up some “early warning signals” or “trigger events” in advance – and then be prepared to act when you notice those events taking place. This avoids being paralyzed into inactivity.
4. Undertake a little creative destruction of your own – and discard institutions or philosophies which are based in the past rather than prepared for the future.
5. Try to avoid ignoring an inevitable surprise in the hope it will go away later – but instead be proactive in responding to whatever new realities emerge.
6. Think and act like a commodity company – by preparing well for the lean years when business is good. Resist the temptation to spend on the basis every year will be good, because not all of them will. Build a surplus in the good times which will sustain you in the inevitable lean times to come.
7. Stay in your area of competence – and avoid the temptation to plunge into specialist areas you know nothing about. Build your success on your core competencies, and don’t get distracted by outside opportunities.
8. Place a high premium on learning – because most of the valuable work of the future will be knowledge intensive.
9. Become environmentally self sustaining – because that will position your organization well to take advantage of the infrastructure of the future.
10. Build in some safety nets for the people in your own organization – because the risks of the future cannot yet be measured accurately.
11. Cultivate your own personal network and connections – and use the expertise of others to help deal with all the inevitable surprises you encounter.

“The great risk of our time is being overtaken by inevitable surprises. It is possible to see beyond immediate events, hold fast to long-term directions, and maintain the resources to manage the consequences of disruption. We can’t stop disruptions from happening, but we can cope with them far better than we have in the past. There is no recipe or play book for doing this. There is only the opening knot of life to unravel. Perhaps the string that is the easiest to pull first is the string of inevitable surprises.”

– Peter Schwartz