

The Future and Our Environment Seminar: Additional Background Information on Futures Topics

Roger L. Caldwell
February 9, 2006

Introduction

It is impossible to predict the future, but key features of it can be anticipated. This requires an understanding of likely changes within global regions or individual nations/states, as well as the driving forces that cause these changes. This approach provides a way of understanding the range of possible futures when developing strategic plans or contingency plans.

The U.S. Armed Forces strategic training schools developed a specific term to describe today's world: Volatile, Uncertain, Complex, and Ambiguous or "VUCA." This means that past events are no longer reliable indicators for what we can expect in the near future. Several expected differences are: 1) the U.S. population will age, become more culturally diverse, and be transformed by technology, 2) uncertainty in the economy, in world power structures, in the role of work, and the role of organizations may have a major impact on our basic assumptions about daily life, 3) managers will face complex dilemmas and will need to develop more advanced strategies for collaboration in order to solve them. Thus, the response to the VUCA world is one that has a flexible, agile, innovative, and sustainable approach to doing business.

This report is structured as an overview of the driving forces and some of their implications, uncertainties, and "what ifs". It also identifies events or trends that are so likely we can call them near certainties. It next identifies some challenges and ends with conclusions.

A Snapshot of the Next 10-15 years

There are three recent periods of major societal transformations in our world: 1) the 1960s-1970s were delineated by transformation in social norms, 2) the 1980s-1990s featured a technological transformation, and 3) the 2000s -2010s will likely be defined by economic transformation and a new emphasis on sustainability in the broadest definition. Each of these past transformations built on previous ones, and society has been immensely changed since WW II. Ingredients of each transformation will continue to be with us, or may be reemphasized as conditions change.

Characteristics of the next 10-15 years are likely to be:

- 1 *Sustainable development* continues to grow in importance, with principles and examples now defined. While "sustainability" used to be directed only at resources, the broader definition and application of sustainability now includes government, economy, resources, privacy for society, individuals, and institutions. By combining sustainability with development it suggests progress and also recognition of new approaches.
- 2 *Uncertainties, complexities, and interactions* require that individuals and organizations begin using concepts and principles when setting long -term goals rather than focusing on narrow targets.
 - 1 *Technology and society interact* to produce new means of connectivity for information and communication, embedded sensors for automated control/notification, new approaches to health and education, organizational change. The transformation of distance and time will allow global and virtual interactions as well as help maintain our local interactions and daily living.
 - 2 *Smart/intelligent everything*: pervasive sensors, data access, robotics, and location-knowing devices remove repetitive activities and the need to monitor routine processes.
 - 3 *Individualization, cooperation, and group interaction* occur at the same time. This allows an individual to personalize and live in their own world, while choosing to work and

- socialize with a few (or many) groups.
- 4 *Peace, war, and global cooperation* continue to be competitive activities and organizations that operate globally must also have an awareness of local needs and customs as well as their opportunities.

Seven Driving Forces and Their Key Trends

Driving forces can be thought of as “clusters” of related trends. Trying to address each trend independently is too difficult (there are too many), but by grouping them into a small number of general categories, the collective effect of the related trends is much easier to comprehend. These driving forces provide an overview to associated trends.

1. Economy and Financial

- 1 Sustainable practices become institutionalized in how institutions operate and products are produced. Institutions take a more comprehensive view of clients/customers by providing on-going services rather than piecemeal responses to needs.
- 2 International trade/trade deficits, public and private debt, and economic inequalities (in world and in US) continue to grow.
- 3 Trend extrapolations become complicated by better understanding of how chaotic behavior affects the economy and its analysis.
- 4 The role of return on investment or the measures of progress may be changed from those used today to include social and environmental factors.

2. Political and Governance

- 1 Continued debates in matching tax rates with desired public services and impacts on country of extreme inaction or action.
- 2 World order options will become clearer as countries work together to guide/monitor how countries function in the world economy.
- 3 Political parties are impacted by rise in individual power (through networking and information sharing over the Internet) with possible changes to the two party system.
- 4 Rise of China's and India's (two largest countries) workforces as economic forces and related changes in political influence.

3. Population and Demographics

- 1 Number of post 65 people and post 85 people continues to increase as a percentage of population.
- 2 Immigration conflicts, worldwide, occur as the increasing percentage of immigrants in the population changes the culture and economy of the developed nations (for the U.S. this is predominantly Hispanic populations).
- 3 With some exceptions, people will continue to retire near where their friends and relatives are located.
- 4 Aged like to live near home and do not move unless special circumstances; migration continues from least desirable states, dependency ratio increases for all states (fewer working to support more young and old).

4. Resources and Environment

- 1 Global climatic change is acknowledged and mitigation measures become vigorously pursued.
- 2 Energy supplies are extended due to increased energy efficiency and alternative sources.
- 3 Water (quality and quantity) continues to be a problem but begins to be addressed by lower cost desalination methods.
- 4 Green manufacturing/building processes and materials, and operation of buildings, will

increase, giving rise to more sustainable and automated business and industries.

5. *Science and Technology*

- 1 Many new technologies make major changes in health, manufacturing, knowledge management, learning/training and infrastructure (including buildings, highways, cities, management). These new technologies allow new networks of communication and searching methods for the relevant information for decisions rather than collecting (and being overwhelmed by) all available data.
- 2 Key technology areas are in biology (including genetic engineering), materials (including nanotechnology), and information/communications.
- 3 Embedded technologies allow unobtrusive devices to monitor and to react to needed actions, reducing the need for human intervention for 'routine' activities. Everything gets smarter and does the drudgery work or monitors in the background to alert someone, or another device, when something needs attention.
- 4 Robotics and micro-robotics already address highly repetitive work or work in unsafe environments. Robotics will continue to become smaller and smarter and take on even more tasks.

6. *Social and Cultural*

- 1 Conflicts increase among people and countries with different values as the global economy grows and as communication increases, and as changes in technologies raise issues that cannot be fully addressed by traditional approaches.
- 2 Respected organizations will be seen as providing extra value through their behavior and relationships with customers/clients - through their emphasis on best practices, efficiency, quality and ethics/societal responsibility, as well as realistic price and speed for production and operation.
- 3 Diversity will be more common and cultural norms of the past will give way to "multiple" norms to better reflect a diverse society.
- 4 The current polarization in the media between traditional and Internet publishers) and polarization of viewpoints by elected officials will yield a more moderate and practical approach to problem solving.

7. *Work and Leisure*

- 1 Employer based benefits move to employee focused benefits and thus become transferable between jobs. Increased demands will be seen for day care, health promotion, or other services related to employment.
- 2 Many job classifications will remain the same but the functions will change, with incorporation of automation and remotely accessed sites; employee location will become more independent of the job location. Other job classifications will develop to address how employees might be more entrepreneurial or use specialized contract arrangements.
- 3 The workforce will be reshaped by reduced need for some workers due to technology or where jobs are outsourced to other countries. Workers will be working but not necessarily at a group location.
- 4 Leisure time will be varied and increasingly include life long learning, working longer, or volunteering. Blending of home/office/family issues will occur.

Five Themes Describing the Future

Certain characteristics emerge when trying to understand the future, regardless of the specific topics addressed. These five evolve from reviewing future trends and issues and will help shape many of our activities.

1. GLOBALIZATION AND REGIONALIZATION

The world is more interdependent through the economy, trade, and marketing because of ease of access through travel or internet. While keeping national culture and local options, nations (or regions or cultures that are dispersed among many locations) become part of the world as a whole and thus require world-wide efforts at governance, treaties and collaborations.

2. INDIVIDUAL AND GROUP FOCUS

Increasingly people will want both personal service (rather than generic relationships) and ways of obtaining products or services that are unique to the individual. At the same time, there is a need to work together to address common issues/problems; working together could be through small teams or collaboration with other organizations. This changes the relationship of the organization to the individual, as employee or as customer.

3. SUSTAINABILITY

Sustainability is likely to be the next defining era (like technology defines our current era). It is pervasive through all driving force topics and is generally defined as doing something today with the long term perspective in mind so you are able to continue doing it a long time without burdening future generations. Topical examples include strategic planning, workforce development, life long learning, health, energy, water, security, infrastructure, resource management (including financial), structure building/maintenance, and organizational behavior (including ethics and quality).

4. COMPLEXITY AND SIMPLICITY

Everything is getting more complex, with more choices, while people look for simplicity. Some solutions are indeed simple, and some new technologies can take the complexity and hide it, so the solution appears simple. Both simplicity and complexity are likely to be characteristics for the future.

5. NEW APPROACHES AND TOOLS

There are many new possibilities for addressing all the driving force categories, and we have a new toolbox of devices to help do this, with many more tools and approaches yet to be discovered. Dealing with the unfamiliar is both exciting and worrisome and different people and institutions deal with the change in different ways. Conflicts in these different approaches to new possibilities will exist and need to be worked out. Often the solutions will be 'hybrids' where you have some of the older ways and some of the newer, each bringing its particular strengths to the solution.

Different Perspectives on the Future

Institute for the Future

These six trends are from their "2003 Map of the Decade"; they occur with individuals, organizations, communities, markets, or households and daily life. The brief titles and descriptions are from IFTF. Original material can be found at <http://www.iftf.org/features/library.html>

1 **Emergence** -- top down control gives way to bottom up sophistication.

This increases unpredictable phenomena that occur when lots of individual actors following simple rules create complex behavior. This increases connectivity among people and how they interact with one another, direct link marketing and supply activities, and innovation is distributed.

2 **The New Agency** -- trusted agents to self as agent.

Who acts on behalf of the individual, the organization or the community, and who assumes the

risks and burdens? Consumers take on more risks in own decisions and are more engaged in these processes (so they are not just “customers”), the user defines what they want (individually customized), and energy production is distributed.

3 **Shared Value** - value of proprietary ownership to value of shared interests.

Shared value is the increased value that information products and services acquire when they are held in common by players with diverse interests. Tasks are shared across different households, people develop their own media rather than using mass media, networking replaces hierarchies, organizations become “hybrid” models, and technology personalizes devices for the individual.

4 **Focus and Fusion** - from virtual boundaries to embedded focal points.

In a distributed information world, the search for center fuses with real places and comes to the foreground. Entertainment is developed by individuals and households, physical places fuse with virtual places. Consumers want simple messages not complex choices, and certain countries specialize in specific topics. Cross organization communication grows, and this changes how things are marketed.

5 **Smart Presence** - from episodic interactions to persistent experiences.

Presence is defined by where you have been, such as digital tracks left behind by visitors to public places. There are more ways to do everything – stay connected, express yourself, monitor friends, processes, or places. The embedded society is immediate, always connected. Real time productivity monitoring of worker health, building health, product lifecycles. All this is due to very small scale technologies that can be embedded in everything.

6 **Health Values** - from traditional health care to a burgeoning health economy.

Health values are like family values – they provide a touchstone for all kinds of decisions in the home, in the workplace, and in the community. There will be more in-home health care using home health technologies, health care is by a community of people focused on the individual, new health networks emerge through employers, schools, insurers and retailers. A focus will be on healthy places and healthy spaces, and traditional health care will be a part of this but augmented. More responsibilities will fall to companies rather than government. Finally technology mimics biology as to possibilities (e.g., tissue scaffolding for replacement skin, neural net programming, bones as models for helmet materials).

Global Business Network

From the book “Inevitable Surprises: Thinking Ahead in a Time of Turbulence” by Peter Schwartz. <http://gbn.org/ArticleDisplayServlet.srv?aid=14200> (2003)

"Most organizations and most people assume that the world in front of us is basically continuous—that tomorrow is basically going to be pretty much like today," he said. In fact, the opposite is true: We live in a time of perpetual discontinuity, a time in which bombshells and shockers are part of everyday life. "The surprise," explained Peter, "would be no surprise." These examples were selected from the book by GBN (see site above).

- 1 **Nearing the end of retirement** – Americans are not retiring and are working at some type of job.
- 2 **Continuing high-growth economy is inevitable** – caused by productivity driven by new technology and globalization.
- 3 **We're moving toward a new world order** – the world is organized into three groups: disorderly countries (chaos is rampant), orderly (traditional industrialized regions), and the United States (which makes the rules but does not play by the rules).
- 4 **We are in the first stages of another scientific revolution** – revisited view of how the

universe works; reinvent our understanding of the large scale, the small scale, the chemical, the biological.

- 5 **Polluting technologies get clean** – with the pace of technological change, high growth equals clean, low growth equals dirty.
- 6 **Abrupt climate change is coming** – the long period of climatic stability may be ending.

Battelle Corporation

Top Ten Challenges and Opportunities for 2008 (1997).

<http://www.battelle.org/forecasts/>

A team of scientists and engineers at Battelle have compiled a list of the ten most important technological challenges facing industry over the next decade. Note the list was developed in 1997.

- 1 **Affordable Home-Based Health Care.** Market forces are shifting health care from hospitals and HMOs to private homes.
- 2 **Personalized Consumer Products.** Many mass-produced products for mass markets will not be competitive in the 21st century. Consumers are increasingly better informed and harder to please.
- 2 **Convergence of Technology in the Home.** In the past, we separated our home life from work and from shopping. In the next ten years, the home will be the place of convergence for private and public lives. Increasingly, the home will be a place for us to work, shop, get an education, and enjoy entertainment.
- 3 **Protecting the Environment and Natural Resources.** Much of the economic growth of the Industrial Revolution was fueled by the easy exploitation of our rich natural resources. Those easily accessible resources are now largely tapped out, so further growth will come from the smart management of remaining resources and our ability to use alternatives.
- 4 **Human Interfaces.** Interfaces are the intermediaries between human and machine that allow us to more easily use technology--such as the software menu that gives us access to computer programs. The computer term "user friendly" describes a supposedly easy-to-use interface between the machine and the person.
- 5 **Nutritional Health.** While people in the developed world are becoming more concerned about the nutritional quality of the foods they eat, the rapidly growing populations in many poor countries will simply need more food with high enough nutritional quality to sustain a healthy life
- 6 **Mobile Energy.** The automotive industry's need for alternative mobile power sources is obvious. In ten years, many more cars, though not a majority, will operate on alternative-fuel systems.
- 7 **Micro-Security.** The Cold War has died away, along with a great deal of the world's fear of nuclear holocaust; yet, in the wake of car-jackings, gang violence, and terrorist bombings in New York, Oklahoma City, and Atlanta, many people feel no safer than they did 10-15 years ago.
- 8 **The Renewed Infrastructure.** In the developed countries, the public infrastructure that provides transportation, bridges, water, and sewage is deteriorating with age. Many developing countries are without advanced infrastructures.
- 9 **Global Business Competition.** Twenty years ago, the United States was by far the world's leader in technological entrepreneurship. Today, though, technology has become a global commodity--developed, traded, sold, and marketed in every corner of the world. Never has the world seen as much international trade and competition for global markets.

Global Trends 2015: A Dialogue about the Future with Nongovernmental Experts

From the 2000 report of the National Intelligence Council.

<http://www.cia.gov/cia/reports/globaltrends2015/index.html>

- 1 **Key uncertainties: technology will alter outcomes** (technology impacts are difficult to estimate and will affect everything).
- 2 **Key challenges to governance: people will decide** (non-state actors as well as governments will shape global outcomes in the years ahead).
- 3 **The report reviews driving forces of change and develops four scenarios.** In all four scenarios, U.S. global influence wanes.
 - **Scenario 1: Inclusive Globalization** – The majority of the world benefits from globalization, through integrated development in technology, economic growth, demographic factors, and effective governance.
 - **Scenario 2: Pernicious Globalization** – Global elites thrive but the majority of the world's population fails to benefit from globalization.
 - **Scenario 3. Regional Competition** – Regional identities sharpen in Europe, Asia, and the Americas, driven by growing political resistance in Europe and East Asia to U.S. global preponderance and U.S. driven globalizations and each region's increasing preoccupation with its own economic and political priorities.
 - **Scenario 4: Post-Polar World** – U.S. domestic preoccupation increases and the U.S. economy slows, then stagnates. Economic and political tensions with Europe grow, the U.S. European alliance deteriorates as the U.S. withdraws its troops, and Europe turns inward, relying on its own regional institutions.

Organisation for Economic Cooperation and Development (OECD)

“Emerging Risks in the 21st Century” (2003) - <http://www.oecd.org>

- 1 **Concern about risk** – risks today can reach magnitudes of harm that hadn't been imagined in modern times; the risks are higher because of the greater population, changes in the environment and terrorism/disease, and changes in technology.
- 2 **Broadening the notion of risk** – taking in the world view of risks, due to the interdependence of economies and societies, risks in one country can spread rapidly, especially from countries that have inadequate monitoring of potential problems.
- 3 **Citizens as partners** – risk decisions are not exclusively the province of experts. There needs to be analysis and deliberation, involving the public as partners in the decisions.
- 4 **Protecting vital systems** – precautions would be in place among countries using agreed upon techniques; risk prevention often entails additional costs and some parts of the infrastructure are more critical than others; communications/early warning needs to be appropriate to the problem (before and after it occurs) and emergency response systems need to be in place.
- 5 **Building trust and sharing the burden** – trust between the public and those in charge is important. Once trust is lost, it can take a long time to rebuild. In some instances, lost trust may never be regained. Share choices and understanding by providing information on a timely basis and in an effective manner. Risk mitigation is costly and many need to be involved with a common goal of minimizing the negative effects.

David Pearce Snyder, The Pearce Family Enterprise

“Five Meta-Trends Changing the World”, *The Futurist*, July-August 2004, pages 22-27

Pearce defines these meta-trends as “evolutionary, system-wide developments arising from the simultaneous occurrence of a number of individual demographic, economic and technology trends.”

- 1 **Cultural Modernization** – Largely as a result of economic globalization, “Cultural Modernization will continue to assault the world's traditional cultures, provoking widespread political unrest, psychological stress, and social tension.”
- 2 **Economic Globalization** – There will be long-term economic benefits from globalization in

both developed and less developed nations, the short-term disruptions in local domestic employment will make free trade an ongoing political issue that will be manageable only so long as domestic economies continue to grow.

- 3 **Universal Connectivity** – As the first marketing medium with a truly global reach, the Internet will also be the crucible from which a global consumer culture will be forged, led by the first global youth peer culture.
- 4 **Transactional Transparency** – Various groups will take advantage of the global (communications) infrastructure to document socially and environmentally abusive behavior by both private and public enterprises...”There will be skullduggery, bloodshed, and heroics before total transparency finally becomes international law – 15-20 years from now.”
- 5 **Social Adaptation** – The forces of cultural modernization – education, urbanization, and institutional order – are producing social change in the developed worlds as well as in developing nations.

Selected Excerpts Indicative of Emerging Trends

These excerpts are taken from recent sources that indicate some of the changes underway. Formal trends take time to identify and thus indicators of emerging trends are useful. While you have to be careful to avoid temporary fads, the points below are sufficiently likely that they are used as examples of anticipating the future.

- 1 **The Future of Work** -- The future will be less about what technology can do and more about what we want to do with technology. Will that technology be used primarily to boost economic efficiency, or will it also be made to serve a broader set of human interests and values? Organizations that do the later will attract the most desirable knowledge workers and be more effective and efficient in the long run. – *Thomas Malone, Author of The Future of Work: How the New Order of Business Will Shape Your Organization, Your Management Style, and Your Life. Source: Global Business Network (2003).*
- 2 **Redefining the Enemy** -- Increasingly we are at war not with enemy states or enemy armies but with small groups of people or with specific individuals: fugitive terrorists, drug traffickers, warlords, dangerous dictators, rogue scientists. Yet powerful institutional barriers to fundamental change remain. In the armed forces, there is still a tendency to view the current situation as an anomaly – as the “other war” as opposed to the “real war,” as missions to be consigned to specialized units rather than to main forces, as opportunities to gain valuable field experience but not a compelling argument to radically alter how we organize to fight. We adapt incrementally. Given our great strength, that may suffice. But one wonders. It is nowhere written that we will win. *Source Rand Corporation, Rand Review (2004).*
- 3 **Green Building** – The Bank of America and the Durst Organization (Real Estate Firm) break ground on the Bank of America Tower in New York City and plan to build the world’s most environmentally responsible high rise office building (2.1 million square foot, 52 story, and a \$1 billion cost). With an emphasis on sustainability, water efficiency, indoor environmental quality and energy and atmosphere, the BA Tower will be constructed largely of recycled and recyclable building materials, feature a wide range of sophisticated environmental technologies, an onsite 4.6 megawatt cogeneration plant, and a LEED Platinum designation. *Source: Durst Organization News (2004).*
- 4 **Smart Mobs: The Next Social Revolution.** – The ingredients are Radio Frequency Chips, wireless internet nodes throughout buildings and neighborhoods, using individual’s personal computers for collectively searching for extraterrestrial intelligence,

buying and selling on the Internet, instant text messaging and friends' mailing lists used for convening meetings of people outside your own circle. People act in concert even if they don't know each other. The individuals operate in ways that were never possible because they carry devices that possess both communication and computing capabilities. These participants will coordinate actions with others around the world, and with people nearby. Groups of people using these tools will gain new forms of social power, new ways to organize their interactions and exchanges just in time and just in place. (text paraphrased). *Source. Book on Smart Mobs by Howard Rheingold (2003).*

- 5 **Complexity and the Economy** – When viewed in out-of-equilibrium formation, economic patterns sometimes simplify into the simple, homogeneous equilibria of standard economics. More often they are ever-changing, showing perpetually novel behavior and emergent phenomena. Complexity therefore portrays the economy not as deterministic, predictable and mechanistic; but as process-dependent, organic and always evolving. *Source. W. Brian Arthur, Santa Fe Institute.*
- 6 **Energy Transitions.** -- In 2001, Shell Oil developed two scenarios contrasting an evolutionary progression from coal to gas to renewable (or nuclear) against the potential for a hydrogen economy. The scenarios have five common features: 1) the important role of natural gas as a bridge fuel over at least the next two decades and the importance of reducing supply security fears, 2) the strong pressures and volatility which oil markets will face as new vehicle technologies diffuse, 3) the shift towards distributed or decentralized heat and power supply for economic and social reasons, 4) the potential for renewables to be the primary source of energy and the importance of robust energy storage solutions, and 5) the difficulty of identifying winning services or technologies in a period of high innovation and experimentation. *Source: Shell (2001).*

Near Certainties and High Impact Uncertainties

There are a number of near certainties – events or trends that seem so likely that we could legitimately view them as certainties. Those identified in the report are:

- 1 Aging and migrating populations, increased diversity and cultural transformation.
- 2 Changing world order especially related to currently dominant countries.
- 3 Financial conflicts between government services and available taxes.
- 4 Increasingly personalized connectivity allows opportunities for communicating with others.
- 5 Infrastructure constraints become more evident.
- 6 Institutions as we know them will change.
- 7 Sustainability becomes the defining paradigm but technology continues as a major driving force of change.

There are also many uncertainties. The uncertainty is not in whether the topic is important but that we don't know how the trends and events will turn out. Examples include:

- 1 Global climatic change, Energy Supplies and Uses, and Water Resources.
- 2 Rich and poor gap (between countries and within countries and organizations).
- 3 Technology and work.
- 4 Capitalization – will there be enough money available?
- 5 Peace and war and how they are defined in the future.

What We Don't Know and Uncertainties

Most of the driving forces, trends and themes are uncertain. For example: How fast will a trend

move? Will it rise to a certain level, crash and burn, or level off? How will the various trends interact with one another? How will growth rates (in population, economy and innovation) in other countries affect the U.S. (especially India and China, the two largest countries)? How will taxes vs services and private vs public good conflicts be resolved? How and when will the initial impacts of global climatic change occur? How will the concern over terrorism (physical, biological, electronic) impact our abilities to function?

How will the definition of quality of life change? Will there be world peace? What natural disasters are most likely at which locations, and how can they be mitigated? How will we deal with the impacts of global climatic change? What will be the modern equivalent to World War III, and how many parts of society will it impact? Will the “open-source” movement combined with the organizational and communication power of internet give more power to the people (or lower level managers)? Some uncertainties include:

1. ***Global Climatic Change, Energy Supplies and Uses, and Water Resources.*** – When will global climate change effect practical consequences on the world economy and environment? What form will the effect take and how will we mitigate them? Current energy usage is not economically sustainable. What new energy sources and efficiency (conservation) action will be the most cost effective, socially acceptable, and technically feasible?, Potable water is in short supply worldwide; will there be new sources (recycling, seawater) or will there be more conservation?
2. ***Government Services vs Taxes – Results are Unclear*** – What are we willing to pay and for what service? Who decides? How will the major political parties differ in 10 years? How do they differ today from when they originated? How will the growth of federal entitlements and specialized tax incentives/loopholes be changed?
3. ***Rich and Poor Gap*** – There are gaps (income, health care, jobs, education, productivity) between the more developed countries and the less developed countries and there are gaps within countries of both types. How great can the gap get before there is a corrective mechanism (or an over-correcting mechanism)?
4. ***Technology and Work*** – How does the work environment change (blue and white collar, inside the U.S. and outsourcing or importing) as a result of technology and wage/benefit scales? How will automation (knowledge management and robotics) impact jobs available for humans?
5. ***World Order Will Change but How is Unclear***– Which country (or group that does not represent a country) will be the dominant world force (this does not necessarily mean military force, but could be economic or social/moral)? What form will world governance take (for example, the United Nations system, which includes many agencies and commissions such as: the World Trade Organization, the International Monetary Fund, International Court of Justice, International and Atomic Energy Agency, some other combination of organizations, or something entirely new) to address 21st century realities? Is world peace possible and under what conditions? Is war moving from an objective of territory or to winning ideological battles where portions of many countries are involved?

In dealing with uncertainties and wildcards one might take two approaches: 1) organize in a way that allows rapid responses and the flexibility to adapt to change easily, along with learning how to respond to past examples so the process is institutionalized, and 2), assign probabilities to the uncertainties and wildcards with a goal to learning more about those that are high probably and

high impact on the organization.

Wildcards

And of course there are “wildcards” – possible events that might happen but that we cannot articulate in advance. These are the events that may have a low probability but will have a large impact, and therefore are worth thinking about in advance. While it is difficult to determine any specific wildcard event in advance, the preparation for the unknown and how one responds to such an event can be helpful when transferable to whatever wildcard does take place. Examples are:

- 1 Energy costs increase dramatically or water supplies decrease, effectively causing shortages of both.
- 2 Decrease in litigation with increase in mediation restructures the legal world.
- 3 Terrorism slowly, simply, and methodically attacks developed societies, effectively eliminating their dominance in the world.
- 4 Trade wars and embargos cripple the global society.

What If... (some things to think about)

- 5 Global climate change is underway causing hurricanes to shift to fewer category 1 and more category 4-5 cases, coupled with increased population and development in coastal areas. The result is more frequent and more devastating events on a continuing basis.
- 6 World supplies of energy cannot keep up with world demand, and shifts to renewable sources and conservation cannot occur sufficiently fast to prevent relatively permanent higher costs in energy.
- 7 New technologies and their practical applications explode and change the traditional way of building and maintaining buildings.
- 8 Energy costs force life cycle costing to become a common practice in building and maintaining buildings, as laws and regulations provide new incentives for this approach and disincentives for the current approach.
- 9 Mexico invades the U.S. (via large number of average people walking across the border) due to natural disasters or economic/food crises in Mexico or work opportunities in the U.S.

Conclusions

1. We are in the early stages of another major period of change. Three primary factors are involved:
 - 1 Technology has been the big driver for the last 20 or more years and will continue to be a large factor.
 - 2 Cultural and economic conditions are shifting in ways that affect workers and organizations alike.
 - 3 Sustainability is poised to become the next driver (sustainability is broadly defined to include organizations, world order, resources, health, income, and the economy).

This period of change can be described as Volatile, Uncertain, Complex, and Ambiguous or “VUCA.” The solutions for such a world are to be flexible and agile in decision making but be prepared by also being innovative and responsive and understanding the strategic goals are what is important rather than the specific route taken to achieve them. The challenge is to adapt to the emerging VUCA world while still living in the current world.

2. These changes will be manifested with new rules (written or unwritten) that allow for redefining terms such as: return on investment, cultural norms, safety, and privacy. Those companies that watch for the early developments of these new rules, and understand their

possible implications, will have significant advantages over companies that operate as if current trends will generally be followed.

3. The role of different types of organizations in society may be changed, especially as individual people increase in their ability to, in part, function like organizations, and the way organizations will both cooperate and compete with one another

4. Transitions to new eras do not always go smoothly but they give ample opportunities for those that see the positive in such transitions and are prepared for the period of transition. We often hear that people resist change, but it is also accurate to say it is human nature to change (that is, try new things, better yourself, and learn). What people resist is change they do not understand or that affects them in a negative way. Understanding more about how we can anticipate the future, and communicating that information to our workers and customers will minimize our transition difficulties.

5. Recognizing dilemmas and how to analyze and address will become more common and more difficult to address. In those cases where there are not clear choices among options and lack of relevant data or an abundance of uncertainty make require new approaches.

Selected References

References for Keeping Up

These references are for keeping up on the future. This report summarizes available information for 2004, but we are in a time of significant change. Knowing how to navigate the future takes some skill (and time); these references are intended to make the trip easier.

There is a good deal of futures-related work completed by others that can be used by anyone with Internet access. The purpose of these references is to identify a range of such works. The focus is on general futures publications dealing with driving forces and trends, not detailed facts about specific trends or issues.

References are grouped by: web sites related to driving forces of change, futures organizations (U.S. and international), newsletters and periodicals, and selected individuals. I have not listed the specific information on my website, but an overall reference and short course for futures approaches and links is at <http://cals.arizona.edu/futures/shortcourse/>

Web sites related to driving forces of change

Selected sites that have driving force selections or trends and statistics.

Fedstats. Gateway to statistics in over 100 federal agencies. Information organized by topic, geographic location, and agency. Includes press releases and summary reports, and key statistics.

<http://www.fedstats.gov/>

Global Trends 2005, Center for Strategic and International Studies. The study, *Global Trends 2005: The Challenges of a New Millennium*, takes advantage of ongoing work at CSIS as well as new research to outline the future of broad trends in such areas as economy, environment, conflict, society, and science and technology.

<http://www.csis.org/gt2005/>

World Tables Dataset Guide, World Bank. Published annually and includes economic and social data organized by country or subject.
<http://www.ciesin.org/IC/wbank/wtables.html>

Futures Organizations (United States)

Some of these organizations have a more narrow focus or values bias, but most cover the broad range of futures topics.

Association of Professional Futurists. A professional association of those involved in futures activities on a practical level. Web site includes results of interviews with a range of people, reviews of meetings and books, and guidance regarding the futures literature.
<http://profuturists.com/>

Battelle. Battelle's team of technology forecasters provides insight into the technological innovations that will spell success for industry and government in the future. Note the focus is on technology.
<http://www.battelle.org/forecasts/>

Brookings Institution. The Brookings Institution is an independent, nonpartisan organization devoted to research, analysis, education, and publication focused on public policy issues in the areas of economics, foreign policy, and governance.
<http://brookings.org>

Global Business Network. As a worldwide membership organization, GBN engages in a collaborative exploration of the future, discovering the frontiers of knowledge and creating innovative tools for strategic action. They provide consulting and training and have a very good reputation on developing scenarios, and list examples on their site. They also provide an annual listing of recommended books to read (that cover a large range of topics).
<http://www.gbn.org/> (book review lists at <http://www.gbn.org/public/services/bookclub/>)

Hudson Institute. Hudson performs applied research toward policy issues and works to counsel and guide policy change, applying our ideas whenever possible alongside other leaders in communities, businesses, non-profit organizations and governments alike.
<http://www.hudson.org/>

Institute for the Future. Based in Menlo Park, California on Sand Hill Road, known as the Wall Street of the West, IFTF is an independent, non-profit research firm specializing in long-term forecasting. The firm develops an annual 10 year forecasts (with summaries available on the web).
<http://iftf.org/>

The Millennium Project: Global Futures Studies and Research. American Council for the United Nations University. Primary focus is developing countries but broad sets of information and reports on specific subjects. Prepares annual scenarios and state of the future summaries through group participation (electronic) from many parts of the world.
<http://www.acunu.org/>

Rand Corporation. They see their job as helping to improve policy and decision making through research and analysis. This includes developing new knowledge to inform decision makers without suggesting any specific course of action but often they spelling out the range of available options and analyze their relative advantages and disadvantages.
<http://www.rand.org/>

World Future Society. The World Future Society is an association of people interested in how social and technological developments are shaping the future. The Society was founded in 1966 and is chartered as a nonprofit educational and scientific organization in Washington, D.C., U.S.A. They develop 10 forecasts annually but also include a good deal of general information on the web site.

<http://www.wfs.org/>

U.S. Department of Labor, Occupational Outlook. The 2004-2005 edition provides descriptions of current conditions and expected trends in many occupations.

<http://www.bls.gov/oco/>

Futures Organizations (International)

These organizations range from independent, to support for a high level government focus, or for consortia or organizations of multiple parties. There is no equivalent organization for the United States government.

Finland Futures Research Center. The center is an organization for futures research, education and development, which has operations on local, national and international level. The Center produces and promotes visionary information on the future trends of society and the environment.

<http://www.tukkk.fi/tutu/english.htm>

Forward Studies Unit of the European Commission. The unit has three tasks: to monitor and evaluate European integration; to establish permanent relations with bodies involved in forecasting; and to work on specific briefs. It provides a number of reports and five possible scenarios for 2010. http://europa.eu.int/comm/cdp/index_en.htm

International Futures Program of the Organization of Economic Cooperation and Development (OECD). The OECD consists of 30 countries, including the US. The Program offers a number of features: improved monitoring of the long-term economic and social horizon, with early warning on emerging issues; more accurate pinpointing of major developments and possible trend breaks; greater analytical appreciation of key long-term issues; and better dialogue and information-sharing to help set policy agendas and map strategy.

<http://www.oecd.org/EN/home/0,,EN-home-notheme-11-no-no-no-0,00.html>

Newsletters and Periodicals

These newsletters are broad based and futures directed. The one on energy is typical of more specific newsletters, but is listed because of the growing interest in the changes taking place in the energy fields and green building and as an example of specific newsletter formats.

EREN NETWORK NEWS - A weekly newsletter from the U.S. Department of Energy's (DOE) Energy Efficiency and Renewable Energy Network (EREN). Free subscription at:

<http://www.eren.doe.gov/news/subscribe/>.

Innovation Weekly – A weekly report on trends, strategies and innovations in business and technology. \$18/year for paid subscribers; company-wide distribution licenses are also available for corporations, academic institutions, and nonprofit organizations.

<http://www.NewsScan.com>

Future Survey – A Monthly Abstract of Books, Articles, and Reports

Concerning Forecasts, Trends, and Ideas about the Future. \$98 per year for individuals (12 monthly issues). Subscriptions for libraries and other institutions are \$145 per year.

<http://wfs.org/fsurv.htm>

Selected Individuals

The names below have been in the futures field for many years and are highly respected by their peers. There are others in the field, but they are not listed because their web pages either don't exist or are not useful in gaining additional information.

Joseph Coates. Consulting futurist, former principle of Coates and Jarrett and assistant director of the former U.S. Office of Technology Assessment. Web site provides large listing of articles, resources speeches, and issues analysis. Orientation is toward technology but is very broad.
<http://josephcoates.com/>

James Dator. Professor of Political Science at University of Hawaii, one of founders of World Futures Study Foundation and the Hawaii Research Center for Futures Studies. His focus is on political and societal issues but is also very broad.
<http://www.futures.hawaii.edu/>

Patrick Dixon. Chair, UK Global Change. Medical doctor by training, now futures speaker and web site has a good deal of summary material on the web site.
<http://www.globalchange.com/main.htm>

Longer term studies

Europe 2020.
<http://www.europe2020.org/en/home.htm>

Air Force 2025.
<http://csat.au.af.mil/2025/>

Water 2025: Preventing Crisis and Conflict in the West (U.S. Department of Interior).
<http://www.doi.gov/water2025/>
Global Trends 2015: A Dialogue with non-Governmental Experts (National Intelligence Agency).
<http://www.cia.gov/cia/reports/globaltrends2015/>

Hawaii 2050 (sustainability study through state government, just beginning).
http://www.state.hi.us/auditor/agendas/min120505_s.pdf

The Millennium Project (UN University).
<http://www.acunu.org/millennium/>

Further Reading

Some references within the report text and others are in the "selected references for keeping up". These references are for a broader analysis of some of the key points identified the report.

Barker, Joel. 1993. Paradigms: The Business of Discovering the Future. 240 pages. Harper Business.

This book defines paradigms, discusses how they work, gives many examples, and identifies 13 important paradigm shifts for 1990s (so you can check how good he was) and relates them to trends of the 1990s. This is the best book on paradigms and change, and it is inexpensive and small.

Barker, Joel. 2005. *Five Regions of the Future: Preparing Your Business for Tomorrow's Technology Revolution*.

The focus is on technology – super technologies, limits to technology, local technology, nature's technology, and human technology. Each section has guidelines of what it is all about, advocates for the position and examples, and some futures perspective. Conclusion: you need all of them, there is no single answer.

Coates, Joseph, John Mahaffie, and Andy Hines. 1996. *2025: Scenarios of U.S. and Global Society Reshaped by Science and Technology*. Oakhill Press. 508 pages.

This book is a little dated now, but it has much still useful information. It includes 107 assumptions about the future and identifies 15 scenarios for the world in 2025. The book summarizes the results of specific studies for a number of science and technology companies, done by Coates and Jarrett consulting. His current web site includes a number of articles he has written on a range of topics about the future. <http://josephcoates.com/>

Courtney, Hugh. 2001. *20/20 Foresight: Crafting Strategy in an Uncertain World*. Harvard Business School Press. 209 pages.

The focus is on assigning probabilities to uncertainty as a means of coping with them. Courtney outlines a four step process: 1) define the strategic issue and the level of residual uncertainty, 2) frame possible solutions, 3) analyze possible solutions and make strategy choices, and 4) monitor and update strategy choices over time.

Peterson, Peter. 2004. *Running on Empty: How the Democratic and Republican Parties are Bankrupting Our Future and What Americans Can Do About It*. Farrar, Graus, and Giroux. 242 pages.

Peterson was the Secretary of Commerce in the Nixon administration and has been involved in a number of efforts directed at balancing income and expenditures. The book has many specific examples, with numbers, about trends and their expected results.

Rand Corporation. 2004. *Shaping the Next One Hundred Years: New Methods for Quantitative, Long-Term Policy Analysis*, 213 pages. Full report available at <http://www.rand.org/publications/MR/MR1626/>

An analysis of various techniques about studying the future, concluding that you need to "move past familiar shores". They propose a complex computer model to generate thousands of scenarios that can then be assessed by humans (while the computer approach likely has more limitations than they cite, the analysis of techniques is good and current and the new possibilities worth reading).

Schwartz, Barry. 2004. *The Paradox of Choice: Why More is Less*. Harper Collins. 264 pages

Making choices among many possibilities causes a "freezing" so no decision is made, or too much time is spent on trivial decisions and not enough on important ones. Schwartz is professor at Swarthmore College.

Schwartz, Peter. 1991. *The Art of the Long View: Planning for the Future in an Uncertain World*. Doubleday. 258 pages.

Provides several case histories where companies planned for the future. The primary focus is on scenarios – how they are developed, used, and the role they play in planning for the future. Driving forces over the next two decades (from 1991) are listed and three scenarios are presented for the world in 2005. An 8 step process for building scenarios serves as a blueprint for others.

Schwartz, Peter. 2003. *Inevitable Surprises: Thinking Ahead in a Time of Turbulence*. Gotham Books. 245 pages.

The “inevitable surprises” are the trends that many know about but not much is done about them in advance, so when they happen they come as a surprise. Schwartz gives a series of examples and identifies strategies to overcome the “surprises.” Schwartz is president of the Global Business Network. GBN has a book club (free) that includes a monthly reading list of books relating to the future, covering a wide range of topics:
<http://www.gbn.com/BookClubSelectionListDisplayServlet.srv>

Weiner, Edie and “Arnold Brown. 2005. *Future Think: How to Think Clearly in a Time of Change*. Prentice Hall. 286 pages.

A book by two experienced futurists that set the stage for the a better understanding of the time for the 21st century. Major sections include: Individual biases and blocks to seeing and understanding change, institutional biases and blocks to responding to change, seeing the big picture, and using metaphors to free your mind. Filled with examples and easy to read.

Appendix:
Selected Pages from Web Course on Anticipating the Future

Full site is accessible at <http://cals.arizona.edu/futures>

Glossary - Definitions of Selected Futures Terms

-- a university of arizona course on methods and approaches for studying the future

Counter-intuitive. Counter to normal expectations. Varies as person's field, but issues that are out of the range of "normal" assumptions and behavior may not gain as much evaluation as those activities that are "expected"

Cross impact analysis. Identification of effects on various events on each other. Increasing one variable might decrease another, or have no effect. By placing a summary of these effects on a single chart, an overall perspective can be gained quickly.

Discontinuity. A major shift in a trend, that is so drastic that it cannot be accounted for by normal variation. An example might be the population shifts due to the baby boom. A larger scale example would be change from the industrial revolution to the information revolution.

Driving Forces. Driving forces are clusters of individual trends on the same general subject. There are many trends or events that shape the future, but some are more important and evident than others. Driving forces highlight these major future shapers by organizing them under a few terms, normally 5-6. Examples of driving forces categories are: demographic, economic, science and technology, or social/political.

Extrapolation. Extending a curve into the future by assuming the variables will continue to behave as they have in the past.

Forecast. An estimate of what might happen in the future. It is not absolute and often has probabilities attached. It is a "best guess".

Futurist. There is no good definition. Basically, it is a person interested in futures-related work. A small number work full time on the topic, many more are part time futurists and full time doing something else. They range from popular writers to highly technical experts in selected areas. Their views are in agreement on some things and vary widely on others.

Gaussian distribution. The distribution of events in a bell shaped curve. This is similar to the sigmoid curve and is derived mathematically but applies to many situations. It indicates there is generally a majority in the middle with extremes at either end. Here the actual number of events is used, where in the sigmoid curve it is the rate of change. A common example is the distribution of grades in a class.

Group-intelligence. This is where each member of the group contributes to the whole. The result is a synergistic effect where the group is more than just a sum of the parts. Groups or teams that operate this way function well. See group-think for the opposite effect of a group.

Group-think. This is the effect when a group works together and is sufficiently similar either by group membership or by training that they "think as one". This frequently results in narrow perspectives, avoidance of debating key assumptions or trends, and detracts from what can be positive benefits of a group. See group- intelligence (opposite) and mindset (similar).

Holistic. Looking at the whole system rather than just concentrating on individual components. The overall sum can be greater than a simple totaling of the individual parts, because the "system" adds something in addition. Another term is "systems thinking".

Leading indicators. Certain indicators that reflect early warnings of change. They vary by field (e.g., economic, social, environmental) and are the important trends as identified by practitioners in the field. They are useful because they take the very large number of relevant variables and

reduce them to the important few (which may also include combinations of the individual variables) which signal changes coming in the relevant subject areas

Mindset. A person's frame of reference that is fixed. A person can have a particular "mindset" that is so strong in a specific outlook that they do not see other perspectives, even though they might hear them and believe they have been given consideration. This prevents looking at new options in a realistic sense.

Model. A prototype or surrogate of a complex situation. It can be a physical model, such as an architectural model of urban design, or a mathematical model of interactions of many variables. It is used in simulations for relating various components together or can be a stand alone tool to evaluate different approaches using different assumptions. Recent use of personal computer tools allows many types of software to effectively answer questions such as "what if I increase the growth rate"; these too are models.

Paradigm or paradigm shift. A paradigm is a pattern/mode/description of a given situation. It can be thought of as the force behind the unwritten rules of society or a particular discipline. A paradigm shift is a movement from the accepted paradigm, to a new one. It applies to subject matter fields, where the prevailing thought can be described by a brief statement. When shifts occur it calls the prevailing wisdom into question, and when there is sufficient evidence to have wide debate on a topic, a paradigm shift is likely underway.

Prediction. A specific statement about a future condition. Usually made by non-experts (who would like to add qualifications or ranges). An example would be "who is going to win the football game this week".

Scenario. A description of several (usually 3-5) possible descriptions of a situation. Hypothetical situations are interspersed with expected extrapolations of trends to list a combination of events that describes how a situation might occur. They are more useful for understanding the options and dealing with uncertainty than in predicting specific events.

Sigmoid curve (S curve). A curve that the rate of growth is rapid and then the growth rate declines. This produces a curve that appears as an S, due to a slow start, rapid growth, then leveling. Many biological systems follow this structure (e.g., population growth, carrying capacity), as well as product life cycles and societal fads. The same information is presented in the Gaussian distribution bell shaped curve; it different ways of looking at the same thing.

Simulation. Imitating or estimating how events might occur in a real situation. It can involve complex mathematical modeling, role playing without the aid of technology, or combinations. The value lies in the placing you under realistic conditions, that change as a result of behavior of others involved so you cannot anticipate the sequence of events or the final outcome.

Sustainability. The term originally applied to natural resource situations, where the long term was the focus. Today, it applies to many disciplines, including economic development, environment, food production, energy, and lifestyle. Basically, sustainability refers to doing something with the long term in mind, (several hundred years is sufficient). Today's decisions are made with a consideration of sustaining our activities into the long term future.

Trend. A pattern that is evident from past events. Sufficient data area required to see if there is a relationship of one (usually) or more variables (infrequent) over time. It is useful to better understand the subject under review as well as to estimate near- term future events.

Vision or Image. A picture or perspective of how you think something might be or should be sometime in the future. It is useful for developing a possible target(s) and explaining it to others. Image is more useful for futures studies, as it suggests there are several "images" where vision to some suggests only one.

These definitions should be enough to get you started, if you have any questions see me in class

or give me a call.

anticipating the future - a short course

-- a university of arizona course on methods and approaches for studying the future

This is a window into a more comprehensive course "anticipating the future" that can be used as a quick self study short course. There are about 20-40 pages of material depending if you print the primary pages only or everything (and the font settings on your browser). Links at the bottom will take you to the full course for additional exploring. This short course can be used as a refresher on futures studies or as a quick introduction to the subject if your primary interest is strategic planning or an assessment of near term possible futures for specific subject areas.

1. Overview and suggested learning framework

- [Summary of what is on this site and how to use it](#)
- [Futures in a nutshell](#)
- [Brief book reviews](#)
- [The big picture \(relating futures to planning and assessment\)](#)
- [A short overview of approaches and tools](#)

2. Techniques and approaches

- [Futures Techniques \(brief summaries of 15 techniques\)](#)
- [Building blocks - paradigms, driving forces, trends](#)
- [Short listing of data sources for driving forces and trends](#)
- [Understanding what you don't know, uncertainties, and change](#)
- [Putting it all together - scenarios and the big picture](#)

3. Examples and sites to explore

- [Examples of futures studies](#)
- [Futures organizations](#)
- [Futures relevant web sites](#)
- [Reference subjects and libraries](#)
- [A range of different sites for your exploring pleasure](#)
- [My views \(Roger Caldwell\)](#)

4. Want more detail? Move to the full course on Anticipating the Future

- [Home page - key areas and quick links](#)
- [Site map](#)

Hints in Dealing With Futures Projects

-- a university of arizona course on methods and approaches for studying the future

This is a short listing (7 actually) of guiding principles or sayings to help you determine your own frame of reference for working with the future. You should build your own toolbox of futures techniques or hints, and re-read them often.

- It Depends --- The answer to many questions.

There are often many "right" or at least acceptable answers. Often we do not provide sufficient information on assumptions or conditions and yet expect a simple answer. Under these conditions, the best answer is simply "it depends". This forces the questioner to better understand the question. This situation occurs quite often.
- The world is Gaussian (bell shaped curve) - or S shaped curve (integrated version of bell shaped)

Many events or situations can be represented by either the bell shaped curve or the s shaped curve. One other curve that is useful is the simple straight line. So, bell, S, and straight line (or their combinations in a single graphic) are sufficient graphics to apply to many situations. There are [other types of curves](#) that also represent major changes relating to futures analysis.
- 7 +/- 2. Commonly used numbers that apply to many situations

More than this amount is unwieldy or too confusing, less is insufficient diversity. Good for number of projects to do at once, members on a committee, goals in a project, days in a week, hints on studying the future, and so on. But, sometimes there are fewer. For example, the number 3 is useful for the optimum rinses for dishes, the number of cycles in a Delphi analysis, or the the number of examples in a learning situation. Similar examples can be developed for other numbers.
- Question Assumptions

Many assumptions about the future are unstated; in fact the author frequently assumes they are facts and believes it unnecessary to identify them as assumptions. This is one of the weaknesses of many reports. Without assumptions identified, everyone uses their own. It is useful to debate an assumption, but to ignore them causes unnecessary argument and anxiety.
- Watch for groupthink and fixed mindsets in individuals and organizations

When large shifts occur, those vested in the previous dominant force have the most to lose. They may know change is coming and resist it for practical reasons, but more often they are so fixed in the past they do not see early or even obvious signals of the future. Arguments based on fact or logic may not work well in these situations. Understanding how to deal with "change" helps in these cases.
- Expect both surprises and expected results from a published forecast

Be flexible on expectations. Some situations can be explained in an "elegant" way - a very simple and powerful statement about very complex activities. Chaotic systems also are part of the explanation, for both short and long term timeframes. What seems like a good correlation in the short term may actually be part of the chaotic longer term and simple extrapolations will get you in trouble. Uncertainties are always around, and learning to live with them and appreciate their "value" in understanding the future is useful. Make good use of scenarios (generally 4 or so) to better understand the ranges of possibility and to help prepare for situations you have not previously studied in detail.
- Several solutions are likely - don't over study the situation

It is difficult to optimize solutions when many conditions must be met with complex situations. While some situations may point to the need to take time and effort to optimize a solution, many situations are satisfied by any one of several solutions (there is no "one best answer"). Don't waste a lot of time coming up with the "best" solution (actually, if a single best solution is the goal, you probably don't understand all the relevant factors and

are approaching the study too narrowly).

Talking Points for Transformation Talk

-- a university of arizona course on methods and approaches for studying the future

This is an outline for a 30 minute or so talk on the issues related to transformation (big changes). It includes some elements of a futures study, some examples of events, some thoughts on a particular topic of interest to the class (in this case, education), and a few conclusions.

1. The Big Picture

- Major eras or societal transition points
- Movement between eras vs living within an era
- Consider the "dominant" era but not to the exclusion of others (past or future)
- Conclusion: a little foresight can go a long way

2. The Little Picture

- Near term experiences, concerns and pressures often prevent looking at the big picture
- Know the difference between rearranging chairs on the Titanic deck and looking for icebergs
- Changing one step at a time

3. Ordinary Change vs Transformational Change

- Incremental change often follows (modified) extrapolation of past experiences with old habits
- Knowing what you don't know is helpful and asking the right questions is essential

4. What are some of the new rules (aka paradigm shifts)?

- Personalization (some call this mass customization)
- Values and lifestyles (e.g., are today's problems solved by getting back our old values)
- Globalization and communication make everyone a neighbor

5. What are some of the driving forces of the major changes underway

- Science and Technology (e.g., genetic engineering, information technology, materials)
- Population changes and demographic shifts (worldwide)
- Political, social, and economic considerations

6. Some discoveries/inventions that will have intended but mostly unintended consequences.

- 1837 Telegraph, 1893 Aspirin, 1928 Penicillin, 1938 DDT (banned in US 1972), 1943 Parathion
- 1977 Personal Computer, 1979 Bar Code, 1980 Global Positioning Satellite
- 1980 Post-its, 1989 Berlin Wall fell, 1993 World Wide Web (via first graphics browser)
- 1993 Sheep Cloned, 1993 First fully computer designed airplane (Boeing 777)

7. A toolbox for the future - develop comfort in several areas

- Chaos, complexity, simplicity (all are related)
- Uncertainty and flexibility, ignorance and knowledge
- Vision, foresight and anticipatory perspectives
- Creative thinking (including pondering and other "informal" activities) Scenario development and strategic thinking (rather than strategic planning)

8. Some thoughts about transforming higher education

Learning: personalized, just in time, any place, any time, any method
Competition, institutional inertia, costs
Traditions and values, fundamental knowledge development and transfer, unique role in society
Who will lead (or force) a transformation - educators, politicians, business, parents, students?
What are the ingredients of a scenario or two about the future of higher education?

9. Some cautions and barriers

Watch out for simplistic solutions or management fads
Groupthink (reinforce each other's biases) is not group intelligence (build on other's knowledge)
Avoid extrapolations of the past during times of major transition

10. Bottom line

We are within a major transition period that probably started in late 1970s and could go until 2015-20
The rate and magnitude of change, and the higher order impacts of the change, are unprecedented
All societal components will be impacted; solutions will lag old and new problems
A context for thinking about the future is as simple as using the Enterprise rather than the Mayflower

My approach: following the presentation there is plenty of time for questions. This outline is provided for the class to take notes; slides were not used. I may include a reference sheet for further reading.