Leadership of Technological Change – Read Ahead

A short list of **ten key senior leadership skills**, and a technology brief exploring *possible*, *probable*, and *preferable* futures – what "could", "will" and "should" happen, as I see it, in **ten key technology foresight areas**. This brief looks out **ten to twenty years**, to the career horizon of many senior leaders and middle managers. See Amazon links and reviews for some favorite primers on these topics. I've tried to state my **key biases and assumptions** where relevant. You likely have different biases and assumptions. This brief is guaranteed to be incomplete and wrong in many parts. It is my personal perspective. Have **disagreements or questions** on any of these assumptions and futures? Let's discuss them in seminar.

Each area brief ends with a few **leadership questions** for **senior leaders and middle managers**. How can you better manage coming opportunities, disruptions, and threats in each technology area?

Please consider me one of your career technology foresight and leadership advisors. It is an honor to serve you. Contact me at: johnsmart@gmail.com | 650-396-8220 | Accelerating.org | Blog: Ever Smarter World

I. Senior Leadership: Ten Key Skills and Books

1. Self-Diagnosis. *Adaption-Innovation*, Kirton, 2003. *Leading the Leaders*, Adizes, 2004. *Strengths Finder 2.0*, Rath, 2007.
2. Self-Management and Health. *Managing Oneself*, Drucker, 1999. *Be Excellent at Anything*, Schwartz, 2004.
　　The Primal Blueprint, Mark Sisson, 2009. *Thinking, Fast and Slow*, Kahneman, 2011.
3. Learning/Evidence-Based Management. *How to Measure Anything*, 2010. *Building the Learning Org*, 2011.
4. Teamwork and Performance. *Senior Leadership Teams*, Wageman, 2008. *Strengths-Based Leadership*, Rath, 2009.
5. Budgeting and Procurement. *High-Perf Supplier Management*, Moore, 2001. *Beyond Budgeting*, Hope & Faser, 2003.
6. Strategic Management. *12: The Elements of Great Managing*, Wagner and Harter, 2006.
　　Balanced Scorecard Strategy, Hannabarger, 2007. *On Competition*, Porter, 2008.
7. Innovation. *The Innovator's Dilemma*, Christensen, 1997. *Arms and Innovation*, Hasik, 2008.
　　Creating Innovators, Wagner, 2012. *The Immigrant Exodus*, Wadhwa, 2012.
8. Change Management. *Leading Change*, 1996. *Turn the Ship Around!,* Marquet, 2012.
9. Ethics and Fairness. *Meeting Ethical Challenges of Leadership*, Johnson, 2011. *Controlling Corruption*, Klitgaard, 1991.
10. Foresight and Intelligence. *Hard Facts, Half-Truths, and Total Nonsense*, Pfeffer and Sutton, 2006.
　　The Well-Timed Strategy, Navarro, 2006. *Analyzing Intelligence*, 2008. *The Signal and the Noise*, Silver, 2012.

II. Technological Change: Ten Areas of Strategic Opportunity, Disruption, and Threat

1. Information Technologies
Main Concept: Information technologies are becoming the "Steering System" of accelerating global change.
Leader's Challenge: Using IT to grow personal, organizational, and global **Intelligence** and **Interdependence**.
"The conversational interface, due 2015-2020, may be the biggest single tech change we will see in our lifetimes."
Computing (Super, Enterprise, Personal, Mobile/Wearable, Web/Cloud). Google, Amazon, Apple, MS, IBM. Bio-inspired computing, like IBM's SyNAPSE, will bring *statistical* and *brain-like learning* to our computer hardware in 2020's.
Communication and Networks. Mobile now reaches 60% of humanity. 85% (50% 4G LTE) by 2017. *3B more folks* will be online by 2020. *"One wearable smartphone per child."* 100Mbps broadband, internet TV, telepresence. Social networks, crowd intelligence. Facebook now 'third largest country' (1B). Google, Facebook largest platforms (>1.4B) by 2014.
Big Data, Maps, and Algorithms. Big Data, Google Maps are preconditions for AI. Many algorithms (sorting, compression, linear optimization, signal processing) improve as fast or faster than our computer hardware (eg., 10^4 in 15 years).
Conversational Interface. NLP: Watson, Siri, Google Now. Avg. length of query we ask search engines *doubles every seven years.* 1998 1.3 words, 2005 2.6 words, 2012 5.2 words. 2019 10.4 words. Soon, *natural language sentences* will work well. This enables biggest set of learning and social change most of us will see in our lives, right around the corner.

Agents and Cybertwins. Personality Capture/Virtual Agents/Cybertwins, Digital Identity, Quantified Self. Circa 2020. Agents become active extensions of your personality, start managing what you read, how you connect, buy, and vote. Books: *Race Against the Machine*, McAfee, 2012; *Age of Spiritual Machines*, Kurzweil, 2000; *Wired for Thought*, 2009
Leadership Questions:
1. What are your IT research, acquisition, R&D, hiring, training, measuring, and management **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had significantly better IT performance in your critical systems? How could you get this performance?
3. What key **disruptions** or **threats** must you anticipate in a world of accelerating IT performance?

2. Nanoscience and Nanotechnologies
Main Concept: Nanotechnologies are the main "Engine" of accelerating IT, social and technical change.
Leader's Challenge: Growing critical **Performance** and **Efficiency** via better use of miniaturization and nanotech.
"Nanospace, where intelligence is headed, is orders of magnitude faster, stronger, and efficient than human space."
Small-Scale Physics. Engineering is inward bound. Distances accessible to scientific manipulation have *shrunk 100 millionfold* (10^8X) in 90 years. Intelligence community now uses encrypted quantum comm. Demo of neutrino comm. through Earth (long term, to submarines). Killer app for quantum computing is simulating quantum-molecular processes (molecular machines, superconductivity). US needs strong STEM/Science culture to continue these amazing advances.
Fission and Fusion. Fission is 10^3X more energetic per mass than chemical reactions. Fusion 10^3X more than fission. We've increased fusion energy output *$10^{12}X$* since 1970. First commercial fusion (ITER Demo) likely by 2030.
Nanochemistry. Rationally designed catalysts are *10^3 to 10^6X more efficient, productive, and fast* than natural ones. Nanopores allow cheap DNA sequencing. Protein engineering. Disassemblers. Nanomedicine. Green chemistry. Expect further vast performance and efficiency improvement in this space. Nano and IT engineering drives accelerating change.
Nanocomputing. Moore's law has given us a *10^{11}* (100 billionfold) performance/price increase, 1950-2007. Computing, comm, storage performance/price doubles every 1-2 years. SoCs. FPGAs. Nanolasers. Optical Computing. SETs. A hardware-based neural net is *10^7 faster* than a neuron. Brain simulation projects (Blue Brain, etc.) are now possible.
Nanodevices. Nanofabrication and lithography. Imaging. Sensors. Nanoprobes. Nanofluidics. Nanowires. Motors. High-strength, self-cleaning, self-healing materials. Nanobiomimicry. Nanopiezoelectronics. Nanocapacitors. MEMS & NEMS.
Books: *Nanotechnology*, Ratner, 2002; *Engines of Creation*, Eric Drexler, 1987, *Physics of the Future*, Kaku, 2011
Leadership Questions:
1. What are your tech miniaturization research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had significantly better tech miniaturization or nanotech performance in your critical systems? How could you get this performance?
3. What key **disruptions** or **threats** must you anticipate in a world of accelerating miniaturization and nanotech?

3. Resource Technologies
Leader's Challenge: Ensuring resource **Abundance** and growing **Sustainability.**
"Next gen tech, enterprise, & policy will solve our Grand Challenges (energy, water, food, CO2), but *only under stress*."
Energy. We're swimming in it, and will continue to move slowly to cleaner forms, barring climate disaster. Nat gas is cheap ($1.90 gal/equiv), and will remain so (US has 2K tcf). We're switching out coal for nat gas. Home compressors(Phill) are an opportunity. Electric-NG-Gasoline hybrids best transition solution. World has 1.2T bbls of proven oil, 38 yr supply, and 10T in shale and tar sands oil. We'll never use most of it. Oil will stay below $200/barrel to keep alternatives from outcompeting it. *"$100-200T of oil still to be sold."* Alternatives continue slow advance. *Solar* half as cheap every 10 yrs, *doubles base every 2 yrs.* Nanoengineered algal biofuels allow renewable transportation. *H2 fuel cells* have *10^5X* further future efficiency potential (Daniel Nocera, MIT). Wind, geothermal have 10% niches. Solar and artificial photosynthesis long term. $1/10,000^{th}$ of solar flux addresses our *entire* current global energy needs. Post 2030, Fusion could play a role.
Water. 1 billlion people presently without safe, clean water, 2.5B have no sanitation. Cellphones are now more prevalent than toilets. Leapfrog tech: Composting, desalinating, plumbing-free toilets. DEKA's Slingshot water purifier.
Food. Agrobiotech, GMOs, aquaculture. Longer term: Cultured meat, vertical farming, aquaponics, aeroponics.
Population. Simon's "Ultimate Resource." *World pop is flatlining.* We reach 8.5 to 9B in 2040 (Next 30 yrs for 1.5 to 2 billion more, half in Asia, half in Africa) then we either stay flat or shrink. *We've already hit "Peak Child"* (Peak Births, 135M/yr total, in 1990 and Peak Fraction of Children, <15yrs, as % of Society, 1.9B, just 27% of population, in 2011). *Better sanitation, water, and basic public health* (lower infant mortality) greatly reduce birth rates in the last two growth areas (Asia, Africa). Growth of human population is almost over. Growth of robots and machine minds is just beginning.

Climate and Ecosystem Resources. We've overfished and acidified the oceans, overfarmed our soil, killed off and threatened many species. But deforestation isn't accelerating, it's saturating. CO_2 will saturate as well beginning mid-century, as next gen energy emerges. All our raw materials supplies are greater than ever, and the smart mining and drilling robots have barely gotten started. Sustainable resources management is also emerging everywhere. Environmental issues are serious, but they are also overstated. We are innovating and legislating our way back to sustainability. Europe leads the way, the US is being dragged along, as we prioritize freedom/innovation over sustainability. Like individual vs. society, innovation vs. sustainability is our central tension. Both are key.
Books: *Abundance*, Diamandis etal, 2012; *Rational Optimist*, Ridley, 2011; *Skeptical Environmentalist*, Lomborg, 2011.
Leadership Questions:
1. What are your critical resource research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had more resource abundance or sustainability? How could you get this outcome?
3. What key **disruptions** or **threats** must you anticipate in a world of regular critical resource shortages?

4. Engineering Technologies
Leader's Challenge: Solving problems of **Urbanization,** growing **Automation.**
"Making smart, networked, virtualized, secure, productive, sustainable urban space is key to every country's future."
Smart Cities. 50% of us live in urban areas. 60% by 2025. By 2050, 70% will live in megacities (>10M). 1/3 of urbanites (850M) now live in substandard slums ("*shadow cities*"). *2B by 2050*. Must participate in global workforce. Keep Infrastructure and slums working, and crime, gridlock, pollution from growing, and the options, money and efficiencies in cities beat everything else. Major drop in violent urban crime in the US from 1990-2010 had many causes: *planned parenthood, unleaded gas, urban renewal, policing upgrades, growth of digital entertainment*. Sustainable, walkable, smart cities are growing. We can expect a return to the 1950's in this regard, cities as a desirable place to live.
Dematerialization and Efficiency. We are *dematerializing* our economies. This is a key to sustainability. Learning how to substitute *digital* products and processes for *physical* ones (think of telepresence vs. physical travel , or all the physical products an iPhone and intelligent household robot will replace). *Beyond $25K per year people consume sharply less energy per salary* (World Bank, Shell). They have their house and key appliances, and they increasingly share them, use them on demand. Efficiency drives our sustainabiility initiatives, which get increasingly intelligent.
Greentech and Pollution. Greentech is growing, but slowly. Carbon will likely never be sequestered. *Carbon taxes* are smarter and cheaper than carbon markets. We will increasingly decarbonize, but even more we will dematerialize.
Transportation and Logistics. *Robocars* will save 1.2M deaths/year, $230B in lost productivity. 2% of GDP. Expect collision avoidance, autovalet, commercial first (2015?) then public robocars, giving us back 5% of work time now lost to commuting (100 of 2100 hrs/yr), HOV lanes for robocars. *Internet of things* will allow even smarter, just-in-time *logistics*. 9B people, each with ~1-5K sensors and other connected objects per person will create *"smart environments"* after 2020.
Manufacturing & Farm Automation and Robotics. *Specialization, Trade and Automation* are the top drivers of economic growth. GWP has grown *15X from 1950-2010*, $4T to $60T. Trade growth drove our 2002 switch to a steeper GWP growth rate. Hi-tech family farms are resurging. Local mfg will resurge as *advanced robotics* emerges, and *China's wages grow faster than US wages*. Some (New Balance, etc.) are have already brought a few *offshored factories onshore again*. Local on-demand mfg and making are growing too, but "desktop mfg" and "3D printing" are much harder than boosters claim.
Books: *Triumph of the City*, Glaeser, 2011; *In Praise of Hard Industries*, Fingleton, 1999; *Reinventing Fire*, Lovins, 2011
Leadership Questions:
1. What are your equip. and engineering research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken with better engineering innovation capabilities?
3. What key **disruptions** or **threats** must you anticipate in a world of increasing urbanization and maker abilities?

5. Health Technologies
Leader's Challenge: Managing **Costs**, addressing **Diseases of Affluence.**
"Digital health is the health that's accelerative. Public health is the health that matters. The rest is always oversold."
Digital Health and Diseases of Affluence. *IT* is the big story of health care, the accelerative part. Watson for oncology, then "Google, Apple, Facebook, Amazon health." Genomic data, microsensors, wireless monitoring. New global health options, such as medical tourism. The medical and insurance professions will slow industry change, but there's great opportunity to use sensors, smart homes, smart toilets, smart environments, networks for *preventive medicine* (cancers,

toxins) and *diseases of affluence* (obesity, diabetes, addictions). Lifestyle diseases, still rising today (just like urban crime 1960-1990) will *saturate* once Watson-level health advice, symbiont networks, and nanodiagnostic prevention arrives.
Public Health and Disease Control. *Clean water and toilets* have the greatest marginal impact on global infant mortality. Lab on a Chip (LoC) nanodiagnostics will bring increasingly effective preventative medicine. Most infectious diseases are *solvable problems* in diagnostics, cellular and nanomedicine. See Lincoln Lab's DRACO for the future of pandemics.
Medical Biotech, Implants, HMIs. *Nanomedicine* and nanosurgery will give us new kinds of implants, sensors, interfaces. *Drug and sensor implants* will greatly improve health management and addiction medicine.
Cellular and Regenerative Medicine and Longevity. Gene Regulatory Networks (GRNs) and epigenome science will *greatly improve* tracking and management of disease. Stem cells and tissue engrg will advance transplants, but will have little effect on the brain. Expect only incremental advances in longevity. Squaring the curve. *Superhard 120-yr limit.*
Big Pharma and Enhancement. Drugs are huge business. Usu. marginal physiologic value, but great psychological value. We'll pay for any easy fix promise, and biotech is an "industry driven by hope." It's never made a net profit as an industry, since 1960's. We keep giving it billions, and there are big disease cures coming with GRN-based drugs, but *don't expect a profoundly better baseline memory, concentration, energy, longevity, or other such hype*. The system is too complex, ethical barriers too high. Almost all human performance enhancement in next 20 years will be *environmental and digital*. Books: *Creative Destruction of Medicine*, 2012; *Truth About the Drug Companies*, 2005; *Innovators Prescription*, 2008.
Leadership Questions:
1. What are your health and wellness research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had much better health care programs?
3. What key **disruptions** or **threats** must you anticipate in a world of increasing heath care costs and complexity?

6. Social Technologies
Leader's Challenge: Growing **Individual Rights/Freedoms** and **Evidence-Based Behavior.**
"Values maps, symbiont networks, and conversational web will drive learning, productivity, diversity, and activism ."
Social Freedom and Creativity. The primary wealth enabler. Why *the West (US and Europe)* will continue to drive global services and entertainment industries. Our laws and social norms are a "generation or more ahead" of the rest of the world. The great new social advances the West can gain right now are based on freedoms of *connection, information creation, digital augmentation, just-in-time education, collaboration, commerce, and specialization*.
Mental Health and Corrections. Consider what a *symbiont network (SN)* can do for a parolee. Or a schizophrenic. Scary potentials for abuse, but powerful new therapies too. Countries with corrections focused on rehab (eg., Scandinavia) will use SN's first. Both SN's and cybertwins will advise us on better ways of talking to others. Nonviolent communication.
Privacy. There are many types of legal privacy in society. They must be better protected, but *anonymity* will disappear.
Media, Entertainment, and Positive-Sum Games. *Internet TV* (millions of channels, user control of content and commercials) will be a major edutainment disruption. The telcos can delay 100Mbps, but can't stop it. MS, Apple, Google, Amazon, Facebook TV. Then Open iTV, with its ability to remix, tag, and personalize content. Many say digital media in the 1980's drove Eastern Bloc discontent with communism. Circa 2020, expect *"serious games" for education and personality assessment*. Bookstore and film, fiction vs nonfiction ratio analogy.
Values and Values-Mapped Web (Valuecosm). Increasingly, our *contacts and values* mediate consumption, entertainment, education, collaboration, political action, conflict. This "valuecosm" will greatly increase subculture diversity, connect the like-minded, and disrupt. Eg, Sweden's Pirate Party, Anonymous, other activist groups.
Books: *Privacy in Context*, 2009; *Nonzero*, 2001; *Master Switch*, 2011; *Better Angels of Our Nature*, 2011
Leadership Questions:
1. What are your social technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had much better social/networking tech?
3. What key **disruptions** or **threats** must you anticipate in a world of greater freedoms, networks, and Big Data?

7. Cognitive Technologies
Leader's Challenge: Aiding Personal and Group **Differentiation** and **Development.**
"Our symbiont networks (group "self") and cybertwin (digital "self") begin to reshape our conception of self."
Education and Specialization. Again, *specialization, free trade, automation* create wealth (Adam Smith, Hayek). Digital *"teacherless education"* will allow vast new specialization and trade. Wearables, augmented reality. Google ed. Global English. Civics. *Finland* became *#1 in OECD in STEM and Innovation*, using a 50% state-directed, 50% student-freedom model. *Free Ed. & HR platforms of 2020's,* built by business, not govt, will drive, pay for these changes. Remember 1998-1999, when an MCSE was worth more than a BS degree? That will return. Expect LinkedIn, G+, Facebook as *skill certifiers*.

Personal and Group Differentiation. Freedom, creativity, risk-taking, education, specialization all play into personal differentiation/individuation. 2020's Web helps us find our *useful uniqueness*, our "difference that makes a difference."
Personal Development, Ethics, Higher Purpose. *Metrics of individual and social progress* will become better *quantified* and *visualized*. Different groups, cultures, religions, have unique measures, yet they have many commonalities and convergences. *Technology assessment and ethics*, measuring whether tech ennobles us or debases us, become key. Consider European vs. US values toward sustainability and privacy, there is more of each in Europe, by political choice. Expect more awareness of others, planet. Sustainability, religious ecumenicalism, political moderation continue to grow.
Social and Symbiont Networks. *Symbiont Network (SN): 5-150 cognitively diverse people, intimately teleconnected 24/7,* outperforming nonsymbionts. Vast new productivity, activism. FB, Twitter, G+, Arab spring are just a warmup to SN. Folks will use SN's for entertainment, education, productivity, and activism/lobbying, regulated by both corps and government.
Human Performance and Extended Cognition. *Cybertwins*, circa 2020, are our digital agents and servants. Eventually our "digital self." Conversational web, wearables, lifelogs, quantified self will allow new levels of *evidence-based, networked, and gamified/incentivized behavior*. Our biology isn't accelerative, but our cybertwin is. Productivity of our biology and our agents together keeps us competitive, in an accelerating world. Will you run a lifelog? Will you let your cybertwin augment your conversations w/ *memeshows*? To suggest words during a "senior moment"? To *keep learning and interacting with loved ones after your death?* These will be important social choices for us, much sooner than we think.
Video: *Finland Phenomenon*, 2011. Books: *Free Culture*, 2005; *Cognitive Surplus*, 2011; *Supersizing the Mind*, Clark, 2010.
Leadership Questions:
1. What are your cognitive technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had much better cognitive technologies?
3. What key **disruptions** or **threats** must you anticipate from accelerating web education and tech augmentation?

8. Economic Technologies
Leader's Challenge: Incentivizing **Innovation** and maintaining **Moderate** (not Extreme) **Economic Inequality.**
"1995-2002, US lost 2M mfg jobs. China lost 15M jobs, to machines. Disruptive TP, not GDP, drives global economy."
West vs. the Rest. For 40 years, the US has produced ~*25% of gross world product*. This will continue for the forseeable future. The US has serious problems (governance, finances, education, workforce), but they are problems of *stagnation* (stitching sideways, relative to past growth and rise of the Rest), *not of capacity decline*. A critical difference. Our *relative* share of capital markets will decline, but the absolute wealth, culture, and innovation of the West (US 1st, Europe 2nd) remains the aspiration of the world, and global tech productivity will hit astounding new levels in coming decades.
Moderate Economic Inequality/Incentives. When there's *too little income and asset inquality*, there is no innovation incentive (Socialism, Communism). When there's *too much*, top players capture markets and governments, rewrite the rules ("Crony Capitalism"), middle class electorate becomes undereducated and unproductive, votes its government into insolvency ("Idiocracy"). We need fair tax law, biz law, antitrust, policy, institutional *pluralism* to avoid this (Acemoglu).
Productivity, Collaboration and Employment. *Technical productivity (TP) underlies all GDP.* In turn, our STEM/technical abilities and infrastructure underlie all TP. Online education, physical and virtual immigration will keep STEM and TP strong. Github. oDesk. Wikinomics. DIY and open source culture. *Tech-caused unemployment* will continue to disrupt. Education *must* adjust to this, support a *perennial startup culture*. Expect smart global HR platforms, 2020 and beyond.
Finance, Entrepreneurship and Innovation. *Financial innovation* always leads TP, AI and value creation. Trillions of dollars daily in in foreign exchange, but *regulation remains lax*, as we saw in the Global Financial Crisis. *Small business support also lags*, and is critical to technical productivity. Accelerators, Seed Funders, Crowdfunding (Kickstarter, J.O.B.S. bill) are among the best new financial innovations. These are analogous to Credit and Mortgages of 1940's-60's, VC's of 1980's-90's. Entre- and intrapreneurship need not just funding but freedom, problem awareness, incentives, passion, purpose.
Development, Economic Freedom, Tech Disruption. Development brings both freedom and security, after a predictable period of *initial new instability* (see *J-Curve*, Bremmer). Core vs. Gap development choice. 18% of world lives in extreme poverty ($1.25/day) today. At current development rates this will be *<5% by 2035*. TP is job disruptor and wealth creator. Books: *Revolutionary Wealth*, Toffler, 2007, *Immigrant, Inc.*, Herman, 2009; *The Great Divergence*, Noah, 2012.
Leadership Questions:
1. What are your economic technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had a better financed department, and better financial planning, budgeting, and cost accounting systems?
3. What key **disruptions** or **threats** must you anticipate from accelerating wealth, deregulation, and globalization?

9. Political Technologies
Leader's Challenge: Balancing **Plutocratic and Democratic Control**, growing **Pluralism** and **Globalism.**
"Plutocracy and democracy are on a pendulum. We need both. Network tech will swing us back toward democracy."
Military Power. Classic issues of force development, management, deployment. New Scenarios: Peer China, Resurgent Russia, Failing States, Recurrent Nationalism/Fundamentalism, Counterinsurgency, Terrorism, Transnational Crime.
Political Freedom and Representation. Levels of institutional and political *pluralism* (competitiveness) must be kept high (Acemoglu). Post 2020, social networks and *lobbytwins* will likely bring much greater *participatory/inititive politics, mass actions, reform*. Developing nations will push through J-curve of initial instability to security via reciprocal transparency.
Globalism, Openness, and Power Politics. Vision, comparative political science, competitive intelligence, rulesets, policy flexibility are leadership assets. US must maintain strength on multilateral issues (nonproliferation, state aggression, terrorism, civilian rights) and perception of fairness (e.g., agreed criteria for drones and transnational security ops). Democracy must be championed to limit opportunistic autocratic actors (Russia, China, Saudi Arabia, Small States).
Laws, Justice, Corruption. The better the web can visualize and benchmark performance of key actors, the more overlap of services, and the more the client public can *give feedback* and *steer resources* to favored actors, the easier it is to control corruption (Klitgaard). Empowered prosecutors can eliminate mid-level corruption (*The Singapore Story*)
Social Services, Fiscal Policy, and Debt. US has a large (bloated) social safety net, with low personal responsibility. We've had poor fiscal policy (no countercyclical saving). Federal debt is nearly in runaway. We'll have to *keep devaluing to avoid default*. Strengthening our alliances and agreements will be key, as this problem is faced by most of the developed world.
Books: *Pentagon's New Map*, 2004; *The J-Curve*, 2007; *Future of Power*, Nye, 2011; *Why Nations Fail*, Acemoglu, 2012
Leadership Questions:
1. What are your political technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had better political relationships with key partners in other departments, government, media, and the public? How can you build those relationships?
3. What key **disruptions** or **threats** must you anticipate from increasing pluralism, competitiveness and globalism?

10. Security Technologies
Leader's Challenge: Growing Local, Nat'l, Global **Transparency** and **Resiliency**, **Bottom-Up** far over Top-Down**.**
"Good security is like an immune system. Redundancy, transparency, memory, fast learning, proportionate response."
Reciprocal Transparency and Intelligence. Reciprocal transparency and intel involve a mix of *top-down, centralized intel, sensors, drones ("surveillance")*, and *bottom-up, decentralized intel ("sousveillance").* As we move to internet of things, *souveillance grows fastest*. Improving *both* creates the best foresight, predictive analytics, scenarios, and simulations.
Immunity, Decentralization, and Resilience. Security can be done in a *top-down, centralized way* (think DHS) or a *bottom-up, decentralized way*, empowering each state, county, city, and public (cultivation of confidential informants) to fish for their own terrorists, build their own immune systems, learn from each other. We need both, but empowering the bottom-up approach delivers a far more proportional, swarm-like response, creates more useful variety, and is *more resilient*. This is true for the tech too. Think of the 'spiderbots' in *Minority Report*. Sensors, DRACO, quarantines, vaccines for bioterrorism. Create speedbumps for AVLIS, bioweapons, IEDs. Artificial immune systems, network transparency, "fireman's keys" for autonomous systems. Reciprocal transparency and symbiont networks are both critical to managing coming *superempowered individuals*.
Physical Security, Networks, and Openness. Physical security, dashboards, scopes, sensors, maps, biometrics, networked SALWs, networked LWs and Less-Lethal W's, arms control, nuclear nonprolif. Riding the J-Curve of openness.
Cybersecurity and Simulations. Digital transparency, big data, next gen internet, local guarding, secure digital ID, *end of anonymity and darknets,* telepresence. Internat'l consortia of blue and red teams in classified world simulations, trying to break and protect security. These will be major activities of the soldiers and DoD of 2020: *"Global Security Games".*
Machine Ethics and Autonomy. Drones and robots need *world models, ethical architecture (Ron Arkin).* We'll use artificial selection on evolutionary robots, just like domestic animals. Teleop hub and spoke will give way to autonomous swarm.
Books: *The Transparent Society*, Brin, 1998; *Wired for War*, Singer, 2009; *Moral Machines*, Allen & Wallach, 2010
Leadership Questions:
1. What are your security technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What **problems** could be addressed and **opportunities** taken if you had much better and more resilient departmental and public security technologies? How can you grow organizational and public transparency?
3. What key **disruptions** or **threats** must you anticipate from greater local, regional, national and global transparency, and efforts to avoid transparency?