

## Strategic Lookahead in Technological Change

This brief outlines eight competencies of **Adaptive Leadership**, and looks out **three to twenty years** in **ten areas of technological change**, a strategic horizon for senior leaders. See [links](#) to “look inside” rec’d books. I’ve tried to state my **biases and assumptions** when relevant. You may have different biases and assumptions. This brief is guaranteed incomplete and wrong in many parts, but I hope it sparks useful **discussion**. Have **disagreements or questions**? Let’s discuss in seminar. Each area includes a few **leadership questions**. How can you lead your team in use of these ten technology areas to better solve your current and coming problems? Please consider me a technology foresight and leadership resource. It is an honor to serve you.

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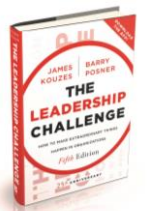
## I. Adaptive Leadership: Eight Competencies of the Learn-See-Do-Review (LSDR) Cycle

### Learn

1. **Learning**, Training, Scanning, Metrics, Intelligence, Research – “Knowing Your History”  
[Building the Learning Org](#), 2011. [Hard Facts, Half-Truths, and Total Nonsense](#), 2006.

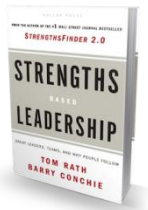
### See (Foresight)

2. **Anticipation**, Forecasting, Risk Mgmt, Law & Security - **Probable Foresight** (“Convergent Thinking”)  
[Forecasting Disruptive Technologies](#), 2010. [Global Trends 2030](#), 2012. [Analyzing Intelligence](#), 2008.
3. **Innovation**, Ideation, Initiative, Entrepreneurship - **Possible Foresight** (“Divergent Thinking”)  
[Adaption-Innovation](#), 2003. [The Innovator’s DNA](#), 2011. [Arms and Innovation](#), 2008.
4. **Strategy**, Visioning, Decision Support, Planning - **Preferable Foresight** (“Adaptive Thinking”)  
[It’s Your Ship](#), 2012. [Turn the Ship Around!](#), 2012. [Fast Strategy](#), 2008; [Adaptive Leadership Handbook](#), 2013



### Do

5. **Execution**, Operations, Sourcing, IT, Knowledge Mgmt – (**Product**) “Getting Somewhere”  
[Strengths-Based Leadership](#), 2009. [Be Excellent at Anything](#), 2004. [The Leadership Challenge](#), 2012
6. **Influence**, Credibility, Sales, Marketing, CRM – (**Market**) “Getting There With Others”  
[Influence](#), 2006. [Senior Leadership Teams](#), 2008. [Leading Change](#), 1996.
7. **Relating**, Empathy, Ethics, HR, Perf. Mgmt, Culture – (**Team**) “Keeping Others On Your Team”  
[Strengths Finder 2.0](#), 2007. [Servant Leadership](#), 2012. [12: The Elements of Great Managing](#), 2006.



### Review (Aftsight)

8. **Reviewing**, Critiquing, Testing, Quality, Unlearning, Adjusting – “Staying On Target”  
[Balanced Scorecard Strategy](#), 2007. [How to Measure Anything](#), 2010. [Higher Unlearning](#), 2011.

## 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 key **disruptions** or **threats** must you anticipate in a world of accelerating IT performance?
3. 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?

## **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.

**Nanoenergetics, Fission and Fusion.** Nanoenergetics in explosives. Fission gives  $10^3X$  more E per mass vs. chemistry. Fusion  $10^3X$  vs. fission. We’ve grown fusion output  $10^{12}X$  since 1970. Expect first comm. reactor (ITER Demo) 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 engrg 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; [Nano-Hype](#), Berube, 2005, [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 key **disruptions** or **threats** must you anticipate in a world of accelerating miniaturization and nanotech?
3. 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. 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. Filling station and home NG compressors will grow. 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, nuclear have 10% niches. Solar and artificial

photosynthesis long term. Just 1/10,000<sup>th</sup> of solar flux is our *entire* global energy use. Post 2030, Fusion could play a role.

**Water.** 1 billion 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. CO2 will saturate as well beginning mid-century, as carbon capture and next gen energy emerge. 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 et al, 2012; [Power Hungry](#), Bryce, 2011; [Skeptical Environmentalist](#), Lomborg, 2011.

#### Leadership Questions:

1. What are your critical resource research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What key **disruptions** or **threats** must you anticipate in a world of regular critical resource shortages?
3. What **problems** could be addressed and **opportunities** taken if you had more resources and sustainability?

## 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 sustainability initiatives, which get increasingly intelligent.

**Greentech and Pollution.** Greentech is growing, but slowly. Carbon capture tech (Skyonic, C12, Calera) will soon rescue (decarbonize) coal, which will grow from 27% today to 30% of energy in 2030. Carbon taxes will win over carbon markets. **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 "reshored" factories 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 key **disruptions** or **threats** must you anticipate in a world of increasing urbanization and maker abilities?
3. What **problems** could be addressed and **opportunities** taken with better engineering innovation capabilities?

## 5. Cognitive Technologies

### Leader's Challenge: Aiding Personal and Group Differentiation and Development.

**"Groupnets (group "self"), cybertwins (digital "self"), and smart environments reshape our conception of self."**

**Individuation/Initiative and Smart Environments.** Freedom-, risk-, and learning-permissive culture key to individuation. 2020's Semantic Web (smart environment) helps us find our *useful uniqueness*, our "difference that makes a difference."

**Education and Specialization.** Again, *specialization, trade, automation* make wealth (Adam Smith, Hayek). 24/7 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 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 Networks and Groupnets.** *Groupnets (GNs): 5-150 cognitively diverse people, intimately teleconnected 24/7*, outperforming the ungrouped. Vast new productivity, activism. FB, Twitter, G+, Arab spring just a warmup to GNs. Folks will use GNs for entertainment, education, productivity, and activism/lobbying, regulated by both corps and government.

**Human Performance and Cognition.** *Cybertwins ("Twins")*, 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 Twin 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 Twin 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; [Subliminal](#), Mlodinow, 2013.

### Leadership Questions:

1. What are your cognitive technologies research, acquisition, R&D, hiring, training, measuring, & mgmt strategies?
2. What key **disruptions** or **threats** must you anticipate from accelerating web education and tech augmentation?
3. What **problems** could be addressed and **opportunities** taken if you had much better cognitive technologies?

## 6. Social Technologies

### Leader's Challenge: Growing Individual Rights/Freedoms and Evidence-Based Behavior.

**"Values maps, groupnets, 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 groupnet (GN) 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 GN's first. Both GN's and Twins 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: [Nonzero](#), 2001; [Master Switch](#), 2011; [Better Angels of Our Nature](#), 2011, [The Measure of Civilization](#), 2013.

#### Leadership Questions:

1. What are your social technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What key **disruptions** or **threats** must you anticipate in a world of greater freedoms, networks, and Big Data?
3. What **problems** could be addressed and **opportunities** taken if you had much better social/networking tech?

## 7. 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, wellness groupnets, 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.*

**Molecular Med, Big Pharma and Enhancement.** Drugs are huge business. Usually marginal physiologic but great psychologic value. 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 key **disruptions** or **threats** must you anticipate in a world of increasing health care costs and complexity?
3. What **problems** could be addressed and **opportunities** taken if you had much better health care programs

## 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 foreseeable 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 1<sup>st</sup>, Europe 2<sup>nd</sup>) 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 inequality, 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 key **disruptions** or **threats** must you anticipate from accelerating wealth, deregulation, and globalization?
3. What **problems** could be addressed and **opportunities** taken if you had a better financed department, and better financial planning, budgeting, and cost accounting systems?

## **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/initiative 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 key **disruptions** or **threats** must you anticipate from increasing pluralism, competitiveness and globalism?
3. 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?

## **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*. 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 groupnets needed to manage 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 & 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](#), 1998; [Privacy in Context](#), 2009; [Wired for War](#), 2009; [Antifragile](#), 2012.

**Leadership Questions:**

1. What are your security technologies research, acquisition, R&D, hiring, training, measuring, & mgmt **strategies**?
2. What key **disruptions** or **threats** must you anticipate from greater local, regional, national and global transparency, and efforts to avoid transparency?
3. 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?