ASU COMPLEX ADAPTIVE SYSTEMS INITIATIVE
ARIZONA STATE UNIVERSITY

Innovation Demands Boldness: Meeting Global Challenges of Escalating Complexity

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The Wiseguise Luncheon Discussion Group
Scottsdale, Arizona • 28 January 2011

Slides Available @
http://www.casi.asu.edu/

"Terrific and inspiring stories about the dreamers and doers who dared to create the modern face of this great nation." — JACK WELCH

From the Steam Engine to the Search Engine: Two Centuries of Innovators

They Made America

Harold Evans

author of *The American Century*

with Gail Buckland and David Lefer

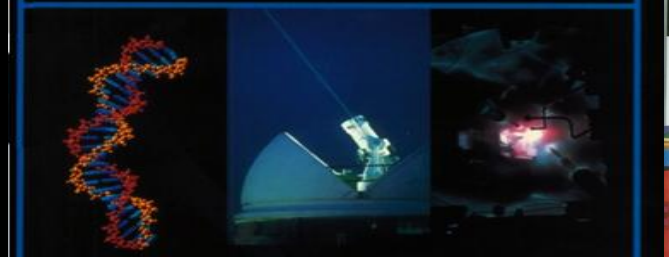
THE NOBEL CENTURY

A CHRONICLE OF GENIUS

INTRODUCTION BY ASA BRIGGS

SCIENCE

A HISTORY OF DISCOVERY IN THE TWENTIETH CENTURY



TREVOR I. WILLIAMS

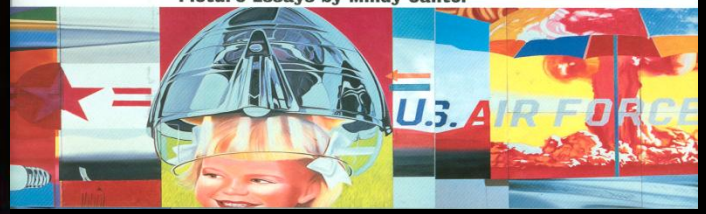
THE AMERICAN CENTURY

Varieties of Culture in Modern Times

Norman F. Cantor

Author of *The Civilization of the Middle Ages* and *The Sacred Chain*

Picture Essays by Mindy Cantor



Optimism and Progress: A Core Element of US Culture

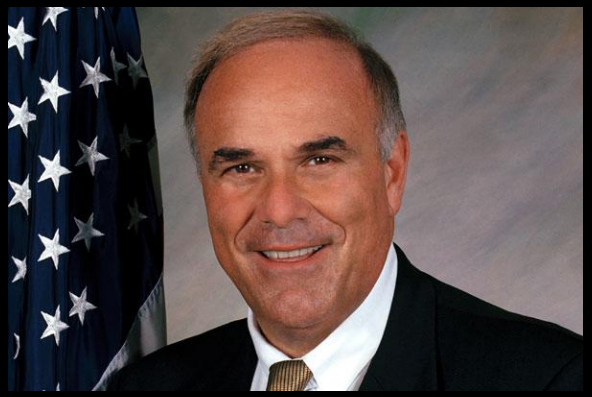
American Progress: Manifest Destiny
by John Gast (1872)

- "A New Order of the Ages"
- unfinished pyramid as symbol that US will always grow, improve and build

"…..banking establishments
are more dangerous than standing armies,
and the principle of spending money
to be paid out by posterity
…..is but swindling futurity
on a larger scale"

"Manufactures are now as necessary
to our independence
as to our comfort."

Thomas Jefferson



Hon. E. Rendell
Governor,
Commonwealth
of Pennsylvania

“We used to be a country that built things.
and not just infrastructure.
If our economy is solely based on services,
I think we’re finished as an economic power.”

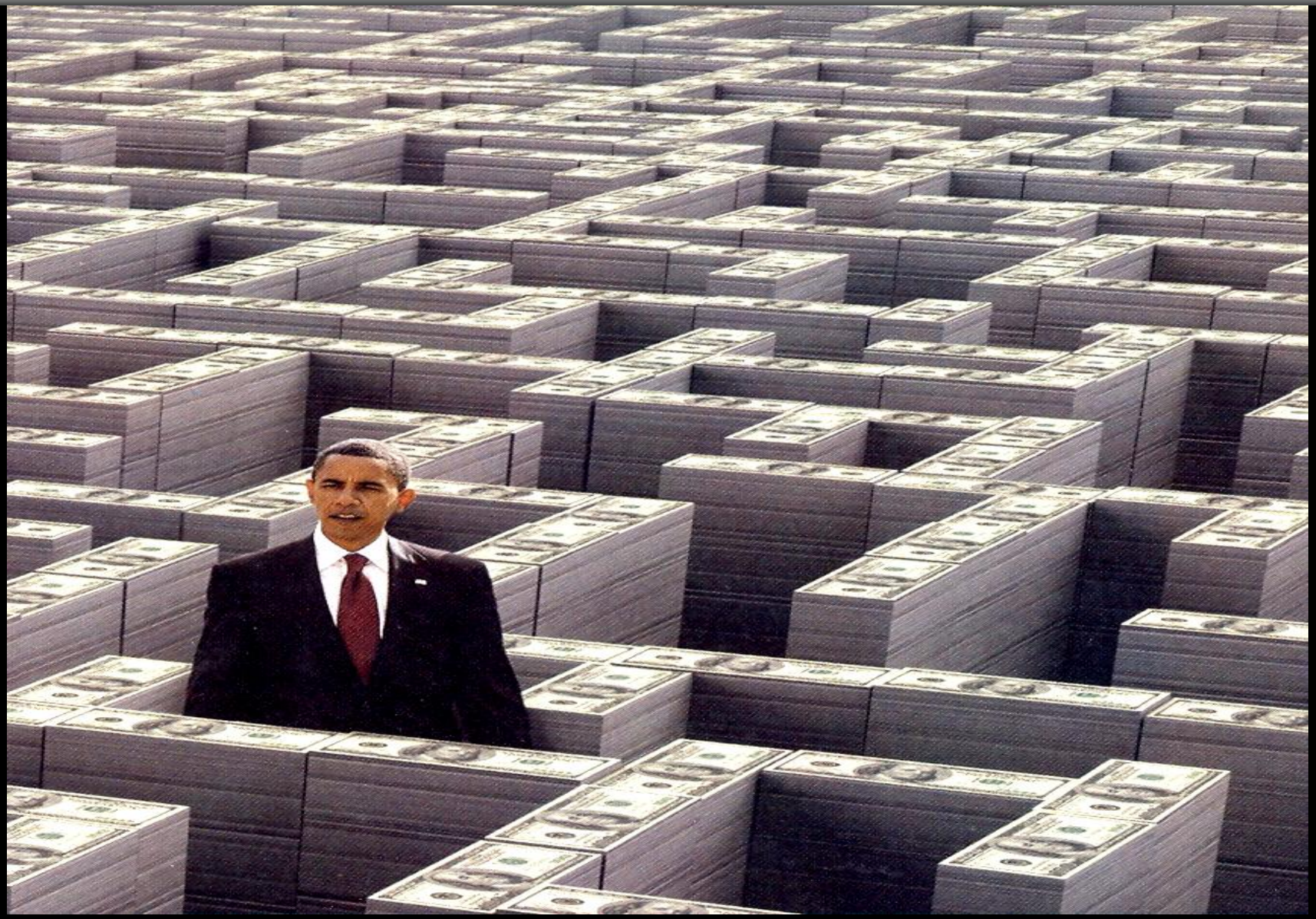
US Services and Manufacturing 2000-2009

- financial services expanded from 10 to 45% of the earnings of the S&P 500 in 2009
- in 2000 high-technology products generated positive trade balance but a $50 billion deficit in 2007
- 47% of revenue for US S&P countries now earned overseas
- the equity cult: from 1952 to 2006 US pension funds increased equity weightings from 17% to 69%
- $249 billion net loss in US stock-based mutual funds since 2007

Systemic Risk

- delusional faith in unfettered markets and global free trade
  - transactional and short term focus
- replacement of domestic manufacturing base with service industries
- off-shoring of high-value design and engineering may follow manufacturing
- “bread and circuses”: rampant consumerism, political populism and quick fixes
- trade imbalance, deficits and unsustainable debt
- ad hoc and conflicting economic, political and regulatory policies
- decline of the national innovation ecosystem?

“Suppose the US Treasury Held an Auction and No One Came”



Where the Jobs Aren't and Won't Be! Time 17 January 2011

- historical rises in unemployment largely cyclical
- political unwillingness to confront the problem that unemployment may now be a deeper, structural problem is a greater threat to prosperity than high unemployment itself
- impact of globalization and technology
  - hyperefficiencies and domestic workforce
- repeated stimulus(i)/QE(s) and endless extensions of temporary benefits will not resolve the problem
- "he-cession": males represent 60% of long-term unemployed
- the education premium
- focus on new economy with cutting edge technologies infrastructure and education

The McGraw-Hill Companies

JUNE 15, 2009 | BUSINESSWEEK.COM

WAL-MART'S MOMENT | THE NEW FACE OF FORECLOSURE

BusinessWeek

PLUS
CLOUD COMPUTING 2.0

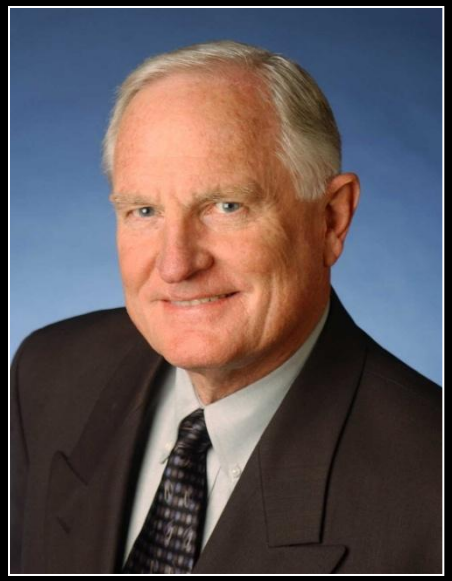
INNOVATION, INTERRUPTED

How America's failure to capitalize on innovation hurt the economy—and what happens next

BY MICHAEL MANDEL

From Small-Time to Prime-Time: Companies with #1 Global Market Share

Company	Industry	Country
SAMSUNG	flash memories, hard disks, flat screen monitors	South Korea
ARACRUZ	market pulp for paper products	Brazil
sasol reaching new frontiers	synthetic fuels	South Africa
tsmc	logic semiconductors	Taiwan
misc MISC BERHAD	liquefied natural gas shipping	Malaysia
GAZPROM	natural gas	Russia
Tenaris Tubular technologies. Innovative services.	oil pipes	Argentina



“Intel can move wherever it must to thrive
but I sometimes wonder
how my grandchildren
will earn a living”

Dr. Craig Barrett
Former Chairman, Intel

Intel Investment in PRC Fabrication Facility

"Intel's goal is to support a transition from manufactured in China to innovated in China"

Remarks by Paul Otellini CEO, Intel at celebration to launch the initiative. Great Hall, Bejing

- **investment will generate additional $1 billion in profits over 10 years versus operating same facility in US**

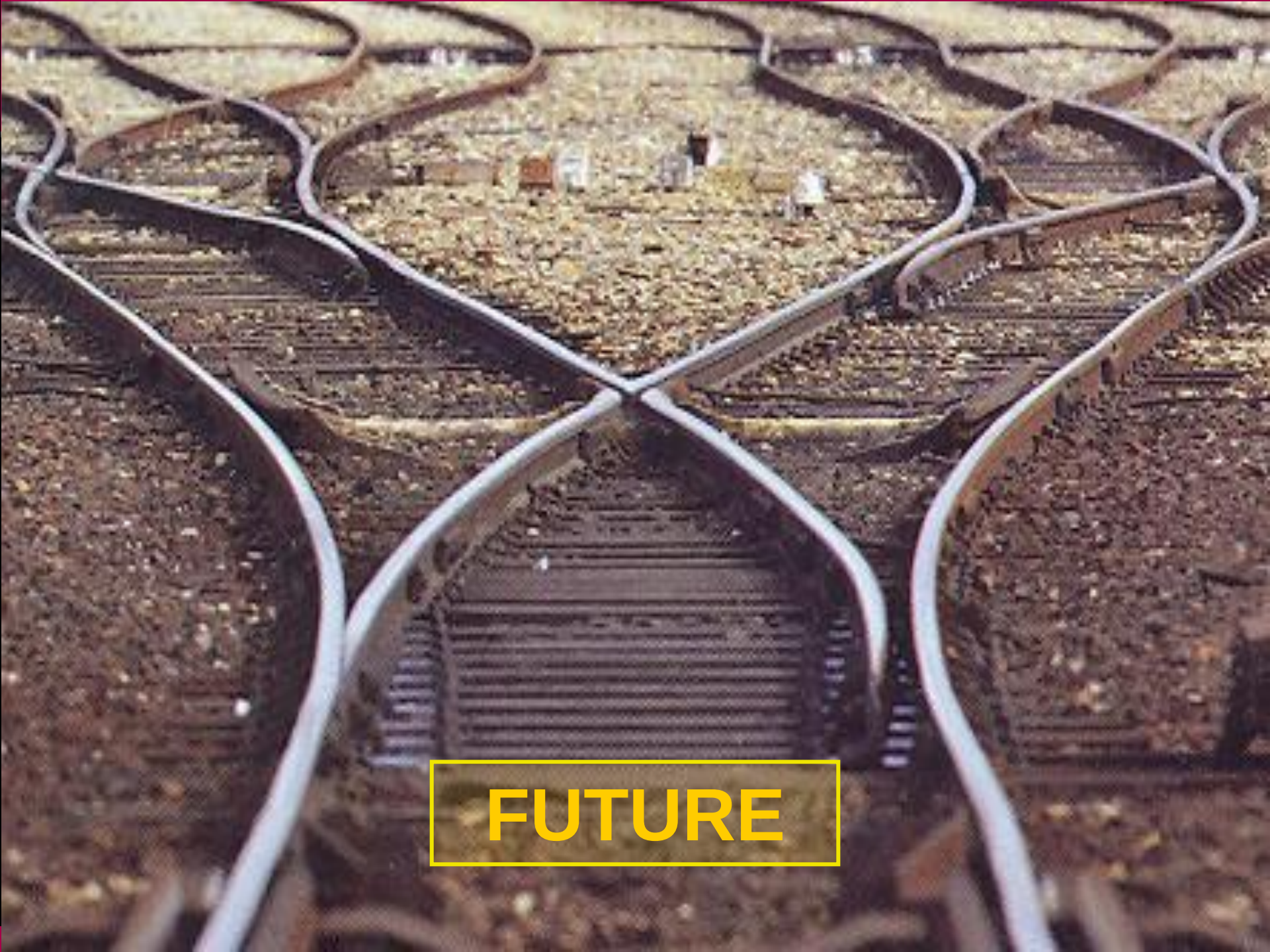
21st Century Dung

- US exports of scrap metal and waste exports to China in 2008 of $7.6 billion
- exceeds exports of next three strongest categories
  - semiconductors, aircraft and parts, oil seeds and grain
- US trade deficit with China
  - $250 billion (with $100 billion in high-tech goods)
  - computer equipment now China's biggest export to US ($46 billion)

Vulnerability of Global, National and Local Supply Chains in a Major Epidemic/Pandemic

Medicines

- "just-in-time" supply networks
  - major hospitals 2/3 deliveries per day
- majority of drug intermediates, excipients and final products sourced off-shore
- 95% generic drugs used in US (64% of total Rx) are made off-shore, primarily in PRC and India
- no national stockpile for routine prescriptions

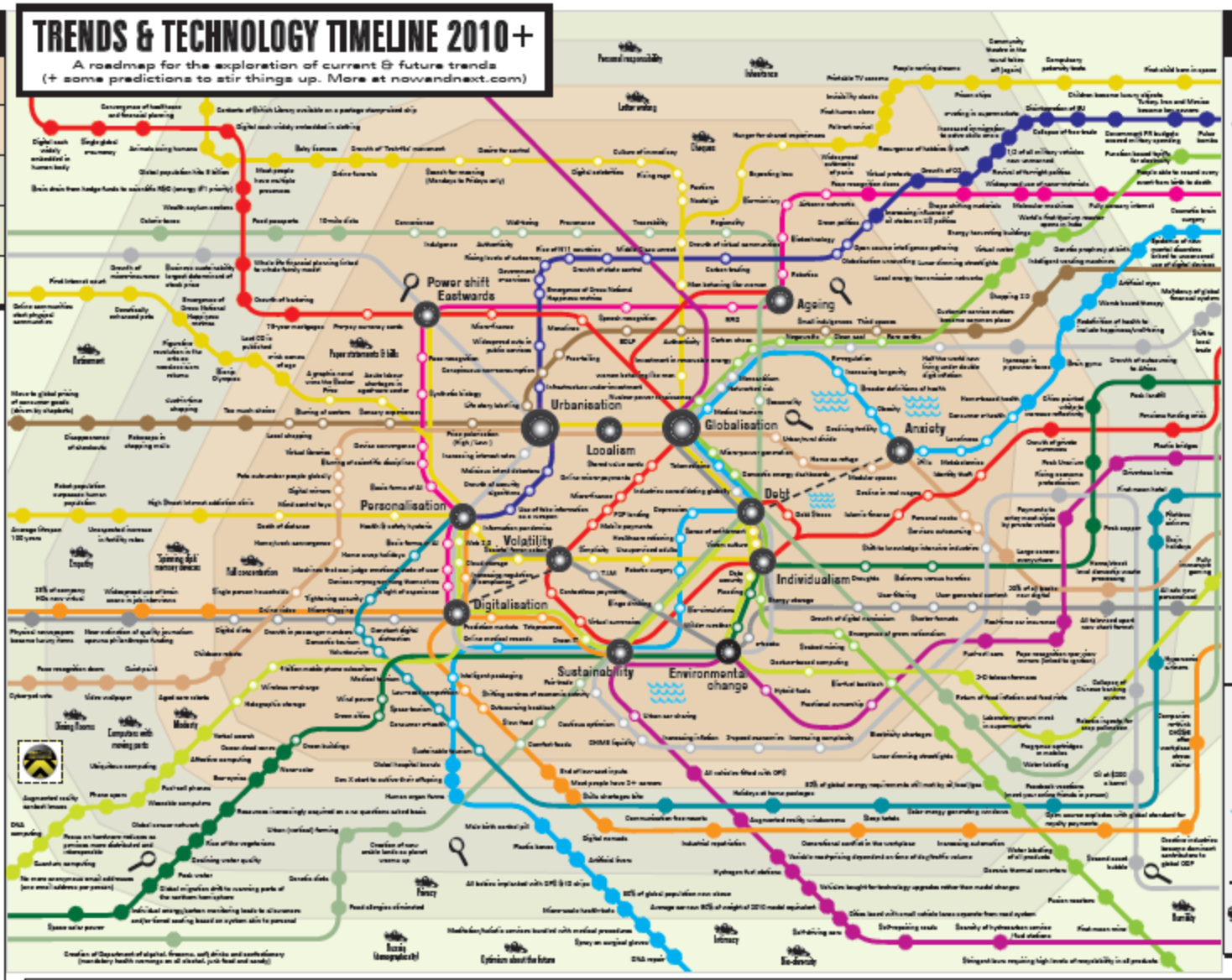

FUTURE

Disruptive Innovations

- non-linear and radical shifts in technology trajectories that replace the status quo
  - products and/or services
  - processes: reduced time and cost
- Schumpeterian ‘creative destruction’
  - a.k.a. dislocation, discontinuity, tipping points, inflection, ‘Black Swans’
- new value proposition rarely sensed and often rejected by current KOLs/companies/financial markets
- typically arise at margins of existing domains or at the convergent interstices between previously separate domains

TRENDS & TECHNOLOGY TIMELINE 2010+

A roadmap for the exploration of current & future trends
(+ some predictions to stir things up. More at nowandnext.com)



TIME ZONES

- ZONE 1: 2010-2015
- ZONE 2: 2015-2020
- ZONE 3: 2020-2025
- ZONE 4: 2025-2035
- ZONE 5: 2035-2050

Notes on time travel

This map is a broad representation of some of the trends and technologies currently visible. Improvement works are carried out at weekends and travellers should check to see whether lines are still operable before commencing any journeys. Helpful suggestions concerning new routes and excursions are always welcome.

If you wish to travel outside of Zone 1 you are advised to bring comfy shoes and a camera. Travellers are also advised to bring their own supplies of food and water although weapons are unnecessary if you keep to well trodden paths. Also note that travel into Zone 5 is not available for people aged over 75 years of age.

A3 and A2 Prints of this map

Full colour prints of this map are available to anyone that asks nicely. A small charge is levied to cover print and postage costs only. Contact richard@nowandnext.com stating whether you'd like A3 or A2 size and saying which country the map is to be delivered to. Delivery is available to anywhere in the world. Alternatively, just print this out yourself (40 minute recommended)

Sourced

Material for this map has been sourced from a number of publications including Future Files and What's Next

www.futuretrendsbook.com

What's Next
www.nowandnext.com

Acknowledgements

This map was conceived and created by Richard Watson at Nowandnext.com with some help from Benjamin Hirzer at Stop. Also thanks to Oliver Freeman, Mike Jackson and Scott Martin.

LEGEND

1. Society & Culture
2. Geopolitics
3. Energy & raw materials
4. Science & technology
5. Healthcare & Medicine
6. Retail & leisure
7. The Economy
8. Financial services
9. Environment & Climate
10. Food & drink
11. Transport
12. Travel & tourism
13. Home & family
14. IT & telecomms
15. News & Media
16. Work & Business

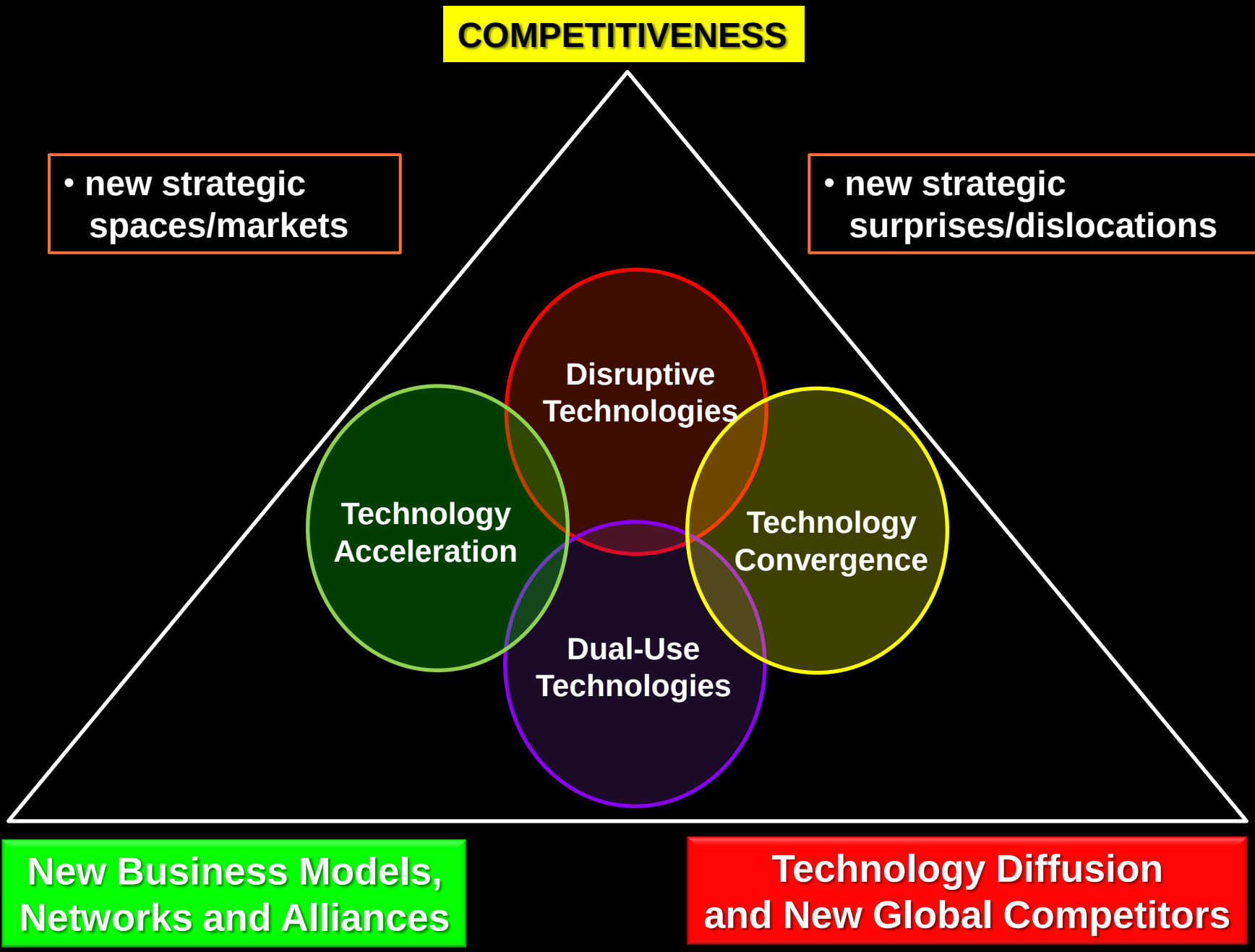
- Mega trend
- Trend
- Prediction
- Dangerous currents
- Poor visibility
- High-speed link
- Partial ruin

Global risks*

*Low probability/high impact events that could develop off the above timelines and predictions

- Commodity price spikes
- Raw materials shortages
- Mass migration of population
- Nuclear terrorism
- Internet brownouts
- Electricity shortages
- Rapid increase in cyber crime
- Critical infrastructure attack
- Rogue stakeholder
- WMD Proliferation
- Green energy bubble
- Genetic terrorism
- Collapse of US dollar
- Global supply chain disruption
- Terrorist attack on urban water supply
- US/China conflict
- Israel/Iran conflict
- Bisphenol A link to cancer
- Geographical expansion of Russia
- Major earthquake in mega city
- Global pandemic
- Conflict with North Korea
- Political disintegration of Saudi Arabia
- Systemic failure of financial system
- Fundamentalist takeover in Pakistan
- Middle class revolution
- Collapse of China
- Mobile phone link to cancer
- Credit Default Swaps
- Rogue asteroid
- Major nano-tech accident
- Space weather disruption to comms
- Aliens visit earth
- Return of the Messiah
- People taking trend maps too seriously

The Strategic Environment for Technology



A Strategy for Science & Technology
Soundbite or True Strategic Inflection?

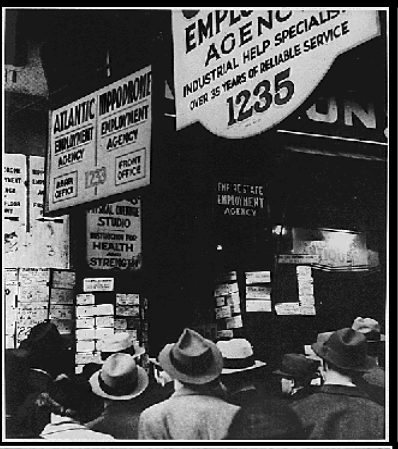
"We need to out-innovate, out-educate and out-build the rest of the world."

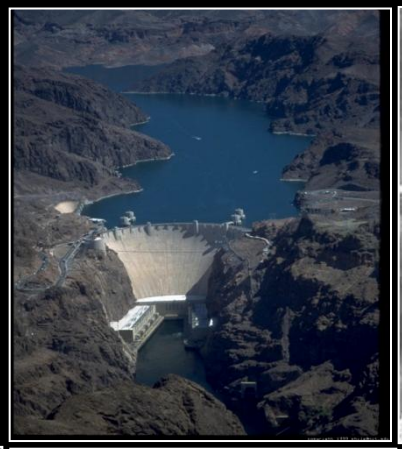
"This is our generation's Sputnik moment."

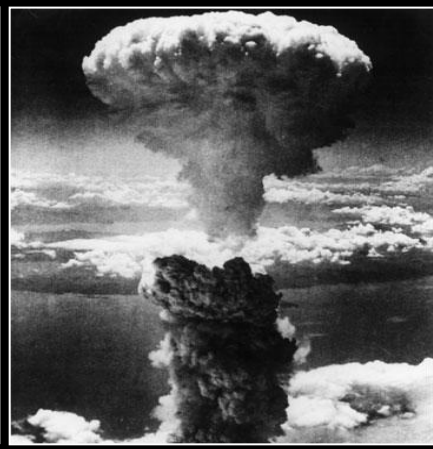
"We need to celebrate not just the Superbowl winners but our scientists."

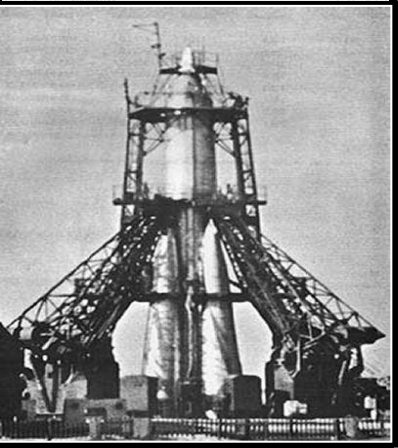
State of the Union Message
January 25, 2011

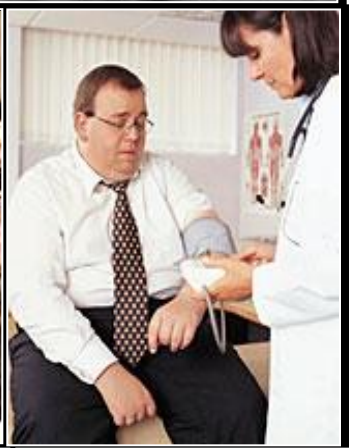
Meeting Previous Grand Challenges

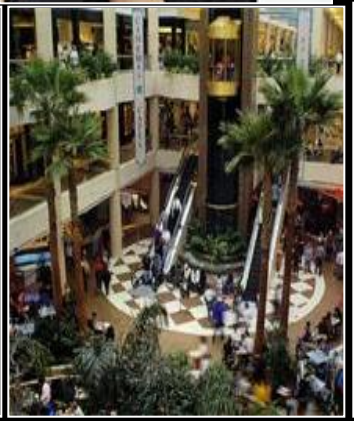






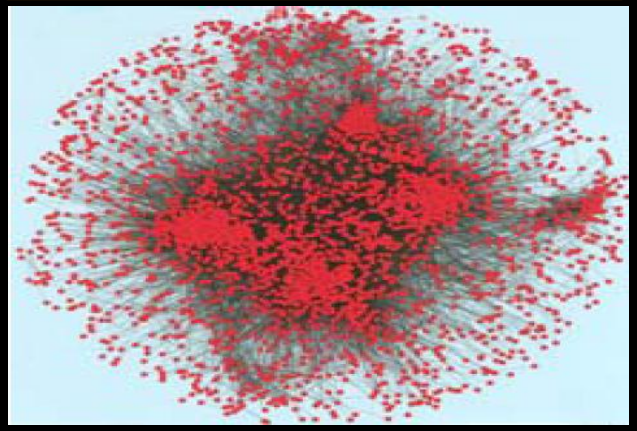




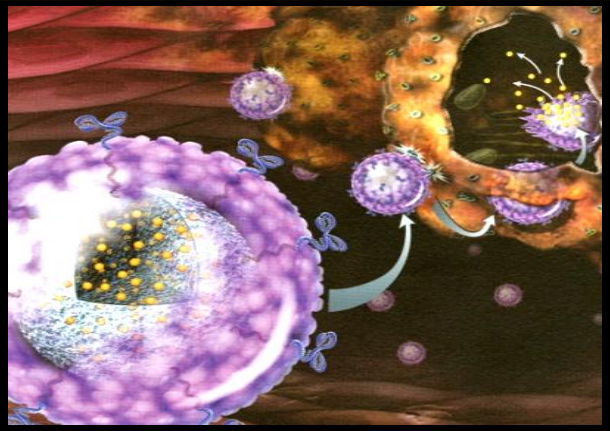


Transcending Boundaries: Emergent Domains Arising from Technology Convergence

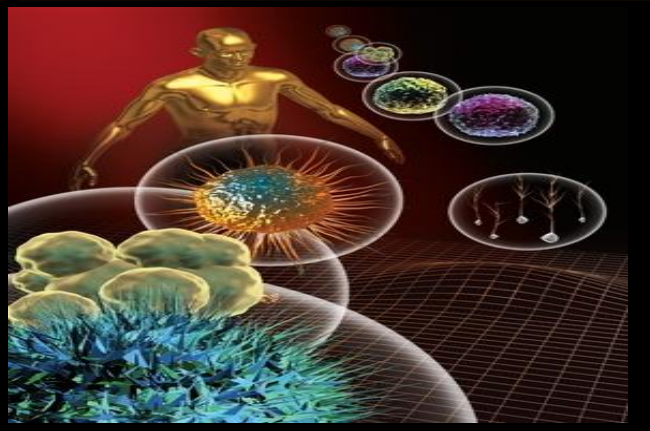
Systems and Synthetic Biology



Targeted Rx and Gene Controls



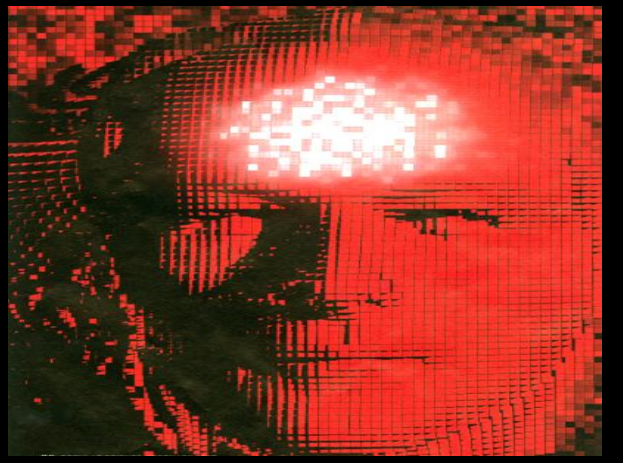
Regenerative Medicine

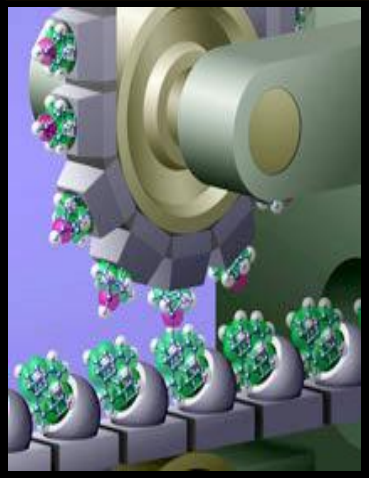
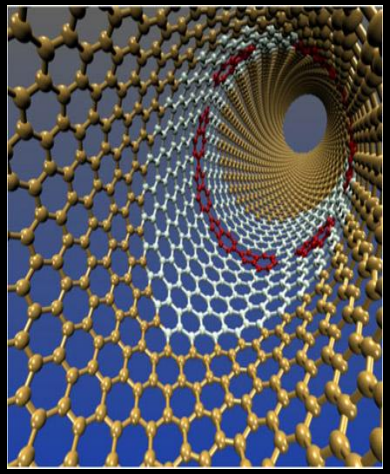
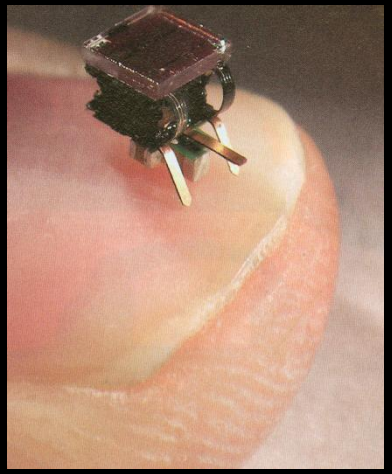
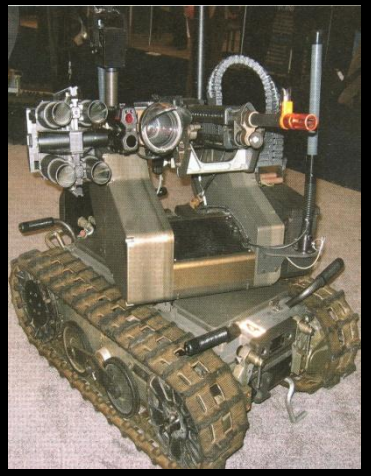


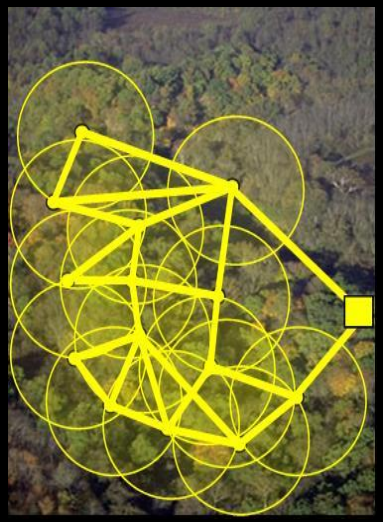
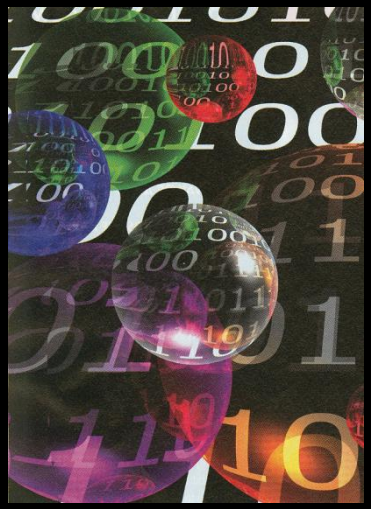
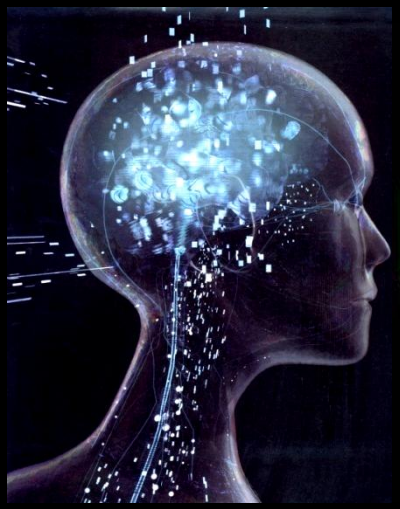
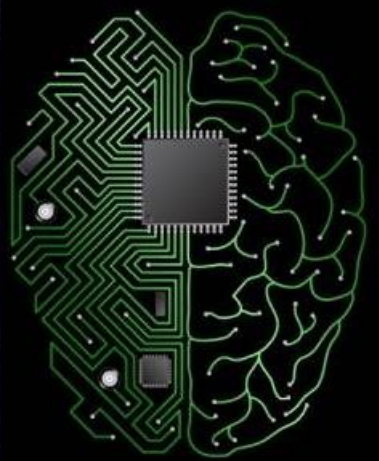
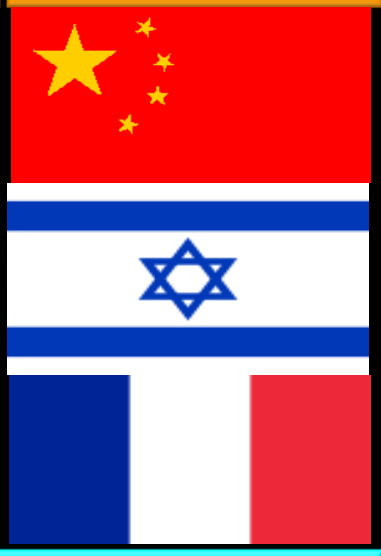
Bio-Enhancement

Bionic-Enhancement

Cognitive Enhancement

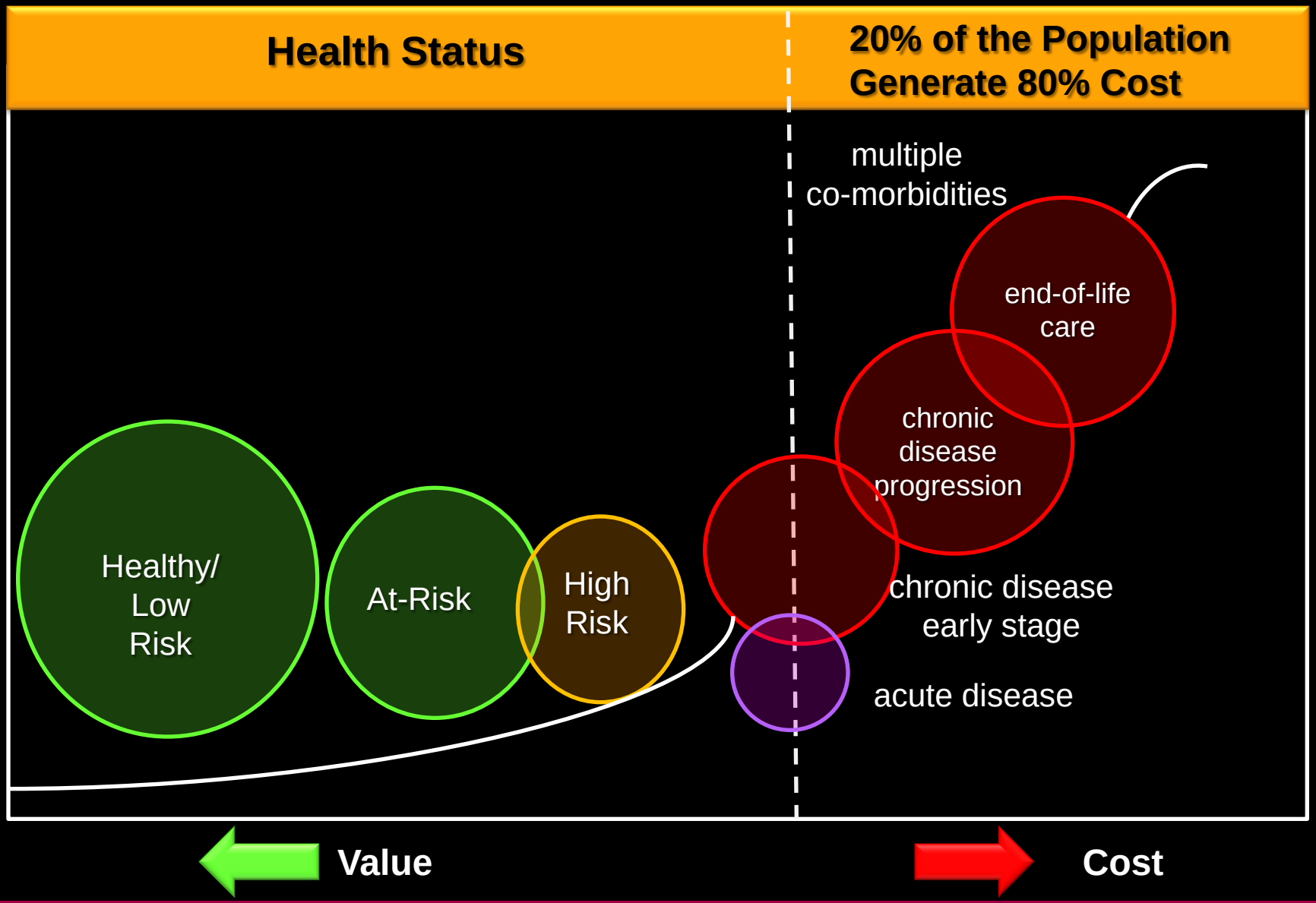


Molecular Foundries	Novel Materials	Micro-Devices	Ubiquitous Sensing	Robotics
				

Ambient Intelligence	Digital Cultures	Cogint	Intelligent Machines	Competition and Espionage
				

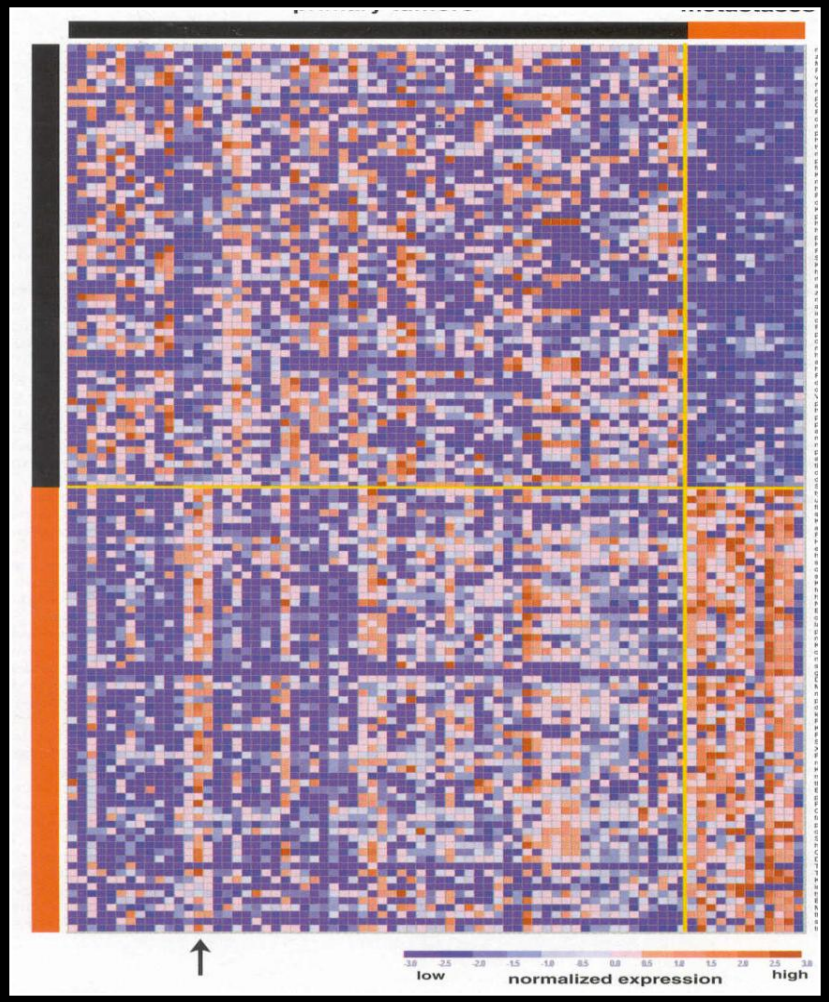
Massive Computing Power and Analytical Parsing

The Economic, Social and Clinical Benefits of Proactive Mitigation of Disease Risk and Chronic Disease Co-Morbidities



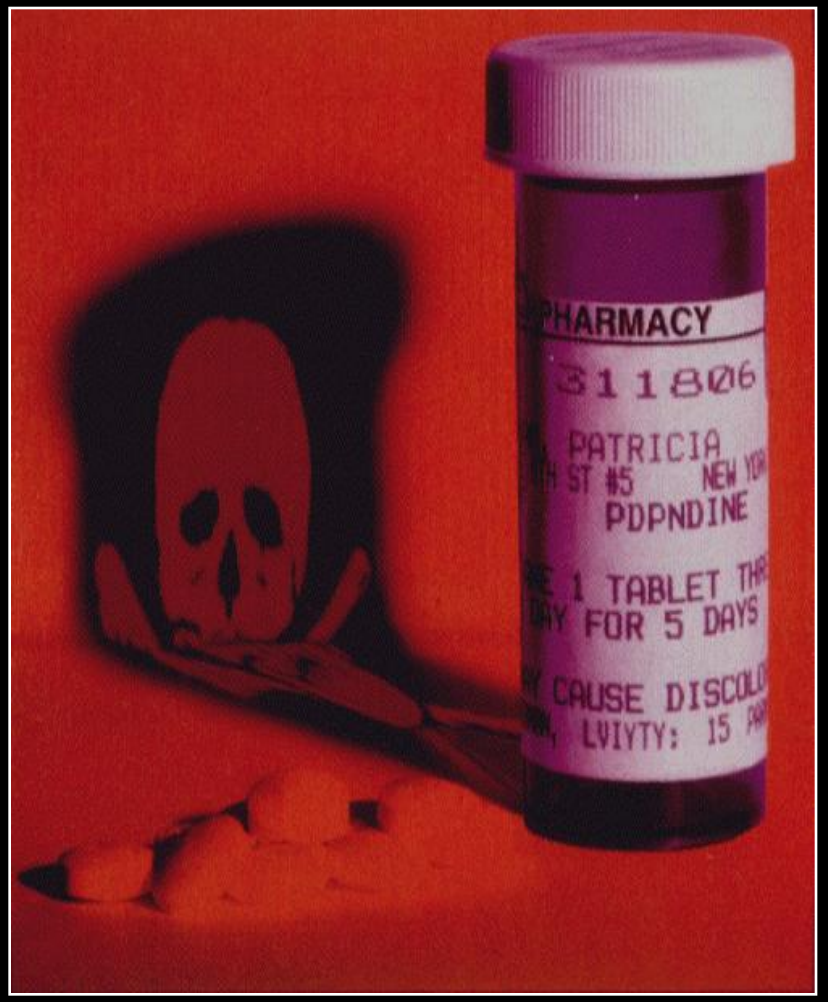
From Pharmaceuticals to Pharmasuitables

Disease Subtyping:



Right Rx for Right Disease

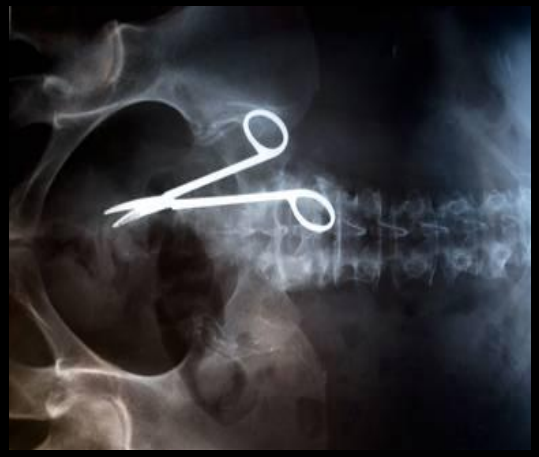
Individual Variation and AE risk



Right Rx for Right Patient

Tracking and Mitigating The Major Cost of Inefficiencies in Healthcare

Overt Error | **Non-Compliance** | **Adverse Rx Events**



Hospital-Acquired Infections | **Cost of Hospital Re-admissions** | **Inaccurate, Inaccessible or Ignored Information**

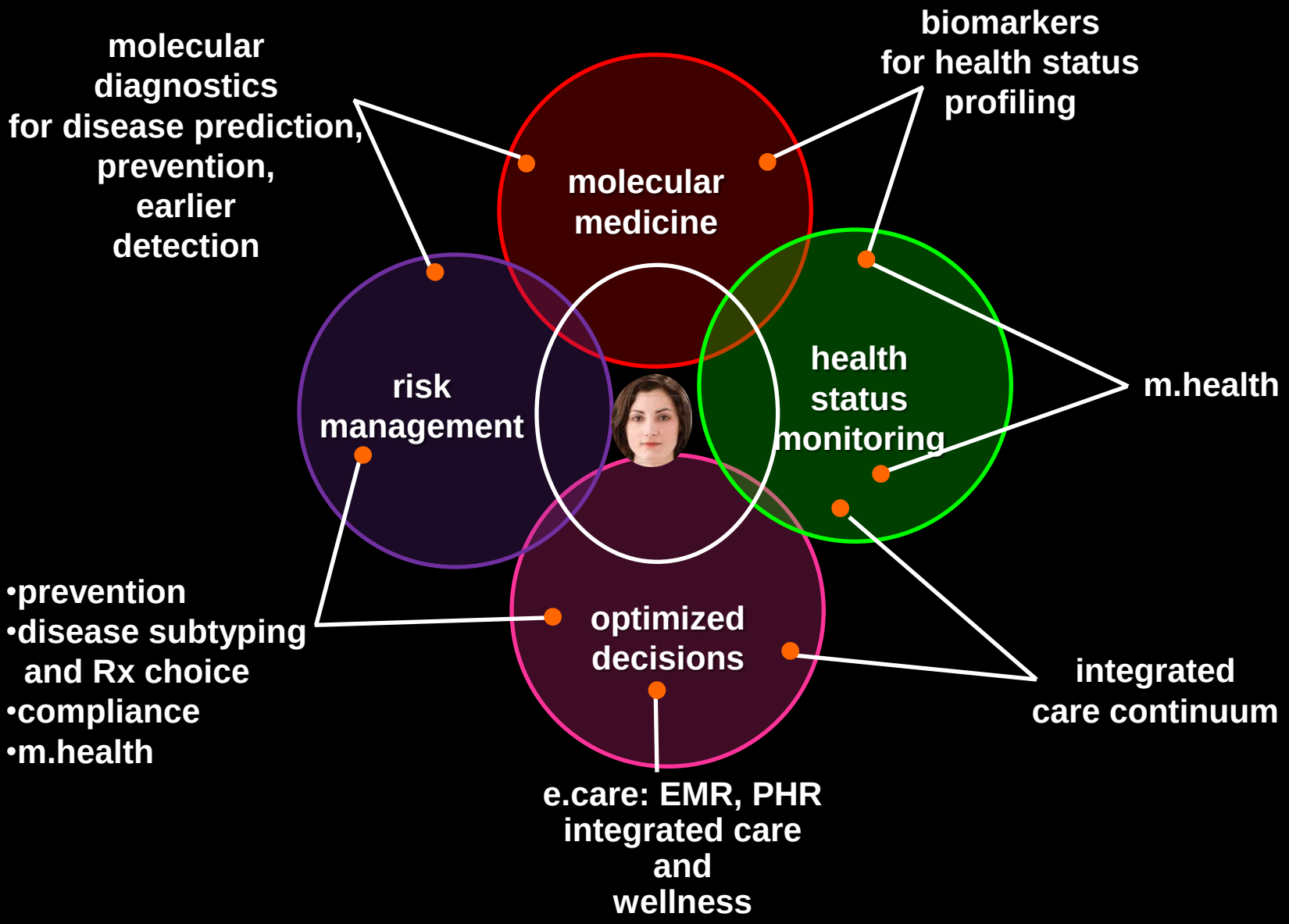
m.Health

Remote Health Monitoring and Chronic Disease Management

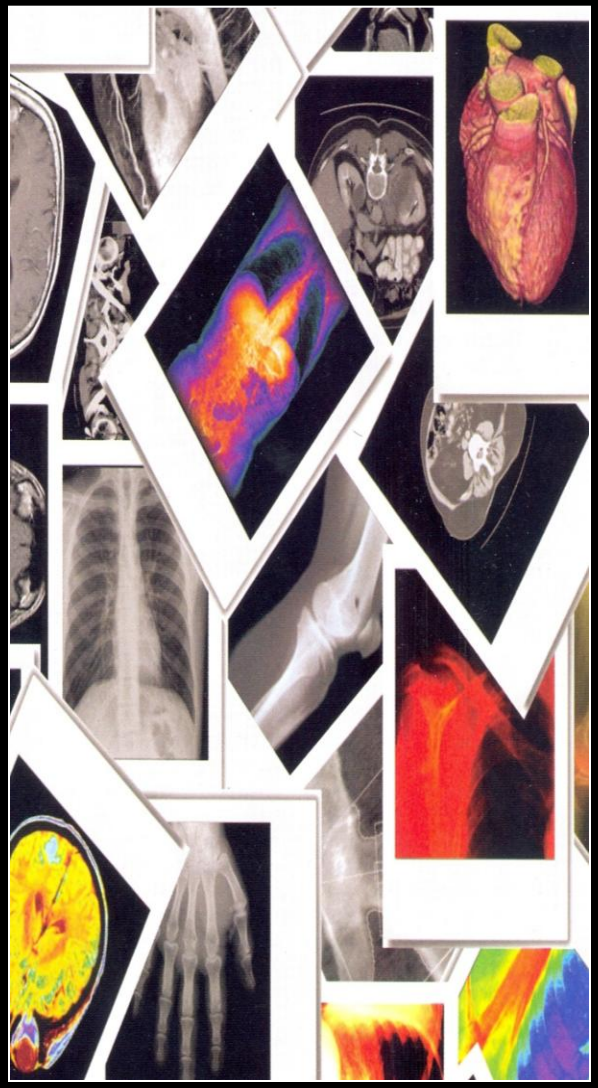
Lifestyle and Fitness

Information for Proactive Health Awareness (Wellness)

The Key Strategic Elements in the Evolution of Healthcare



How Much New Technology Can We Afford?

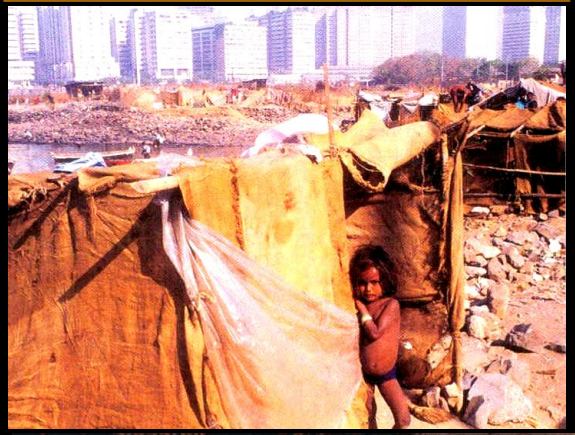


Global Demographics

- sustaining a population of 9 or 10 billion
- urbanization
- non-renewable resources
- almost 90% of world's youth is growing up in countries that can't support them
  - infant and maternal mortality
  - education
  - access to capital
  - physical security
  - good governance and legal systems

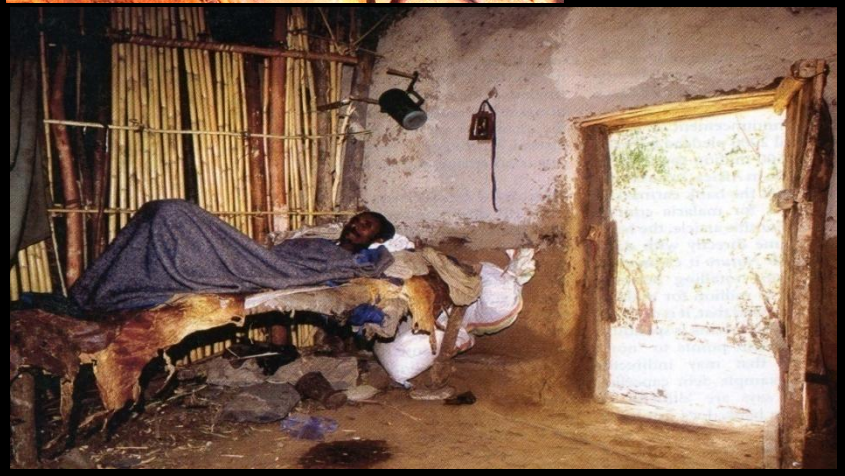
The Global Public Health Challenge Posed by Rapid Urbanization in Developing Countries

High Disease Transmission



Lack of Safe Water

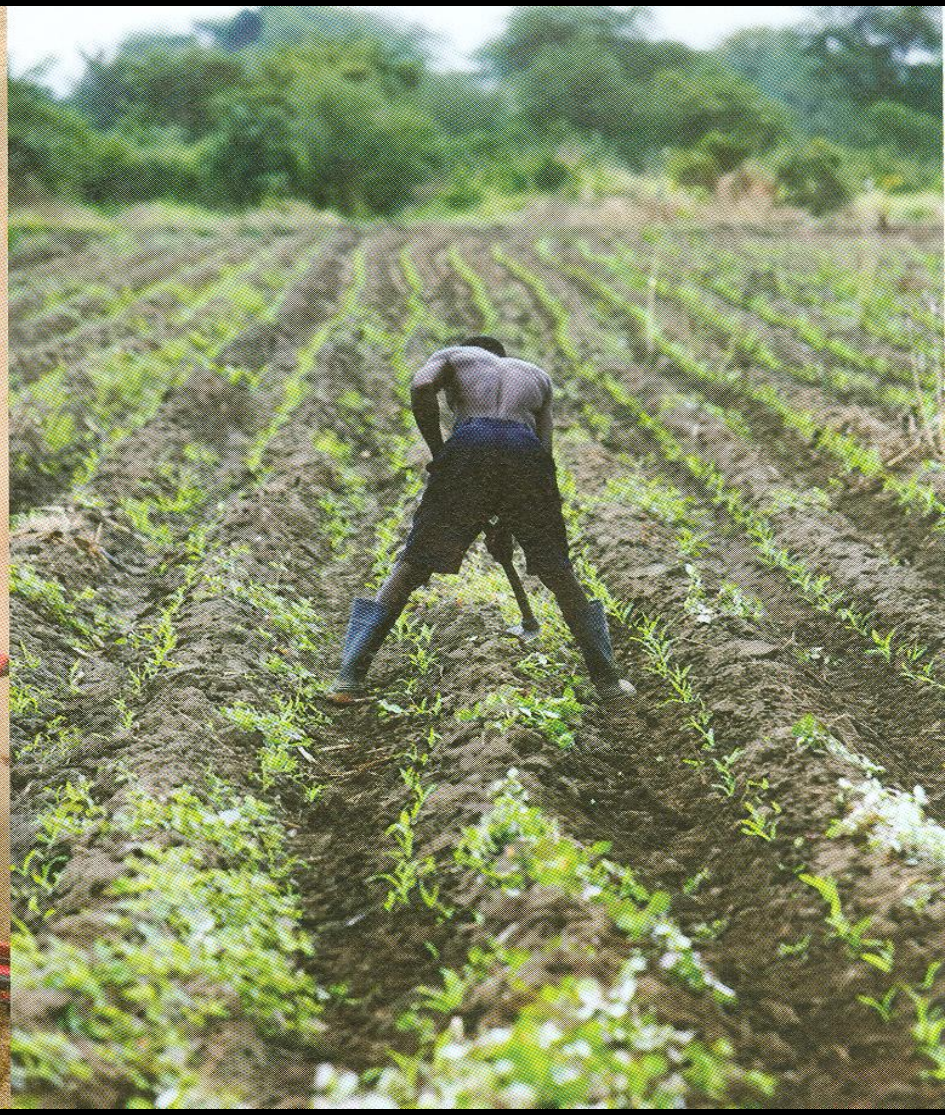
Toxic Waste



Major Deficits in Health Infrastructure

Expanded Eco-niches and Increased Zoonotic Risks

The Global Food Supply: A Major Choke Point in Sustaining a Future Population of a 8-9 Billion People



The Economist

MAY 22ND–28TH 2010

Economist.com

The battle of Bangkok

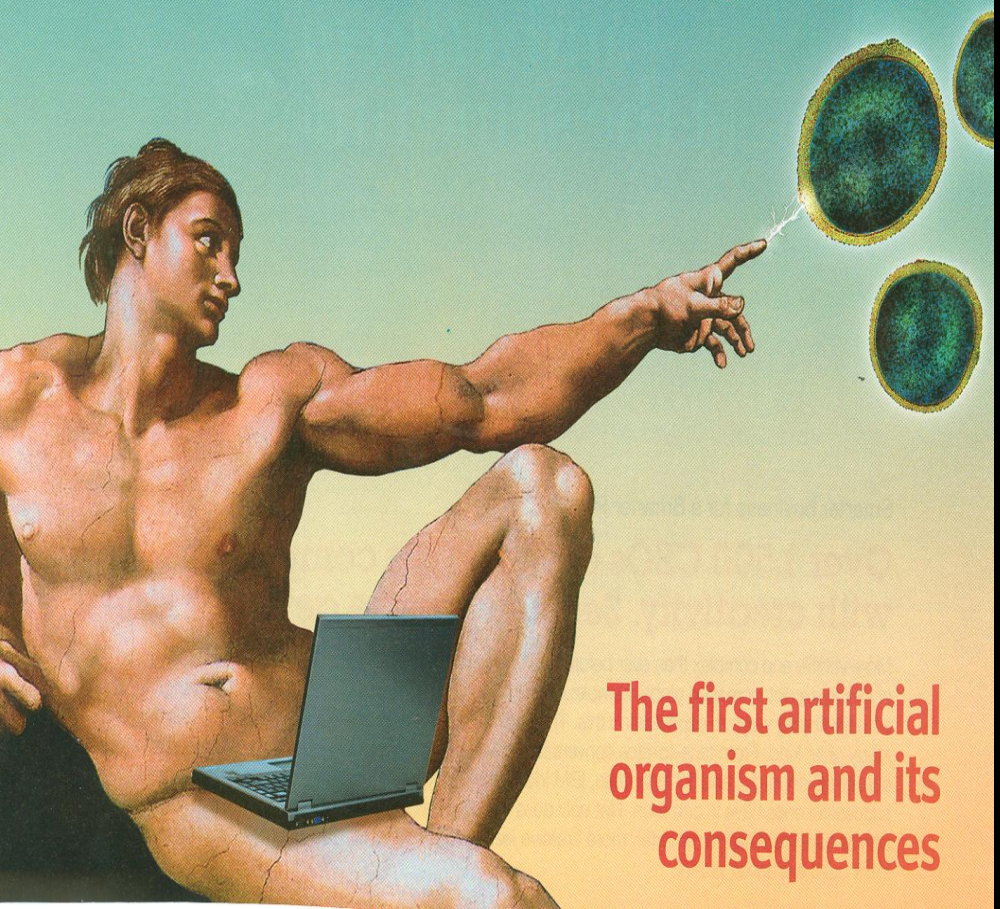
America's surprising primaries

Does Facebook know too much?

Labour after Gordon Brown

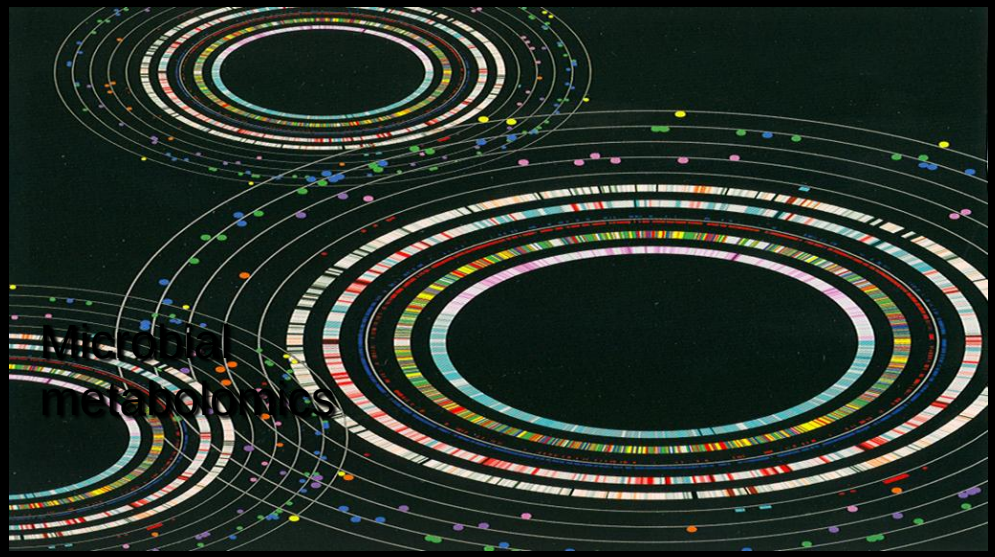
How to plug an oil well

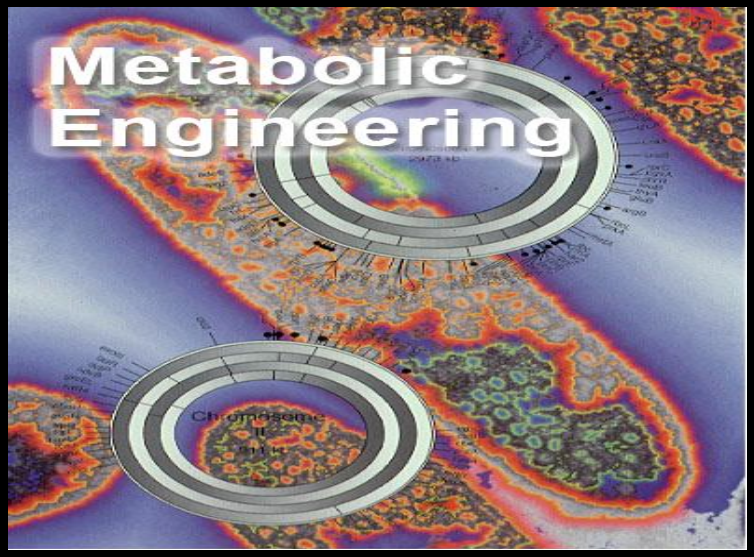
And man made life



The first artificial organism and its consequences

Synthetic Biology and Building A New Industrial Ecology Engineering Novel Organisms with Novel Functions





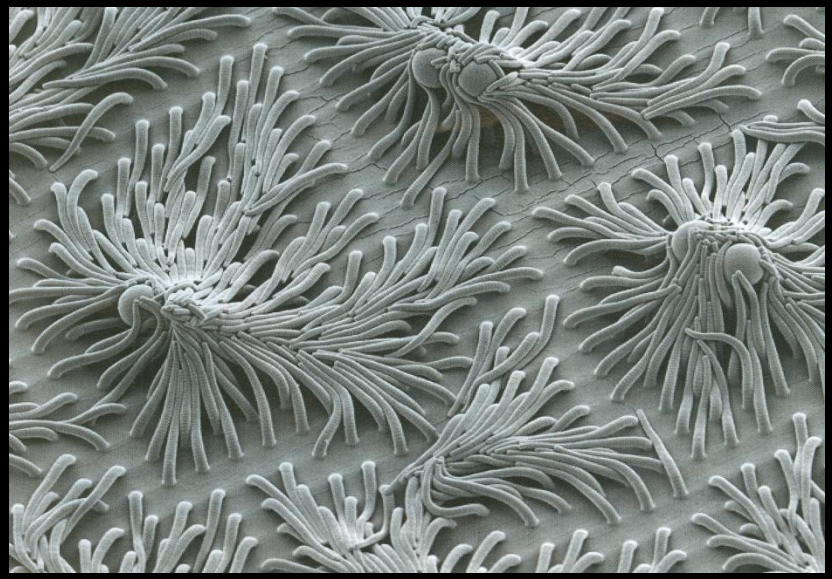
Bio-inspired Systems Engineering

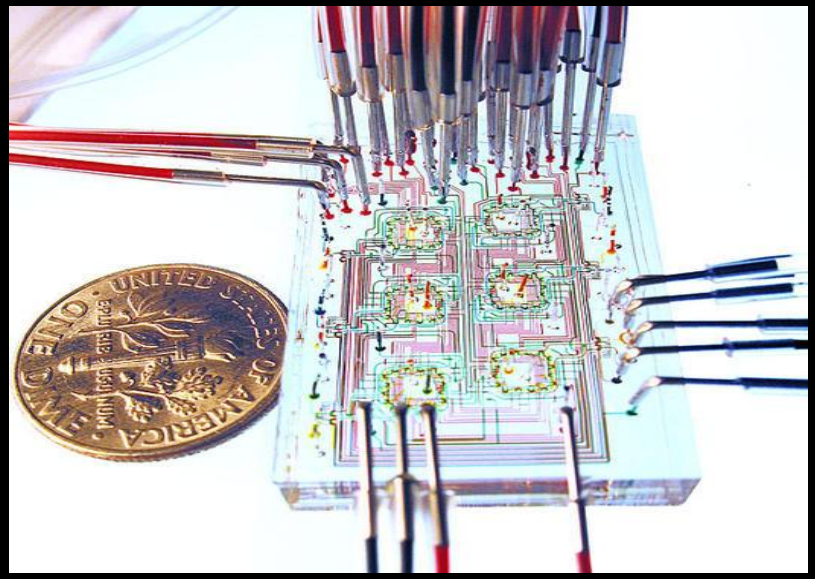
- high performance materials made in completely different ways
- mimic resource efficiency of natural ecosystems
  - self-sustaining renewal resources
  - limit/eliminate waste stream
- manufacturing at room temperature in water versus high temperatures and toxic solvents
- highly distributed manufacturing units

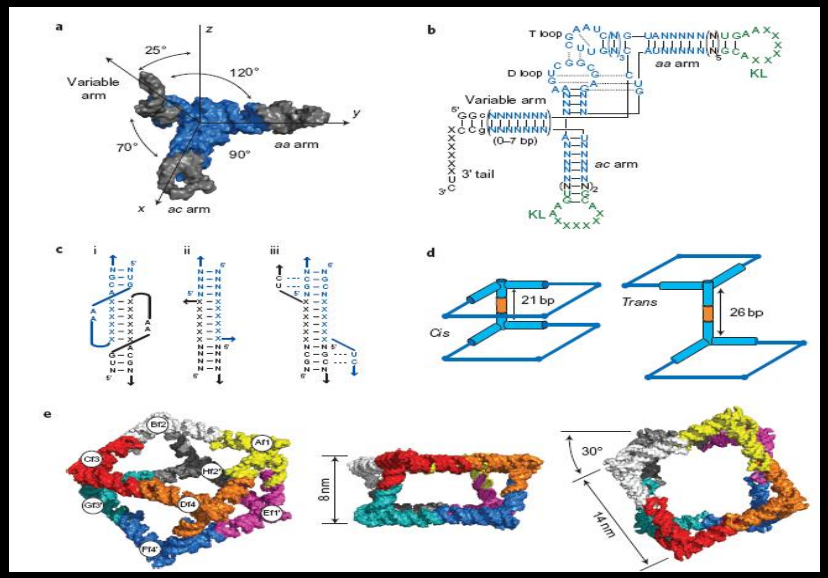
Site: geekologie.com

Source: Wired 10-10

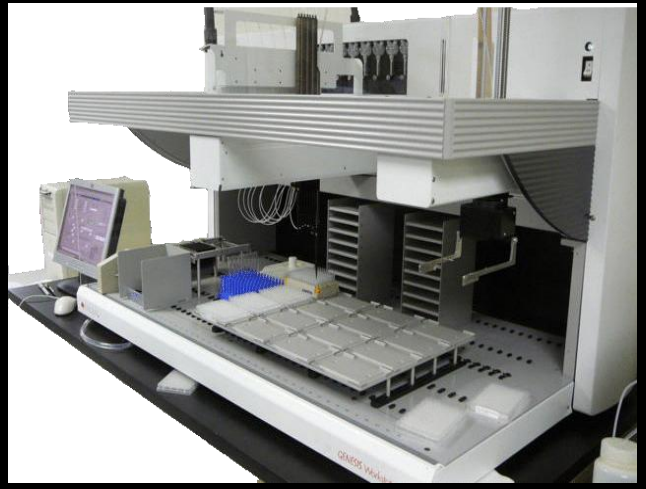
Nano- and Meso-Scale Engineering and Directed Molecular Assembly for Novel Materials, Sensors and Self-Assembling Devices







Robotics
4D Jobs: Dull, Dirty, Detailed and Dangerous



“Every age has its own kind of war,
its own limiting conditions
and its own peculiar preconceptions.”

Claus von Clausewitz

- security policy is determined by changing threats and their deployment
- there is no single security policy that serves all needs equally well

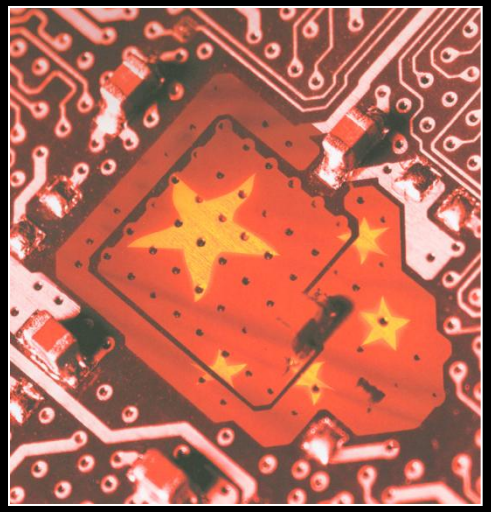
Revolutions in Military Affairs (RMAs)

- "discontinuities in warfare"
- disruptive, transformative technological innovations
  - stirrup, long bow, machine gun, tank, aircraft
  - nuclear weapons, ICBMs, satellites
  - precision-guided munitions, UAVs, advanced C4SIR
  - extending the battlefield in time and space
- but battlefield not reshaped until military culture and doctrine can assimilate
  - "fighting the last war": denial and delay
- ever greater need to think holistically about CONOPs impact
- cultural variances and the complexities of cooperation

Convergence and Complexity in National Security

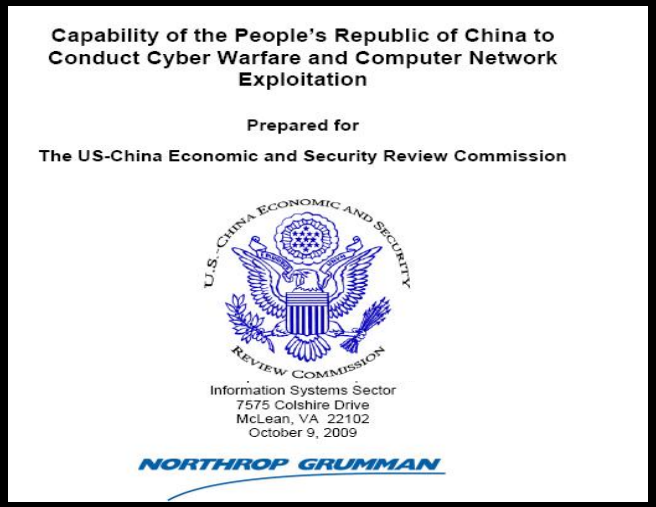
- new doctrine(s) for new threats
- asymmetric warfare, terrorism and non-state actors
- homeland defense
- WMD proliferation
- cyberspace
- militarization of space
- instabilities generated by natural phenomena
  - climate change
  - disease, food production, water scarcity
  - depletion of natural resources
- openness and stability of global common spaces/resources (the commons)

The PRC Strategy for Cyberwar



- "to cut off the enemy's ability to:
  - obtain, control and use information
  - influence, reduce and destroy decision-making and command decision"

  Wang Houqing and Zhang Xingye, Eds.
  Science of Campaigns
  National Defense University Press, 2000


Capability of the People's Republic of China to Conduct Cyber Warfare and Computer Network Exploitation

Prepared for

The US-China Economic and Security Review Commission

U.S.-China Economic and Security Review Commission

Information Systems Sector
7575 Colshire Drive
McLean, VA 22102
October 9, 2009

NORTHROP GRUMMAN


SAIC
From Science to Solutions

China's Use of Perception Management and Strategic Deception

U.S.-China Economic and Security Review Commission

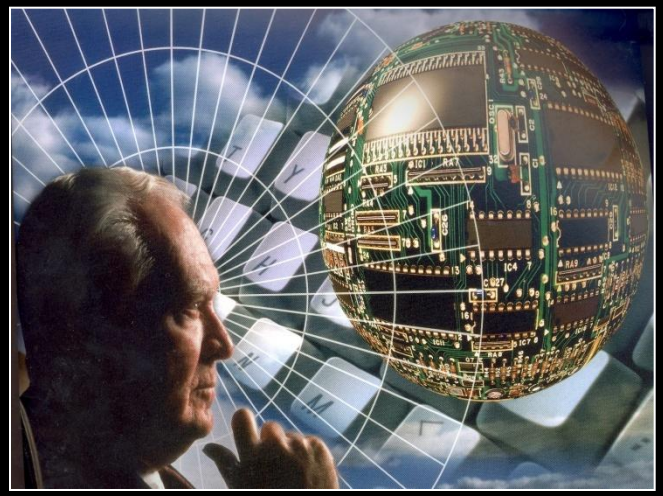
Prepared for the U.S.-China Economic and Security Review Commission
by
Dr. Eric C. Anderson with Mr. Jeffrey G. Engstrom
Science Applications International Corporation

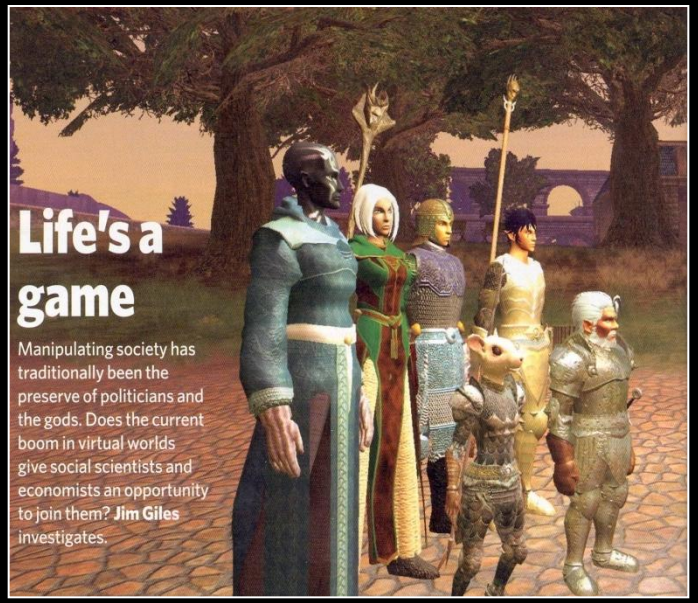
Revised November 2009

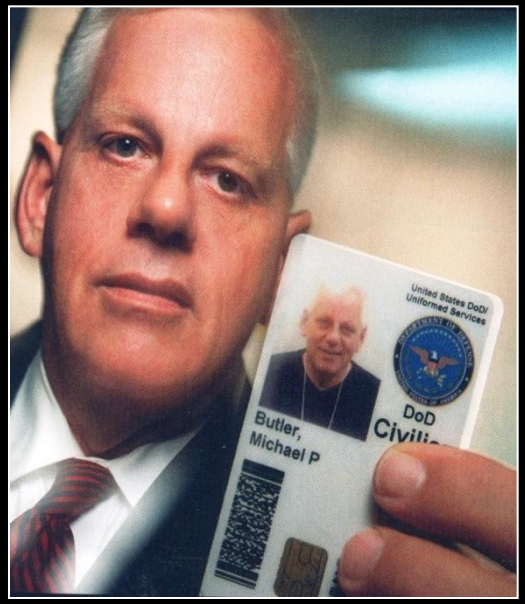
Source: Jane's Int. Rvw. 3-10

Cyber-Attacks and Vulnerable Infrastructure: Compromising Critical Systems

The Infocosm: Emerging Networks of Global Connectivity

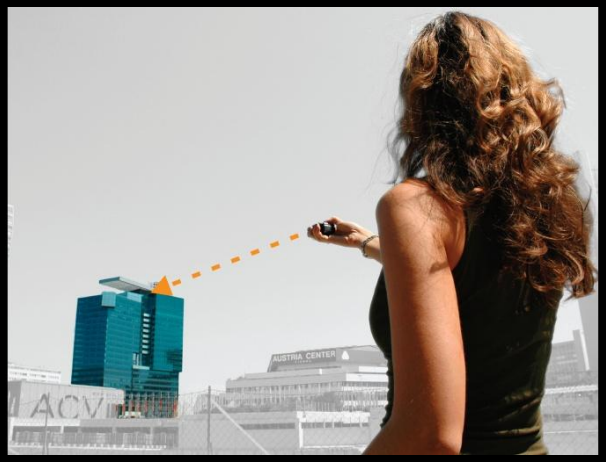




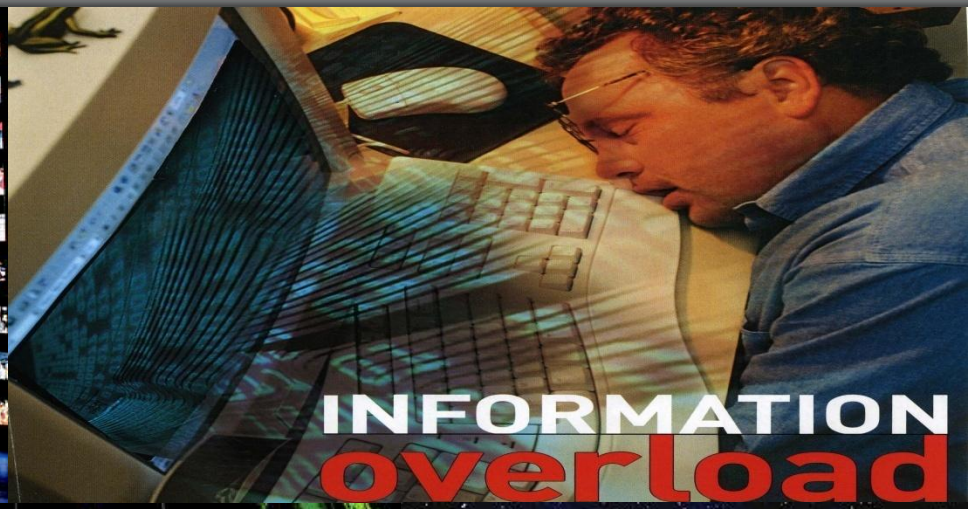


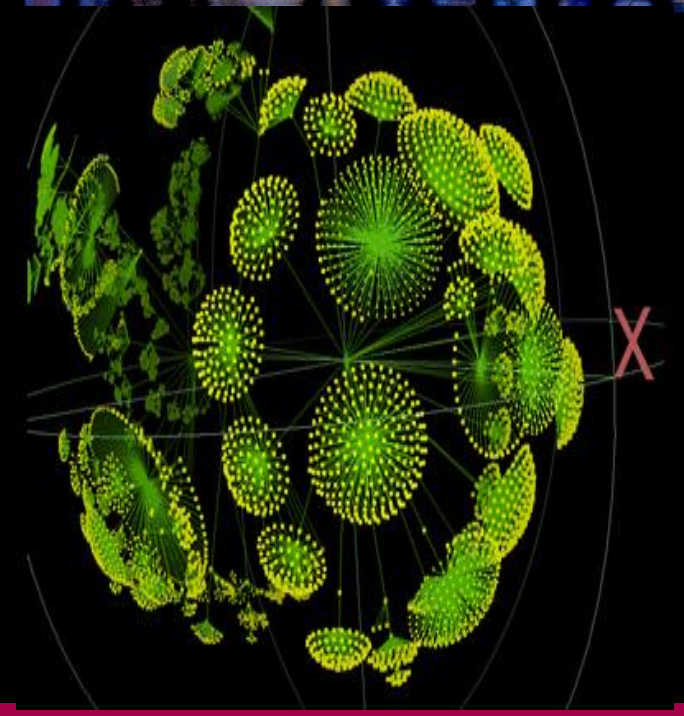
Mobile Spatial Interaction (MSI)

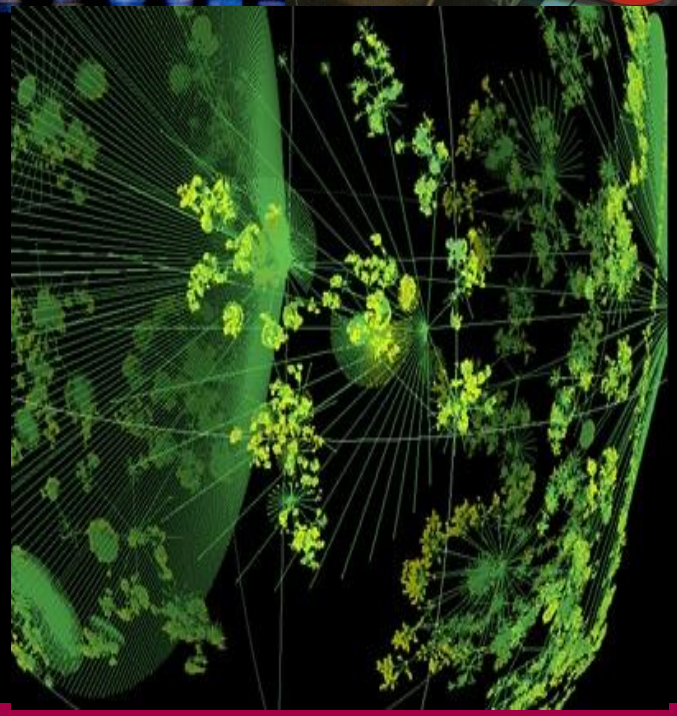
- new interfaces between mobile handheld devices and physical, natural and urban surroundings
  - spatial sensing, smart lenses, magic wands
  - geo-referenced digital content in objects
  - tactile and auditory cues without switching gaze between the environment and the device

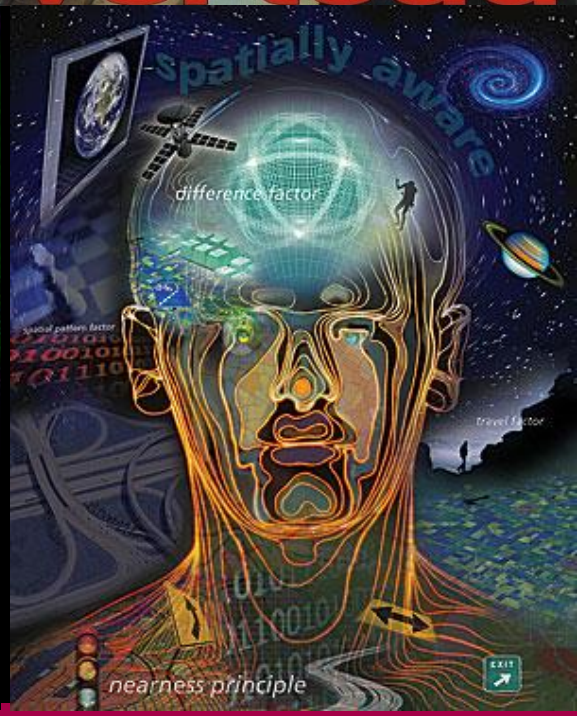


Enhancing Human Capabilities to Use the Increased Volume, Diversity and Complexity of Information Flows

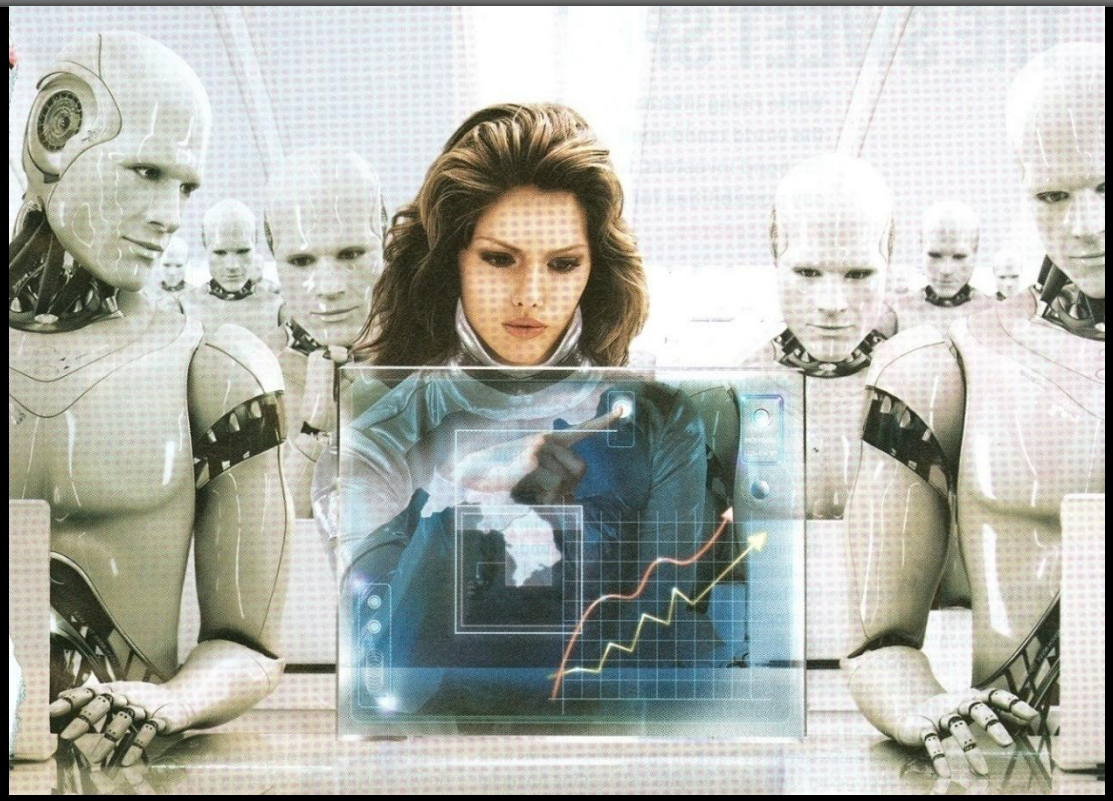








Touch the Future:
Computing Platforms as Socio-Biological Systems



- modification of social patterns
- modification of cognitive process/brain structures
- “the brain(s) in the cloud”
- brain: machine interface technologies and machine intelligence

USG National Industrial Policy

- a ‘no-touch’ subject in USG policy
  - “the taboo of picking winners”
  - sustained political support financial subsidy of bloated/sunset industries (agriculture, banking, oil, automobiles)
- Pervasive and dangerous timidity to support high risk research in emerging research fields

National Industrial Policies

- 863 Program
- State-Owned Assets Supervision and Administration Commission (SASAC)
- world's largest sovereign wealth fund

- Council on Economic Planning and Development
- Green Silicon Island

- Singapore Development Authority
- A*STAR

- Ministry of International Trade and Industry

- explicit industrial policy via national development bank (BNDES)
- loan interest less than half market rates for targeted industries
  - biotechnology (agriculture), pharmaceuticals, IT
- support of M&A activity by Brazilian companies
  - Brasil Foods
  - Braskem(petrochemicals)
  - Electrobras (electricity)
- Petrosal
  - new sovereign wealth fund to develop *pre-sal* off-shore oil reserves
  - $224 billion over next five years
  - 65% of equipment must be purchased from Brazilian companies

“Fortress America”: NRC Report

- outdated USG export controls created market niche for foreign competitors

aerospace

  - European Aeronautic Defence and Space Company
  - Swiss Propulsion Laboratory

satellites

  - Thales Alenia Space

carbon composites

  - M. Torres (Spain)

miniaturized electronics

  - multiple countries

- off-shoring by US companies to avoid export controls and access foreign markets

The Fundamental Question

"Has our capacity to build complex systems transcended our evolutionary cognitive abilities and agilities to comprehend multidimensional and non-visual data and devise ways to mitigate the intrinsic risks generated by escalating complexity?"

The Imperative to Develop New Analytics for Design Parameters in Complex Systems and Predictive Modeling of Non-Linear Dynamics

- dangerous knowledge void in relation to rapid evolution of large scale networked systems
- poor prediction of precursors of critical transition or cascading system collapse
  - tipping point, critical thresholds, catastrophic bifurcations
  - “normal accidents” (C. Perrow)
- evolution of systems too complex to be understood and too important to be turned off

EARLY WARNING SIGNALS OF CRITICAL TRANSITIONS

“Plug the Damn Hole”

President Obama
Alleged commentary to staff
Washington Post 25 May 2010

THE 29 July 2010

Ignorance lays Parliament open to ‘nonsense debates’

Andrew Miller admits that busy MPs avoid science policy as it is too challenging. Paul Jump reports

ties and science minister David Willetts, preferring to get a sense of his "general philosophy".

He was impressed by the minis-

He dismissed criticism that the committee was light on direct scientific expertise, adding that "there is also merit in any committee being

A Deficit of Trust

- deep disenchantment and corrosive cynicism about government and corporations
- lobbying, pork and overt corruption
- partisan divisiveness and vitriol
- an ignorant political elite
- quick fixes for cosmetic actions and sound bites that play out within elected terms
- corporate short-termism to ‘meet the Street’s expectations’

Back to the Economic Future
Why Is the Newest Thinking in Economics Decades Old?

John Maynard Keynes

Friedrich Hayek

Modified from Bloomberg Business Week 17 Jan. 2011

Legislative Burdens and Regulatory Uncertainties

Financial Reform Law 2010

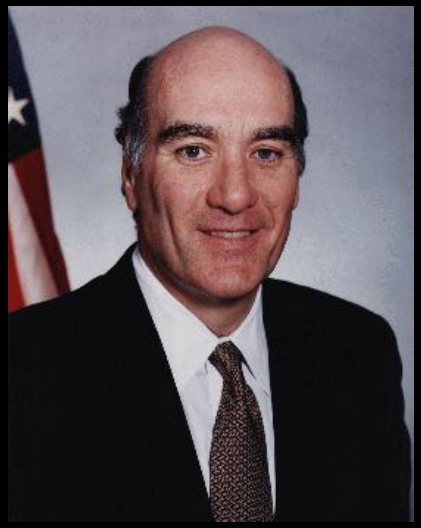
- 23,000 pages
- 243 explicit new rules yet to be written
- 67 studies to be done by 11 Federal Agencies

Health Care Reform 2010

- 2300 pages
- patient protection section as typical
  - 38 new studies and 59 evaluations to be conducted by Federal Agencies

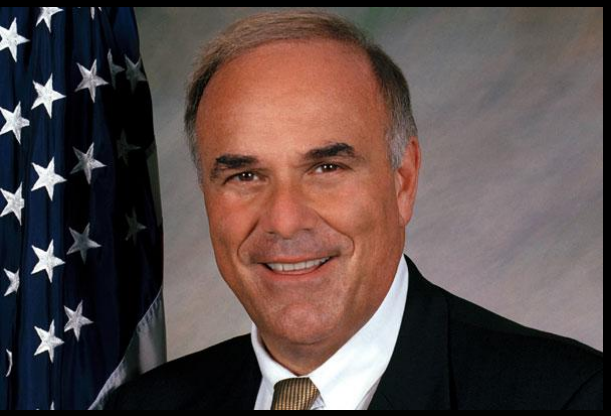
The Fragmented Silos of USG: A Dangerous Vulnerability

Two Recent Perspectives on USG Dysfunction



"Optimizing the Federal innovation enterprise might require "reorganization of agencies." You can't understand how screwed up it is."

William Daley
White House Chief of Staff
cited in Science 14 January 2011



"The Federal government buys paper clips, which have a 35 day life span, the same way it finances bridges that have a 30 or 40 year life span. It makes no sense at all. No business would do it."

Hon. E. Rendell
Governor, Commonwealth of Pennsylvania

The Retreat from Complexity

BIG IDEAS GO UNEXPLORED AND UNFUNDED

TIMIDITY AND PRESERVATION OF STATUS QUO (TURF, BUDGET) TRUMP BOLDNESS AND DISRUPTIVE INNOVATION

The Imaginot Line

- leadership delusion that current pre-eminence can be sustained with existing (historical) approaches
- comfort, complacency and catastrophic hubris
  - legislature, governance institutions, corporations, sports teams, countries, Individuals
- the poverty of imagination and agility
  - ideas (timidity)
  - incentives (protecting the status quo)
  - institutions (sclerosis)
  - ideology (myopia)

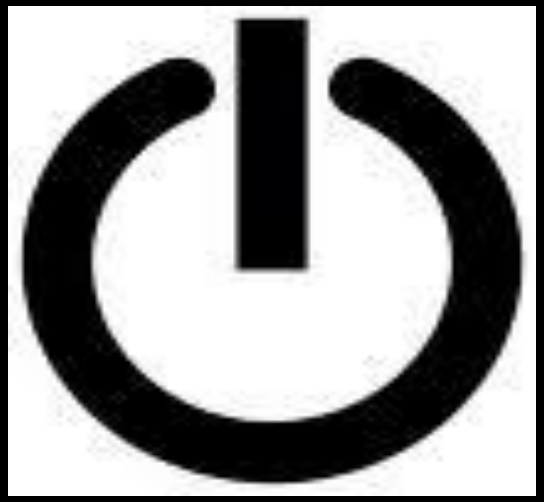
BOLDNESS!

CIA Recovery of Soviet Submarine K-129 at Depth of 16,500 feet (August 1974)

"A government or organization too timid
to undertake calculable risks
in pursuit of proper objectives
would not be true to itself
or to the people it serves."

CIA Studies in Intelligence Failure 1985
National Security Archive
Declassified 13 Feb. 2010

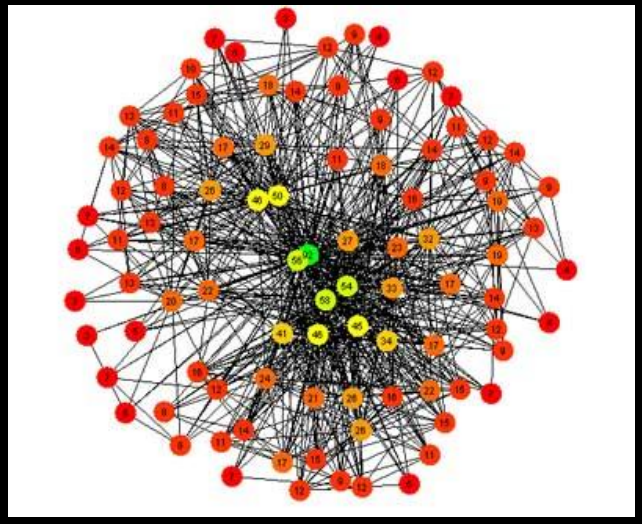
Things That Still Matter



Reset

The Core Challenges in Out-Innovate, Out-Educate, Out-Build: Understanding Complexity and Complex Systems

- financial markets
- information networks, grids and global systems
- knowledge networks and education
- healthcare delivery
- ecosystems and environmental sustainability
- food and water resources
- distribution logistics
- epidemics and other large scale disasters
- national security (connecting the dots)



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COMMON DESIGN PRINCIPLES

- scale-free networks
- highly-optimized tolerance/robustness
- novel convergence and trigger of cascading instability

Mega-Trends:
Things That Still Matter

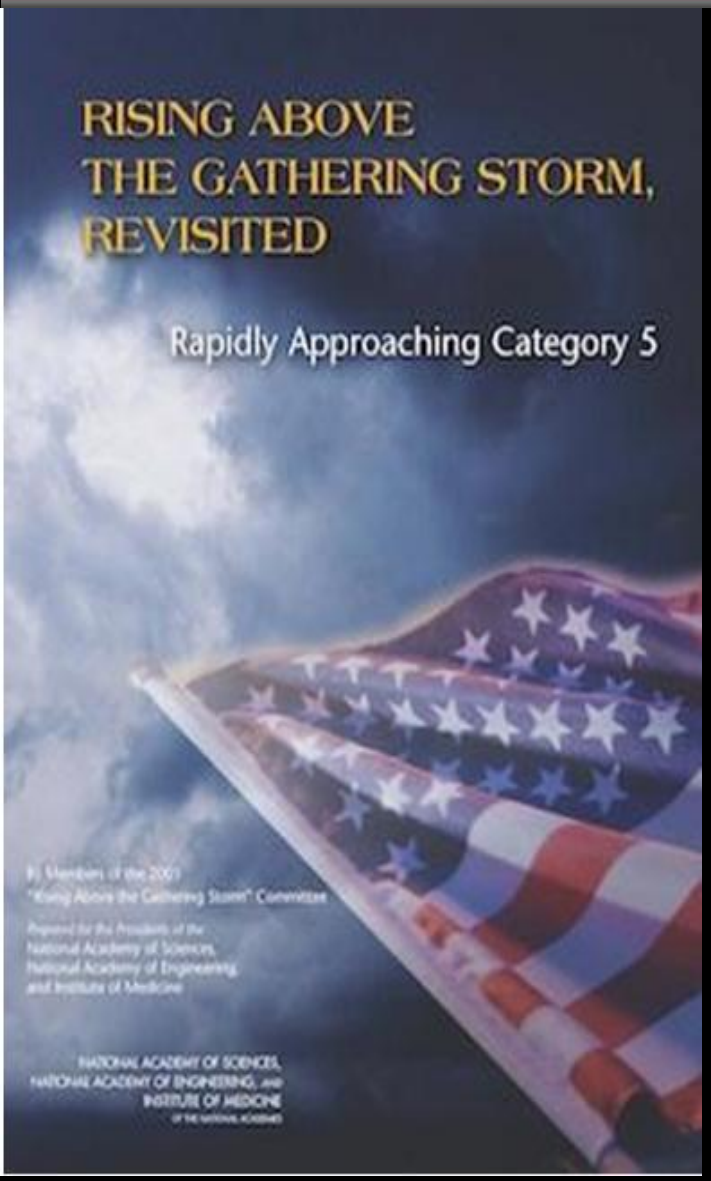
- innovation
- strategy
- policy
- aspiration and incentives
- ethics
- creating a better future
- operational excellence
- accountability
- competitive performance
- educational standards
- individual competence

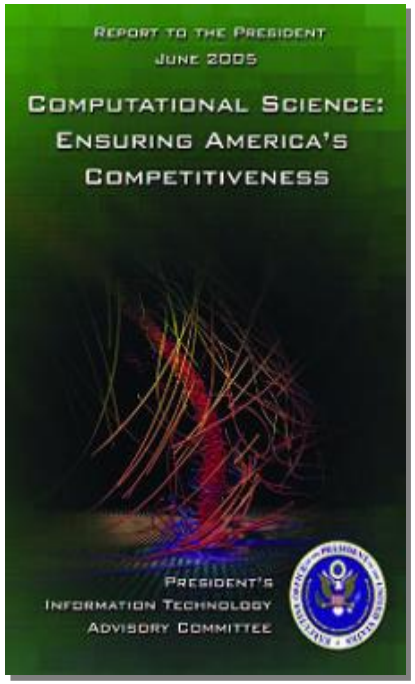
thr mst b a futr, rt?

"Why Johnny Can't Read"
Rudolf Flesch 1955

"Why Johnny Can't Write"
Newsweek 8 Dec. 1975, pp 58-65

"Why Johnny Now Speaks Like His Texts and His Tweets"





One Hundred Thirty-Three Thousand H-1B Visa Applications Submitted In Two Days

The Gathering Storm:
The USA is Losing Scientific and Technical Leadership

- Annual Competition in algorithm coding
- 4200 competitors (2009)
- finalists
  - China (20)
  - Russia (10)
  - USA (2)

[TopCoder]

- rapid growth in number and nationalities competing
- major presence of PRC teams
- contest winners now largely non-US

Educational Kryptonite

**“By 2010 of the 123 million jobs
available for highly skilled, educated people
the US education system at best
might be able to provide 54 million qualified applicants.”**

Bill Gates
Waiting for “Superman”
David Guggenheim Documentary 2010

REPORT TO THE PRESIDENT

PREPARE AND INSPIRE:
K-12 EDUCATION IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH (STEM) FOR AMERICA'S FUTURE

Executive Office of the President

President's Council of Advisors on Science and Technology

SEPTEMBER 2010

PREPUBLICATION VERSION

Source: http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-stemed-report.pdf

CHANGE THE EQUATION

Search Site

"It's time to restore science to its rightful place, and . . . to wield technology's wonders to meet the demands of a new age." *President Barack Obama*

About Change the Equation | Why STEM? | Members | Featured Programs | Blog | Get Connected | Media Center | Home

President Obama Launches Change the Equation

At a White House Ceremony, President Obama is our announcing the launch of Change the Equation (CTEq), a CEO-led initiative to cultivate widespread literacy in science, technology, engineering and math (STEM). other countries are leaving us in their wake. Now, more Learn More companies are joining forces to work with schools and communities to change the equation for our youth and CLICK FOR MORE Learn More

CLICK FOR MORE

1 2 3 4

Great Teaching

Improving STEM teaching at all grade levels, with a larger and more diverse cadre of highly-capable and inspirational STEM teachers.

Inspired Learners

Inspiring student appreciation and excitement for STEM programs and careers to increase success and achievement in school and opportunities for a collegiate education, especially among females and students of color.

A Committed Nation

Achieving a sustained commitment to improving STEM education from business leaders, government officials, STEM educators and other stakeholders through innovation, communication, collaboration and data-based decision making.

Source: http://www.changetheequation.org/

Reset and Redesign

- commit to radical reform of educational systems to embrace emerging career requirements
  - professional incentives
  - standards, metrics and accountability
  - K-12, higher education (not just STEM)
  - cultural recalibration of ‘success’ and ‘what matters’ (rewards)
- rationalize immigration policies
  - current challenges
  - attracting foreign talent to expand knowledge-based capabilities

The Academy

- house of mirrors (Dr. Michael Crow)
- adaptive agility or denialism and decline?
- how to use scientific knowledge not accorded sufficient attention
- reconceptualize science as path to outcomes rather than as outcome in its own right
- radical redesign of the structure and sociology of the enterprise
  - from knowledge compartments (silos) to knowledge networks (systems)
- new metrics
  - groups versus the individual hero

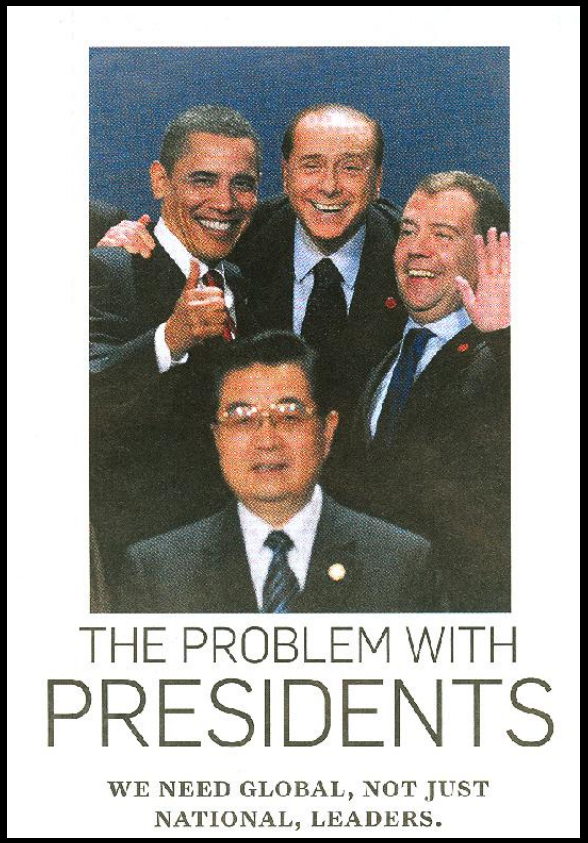
Business Education: Have MBA Programs Distorted Priorities and Metrics for Business Performance?

- aspiration of best graduates to join major financial and consultancy houses
- ranking of B.schools by graduate starting salaries
- primary source of now discredited financial market prediction models
- narrow, disproportionate focus on finance/economics versus analysis and management of the trends shaping escalating complexity
- predominant curriculum channeling to non-S&T topics creates dangerous knowledge void in corporations/financial markets

Reset and Redesign

- set national goals for 2025
  - grand challenges in education, health, energy and sustainability
  - knowledge management
  - national security
  - high-value jobs and manufacturing capabilities for new industries as 20% total employment

Challenges Are Global But Politics is Still Local: The Cultural and Institutional Limits of Governance

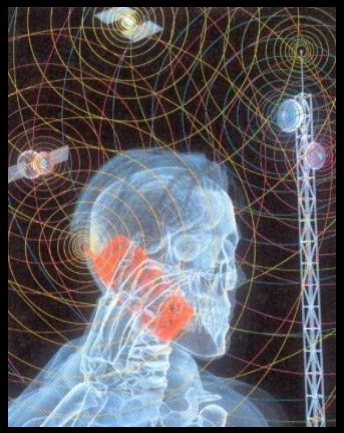
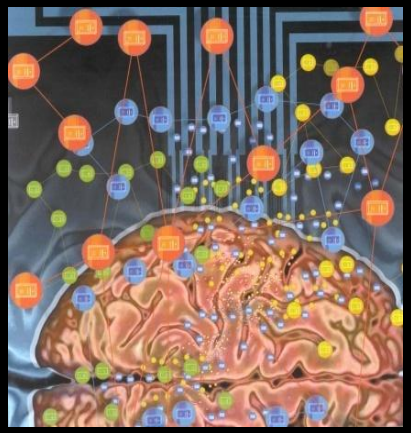


- supranational oversight and harmonized regulation
- global commons
- WMD proliferation
- cyber-vulnerability
- terrorism
- climate change
- infectious disease
- finance and trade

Building A New International Consensus

Rude Shocks and Wake Up Calls

Understanding New Patterns of Convergence and the Evolution of Escalating Complexity

Systems and Synthetic Biology	Ubiquitous Sensing	Brain: Machine Interactions	Infocosm and the Metaverse	Global Governance
				
“Bio-space”	“Connected Space”	“Smart Space”	“Cyberspace”	“Shared Space”

Constantly Emerging and Evolving Multi-Dimensional Matrices of Knowledge Ecologies

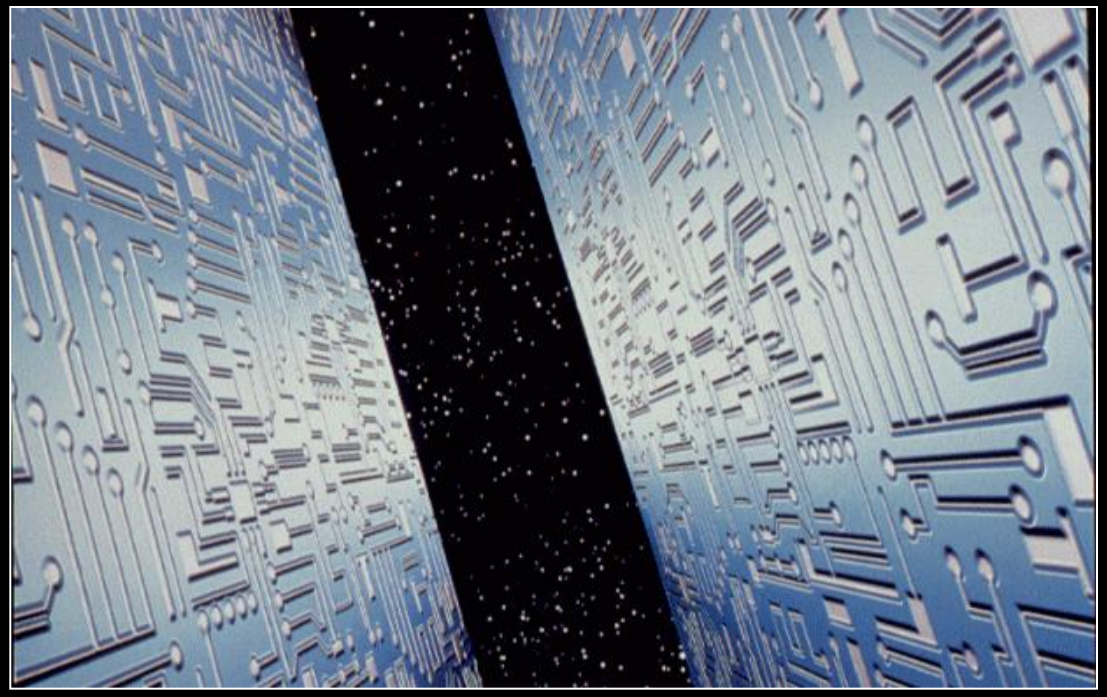
Global Challenges

Systems of Innovation

“What have future generations ever done for us.”

Groucho Marx

Aspiration and Engagement with Grand Challenges



"The only way of discovering
the limits of the possible
is to venture a little way past them
into the impossible"

Arthur C. Clarke
Profiles of the Future (1962)


JULY/AUGUST 2010
AAA.com