INNOVATION

A New Day in the U.S.?

Aneesh Chopra       Mark Crowell       Stephan Dolezalek
A Declaration of Innovation
UVA, Darden School 2011

• **Education:** A comprehensive educational system that develops and inspires all people to be curious and creative leaders by providing experiential learning opportunities and exposure to imaginative and entrepreneurial role models

• **Entrepreneurialism:** An entrepreneurial culture that inspires and empowers communities and individuals to embrace, nurture and celebrate innovators and entrepreneurs

• **Investment:** Collaborative public and private financial institutions that promote appropriate investment in innovative research, entrepreneurial startups and social enterprises

• **Immigration:** Progressive immigration policies that attract and retain the best talent in the world and encourage them to work for local businesses and launch their own ventures

• **Taxation:** A coherent tax structure that encourages investors, managers, entrepreneurs and inventors to allocate greater risk capital to research, development and new venture creation

• **Governance:** A nimble and professionalized regulatory system that simplifies and harmonizes regulation across nations, states, regions and municipalities, enabling productive and progressive risk taking

• **Property Rights:** Modernized intellectual property laws that reflect the realities of the post-industrial age in order to improve collaborative efficiency and better incentivize the co-creation of new ideas, technologies and ventures
Our Innovative History

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<th>“SOCIAL INFRASTRUCTURE”</th>
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21st Century Innovation Needs

“Social Infrastructure”
- Energy conservation and sustainable development
- Food and water production and distribution
- Waste management
- Medicine and prolonging life
- Security and counter-terrorism
- Infectious Diseases/Pandemics
- Traffic and population logistics
- Weather prediction and control

“Social Wealth”
- Education and learning
- Information sharing
- Globalization
- Global communication
- Cloud Computing
- Entertainment
- "Virtualization" and VR
THERE ARE MORE OF US

WE LIVE LONGER

WE CONSUME MORE ENERGY

WE CONSUME MORE RESOURCES
Global Growth and Resource Limitations

China’s Percentage Share of World Commodity Consumption in 2009-2010

Iron Ore Prices 1900-2010

U.N. Food Price Index 1990-2011

Grain Prices 200-2011

Annual Fertilizer Usage 1961-2007

25 Year Copper Prices

25 Year Silver Prices

Jeremy Grantham’s Paradigm Shift

Llyod’s Peak Oil and Deficit
Waves of Innovation: Faster and Faster
An Accelerating Pace of Creative Destruction

Average Length of Time in the S&P 500 (years)

Turnover rate:
1920: 1.5% per year
2020: 10% per year

Source: Cleantech Group LLC analysis, from Foster, R. and Kaplan, S., Creative Destruction
Where New Jobs Come From
They Come from New, Not Large or Small Businesses*

• In any given year, the top-performing 1 percent of firms generate roughly 40 percent of all new jobs. So-called "gazelle" firms (ages three to five) comprise less than 1 percent of all companies, yet generate roughly 10 percent of new jobs in any given year.

• The "average" firm in the top 1 percent contributes 88 jobs per year, and most end up with between 20 and 249 employees. The average firm in the economy as a whole, on the other hand, adds two or three net new jobs each year.

• "While some new companies will undoubtedly fail, high-growth firms must be started; the more quickly they are launched and in larger numbers, the faster both output and employment will grow."

• Remove barriers that potentially block the emergence of high-growth companies. These barriers include access to capital, taxation and regulatory burdens.

• Target immigrants and universities. Recent research has shown that U.S.-based technology and engineering companies founded by immigrants have created thousands of jobs for Americans.

• On the university front, enhance innovation and job creation by breaking down barriers in the commercialization process that could impede university researchers from moving their innovations into new companies.

• "Without startups, our research shows that net job creation in most years would be negative, so policies that expand firm formation could increase both job creation and the number of high-growth firms,"

*High-Growth Firms and the Future of the American Economy*, the third in the Kauffman Foundation Research Series on Firm Formation and Economic Growth, March 9, 2010
The Power of Conventional Thought:

“This ‘telephone’ has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us.”

(Western Union internal memo, 1876)

“The horse is here to stay, but the automobile is only a novelty, a fad.” (advising Henry Ford’s lawyer not to invest in the Ford Motor Co.)

(President of the Michigan Savings Bank, 1903)

“While theoretically and technically television may be feasible, commercially and financially it is an impossibility, a development of which we need waste little time dreaming.”

(Lee Forest, American radio pioneer - inventor of the vacuum tube, 1926)

“Transmission of documents via telephone wires is possible in principle, but the apparatus required is so expensive that it will never become a practical proposition.”

(Dennis Gabor, British physicist, 1962)

“There is practically no chance communication space satellites will be used to provide better telephone, telegraph, television or radio service inside the United States.”

T. Craven, FCC Commissioner, 1965)
The “Laws” of Innovation and Invention

Moore

Microprocessors

Metcalf

Law of Sharing: \( y = 2^x \)

Zuckerberg

Hard Disk Memory

iPhone Sales

Haitz

Luminous Efficiency over time

Imaging Sensors

Imaging Sensors: The Effect of Price vs. Volume
Technology Keeps Sneaking Up On Us

When new technology arrives, the challenge is in deciding when to change course.

History suggests moving more quickly than we want -- in the end the new will be more disruptive than we can possibly imagine.
We Recently Witnessed the End of the Kodak Saga

The Crucial Decision, However, Was Made
More Than 25 years Ago

Kodak invents the
digital camera

Kodak commits to
sticking with film

Market cap
peak: $30B

Bankruptcy

Eastman Kodak stock price, 1968-2012
Leadership Can be Misleading

Apple vs. Dell – Market Cap Over Time
$ Billions

1997:
- Michael Dell: “If I ran Apple, I would shut it down and give the money back to shareholders.”
- Steve Jobs returns to Apple as interim CEO
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[Graph showing market cap fluctuations over time with key milestones and leadership comments]

Leadership Can be Misleading
Invented Here; Built There

- Personal Computers
- Cell phones
- Televisions
- Semiconductors
- Digital cameras
- Wind power
- Solar power
- Nuclear Power
Wind: Opportunity Lost?
Solar: An Escaping Opportunity?

From Early Leadership in The U.S. and Europe to Current Domination from China:
WHY INVESTING IN INNOVATION IS HARD

The Momentum Zone of Optimism

The Zone of Uncertainty

Cognitive Lag

The Momentum Zone

Valuation

Per Unit Costs

“The Hype Cycle”

“Valley of Death”

← “Angels” ← ← ← “Investors” ← ← “Followers”
Fundamental vs. Social Innovation

- **Infrastructure**
  - Computer
  - Internet
  - Cell Phone
  - Television
  - Electronic Commerce
  - Digital Photography
  - EV’s & Solar Panels

- **Applications**
  - Software
  - Social Networks
  - Games
  - 3D Virtual Reality
  - Synthetic leases
  - Photo Sharing
  - The Smart Grid

Unfortunately, someone has to invent and build the infrastructure before others can come along and invent and profit from the applications!
Entrepreneurialism at its Finest?

Instagram

- $1,000,000,000
- $33 per user
- $77,000,000 per employee
- Is this how we want to “grow” jobs?
Can We Pioneer Our Way to Prosperity Once Again?
A Declaration of Innovation
(Revisited)

- Education: Engineering & Science vs. The Internet
- Entrepreneurialism: Built to Last vs. Speed to Exit
- Investment: Billions vs. Millions
- Immigration: We are all immigrants vs. Bar the Door
- Taxation: 10-20 year incentives vs. 1-3 year
- Governance: Leadership vs. protectionism
- Property Rights: U.S. vs. China