

# “21st-Century Technology Commercialization— A New Contact Sport”



International Year of  
**CHEMISTRY**  
2011

Judith Giordan  
Joseph Priestley Society Luncheon  
Chemical Heritage Foundation  
October 20, 2011



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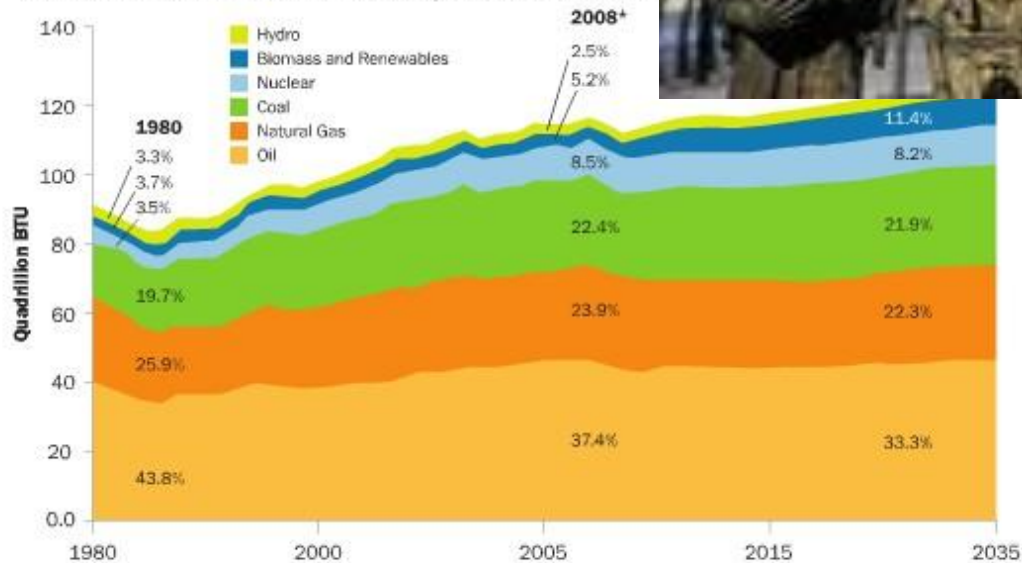
# THE PROBLEMS ARE COMPELLING...

And scientists and engineers are needed with solutions....



## Future U.S. Energy Demand

The U.S. will require 14 percent more energy in 2035 than in 2008



\*Excludes non-biogenic municipal waste and net electricity imports. Source: EIA, AEO 2009 Tables A1 and A17.

**Business people CAN NOT do it alone!**

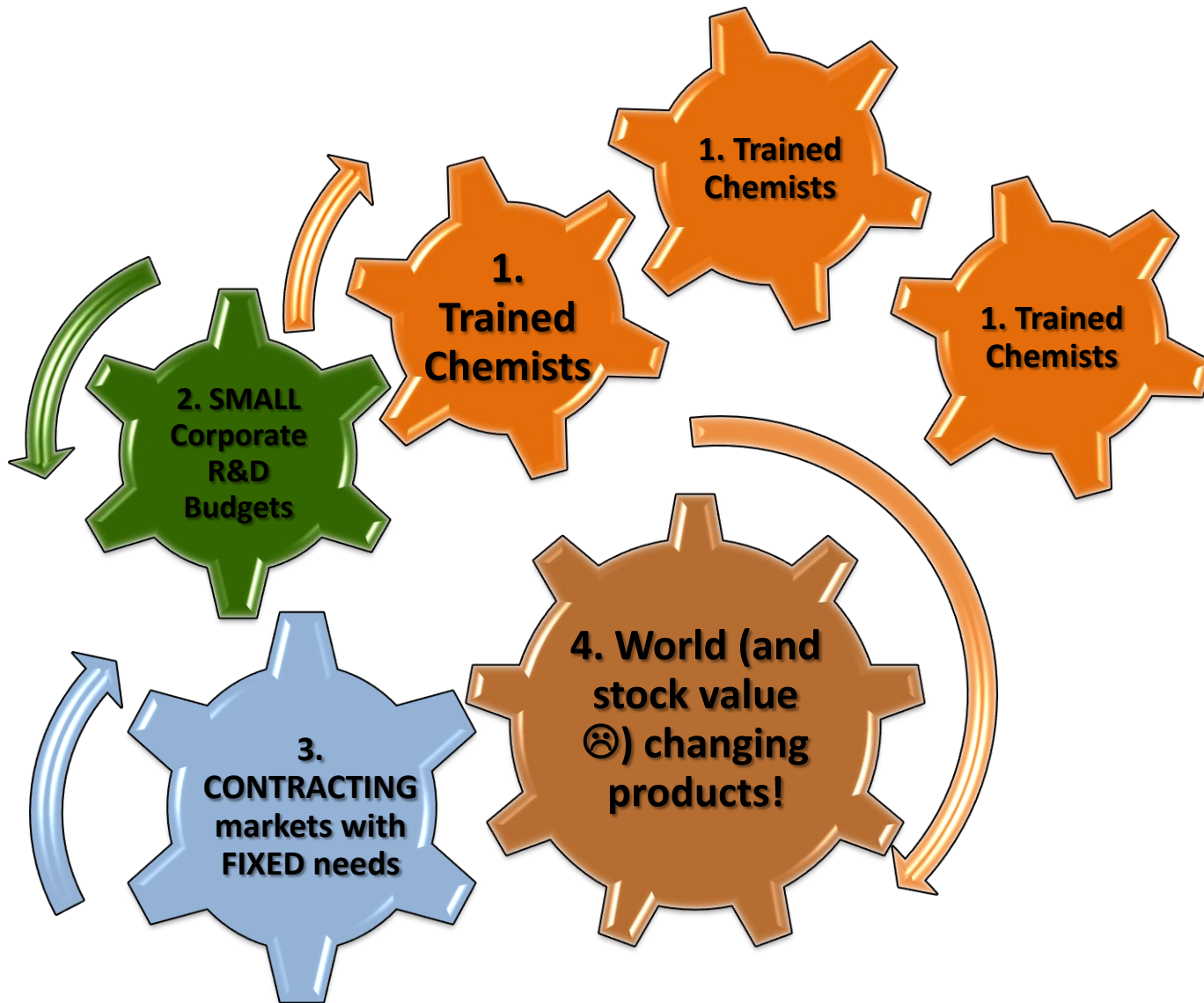


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# It Used to be SOOOOO Simple..



# Then it changed..



# Why the change?

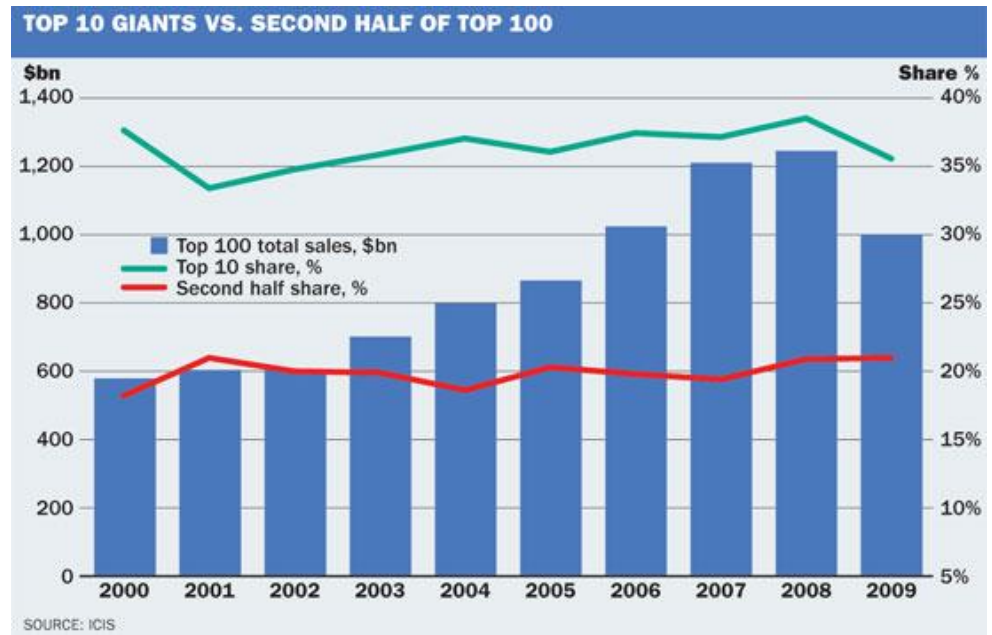
- Universities *had* CLOUT...
- Diversity was coming...and NO do NOT just “blame” women!
- Scientists and engineers did not WANT to be shoved in a corner
- It is a BIG world! EVERYONE wants to *make..not everyone buys*





# Global Chemical Enterprise...

- The average size of the global, annual procurement budgets is **US\$52.9m**, compared to **US\$100.8m** for petrochemical companies.
- **42% of chemical industry buyers** agree that in order to maintain and win their business, suppliers will have to **provide innovative products**.



# The Corporate R&D Landscape - 2009...

- The 2009 EU R&D Industrial Worldwide corporate R&D investment increased by 6.9%
  - With an **8.1% for EU companies**, defined as companies having headquarters within the EU,
  - This is significantly higher than **5.7% for US companies** for the second year, and
  - **Japan at 4.4%.**
  - **China and India at 41.8%**
- Real but modest wrt inflation



[http://ec.europa.eu/dgs/jrc/index.cfm?id=1410&obj\\_id=9380&dt\\_code=NEWS&lang=en](http://ec.europa.eu/dgs/jrc/index.cfm?id=1410&obj_id=9380&dt_code=NEWS&lang=en)

# What About Industries in 2009...



The Booz & Company 2010 Global Innovation 1000 study, "How Top Innovators Keep Winning,"

- Total R&D expenditure dropped for usual top spenders
- More than half of all companies tracked cut their R&D spending in 2009 and nearly all the cuts came in just three industries: Auto, computing and electronics, and industrials.
- Computing and electronics preserved its top spot as the industry that spent the most on innovation, while auto stayed put at number three.





# Impact and next steps...

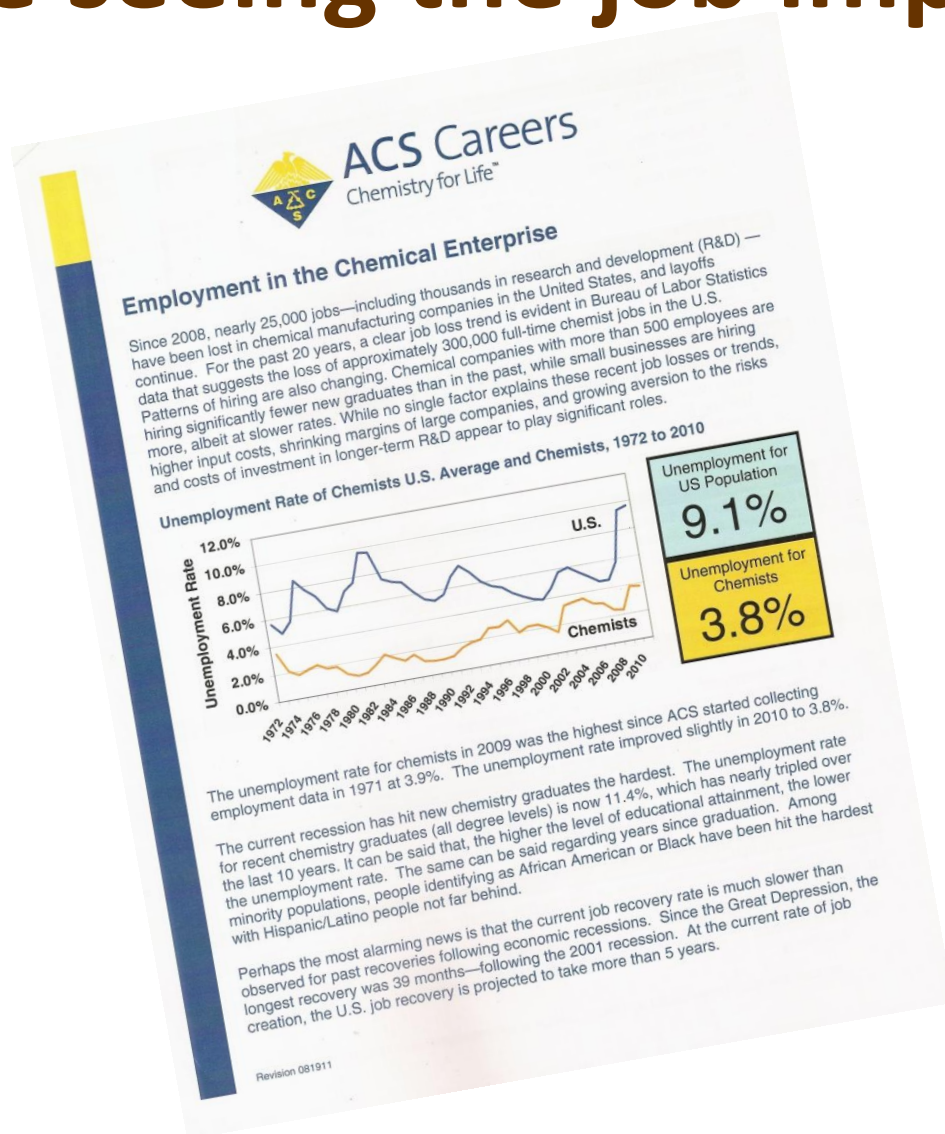
- **Some executives worry** that the cost-cutting moves their companies made in R&D during 2009 will have painful consequences, including a **weaker talent pool and a loss of market share resulting from shriveled new-product pipelines.**
- 40% of executives say their **companies' R&D budgets will be higher or much higher in 2010 than they were in 2009.**
- Companies are taking a **wait-and-see approach to R&D hiring**

McKinsey Quarterly

<http://www.forbes.com/2010/04/29/research-development-product-strategy-leadership-managing-mckinsey.html>



# And we're seeing the job impact...



# The RESULT....



**Fear!**



**OPPORTUNITY!!!! *maybe....***



# The NEW Cottage Industry!





# The NEW answer to a failing economy!

The screenshot shows a Firefox browser window with the following details:

- Address bar: <http://www.whitehouse.gov/blog/2011/09/09/american-jobs-act-fueling-innovation-and-entrepreneurship>
- Page Title: The American Jobs Act: Fueling Innovation and Entrepreneurship
- Page Content:
  - Header: The White House Blog
  - Article Title: The American Jobs Act: Fueling Innovation and Entrepreneurship
  - Author: Posted by Aneesh Chopra and Tom Kall on September 09, 2011 at 04:30 PM EDT
  - Ed. Note: The following is a cross-post that originally appeared on the Office Of Science and Technology Policy blog.
  - Text: President Obama just unveiled the [American Jobs Act](#), an ambitious plan to create jobs across the country and put more money in the pockets of American workers and businesses – all without adding a dime to the deficit.
  - Text: The President's jobs plan, specifically crafted to garner quick bipartisan support, also promises to dramatically accelerate the pace of American innovation and the success of U.S. entrepreneurs, who have historically been responsible for virtually all new job growth across the country. Here are five highlights:
  - 1. **Boosting access to capital for high-growth companies:** America's most innovative companies need equity capital to grow and hire faster. As part of the President's [Startup America](#) initiative, the Administration will work to unlock this capital through smart regulatory changes that are consistent with investor protection. This means reducing the disproportionately high costs that smaller companies face when going public, as well as raising the cap on "mini" public offerings (Regulation A) from \$5 million to \$50 million. It also means responsibly allowing startups to raise money through "crowdfunding" – gathering many small-dollar investments that add up to as much as \$1 million. Right now, entrepreneurs like [these bakers](#) and [these gadget-makers](#) are already using crowdfunding platforms to raise hundreds of thousands of dollars in pure donations – imagine the possibilities if these small-dollar donors became investors with a stake in the venture. Steve Case, chairman of the [Startup America Partnership](#), noted after he joined the First Lady as a guest at the President's speech, that "High-growth entrepreneurial businesses have been responsible for nearly all of the net jobs created in the last three decades – so policies that make it easier for entrepreneurs to start and expand companies must be at the epicenter of any jobs effort. While Republicans and Democrats don't seem to agree on much these days, they do agree that entrepreneurs hold the key to a bright economic future. Therefore, I hope both parties will put politics and partisanship aside, and work together to ensure the success of the next generation of great American companies."
  - 2. **Turning job-seekers into job-creators:** Through innovative use of Federal unemployment insurance funds,

- Right Sidebar:
- Search WhiteHouse.gov
- GIVE FEEDBACK ABOUT THIS PAGE
- YOUR FEDERAL TAXPAYER RECEIPT (with a "Launch the Receipt" button)
- WHITE HOUSE BLOGS (with a list of various White House blogs)




# The NEW topic of conversation for pundits!



# The NEW corporate answer !?

The screenshot shows a Firefox browser window with two tabs. The first tab is open to a Yahoo! news article titled "Executives tell Obama how to create jobs" by Reuters, dated 4 hours ago. The article discusses a report from the President's Council on Jobs and Competitiveness, featuring comments from GE CEO Jeffrey Immelt and other executives. The second tab is open to a blog post titled "Obama's jobs council wants help for startups, but will that spur hiring?" by Zachary Roth, dated 5 hours ago. The blog post critiques the council's approach, arguing that focusing on new startups is less effective than supporting established businesses. The browser's address bar shows the URL for the news article, and the taskbar at the bottom displays various application icons and the system clock showing 6:04 PM on 10/11/2011.

## Executives tell Obama how to create jobs

REUTERS By Laura MacInnis | Reuters - 4 hrs ago

WASHINGTON (Reuters) - President Barack Obama could create millions of jobs by attracting more foreign capital to the United States, helping entrepreneurs and being more aggressive in energy, business leaders said on Monday.

In a new report, the chief executives of GE, Intel, Boeing and other companies also backed White House proposals to fix infrastructure like airports, railways and electricity grids and to expand broadband Internet networks as a way to boost hiring and speed up flagging growth.

"If Washington can agree on anything, it should be this -- and it should be now," the President's Council on Jobs and Competitiveness said in the report, to be presented to Obama at a meeting in Pittsburgh on Tuesday.

GE chief executive Jeffrey Immelt, who also chairs the non-partisan advisory panel, said the long list of proposals -- which include streamlining drug approvals, reducing costs of initial public offerings and improving air traffic control -- could have a big impact taken together.

"We never thought there was going to be a silver bullet to create jobs," Immelt told Reuters in a telephone interview.

"What we want to offer the president is a very broad set of ideas that can help me...," he said. "It's..."

## Obama's jobs council wants help for startups, but will that spur hiring?

By Zachary Roth | The Lookout - 5 hrs ago

President Obama's jobs council is set to propose help for new start-up companies as a key component of its recommendations for encouraging hiring. But one expert on entrepreneurship says that's the wrong approach to the present jobs crisis.

The panel, which will hold its third meeting Tuesday, will propose that Congress eliminate taxes on income from investments of \$25 million or less in a privately held firm, so long as the investment is held for at least five years, according to a report in the Wall Street Journal. And the panel will also reportedly urge cuts to corporate income taxes for the first three years of a new company's existence.

But Scott Shane, an economics professor at Case Western Reserve University, thinks the focus on startups is off base. "Most of the businesses that create jobs are not new—they're more established businesses," Shane, the author of the 2008 book, "The Illusions of Entrepreneurship: The Costly Myths that Entrepreneurs, Investors, and Policymakers Live By," told The Lookout. "The businesses that are brand new in a given year are only accounting for a couple percentage points of total employment"—in large part simply because there are so many of them.

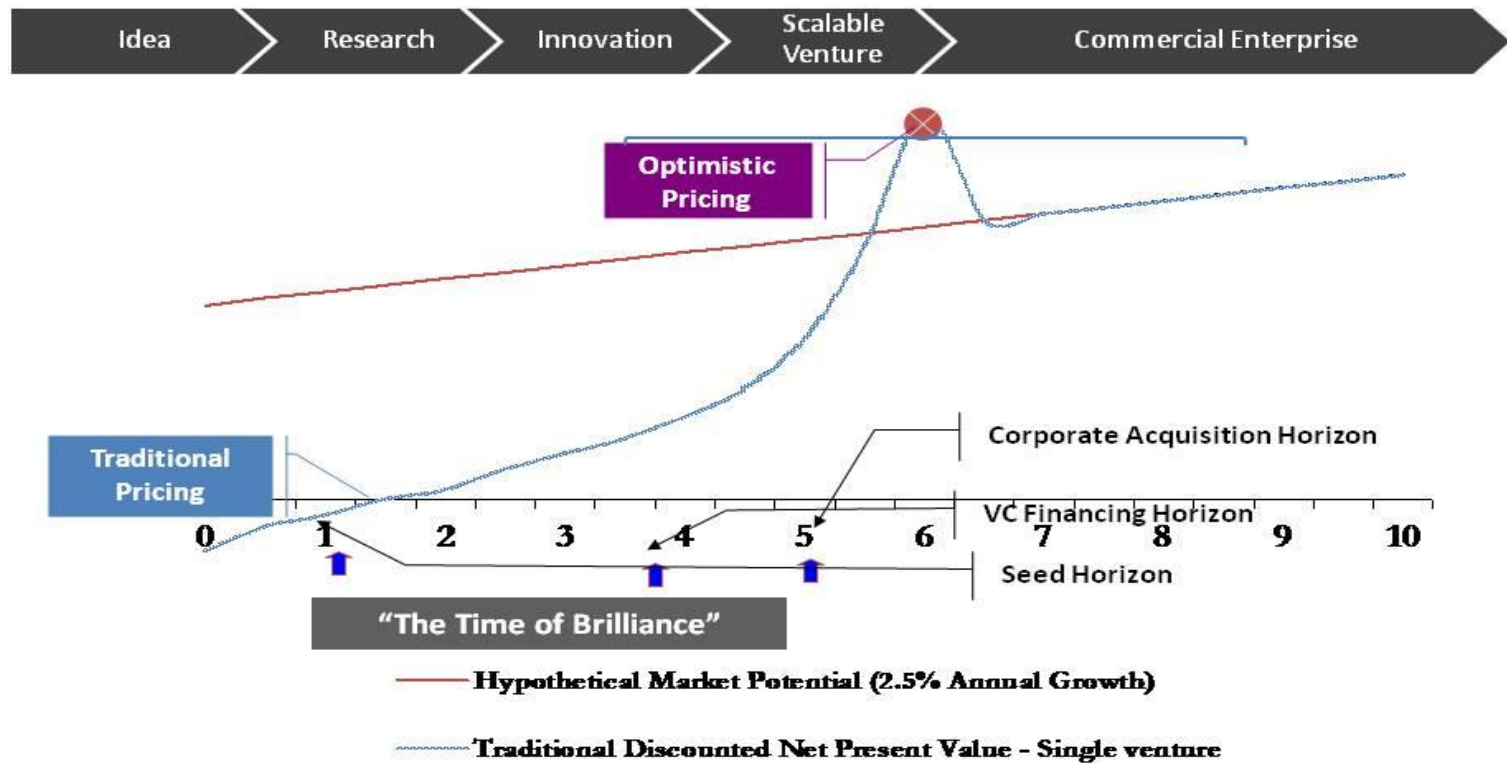
"A tax cut for new businesses doesn't do a lot for existing businesses," he said.

Nor, despite the hype, are the major job creators likely to be dynamic, new-economy companies, he said. "These policies assume a small number of super high-growth businesses are where jobs are created," Shane continued. "Like you're going to get the next Apple or Google." In fact, he said, the bulk of actual job creation is more mundane. "It's getting another barber in the barber shop, another person working at the dry cleaner."



# Open Innovation – The *NEW* solution for growth...

Figure 2:  
Stage Dependent Value of Research to Commercial Enterprise – years versus arbitrary \$





# Open Innovation – The *NEW* solution for growth...



# Corporate Implications...

## Open Innovation.....

### – IDENTIFICATION

- Defined strategy for growth and *jobs*
- Defined aligned collaborations
  - Universities; other companies in value/supply chain; start-ups

### – ACQUISITION..

- Warchest with defined process and criteria
  - Within CVC portfolio
  - Build by external funding and acquisition
- Courage and conviction to act

### – ON BOARDING AND INTEGRATION





# MOSTLY it takes....

- **R – E – S – P – E – C – T .....**
- **For the ...**
  - **Passion**
  - **Hard work**
  - **Energy**
  - **Skill**
  - **Dedication**

**REQUIRED TO COMMERCIAL A TECHNOLOGY  
WITH NO “corporate cover”**



# VALLEY OF DEATH:

Science and engineering innovators – and **CHEMICAL COMPANIES** - are challenged in converting research into commercial innovations, the so-called “Valley of Death”



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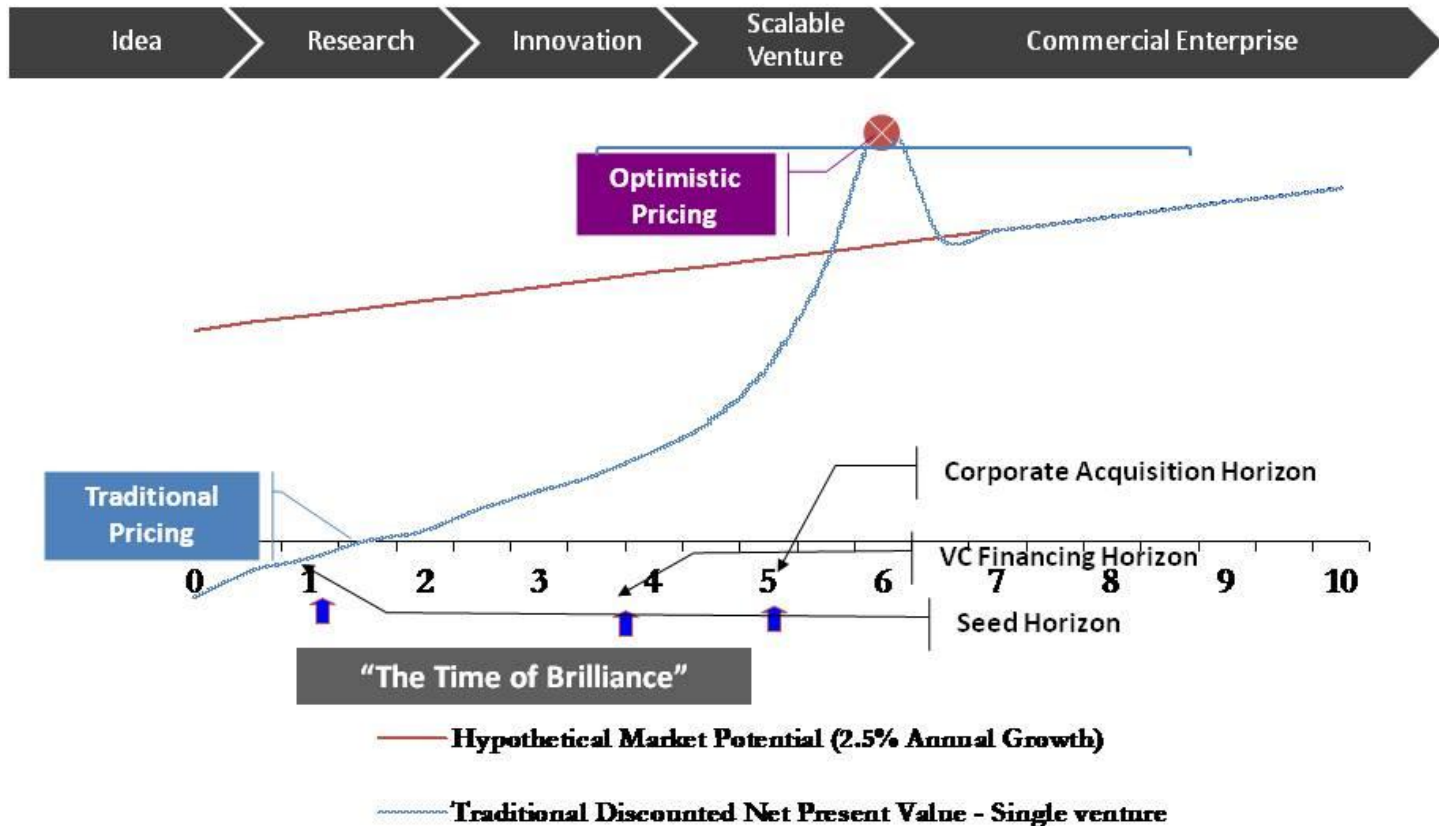
# TIME OF BRILLIANCE



# TIME OF BRILLIANCE

Figure 2:

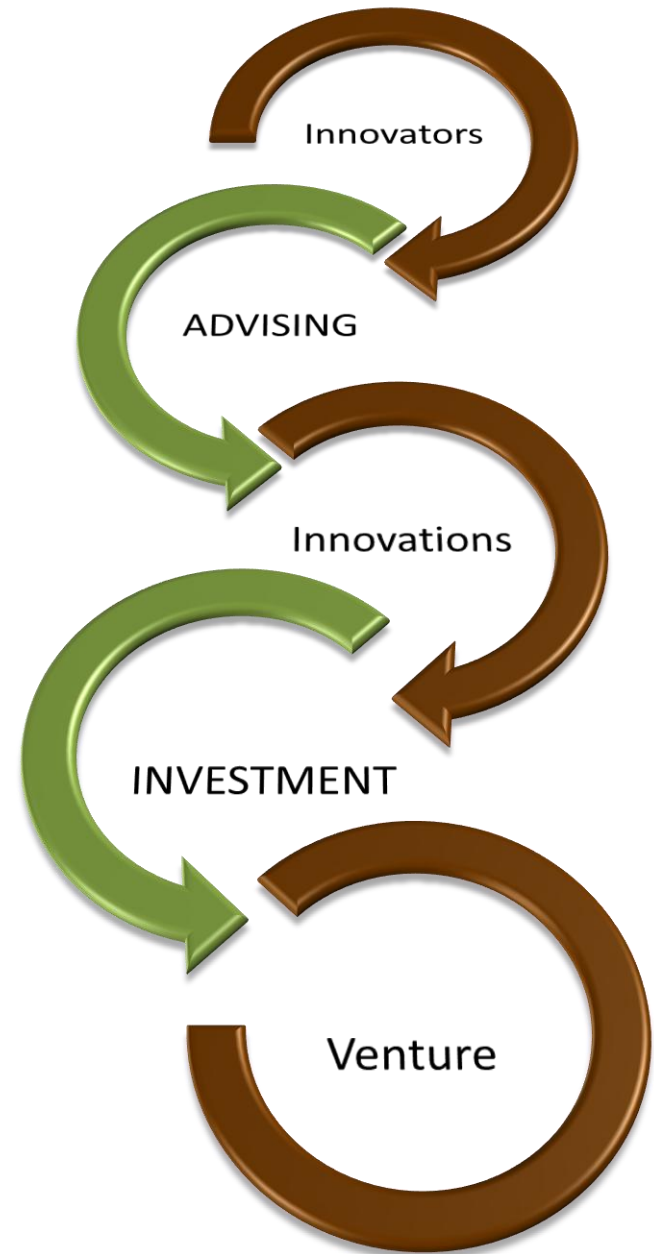
Stage Dependent Value of Research to Commercial Enterprise – years versus arbitrary \$





# It's a HEAVY LIFT and a CONTACT SPORT..

- **Respect** the *innovator* at least as much as the *innovation*
- **Educate** for research *and fast* innovation and iteration. R2I2V is an interdisciplinary process – which can be taught and learned.
- **Address** the challenges in venture formation head-on
- **Embrace Diversity** not all innovators or entrepreneurs are “traditional” MBA's





# PUBLICATION...PREPRINT

- ASEE
- Defines pedagogic background
- Discusses original research and lit references

## Transforming the Practices and Rationale for Educational Programs to Aid Academic Researchers in Translating Research into Innovations and Ventures

Judith C. Giordan, Joseph Steig, Angela Shartrand, Phil Weilerstein  
National Collegiate Inventors and Innovators Alliance  
Accepted for Publication ASEE, March 2011

### I. The innovation challenge

#### Overview

*One of our hopes is that... there will be full employment, and that the production of goods and services will serve to raise our standard of living... Surely we will not get there by standing still, merely by making the same things we made before and selling them at the same or higher prices. We will not get ahead in international trade unless we offer new and more attractive and cheaper products... There must be a stream of new scientific knowledge to turn the wheels of private and public enterprise. -- Vannevar Bush, 1945 [1]*

The translation of basic scientific research to practical and deployable innovations that benefit people and the planet is as old as human history itself. From the discovery of the uses of fire to the transformative basic research that is the basis for space exploration, humans have translated scientific research into technological innovations that have advanced society.

To address the complex challenges faced by our planet and its inhabitants, many studies over the last fifteen years have pointed to the need for those formally trained in the science, technology, engineering and math (STEM) disciplines to be more broadly and flexibly educated to meet the demands of the 21<sup>st</sup> century. It has been suggested that this broader education consist not only of greater depth in a given STEM discipline<sup>1</sup> but also include additional interdisciplinary scientific skills,<sup>1-3</sup> the ability to participate in the translation of research into innovations that become products and processes that address societal problems,<sup>4</sup> and the desire and skill to work collaboratively in developing and implementing those innovations.<sup>5</sup>

Engineering education has traditionally been focused on preparing students to effectively apply scientific principles in order to design and develop useful things.<sup>6</sup> While this remains the essence of engineering training, there is an urgent need to equip engineers with better translational skills and the ability to see opportunity in and translate scientific research into practical applications. This is even more important in the increasingly interdisciplinary environment of science and engineering. The once clear demarcation between scientist and engineer has become less sharp. Biologists engineer life forms and engineers increasingly pursue research that is at the boundary of interdisciplinary engineering knowledge, but engineers often remain key mediators of discovery to useful and commercially viable applications.<sup>7</sup>



# RESPECT: INNOVATOR AND INNOVATION

•It is not a single event...NO one learned P Chem the first time round!

Idea

Research

Innovation

Scalable  
Venture

Commercial  
Enterprise

**Ongoing Education and Training**

**Business Advising**

**Funding**

Acknowledge

Aware

Accept

Act

Accomplish



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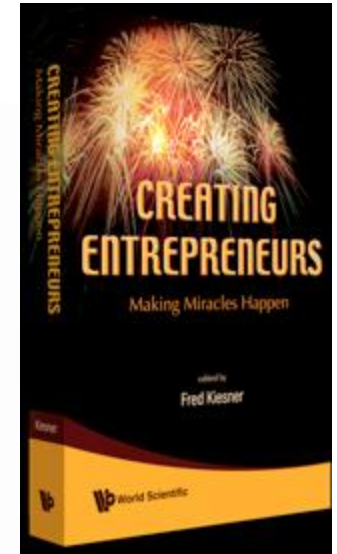
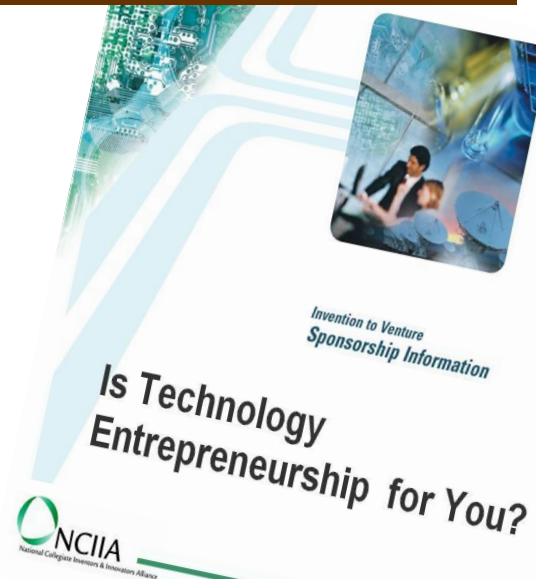
# EDUCATE... TO INNOVATE

Only 1 percent of more than 200 [U.S.](#) entrepreneurs surveyed cited higher education as a significant motivator toward starting their own venture, while 61 percent cited their "innate drive." Northeastern University Survey

Entrepreneurs are born, but can they be taught? By Jim Hopkins, USA TODAY



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**Are Entrepreneurs Born or Made?**  
Two-thirds of entrepreneurs claim they were inspired by innate desire, not education or training, according to a new survey.  
By Leslie Taylor | Inc. | Oct 24, 2006

Southern Miss  
Ole Miss

# ADDRESS - CHALLENGE #1: dealflow

Innumerable undifferentiated “top of funnel” opportunities

INVITURE  
**BUSINESS  
PLAN  
COMPETITION**



**\$100K**  
MIT ENTREPRENEURSHIP COMPETITION

accelerate>>MICHIGAN™  
INNOVATION COMPETITION

USF  
UNIVERSITY of  
SAN FRANCISCO  
International Business Plan Competition

mic mass  
CHALLENGE

2011 RICE  
UNIVERSITY  
BUSINESS PLAN  
COMPETITION  
Sponsored by Administaff  
World's Richest and Largest Business Plan Competition April 14-16, 2011



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# CHALLENGE #2: PROCESS, ADVICE, SUPPORT and PRACTICE

An ecosystem that efficiently validates and structures seed stage deals exists only in Web 2.0, not for STEM ventures



Combinator



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# CHALLENGE #3: Lost in translation

- Low success of STEM translation to commercialization
- Need to “fail fast and iterate” ..not easy in STEM



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# Business Case for Diversity



## Creates

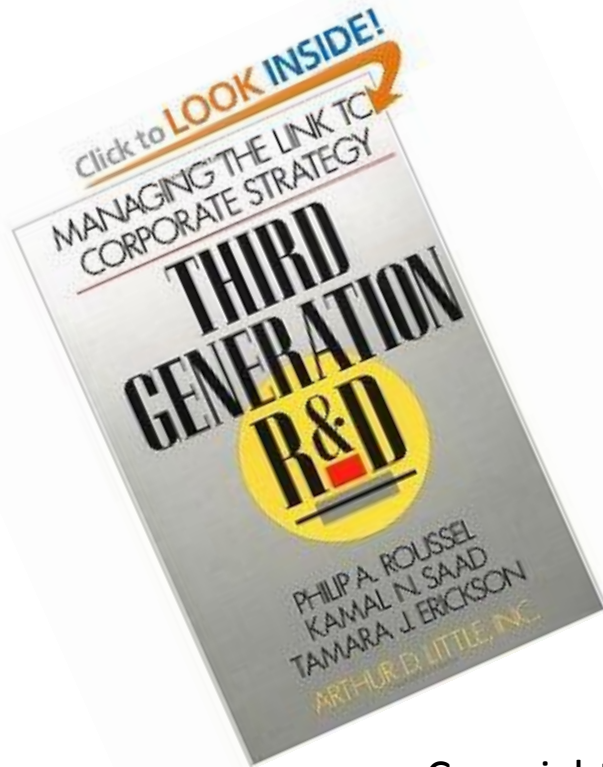
Operational  
Reputational  
Financial

## Value

## NOT a compliance exercise



# It's not like we NEVER HEARD of this....



DOWN with *functional*  
silos...  
UP with *business* silos!

Copyright 1991!

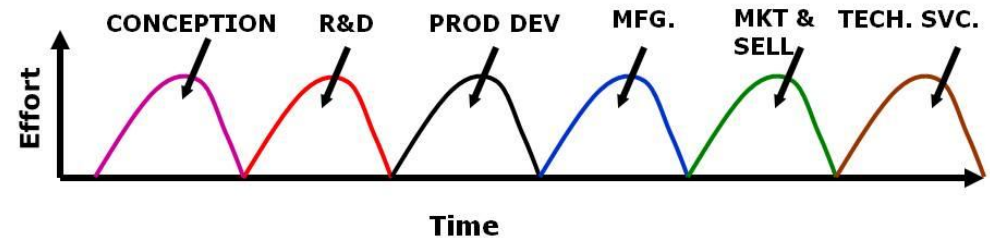


# Embracing the value of *FUNCTIONAL* diversity....

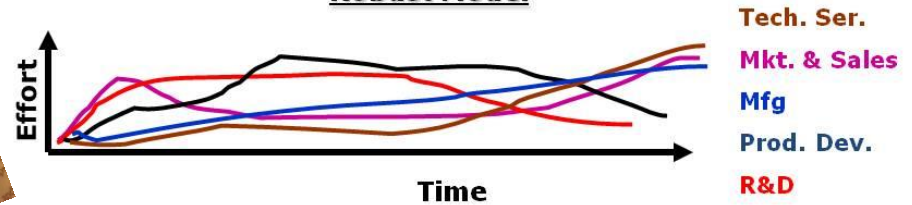


## Cross-Functional Teams

### Dysfunctional Model



### Robust Model





# It's not like we NEVER HEARD of this.... *CULTURAL Diversity...*

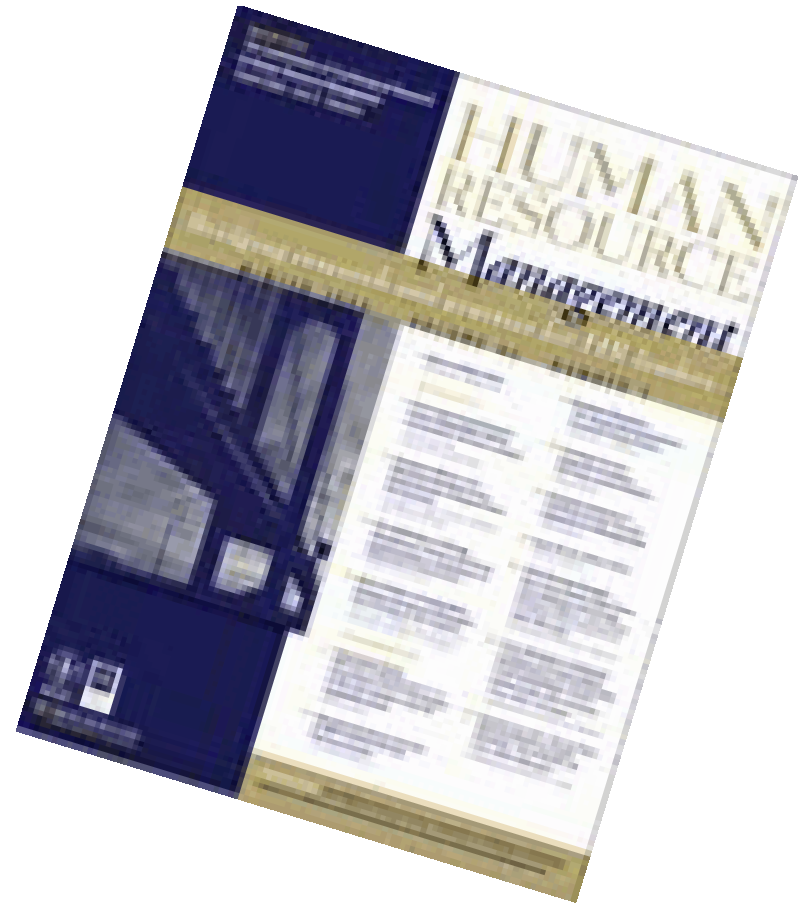
## **BLUES** and **GREENS**

Hierarchy of cultural imperatives

- Country

Industry

Company



**Andre Laurent- Insead Professor  
Human Resource Management Spring 1986!**



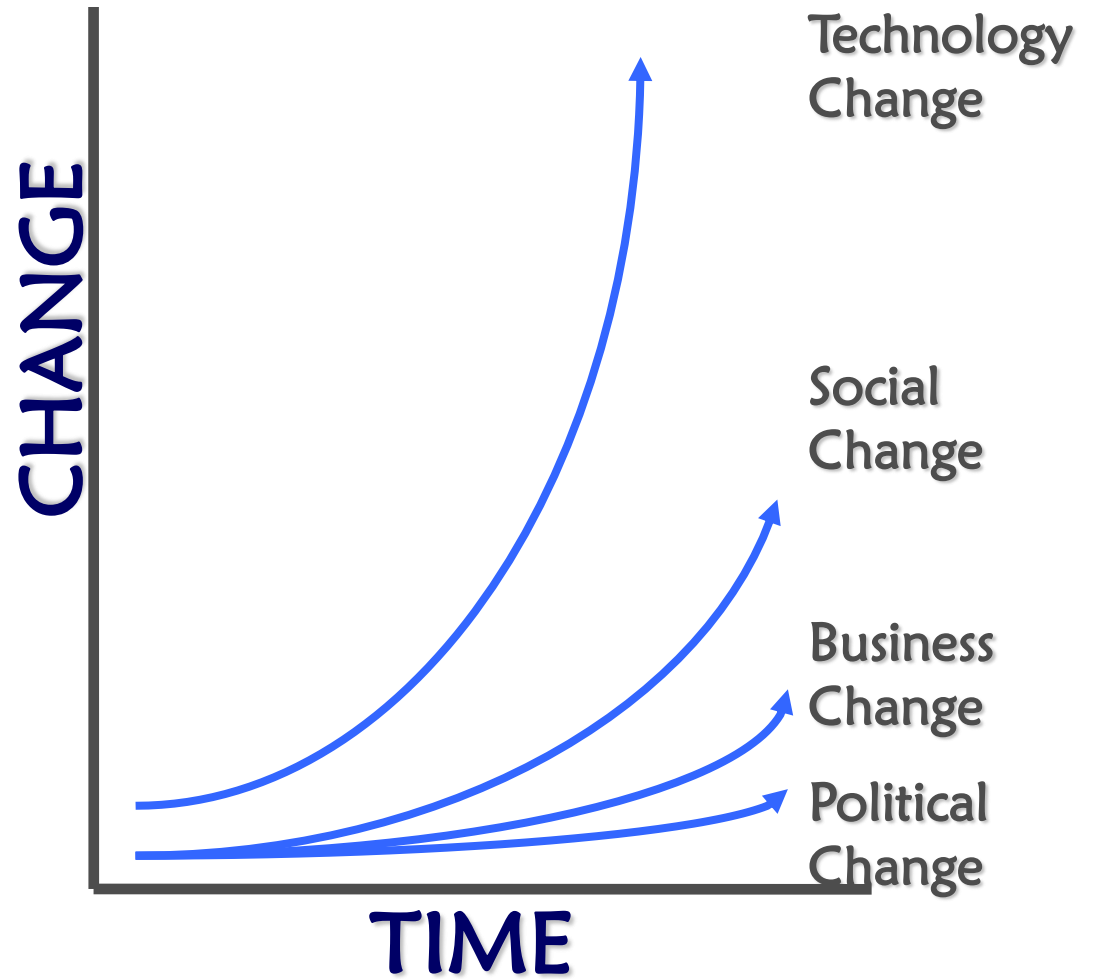
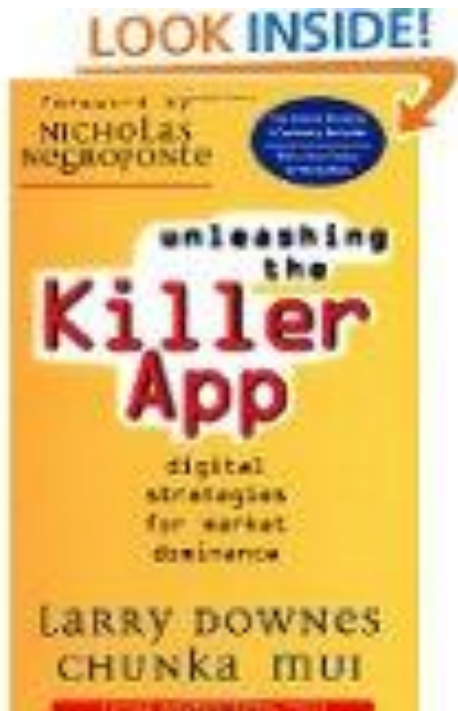


**But it IS NOT easy...unless we help it out...**

**The data say it's an uphill battle**



# 1998



Harvard researcher, John Kotter in the early nineties demonstrated that so called “adaptive cultures” dramatically outperformed “non-adaptive” cultures across a variety of indicators.

Success Indicators	Adaptive Culture	Non-Adaptive Culture
Increase in revenues	682%	166%
Expanded workforce (growth)	282%	36%
Increased stock price/market valuation	90%	74%
Improved Net Incomes	756%	1%

[http://workforcediversitynetwork.com/docs/business\\_case\\_3.pdf](http://workforcediversitynetwork.com/docs/business_case_3.pdf)

Business Case for Inclusion and Engagement. By Marcus Robinson, Charles Pfeffer, and Joan Buccirossi, (2003). wetWare, Inc. Rochester, NY.



# Voting with OUR FEET.....

- Each year, more than **2 million** people voluntarily leave organizations due to perceived unfairness (cumulative comments/jokes, unfair policies, perceived invisibility)
- **This trend costs U.S. corporations \$64 billion each year**

*Source: Level Playing Field Institute, "The Corporate Leavers Survey," 2007, LPFI.org  
[www.shrm.org/communities/volunteerresources/.../businesscase.ppt](http://www.shrm.org/communities/volunteerresources/.../businesscase.ppt)*



# It's about to catch up with US....

- ✦ By 2042, there will be **no single majority demographic**; people of color will comprise more than **50% of the U.S. population.**
- ✦ Our labor market, like our economy is irreversibly global.
- **46% of employees who experienced intolerance/discrimination indicated they would remain with the organization vs. 71% of employees who had not.\***

\* The Gallup Organization. *Employee Discrimination in the Workplace, Public Opinion Poll.* December 8, 2005.







**Defining diversity solely as race and gender  
can have a detrimental effect...**

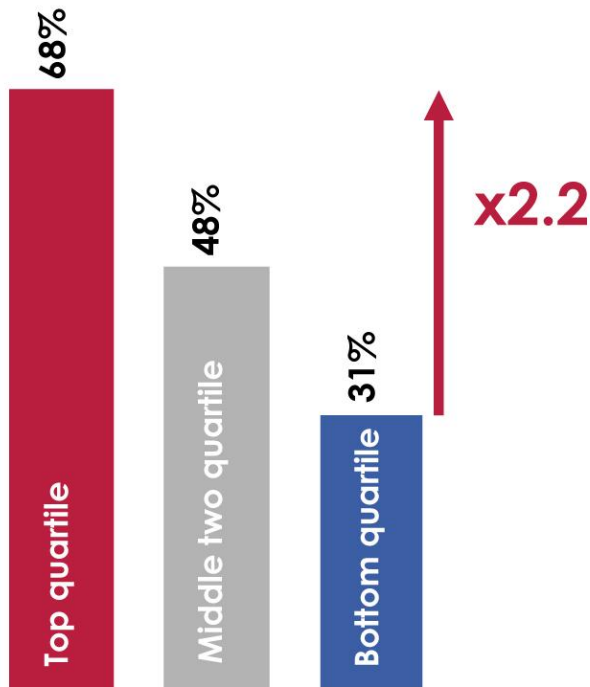
***Inclusion and multidimensionality* are  
essential in defining diversity in order to gain  
acceptance.\*\***

**\*\* Stella M. Nkomo. "Identities and the Complexities of Diversity," in Susan Jackson and Marian Ruderman (eds.),  
*Diversity in Work Teams: Research Paradigms for a Changing Workplace*, 1999.**



# Women Make the Difference

Gender diversity improves the probability of having an above-average EBITDA%



Source: McKinsey & Company, 2007

- *American companies would do well with more senior women. And the world would do better with more women entrepreneurs!*

**Fixing the Economy? It's Women's Work.**

*By Katty Kay and Claire Shipman*

Boston Globe

Sunday, July 12, 2009



# More Facts....Pepperdine University

- **Fortune 500 firms with the best records of putting women at the top are...**

**18 to 69 %**

**more profitable**



## More Facts....Catalyst

- Companies with **three or more women on their boards...**

**...outperformed the competition on all measures by at least**

**40 %**



# More Facts... Center for Venture Research at the University of New Hampshire

- 2007 submitted proposals to angel funds in the US

**9% v 92%**

Women v Men

... but women received funding at equal rates to men

**~14%**





# Diversity = Superior Intangible Asset Management



- Diversity improves
  - Operations, reputation, finance
- This is why
  - No single expert is better than an *informed, knowledgeable* and diverse group.
  - It's in the math!

## Why it has to be women

Equality of opportunity is not just a matter of improving corporate diversity profiles. The simple fact is that companies that employ a number of women in senior positions tend to do better on a range of key measures than those that do not

By Judith Giordan

Women are tangible. We are flesh and blood capital and smart – and we deliver results. But the value we bring to an organisation has traditionally been viewed as intangible – or, not really at all, directly measured or able to be captured on a balance sheet – until now.

It's not hard to see why. For the past 100 years, the average annual rate of return on the stock market has been around 10%, with a peak including Charlie Blue, Ken Cusick and Jerry Seinfeld in the latter 1990s. The 1990s were the heyday of the 1990s. The 1990s were the heyday of the 1990s. The 1990s were the heyday of the 1990s.

and represent efforts to maximize an often-neglected intangible asset – the value of women and diversity in business for results and corporate reputation.

Simply put, the data shows that the presence of women in corporate leadership positions adds tangible to the bottom line, and the National Association of Corporate Directors reported that companies with women on their boards generate 21% in total compensation by increasing market value, enhancing brand strength, keeping the stock price high and improving corporate reputation. This paper reviews the evidence that there is a compelling business case – in terms of operations, reputation and finance – for promoting women into positions of corporate leadership and having women on the board. It also provides recommendations for specific actions women and companies can take to enhance and successfully engage in the pipeline.



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# Technology Commercialization is a CONTACT SPORT...

- **NEW RULES...**

- Acquiring “ventures” MUST fill the empty pipeline
  - Respect the work that was done to develop the “venture”
  - “Pay the price” to mitigate the risk and get value – and ACQUIRE
- Hire...if people don’t have jobs, they can’t buy stuff – so when you do acquire – find ways to sustain employment
  - Scientists and engineers are NOT disposable! Especially not from an acquired venture!
- Respect and use diversity as your (not so) secret weapon for success!
  - LISTEN to what “diverse” populations have to say!



# Technology Commercialization is a CONTACT SPORT...and the planet is at stake



## CALL TO ACTION – for Investors!

- Companies with ANGEL INVESTMENT are more likely to succeed and have better exits!
- MAKE CONTACT!
  - YOUR expertise is needed!
  - YOUR investment is needed!

# SEA – Science and Engineering Angels...



ecovative design

We identify and develop “angel appropriate”  
technology ventures:

- “millions not tens of millions” of capitalization
- 36 months to revenue
- Focused on sustainable materials and clean energy

QTEROS



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**Science and Engineering Angels (SEA)\***  
**An angel fund for science and engineering ventures**  
**focused on sustainable materials and clean energy.**



**Dr. Judith Giordan, Partner, ecosVC**

[judy@jgiordan.com](mailto:judy@jgiordan.com); [www.ecosvc.com](http://www.ecosvc.com)

- Also: Senior Advisor to the National Collegiate Inventors and Innovators Alliance
- Managing Director, Intangible Asset Finance for Steel City re



**Mr. Joseph Steig, Partner, ecosVC**

[joseph@steig.com](mailto:joseph@steig.com); [www.ecosvc.com](http://www.ecosvc.com)

- Also: Director of VentureWell, an initiative of the National Collegiate Inventors and Innovators Alliance
- CFO of Long River Ventures



\*General Partner – ecosVC; Managed by Angel Catalyst



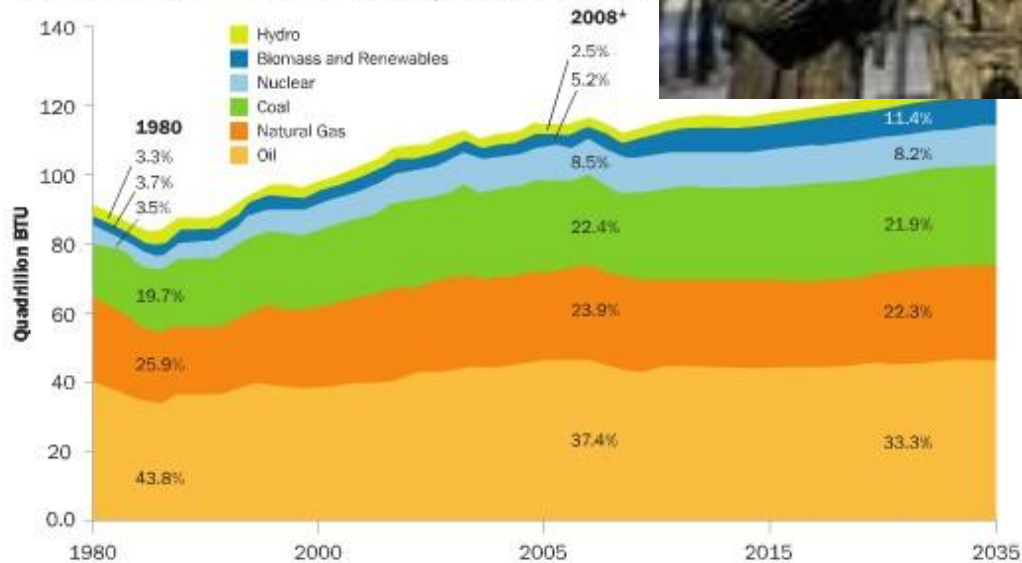
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