

# *Succeed with Inquiry: Insights, Knowledge, Action*

In2:In Thinking Network 2014 Forum

June 18 ~ 22<sup>nd</sup> 2014

Los Angeles, CA

Yámana Science and Technology ...bringing forth the best in science and society

平衡

[www.yamanascience.org](http://www.yamanascience.org)

# The Fragility of Knowledge:

## Science in a Time of Transition

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Yámana Science and Technology ...bringing forth the best in science and society

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We are in interesting times...

Our global systems are under stress:  
ecological, financial, political ...

Science is no exception...

# Confluence of Three Eras

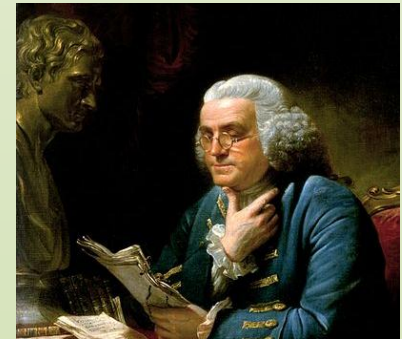
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- The academic institution (~ 1000 yrs)



- The age of enlightenment  
(~ 400 yrs)

The White House Historical Association



- Vannevar Bush's policy for science in the United States  
(~ 70 yrs)

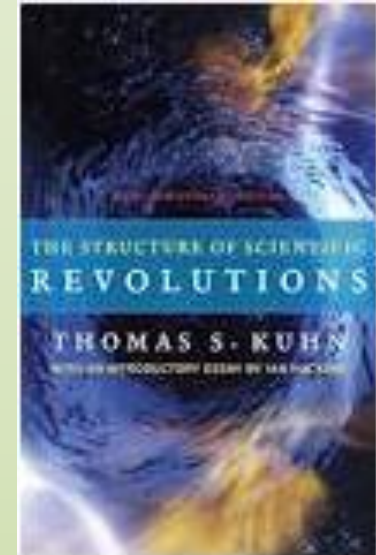
Her Majesty's Stationery Office



# Three Points Today

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- Science is undergoing a paradigm shift
  - 'Being' a scientist
  - The science itself
- Science as a participant on the planet



# Modern Era

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- Vannevar Bush's policy for science in the United States



Her Majesty's Stationery Office

# A growing need for STEM education....

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## SUCCESSFUL K-12 STEM EDUCATION

Identifying Effective Approaches in Science,  
Technology, Engineering, and Mathematics

Committee on Highly Successful Schools or Programs for K-12 STEM Education

Board on Science Education and Board on Testing and Assessment

Division of Behavioral and Social Sciences and Education

NATIONAL RESEARCH COUNCIL  
OF THE NATIONAL ACADEMIES

“16 of the 20 occupations with the largest projected growth in the next decade are STEM related

***but only 4 of them require an advanced degree.”\****

\**Monthly Labor Review*, 132 (11), 82-123



# SCIENCEINSIDER



BILL BRANSON/NATIONAL INSTITUTES OF HEALTH

**In trouble?** The U.S. biomedical research system, including labs such as this one at the National Institutes of Health, is in need of reform, according to four prominent researchers.

# Rescuing US biomedical research from its systemic flaws

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A call from the scientific elite to  
"confront the dangers at hand  
and rethink" **how academic  
research is funded, staffed,  
and organized.**

# Who says?

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## **Bruce Alberts**

Former president of the National Academy of Sciences  
and former editor-in-chief of *Science*

## **Marc W. Kirschner**

Founding chair of the Department of  
Systems Biology at Harvard Medical School

## **Shirley Tilghman**

Former president of Princeton University

## **Harold Varmus**

Nobel laureate, Director of the National Cancer Institute

# What do they say?

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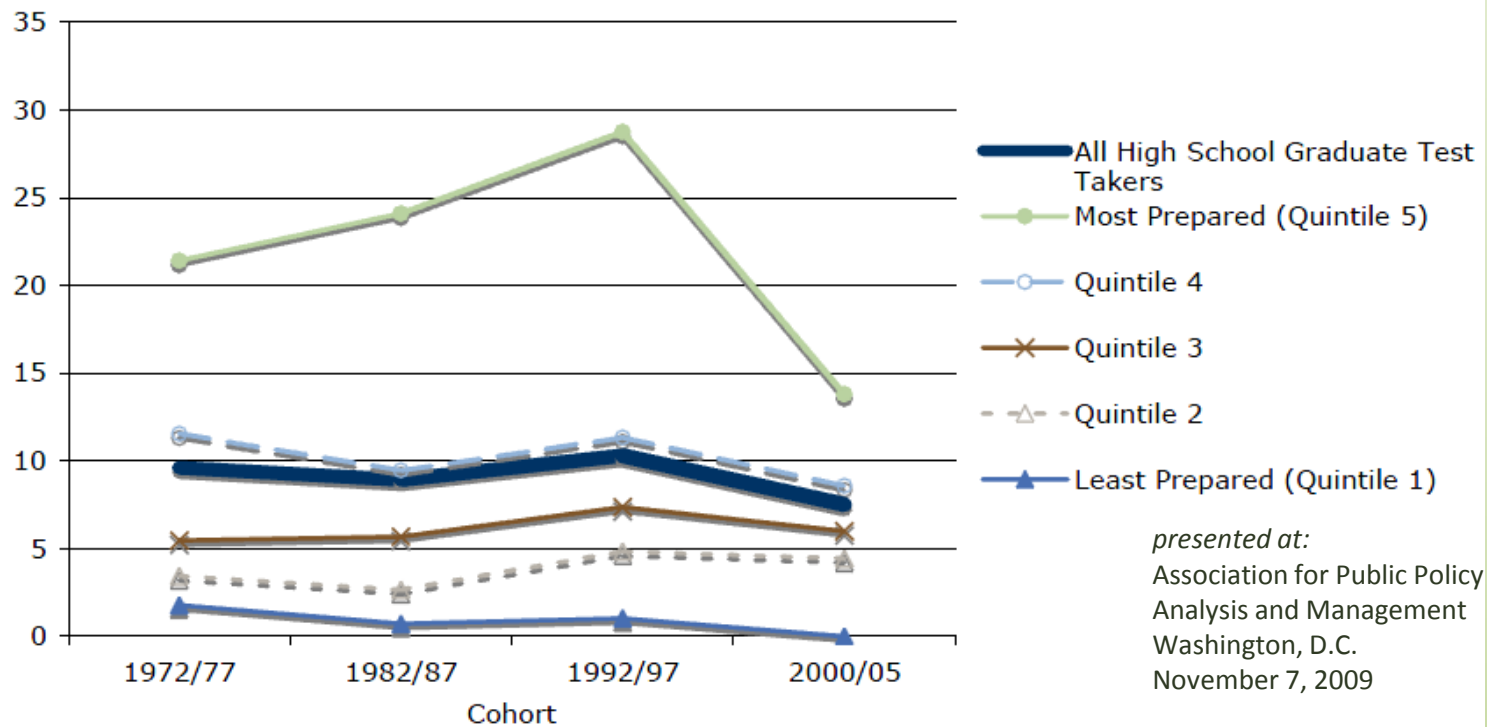
“Critical action is needed on several fronts by many parties to reform the enterprise”

# Steady as She Goes?

## Three Generations of Students through the Science and Engineering Pipeline \*

October 2009

Figure 1. Percent of High School Graduates who Major in STEM (obtained BA or enrolled in STEM program) by Level of STEM Preparation (Score on Math SAT/ACT)



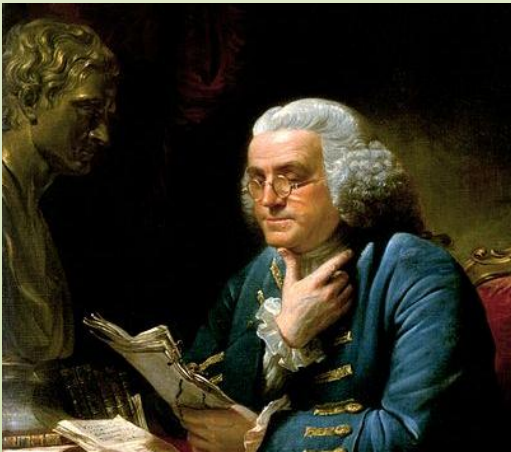
Study of labor statistics, high school test scores since 1972; B. Lindsay Lowell et al.

# The Second Confluence

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The age of enlightenment

(~ 400 yrs)



# The Amgen Study

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Amgen scientists reported they could only replicate 6 of 53 of cancer drug preclinical research results deemed landmark studies

(eg a 11% replication rate)

# Amgen

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“...the inability of industry and clinical trials to validate results from the majority of publications on potential therapeutic targets suggests a general, systemic problem.”



“On speaking with many investigators in academia and industry, we found widespread recognition of this issue.”

# John Ioannidis MD, DSc Stanford Medical School

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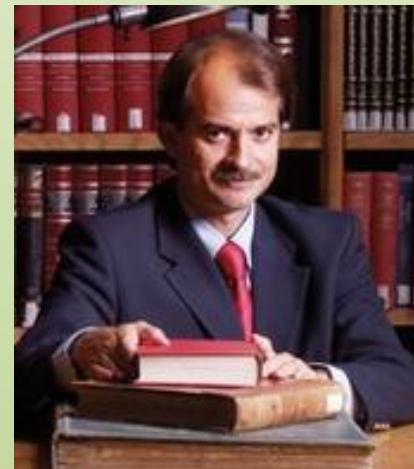
BRAVE THINKERS NOVEMBER 2010

## Lies, Damned Lies, and Medical Science

DAVID H. FREEDMAN | OCT 4 2010, 6:16 PM ET

*The Atlantic*

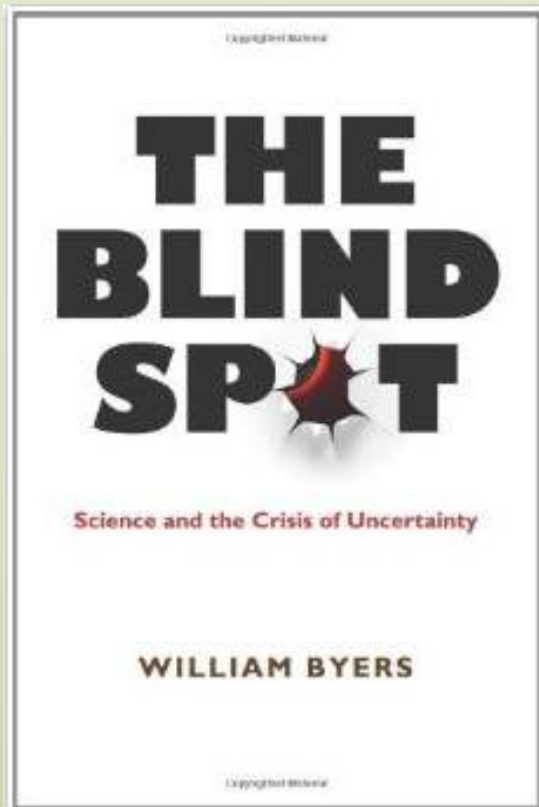
“Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true. “



# *The Blind Spot: Science and the Crisis of Uncertainty*

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by mathematician William Byers



- The nature of our rational consciousness *precludes* absolute, objective information
- Reminds us that science is open, not closed

# *The Blind Spot: Science and the Crisis of Uncertainty*

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- Savants that do math nearly instantaneously use a different path for thinking and calculation
- Idiot savants that can tell you if a 6 digit number is prime or not, yet didn't understand multiplication or division
- Much richer, intuitive mental process

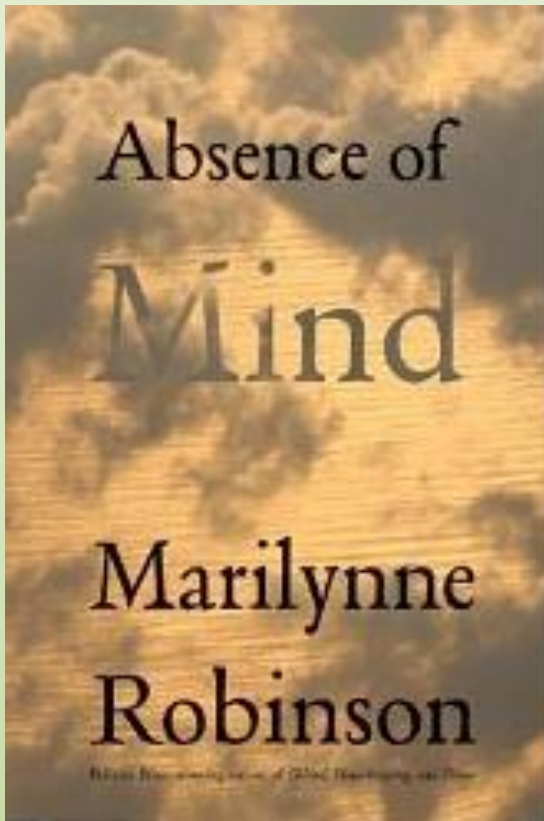
# *The Blind Spot*

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- Even more interesting, there is an inherent ambiguity, even for the most basic of mathematical constructs
- One of the myths of science is that the participant mode can be dispensed with

# Absence of Mind

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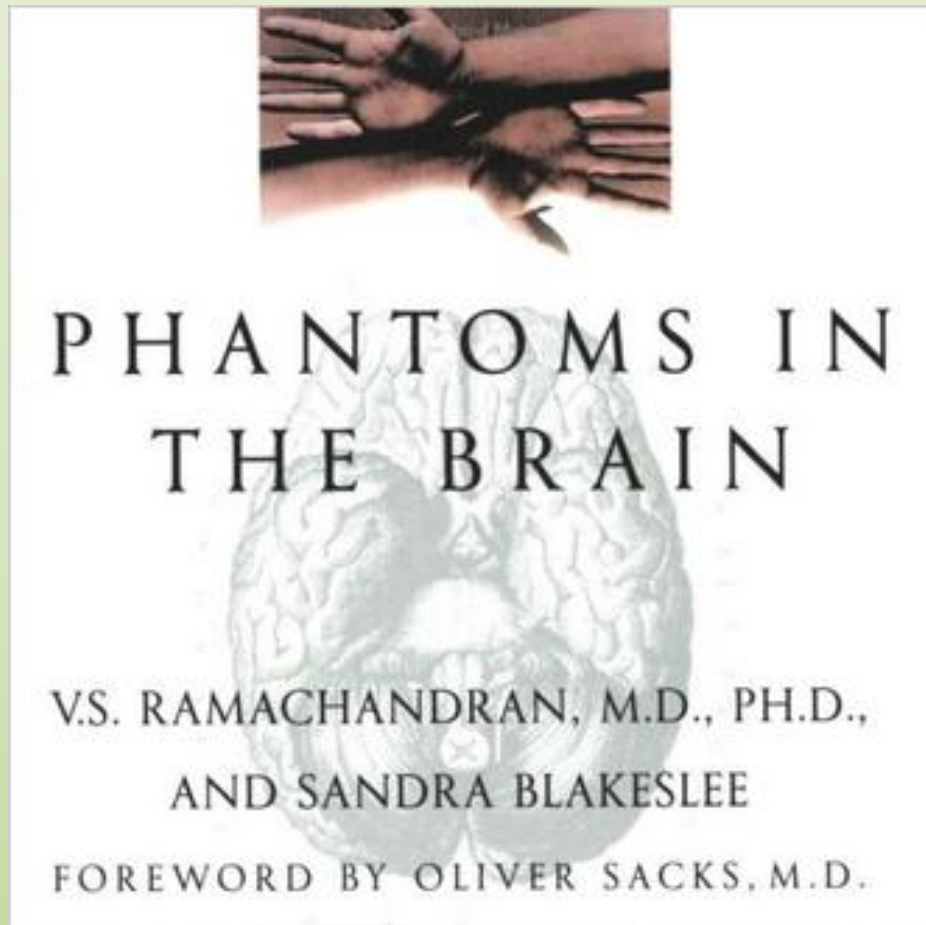


Eloquently calls into question the basic assumption that interior logic is free from the organic/self of the mind

- Perception is spread over 7 billion individual awarenesses
- And it can never be different

# Even our visual system is processed

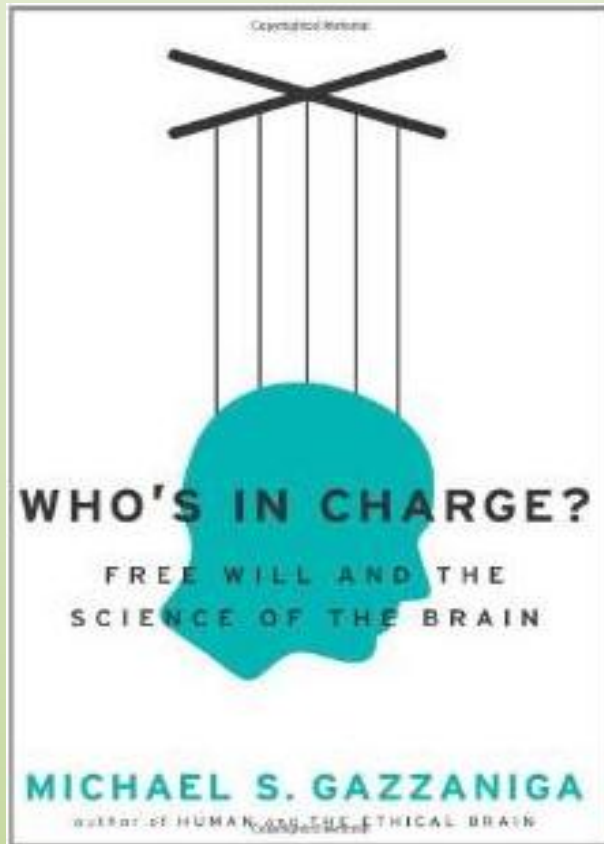
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# Who's in Charge?: Free Will and the Science of the Brain

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by Michael S. Gazzaniga



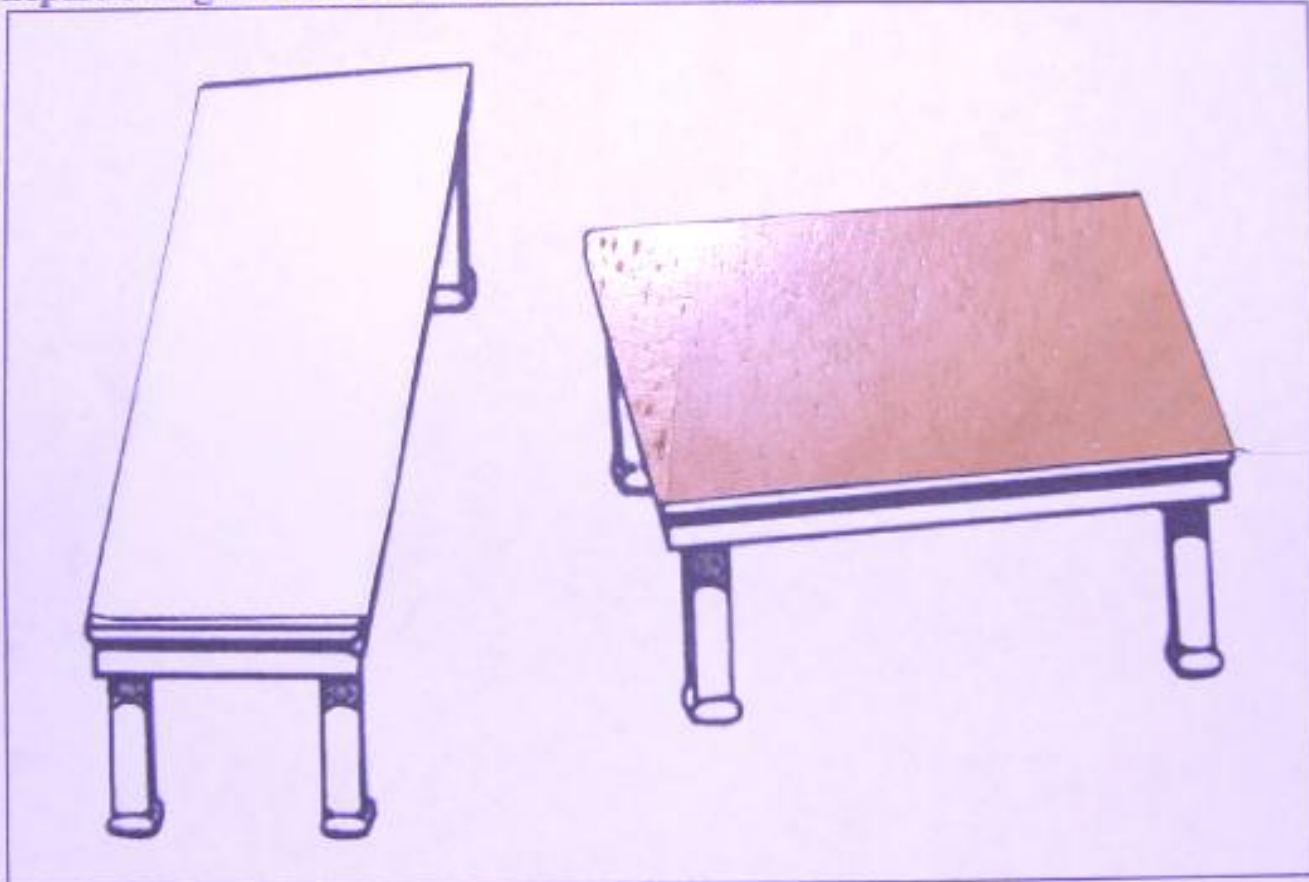
Neuroscientist involved in the early split brain assessments, where the corpus callosum was severed as a means of treating severe brain seizures



# ...and we think we're logical

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- Shepard's original table illusion was something like this:



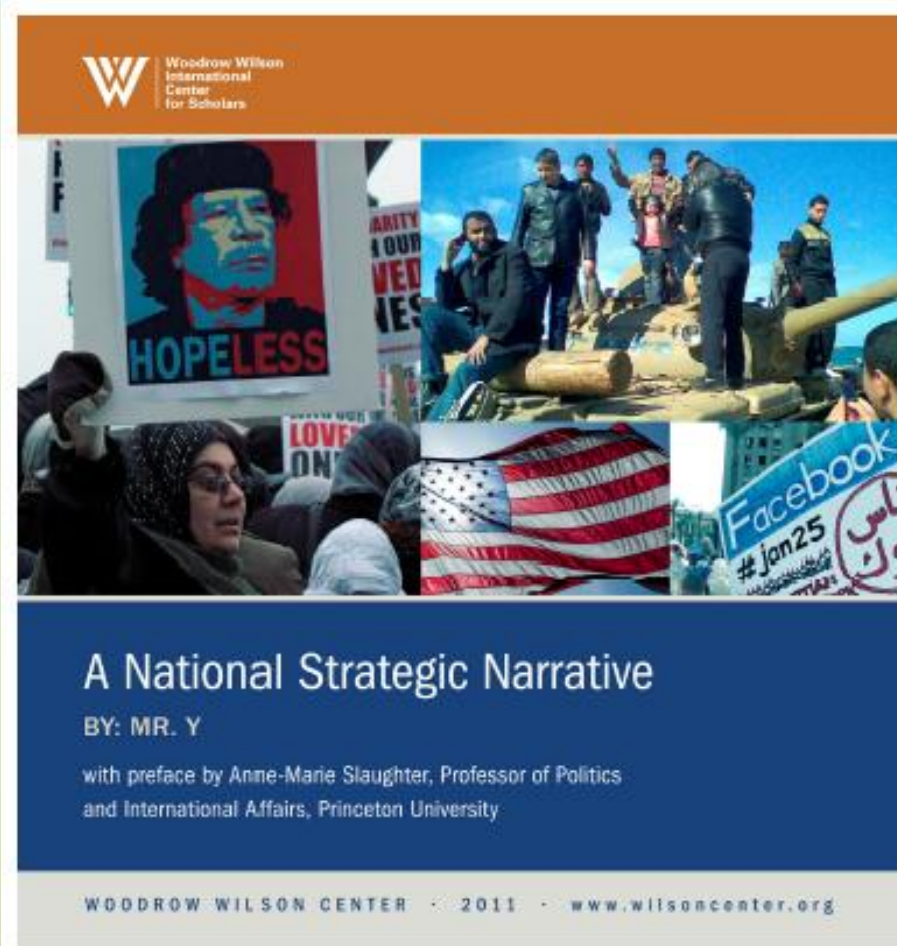
## Rhetoric and Its Relationship to Organizational Culture

Kenneth Burke “Even if any given [terministic screen] is a *reflection* of reality, by its very nature . . . it must be a *selection* of reality; and to this extent, it must also function as a *deflection* of reality.”

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From *Tribal Leadership* by Logan, King and Fischer-Wright

The inspiration of a new narrative...



Call for the United States Government to embrace a different foreign policy narrative

From Control to Credible Influence



**Roland Jackson**  
@Roland\_Jackson

A shift from top-down 'KING'  
model to a shared  
'Wisdom of the Crowds'  
model

Allowing a Complex System to self-organize –

HOW?

# Beyond dialog

- James Wilsdon & Rebecca Willis, Demos

## ‘See Through Science’



<http://www.nanoandsociety.com/framing/papers/SeeThroughScience.pdf>

Regional Innovation Initiative

# Collaborate.

Leading Regional Innovation Cl

## Compete.

Council on  
Competitiveness



Compete.  
Council on  
Competitiveness

# Confluence of Three Eras

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- The academic institution (~ 1000-2000 yrs)



The Ivory Tower

The Planet



# Enough Challenges to Go Around

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Coral Reef bleaches

Fish

Fresh Water (Aral Sea)

Unsustainable fuel  
sources/outcomes

Micro-environments, new chemicals

Green Revolution ... and outcomes

1973



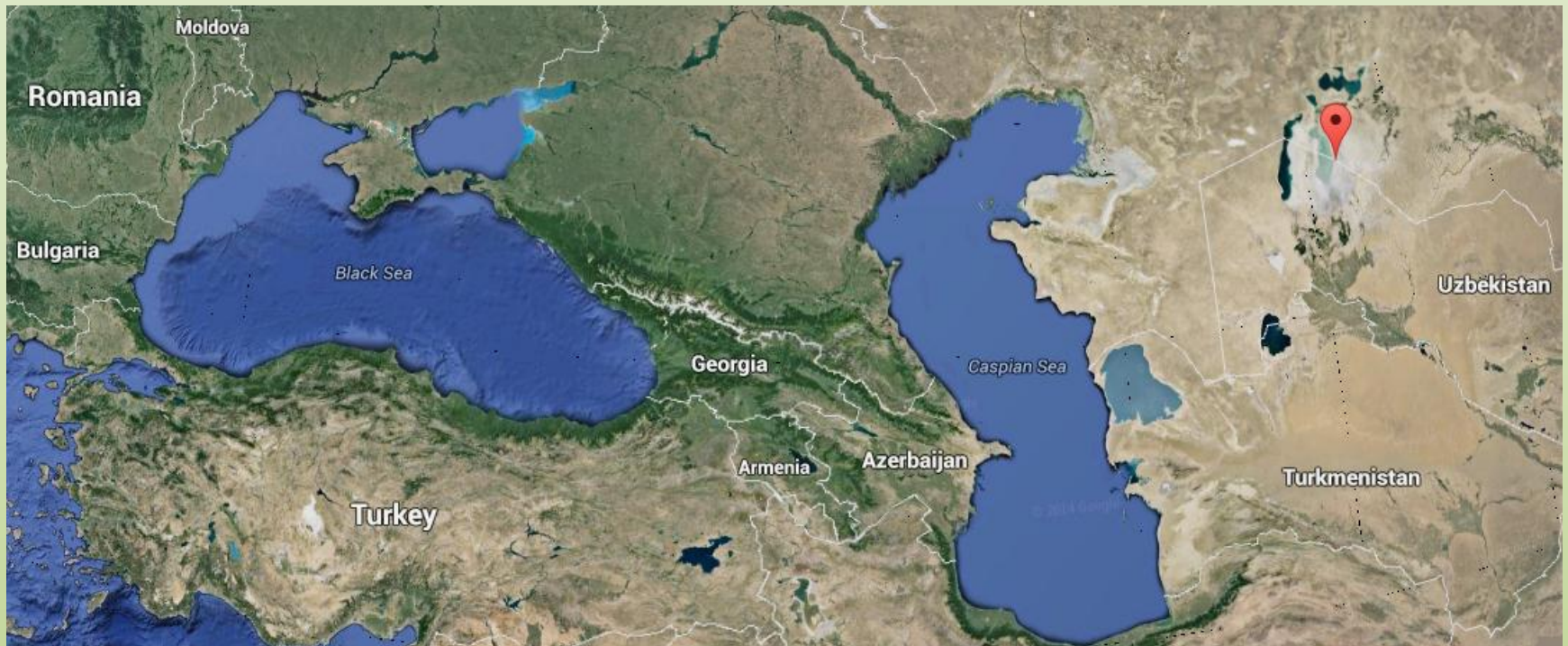
2009



# Aral Sea

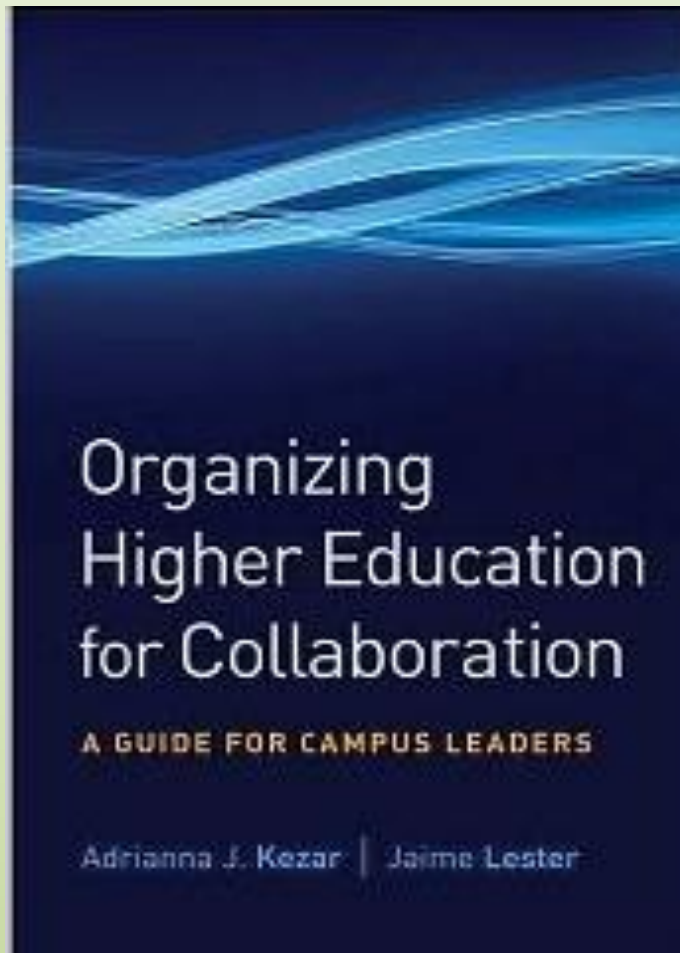
Currently

<http://bit.ly/JonFoleyInconvTruth>



# What's Happening in Universities?

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“Collaboration can be one of the most difficult and challenging human endeavors. Part of this difficulty is related to Western philosophies and values (to speak in the most generic terms) that celebrate the individual and structure institutions to support individual activity”

-from Kezar and Lester and references there-in

Regional Innovation Initiative

# Collaborate.

Leading Regional Innovation Cl

## Compete.

Council on  
Competitiveness



Compete.  
Council on  
Competitiveness

# Today: what to keep what to change

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## **Adaptive Change:**

**What's Essential and What's Expendable?**



**Conversation with Ronald Heifetz  
Harvard Kennedy School of Government  
June 23<sup>rd</sup>, 1999  
Claus Otto Scharmer**

# What to Keep?

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# What to Change?