

Lost in Translation: The Systematic and Comprehensive

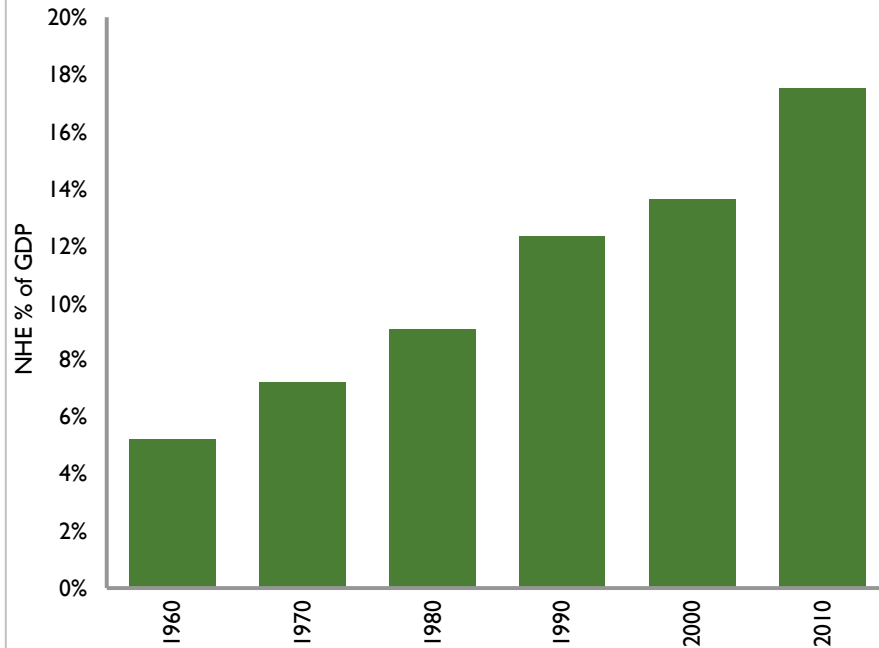
IOM Roundtable on Translating Genomic-Based
Research for Health
Beckman Center of the NAS&E
Irving, CA
December 3, 2012

Overall Healthcare Spend is High

NATIONAL HEALTHCARE EXPENDITURES GROWTH AND SHARE OF GDP OVER TIME

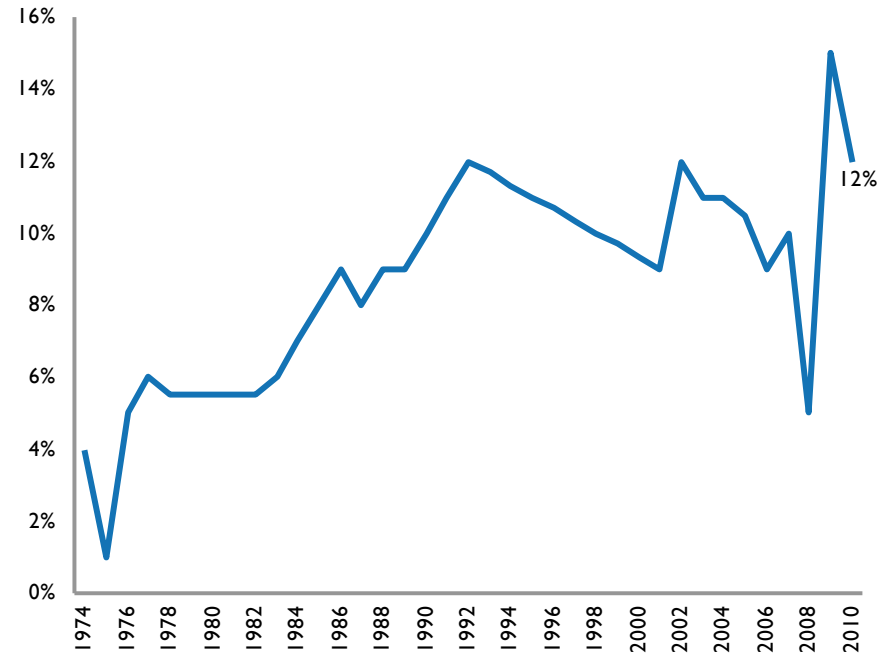
(\$ Billions)

■ NHE % of GDP



Source: Kaiser Family Foundation

HEALTHCARE CONTRIBUTION TO S&P 500 NET INCOME

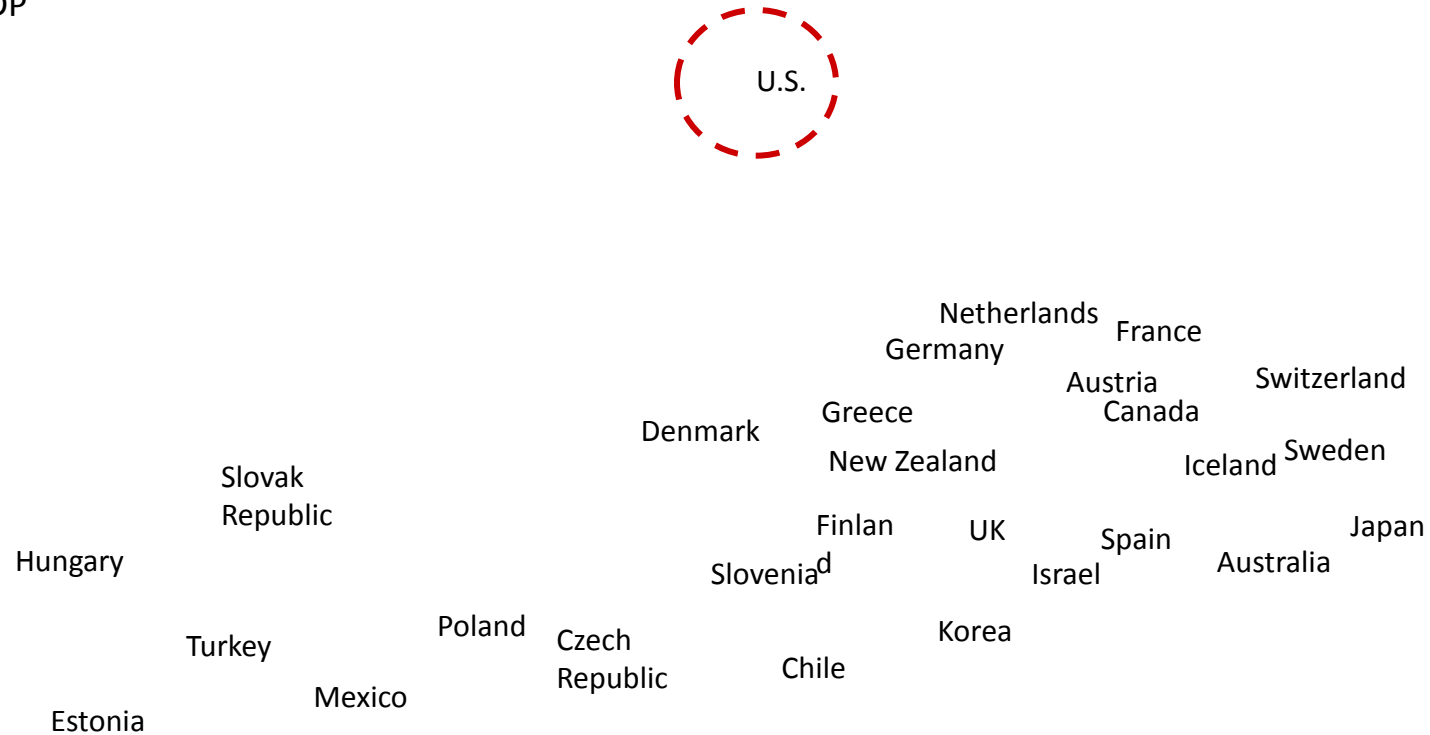


Source: Kaiser Family Foundation

Spend levels are high and increasing over time, with healthcare remaining a significant fraction of the economy

Are We Getting Our Money's Worth?

Healthcare Spend
as % of GDP



Average Life Expectancy at Birth

Source: OECD 2007 data (most recent date to include data for all of the countries above)



Opportunity lies in improving cost effectiveness in medicine

NIH Launching New Translational Activities



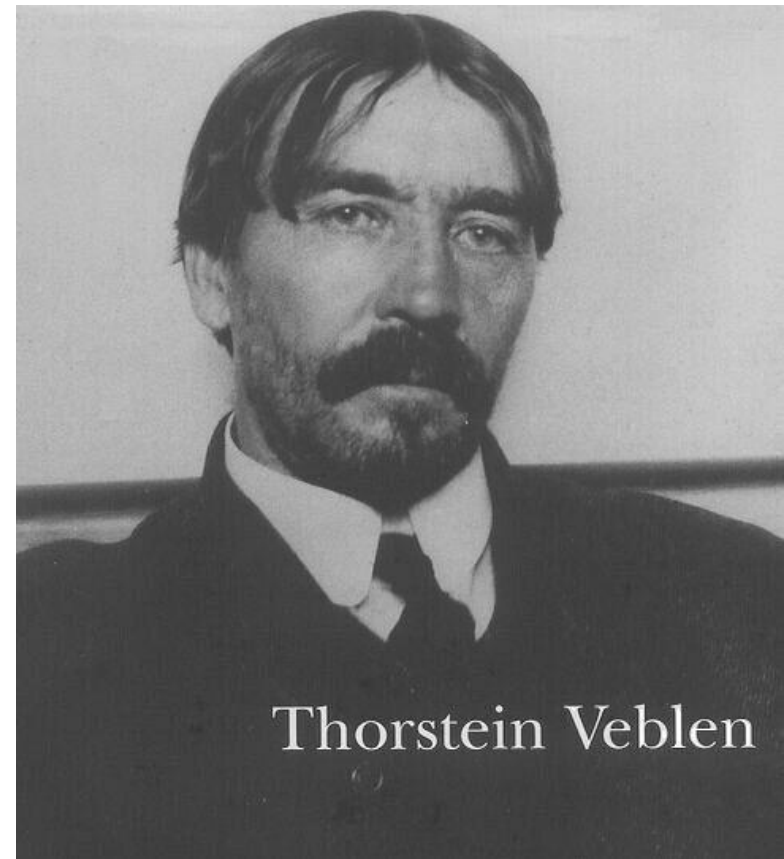
President Signs Law Creating New Translational Center

— *Science*, Dec 27, 2011



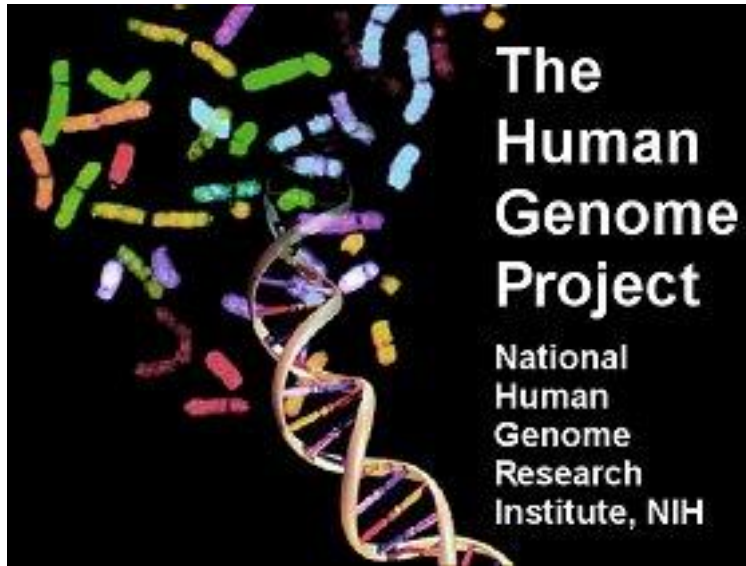
Targeting the “re-engineering” of drug development
to speed basic science to the clinic

Translational Research and The Myth of Technological Determinism



“Science Finds--Industry Applies--Man Conforms.”

Impedance Mismatch and Innovation



- Faster Better and Cheaper

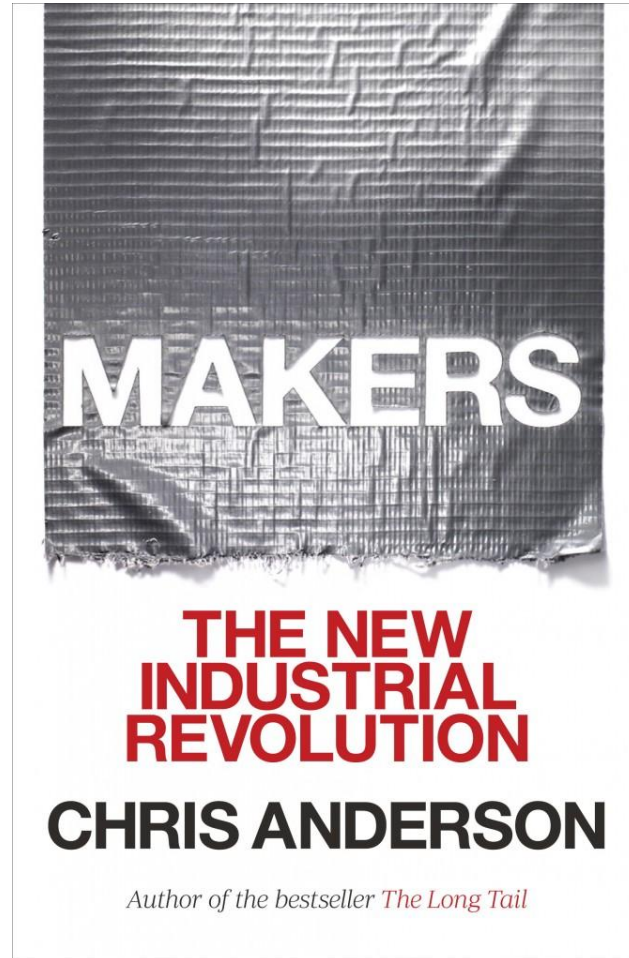
- Research
- Discovery
- Globalization

- “Impedance Mismatch”

- Systems Biology
- Translational Research
- Molecular Medicine
- Clinical Research
- Clinical Development
- Regulatory Regimes
- Reimbursement Policy
- ELSI
- Scientific Literacy



Innovation and Market Transformation: Disrupting the Ecosystem



FOREIGN AFFAIRS

NOVEMBER/DECEMBER 2012



How to Make Almost Anything

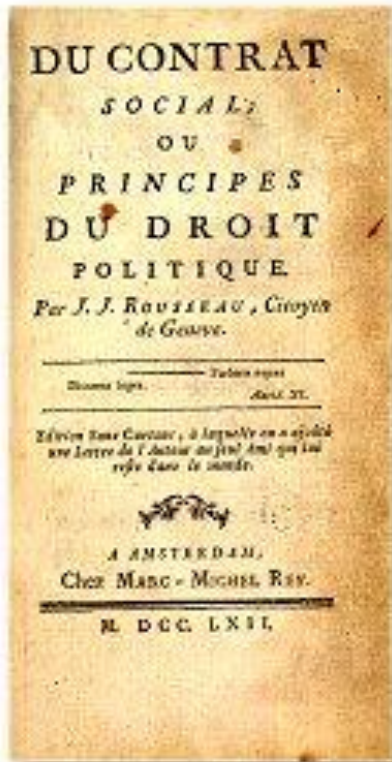
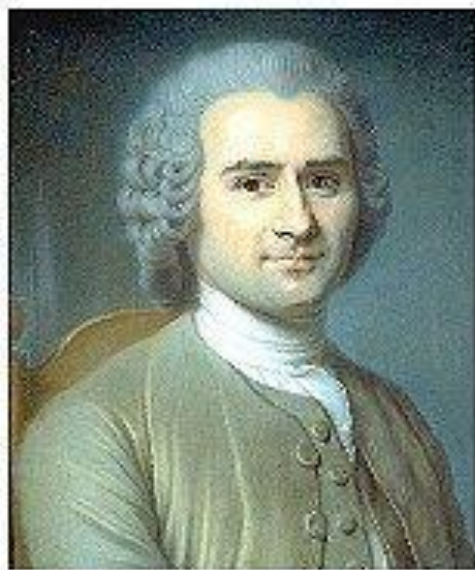
The Digital Fabrication Revolution

Neil Gershenfeld

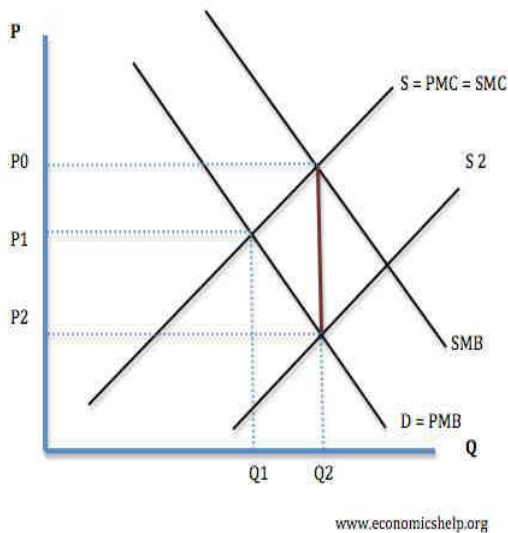
Volume 91 • Number 6

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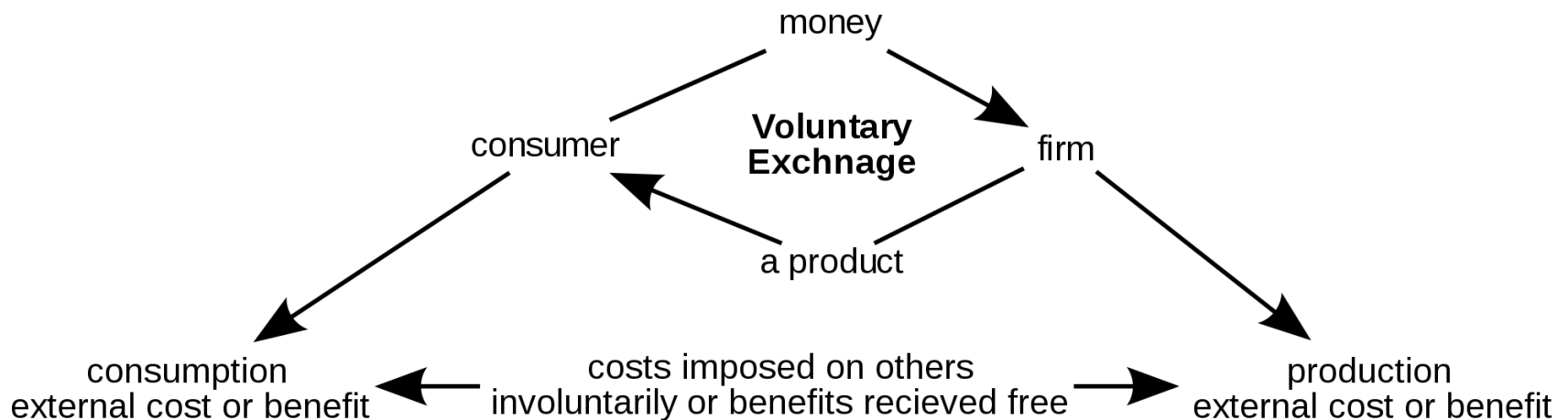
Health Care: A Fundamental Human Right and a “Big Business”



“Externality is a harsh mistress”



In economics , an externality (or transaction spillover) is a cost or benefit, not transmitted through prices , incurred by a party who did not agree to the action causing the cost or benefit. A benefit in this case is called a positive externality or external benefit, while a cost is called a negative externality or external cost.



The Health Care Sector



- A “Big Business”, but access is considered part of the social contract
- Highly regulated and socially structured industry: market access and reimbursement
- Technology Enabled requiring large, long term and hi risk R&D investments (diminishing returns)
- Capital Intensive
- Status Quo is not sustainable
- Fundamental change requires “generational altruism”

The High Cost of Uncertainty



The High Cost of Uncertainty

WILLINGNESS TO PAY



The High Cost of Uncertainty

WILLINGNESS TO PAY

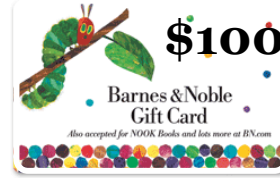


or



The High Cost of Uncertainty

WILLINGNESS TO PAY



or



\$45

\$26

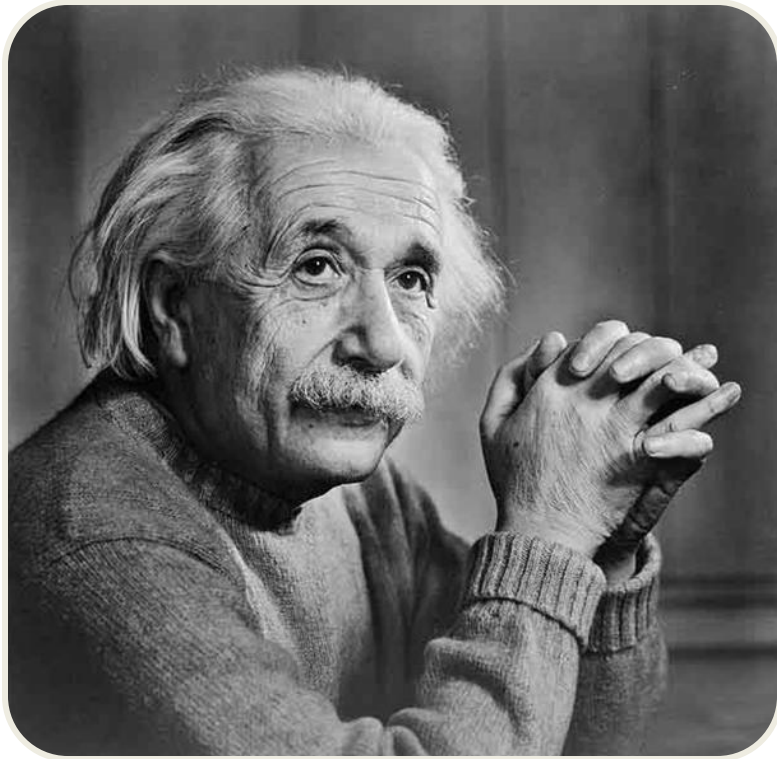


\$16



Source: Gneezy, List, Wu, The Quarterly Journal of Economics (2006) 121 (4): 1283-1309

Uncertainty can lead to mispricing of risk



“We can’t solve problems
by using the same kind of
thinking we used when
we created them.”

— *Albert Einstein*

Consumer and Patient



Individuals are Picking Up More of the Bill

AVERAGE ANNUAL HEALTH INSURANCE PREMIUMS AND
WORKER CONTRIBUTIONS FOR FAMILY COVERAGE

(2000–2010)



Opportunities will arise in empowering the patient as a consumer

Aligning “Customer Interests”



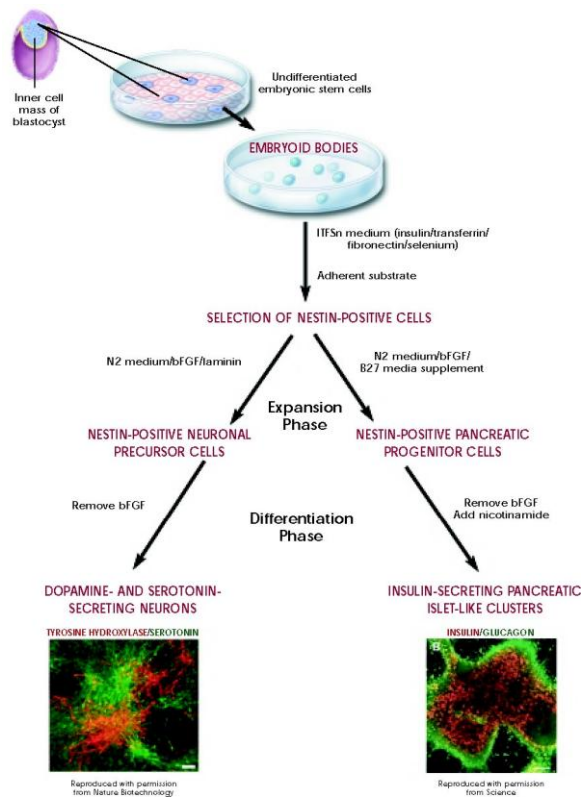
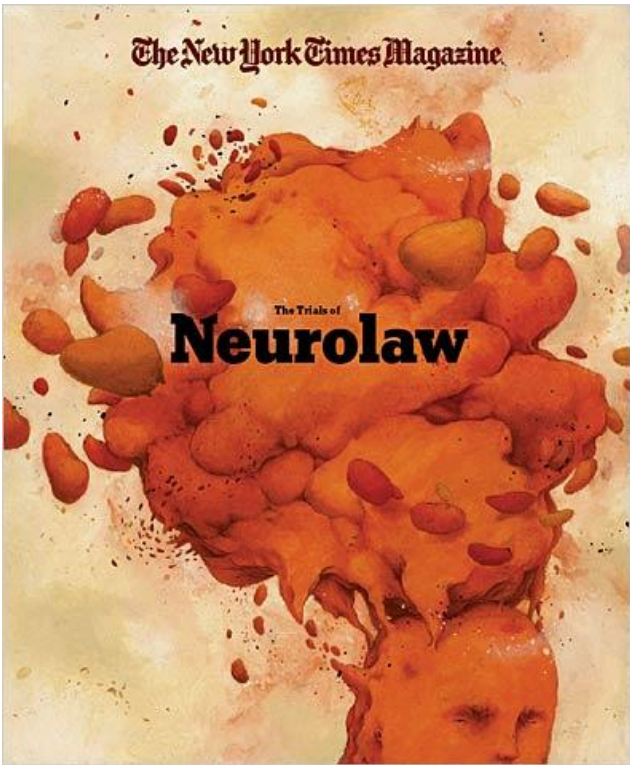
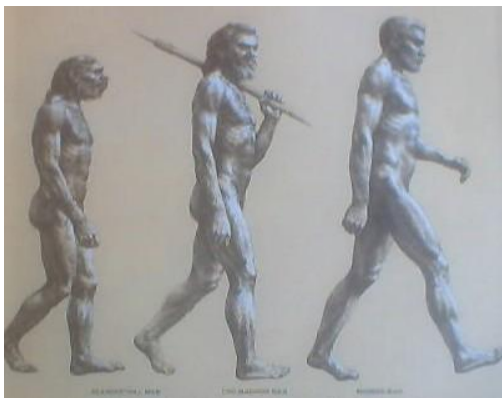
*“I don’t think it’s anything serious, but, just to be sure,
I’m going to bill you as if it is.”*

Changing Consumer Dynamics

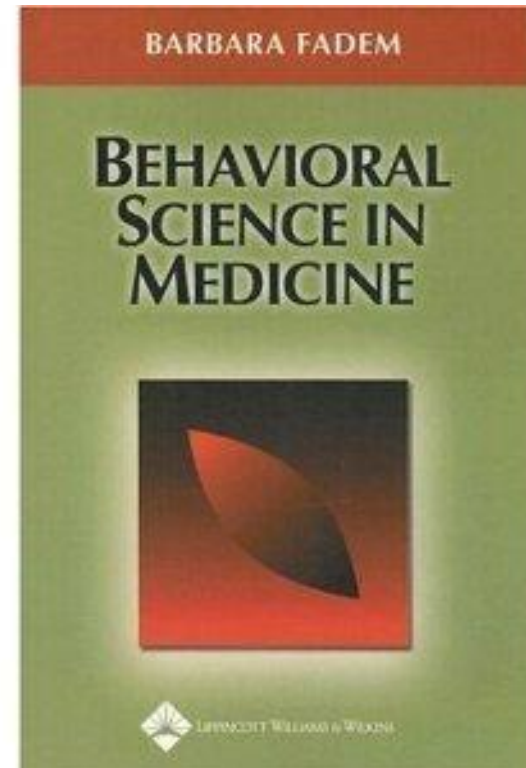
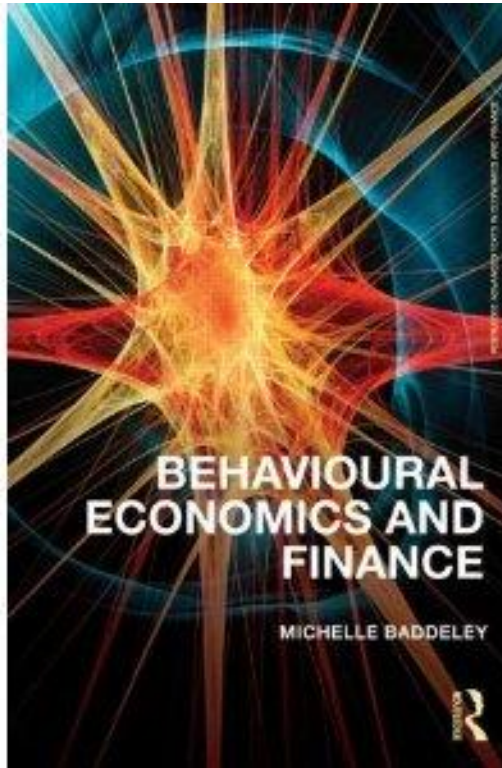


Patients are going to expect more data and transparency if they are picking up the tab

Scientific Literacy and Social Policy

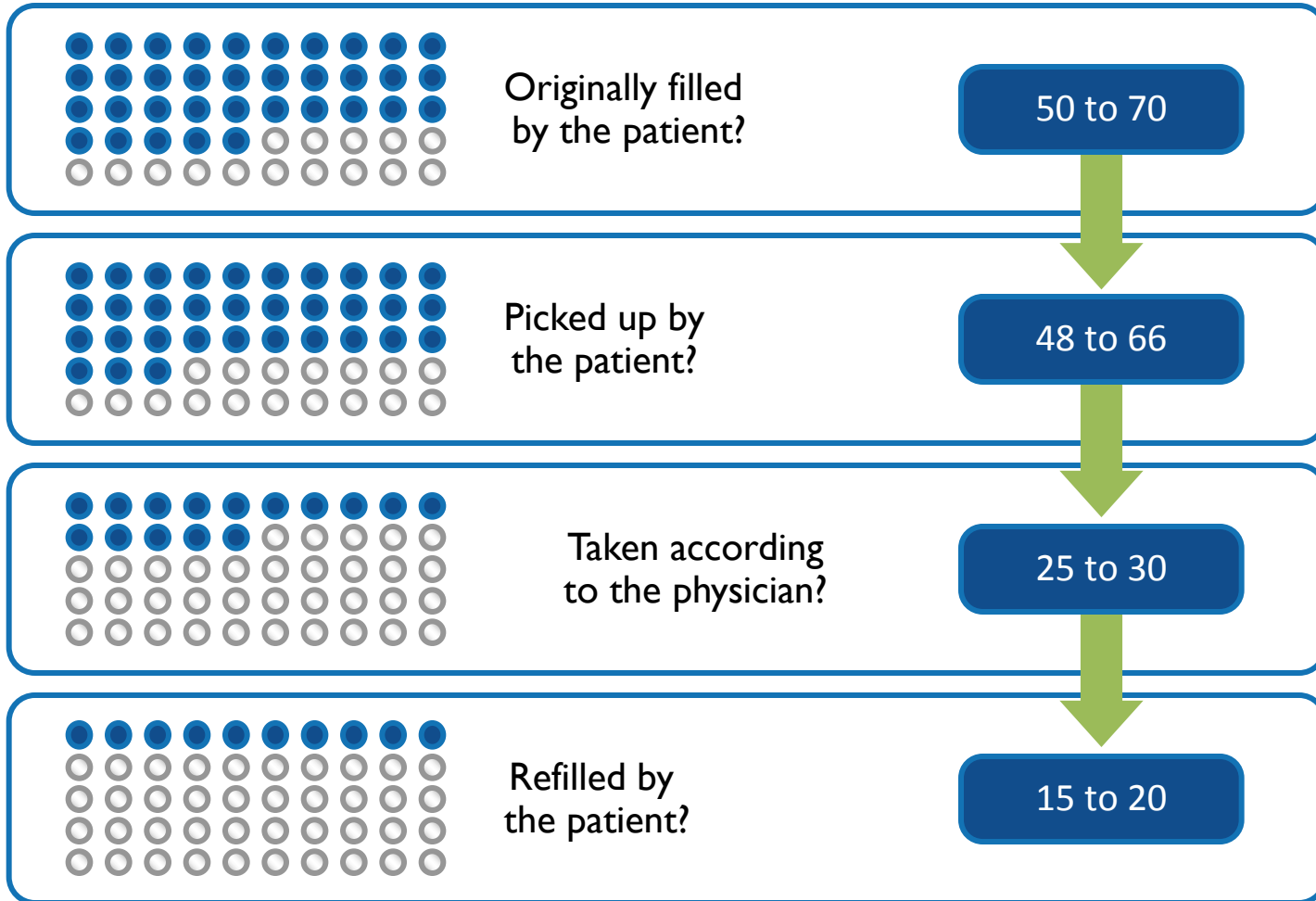


Rationally Irrational Behavior and Health Care



Medication Adherence Patterns

For every 100 prescriptions written by a physician,
how many prescriptions are...



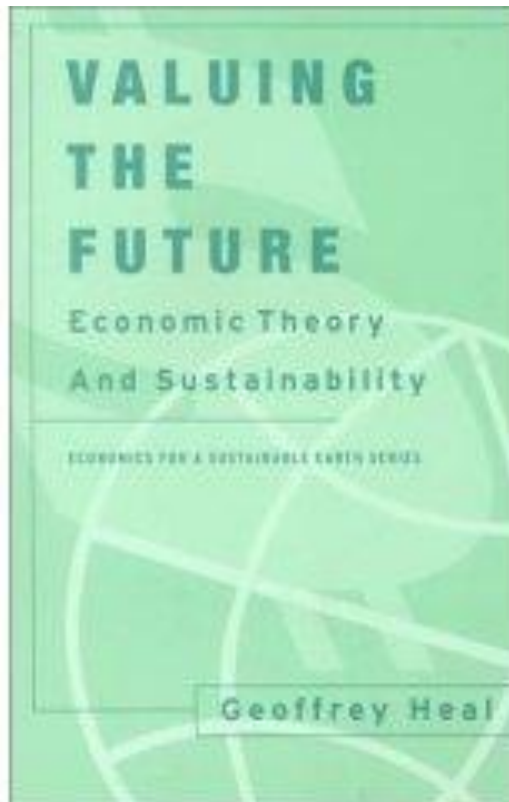
Nonadherence

America's Other Drug Problem

- ◆ Noncompliance accounts for up to 11% of all hospital admissions and 40% of nursing home admissions
- ◆ 30–50% of chronic disease patients are non-adherent or poorly adherent and this correlates to 125,000 deaths yearly
- ◆ More than \$290 billion in annual costs and 1/3 of hospitalizations are attributed to non-adherence

Source: Frost & Sullivan Whitepaper: Patient Nonadherence

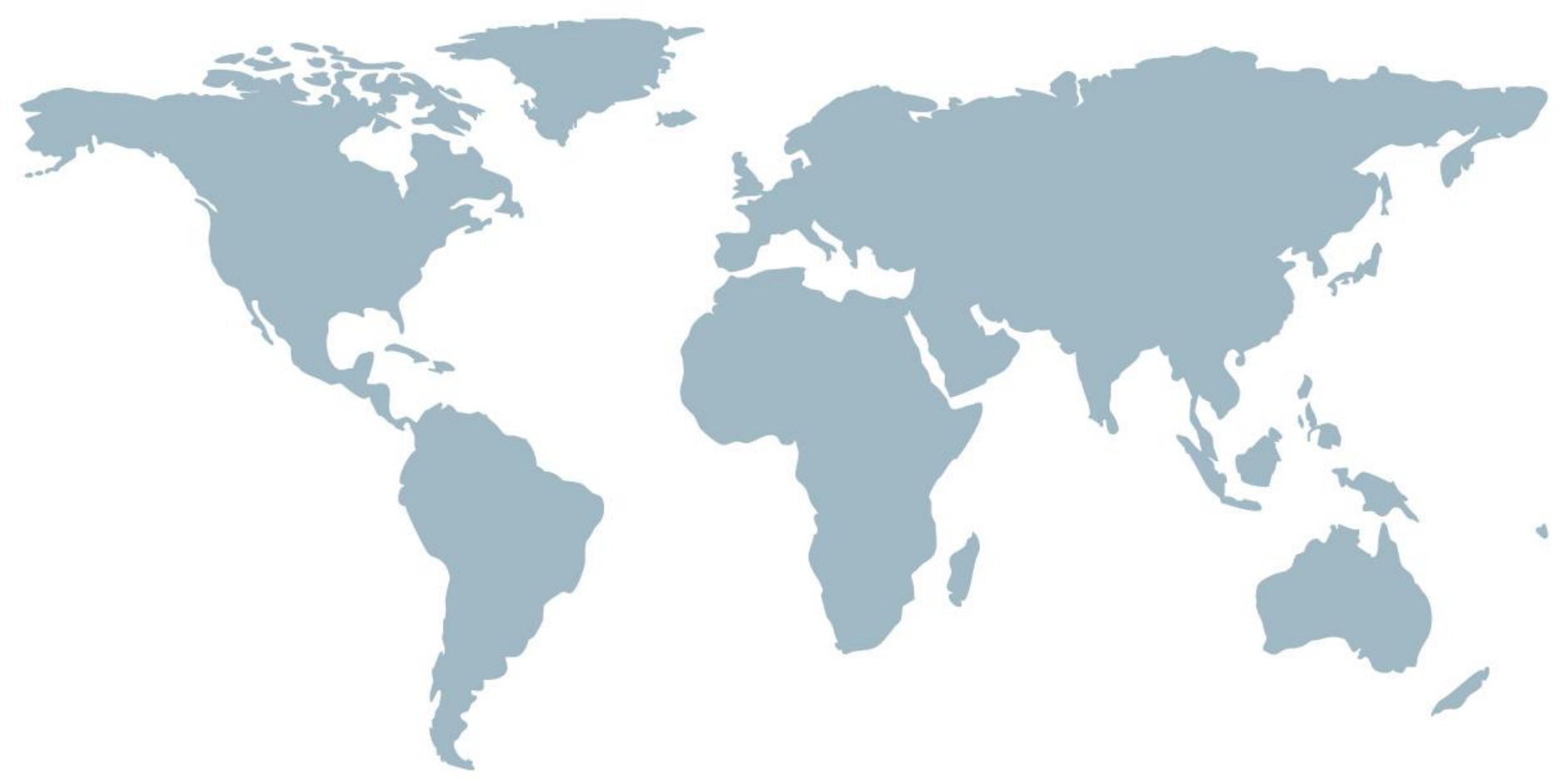
Reconciliation of Time Horizons and Valuing Health and Well Being as an Economic Asset



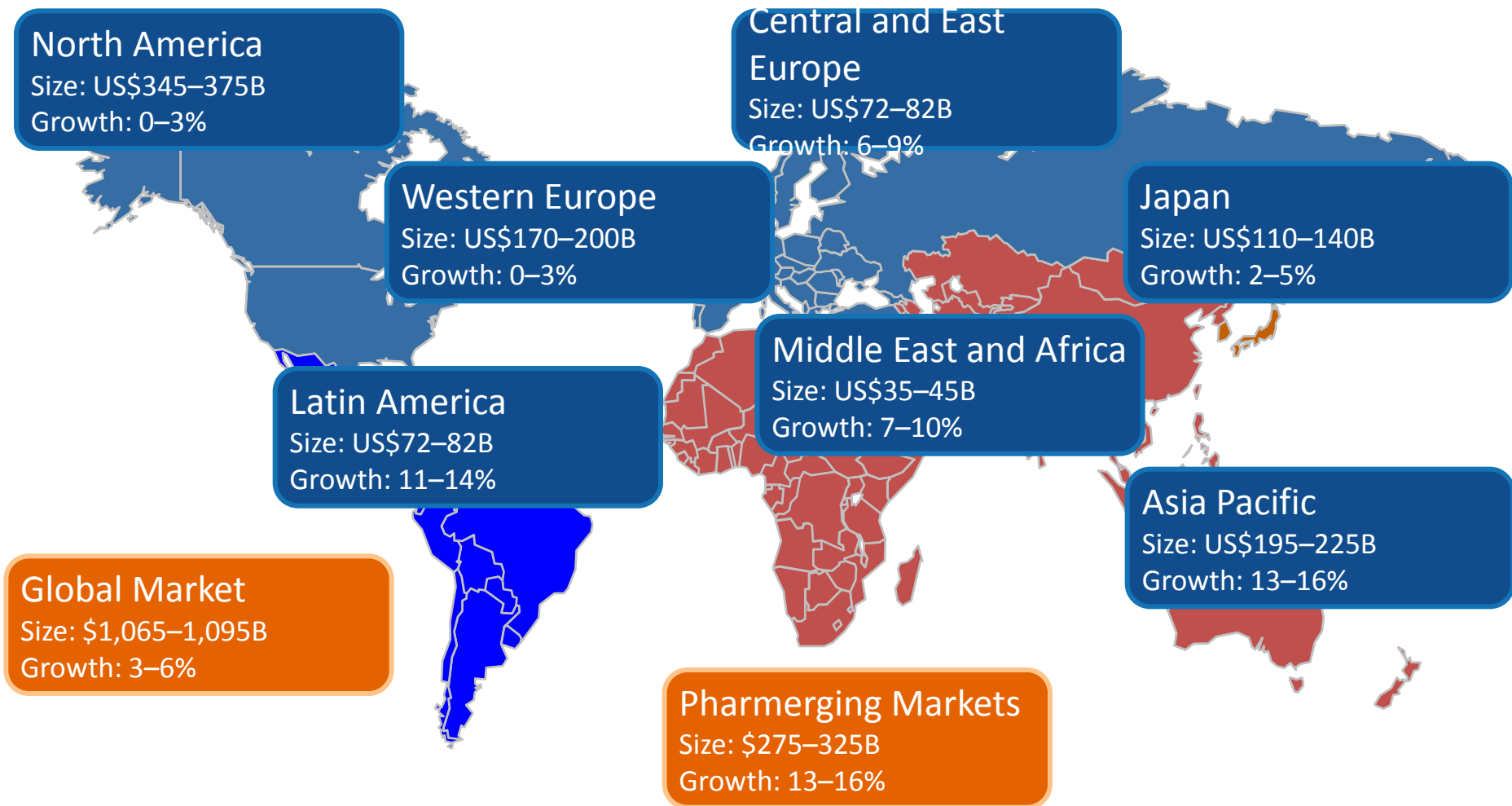
Three Axioms:

- A treatment of the present and future that places a positive value on the long run.
- Recognition of all the ways in which “Health” assets contribute to economic well being.
- Recognition of the constraints implied by the dynamics of the natural life cycle and the limits of technology with respect to “health” assets.

Globalization: “Leap Frogs and Whiteboards”



Global Pharma Market Projected to Be More Than \$1 Trillion by 2015



Note: Pharmerging Markets: China, India, Brazil, Russia, Mexico, Turkey, Poland, Venezuela, Argentina, Indonesia, S. Africa, Thailand, Romania, Egypt, Ukraine, Pakistan, Vietnam; growth defined as CAGR 2011–15
Source: IMS Health, Market Prognosis, April 2011

Pharma growth is driven by emerging market demand

Leapfrogging: The Challenge of Scalability

Wireless Technology Speeds Health Services in Rwanda

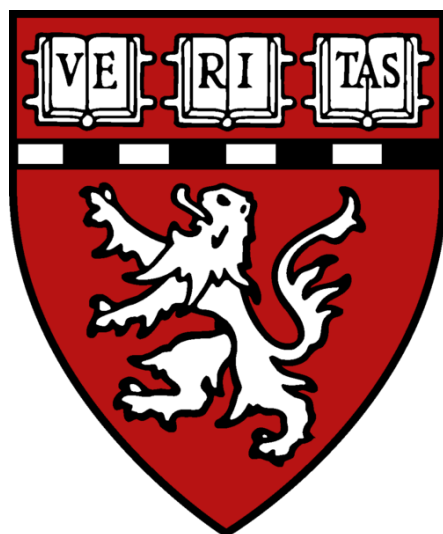


Rwandan health ministry workers can keep electronic track of disease.

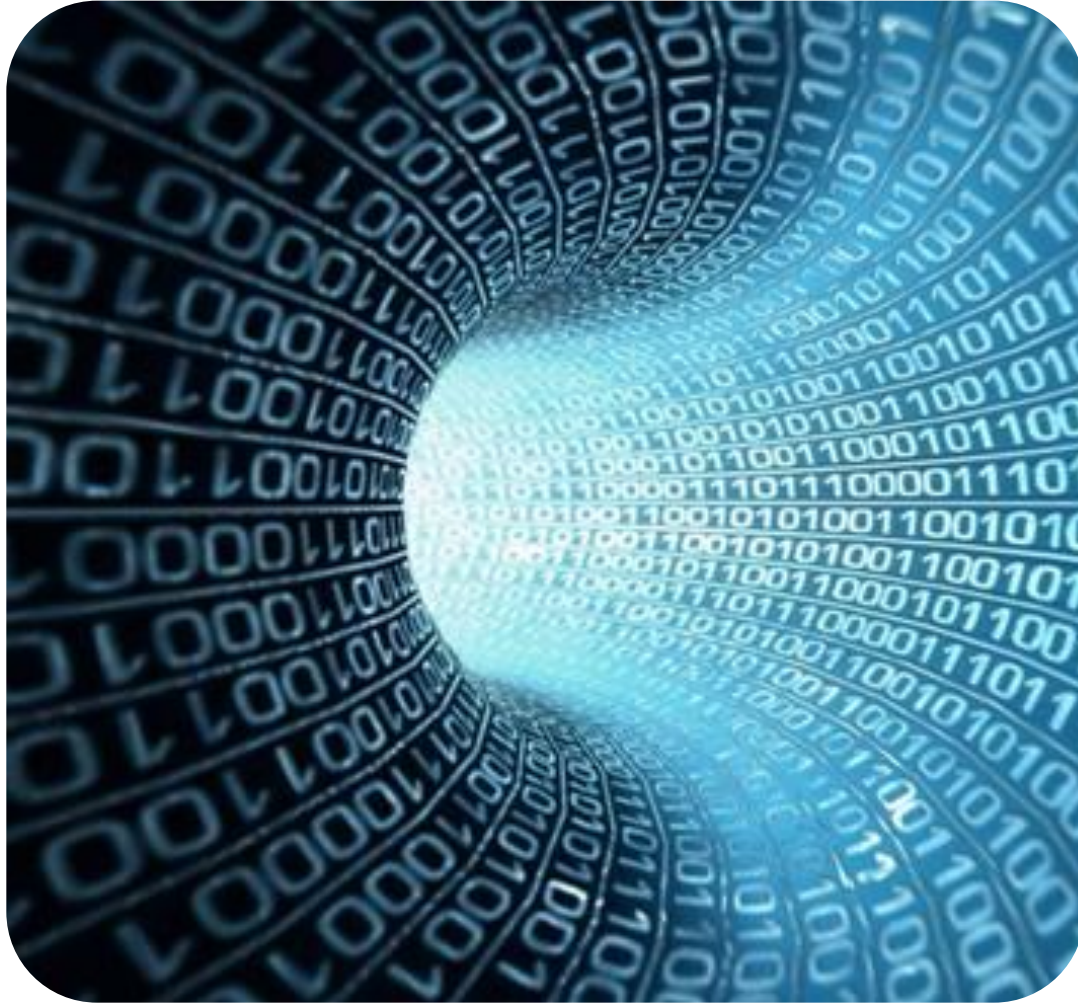
By THOMAS CRAMPTON
Published: March 5, 2007

The New York Times

Unintended Consequences: The Division of Public and Individual Health



Big Data and Mobile



A New Era of Data and Connectivity

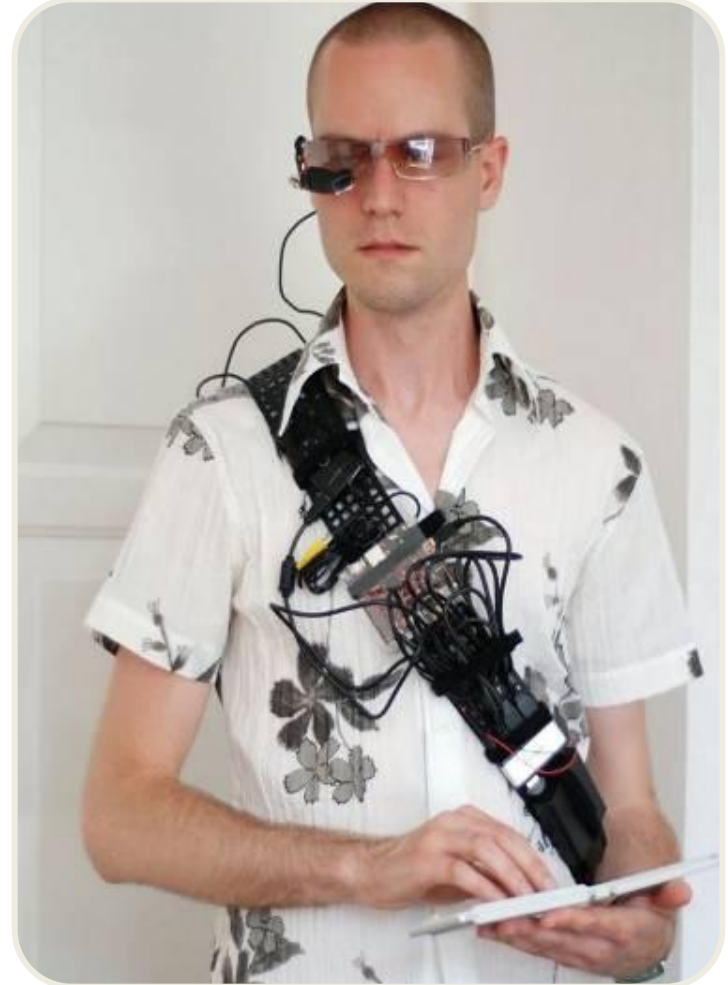
“We’re all aware of the approximately two billion people now on the Internet [and] also upward of a trillion interconnected and intelligent objects and organisms — what some call the Internet of Things. All of this is generating vast stores of information... reaching 35 zettabytes in 2020.

”
— *Samuel Palmisano, Chairman IBM*

Sensors, Sensors Everywhere



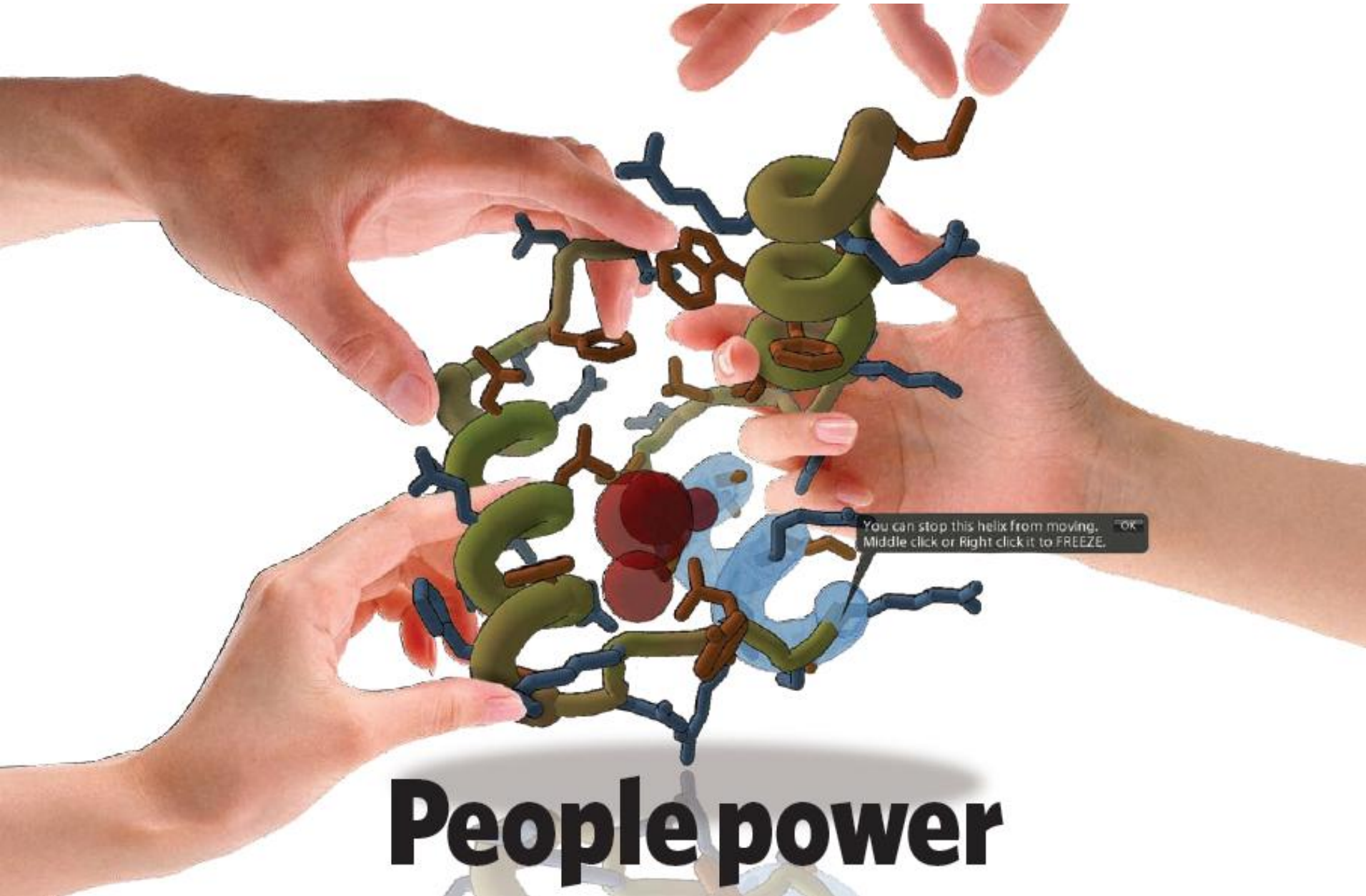
The Borg



Modern Man?

Lots of data being generated

Crowdsourcing and the Power of Community



Changing Dynamics of Transparency and Privacy



Disruptions: Privacy Fades in Facebook Era

— *New York Times*, Dec 11, 2011

It's a Generational Issue



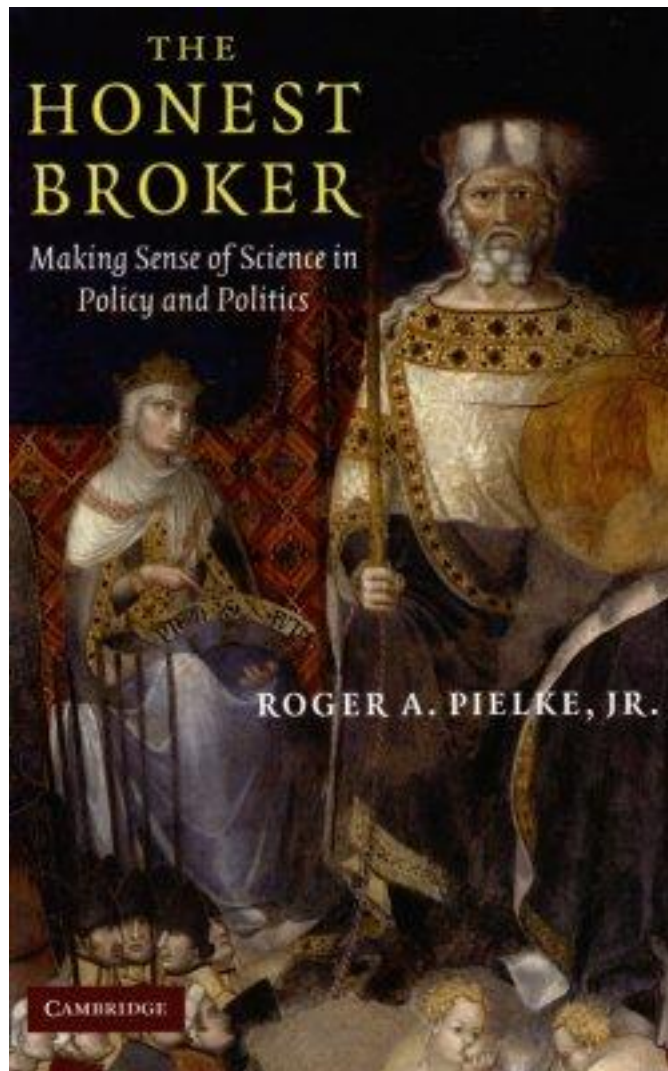
“Hey! Elbows off the table.”

THE HONEST BROKER

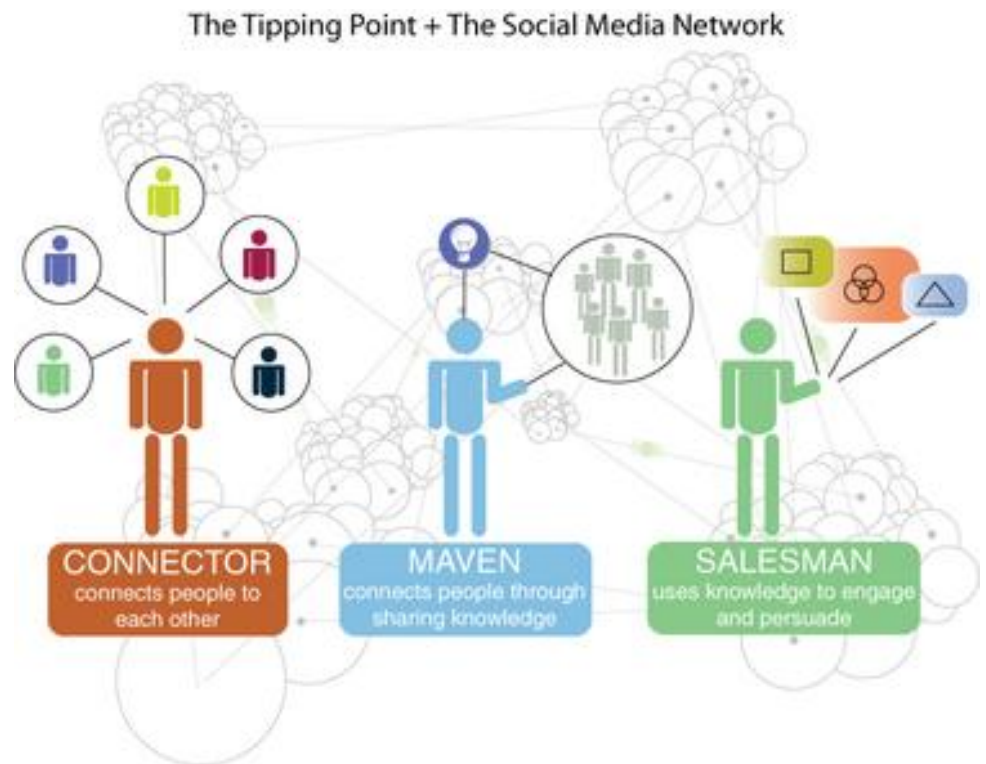
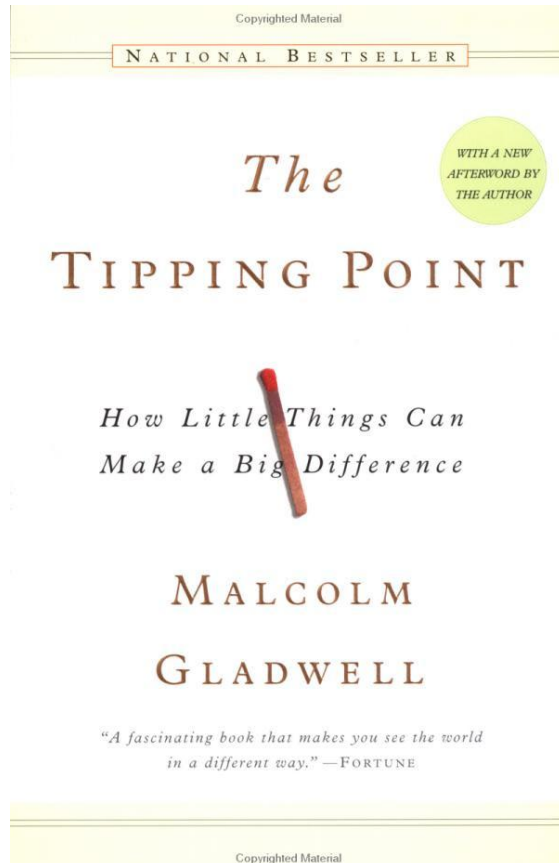
*Making Sense of Science in
Policy and Politics*

ROGER A. PIELKE, JR.

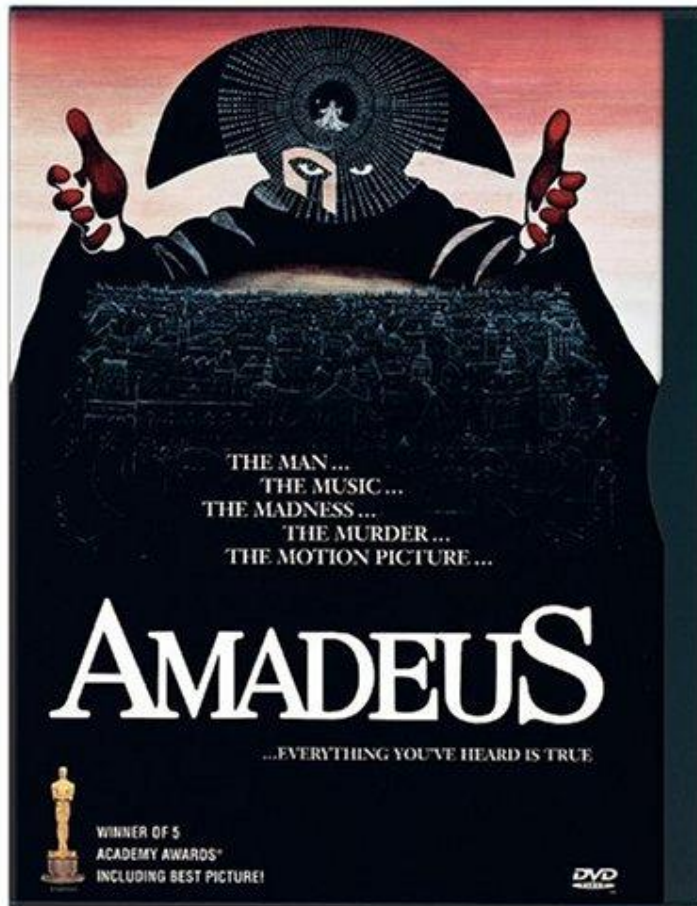
CAMBRIDGE



Social Networking



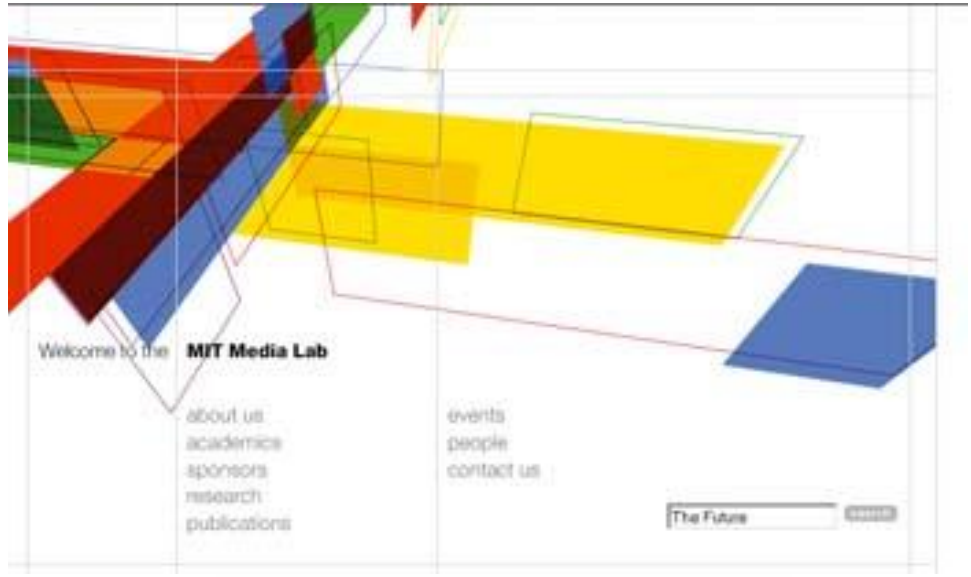
“Super Hero Skills”



Adopting Alternative Research Models



The School and Society by John Dewey, 1899



“The School of Athens:”



Raphael 1510