

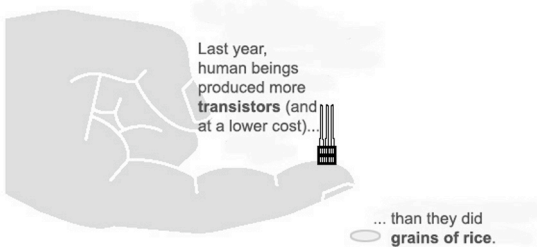
## New Knowledge Frontiers in a Flat World: A Campus Perspective

William Hoffman  
Founding Executive Director  
Minnesota Biomedical and Bioscience Network  
MBBNet.umn.edu

Sterling Memorial Library  
Yale University  
September 28, 2006



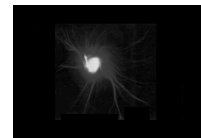
What does this mean for your future?



indata, *Business Week*, June 2006

## "Web Site of the Week" Metronet Regional Library Network June 1995

- Hill Museum & Manuscript Library, St. John's University
- Biomedical Engineering Center, University of Minnesota



"On the Internet, nobody knows you're a dog"



Peter Steiner, *The New Yorker*, July 5, 1993

## New Knowledge Frontiers in a Flat World

- Printing, a Flattener Extraordinaire
- Universities, Libraries and the Machine
- Higher Ed Faces a Flat World
- Technology, Maps, and Global Partnerships

## Printing, a Flattener Extraordinaire

## Bridging Town & Gown

- Printing created a “bridge over the gap between town and gown.”  
-- Elizabeth Eisenstein, *The Printing Press as an Agent of Change*, 1979



Representation of a university class.  
Laurentius de Voltolina, Bologna, circa. 1350.  
The University of Bologna was founded in 1088.

## Trithemius of Sponheim

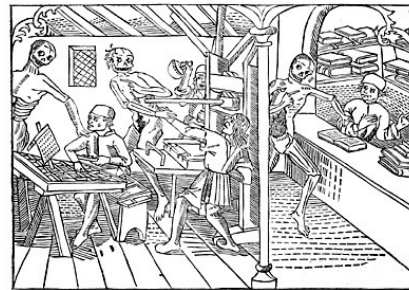
- Abbot John Trithemius built a renowned library in the Benedictine monastery at Sponheim, Germany.
- Author of a treatise entitled *In Praise of Scribes*, a criticism of the new technology.
- Trithemius did not shun the new technology of printing. His library included both printed and handwritten works.



Abbot John Trithemius, 1462-1516

-- Hill Library

## New Technology and the Ultimate Flattener



Typesetter, printer and bookseller. From *Danse Macabre*, Matthias Huss, Lyons, 1499.

## Globalization 1.0: The Age of Discovery



"Adveniat regnum tuum" by Maerten van Heemskerck (1498-1574). Hill Library.

## Universities, Libraries and the Machine

### Abraham Lincoln creates the Land Grant colleges



Lincoln signing the Morrill Act, July 2, 1862  
Eugene Francis Savage, HSSE Library, Purdue University

### Abraham Lincoln Signs the Pacific Railway Act

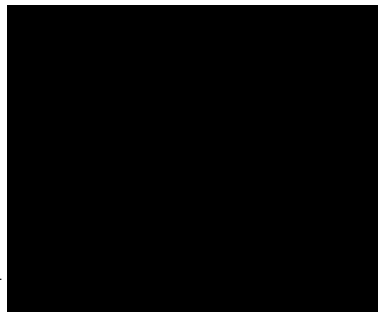
On July 1, 1862, Lincoln signed an act to aid in the Construction of a Railroad and Telegraph Line from the Missouri River to the Pacific Ocean



Map by G.K. Warren, 1857. Library of Congress

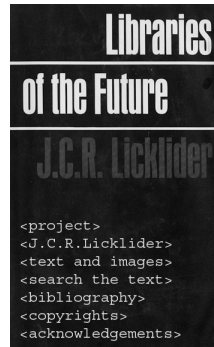
### Vannevar Bush and the Memex

- Vannevar Bush first described the Memex, a "microfilm rapid selector," in a famous article "As We May Think" published by *The Atlantic Monthly* in 1945.
- His report to the President "Science the Endless Frontier" set the stage for the world of science and technology we live in.



Dynamic Diagrams, Inc.

### J.C.R. Licklider



MIT Press, 1965

"If books are intrinsically less than satisfactory for the storage, organization, retrieval, and display of information, then libraries are bound to be less than satisfactory also."

### Scholarly Journals

"We are on the threshold of dramatic changes in scholarly publications.... The question is whether they will die out like the dinosaurs, or whether they will adapt to the new era."

Andrew Odlyzko, PhD.  
AT&T Bell Laboratories  
"Tragic loss or good riddance? The impending demise of traditional scholarly journals." 1994

### Libraries and Open Access

#### Changes in North American university research libraries 1991 - 2004.

interlibrary borrowing:	+148%
student population:	+18
circulation:	-1
reference transactions:	-34

Andrew Odlyzko, PhD.  
Director, Digital Technology Center, U Minnesota  
In "Open Access: Key Strategic, Technical and Economic Aspects." Forthcoming

### Libraries and Open Access

- Spending for information and communication technologies - ICT- is far larger than the library budget, and over 10 times as large as the book and serial acquisition costs of the library.
- Costs of supporting Open Access...are a very small fraction of ICT costs. Almost the entire required infrastructure is already in place.

Andrew Odlyzko, PhD.  
Director, Digital Technology Center, U Minnesota  
In "Open Access: Key Strategic, Technical and Economic Aspects." Forthcoming

### Google at the ALA Meeting

Conrad Winke  
Columbia College Chicago

Abigail Goben, WebMD

Valerie Perry, U Kentucky

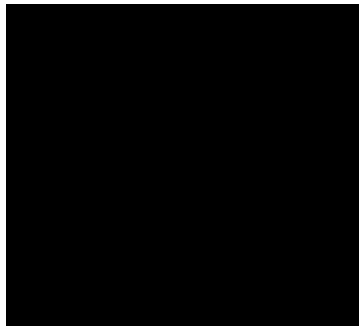
Martha Kruey  
Fairfield University

Anne Harrison  
Library of Congress

Juan Jaime  
UCLA Medical Library

James Jones  
Atlanta Public Library

Elvis



### Higher Ed Faces a Flat World

### The Unified Nature of Knowledge

- Knowledge isn't inherently compartmentalized; there is only one nature, only one human record.

-- William Wulf  
"Warning: Information Technology Will Transform the University," 1995



William Wulf, PhD., President  
National Academy of Engineering

### The Spellings Report

#### The paragraph

"New initiatives such as OpenCourseWare, the Open Learning Initiative, the Sakai Project, and the Google Book project hold out the potential of providing universal access both to general knowledge and to higher education."

#### was replace by

"Both commercial development and new collaborative paradigms such as open source, open content, and open learning will be important in building the next generation learning environments for the knowledge economy."

#### after the Commission had voted on the final draft.

"Changing the Report, After the Vote"  
Inside Higher Ed  
Sept. 1, 2006

### "Killing Off the American Future"

America's domination of the global information economy did not come about by accident. It flowed directly from policies that allowed the largest generation in the nation's history broad access to a first-rate college education regardless of ability to pay.

No longer the world leader in terms of the proportion of young people enrolled in college, the country now ranks 16th among the 27 nations examined when it comes to the proportion of college students who complete college degrees or certificate programs.

New York Times editorial  
Sept. 16, 2006

### "Envisioning a Transformed University"



Sterling Memorial Library, Yale University

"In a sense, the library may be the most important observation post for studying how students really learn. If the core competency of the university is the capacity to build collaborative spaces, both real and intellectual, then the changing nature of the library may be a touchstone for the changing nature of the university itself."

James J. Duderstadt  
William A. Wulf  
Robert Zemsky  
*Issues in Science & Technology*  
Fall 2005

STANFORD UNIVERSITY | INNOVATION JOURNALISM | VINNOVA

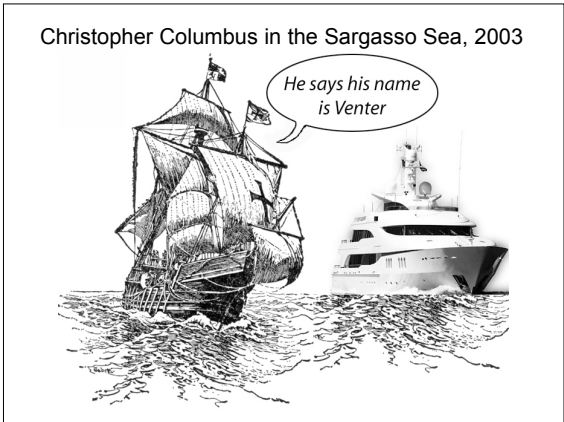
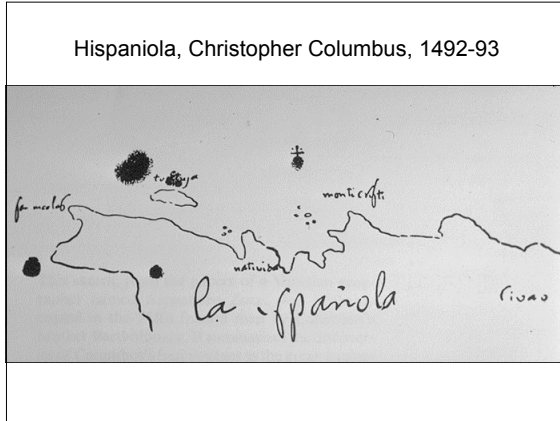
### Challenge: Journalism Beat Structure

Science	■	o v e r l a p p i n g
Technology	■	
Business & Finance	■	
Politics	■	
Culture	■	

Today: Innovation – a topic within the beats  
Vision: Innovation – a multidisciplinary beat

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

Technology, Maps  
and Global Partnerships

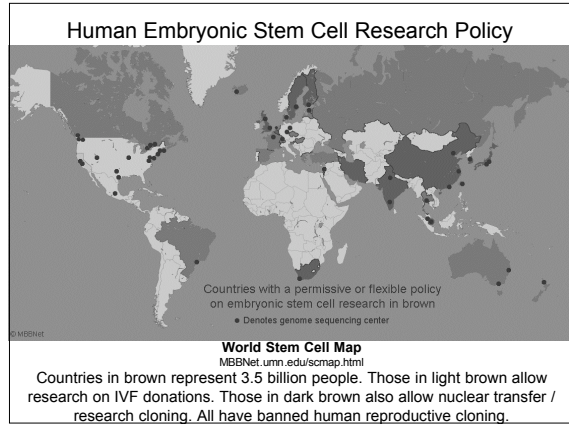
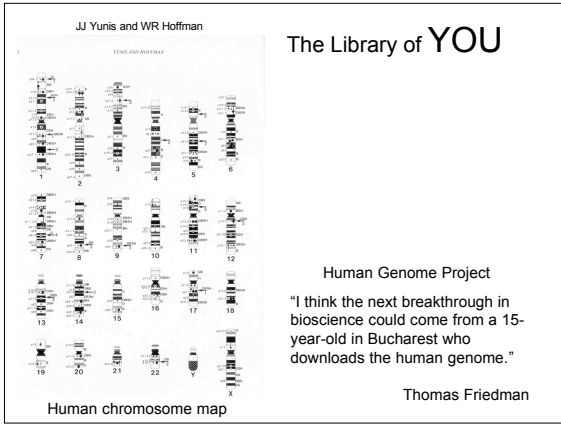


### Bioscience: The New Maps

- Transcription, ribosomal structure and biogenesis
- Reproduction
- DNA replication, recombination and repair
- Cell division and chromosome inheritance
- Posttranslational modification, protein turnover, autophagy
- Cell death and necrosis
- Signaling in transport and metabolism
- Signal transduction mechanisms
- Defense mechanisms
- Mitochondrial trafficking and function
- Cellular transport and metabolism
- Energy and transport mechanisms
- Autosome transport and metabolism
- Cellular morphology
- Cell motility and cytoskeleton
- Primary metabolic pathways, transport and catabolism
- Specialized metabolism
- Function unknown

Foster et al.  
*PLoS Biology*,  
April 2005





FT.com  
FINANCIAL TIMES

Map Source: William Hoffman (MBBNet)

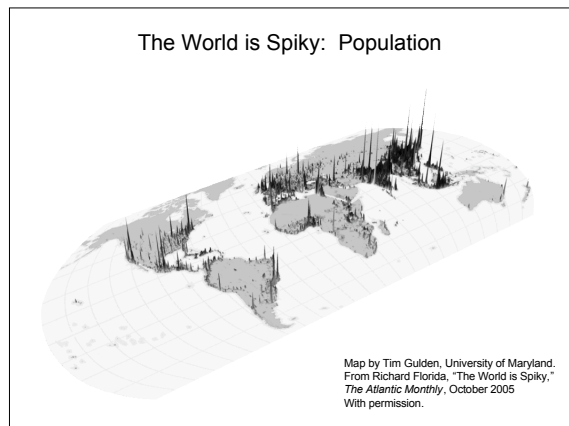
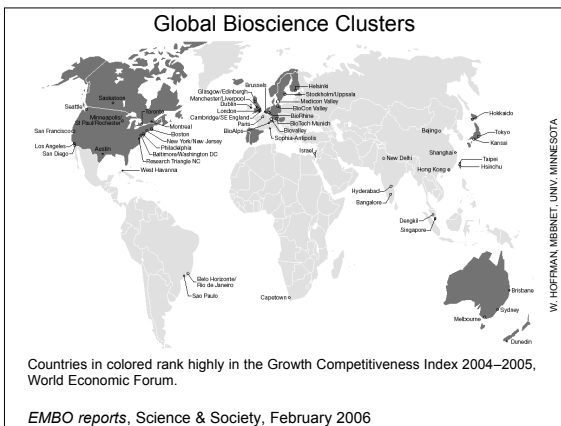
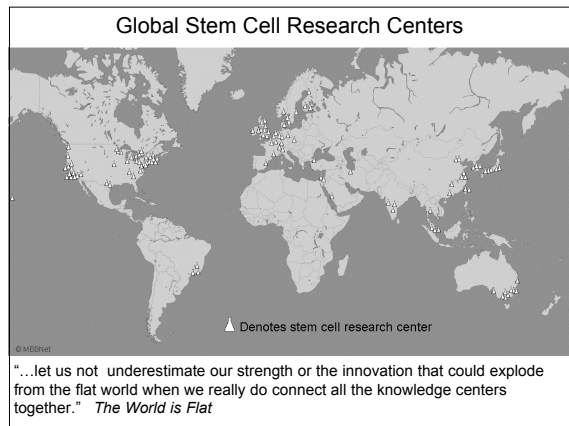
FINANCIAL TIMES THURSDAY JULY 20 2006

### THE AMERICAS

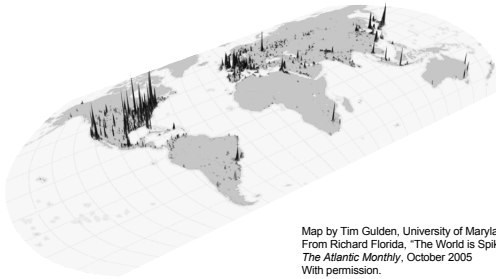
## Bush's veto of embryo stem cell law marks turning point with Congress

By Holly Tregler in Washington

Cost a \$1B with a moral base that is opposed to life... Biotechnology... in, to get re-elected in... '08 then to see the Republic... can fight working in... the nations and they get... Even presidents whose parties also controlled both houses of Congress have...

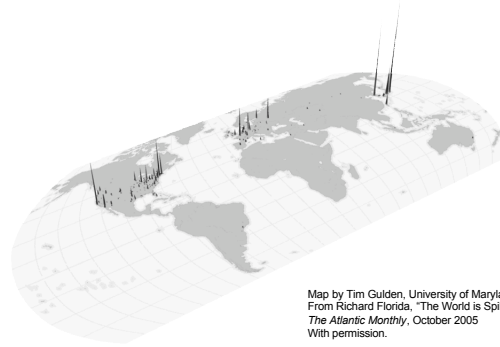


### The World is Spiky: Light Emissions



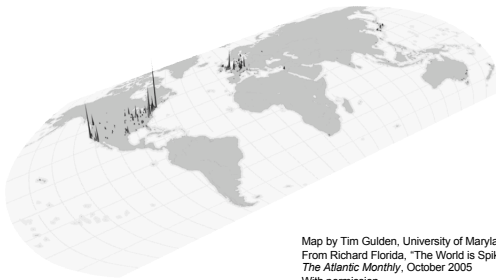
Map by Tim Gulden, University of Maryland.  
From Richard Florida, "The World is Spiky,"  
*The Atlantic Monthly*, October 2005  
With permission.

### The World is Spiky: Patents

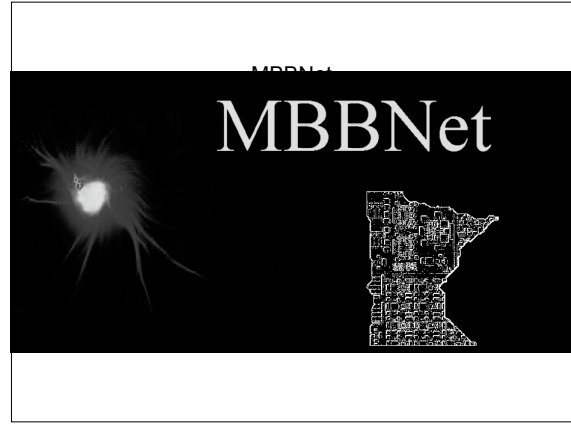


Map by Tim Gulden, University of Maryland.  
From Richard Florida, "The World is Spiky,"  
*The Atlantic Monthly*, October 2005  
With permission.

### The World is Spiky: Scientific Citations



Map by Tim Gulden, University of Maryland.  
From Richard Florida, "The World is Spiky,"  
*The Atlantic Monthly*, October 2005  
With permission.



**“As an agent of change, printing altered methods of data collection, storage and retrieval systems and communications networks used by learned communities throughout Europe.”**

-- Elizabeth Eisenstein  
*The Printing Press as an Agent of Change*, 1979

**MBBNet**

Minnesota Biomedical & Bioscience Network  
www.mbbnet.umn.edu

Web Sites  
Companies  
Providers  
Nonprofits  
Co-ops  
Agencies  
Foundations

**MBBNet**

Web Sites  
U of MN  
Laboratories  
Institutes  
Centers  
Programs  
Clinics

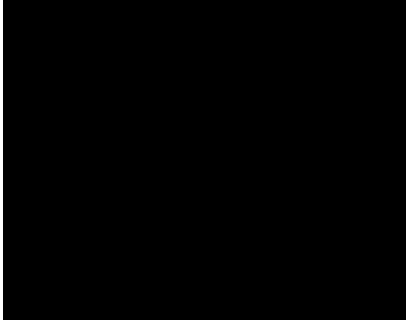
MBBNet is the world's largest regional Internet gateway in the life sciences and healthcare fields, connecting 1,200 organizations and serving 40,000 visitors per month.

Year	Pages/month
2006	180,000 pages
2004	130,000 pages
2002	100,000 pages
2000	80,000 pages
1999	65,000 pages
1998	30,000 pages
1997	10,000 pages
1996	6,000 pages
1995	1,000 pages

the foundation for new business development, trade, education and research

**The MBBNet – Zürich MedNet Internet Alliance**

The MBBNet - Zurich MedNet Link, 2000



The Fudan-Yale Biomedical Research Center, 2003



"There is one world of Science out there," said [Yale President Richard] Levin. "and this kind of international division of labor makes a lot of sense." Quoted in *The World is Flat*.



Tian Xu, PhD., director of the Fudan-Yale Center, can watch "knock-out" mice in Shanghai from his laboratory in New Haven.

"It's a Wiki, Wiki World"

"It's been suggested to me that we actually turn the book into an open-source product. Just put it up on the web like Wikipedia and let people add to it."



Round Wiki World

Thomas Friedman  
In "An Open Source Guide to a Flat World"  
*Financial Times*, Nov. 28, 2005



Flat Wiki World