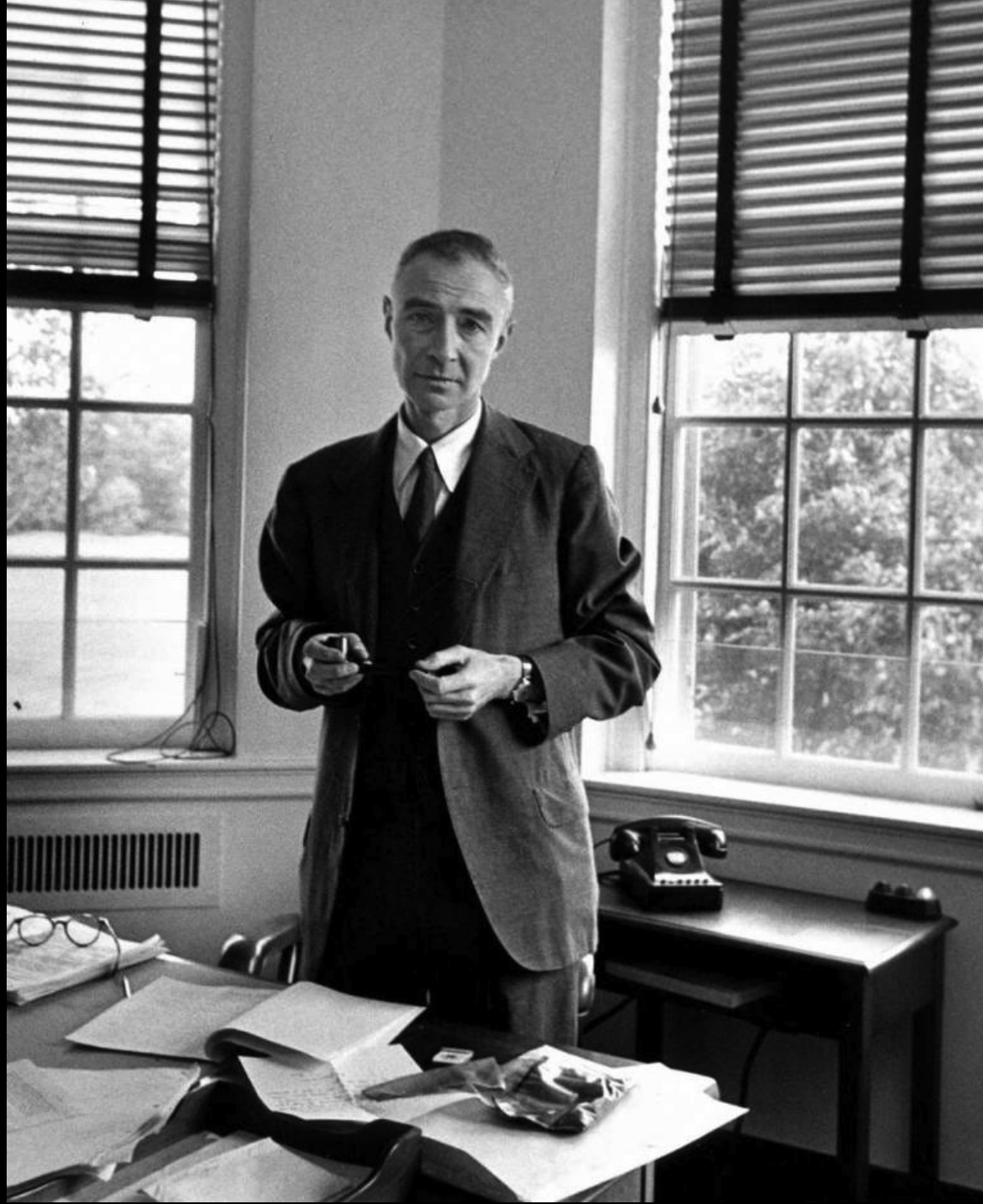


SCIENCE, ACADEMIES AND SOCIETY

Robbert Dijkgraaf
InterAcademy Council (IAC)

**International Conference on
Science and Technology for Sustainability
Science Council of Japan
9 October 2013**



J. Robert Oppenheimer



Abraham Flexner
(1866-1959)



THE USEFULNESS OF USELESS KNOWLEDGE

BY ABRAHAM FLEXNER

IS IT not a curious fact that in a world steeped in irrational hatreds which threaten civilization itself, men and women—old and young—detach themselves wholly or partly from the angry current of daily life to devote themselves to the cultivation of beauty, to the extension of knowledge, to the cure of disease, to the amelioration of suffering, just as though fanatics were not simultaneously engaged in spreading pain, ugliness, and suffering? The world has always been a sorry and confused sort of place—yet poets and artists and scientists have ignored the factors that would, if attended to, paralyze them. From a practical point of view, intellectual and spiritual life is, on the surface, a useless form of activity, in which men indulge because they procure for themselves greater satisfactions than are otherwise obtainable. In this paper I shall concern myself with the question of the extent to which the pursuit of these useless satisfactions proves unexpectedly the source from which undreamed-of utility is derived.

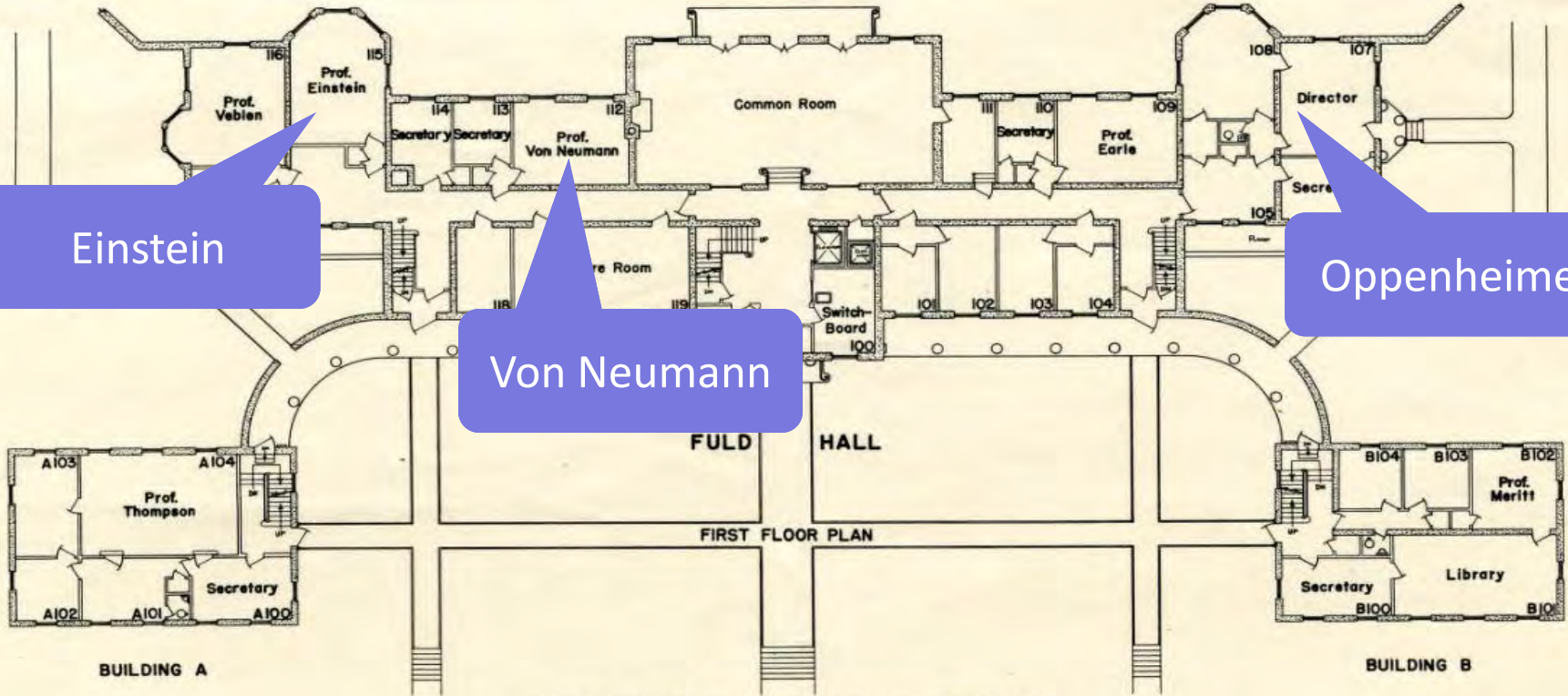
mental problems. I have no quarrel with this tendency. The world in which we live is the only world about which our senses can testify. Unless it is made a better world, a fairer world, millions will continue to go to their graves silent, saddened, and embittered. I have myself spent many years pleading that our schools should become more acutely aware of the world in which their pupils and students are destined to pass their lives. Now I sometimes wonder whether that current has not become too strong and whether there would be sufficient opportunity for a full life if the world were emptied of some of the useless things that give it spiritual significance; in other words, whether our conception of what is useful may not have become too narrow to be adequate to the roaming and capricious possibilities of the human spirit.

We may look at this question from two points of view: the scientific and the humanistic or spiritual. Let us take the scientific first. I recall a conversation



Institute for Advanced Study, Princeton, 1948

First Floor Plan of IAS



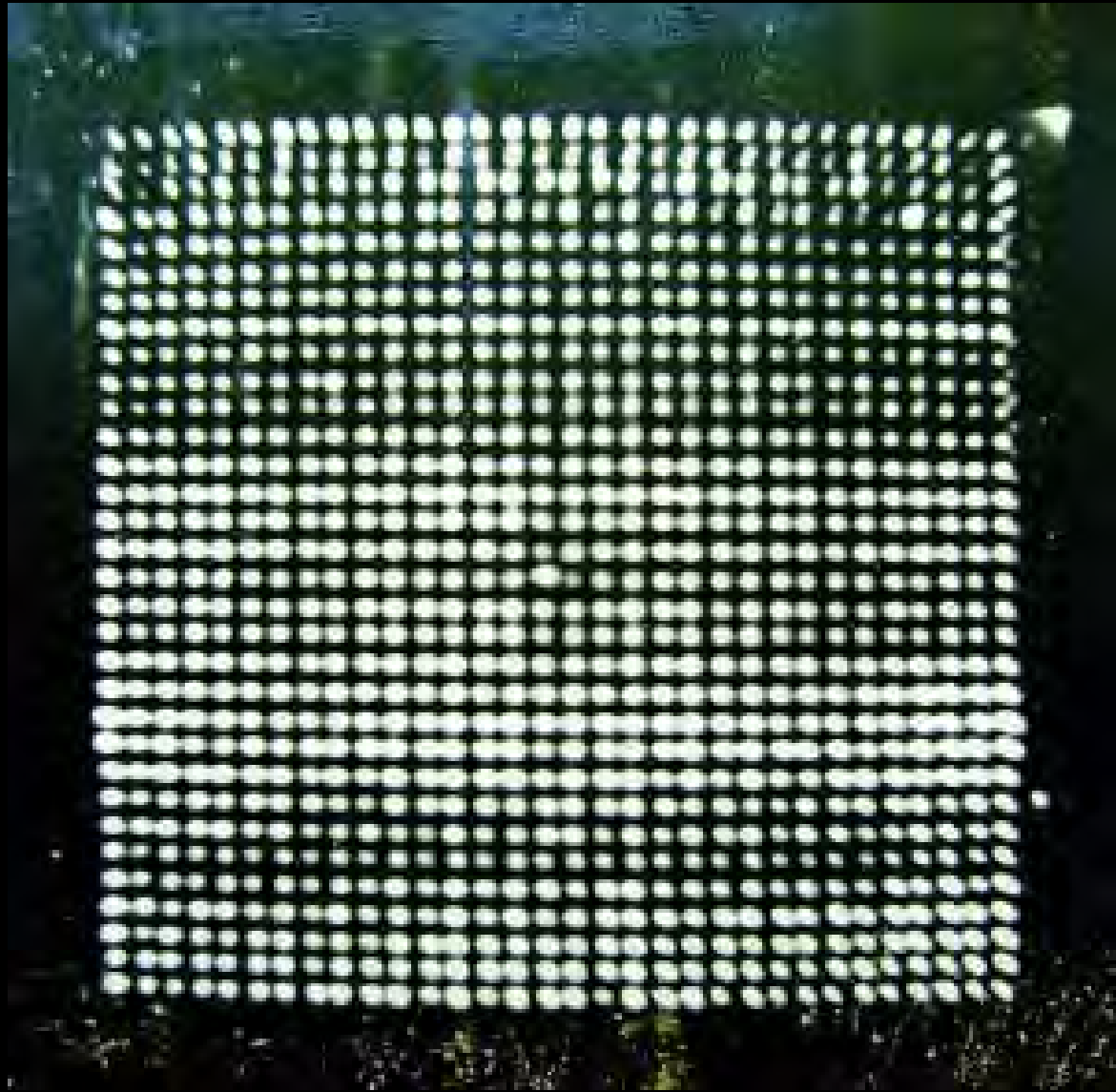
FLOOR PLANS OF FULD HALL AND BUILDINGS A AND B
INSTITUTE FOR ADVANCED STUDY
Princeton, N.J.

Drawn by
PETER PANAGOS

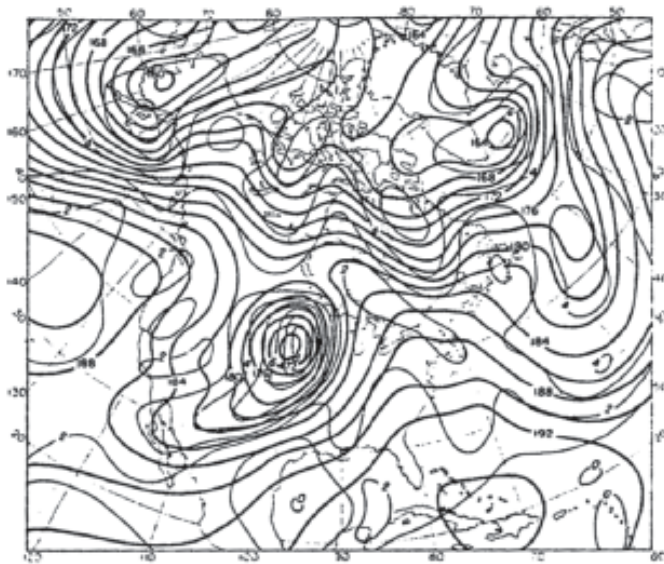
Electronic Computer Project



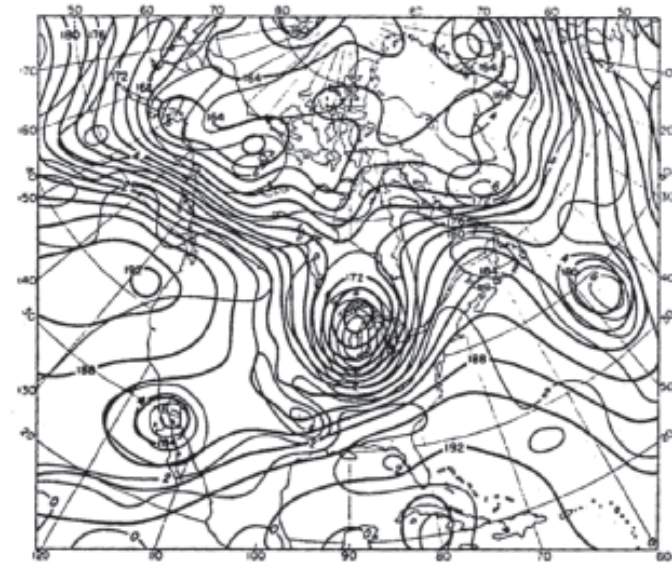
Von Neumann and Oppenheimer at the IAS machine's formal dedication ceremony, June 10, 1952



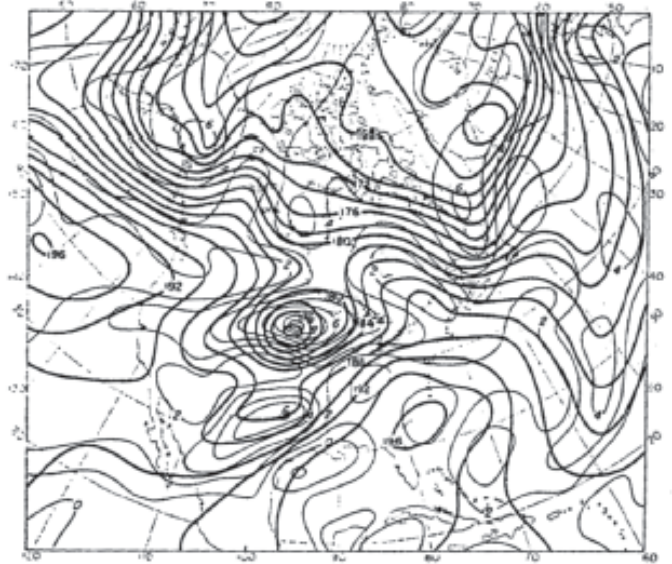
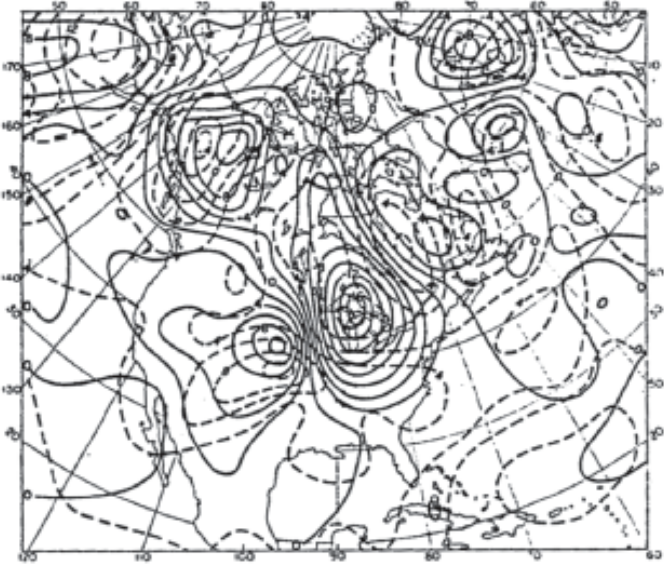
32 x 32 bit memory



a



b



Charney, Von Neumann, et al.
Weather forecast of 5 Jan 1949



Can we survive technology?
John von Neumann, *Fortune*, 1955



IPCC

FIFTH ASSESSMENT REPORT Working Group I

27 September 2013

A total of 209 Lead Authors and 50 Review Editors from 39 countries and more than 600 Contributing Authors from 32 countries contributed to the preparation of Working Group I AR5.

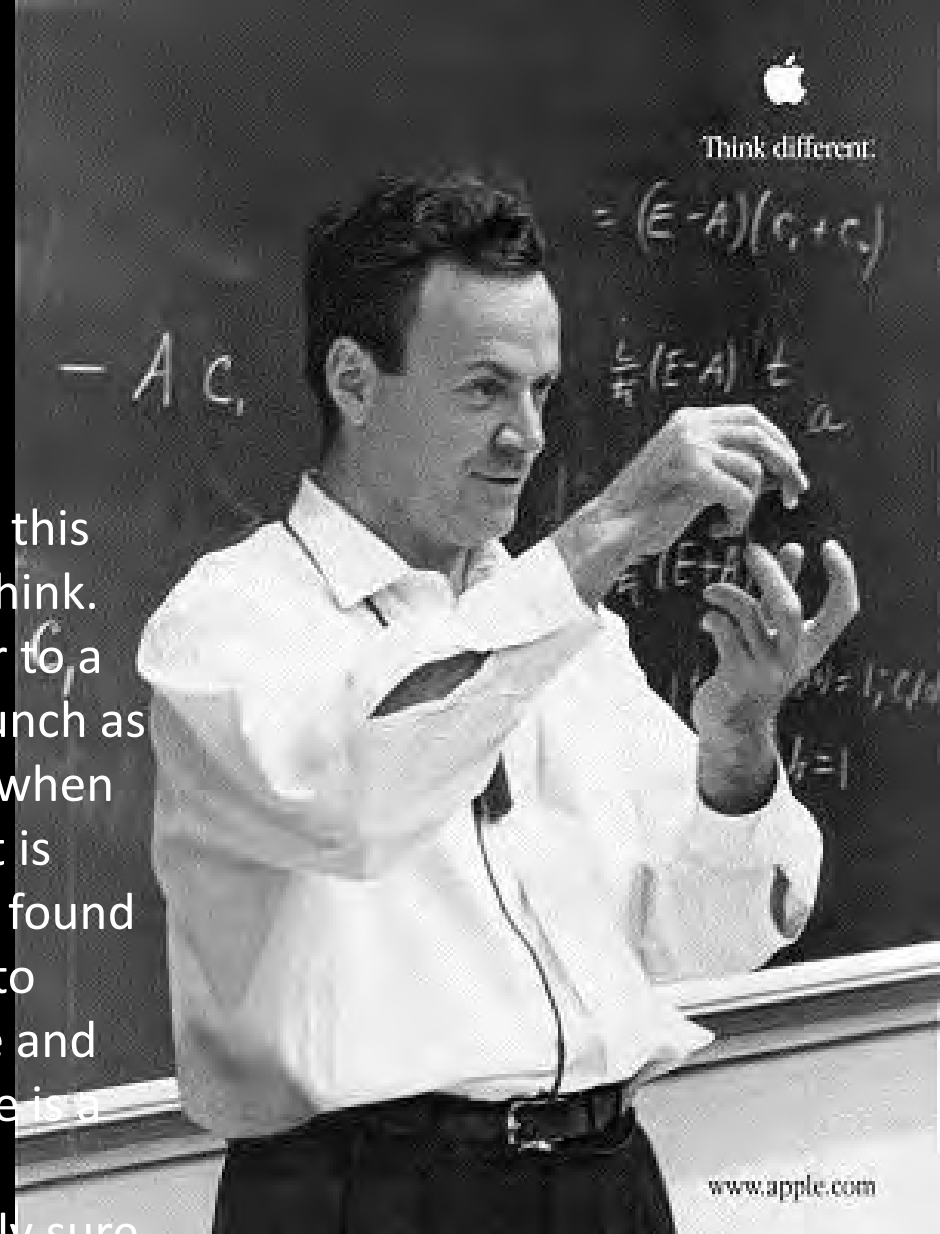


Dark Knowledge

Science is the belief in the ignorance of experts.

-- Richard Feynman

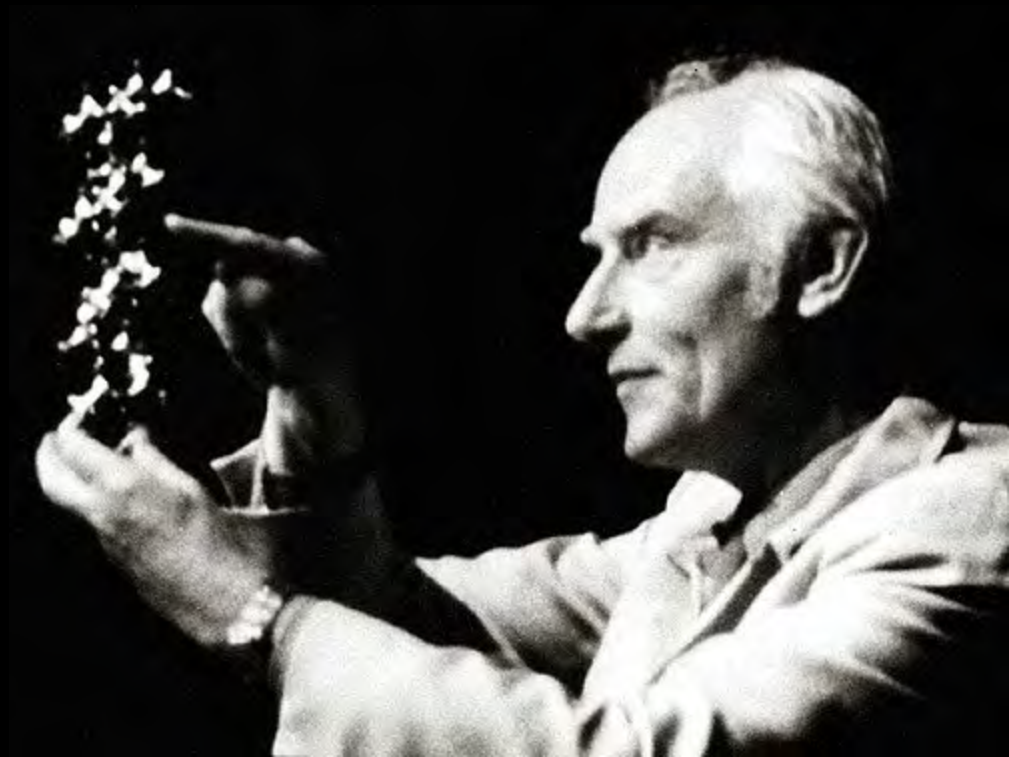
The scientist has a lot of experience with ignorance and doubt and uncertainty, and this experience is of very great importance, I think. When a scientist doesn't know the answer to a problem, he is ignorant. When he has a hunch as to what the result is, he is uncertain. And when he is pretty darned sure of what the result is going to be, he is in some doubt. We have found it of paramount importance that in order to progress we must recognize the ignorance and leave room for doubt. Scientific knowledge is a body of statements of varying degrees of certainty -- some most unsure, some nearly sure, none absolutely certain.



Science as organized skepticism

“Any theory that can account for all of the facts is wrong, because some of the facts are always wrong.”

-- Francis Crick



Science and Society

Science

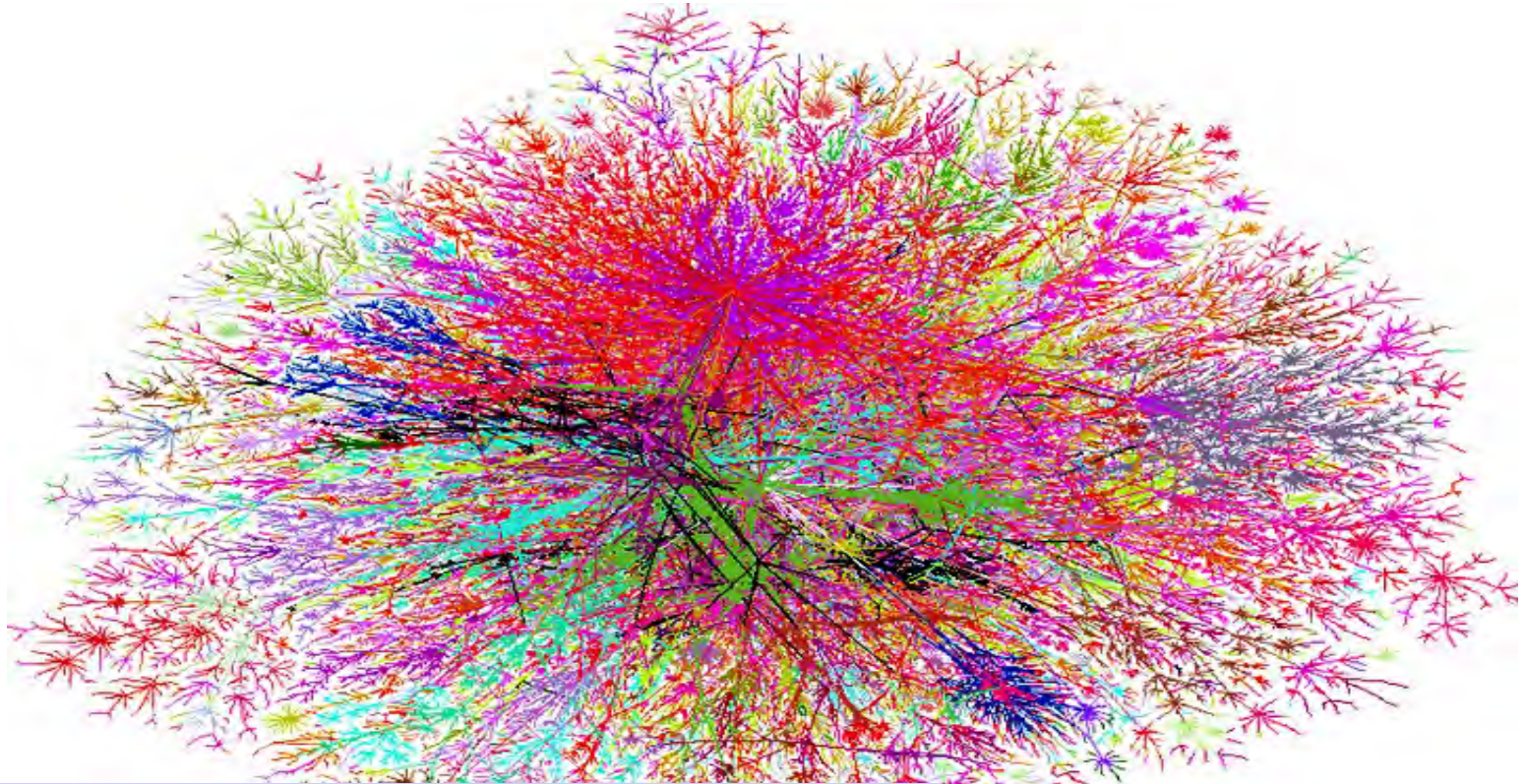
Society



Science

Society

University of Google



*The problem with the global village
is all the global village idiots.*

- Paul Ginsparg

UN report that said Himalayan glaciers would melt within 25 years was all hot air

By David Derbyshire

UPDATED: 04:59 EST, 18 January 2010

Claims by the world's leading climate scientists that most of the Himalayan glaciers will be exposed as nonsense.

The alarmist warning appeared two years ago in a highly influential report by the United Nations Intergovernmental Panel on Climate Change.

At the time the IPCC insisted that its report contained the latest and most detailed evidence of climate change to the planet.



Misleading: UN climate change report's claim that Himalayan glaciers would vanish within 25 years

But the experts behind the warning have now admitted their claim was not based on the latest science. It was based on data from the magazine New Scientist in the late 1990s.

THE TIMES THE SUNDAY TIMES

Archive Article

Please enjoy this article from The Times & The Sunday Times

From [The Sunday Times](#)

January 17, 2010

World misled over Himalayan glacier meltdown

Jonathan Leake and Chris Hastings

A WARNING that climate change will melt most of the Himalayan glaciers by 2035 is likely to be retracted after a series of scientific blunders by the United Nations Intergovernmental Panel on Climate Change (IPCC).

Two years ago, the IPCC (IPCC) issued a warning that the world was warming. A fast that the

guardian.co.uk

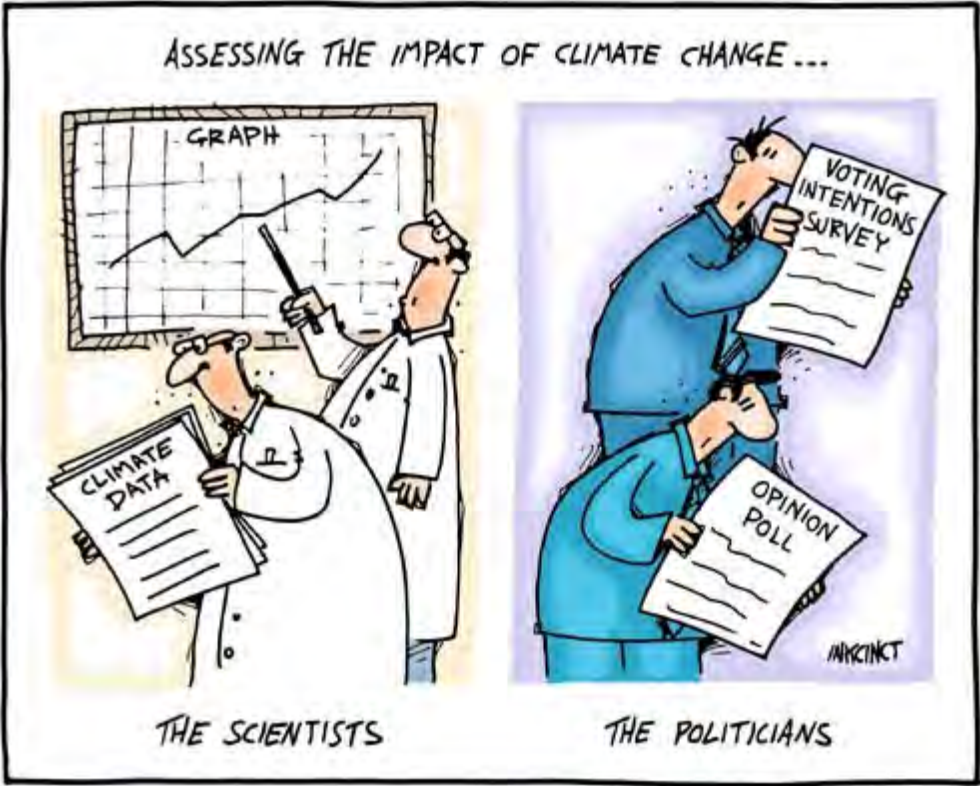
Sharp decline in public's belief in climate threat, British poll reveals

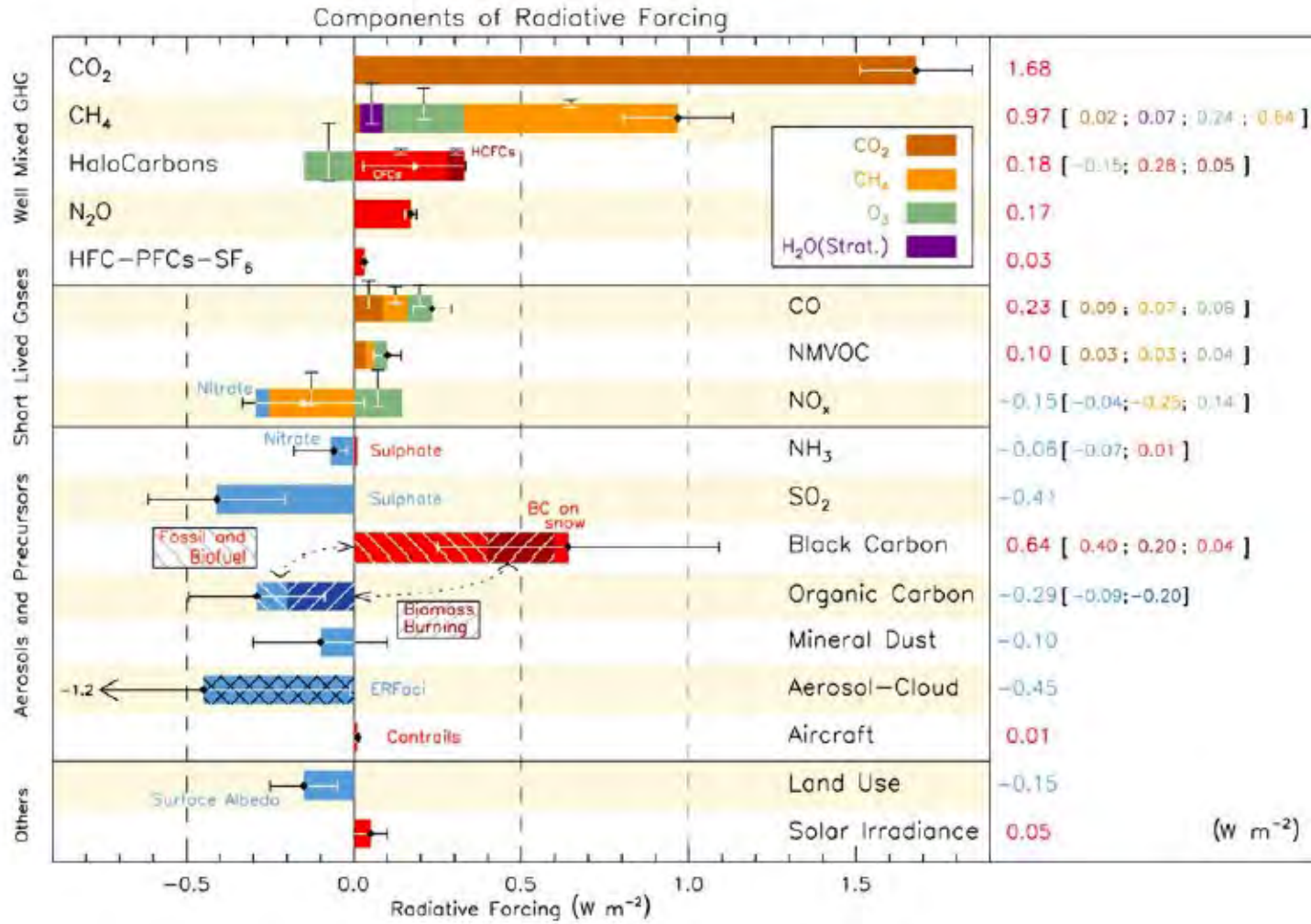
Climate change survey raises fears it will be harder to persuade the public to support costly policies to curb emissions

Juliette Jowit

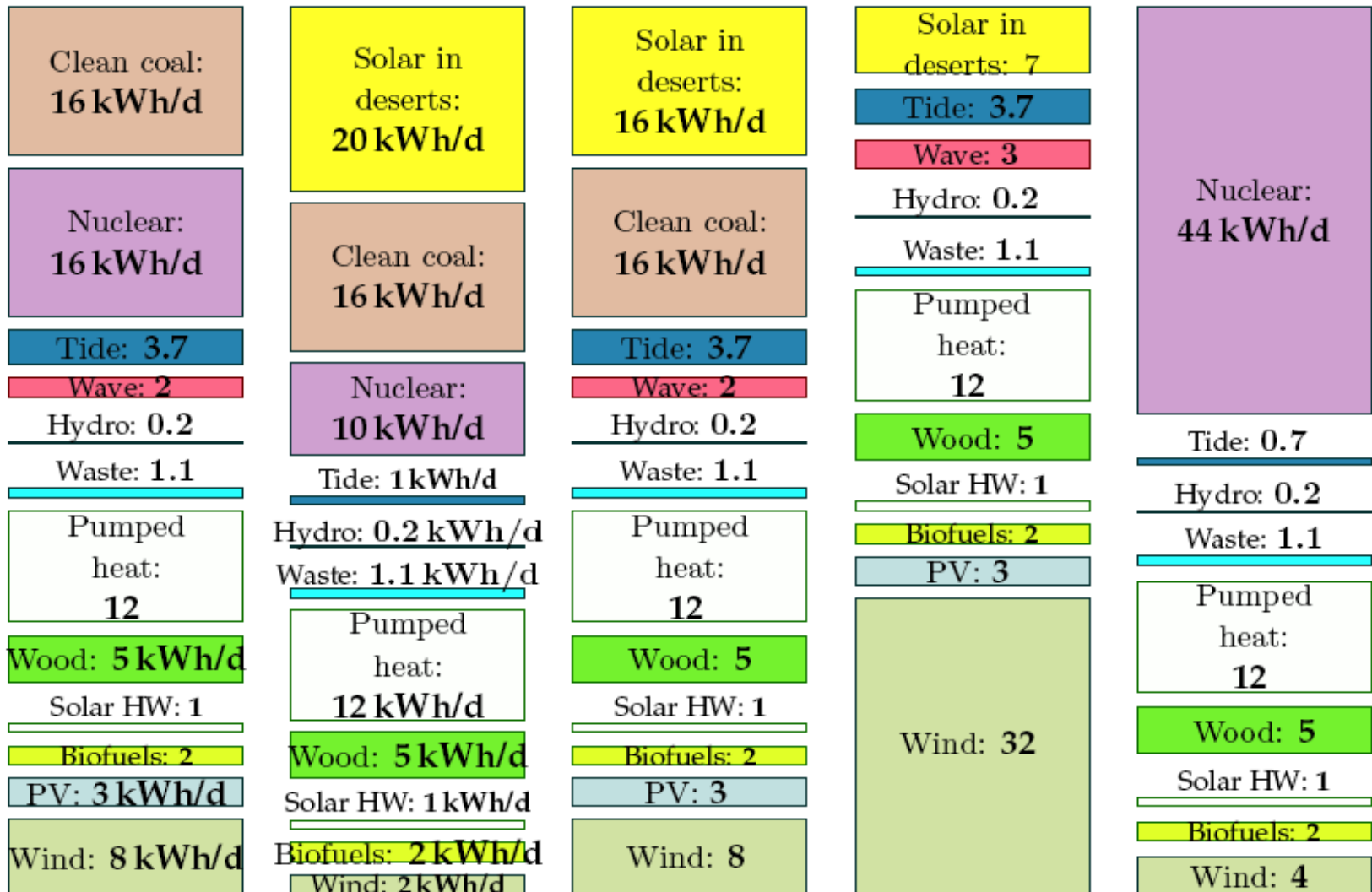
guardian.co.uk, Tuesday 23 February 2010 15:22 GMT

Scientists vs. Politicians





Explaining Mixed Strategies



David MacKay, *Sustainable Energy – Without the Hot Air*

"Doubt is our business"

SMOKING AND HEALTH PROPOSAL

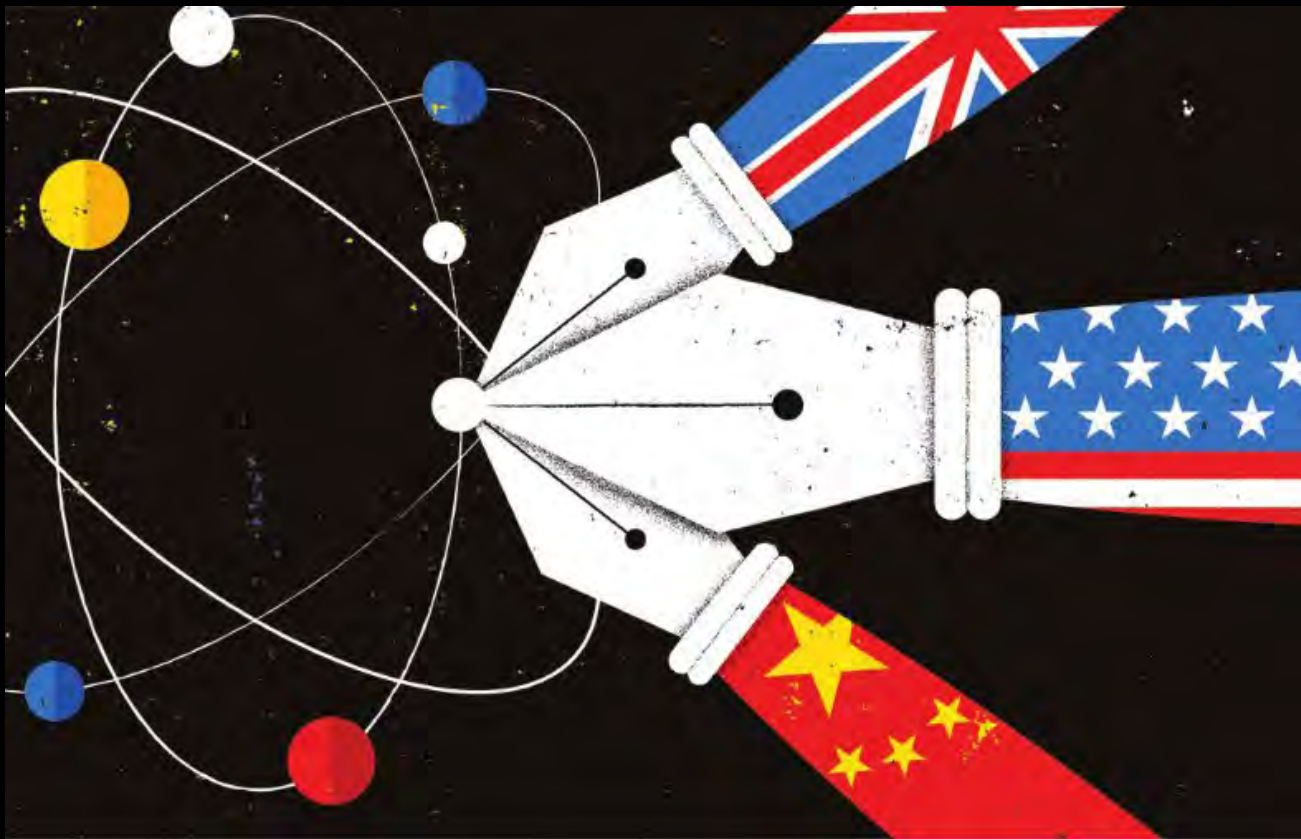
VB
M
What we want to do this morning is to take a summary look at the smoking and health question and then make a proposal to you for a B&W project to counter the anti-cigarette forces. F

This is a chronological table of smoking and health activities. Not all

the activities
chart -- just
probably left
believe we c
and how we
government

VB
Doubt is our product since it is the best means of competing with the "body of fact" that exists in the mind of the general public. It is also the means of establishing a controversy. Within the business we recognize that a controversy exists. However, with the general public the consensus is that cigarettes are in some way harmful to the health. If we are successful in establishing a controversy at the public level, then there is an opportunity to put across the real facts about smoking and health. Doubt is also the limit of our "product". Unfortunately,

Global Science & Capacity Building

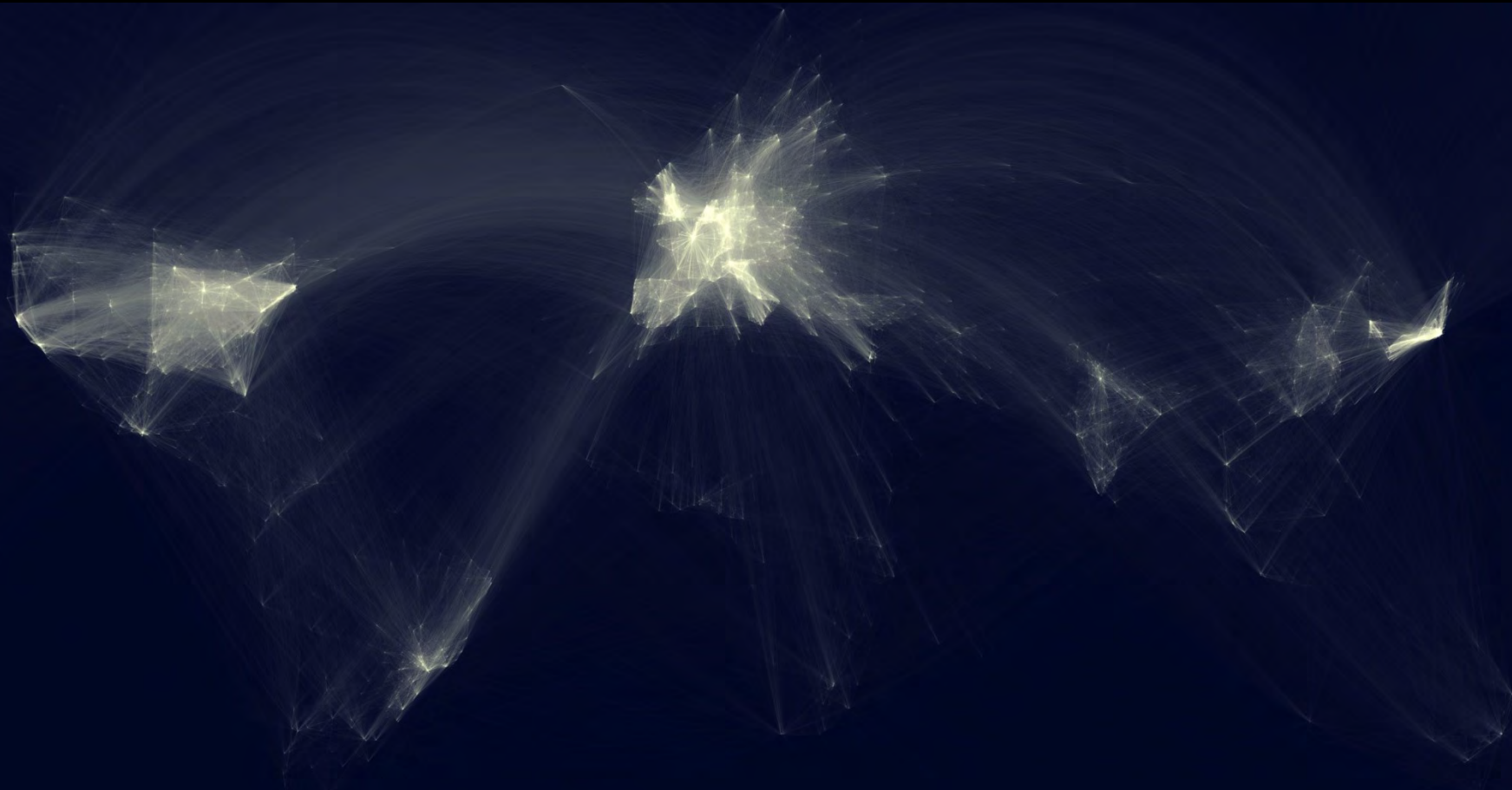


The fourth age of research

Jonathan Adams analyses papers from the past three decades and finds that the best science comes from international collaboration.

Research has progressed through three | growing: between the knowledge a country | papers in a country's tally if one or mo

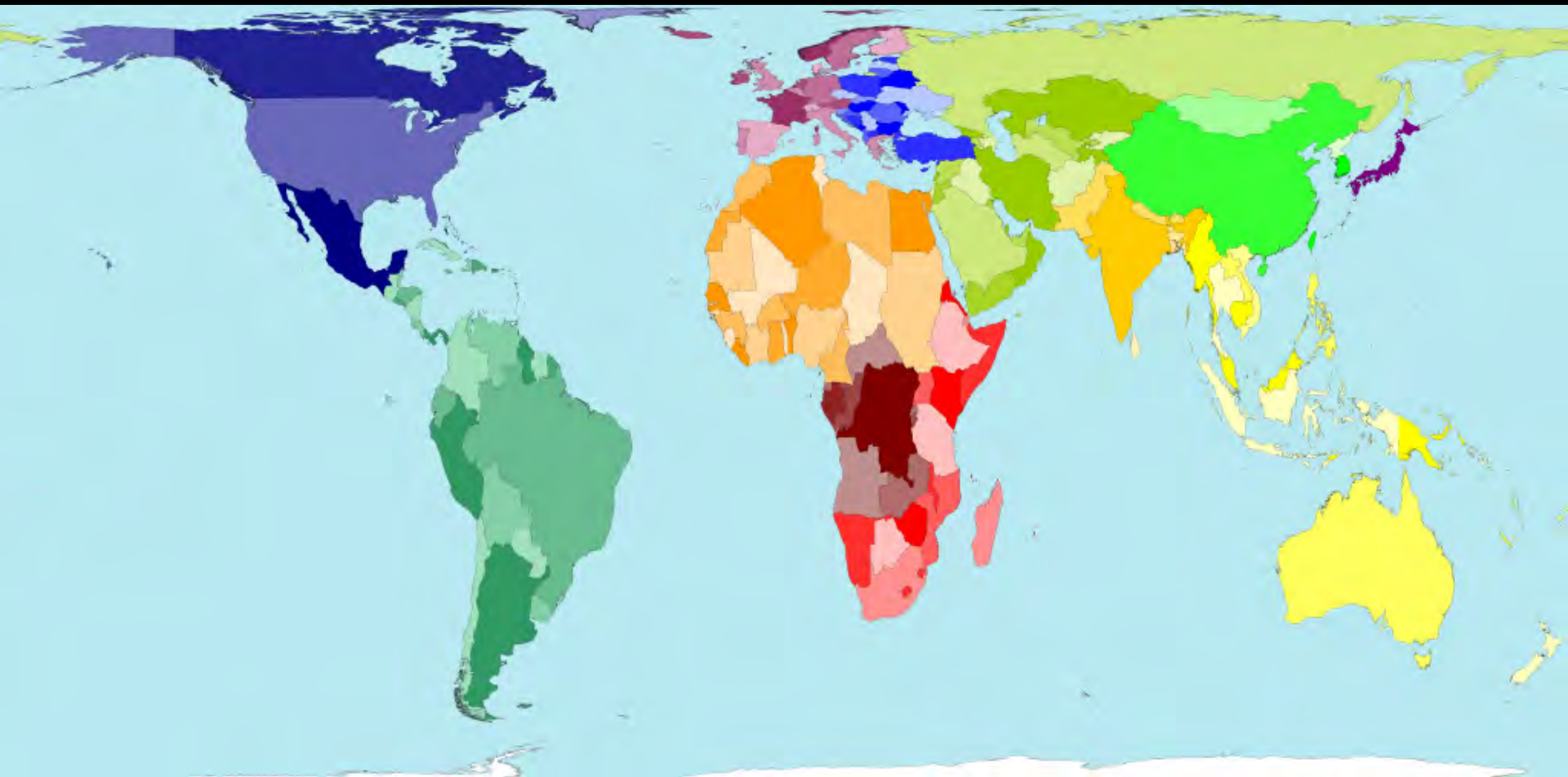
Nature, May, 2013



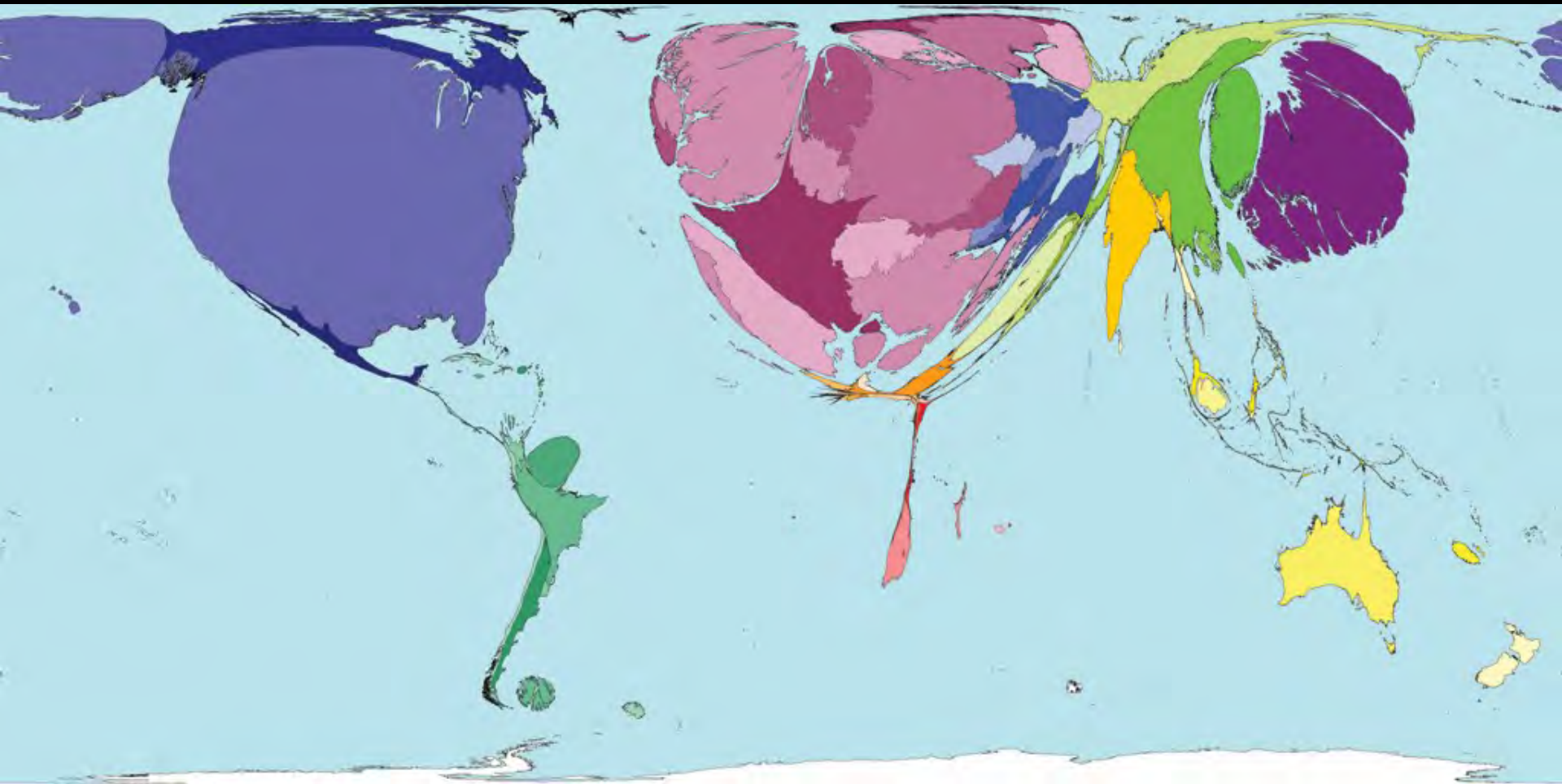
Map of scientific collaborations from 2005 to 2009

Computed by Olivier H. Beauchesne @ Science-Metrix, Inc.

Data from Scopus, using books, trade journals and peer-reviewed journals



The World



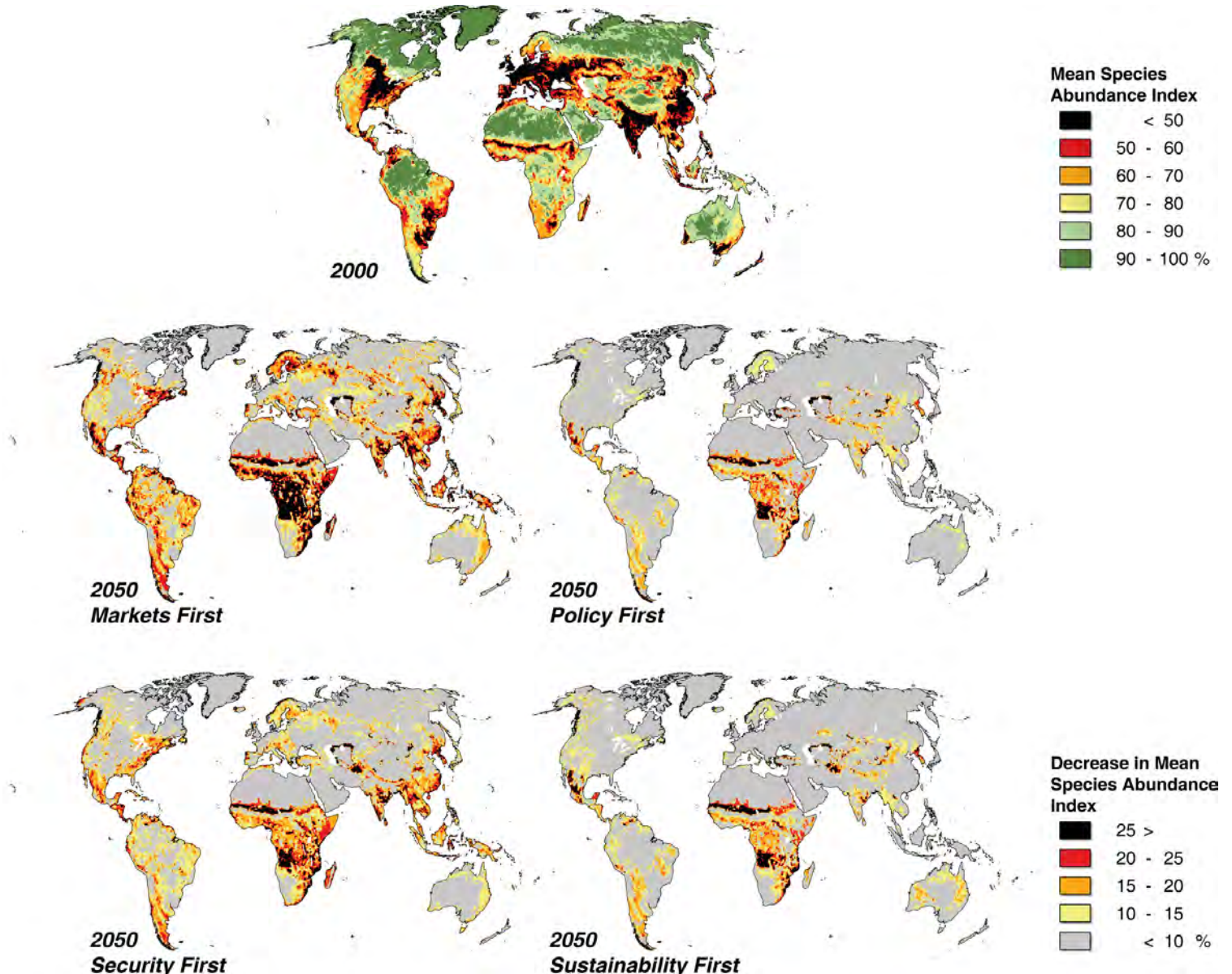
The World of Science
(output 2002)

Worldmapper.org

Impact of Climate Change



Biodiversity



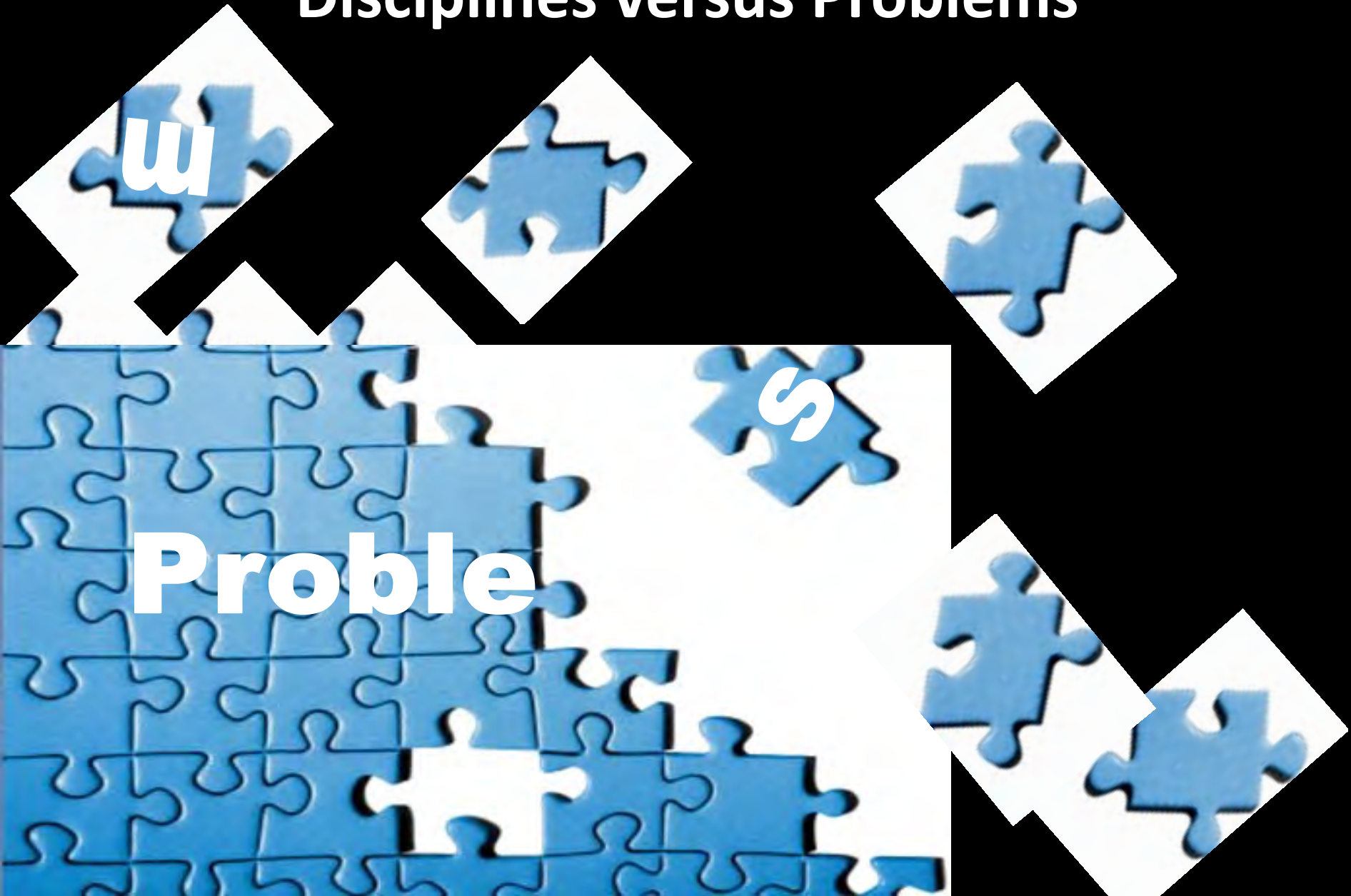
Borders in Science

Disciplines versus Problems

W

S

Proble



The Unity of Science

● Steaks and roasts suitable for broiling, panbroiling and roasting

Also represents the most desirable cuts and accounts for about 90% of the retail value of a carcass

■ Thrifty cuts requiring longer cooking methods

OTHER CUTS			
GROUND BEEF <i>Beef, Partly, Partly, Partly (Steak)</i>	CURED STEAK <i>Partly, Steaks</i>	BEEF FOR STEW <i>Steaks, Co. at in liquid</i>	CUBES FOR RABOBS <i>Steak, Steaks</i>

RIB		SHORT LON		SHORT LON	
RIB ROAST, LARGE END <i>Roast</i>	RIB ROAST, SMALL END <i>Roast</i>	BONELESS TOP LOIN STEAK <i>Steak, Partly, Partly</i>	T-LOIN STEAK <i>Steak, Partly, Partly</i>	POURHOUSE STEAK <i>Steak, Partly, Partly</i>	SIRLOIN STEAK, FLAT ROBE <i>Steak, Partly, Partly</i>
RIB STEAK, SMALL END <i>Steak, Partly, Partly</i>	RIB EYE ROAST <i>Roast</i>	TRIMMED RIB ROAST (FLAT END) <i>Roast, Steak</i>	TRIMMED RIB STEAK (FLAT END) <i>Steak, Partly, Partly</i>	TRIMMED RIB STEAK (FLAT END) <i>Steak, Partly, Partly</i>	SIRLOIN STEAK, ROUND ROBE <i>Steak, Partly, Partly</i>
RIB EYE STEAK <i>Steak, Partly, Partly</i>	BACK RIBS <i>Steaks, Co. at in liquid, Partly</i>				TOP SIRLOIN STEAK <i>Steak, Partly, Partly</i>

A1 COLDING VEAL
 A2 CHUCK FOR ROAST
 A3 CHUCK FOR STEW
 A4 SHORT RIB
 A5 MAIN POT ROAST
 A6 CROSS RIB POT ROAST
 A7 CROSS RIB POT ROAST
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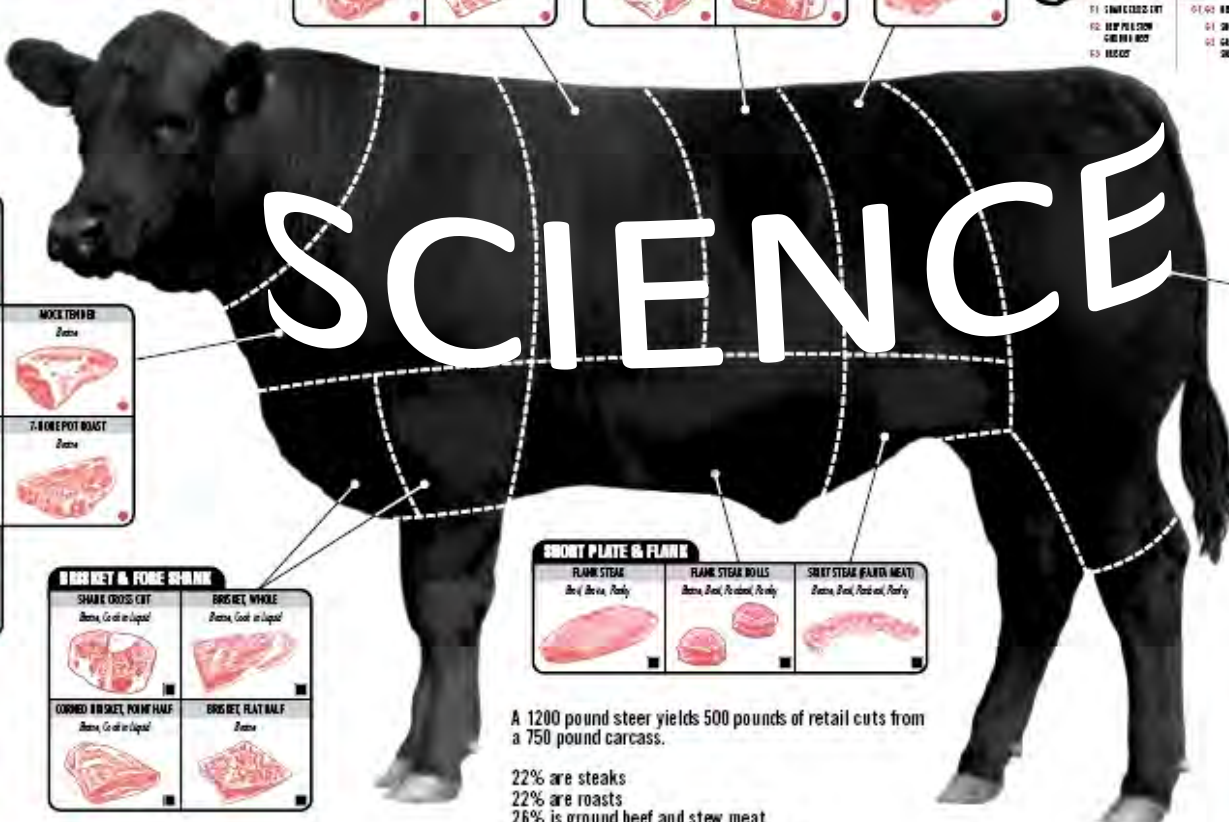
CULICK		
CHUCK EYE ROAST <i>Steak, Roast</i>	BONELESS TOP BLADE STEAK <i>Steak, Partly</i>	ARM POT ROAST <i>Steak</i>
BONELESS CHUCK POT ROAST <i>Steak</i>	CROSS RIB POT ROAST <i>Steak</i>	MOCK TENDER <i>Steak</i>
BLADE ROAST <i>Steak</i>	UNDER BLADE POT ROAST <i>Steak, Roast</i>	7-BONE POT ROAST <i>Steak</i>
SHANK RIBS <i>Steak, Co. at in liquid</i>	FLANKER-STYLE RIBS <i>Steak, Co. at in liquid</i>	

BRIQUET & FORE SHANK	
SHANK CROSS CUT <i>Steak, Co. at in liquid</i>	BRIQUET WHOLE <i>Steak, Co. at in liquid</i>
CORNERED BRIQUET POINT HALF <i>Steak, Co. at in liquid</i>	BRIQUET FLAT HALF <i>Steak</i>

SHORT PLATE & FLANK		
FLANK STEAK <i>Steak, Partly, Partly</i>	FLANK STEAK BOLLIS <i>Steak, Partly, Partly, Partly</i>	SHORT STEAK (FAKEN MEAT) <i>Steak, Partly, Partly, Partly</i>

ROUND	
R ROUND STEAK <i>Steak, Partly</i>	TOP R ROUND ROAST <i>Roast</i>
TOP ROUND STEAK <i>Steak, Partly, Partly</i>	BONELESS HAMP ROAST <i>Roast, Steaks</i>
BOTTOM ROUND ROAST <i>Steak, Roast</i>	HP ROAST, CAP OFF <i>Roast, Steaks</i>
EYE ROUND ROAST <i>Steak, Roast</i>	TOP STEAK <i>Steak, Partly, Partly</i>

VARIETY MEATS	
TONGUE <i>Steak</i>	LIVER <i>Steak, Partly, Partly</i>
BONEY <i>Steak, Steaks</i>	HEART <i>Steak, Steak, Steak</i>



A 1200 pound steer yields 500 pounds of retail cuts from a 750 pound carcass.

22% are steaks
 22% are roasts
 26% is ground beef and stew meat
 30% is made-up of fat, bone & shrinkage

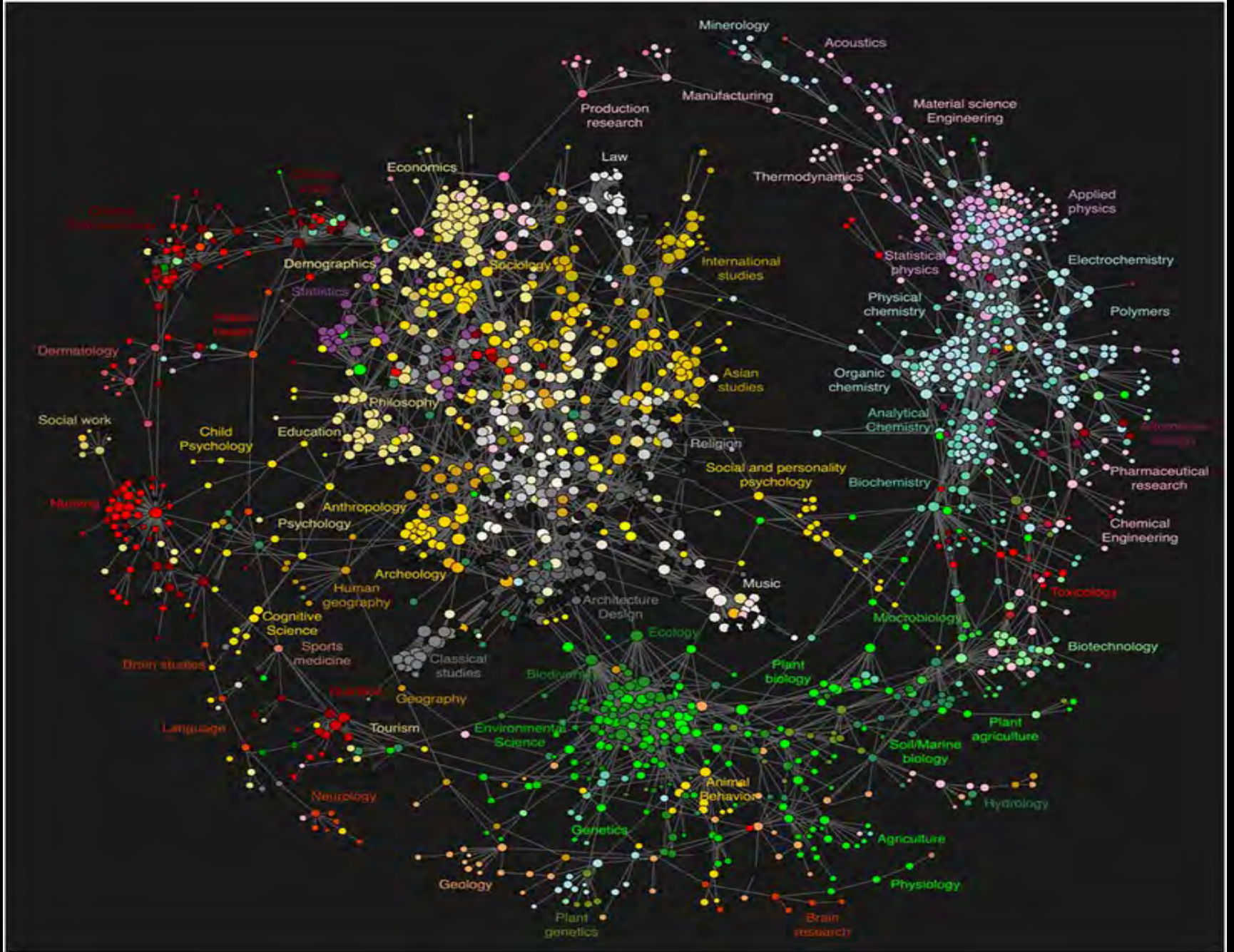
American Angus Association
 28201 Frederick Ave., St. Joseph, MO 64506
 816-383-5100 • www.angus.org

Tree of Knowledge





Diderot & D'Alembert, *Encyclopédie* (1751-1772)



Bollen J et al., *Clickstream Data Yields High-Resolution Maps of Science*. PLoS ONE 4(3):

Society and Academies

Role of National Academies

- Authoritative voice within science community.
- Convening power.
- Politically neutral.
- Able to call on experts, within Academy and outside.
- Special role, often by law, to inform government and policy makers.
- Can speak to the public at large.

Regional/Global Role of Academies

- Many of the problems are global (energy, climate, water, health, food, environment, education,...).
- Science is increasingly a global effort.
- Bridges are necessary between science and policy.
- Need for objective, authoritative, credible, independent, peer-reviewed reports, based on the best global expertise, with a geographical and scientific balance.
- Both in the domain of science for policy, as well as policy for science.
- Academies have the ability to select the best experts in the world through network of affiliated organizations.

International Organisations

**Inter
Academ
y**

National Academies

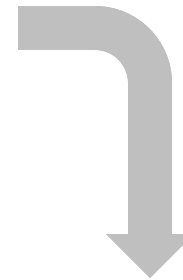
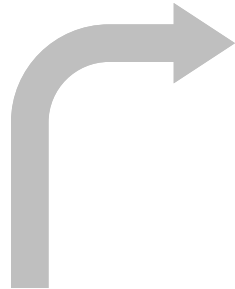
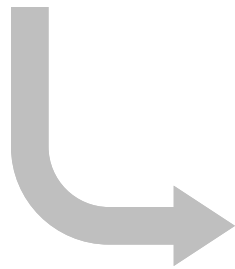
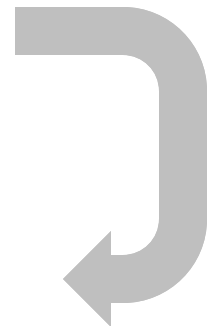
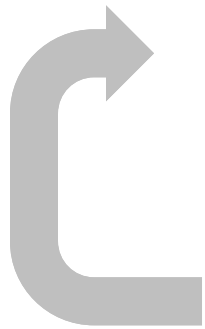
National Governments

Requests

Expertise
Reports
Members

Reports

(Regional)
Meetings



Building Bridges



Society

Governments
Policy Makers

Science
Universities

Public opinion

Politics

Media

Economy

Industry

Science-Policy Interface

What are the best practices in building science-policy “bridges”?

- What is the most useful way to organize the international field?
- How to plan assessments so that they are relevant, timely, adaptive?
- How is quality control implemented?
- What, if any, should be the role of policy makers in assessments?
- What is the most effective communication?
- What defines success?

**Need for Strong International
Collaborations between Academies
And Science Organizations
As Advisors to the World!**