# A Dialogue on the Future of NOAA Science

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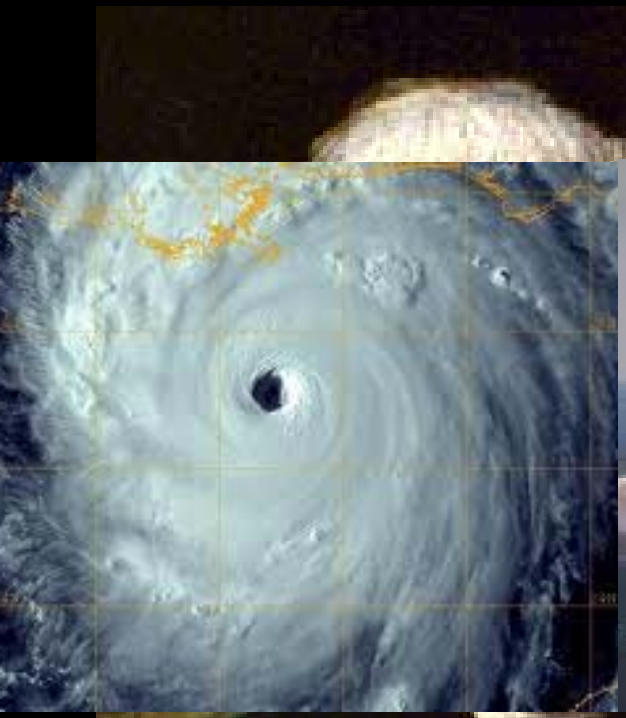
NOAA Administrator

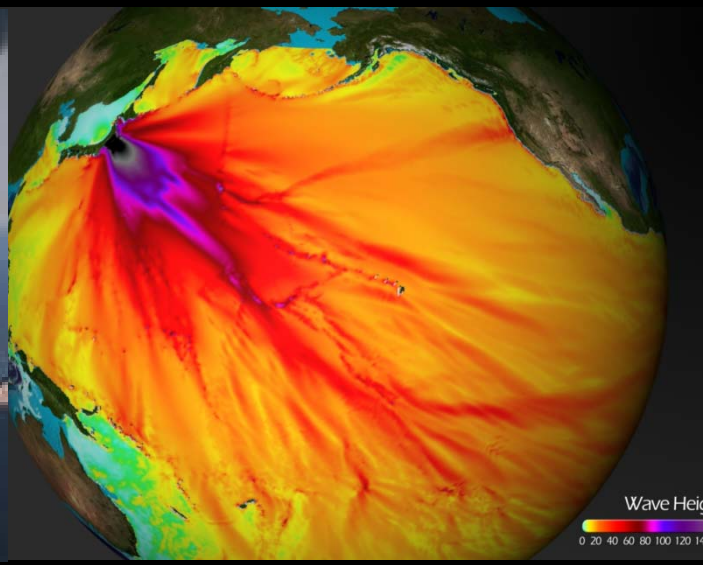
NOAA Library Brown Bag
January 27, 2012

# 500th NOAA LIBRARY BROWN BAG

Skip Theberge, Jr..
1973

# ONE NOAA: Then *& Now*





1970 – NOAA

# ONE NOAA = *NGSP*

## LONG-TERM GOALS

### Climate

An informed society anticipating and responding to climate and its impacts

### Weather

Society is prepared for and responds to weather-related events

### Oceans

Marine fisheries, habitats, and biodiversity are sustained within healthy and productive ecosystems

### Coasts

Coastal and Great Lakes communities are environmentally and economically sustainable

## MISSION

To understand and predict changes in climate, weather, oceans, and coasts,

To share that knowledge and information with others, and

To conserve and manage coastal and marine ecosystems and resources.

## ENTERPRISE-WIDE CAPABILITIES

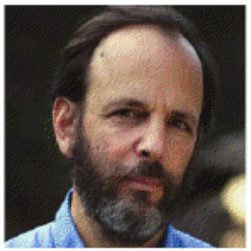
**Science & Technology**

**Partner & Customer Engagement**

**Organization & Administration**

nature
International weekly journal of science

WORLD VIEW *A personal t*



# Blue-sky bias should be brought down to Earth

*High-prestige research hogs the money, while the needs — and value — of the US science agencies closest to the public are ignored, says* **Daniel Sarewitz.**

The Republican majority swept into Congress promising to reduce government spending. One of the first targets was the US Geological Survey (USGS), an agency within the Department of the Interior. The survey had long prided itself on the excellence of its science, but its relatively small budget and low profile made it a good candidate for political sacrifice. The year was 1995.

As 2012 begins, we are entering the most important and decisive period for US science and technology policy since the late 1940s. After 60 years dominated by growing federal expenditure, US science now faces a long period of budgetary stasis, or even contraction. From today's vantage point, we can see the 1995 assault on the USGS as a harbinger of this new era.

The USGS did survive. An important factor in this was the 1,400 state and local organizations that collaborated with the agency to monitor and manage water resources. When these groups let their elected representatives know about the survey's importance for the well-being of the nation, Congress took the USGS off the chopping block. But over the past 15 years, mission agencies such as the USGS that seek principally to serve public goals rather than to advance science have experienced minimal budgetary growth, in some cases not even keeping up with inflation. Since 1996, research funds at the USGS have risen by a mere 16%; at the National Oceanic and Atmospheric Administration (NOAA), 11%; the Environmental Protection Agency, 33%; the National Institute of Standards and Technology (NIST), 38%; and the Centers for Disease Control and Prevention, 45%. Even Department of Defense research has diseases, and developing the standards and measures that facilitate technological innovation. Indeed, just over a year ago, NOAA director Jane Lubchenco earned a place on the cover of *Nature* for guiding her agency's response to the Deepwater Horizon oil spill.

But as the current budget crisis unfolds, the erosion of mission-oriented research is likely to accelerate. For example, the spending bill passed in late November increased the NSF's budget by 2.5%, flat-funded NIST and cut NOAA's by 4.3%.

It wasn't supposed to be this way. America's pragmatic culture has long been assumed to favour applied investigation over fundamental science, a notion that goes back at least to Alexis de Tocqueville's nineteenth-century classic *Democracy in America*. And the foundational text of modern US science policy, Vannevar Bush's 1945 report *Science the Endless Frontier*, builds its case on the claim that the government will naturally support applied research, but must be compelled to support basic work.

**AS THE CURRENT BUDGET CRISIS UNFOLDS, THE EROSION OF MISSION-ORIENTED RESEARCH IS LIKELY TO ACCELERATE.**

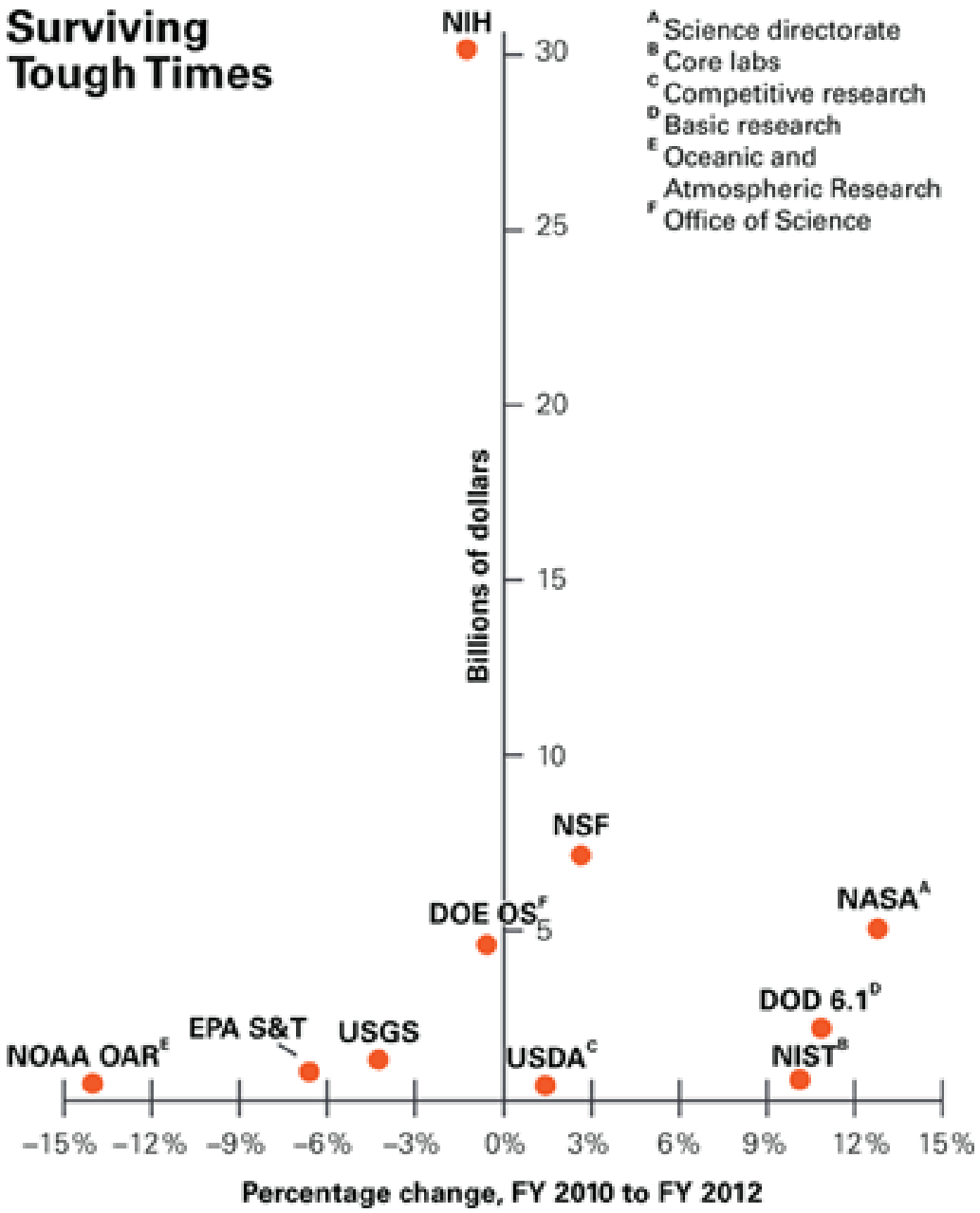
Why, then, the neglect of the mission agencies? One important reason may be that the leading public voices speaking on behalf of research funding come mostly from the high-prestige frontiers of science, and from the institutions associated with such research — universities, the National Academies, the professional scientific societies, and so on.

Last November, for example, the head of the American Association for the Advancement of Science called for "rethinking t to make the funding of univ more efficient (A. I. Leshner *Science* **334**, 758; 2011). This is a worthy goal, but nowhere in his

January 4, 2011

# 2012 Research Budgets

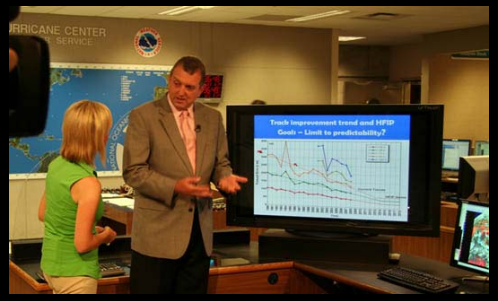
*Science*
January 6, 2012



# MAKE SCIENCE USABLE

UNDERSTANDABLE

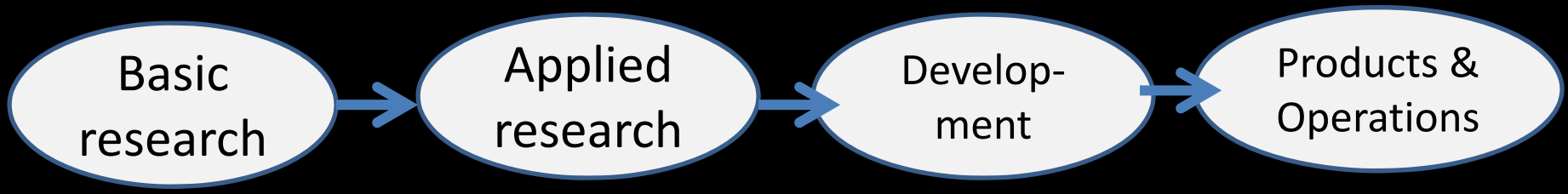
RELEVANT




CREDIBLE

# Linear Model

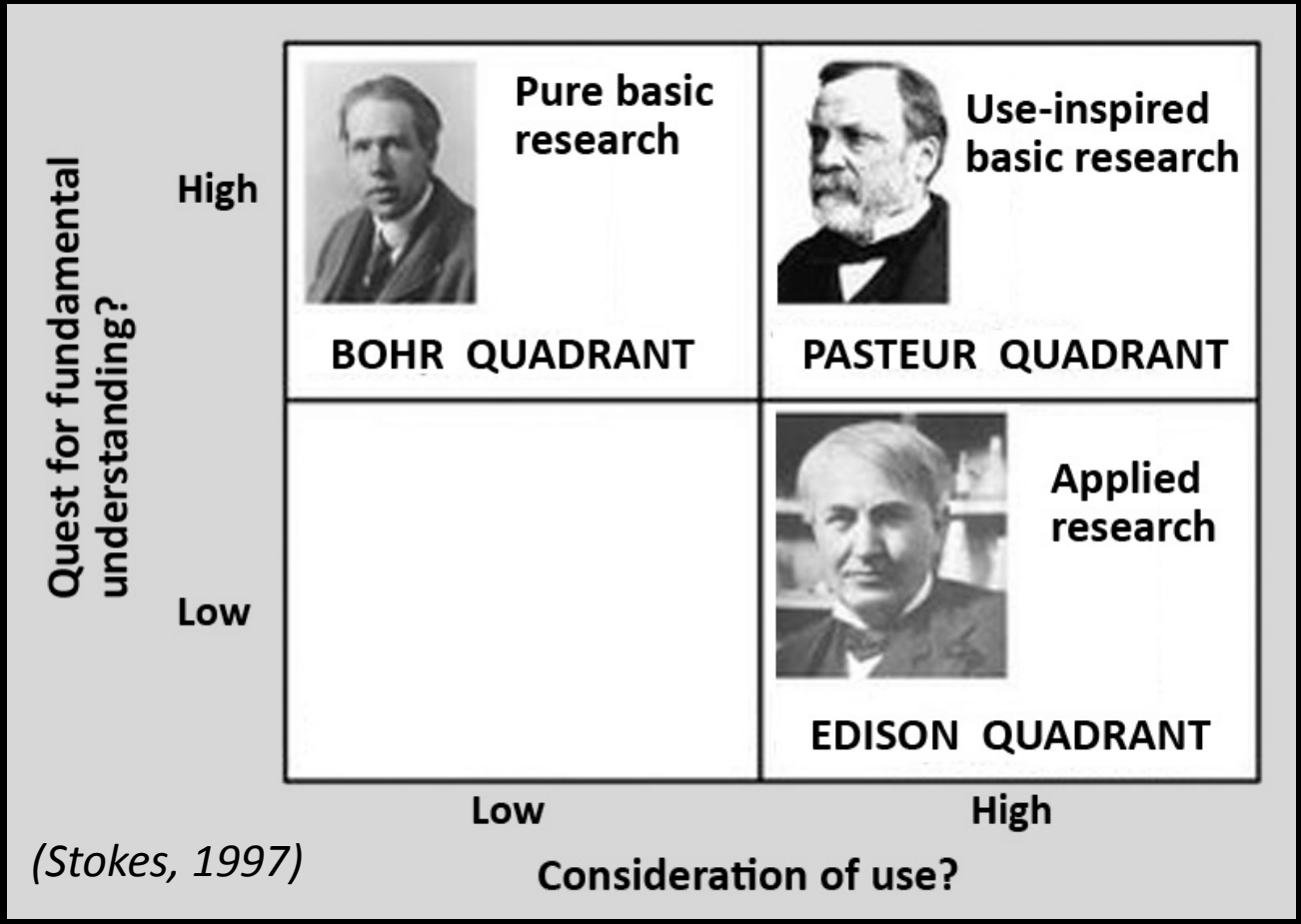
BASIC RESEARCH:
performed without thought of practical ends to yield fundamental understanding




APPLIED RESEARCH: motivated by use but does not seek fundamental understanding

Vannevar Bush (1945) *Science – The Endless Frontier*
as described in *Rising Above the Gathering Storm (NAS, 2007)*

# Pasteur's quadrant




There is not **pure science** and **applied science**, but only **science** and the **applications of science**.

*Louis Pasteur, 1863*

# QUESTIONS

- What are our best stories of user-inspired science that has benefited society?
- What should we call “user-inspired science”?
- What new discoveries would most improve our management and policy missions?
- Where are our good opportunities to make a case for use-inspired science?

# SCIENCE WORKSHOPS

4/2010 STRENGTHENING NOAA SCIENCE

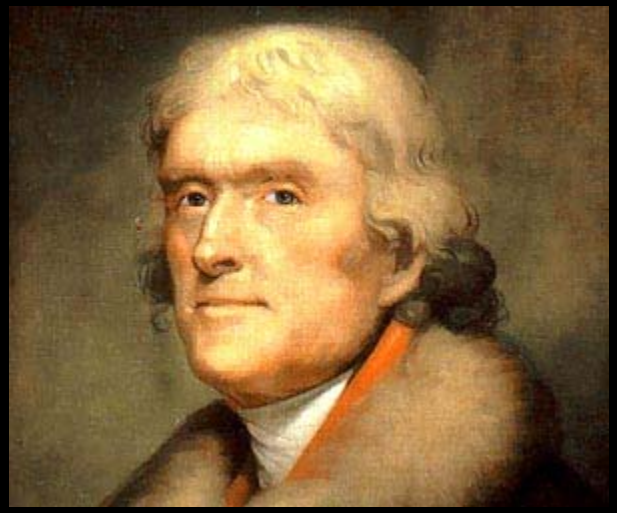
6/2011 - SOCIAL SCIENCE CHALLENGE

9/2011 – WATER CYCLE

9/2011 – CLIMATE VARIABILITY & CHANGE

11/2011 - ECOSYSTEM  RESEARCH

# YOUR IDEAS

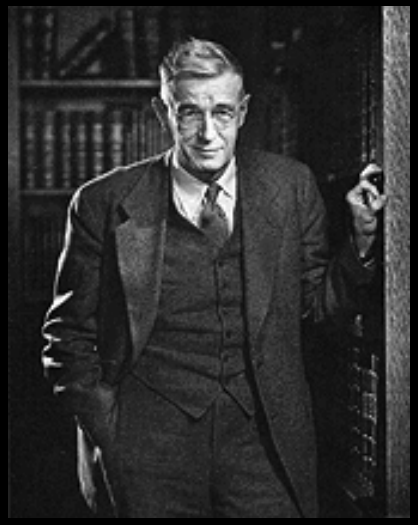


# Jeffersonian science

"The specific research project is motivated by placing it in an area of basic scientific ignorance that seems to lie at the heart of a social problem. Its main goal is to remove basic ignorance in an uncharted area of science and thereby to attain knowledge that will have a fair probability – even if it is years distant – of being brought to bear on a persistent debilitating national (or international) problem."

Sonnert & Holton, 2002

# *Science – The Endless Frontier*

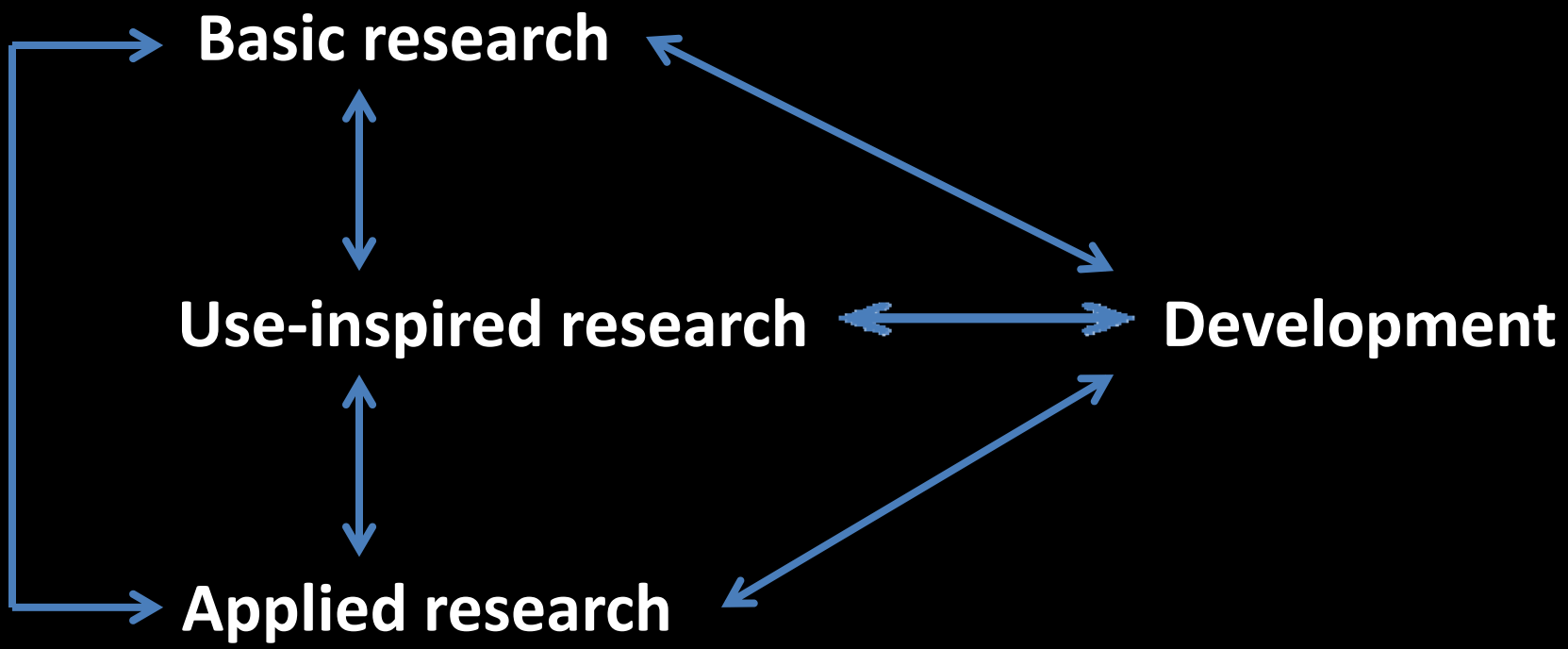


Vannevar Bush

"Basic research is performed without thought of practical ends. It results in general knowledge and an understanding of nature and its laws. This general knowledge provides the means of answering a large number of important practical problems, though it may not give a complete specific answer to any one of them. The function of applied research is to provide such complete answers. "

# Use-inspired research

## A DYNAMIC MODEL




**" Use-inspired science** consists of scientific investigation whose rationale, conceptualization, and research directions are driven by the potential use to which the knowledge will be put (Stokes, 1977). It sometimes involves the 'application' of other 'basic' or 'fundamental' science, but it also includes investigations that advance or even transform scientific disciplines or that create entirely new scientific fields." (NAS, 2007)