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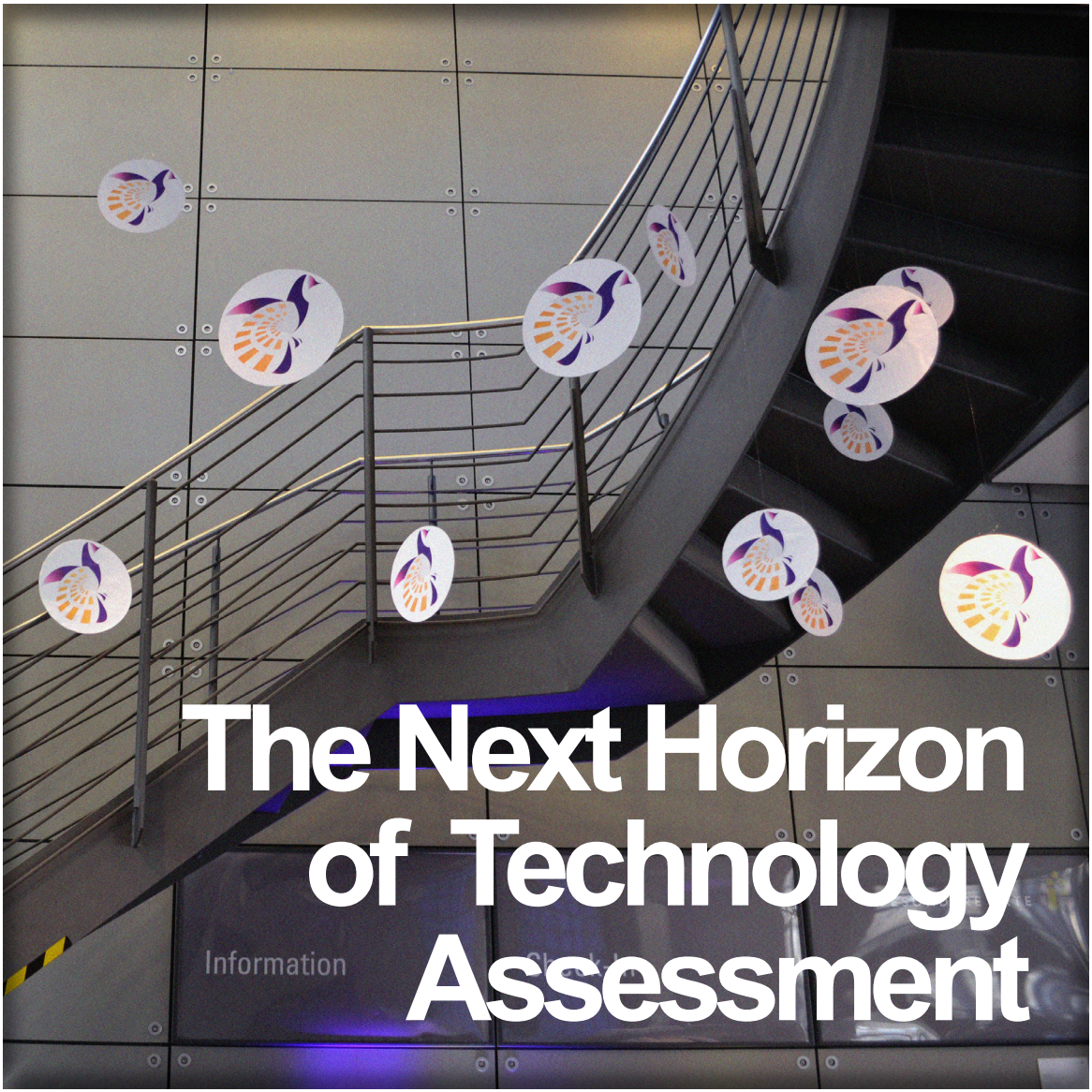

The Next Horizon of Technology Assessment

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Afterword

Technology Assessment as Political Myth?

Roger Pielke, Jr.

Abstract

This short paper considers two topics of technology assessment in the context of political myth. The two subjects are the role of "basic research" in the innovation landscape and the so-called green revolution in agriculture. I argue that both examples exhibit properties of politic myth – the condensation of expectations of cause and effect into stories that we tell ourselves to justify commitments to one course of action or another. I argue that the making of wise decisions on innovation – in general or in a field such as agriculture – would benefit from opening up our political myths to scrutiny and, in some cases, challenging received wisdom.[1]

Introduction: The Meaning and Significance of "Political Myth"

Discourse is full of political symbols. Cobb and Elder (1983) define a symbol as: "any object used by human beings to index meanings that are not inherent in, nor discernible from, the object itself. Literally anything can be a symbol: a word or a phrase, a gesture or an event, a person, a place, or a thing. An object becomes a symbol when people endow it with meaning value or significance." Consequently, political symbols play an in important role in politics – bargaining, negotiation and compromise in pursuit of shared interests, and in policy – the securing of a commitment to a course of action (see Pielke, 2007).

Social science has a long tradition of research into the social and political context of collective action. Gunnell (1968) argued that one purpose of such research is "illuminating the symbolic context that gives meaning to social action."[2]

In political discourse symbols can be referential and/or condensational (Sapir 1934). Referential symbols are "economical devices for purposes of reference." So each of the following are examples of a referential symbol -- !, X, PIZZA, etc. The second type of symbol distinguished by Sapir holds "emotional tension in conscious or unconscious form." Examples of such symbols would include a swastika, the American flag, and your family name.

Sapir highlights the importance of symbols in human interactions: "society is peculiarly subject to the influence of symbols in such emotionally charged fields as religion and politics." Following Sapir, Lasswell et al. (1952) define "key political symbols" as those which occur "in the flow of political statements." They further distinguish three types of symbols:

- identification (referring to people and groups)
- demand (referring to preferences and volitions)
- expectation (referring to assumptions of fact)

Symbols play an important role in politics because they are used as instruments of power but also to expand and contract the scope of options for collective action (see, e.g., Brunner, 1987; Burnier, 1994).[3]

For instance, consider the technology of vaccination. As a technology, vaccination provides "something a policy cannot: a reliable cause-effect chain that delivers a particular local outcome with great consistency" (Sarewitz 2011). In this case the "local outcome" is protection against disease. But as a political symbol, vaccination is anything but viewed consistently. Consider the following two examples:

- After the CIA used a vaccination program in Pakistan as cover to gather intelligence on the whereabouts of Osama bin Laden, The Economist reported: "All over the world, poor people resist vaccination campaigns in the belief that they are part of a plot by powerful authorities to take advantage of them. The CIA operation in Pakistan turns these fears from crazy conspiracy theories into accurate and rational beliefs."[4]
- In 2013 an epidemic of measles occurred in Wales, 15 years after false claims about vaccination risks. The Wall Street Journal reported: "Many here refused the vaccine for their children after a British doctor, Andrew Wakefield, suggested it might cause autism and a local newspaper heavily covered the fears. Resistance continued even after the autism link was disproved."[5]

In these instances vaccination became more than just a technical process of inoculation against disease. It became, in the former instance, a symbol of western aggression and, in the latter, of great risks to children. In each case the symbolization reflects power and evocative patterns of identification, demand and expectation which resulted in changing patterns of power and decision making. The consequences in each case were profound, more cases of polio and measles. The effects of symbols in politics are very real.

Symbols are the building blocks of political myth. As Bottici and Challand (2006) explain, "[P]olitical myths are mapping devices through which we look at the world, feel about it and therefore also act within it as a social group." They continue:

- [P]olitical myths cannot be falsified because they are not scientific hypotheses as to the constitution of the world or astrological almanacs that foretell its future: they are determinations to act that can always reinforce themselves. This practical dimension of a political myth cannot, however, be separated from what we can call its cognitive and its aesthetic dimension. Political myths provide fundamental cognitive schemata for the mapping of the social world: by reducing the complexity of experience, they enable us to come to terms with the multifaceted character of the world we live in.

In what follows I summarize explorations of two powerful symbols found in the field of technology assessment, namely basic research and the green revolution, as political myths, that is, as a mapping device through which we look at the world, interpret ît, and shape how we act in it. These two are chosen merely as examples of the role and power of political myth in shaping both discourse and action. The goal of this exploration is not to falsify a political myth, but rather to evaluate it and its components in terms of how it shapes thinking and action. Our explorations of technology assessment may be more informed with a willingness to recognize and challenge a political myth.

Basic Research as Political Myth

Writing in the Washington Post, a member of the US Congress and the president of the American Association for the Advancement of Science argued that: "Across society, we don't have to look far for examples of basic research that paid off."[6] They cite the creation of Google as a prime example of such payoffs: "Larry Page and Sergey Brin, then a National Science Foundation [NSF] fellow, did not intend to invent the Google search engine. Originally, they were intrigued by a mathematical challenge...."[7]

The appealing imagery of a scientist who simply follows his curiosity and then makes a discovery with a large societal payoff is part of the core mythology of post-World War II science policies. The mythology shapes how governments around the world organize, account for, and fund research. A large body of scholarship has critiqued postwar science policies and found that, despite many notable successes, the science policies that may have made sense in the middle of the last century may need updating in the 21st century.

In short, investments in "basic research" are not enough. Benoit Godin has asserted that: "The problem is that the academic lobby has successfully claimed a monopoly on the creation of new knowledge, and that policy makers have been persuaded to confuse the necessary with the sufficient condition that investment in basic research would by itself necessarily lead to successful applications."[8] Or as Leshner and Cooper declare in The Washington Post: "Federal investments in R&D have fueled half of the nation's economic growth since World War II."

A closer look at the actual history of Google reveals how history becomes mythology.[9] The 1994 NSF project that funded the scientific work underpinning the search engine that became Google (as we know it today) was conducted from the start with commercialization in mind: "The technology developed in this project will provide the 'glue' that will make this worldwide collection usable as a unified entity, in a scalable and economically viable fashion."[10] In this case, the scientist following his curiosity had at least one eye simultaneously on commercialization.

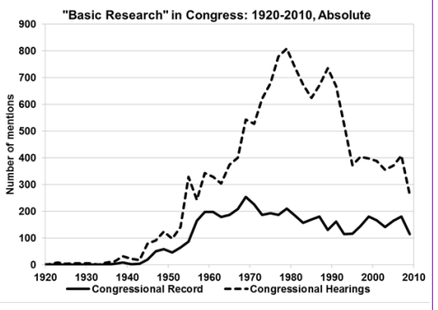

Figure 34: Basic Research

The phrase "basic research" originated around 1920 in the United States' agricultural community, where "research" was described as "the basic work" of the Department of Agriculture. The phrase was shortened to simply "basic research" and its usage slowly expanded in the 1920s and 1930s, but without the meaning it carries today. Ironically, basic research began as a phrase meaning what today we call applied research.

During the period between the World Wars, scientists in both the US and UK sought to expand their role in government, as well as government's role in supporting science – in both instances with limited effect. During this time, scientists continued to appeal for government support of "fundamental" or "pure" research conducted with little or no consideration of its application. On both sides of the Atlantic such arguments, not surprisingly, found little political support.

Not until World War II did governments decide that large-scale support of scientific research was an appropriate role for public investment. As has been well chronicled, the change in orientation was reflected in Vannevar Bush's Science – The Endless Frontier, which marked the transformation of "basic research" into a political symbol representing a powerful conception of the role of science in society.[11]

Bush's decision to use the phrase was conscious and strategic, as he explained in his memoirs: "To persuade the Congress of the pragmatically inclined United States to establish a strong organization to support fundamental research would seem to be one of the minor miracles ... When talking matters over with some of these [people on Capitol Hill], it was well to avoid the word fundamental and to use basic instead."

After the war, the usage of the phrase "basic research" increased dramatically in the elite media, in Congress, and within the scientific community. Interestingly, the usage increased and peaked first in the media, next in Congress, and lastly within the scientific community

– a pattern supporting Bush's claim that the phrase was politically expedient. Yet, despite its fall from favor, it remains a core concept in contemporary discussions of science policy.

A key reason for the durability of the phrase is that it can simultaneously convey opposite meanings to different audiences. For many scientists, "basic research" means "fundamental" or "pure" research conducted without consideration of practical applications. At the same time, policy makers see "basic research" as that which leads to societal benefits including economic growth and jobs.

In recent decades, use of the phrase "basic research" has been in decline. The scientific community has tried out an impressive range of alternative phraseology – "fundamental," "transformative," "transformational." Academics have also provided suggestions – "use-inspired," "collaboratively assured," and "mode 2." To date, no key symbol has displaced basic research for the simple reason that no model of science policy has yet displaced the postwar consensus. If and when such a shift occurs, it will not only be our institutions that change but our language as well.

The Green Revolution as Political Myth

The phrase "green revolution" was coined in 1968 to describe the recent and anticipated rapid increase in agricultural productivity through the adoption of new technologies, such as new hybrid varieties that thrived with a surging use of fertilizers, irrigation, and pesticides. The green revolution is used to refer to both an event and a process.

As an event, the green revolution is primarily associated with rapid increases in Indian wheat production in the late 1960s. As a process, the green revolution is commonly attributed to the period 1940 to 1970, starting with the planting of modern crop varieties in Mexico. A Google search for "Green Revolution in India" gave 507,000 hits, fourteen times more common than "Green Revolution in Mexico", which shows up 36 700 times. The same search terms for other countries give even fewer hits.[12]

Agricultural development predated and lasted longer than the period encompassed by the green revolution under either definition.[13] The so-called developing world in total saw food production more than double between 1960 and 1985.[14] By the 1990s, almost three-quarters of Asia's rice production and half of the wheat in Asia, Latin America and Africa was produced through new plant varieties.[15] While Asia's net cropped area only increased 4% in 25 years, the food supply was doubled. In four decades after 1950, global cereal production had increased by 174% while the global population increased by 110%.[16]

The enormous increase in global food production was the result of agricultural change over more than 100 years. To understand how and why it was conceptualized as a revolution, we need to look not only at the development of agriculture in the early post-World War II years, but also at the connection between the global population debate, natural resources management, geo-politics and the emergence of a powerful scientific elite.

As a political myth, the green revolution has come to represent actions which saved the world from massive starvation. In May, 2014 The Economist repeated the oft-told story:

- The first green revolution helped save the developing world from disaster. Two plant breeders, Norman Borlaug with wheat and M.S. Swaminathan with rice, persuaded governments in Asia and elsewhere to encourage the planting of higher-yielding varieties, especially of rice; 3.5 billion people, half of mankind, get a fifth of their calories or more from the stuff. When the men started work in the early 1960s, China was suffering the famine of the Great Leap Forward. And India was widely thought to be on the brink of starvation.[17]

A more accurate history shows that the specter of a looming famine in India was an invention engineered by President Lyndon Johnson to help sustain the U.S. Food for Peace program, which faced a politically skeptical Congress. Technological advances had led to a glut of crops in the U.S., low prices for commodities, and unhappy farmers. Agricultural aid was also seen as a useful strategy in the Cold War. So Johnson wanted the shipments made. Thus, as historian Nick Cullather writes in The Hungry World, "through the fall of 1965 [LBJ] developed the theme of a world food crisis brought on by runaway population growth."

In fact, official State Department notes reveal that when Indian prime minister Indira Gandhi visited Washington in the spring of 1966, one of her agenda items was to get the story straight about a crisis that didn't exist. The Indian delegation noted that, "The situation in the United States is that to get a response, the need must be somewhat overplayed." Scientists and the media jumped on the bandwagon, and a mythology of famine was born.

Bailey's restatement of the Green Revolution mythology in fact gives neo-Malthusians far too much credit, suggesting that they were correct in their forecast of global famine, only to be proven wrong by the wonders of technological and market innovation. In fact, the neo-Malthusians were never right to begin with. Bailey is promoting a solution to a problem that never existed in the first place.

In 2003, the International Food Policy Research Institute asked what would have happened if the Green Revolution in the developing world never happened. They concluded that developed countries would have produced more and trade patterns would have evolved differently, but the situation "probably would not be considered a 'World Food Crisis.'"

As with all myths, there are elements of fact and fiction at work. Scientific investments did indeed contribute to increasing crop yields in India and elsewhere. But the notion of a world on the brink of famine was a political creation, motivated by the confluence of US Cold War politics (both domestic and international), the rise of neo-Malthusians, and a growing scientific community hungry for power and influence.

Conclusion

This talk and brief overview paper argue that the narratives which we construct around science and technology in the broad field of technology assessment exert a powerful influence on how we think and act. Science and technologies are, in addition to knowledge and tools, powerful political symbols. Such symbols, when deeply ingrained into culture and society, have been called "political myths."

The notion of basic research has been part of the discourse in science policy for almost a century. It encapsulates an axiology – a theory of value, along with a theory of causality, ultimately linking public investments in science with broad societal goals such as economic growth. Both the value structure and mechanisms of causality underpinning the notion of basic research have been challenged in recent decades, but thus far no new political mythology has displaced that of basic research.

Similarly, the mythology of the green revolution exerts a strong influence not just on agricultural policies, but on innovation policies more generally. That influence can be readily seen in calls for a "Second Green Revolution," which suggests that the world needs to replicate the first. However, a close look at the history of the green revolution suggests that the world experienced more of a green evolution.

Understanding how policy alternatives are connected to possible outcomes is essential to effective decision making. Political myths can often facilitate effective decision making, but can also stand in the way. Understanding the difference is essential to effective science and technology policy making, and thus understanding, critiquing and even re-inventing political myths should be a core task of the discipline that we know as technology assessment.

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1) See: www.bio-fiction.com/2014
2) See: http://bio-fiction.com/en
3) For more information about all 60 films, see: http://bio-fiction.com/2014/#call-for-submission
4) See: www.synenergene.eu

Acknowledgement:

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Footnotes:

1) http://publications.jrc.ec.europa.eu/repository/bitstream/JRC94867/lbna27252enn.pdf

Afterword: Technology Assessment As Political Myth, p. 403.

Footnotes:

1) This paper summarizes a talk given at PACITA: The Second European Technology Assessment Conference, February 2015, in Berlin, Germany. The talk and paper draw upon previously published work; the section on "basic research" draws on Pielke (2013) and also work in progress, while the section on the green revolution draws on an ongoing collaboration with Björn Ola-Linnér.

2) Gunnell, John. 1968. "Social Science and Political Reality: The Problem of Explanation." Social Research 35: 159-201.

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17) http://www.economist.com/news/briefing/21601815-another-green-revolution-stirring-worlds-paddy-fields-bigger-rice-bowl