



The development of technology foresight: A review

Ian Miles

Manchester Institute of Innovation Research, MBS, University of Manchester, Oxford Road, Manchester, M13 9PL, UK

ARTICLE INFO

Article history:

Received 28 March 2010
Received in revised form 24 June 2010
Accepted 29 June 2010

Keywords:

Foresight
Innovation policy
Innovation studies
Technological forecasting

ABSTRACT

The term “foresight” has long been used to describe readiness to deal with long-term issues (especially on the part of governments). This term “Technology Foresight” took off in the 1990s, as European, and then other, countries sought new policy tools to deal with problems in their science, technology and innovation systems. Large-scale exercises drew in numerous stakeholders as sources of knowledge and influence, and the prominence of these exercises led to “foresight” being used much more widely to describe futures activities of many kinds. While few new tools and techniques have been developed in these exercises, they represent an unprecedented diffusion of forecasting, planning and participatory approaches to long-term issues. Futures approaches are, in consequence, far more officially acceptable and legitimate than in the past.

© 2010 Elsevier Inc. All rights reserved.

1. Introduction

In the 1970s and 1980s, I was engaged in futures studies at the Science Policy Research Unit (SPRU) at Sussex University. Mainly this was deskwork. I was fortunate in that the desk was near those of some of the world’s most creative and insightful researchers into innovation processes, and I was immersed in the rapidly expanding field of innovation studies. From the mid-1990s I was swept along in (and sometimes surfed) the wave of technology foresight activity that built up from this time. This moved well beyond deskwork, with groupwork of various kinds, engagement of large networks, and relations to policy processes. My perspectives are inevitably shaped by these experiences, though I have attempted to validate them through literature review and discussion with other scholars.¹

Innovation researchers at SPRU played a central role in shifting terminology, and indeed in catalysing the wave of foresight activities that exist around the world. In the early 1980s, John Irvine and Ben Martin examined the application of futures methods to Science and Technology (S&T – and STI will refer to S&T and Innovation) policymaking round the world. Their books, *Foresight in Science* in 1984, and *Research Foresight* in 1989, explored how priorities are set (mainly by governments) in funding research [1,2].

Earlier SPRU work on technology futures – with which Irvine was well-acquainted – had been labelled “anticipation”, “forecasting”, and “futures studies” [3–5]. Irvine and Martin (I&M) introduced the term “foresight”, according to Martin², partly as a humorous counterpoint to “hindsight”. SPRU researchers had undertaken retrospective analyses of the sources of innovations, and were familiar with “Project Hindsight”, which traced the origins of contemporary technologies [6]. Indeed, I&M devoted the second chapter of *Foresight in Science* to outlining Project Hindsight and other retrospective studies of innovation.

I&M’s influential studies foregrounded “Foresight” as a popular way of describing broad programmes of study of research and innovation plans and priorities in the light of potential long-term future developments. Though neither of their books carried the term in their titles, “Technology Foresight” (TF) became widely used to describe such programmes. This essay cannot review all of the experience generated by Technology Foresight Programmes (TFPs) in the last twenty years (see [7]). It focuses on how one terminology became so influential in describing a set of approaches in futures work. Partly the terminological shift is, as Linstone

E-mail address: ian.miles@mbs.ac.uk.

¹ Thanks in particular to Clem Bezold, Jim Dator, Aant Elzinga, Luke Georghiou and Ben Martin.

² See his paper in this issue.

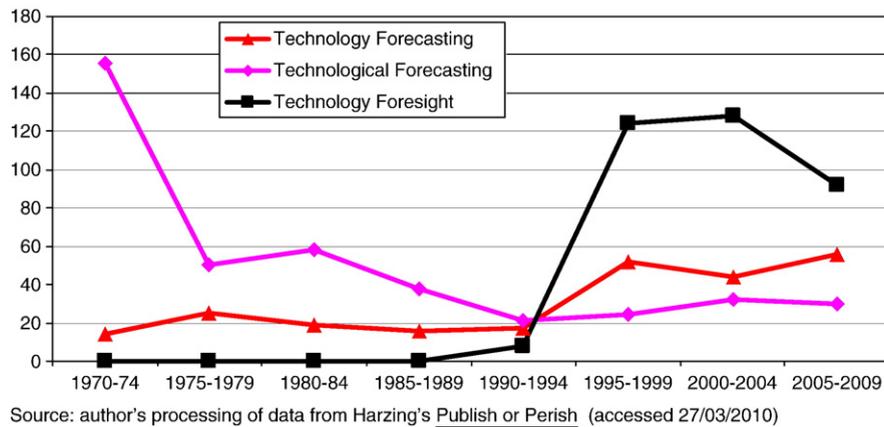


Fig. 1. Publications featuring key terms in their titles, 1970–2009.

hints in his introduction “On Terminology” in this issue, simply a matter of fad and fashionable labels. Partly it signifies specific approaches with specific emphases within the futures field. This essay will explore just how distinctive and novel these are.

The terminological shift is displayed in Fig. 1, using data generated from Harzing's “Publish or Perish” [8].³ The graph contrasts publications with the terms “technology foresight”, “technology forecasting”, or “technological forecasting” in their titles – concepts to which authors are directing readers' attention.⁴ Despite very noisy data,⁵ the results are striking and plausible. TF emerges from nowhere, in the 1990s, to be easily the most widely used term.

2. Foresight in hindsight

“Foresight” has a long etymology, referring to a capability that humans have exercised for time immemorial. The word was familiar enough in Renaissance England to be used in Congreve's *Love for Love* (1694) – Mr Foresight is an illiterate believer in signs and portents. In an industrialised world, H G Wells argued for systematic study of future implications of new technologies. *Anticipations of the Reactions of Mechanical and Scientific Progress upon Human Life and Thought* (1901) [9] projected a better society, consciously shaping human affairs and an “amplified future”. Three decades later he expostulated:

“...though we have thousands and thousands of professors and hundreds of thousands of students of history working upon the records of the past, there is not a single person anywhere who makes a whole-time job of estimating the future consequences of new inventions and new devices. There is not a single Professor of Foresight in the world.” (1932 radio broadcast – p90 in [10])

More systematic approaches to technology forecasting were undertaken in the USA. The 1937 National Resources Committee (NRC) report, *Technological Trends and National Policy including the Social Implications of New Inventions* [11], argued for examination of regularities and trends in technology invention and development:

“Though the influence of invention may be so great as to be immeasurable ... there is usually opportunity to anticipate its impact upon society since it never comes instantaneously without signals. For invention is a process and there are faint beginnings, development, diffusion, and social influences, occurring in sequence, all of which require time. From the early origins of an invention to its social effects the time interval averages about 30 years.” (p.iv)

The terms “forecasting” and “prediction” are used repeatedly in this report. “Foresight” appears twice, more or less as a synonym for “forecasting”; “technology foresight” or “technological foresight”, are absent. The NRC study was led by the sociologist William F Ogburn, who had earlier examined the patterns of invention, and developed the theory of “cultural lag” – difficulties faced by societies in keeping pace with technological change. (For a useful compilation see [12]; on Ogburn's contribution to innovation studies see [13]). The NRC study – and Ogburn's work on measurement of social change⁶ – was

³ This program works with information derived from Google Scholar, cleaning the material somewhat, and allowing the user to process it in various ways.

⁴ The term “foresight” alone is unsuitable for such a data analysis exercise, because it is used in a number of contexts that are far removed from forecasting and futures studies. The journal *Foresight* dates from 1999, *The International Journal of Foresight and Innovation Policy* 2004. Of course, other journals have a long lineage: for example *Technological Forecasting and Social Change* and *Futures* both date from 1969.

⁵ There are many publications with no date assigned to them, and there are some evident mistakes and duplications. There is no reason to think that these problems vary systematically across the various terms used.

⁶ Ogburn was pivotal in developing what we now know as social indicators and social reporting: his long-term orientation was grounded in empirical analysis of current developments. He concluded that statistical work often failed to demonstrate the expected wide and rapid social change in the wake of policy changes such as the New Deal; many social structures and processes are relatively slow-moving, in the face of political as well as technological initiatives.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات