



## A challenge of integrating technology foresight and assessment in industrial strategy development and policymaking

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### Abstract

Appropriate demand articulation of emerging technologies to social needs are vital to the economic and social productivity, and it is essential to grasp the future trends of social needs and technology advancement to promote the strategic technology policy. Japan embarked on technology foresight in the early 1970s and has since been conducting a regular Delphi survey approximately every 5 years. To explore a new intelligent methodology for integrating technological seeds and social needs by articulating future demands, this paper reviews the following two cases: the Delphi-scenario writing (DSW) method, which is applied in 1977 for the home/office small facsimile, and the method of general assessment applied in 1972 for *informationalization*, which focused on the rapidly advancing information society, with a matrix scoring and policy-simulation method. Those new approaches were proved to be a powerful methodology to integrate the technology forecasting and assessment for comprehensive understanding of the emerging technologies and their social impacts in the form of integrated technology road mapping, which supports the integrated strategic planning methodology for enhancing the future innovation system.

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*Keywords:* Delphi-scenario writing method; General assessment method; Demand articulation; Informationalization

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## 1. Introduction

Appropriate demand articulations<sup>1</sup> of emerging technologies to social needs are vital to economic and social productivity, which seeks the continuous improvement in the progress of humanity [1]. In December 1995, *The Science and Technology Basic Law of Japan* was enacted, and, in 2001, the *Second Science and Technology Basic Plan* was approved by the Cabinet, whereby the government adopted a clear political stance of setting priorities on science and technology under the new science and technology administrative structure composed of the Council for Science and Technology Policy (CSTP), Ministry of Education, Culture, Sports, Science and Technology (MEXT), and other ministries. For these organizations, it is essential to grasp the future trends of social needs and the technology to promote the strategic technology development and economic policy formulation.

## 2. Technology foresight in Japan

MEXT embarked on technology foresight in the early 1970s and has since been conducting a regular survey approximately every 5 years. Each survey aims at forecasting long-term trends in various fields of science and technology for the next 30 years by adopting the Delphi method throughout the survey [2–5]. The number of technological fields and topics have increased as shown in [Table 1](#), covering all science and technology fields in the major surveys and experts.

### 2.1. Methodological approach

Prior to a survey, a steering committee is formed with subcommittees set up around it. The leader of each subcommittee is a member of the steering committee. The members of the steering committee and the subcommittees are appointed by National Institute of Science and Technology Policy (NISTEP), which implements the surveys after consultation with expert groups and the appropriate ministries/agencies. More than 100 experts are involved in the design of a survey and the analysis of the results. These experts hold responsible and influential positions in their institutes, universities, and companies. Furthermore, more than 3000 experts participate as respondents. The results are provided to the related ministries/agencies, and they are also widely used in industry. The major aspects are made open to many newspaper and magazines in response to the strong requirement.

### 2.2. The survey results

The seventh survey (latest), which started in 1999 and adopted a new approach of including social dimensions, reflected the social needs on technology development by experts

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<sup>1</sup> This concept was first introduced by Fumio Kodama by saying “In developing new policies to meet this needs, the most important element is the process of ‘demand articulation.’ Through this process, the need for a specific technology manifests itself and the R&D efforts is targeted toward developing and perfecting it.”

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