Technology foresight and crucial technology focus in China

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1. China's technological forecasting in early stage and it's national science and technology plan

China is a developing country. Transition in the wake of the planned economy to the socialism market economy, the technological forecasting was experienced the process through method learning from abroad to the research practice. The application of forecasting technique in strategic decision-making was started through some special topics such as population, energy resources, transportation and industrial economy, and then is gradually developed into the field of perspective for science and technology.

Since the Establishment of new China in 1949, the government was valued on the macro strategy formulation and made all kinds of development programs. Before 1978, China drew up two science and technology development plans: <National long-ranged science and technology prospective program in 1956-1967> and <1963-1972 Year the science and technology plan in 1963-1972>.

The 12 year Science and technology plan is the first government S&T plan of China which is lead by the premier zhou enlai. Thousands of specialists worked together with the government economic department chiefs and drew up long-term development strategy of science and technology. The 12 year science technology plan made sure 57 research missions in 13 realms. Among them 12 point research missions had been chosen out.

1. Nuclear energy technique
2. Electronics (semi-conductor technology, computer technology, long distance control technology)
3. Jet technique
4. Automation and precise instrument
5. The petroleum and mineral resources survey and explore
6. New metallurgy technique
7. Fuel synthesizes exploitation
8. New motive machine and large machine
9. The yellow river, Yangtze River synthesizes exploration
10. Modern agriculture technique
11. Paroxysm prevention and cure
12. Basic research in science

It is obvious that China's science and technology development has been affected deeply by it in last century. It made the foundation of Chinese S&T system. Since 1978, Chinese economy developed very quickly. The government pay much attention on science and technology work and drew up several science and technology development plans such as:<National science and technology development plan in 1978-1985>, <National science and technology development plan in 1986-2000>, <The long-term science and technology development sketch (1990-2000-2020)> and <National 5 year plan for science an technology in 2001-2005>. The substance of planning consists of development targets, main missions, focal territories and key techniques, along with the relevant development measures.

The above-mentioned planning process continues to use essentially method which the 12 year science and technology development plan shaped. However the scale was broadened, in other words, the technological forecasting was contained in all the previous science and technology planning. The process were participated by thousands of specialists in all sides, in 1983 20,000 scientists and engineers took part into the drawing of <National science and technology development plan in 1986-2000>. The basic method chiefly is extensive specialist conference.

2. Technological forecasting research in China

The independent forecasting research in China started in 1970's and chiefly in the social development fields. The first important forecast research was on population problem witch was fulfilled by System Research Institute of Ministry of Aerospace Industry. This research applied cybernetics method, by means of establishing population feedback pattern, population in 100 years were forecasted with the different bearing rate. On its base, the researchers proposed a serious warning on Chinese population development tendency. Moreover a population development proposal of less than 1.5 average birth rate was given out.

In 1979, the forecast research association was established, which organize researchers to translate forecast research articles and published research works, such as <scientific forecasting>, <Great thinking - Predict approaching methodology> and so on.

In 1981, under the leadership of State Planning Commission, State Economy Commission, State Science and Technology Commission and the Chinese Academy of social science, a big forecasting research started and which lasted for three years. The general report - <China in 2000> was published in 1985. Moreover, 12 other subject reports were also published which refers to population and occupation, people consume, economy, energy resources, communications, transportation, agriculture, education, ecology environment, natural resources, science and technology, international environment and so on.

In the research of above mentioned, quantitative analysis method and the computer simulation pattern were first widely adopted, having carried on the synthesis analyses evaluating, which settled the base in the research on long term strategy study in China.

3. The national crucial technology focus research

Among Chinese national key technique focus researches, there are two projects which has great influence in technology foresight fields. The first one is "National Crucial Techniques for Economy Development in 1990's" which is formed by the State Plan Commission; The second one is "The State Crucial Technology Focus Research" which is organized by the State Science and Technology Commission.

The State Plan Commission organized a research on industrial technique territories selection in 1993, and released a report-- <national crucial techniques for economy development in 1990's>. Seven technological territories were chosen out, including 35 key techniques.

For this research, 220 technological projects had been commended by hundreds of specialists with the means of bottom to up, then which were evaluated by the members of Chinese Academy and Chinese Engineering Academy. Finally, 10 important technical territories were taken shape, including 134 key technique projects. This result was released as a component part of the national industrial technique policy and issues.

4. The focal high and new technology territories and technological foresight in China

At the end of last century, the concept of technology foresight was introduced into China and accepted by Chinese researchers. Some technology foresight projects were executed by local government, such as in Shanghai and in Beijing. The first China's technology foresight conference was held in Shanghai in December of last year, there are about 80 researchers attended the conference. Now technology foresight is a significant component part of national innovation system of China. It is a base of drawing up national strategy for science and technology development.

During years of 2002-2003, we are executing a national technology foresight project including three fields: information and communication, life science and engineering, new materials technology.

The Targets

Technological foresight is on the foundation of systematically study on science, technology, economy and community development, to make sure the certain strategy research territories and selection of the largest contribution technique groups to economy and community benefit.

On the basis of actual demand for national economy and social development, the general target of this foresight is: By means of short or middle term systematic study on science and technology, economy and community development, to fix some strategic crucial technique groups in the focal high and new technology territories; to achieve the

prefer S&T stress that can be leaping over; to serve for making the national science and technology development plan in 2006-2010, to supply science and technology development tendency message in the interest of the community public, and thereby to gradually take shape democratic decision making system for science and technology.

The Main missions

In the interest of the targets to achieve, the technology foresight project will complete 3 respect missions chiefly:

- **China's economic and social development demands analysis**

  It will be systematically study the fundamental conditions of China and the national development macro-target to fix the demands of national economy and society development for science and technology along with external environment for S&T development. For example, the effect of economic globalization and the WTO rules adjusting science and technology development, how science and technology props up the national economy restructuring, how science and technology eases the resource constraints that economy and community developed is awaited.

  At the same time, the influence of information technology, life science and engineering, new materials technology research for China's economy and society will also be concerned.

- **The study for high technology development in 10 years**

  Three focal high and new technique territories: information and communication, life science and engineering, new materials technology will be investigated, and 1000 scientists, engineers, economists and social scientists will be surveyed for the technology foresight.

  The investigation substance consists of: Various techniques adjust significant degree for the country, probable realization time for the techniques, commercial opportunity for the techniques, effect elements for technology innovation, the way of development for the techniques (In case: independent research, jointly research, imported from abroad and so on), along with the assessment of Chinese technology comparing with the one's of the developed countries. Probable technological opportunities in future will also be explored.

  At the same time, the heat problems that arise from the three focal high and new technical territories will be studied deeply such as the life moral principles, the problem of social safe for the new technology and so on.

- **The crucial technology focus**

  On the synthesis of the technological foresight investigation, about 100 key technological issues will be confirmed and including probably 10 crucial technology projects as the focus. The result of the foresight research could supply

some valuable references for the next national five year plan in 2006-2010.

Research method and Organization

The basic research schedule consists of two rounds Delphi investigation and experts conference, the scenery analysis means will be used for economy and society development, some necessary desk work and international comparative study will also be done. This technology foresight research will be supported and directed by the Ministry of State Science and Technology. The research organization is composed by two parts that are consultation expert system and foresight investigation system. The later one consists of the general research group (15 experts) and three high-tech territories survey groups (60 experts). The consultation expert system consists of specialist's network in various research fields.

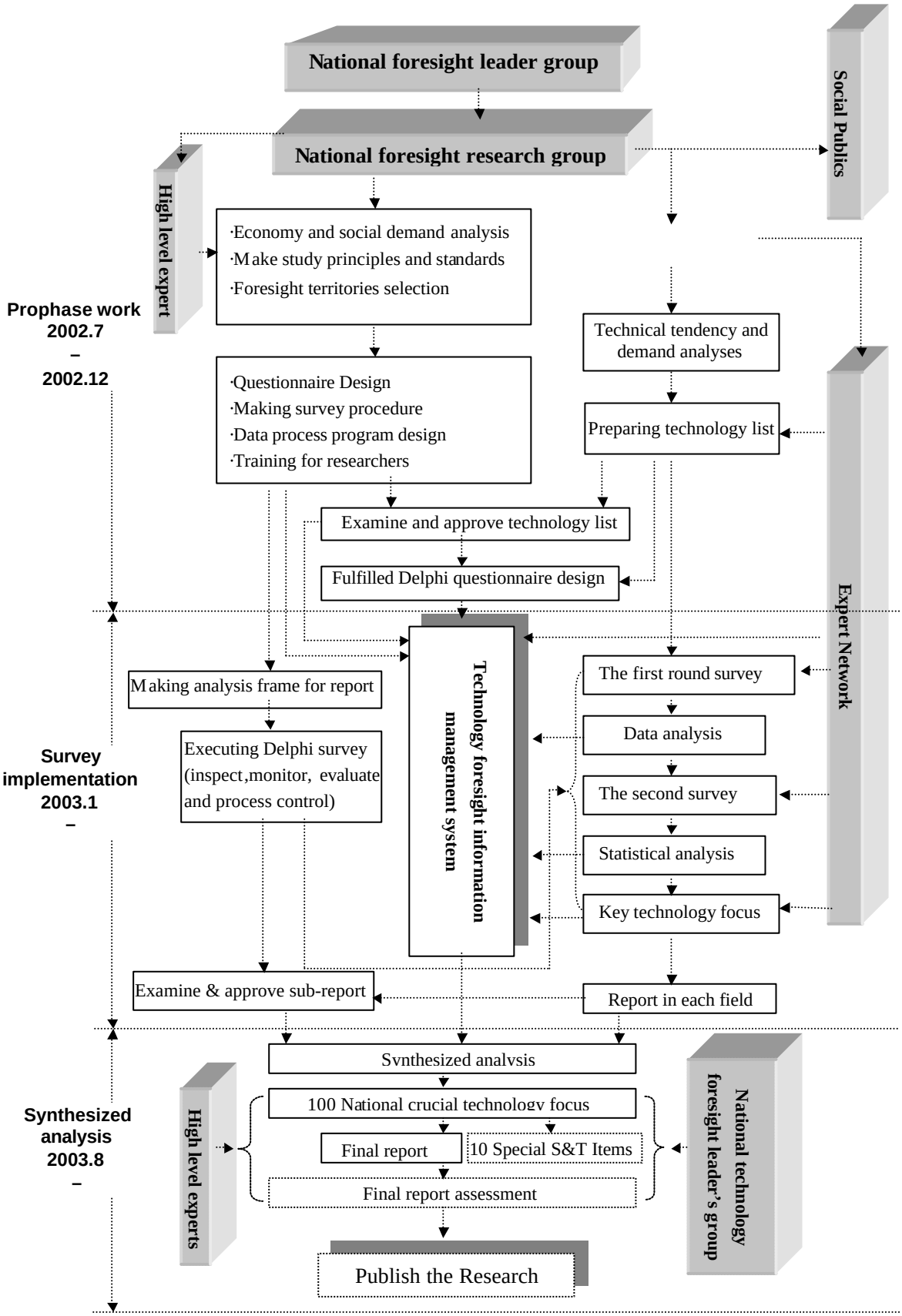
Expert Network

They are famous specialists from business, university, research institution, government organization, and personnel staff of various sides ought to possess the specified proportion. Every one high-tech territory consists of more than 200 experts.

Working Schedule

This technology foresight investigation work is drift to 2002.7 - 2003.12. It is in three phases:
We have already fulfilled the first stage work (7-12, 2002), which include the establishment of technology foresight organization and the consultant expert system, completing the Delphi questionnaire design, and in every high-tech fields the desk investigation has also been finished.
The second stage: Implement investigation (1-7, 2003) is started in last month. The research group in every territory is launched the technological foresight survey.
The third stage: Crucial technology focus and synthesized analysis will be fulfilled in the end of year 2003.

The synthetic integration is based on the territory research. Moreover national key technique selection will be combined with the making process of "National five year plan for science and technology (2006-2010)". A final report will be finished in December and published with the national five year plan in 2005.


National foresight leader group
National foresight research group
Social Publics
High level expert
·Economy and social demand analysis
·Make study principles and standards
·Foresight territories selection
Prophase work
2002.7
–
2002.12
·Questionnaire Design
·Making survey procedure
·Data process program design
·Training for researchers
Technical tendency and demand analyses
Preparing technology list
Examine and approve technology list
Fulfilled Delphi questionnaire design
Expert Network
Technology foresight information management system
Making analysis frame for report
Executing Delphi survey (inspect,monitor, evaluate and process control)
Survey implementation
2003.1
–
The first round survey
Data analysis
The second survey
Statistical analysis
Key technology focus
Examine & approve sub-report
Report in each field
Synthesized analysis
2003.8
–
High level experts
Synthesized analysis
100 National crucial technology focus
Final report
10 Special S&T Items
Final report assessment
National technology foresight leader's group
Publish the Research