Innovation Policy and Technology Foresight in China

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Outline

I. Introduction

II. New Innovation Policy of China

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IV. Innovation Policy and Technology Foresight

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I. Introduction

- Thanks to the policies for reform & opening, China has experienced over 20 years of high-speed economic growth and become the fourth largest economies.
- However, the economic growth mainly relies on the low cost of labors and the growth of investment instead of innovation.

- Scientific Outlook for Development

----Resource Saving/Environment Friendly

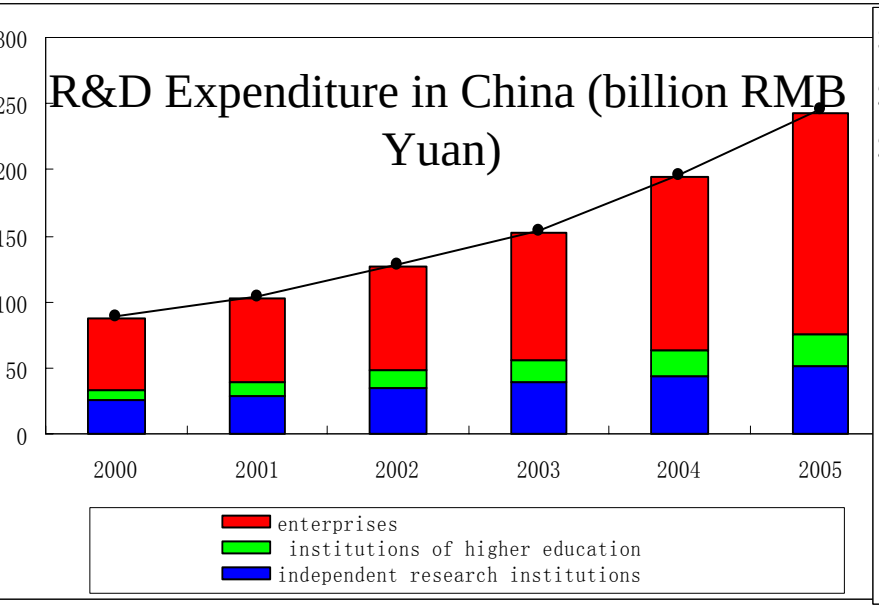
- Harmonious Society

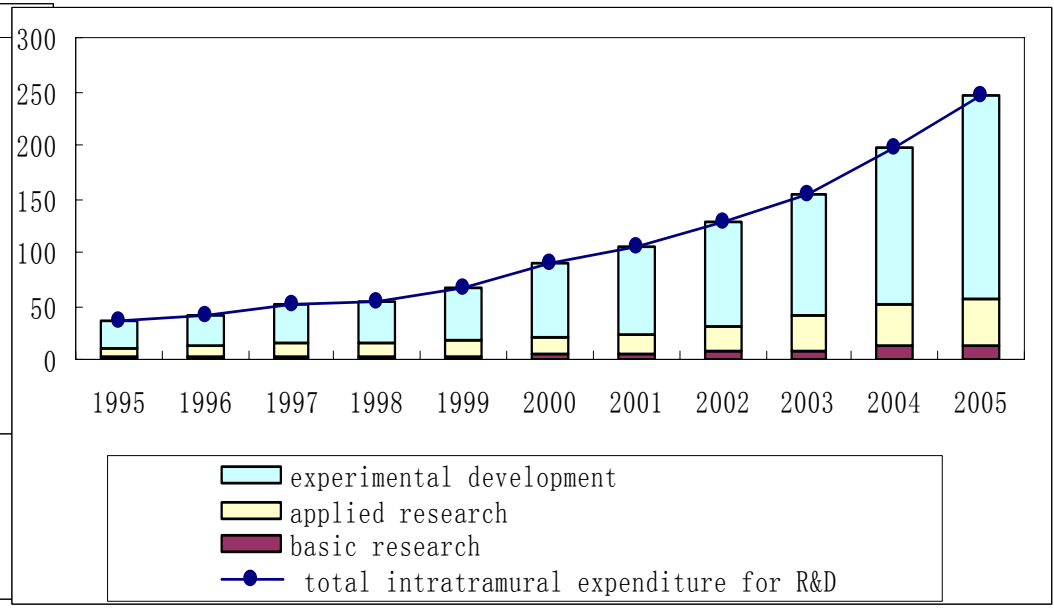
----Growth of Development Cost

From Resource-based to innovation based development.

From Reform & Open to Scientific Developmt.

I. Introduction





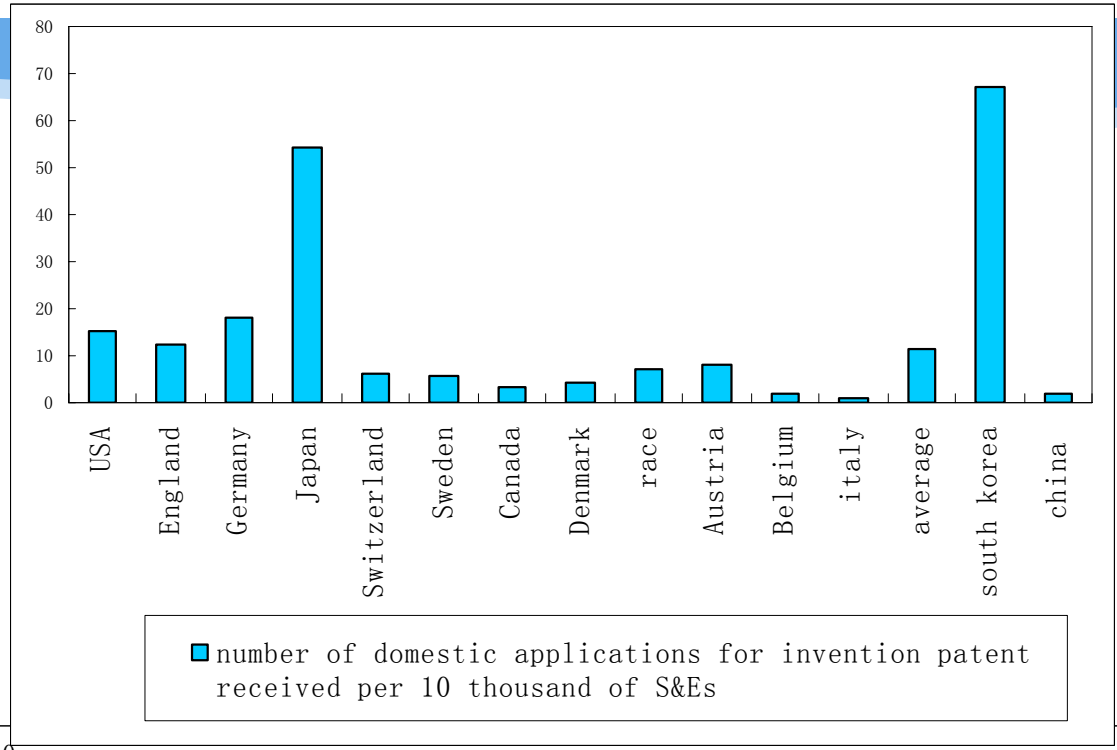
•The expenditure for R&D in China has increased very fast since 1998. Enterprises play increasingly important role in the growth of R&D expenditure. However, the experimental development domains the R&D expenditure.

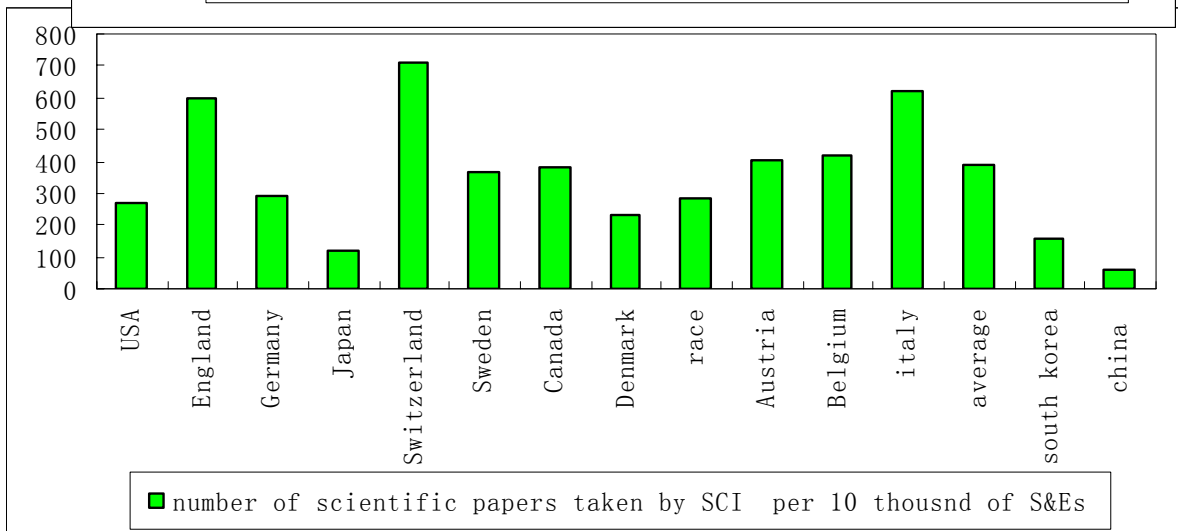
I. Introduction

1. **There is a big gap in R&D capacity between universities/research institutes and enterprises**
2. **The enterprises' capacity for technology development is relative weak in terms of patent productivity.**
3. **The linkage between technology development in enterprises and R&D in universities and research institutes is not effective.**
4. **Chinese firms have less experiences in high-level innovation management**

I. Introduction

5. In terms of SCI papers and patents, the productivity of S&E in China is still much lower than that in developed countries.
6. The effectiveness of R&D investment is still lower than many developed countries Even if we consider the quantity of output





I. Introduction

- **The innovation strategy in China has changed from keeping balance of allocation of innovation resource in all sub-systems of NIS to strongly promoting the enterprises' capacity-building for innovation, which has become the focus of the innovation policies and the major task and key to the NIS development.**

II. New Innovation Policy of China

1. Supportive Policy

(1) To Increase Input in S&T and Innovation

•To increase S&T expenditure dramatically and maintain a growth rate faster than governmental regular revenues.

•To adjust the structure of S&T expenditure and the structure of national S&T programs so as to stimulate enterprises' investment in innovation.

•To set up new mechanism for managing public S&T expenditure.

•To innovate a new management mechanism for public S&T expenditure.

II. New Innovation Policy of China

(2) Tax Incentives

•To share the cost of technology development in enterprises by means of tax deduction (50%).

•To provide policy for deducting tax of imported facilities & instruments, for speeding up the depreciation of the facilities and instruments so as to upgrade enterprises' experimental capacities.

•To provide tax incentives for equipments & instruments & materials imported by ETDC & ERC & National S&T projects so as to promote capacity building for innovation in enterprise.

•To support the development of transformed PRIs, venture capitals, and S&T service institutions by providing tax deduction.

II. New Innovation Policy of China

(3) Government Purchase Policy

•To promote the indigenous innovation by providing various measures related government purchases, concerning identification of indigenous innovative product, the evaluation measures for government purchase.

(4) Finance Support (seed fund, VC, bank, stock market)

(5) Innovation Based on Imported/Assimilated Technology

•To strengthen the management of technology import and assimilation. To make special technology policy and list technologies to be encouraged/limited so as to strengthen capacity-building for innovation.

II. New Innovation Policy of China

(6) To Create and Protect the IPRs.

•To support enterprise to generate & protect IPRs, to engage in standard-making procedure at national and international level.

•.To speed up the checkup cycle of patent application, and improve the system for IPR protection.

(7) To Train Qualified HRST & Promote the Flow to Firm

•To train talents in different level from top scientist to skilled workers. To encourage the flow of talents from Universities to enterprises. To set up S&T credit system.

(8) To Building National Infrastructure/Platform for S&T

II. New Innovation Policy of China

2. Detailed Rules for Implementing the Policy

So far, Chinese government have issued 54 detailed rules for implementing supportive policies. 37 of which are related to enterprises' capacity-building for innovation.

Among the 37 rules, mainly focus on the innovation investment, the innovation infrastructures, and the innovation output such as IPRs and product.

The entrepreneurship, start-ups and innovation diffusion have to be strengthened in the rules to be issued in the future.

II. New Innovation Policy of China

3. The Effectiveness of the Policies and Rules

(1) The central governments have issued many detailed rules for implementing the supportive policies.

(2) local governments also have issued many regional policies for implementing the supportive policies.

(3) The S&T investment in most province has increased dramatically since 2006.

(4) There are still many enterprises who have not yet benefited from the supportive policies and detailed rules.

II. New Innovation Policy of China

The main reasons for enterprises who have not benefited from the policies and rules:

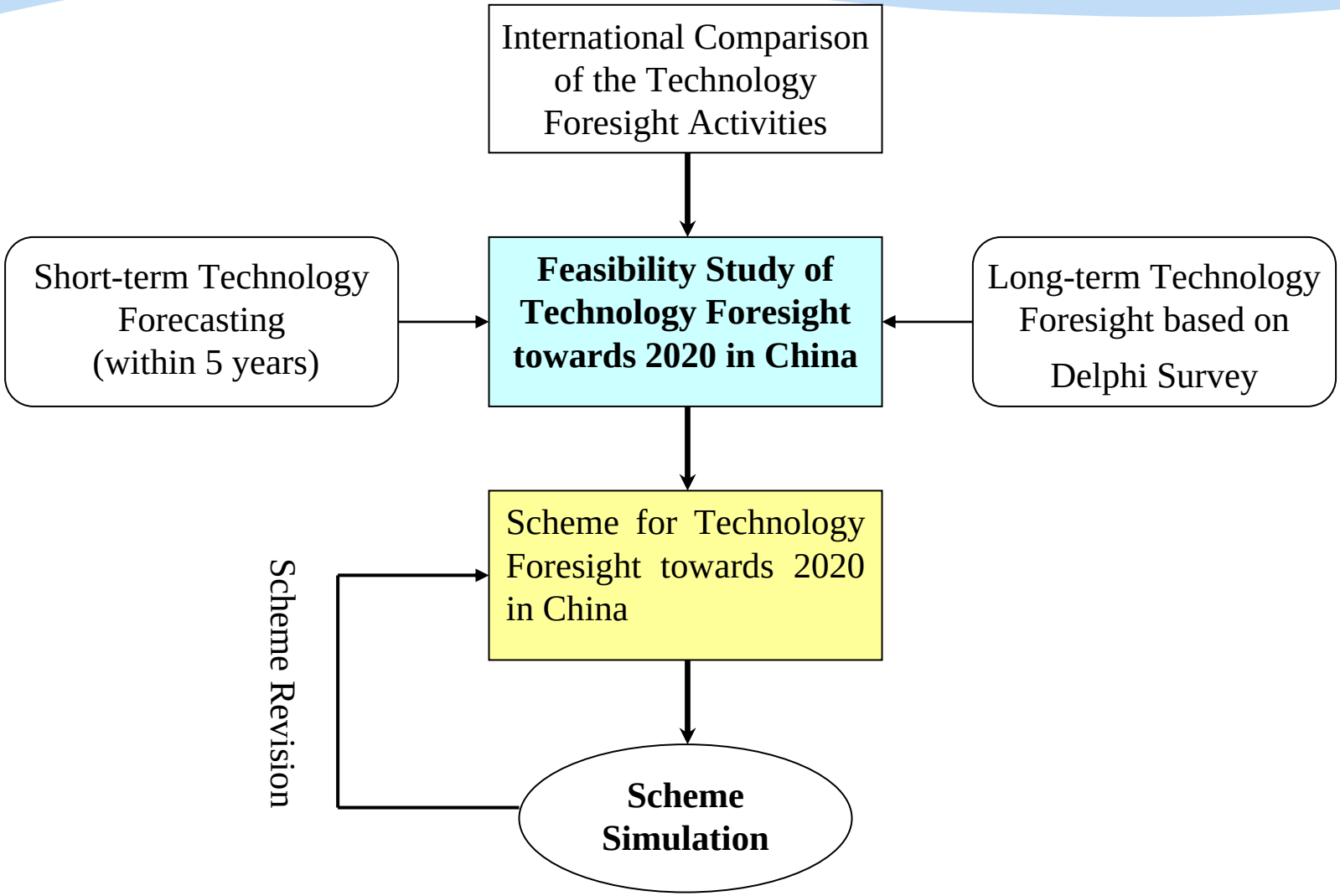
1. There are still some unfinished important detailed rules that is very important for implementing the policies.
2. Many enterprises do not know the policies and rules.
3. The procedures for implementing the policies & rules are relative complicated for enterprises.
4. Most of enterprises in China have less experiences in innovation management, for example, it is often difficult for them to clearly calculate the cost of tech. development.

III. Technology Foresight in China

Purposes of *"Technology Foresight towards 2020 in China"*

- **To explore a set of systematical methods for technology foresight;**
- **To build the scenarios for China development in 2020---identify the technology demands;**
- **To conduct the Delphi Survey---setting the priority of technologies;**
- **To construct the interactive platform for government-industry-university-academia;**
- **To foster the foresight culture in China.**

III. Technology Foresight in China



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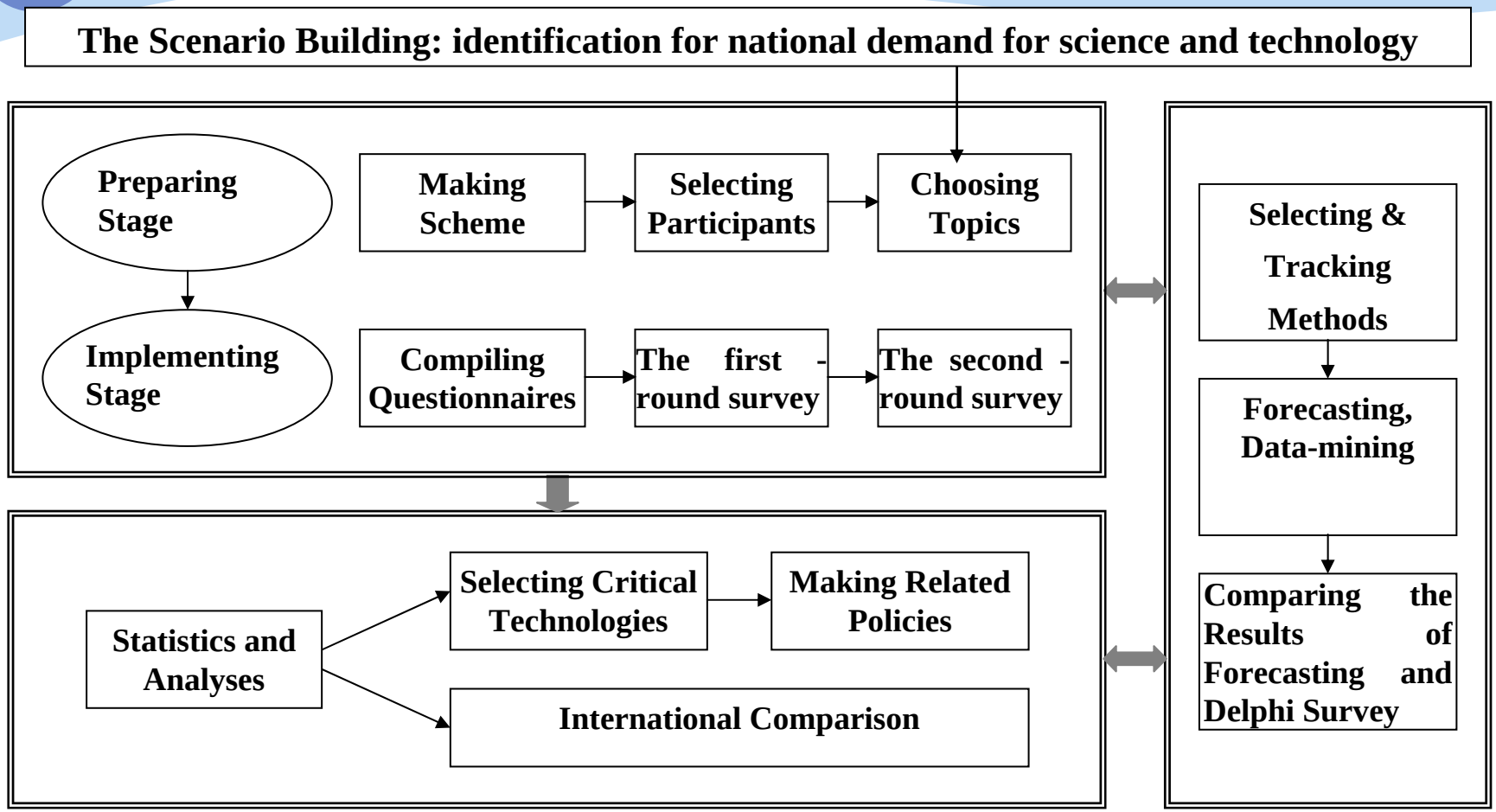
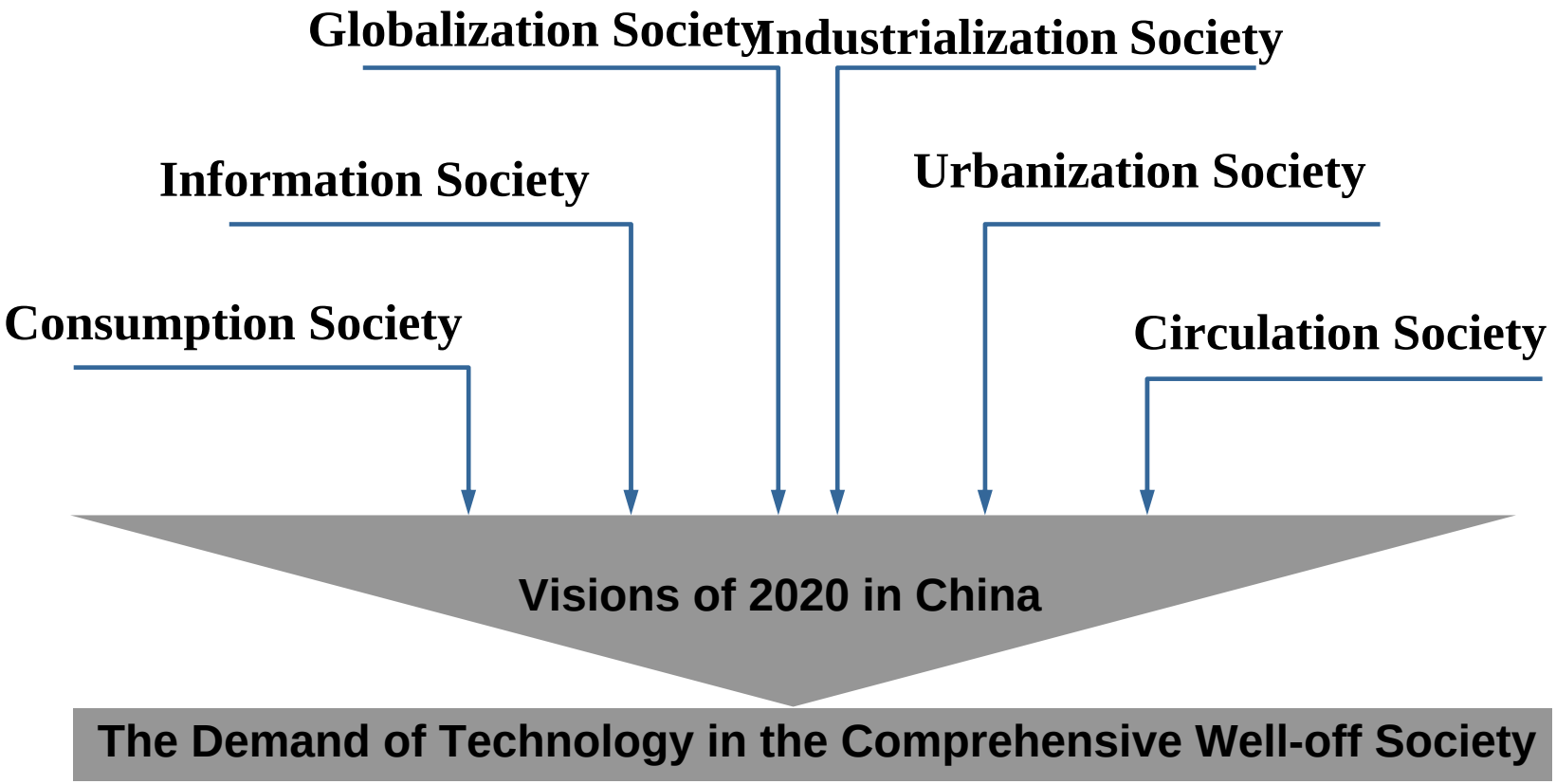


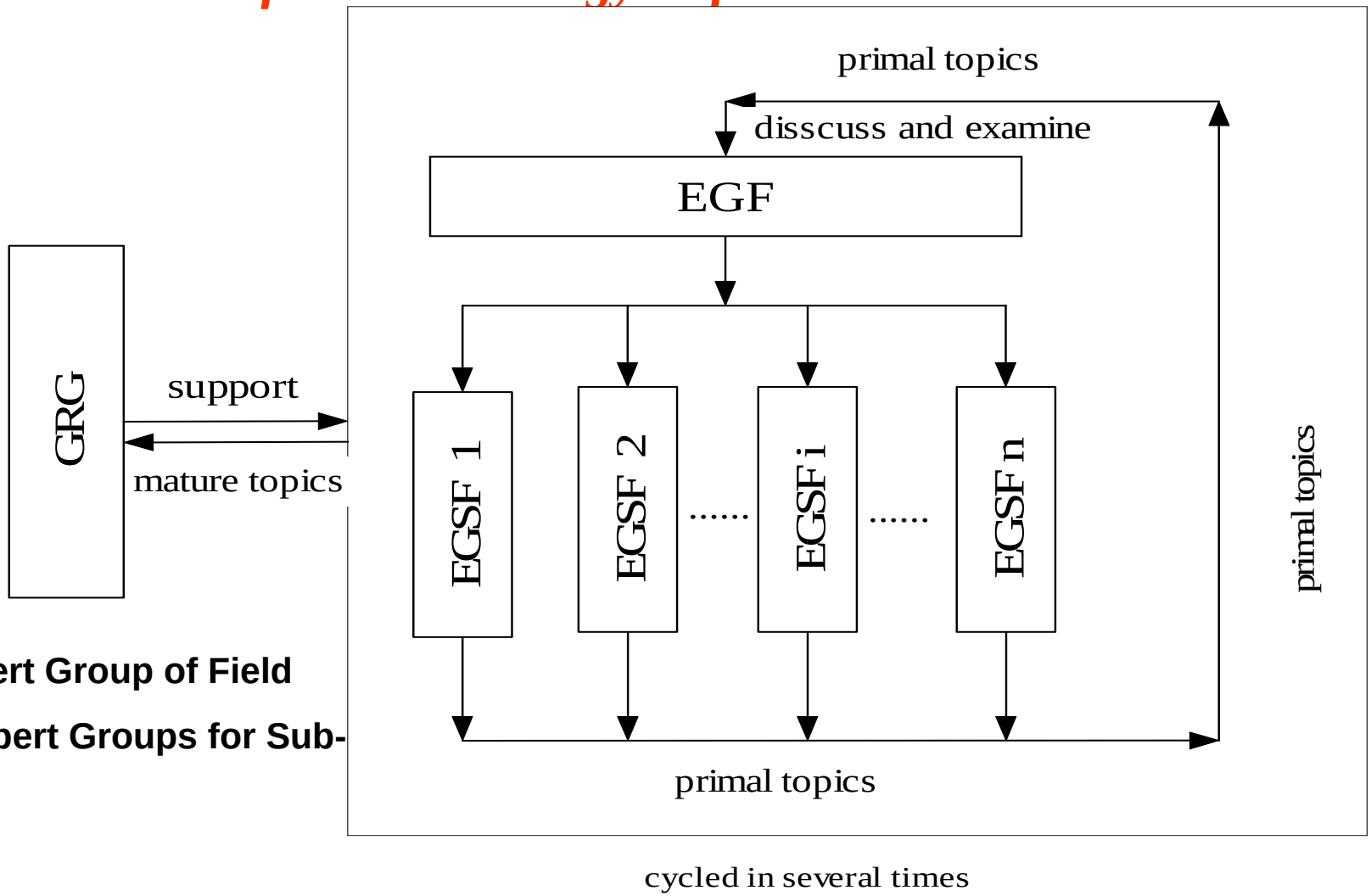
III. Technology Foresight in China

Scenario Building



III. Technology Foresight in China

Generation of the Technology Topics



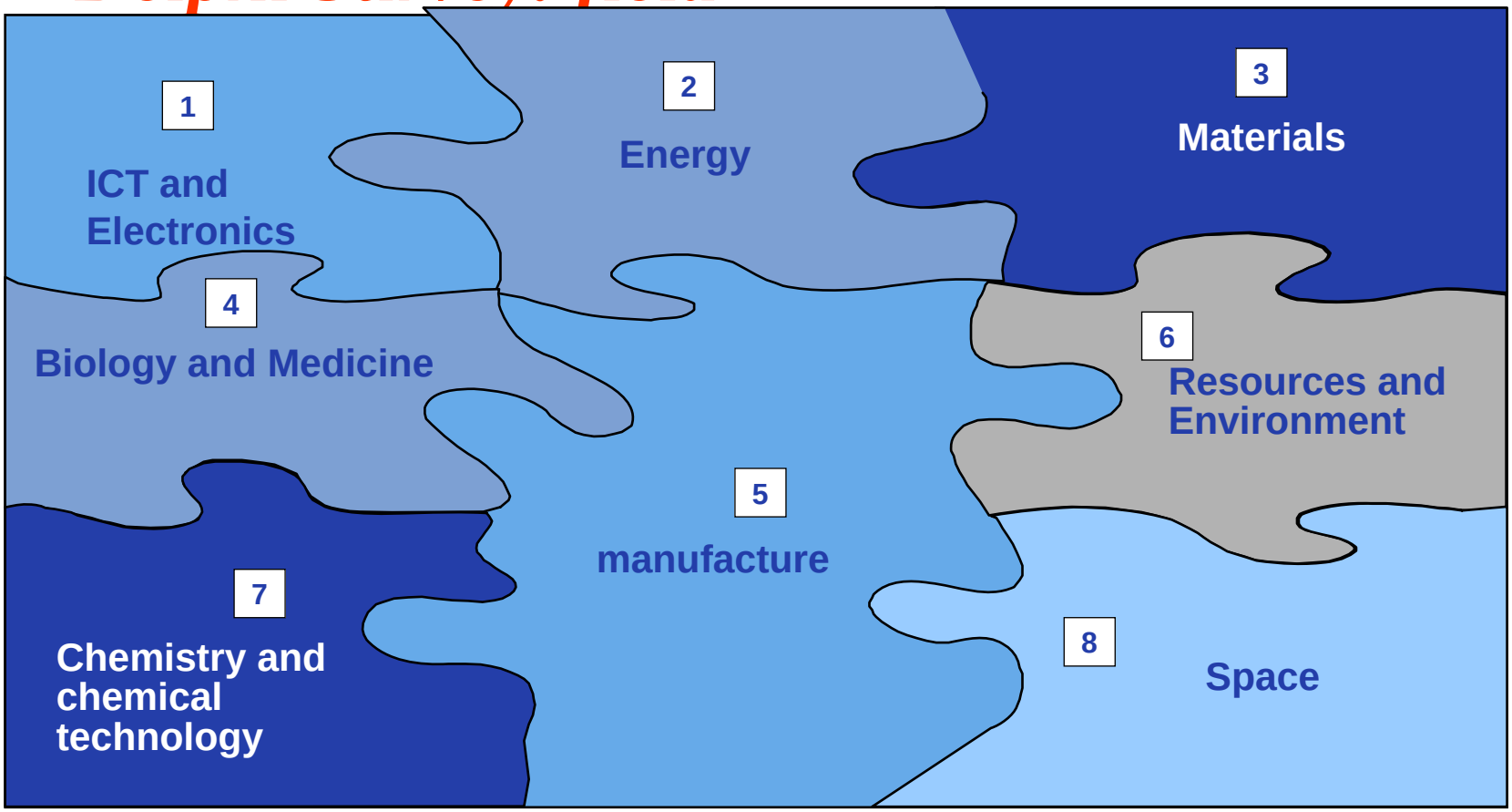
Note:

EGF= Expert Group of Field

EGSF= Expert Groups for Sub-Field

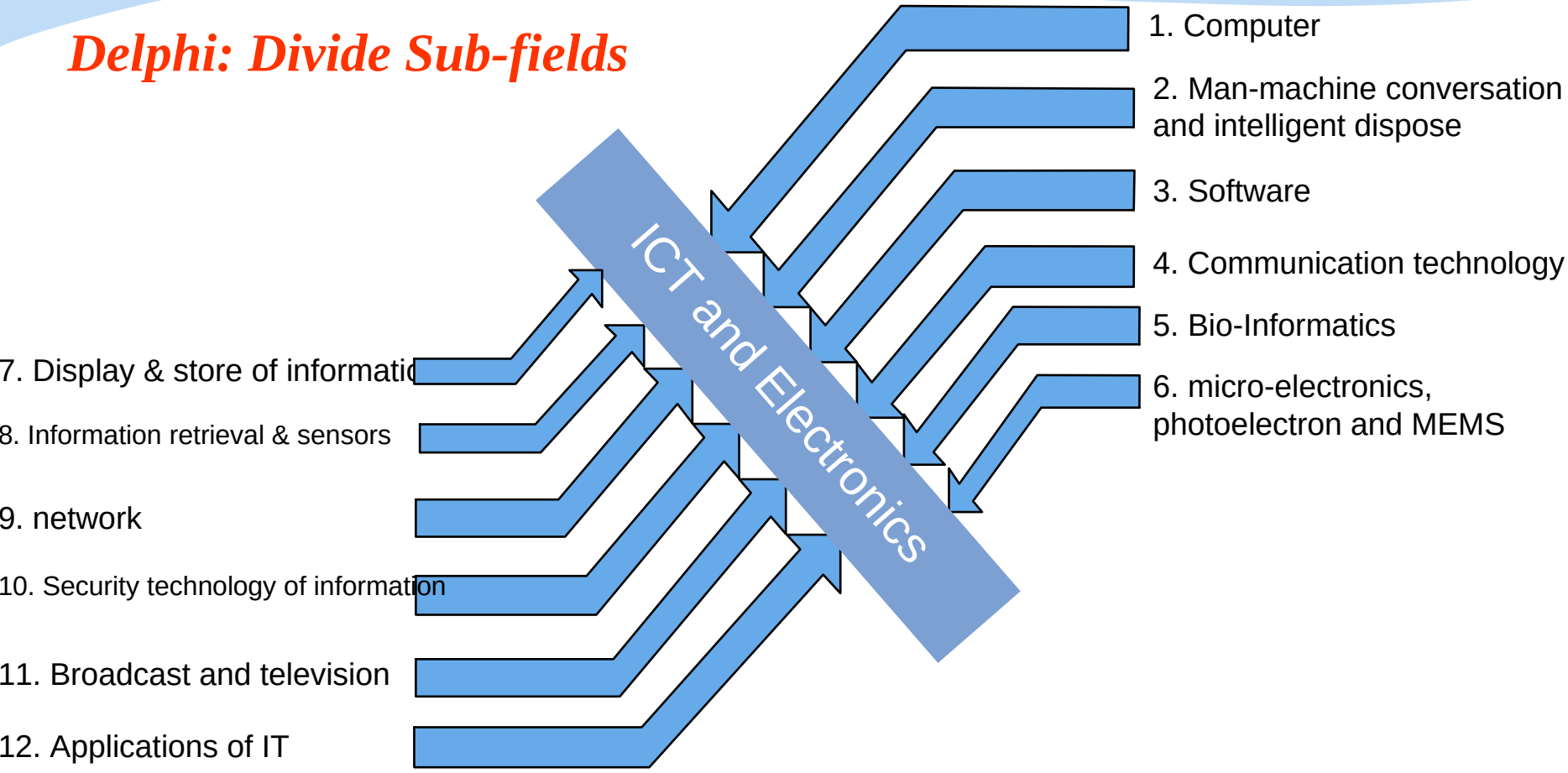
III. Technology Foresight in China

Delphi Survey: field



III. Technology Foresight in China

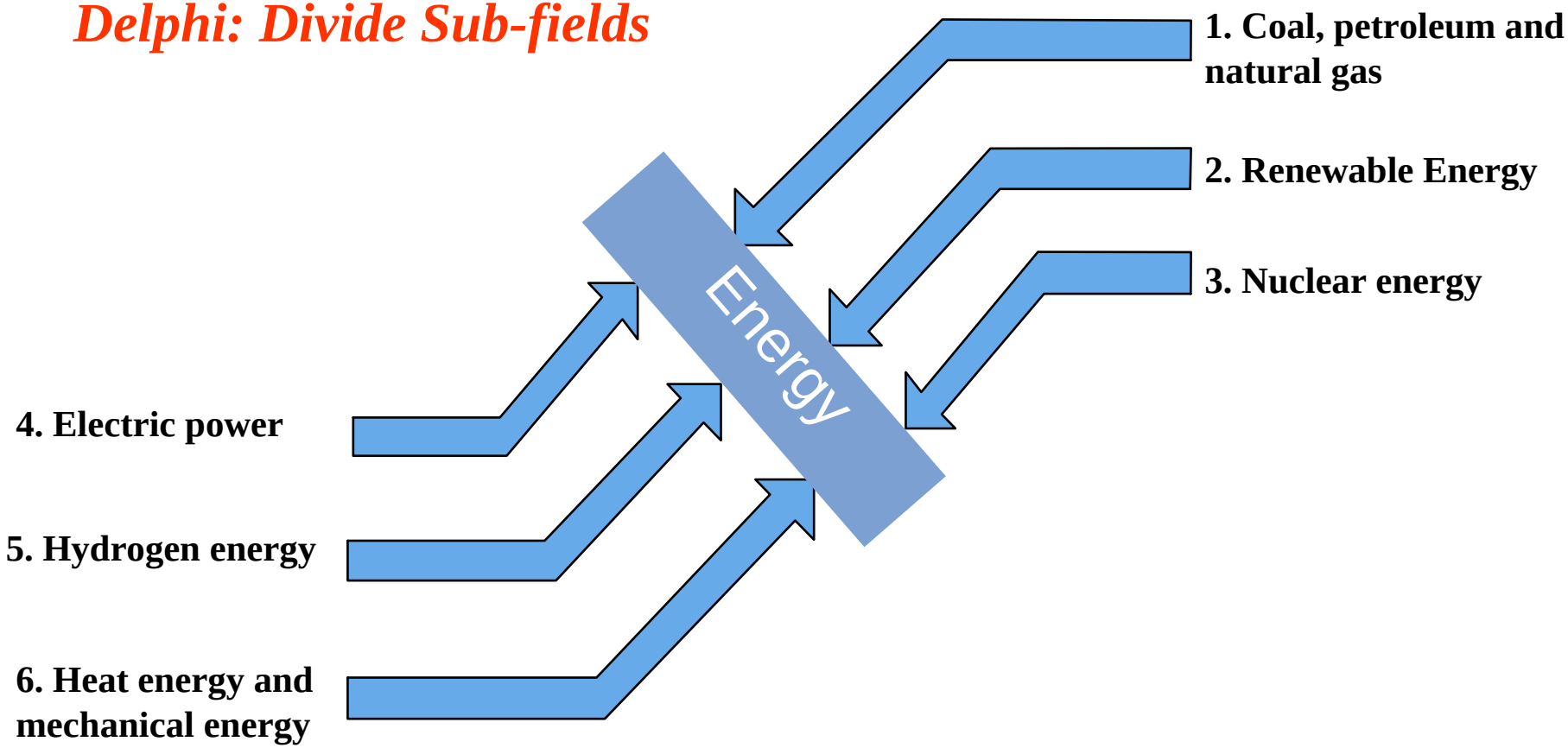
Delphi: Divide Sub-fields



(12 sub-fields, 150 topics)

III. Technology Foresight in China

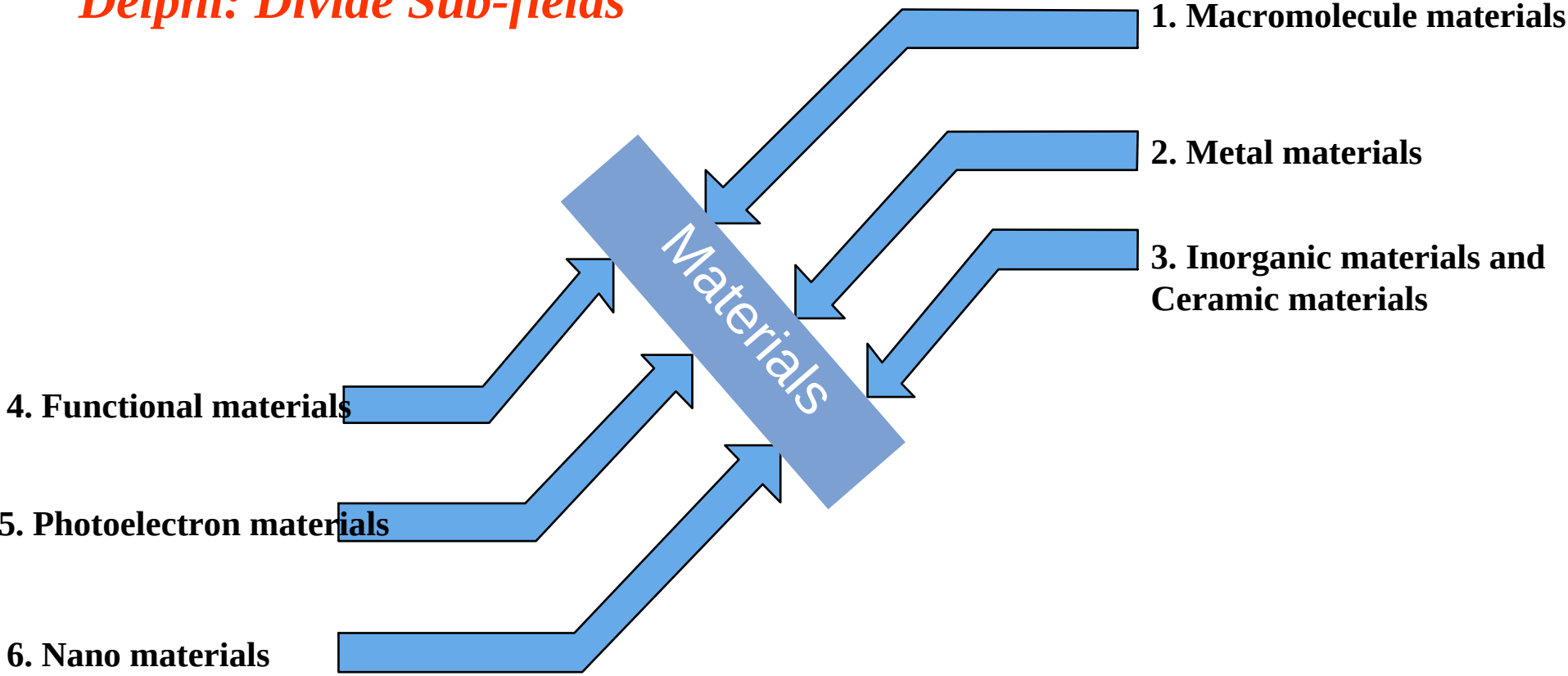
Delphi: Divide Sub-fields



(6 sub-fields, 72 topics)

III. Technology Foresight in China

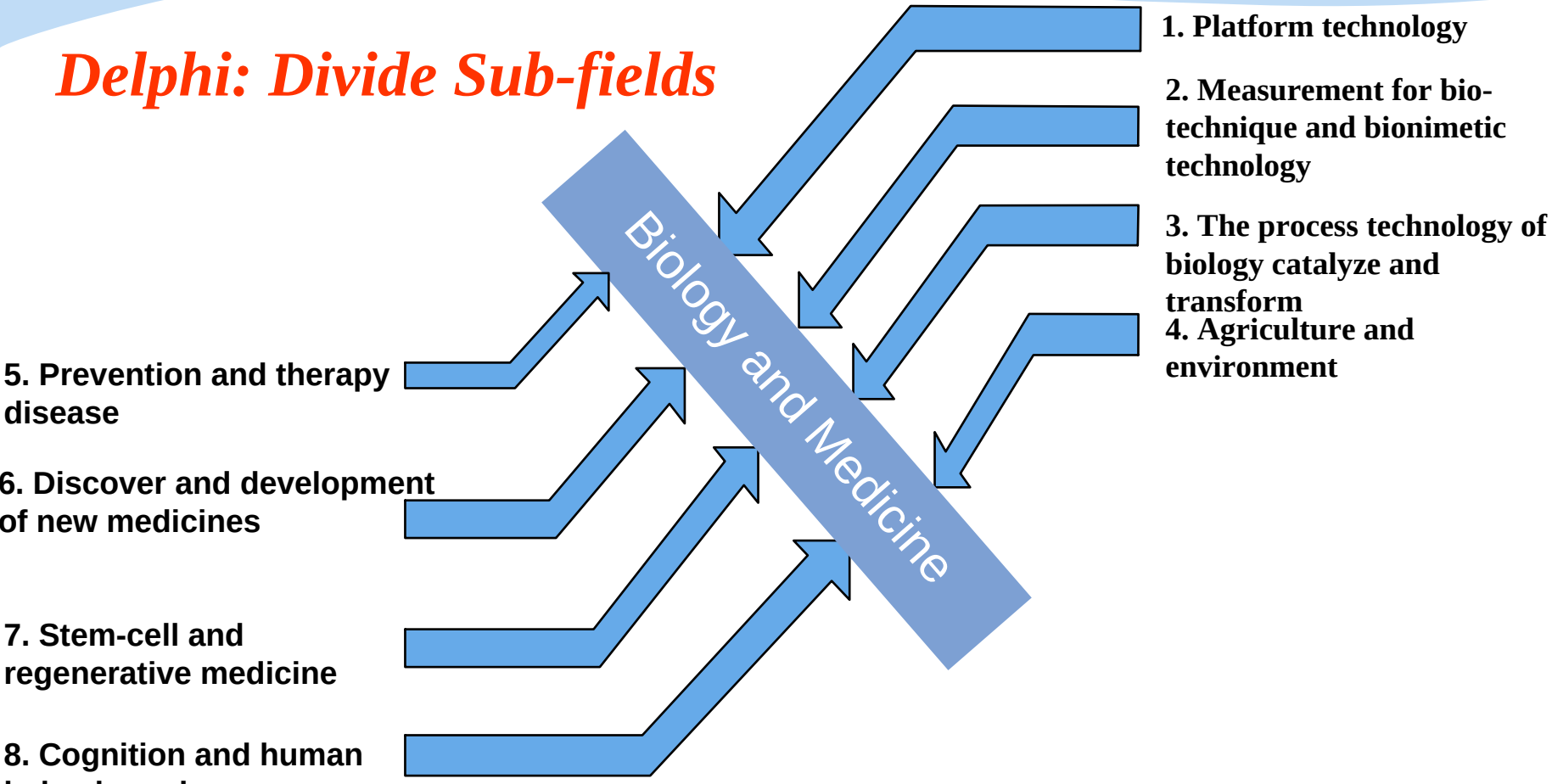
Delphi: Divide Sub-fields



(6 sub-fields, 86 topics)

III. Technology Foresight in China

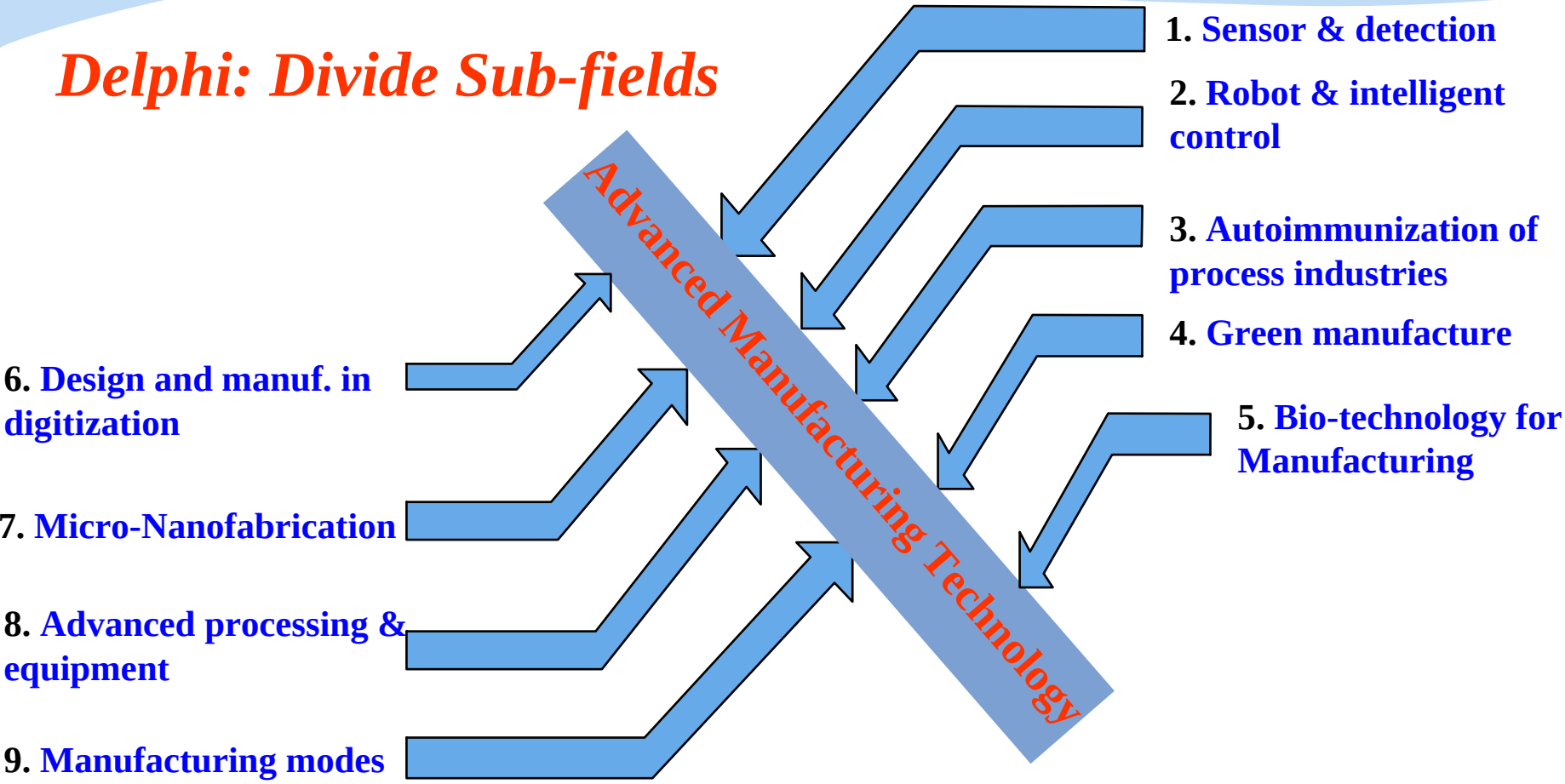
Delphi: Divide Sub-fields



(8 sub-fields, 101 topics)

III. Technology Foresight in China

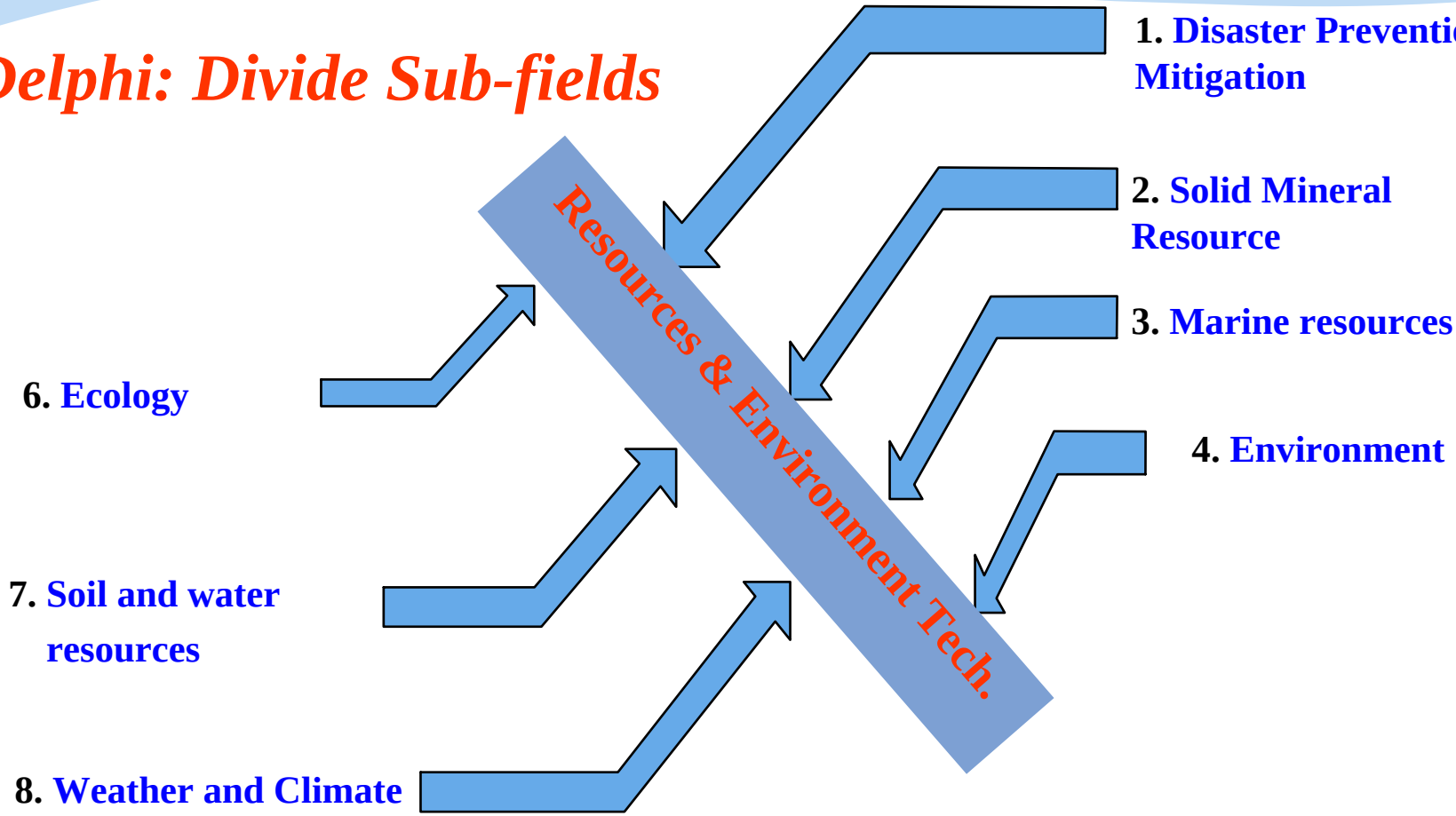
Delphi: Divide Sub-fields



(9 sub-fields, 90 topics)

III. Technology Foresight in China

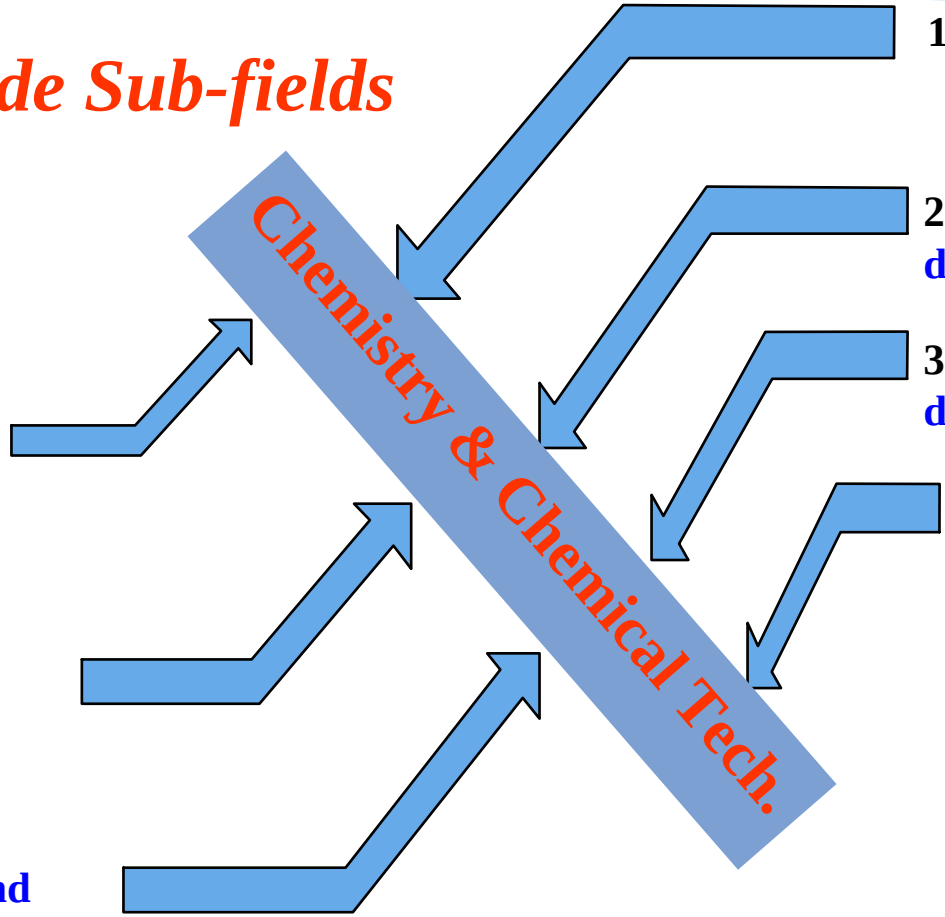
Delphi: Divide Sub-fields



(7 sub-fields, 82 topics)

III. Technology Foresight in China

Delphi: Divide Sub-fields

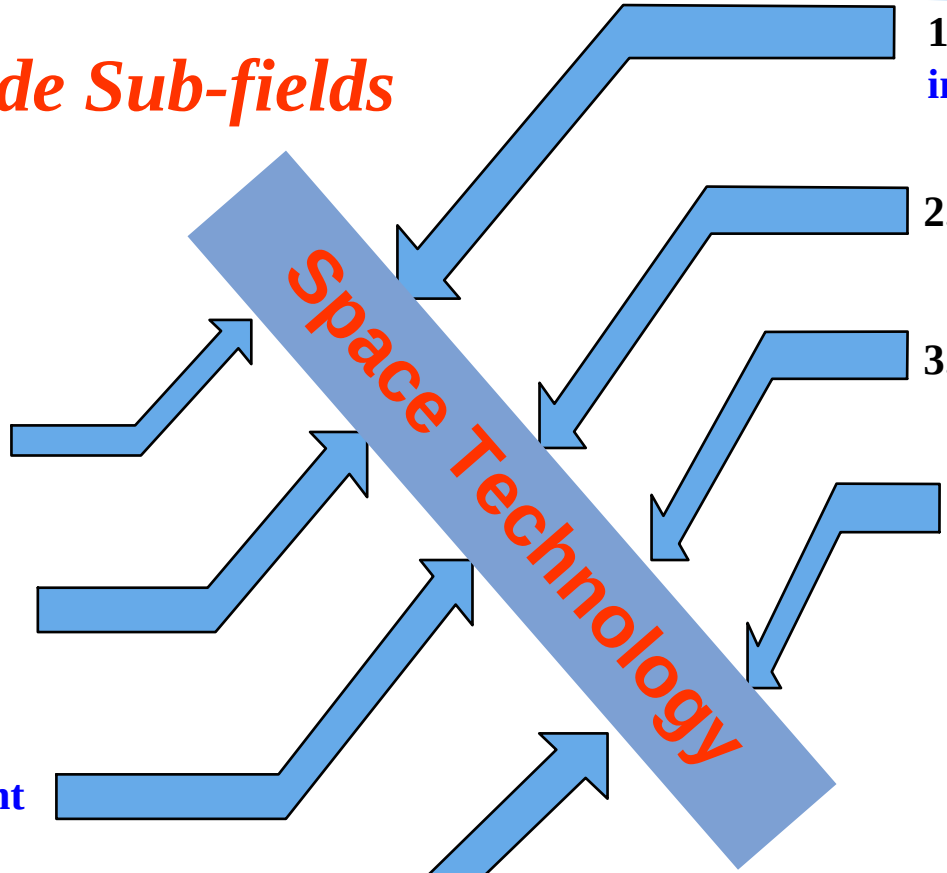


1. Resources and energies
2. Information and system design of process
3. Technologies of detection and test
4. Chemical materials and products
5. Environment and security
6. Transformation and control
7. Biomedicines and healthcares

(7 sub-fields, 78 topics)

III. Technology Foresight in China

Delphi: Divide Sub-fields

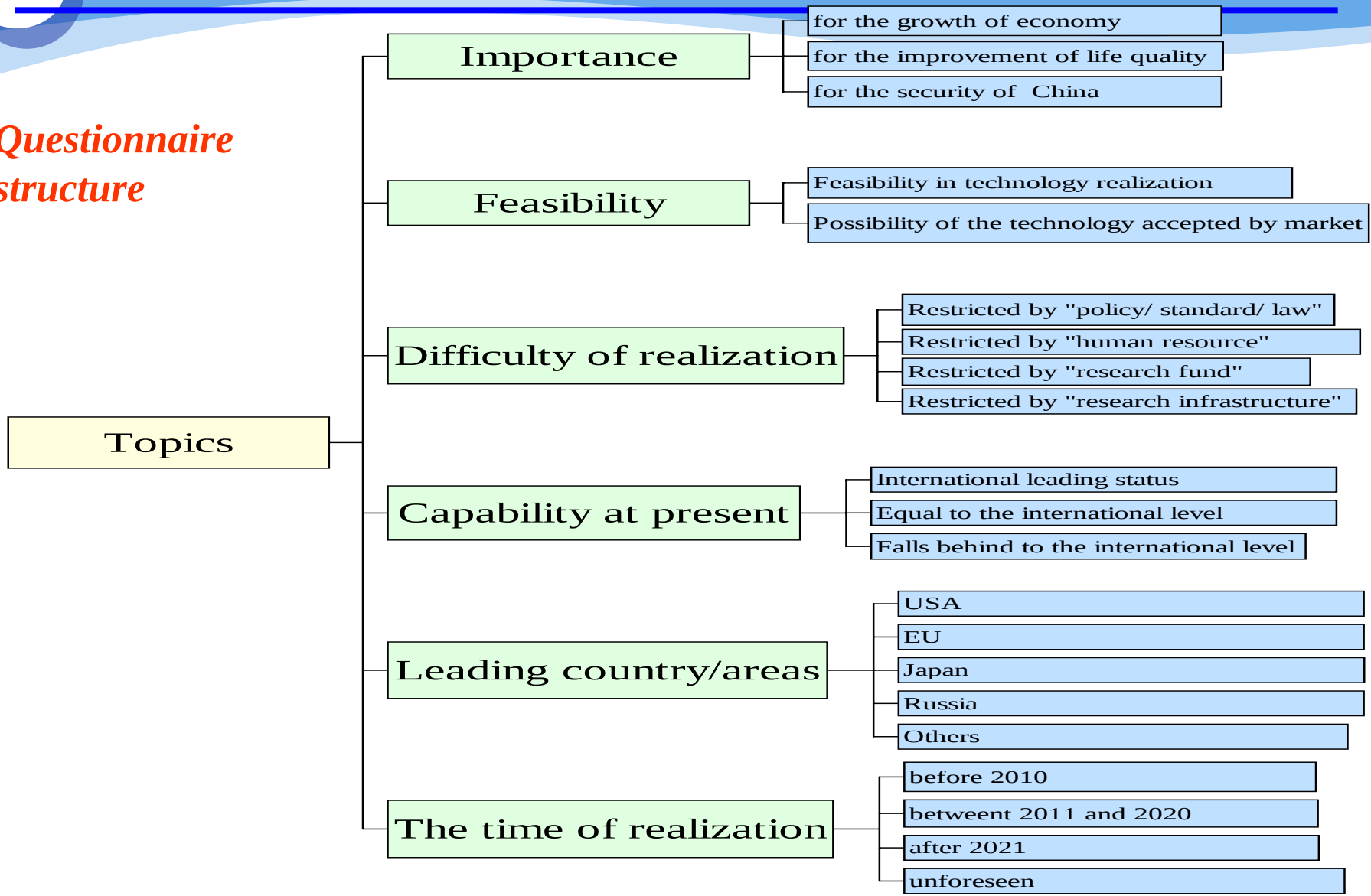


1. Space exploration of planet in solar system
2. Platforms of spacecrafts
3. Space communication
4. Global navigation & position system
5. Astronomy observation
6. Space launchers
7. Manned spaceflight
8. Technology for space remote sensing

(8 sub-fields, 78 topics)

III. Technology Foresight in China

Questionnaire structure



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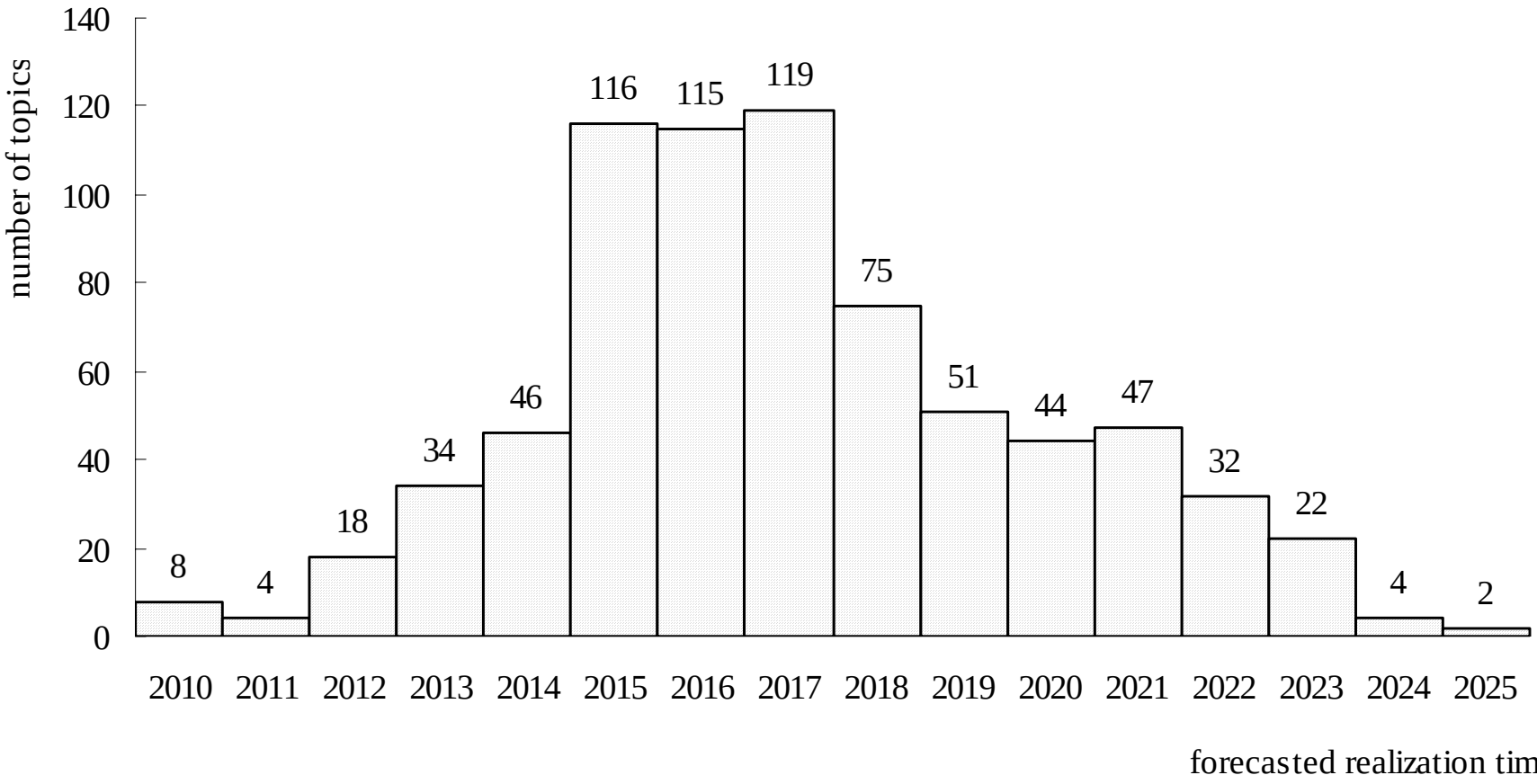

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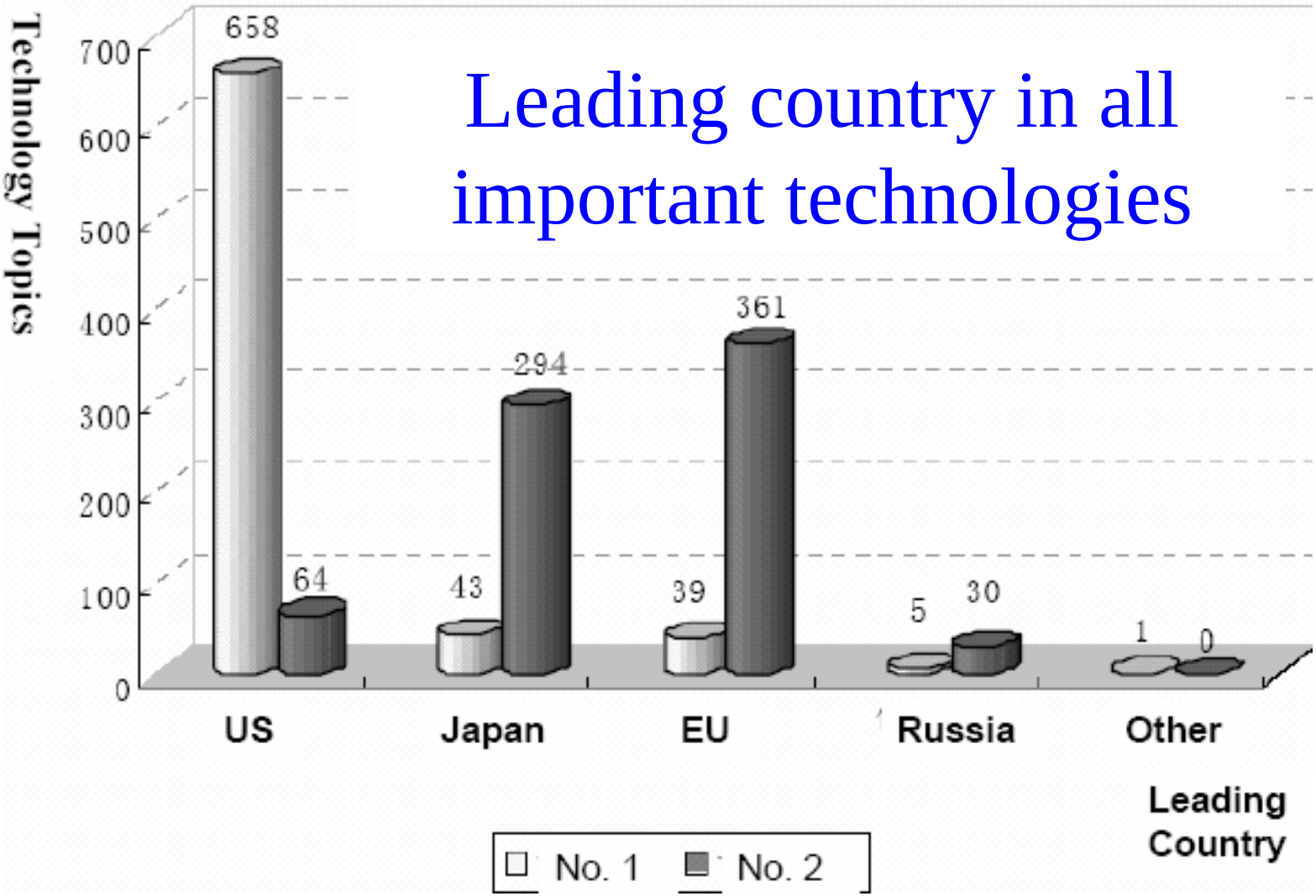

Leading country in all important technologies

III. Technology Foresight in China

Top 10 Topics in terms of the R&D Level of China

1. Nonlinear optics materials and apparatus about fuscous ultraviolet reach practical use
2. The space solar telescope with large caliber will be used practically
3. The high temperature reactor with air cooled reaches practical use
4. The technologies of transmitting satellite regional navigation & positioning will be developed successfully
5. The technology of mode identification for Chinese native medicine reaches practical use
6. Generator sets with evaporative cooling reach medium scale use
7. Treatment technologies which combine biological technologies and Chinese native medicine technologies reach practical use
8. Modernization of the technical standard system of traditional Chinese native medicine will be established
9. The measurement of the genome sequence of main economical important plants and microorganisms will be completed
10. The thoroughbred breeding technologies for marine living things will be used widespread

III. Technology Foresight in China

Top 10 Topics in terms of integrated index of importance

1. **The Chinese GPS system** will be developed successfully
2. **The mining tech. for deep-sea oil & gas** & **mineral resources** will be used widespread
3. **The earth observing technologies** with Ultrahigh-resolution will be used widespread
4. **The system of satellite communication** for earth environment monitoring, forecast and emergency rescue will be developed successfully
5. **Enhanced multi-modes GPS receiver** will be used widespread
6. **Solar cells** will be developed successfully, and their transfer efficiency reaches as high as 50%
7. **The remote sensing techniques** for geostationary satellites with high spatial resolution will be used widespread in disaster monitoring
8. **The early warning & emergency technique system** for water source and drinking water will be used widespread
9. **The GPS** will be used for positioning in building, underwater and underground
10. New technology for biological energy will be developed successfully, which can continuous produce ethanol with straw, biological diesel, hydrocarbon compounds and so on

IV. Innovation Policy and Technology Foresight in China

Understanding to the development

Development =

- **economic development**
- **economic & natural development**
- **economic & natural & societal development**
- **economic & natural & societal & human development**
- **human being centered development---scientific development**

Innovation capacity has been considered as important base for scientific development. The technology foresight is able to play important role in identifying the right way of scientific development, and to support the policymaking of innovation.

IV. Innovation Policy and Technology Foresight in China

- China is still a developing country in terms of productivity of IPRs and in terms of storage of IPRs. On the one hand, there is a big gap in innovation capacity between Chinese academia and that in developed countries; on the other hand, there is also a big gap in innovation capacity between academia (universities and research institutes) and enterprises.

IV. Innovation Policy and Technology Foresight in China

- Therefore, Chinese government now has to give the highest priority to the capacity building for enterprises' innovation. Meanwhile, Chinese government has to choose limited research fields which are of significant for future development of Chinese social and economic development.
- Foresight activity is expected to play increasingly important role in making or revising national strategic plan for science and technology as well innovation.
- Foresight has influenced the selection of the research fields with higher priorities, and the selection of national strategic projects.

V. Conclusion Remarks

The goal to become innovation-driven country is very ambitious, which depends on many factors.

- Firstly, it depends on the efficiency, effectiveness, efficacy of technology learning process.
- Secondly, it depends on the effectiveness of mechanism for implementing/adjusting supportive policies & detailed rules for innovation.
- Thirdly, it depends on the innovation-friendly culture.
- Fourthly, it depends on talents supply and the effectiveness of education and training system.
- Fifthly, it depends on the effectiveness, efficacy of international cooperation.

V. Conclusion Remarks

- China is still a developing country in terms of many indicators.
- However, it is possible in the future for China to make a significant contribution to world science and technology in some fields, such as biology and Chinese medicine, nano-technology, space science & technology, energy technology.
- China is expected to play increasingly important, active role in the global innovation system, especially when innovation capacity of Chinese enterprises have been highly strengthened.
- The foresight activity will play increasingly important role in the process of policy-making of science, technology and innovation, especially in the transition from reform policy to development policy.

thank you for your attention !