SPICE Project Document

Scanning the Potentialities for Future ICT Research Collaboration between China & the European Union

WP1, Analysis & Mapping of ICT in China

D1.1.1 Common aims, approach, methodology and requirements for mapping

SPICE is a Specific Support Action in the IST Programme of the 6th Framework Programme - Project Contract Number IST-045266. It is part of the project portfolio of DG Information Society and Media, Unit International Relations.

The project duration is from 1st November 2006 to 31st July 2008.

The SPICE project partners are:

1	eutema	eutema Technology Management GmbH, Austria
2	CSTEC	China S&T Exchange Center, P.R. China
3	Skillnet	Skillnet GmbH, Germany
4	CATR	China Academy of Telecommunication Research of Ministry of Information Industry of P.R.China, P.R. China
5	CHTF	China Hi-Tech Transfer Center, P.R. China
6	Skill Sh	Skillnet Consulting (Shanghai) Co., Ltd., P.R. China

Project contact person:
Bernd Wohlkinger
eutema Technology Management GmbH
wohlkinger@eutema.com
Tel: +43 1 52453-16

Content list

0. Foreword

The mapping of ICT R&D organizations in China is a fundamental task within the SPICE project as its results form the basis for all other project activities. This document aims at defining requirements for aims and methodology of the analysis and mapping of R&D intensive organizations in the field of ICT aiming at cooperation with European research partners.

Concerning methodology and terminology used, SPICE draws on relevant information published by the OECD[1] as well as other research focused organizations, e.g. the National Science Foundation and the German Federal Ministry of Education and Research. Based on this input in terms of available data a set of common criteria and focused methodology has been developed and is explained further in this document.
Moreover a template for all partners plus experts that support them in mapping needs and competencies will be produced.

1. Targeted objects of mapping

1.1 Target groups and their benefits

In order to define the requirements and the aims of mapping the Chinese ICT market it is important to take a look at the target groups of the SPICE project and the benefits they get from cooperation with the SPICE project.

The target groups of SPICE are:

1. EC
2. Chinese authorities
3. European ICT industry (with interest in research cooperation with China)
4. Chinese ICT industry (with interest in research cooperation with Europe)
5. European research organizations
6. Chinese research organizations
7. Multipliers in Europe (chambers of commerce, technology parks, R&D parks, etc.)
8. Multipliers in China (chambers of commerce, technology parks, R&D parks, etc.)
9. Others

Throughout the whole process of mapping and analyzing the Chinese ICT R&D organizations the potential benefits of SPICE need to be communicated to the relevant approached organizations.

[1] Frascati Manual – Proposed standard practice for surveys on research and experimental development, OECD, 2002; Division of Science Resources Statistics, The National Science Foundation, 2006)

The major benefits of SPICE for the main six target groups are:

	Benefits \ Target Group	EC	Chinese Authorities	European ICT Industry	Chinese ICT Industry	European research organizations	Chinese research organizations
1	Gaining knowledge about current development and focus areas of ICT R&D activities	✓	✓	✓	✓	✓	✓
2	Gaining knowledge about the different and similar stages of ICT R&D activities in Europe and China	✓	✓	✓	✓	✓	✓
3	Getting information on research organizations that are active in the same field of ICT R&D for knowledge exchange	✓	✓	✓	✓	✓	✓
4	Finding potential ICT R&D partners for future cooperation in China and Europe	✓	✓	✓	✓	✓	✓
5	Becoming part of an international contact pool of European and Chinese organizations highly interested and involved in Sino-European R&D cooperation in the ICT-industry			✓	✓	✓	✓
6	Gaining knowledge about R&D potentials and barriers in the Chinese/European ICT markets for European/Chinese companies	✓	✓	✓	✓	✓	✓
7	Possible qualification for funding from potential EU-programs			✓	✓	✓	✓
8	Create contacts to win European R&D partners				✓		✓
9	Create contacts to win Chinese R&D partners			✓		✓	
10	Create R&D cooperation potential			✓	✓	✓	✓
11	Possibility to present the own organization within an international context			✓	✓	✓	✓
12	Information on FP7			✓	✓	✓	✓
13	Exertion of influence on the contents of FP7			✓	✓	✓	✓

High interest in those benefits is a critical selection criterion for finding capable R&D organizations for the SPICE project. Organizations that do not show explicit interest shall not be further targeted within the mapping and analyzing of the industry.

1.2 Objectives of mapping

According to the benefits of the target groups the objectives of mapping are:

- SPICE will provide a mapping of Chinese R&D/ICT actors, especially those with high potential for research collaboration with Europe.
- Moreover the mapping will allow naming the geographic regions in China with ICT strengths.
- Furthermore, it allows an insight over the ICT sub-areas with high potential for EC initiatives in FP7.

1.3 Definition of ICT

Information and communications technologies (ICTs) is a term which is used to comprise a wide range of services, applications, and technologies, using various types of equipment and software.

According to the focus of SPICE the ICT market can be divided into the following segments:

ICT - Information and Communication Technologies

1 **Electronics & Microelectronics**

- 1.1 Electronic Core Sciences
- 1.2 Nanotechnology
- 1.3 Microelectronics & integrated circuits
- 1.4 Electrical Engineering
- 1.5 Embedded Systems & real-time systems
- 1.6 Robotics & manufacturing

2 **Information Processing, Information Systems**

- 2.1 General informatics
- 2.2 Formal languages
- 2.3 Mathematics
- 2.4 Artificial Intelligence
- 2.5 Semantic Systems
- 2.6 IT security
- 2.7 Medical informatics

3 **Multimedia & HCI**

- 3.1 Visual Computing
- 3.2 Multi-modal Interfaces
- 3.3 Audio & HLT

4 **Telecommunications**

- 4.1 Telecommunication
- 4.2 Mobile & wireless communication technologies
- 4.3 Distributed systems
- 4.4 Telematics
- 4.5 Photonics and quantum informatics

5 **Informatics for Business & Society**

- 5.1 Information systems & business informatics
- 5.2 ICT & society, technology assessment

1.4 R&D value chain

R&D (Research and Development) activities normally refer to future-oriented, long term activities in science and technology.

The term covers three activities: basic research, applied research and (experimental) development.

Basic research is primarily undertaken to acquire new knowledge of the fundamental aspects of phenomena and of observable facts, without specific applications or use toward processes or products in mind.

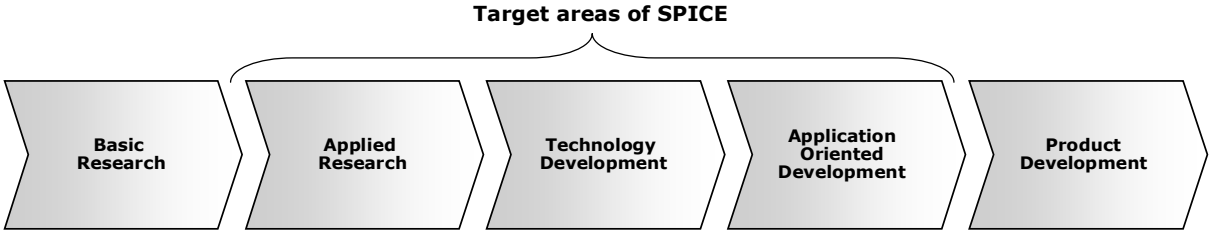
Applied research also aims at acquiring new knowledge, but it is directed towards a specific objective. It is a systematic study undertaken either to determine possible uses for the findings of basic research or to determine the means by which a specific and predetermined objective may be met.

Development is systematic work, drawing on existing knowledge gained from research or practical experience. It is work that is directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.[2]

R&D activities can be divided along the value chain into:

- Basic Research
- Applied Research
- Technology Development
- Application Oriented Development
- Product Development

SPICE is mainly targeting ICT R&D activities in applied research, technology development and application oriented development.



Source: German Federal Ministry of Education and Research, 2005

[2] Frascati Manual – Proposed standard practice for surveys on research and experimental development, OECD, 2002; Division of Science Resources Statistics, The National Science Foundation, 2006

2. Process of mapping

2.1 Approach of targeted organizations

In order to guarantee that the targeted organizations provide the required information and data, a personal approach is recommended and should be encouraged. The contact person at the targeted organization should be in an appropriate position to provide profound information, e.g. Chief Research Officer (CRO), Chief Information Officer (CIO), Chief Security Officer (CSO), Chief Executive Officer (CEO) or Chief Financial Officer (CFO) and serve as contact person for any future communication with regard to the SPICE project activities. Where necessary, further contact persons need to be approached, in order to guarantee that the required information is adequately provided.

During a first approach (personally or via phone) the benefits of SPICE (as discussed under 1.1 of this paper) should be clearly communicated to the targeted organization. This first step also serves as a filter. Organizations that do not show explicit interest in those benefits and SPICE shall be excluded from further research.
Following, a questionnaire (based on the template introduced under 2.4 of this paper) should be handed out to the respective contact person. In order to assure effective support and secure the cooperation of the person in charge of responding every targeted organization should be given a personal SPICE contact person for further questions and inquiries. Follow up calls will ensure the delivery in the required timeline.

It is the responsibility of all SPICE partners to help contributors to appreciate the potential uses and benefits of the data. It is important to communicate the specific benefit for the targeted organization to encourage cooperation.

2.2 Collection of data

The results of SPICE will be based on the mapping and analyzing of primary and secondary data. The necessary data can be gathered through the following information sources:

- Events and Conferences (e.g. China High-Tech Fair Shenzhen, Beijing Science Week, Chongqing High-Tech Fair, Xi'an High-Tech Fair, Northeastern High-Tech Fair, the Global NGN Summit in China, 3G Summit, Conference on the Development and Trends of ICT, Euro-China Workshops on Home Networks and Platforms, etc.)
- Clusters & Multipliers (e.g. China Association of Information Industry, China Association of Software Industry, China Association of Communication Enterprises)
- Available contacts and mailing lists or research organizations from previous projects
- EU publications & reports

- National surveys or studies published by international initiatives targeting the region
- Other research sources
- Etc.

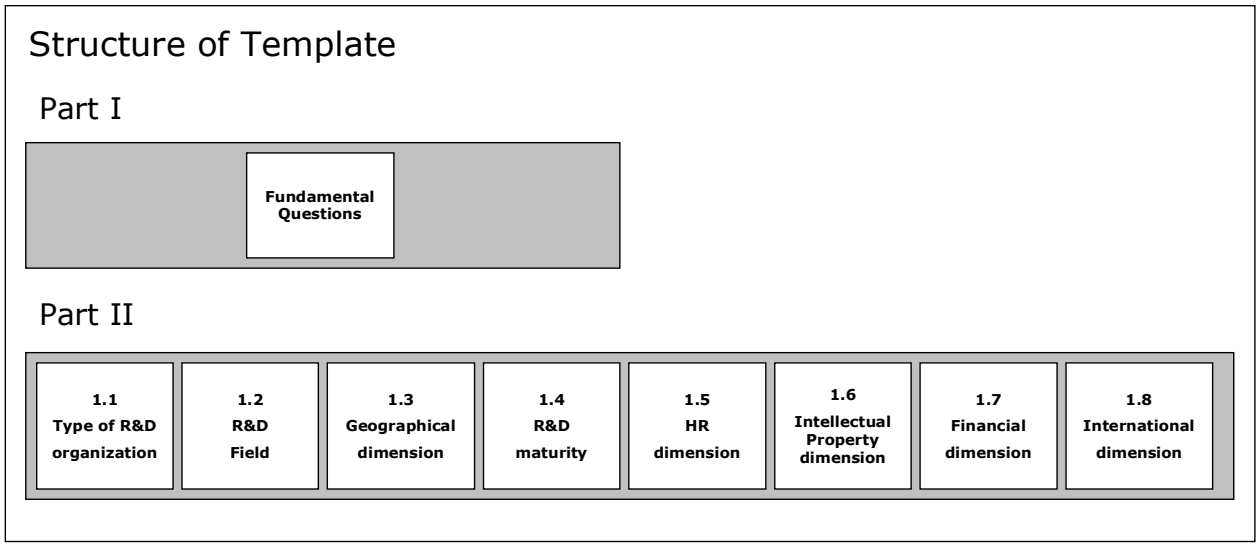
2.3 Organizations to approach

As stated in 1.1 of this paper, the mapping will provide a mapping of Chinese R&D ICT actors, especially those with high potential for research collaboration with Europe. To identify "research intensive organizations in China" the following aspects should be considered:

- Organizations that spend a considerable amount of budget (>EUR 3 M. p.a.) into their R&D activities
- Organizations that have a number of >30 employees working in R&D
- Organizations that have compiled registered research results (patents, standards, etc.)

2.4 Structure and contents of template

To guarantee an effective and purposeful mapping, a two-stage methodology of mapping is suggested. Therefore two parts of the template will be created. Template part I will provide a rough overview about the fundamental facts of an R&D ICT organization. If the organization falls under the category of "research intensive organizations in China" (as described in 2.1) and shows interest in the potential benefits of SPICE (see 1.1) Template part II will be applied to provide further insight into different related dimensions.



Template Part I – Fundamental Questions

- Contact Details
  - Full name of legal entity (e.g. faculty, department, institute; to be referred to as 'organization' in the following)
  - Address Details (street, street number, zip code, city, province, country)
  - Other locations of your organization (address details, telephone number for possible further inquiries about those locations)
  - Website, phone/fax number, Email address
- Date of foundation of the R&D department/institute
- Contact Person
- Position of contact person in organization (please specify)
- Please indicate in which areas of ICT your organization is engaged in R&D: (multiple choice)
  - Electronics & Microelectronics
    - Electronic Core Sciences
    - Nanotechnology
    - Microelectronics & integrated circuits

        - Electrical Engineering
        - Embedded Systems & real-time systems
        - Robotics & manufacturing
    - Information Processing, Information Systems
        - General informatics
        - Formal languages
        - Mathematics
        - Artificial Intelligence
        - Semantic Systems
        - IT security
        - Medical informatics
    - Multimedia & HCI
        - Visual Computing
        - Multi-modal Interfaces
        - Audio & HLT
    - Telecommunications
        - Telecommunication
        - Mobile & wireless communication technologies
        - Distributed systems
        - Telematics
        - Photonics and quantum informatics
    - Informatics for Business & Society
        - Information systems & business informatics
        - ICT & society, technology assessment
    - Other_please specify
- Covered area of R&D value chain (multiple choice, see definition according to 1.3 of this paper)
- Number of employees in R&D
- How many of your R&D project have been registered (patents, awards, standards (CMM, ISO, …))
- Please name the key areas of registered R&D results (multiple choice)
    - Technologies
    - Standards
    - Products
    - Other_please specify
- Contractor of previous projects (multiple choice)
    - Chinese government
    - National clients
    - International clients
- Do you have a retaining contractor (contractor who has been involved in more than 5 R&D projects)?
    - No
    - Yes_please specify
- Did you undertake cooperative R&D projects?
    - No
    - Yes_please specify
- Did you take part in any of the following programs (multiple choice)
    - Torch
    - 863

  - 973
  - FP5
  - FP6
- If yes, please specify in which areas of ICT R&D you did receive funding? (multiple choice)
  - Electronics & Microelectronics
    - Electronic Core Sciences
    - Nanotechnology
    - Microelectronics & integrated circuits
    - Electrical Engineering
    - Embedded Systems & real-time systems
    - Robotics & manufacturing
  - Information Processing, Information Systems
    - General informatics
    - Formal languages
    - Mathematics
    - Artificial Intelligence
    - Semantic Systems
    - IT security
    - Medical informatics
  - Multimedia & HCI
    - Visual Computing
    - Multi-modal Interfaces
    - Audio & HLT
  - Telecommunications
    - Telecommunication
    - Mobile & wireless communication technologies
    - Distributed systems
    - Telematics
    - Photonics and quantum informatics
  - Informatics for Business & Society
    - Information systems & business informatics
    - ICT & society, technology assessment
  - Other_please specify
- Please list your organization's current membership in national and international associations/networks.
- Please indicate the most important network partner of your organization.
- Which major R&D projects/programs are you currently involved in?
- In which areas of ICT are you interested for future R&D projects?
- In which areas of R&D do you see the core competencies of your organization?
- Please indicate which areas are qualifying for international cooperation in your opinion.

Template Part II – Detailed Examination

1.1 Types of R&D organization

To break down the R&D segments, the organizations should be put into (in prior defined) categories.

(Multiple choice)

- Government institution
  - Provincial government
  - National government
- State-owned industry organization
  - Local organization
  - National organization
  - International organization
- Private-owned industry organization
  - Local organization
  - National organization
  - International organization
- University
- Other non-profit organization
  - local
  - national
  - international
- Other_please specify

1.2 R&D Field

- Which areas of R&D are you operating in/specialized in?
- In which areas would you like to cooperate with international partners?
- Where do you see opportunities for future R&D cooperation?

1.3 Geographical dimension

Splitting the Chinese market into geographical areas helps to get a quick overview over the regional spreading.

- Locations of organization (multiple choice)
  - North-East China (Liaoning, Heilongjiang, Shandong, Jilin, Hebei, incl. Beijing)
  - East China (Jiangsu, Zhejiang, incl. Shanghai)
  - Central China (Anhui, Henan, Hubei, Hunan, Guizhou, Jiangxi, Shaanxi & Shanxi Provinces)
  - South-East China (Guangdong, Fujian, incl. Shenzhen)
  - Central & Western China (Yunnan, Xinjiang, Qinghai, Gansu, Sichuan)

    - Hong Kong*
- Number of R&D people per location
- Please specify which areas of ICT R&D are covered in each region:
    - Electronics & Microelectronics
        - Electronic Core Sciences
        - Nanotechnology
        - Microelectronics & integrated circuits
        - Electrical Engineering
        - Embedded Systems & real-time systems
        - Robotics & manufacturing
    - Information Processing, Information Systems
        - General informatics
        - Formal languages
        - Mathematics
        - Artificial Intelligence
        - Semantic Systems
        - IT security
        - Medical informatics
    - Multimedia & HCI
        - Visual Computing
        - Multi-modal Interfaces
        - Audio & HLT
    - Telecommunications
        - Telecommunication
        - Mobile & wireless communication technologies
        - Distributed systems
        - Telematics
        - Photonics and quantum informatics
    - Informatics for Business & Society
        - Information systems & business informatics
        - ICT & society, technology assessment
    - Other_please specify

* Hong Kong will be separately listed as its R&D maturity shows off a more developed stage than Mainland China

1.4 R&D maturity

In order to evaluate the potential future R&D cooperation it is necessary to examine the maturity of previous projects and their outcome.

- How many R&D projects have you already worked on?
- How many R&D projects have been completed?
- What is a typical size of a R&D project (budget/man years)
- How many of your R&D projects have been granted (Please name them)
    - Patents

    - Awards
    - Standards
    - Other achievements
- Number of patents pending?
- Number of registered patents registered by the Chinese government?
- Number of patents internationally registered?
- How many registered R&D project results are in: (Please specify)
    - Technologies
    - Standards
    - Products
    - Other_please specify
- Have those registered results been peer-reviewed in publications? Please name some publications.
- What is the rate of peer-reviewed publications?
- Please indicate the number of scientific articles written by researchers from your organization on ICT issues in the last 3 years.
    - Domestic
    - International
- Number of Ph.D. studies completed at the organization in the last 3 years? (Ph.D. students, who received supervision from the organization and acquired their Ph.D. degree)
- Number of advisory projects (e.g. studies performed for third parties, services provided etc.) performed by the organization in the last 3 years?

1.5 HR dimension

This dimension focuses on the human resource side of the R&D organizations.

- Total number of people in your organization?
- Total number of researchers in your organization?
- Total number of female researchers in your organization?
- What is their education background? (For universities – please answer following question instead) How many percent have a:
    - Ph.D.
    - Master
    - Bachelor
    - other
- Educational background:
    - Total number of BA alumni each year?
    - Total number of MA alumni each year?
    - Total number of Ph.D. alumni each year?
    - Total number of postdoctoral?
    - Total number of professors?
- How many of them have international experience/worked abroad before? Please indicate the total number of own researchers sent abroad to do research for at least 3 months
- Please indicate the approximate percentage of your staff which has relevant English skills:

  - None
  - Basic user
  - Average user
  - Proficient user
- What is the average salary of your employees?
- What is the average employment period of your employees?
- How do you prevent your researchers from changing their jobs? Do you have any employee retention programs? Please define.
- Are there any foreign researchers working in your organization?
- If yes: Please indicate the total number of foreign researchers hosted for more than 3 months in the last years?

1.6 Intellectual Property dimension

As intellectual property is very important in R&D, especially in the ICT industry, it is of special interest to analyze how Chinese organizations deal with this issue.

- Do you have any Intellectual Property protection policies & measures? Please specify.

1.7 Financial dimension

This dimension aims at providing an insight of the budget spent on R&D in the respective organization and examines the detailed sources of funding.

- What is the annual budget for R&D in your organization?
- Please indicate the typical total project budget in the national projects your organization participated in the last three years.
- Please indicate the typical budget of your organization in the national projects it participated in the last three years.
- Please indicate the maximum budget share of your organization from national projects it has participated in the last three years.
- Source and share of funding (in %) (multiple choice & please specify)
  - Chinese government/authorities
  - European Commission
  - Other foreign authorities
  - Third party budget
  - Chinese private investors
  - Foreign private investors
  - Revenue from your R&D services rendered

1.8 International dimension

This dimension aims at scanning previous cooperation and experience with international partners and aims at scanning the potential for future cooperation with international partners.

- Have you had any cooperation with international R&D partners?
- If yes:
    - Please specify the type of cooperation/your position in the cooperation?
        - Supplier/Developer of technologies
        - Joint Venture partner
        - Joint Research
        - Other_please specify
    - Name of partners involved
    - Are you interested in further R&D cooperation with international partners?
    - What geographical background are you looking for in partners (multiple choice)?
        - US Partners
        - EU Partners
        - Asian Partners (please specify)
            - Japan
            - South Korea
            - India
            - Other
        - Others_please specify
    - What type of R&D organization are you looking for in partners (multiple choice)?
        - Government institution
            - Provincial government
            - National government
        - State-owned industry organization
            - Local organization
            - National organization
            - International organization
        - Private-owned industry organization
            - Local organization
            - National organization
            - International organization
        - University
        - Other non-profit organization
            - local
            - national
            - international
        - Other_please specify
    - Please indicate why you chose the above partners?
- If no:
    - Are you interested in R&D cooperation with international partners?
    - What geographical background are you looking for in partners (multiple choice)?
        - US Partners
        - EU Partners
        - Asian Partners

        - Others_please specify
    - What type of R&D organization are you looking for in partners (multiple choice)?
        - Government institution
            - Provincial government
            - National government
        - State-owned industry organization
            - Local organization
            - National organization
            - International organization
        - Private-owned industry organization
            - Local organization
            - National organization
            - International organization
        - University
        - Other non-profit organization
            - local
            - national
            - international
        - Other_please specify
    - What type of cooperation are you looking for?
        - Supplier/Developer of Technologies
        - Joint Venture partner
        - Joint Research
        - Other_please specify
    - Please amplify why you are interested in cooperation partners?
    - Which channels are you using to find cooperation partners?
    - Which criteria are important for you in a cooperation partner?
        - Geographical background
        - Previous R&D experience
        - Financial strength
        - Other_please specify
- Where do you see the biggest barriers in R&D projects with international partners? (multiple choice)
    - Language problems
    - Problems caused by different cultural backgrounds of partners
    - Problems caused by political backgrounds
    - Financial problems
    - Other_please name them
- Where do you see the biggest drivers R&D projects with international partners?
    - International contacts
    - Financial opportunities/international funding
    - Exchange of knowledge
    - Acquirement of high quality human resources
    - Explore unknown science and technology fields
    - Level of international R&D infrastructure
    - Other_please name them

2.5 Interpretation of Data

The data of the templates will be collected by all SPICE project partners. For instance, templates filled at consultation workshops will be reviewed and forwarded by the partner responsible for this particular workshop.

Task 1.3 will produce a simple database that will be fed with the template data by all partners. The data will be interpreted within Task 1.3.