

# *Technological level evaluation in ICT*

## *- Korean Viewpoint -*






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**Keit**

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-  **2. Technological level survey in ICT**
-  **3. Technological competitiveness analysis in ICT**
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-  **5. Discussion**

\* *TLE : Technological Level Evaluation*



## 1. Introduction of KEIT TLE

# 1. Introduction of TLE

Technological level survey

Technological competitiveness analysis

## EXPERT DELPHI

- Relative importance of individual tech.
- Relative Technology level and Gap

TLE

## PATENT ANALYSIS

- With AIMS+ model  
Using patent information
- Patent application
  - Triadic patent
  - Patent family
  - Patent citation

Qualitative & Quantitative  
Mutual Complementary Method

# 1. Introduction of TLE

## Goal

- To allocate R&D resource efficiently
- Reference to government, agency and committee when they performs next year project planning & selection

## Survey/Analysis contents

	Tech. level survey in ICT	Tech. competitiveness analysis in ICT
Target	o Information & communications technology (14 main tech. category)	
Countries	o South Korea, USA, Europe, Japan, and China	
Data	o Second round expert Delphi survey - 1 <sup>st</sup> : 7,824 replied, 2 <sup>nd</sup> : 2,289 replied	o Patent applications - Recent ten years(2000.01.01 ~ 2010.08.31)
Evaluation item	o Relative technological level and gap o Relative importance of individual technology	o Patent Activity Index, Patent Intensity Index, Patent Market-power Index, Patent Strength Index, Patent Strike Index
Period	o July, 2010 ~ November, 2010	o August, 2010 ~ November, 2010
Etc.	o Web-based survey through IT-CAP (IT Capability Analysis Program) System	o Patent DB : WIPS DB(search.wips.co.kr)



## 2. Technological level survey in ICT

# 2-1. Definition/Survey items

## Definition

**“Technological capability” is defined as the ability developing new technology,**

**“Technological level” is used when we want to compare one with other technological capabilities relatively.**

- Survey items

S.I.	Sub-S.I.	Operational Definition	scale
Technological Importance	Importance	▪ Degree of relative importance of a target technology about upper-level technology	100
	Urgency	▪ How soon this technology should be developed ※ Within one year, Within 1~2 year, Within 2~3 year, etc.	year
	Impact	▪ Degree of influence of this technology to other technologies	5
Tech. level	Relative level	▪ 2010, 2012, 2015 target countries' relative technological level(Top level : 100%)	%
	Relative Gap	▪ 2010, 2012, 2015 target countries' relative technological gap(Top level : : 0)	year
	Top level Country/ Company	▪ Country/Company holding top level technological capability	-

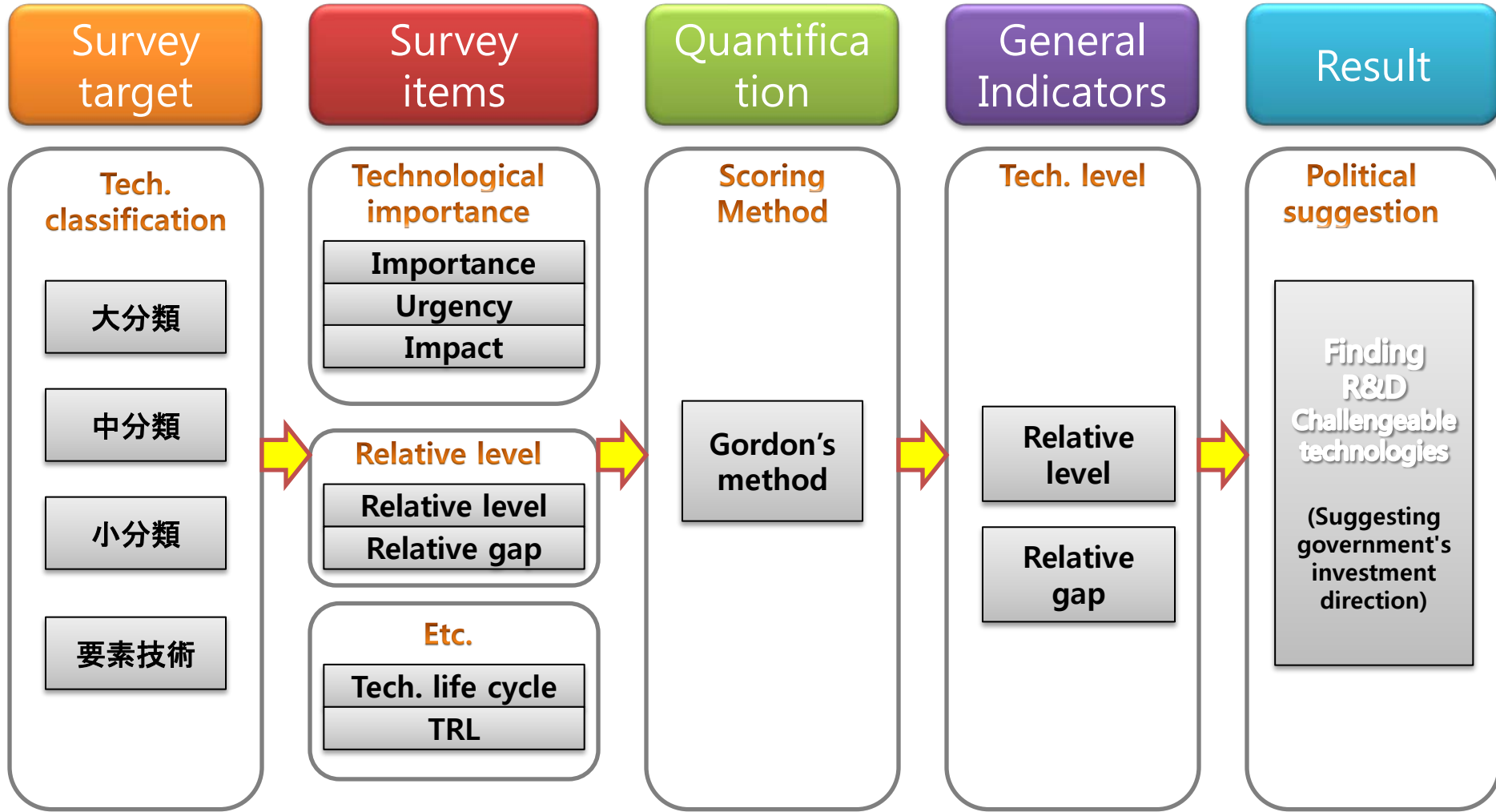
## 2-2. Survey target

- Target Tech. category

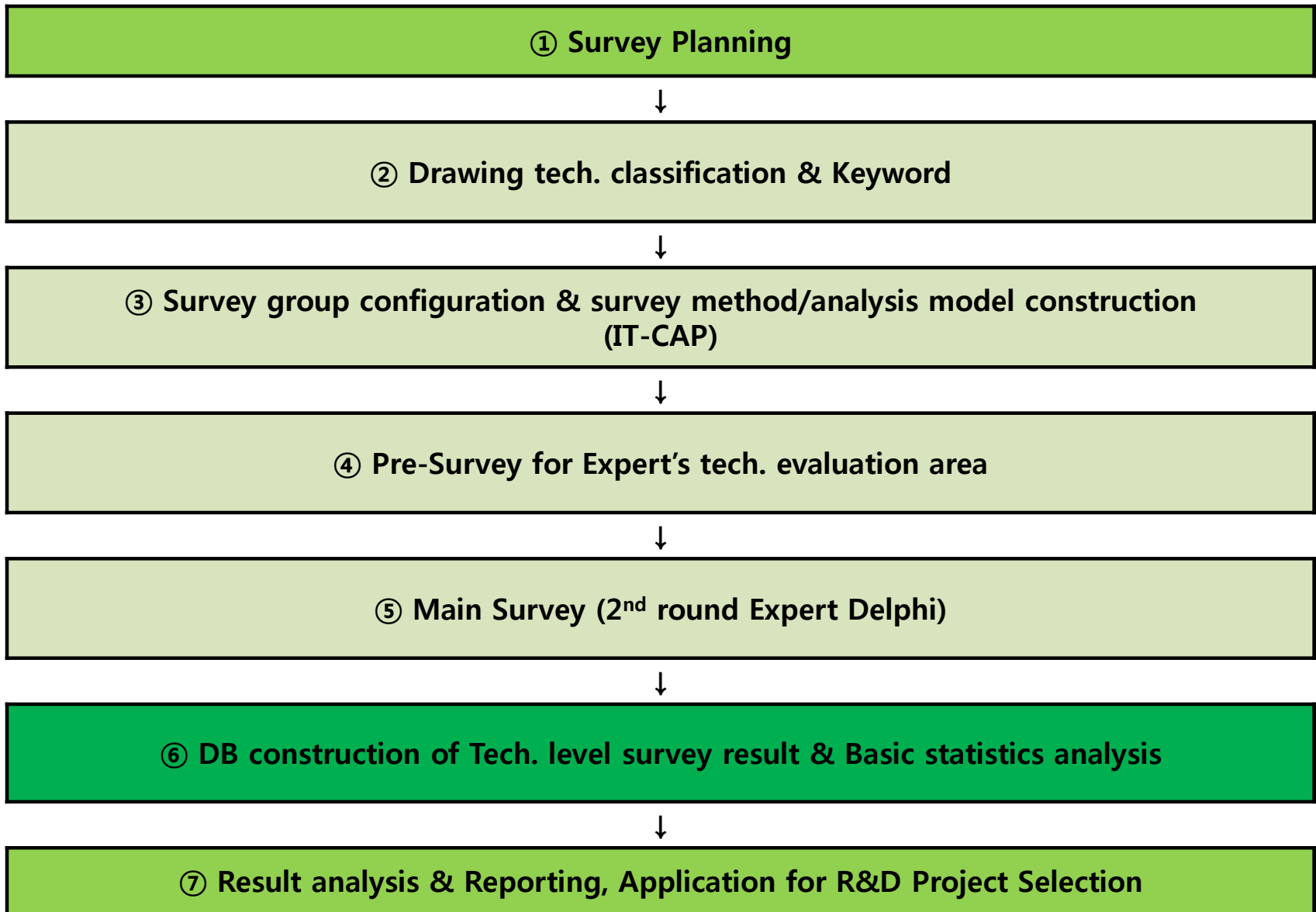
category
① Semiconductor
② Display
③ LED & Optical
④ Home-network/Information Appliances
⑤ Digital TV/Broadcasting
⑥ Radio/Broadcast/Satellite
⑦ Mobile communications
⑧ Broad Convergence Network(BcN)
⑨ Software(SW)
⑩ Next-generation computing
⑪ Security
⑫ Robotics
⑬ RFID/USN
⑭ IT convergence



# 2-3. Evaluation Model



## 2-4. Process





### 3. Technological competitiveness analysis in ICT

# 3-1. Outline

## Goal

- Competition-level understanding of major competitors(countries) through patent information analysis of key technologies in ICT sector
  - Building Patent Data Base of Republic of Korea, the United States, Japan, Europe, China in ICT sector

## Contents

- **Analysis Target Country** : Republic of Korea, the United States, Japan, Europe, China
- **Analyzed period** : 10 years(2000.01.01 ~ 2010.08.31)
- **Analyzed information** : Patent Activity Index, Patent Intensity Index, Patent Market-power Index, Patent Strength Index, Patent Strike Index
- **Patent DB** : WIPS DB(search.wips.co.kr)

## 3-2. Survey target

- Target Tech. category

category
① Semiconductor
② Display
③ LED & Optical
④ Home-network/Information Appliances
⑤ Digital TV/Broadcasting
⑥ Radio/Broadcast/Satellite
⑦ Mobile communications
⑧ Broadband Convergence Network(BcN)
⑨ Software(SW)
⑩ Next-generation computing
⑪ Security
⑫ Robot
⑬ RFID/USN
⑭ IT convergence

# 3-3. Evaluation model

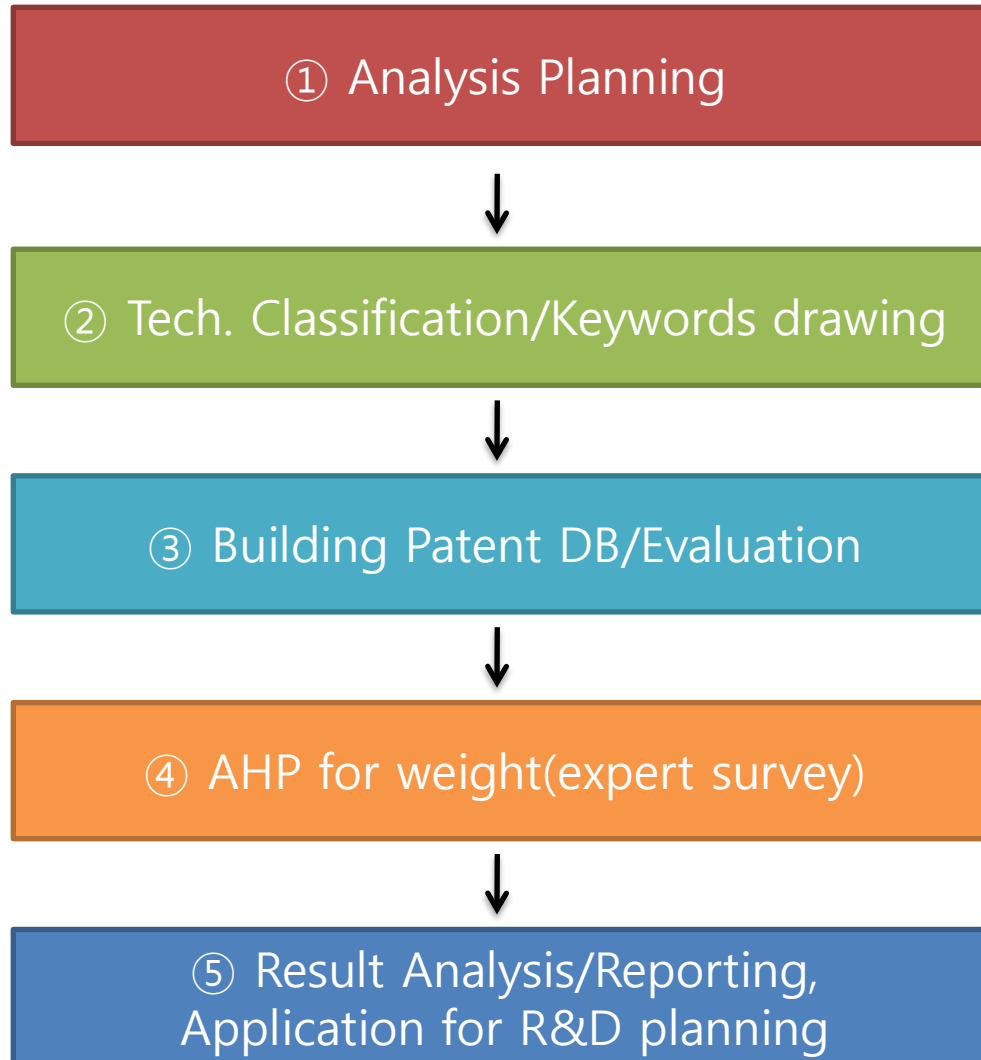
Patent Competitiveness evaluation Model - **AIMS** +  
 (Patent Activity Intensity, Market-power & Strength + strike Index)

Index	Indicator	Weight (by AHP)	Details
Patent Activity Index (PAI)	# of patent applications	0.368	<ul style="list-style-type: none"> <li>Identifying the national R&amp;D activities state based on the number of patent applications issued by the patent office.</li> </ul>
Patent Intensity Index (PII)	# of patent applications (Relatively)	0.202	<ul style="list-style-type: none"> <li>Relative proportion about a technology among the comparative technologies</li> <li>Represents the concentration of innovative activities for the technology sector</li> </ul>
Patent Market-power Index (PMI)	# of average patent family	0.145	<ul style="list-style-type: none"> <li>Patent family represents the market power because the country apply patents abroad when they have commercial interests or competing for overseas</li> </ul>
Patent Strength Index (PSI)	# of triadic patent	0.153	<ul style="list-style-type: none"> <li>Filed in EPO (European Patent Office), JPO (Japan Patent Office) and USPTO (U.S. Patent and Trademark Office) patent applications at the same time</li> </ul>
Patent sTrike Index (PS <sub>t</sub> I)	# of patent citation	0.132	<ul style="list-style-type: none"> <li>Identifying how the patent is being used in the future patent based on US patent citation information</li> </ul>

**\* THIS MODEL WAS DEVELOPED BY KEIT, AND APPLIED FOR THE DOMESTIC PATENT AT AUGUST 2010.**

\* AHP : Analytic Hierarchy Process (Thomas L. Saaty, 70s)

## 3-4. Process





#### **4. Overall Result in 2010**

- 1) Result of Technological level survey**
- 2) Result of Technological competitiveness analysis**



## ENTIRE RESULT OF ICT

### (1) COUNTRIES HOLDING WORLD TOP LEVEL

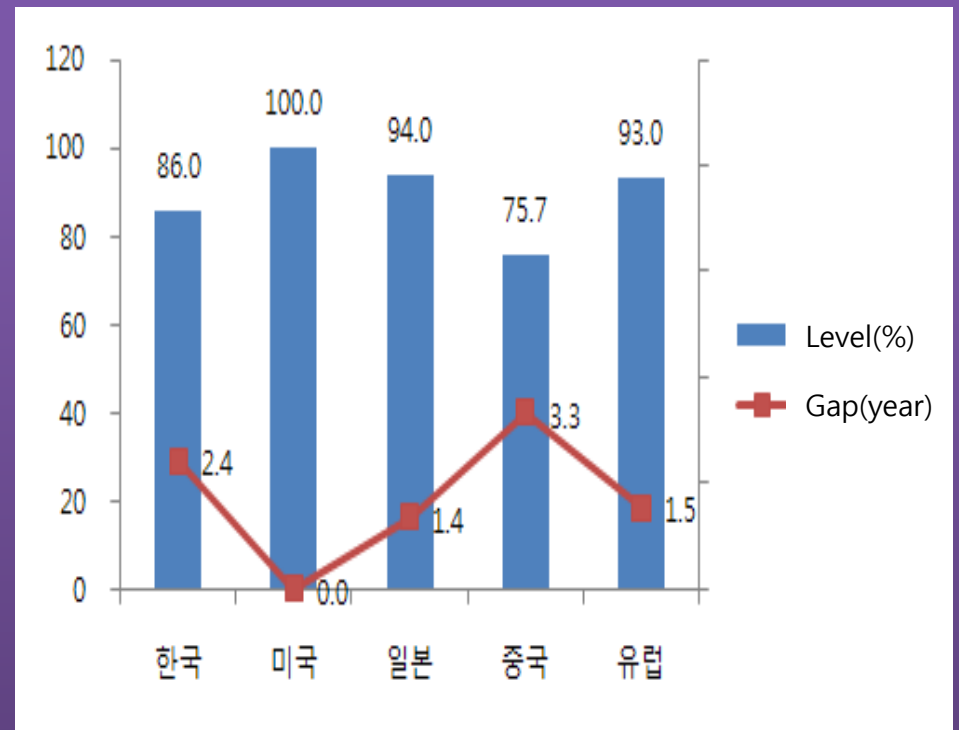
- The highest technological level of all states In ICT sector is the United States.
  - The Second highest is Japan.
- ※ Among 14 tech. field in ICT, US is holding top level in 12 and Japan is holding top level in two field.

	Tech. field	# of field holding world top level
<b>US</b>	Semiconductor, Home-network/Information Appliances Digital TV/Broadcasting, Radio/Broadcast/Satellite Mobile communications, BcN, SW, Next-generation computing, Security, Robot, RFID/USN, IT convergence	12 (85.7%)
<b>Japan</b>	Display, LED & Optical	2 (14.3%)

## ENTIRE RESULT OF ICT

### (2) RELATIVE LEVEL AND GAP

	Level(%)	Gap(year)
KR	86.0	2.4
US	100.0	0.0
JP	94.0	1.4
Ch	75.7	3.3
EU	93.0	1.5



## RESULT OF 14 TECH. FIELD IN ICT

## (1) RELATIVE TECH. LEVEL

14 tech. field	KR		US		JP		EU		CH	
	'10	'15e	'10	'15e	'10	'15e	'10	'15e	'10	'15e
① Semiconductor	<b>87.9</b>	96.6	<b>100</b>	100	<b>96.9</b>	99.2	<b>91.6</b>	95.2	<b>73.9</b>	85.9
② Display	<b>88.7</b>	97.7	<b>93.7</b>	96.5	<b>100</b>	100	<b>88.8</b>	94.2	<b>74.3</b>	89.2
③ LED & Optical	<b>86.1</b>	96.5	<b>97.8</b>	99.2	<b>100</b>	100	<b>93.5</b>	97.3	<b>75.8</b>	89.6
④ Home-network /Information Appliances	<b>86.5</b>	96.7	<b>100</b>	100	<b>93.0</b>	98.3	<b>93.8</b>	98.8	<b>75.5</b>	90.2
⑤ Digital TV/Broadcasting	<b>88.5</b>	97.7	<b>100</b>	100	<b>93.9</b>	98	<b>95.3</b>	98.5	<b>77.3</b>	90.1
⑥ Radio/Broadcast/Satellite	<b>81.4</b>	94.0	<b>100</b>	100	<b>90.9</b>	97.5	<b>93.5</b>	98.3	<b>76.1</b>	90.3
⑦ Mobile communications	<b>86.5</b>	95.9	<b>100</b>	100	<b>90.4</b>	96.6	<b>93.5</b>	97.8	<b>76.5</b>	90.2
⑧ BcN	<b>85.9</b>	96.0	<b>100</b>	100	<b>89.8</b>	96.9	<b>91.8</b>	97.6	<b>78.2</b>	93.0
⑨ SW	<b>80.6</b>	93.2	<b>100</b>	100	<b>86.2</b>	94.8	<b>89.8</b>	96.9	<b>72.8</b>	86.9
⑩ Next-generation computing	<b>81.1</b>	95.2	<b>100</b>	100	<b>87.5</b>	96.5	<b>87.5</b>	96.1	<b>71.5</b>	87.1
⑪ Security	<b>85.2</b>	95.5	<b>100</b>	100	<b>88.4</b>	95.5	<b>90.8</b>	97.2	<b>74.1</b>	86.3
⑫ Robot	<b>84.7</b>	94.7	<b>100</b>	100	<b>96.7</b>	99.3	<b>94.5</b>	98.3	<b>74.6</b>	86.7
⑬ RFID/USN	<b>85.8</b>	96.4	<b>100</b>	100	<b>88.9</b>	97.0	<b>92.0</b>	97.8	<b>73.9</b>	89.2
⑭ IT convergence	<b>85.1</b>	95.7	<b>100</b>	100	<b>94.1</b>	98	<b>96.1</b>	98.8	<b>73.4</b>	86.3

## RESULT OF 14 TECH. FIELD IN ICT

### (1) RELATIVE TECH. GAP (YEAR)

14 tech. field	KR		US		JP		EU		CH	
	'10	'15e	'10	'15e	'10	'15e	'10	'15e	'10	'15e
① Semiconductor	1~2	1~2	0	0	1~2	1~2	1~2	1~2	3~5	2~3
② Display	1~2	1~2	1~2	1~2	0	0	1~2	1~2	3~5	2~3
③ LED & Optical	1~2	1~2	0~1	0~1	0	0	1~2	1~2	2~3	1~2
④ Home-network /Information Appliances	2~3	1~2	0	0	1~2	1~2	1~2	1~2	3~5	2~3
⑤ Digital TV/Broadcasting	1~2	1~2	0	0	1~2	1~2	1~2	1~2	3~5	2~3
⑥ Radio/Broadcast/Satellite	3~5	2~3	0	0	2~3	1~2	2~3	1~2	3~5	2~3
⑦ Mobile communications	2~3	1~2	0	0	2~3	1~2	1~2	1~2	3~5	2~3
⑧ BcN	2~3	1~2	0	0	2~3	1~2	1~2	1~2	3~5	1~2
⑨ SW	3~5	1~2	0	0	2~3	1~2	2~3	1~2	3~5	2~3
⑩ Next-generation computing	3~5	1~2	0	0	2~3	1~2	2~3	1~2	3~5	2~3
⑪ Security	2~3	1~2	0	0	2~3	1~2	2~3	1~2	3~5	2~3
⑫ Robot	2~3	1~2	0	0	1~2	1~2	1~2	1~2	3~5	2~3
⑬ RFID/USN	2~3	1~2	0	0	2~3	1~2	1~2	1~2	3~5	2~3
⑭ IT convergence	2~3	1~2	0	0	1~2	1~2	1~2	1~2	3~5	2~3

### Relative technological competitiveness of ICT based on Patent information

▶ US(100%) > JP(74%) > KR(55%) > CH(47%) > EU(42%)

	Evaluation items	KR	US	JP	EU	CH
Entire ICT	PAI	0.22	0.30	0.26	0.05	0.16
	PII	0.20	0.20	0.20	0.20	0.20
	PMI	0.14	0.34	0.20	0.16	0.15
	PSI	0.14	0.34	0.20	0.16	0.15
	PSI	0.08	0.45	0.26	0.19	0.03
	<b>AIMS+ Score</b>	<b>17.39%</b>	<b>31.38%</b>	<b>23.28%</b>	<b>13.28%</b>	<b>14.67%</b>
	<b>Equivalent to 100</b>	<b>55.42%</b>	<b>100.00%</b>	<b>74.18%</b>	<b>42.32%</b>	<b>46.74%</b>

### Result of 14 tech. field in ICT

	KR	US	JP	EU	CH
Overall ICT	<b>55.42%</b>	100.00%	<b>74.18%</b>	42.32%	46.74%
① Semiconductor	<b>67.2%</b>	100.0%	<b>82.3%</b>	52.7%	42.0%
② Display	<b>60.2%</b>	84.0%	<b>100.0%</b>	38.8%	47.9%
③ LED & Optical	<b>54.1%</b>	100.0%	<b>91.7%</b>	54.1%	65.5%
④ Home-network /Information Appliances	<b>66.6%</b>	100.0%	<b>48.8%</b>	53.6%	50.9%
⑤ Digital TV/Broadcasting	<b>60.0%</b>	100.0%	<b>51.4%</b>	41.6%	52.0%
⑥ Radio/Broadcast/Satellite	<b>65.8%</b>	100.0%	<b>62.8%</b>	62.4%	44.8%
⑦ Mobile communications	<b>94.0%</b>	100.0%	<b>58.3%</b>	78.9%	56.5%
⑧ BcN	<b>54.8%</b>	100.0%	<b>52.1%</b>	73.5%	71.6%
⑨ SW	<b>25.3%</b>	100.0%	<b>54.5%</b>	34.5%	36.2%
⑩ Next-generation computing	<b>29.2%</b>	100.0%	<b>61.3%</b>	44.5%	45.9%
⑪ Security	<b>59.3%</b>	100.0%	<b>65.1%</b>	62.3%	44.6%
⑫ Robot	<b>60.8%</b>	84.5%	<b>100.0%</b>	58.9%	45.6%
⑬ RFID/USN	<b>88.3%</b>	95.0%	<b>100.0%</b>	61.6%	58.9%
⑭ IT convergence	<b>51.7%</b>	100.0%	<b>38.4%</b>	39.8%	55.1%

### Result of 14 tech. field in ICT

#### - Implication

- ▶ **(US)** ranked No. 1 in 11 tech. fields including semiconductor, DTV, LED, and etc.
- ▶ **(KOREA)** was ranked 2nd in 4 tech. fields including mobile communications networks, Home-network/information Appliances, DTV, Radio/broadcasting/satellite. And SW, next-generation computing, two areas recorded the lowest
- ▶ **(JAPAN)** 3 tech. fields including display, IT Convergence, and the robots were ranked 1<sup>st</sup>. And ranked 2<sup>nd</sup> highest in semiconductor, display, and LED adjacent to the world's highest.
- ▶ **(CHINA)** ranked 2<sup>nd</sup> in IT Convergence, ranked 3<sup>rd</sup> in BcN and SW. China's technological competitiveness in patent is growing rapidly.
- ▶ **(EU)** patent-based technological competitiveness in ICT is lowest among five countries.



# Thank you

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