HCI in S&T Foresight by Korean Government

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Abstract. HCI is expected as one of significant technological tools for improving quality of life and solving social issues in the future. This was verified in the 'The 4th Korean Technology Foresight (2020~2035)' conducted by the KISTEP and National Science and Technology Commission of Korean government last year. In foresight, 652 future technologies were predicted to be developed and practically used until 2020 or 2035, and 40 technologies among them were related to HCI. The aim of this paper is to briefly review HCI technologies from this report, and to find policy implications for national R&D. Characteristics and R&D strategies will be drawn from reviewing the report in terms of different index about technical completion, social propagation, technology level, importance, negative impact, type of R&D agents, domestic and international research collaboration, R&D strategery, and necessity of government investment. The study will provide R&D strategies for R&D and practical implication toward future HCI technologies.

Keywords: S&T foresight, Korean government, R&D strategery, HCI.

1 Introduction

If the change of trends and needs in the future can be predicted, countries can establish efficiently/effectively the national strategies and policies for measures to resolving uncertainty and not missing opportunities in the future. Considering important role of science and technology in the national/social innovation, innovative future technologies can be the important measures for the future needs. Above all, HCI will be one of main technical tools providing us different benefit in the future environment where is expected to be full of electronic instruments. This was verified in the 'The 4th Korean Technology Foresight (2020~2035)' conducted by the KISTEP and National Science and Technology Commission of Korean government last year [1]. By the way, Korean government conducted technology foresight 4 times since the 1st foresight survey in 1997. 652 future technologies of the 4th Foresight were predicted to be developed and practically used until 2020 or 2035 [1], and 40 technologies from 5 technical fields among totally 8 fields were related to HCI. Considering the 3 rd foresight result was directly reflected on Framework Act on Science and Technology of the last Government [1], HCI can be expected to be reflected on next R&D policy.

C. Stephanidis (Ed.): Posters, Part I, HCII 2013, CCIS 373, pp. 83–87, 2013.

< 40 HCI-related future technologies in 'The 4th Korean Technical Foresight (2020~2035)'>

Field 1. Machinery/Manufacture/Aircraft/Aerospace/Astronomy (7 technologies)
10. LVC(Live, Virtual, Constructive) training system technology that enables land/sea/air joint-training by utilizing the weapon system in the actual, simulation and virtual reality
15. Wearable robot available for utilization in the accident site and disaster site with being designed so as to demonstrate power beyond limitation of human being
16. Manufacturing robot understanding common expressions(natural language and behavior knowledge) of the human workers, detecting movement of the human and change of factory status, and avoiding dangerous situation by themselves, such as collision, with prediction
18. Biologically combined robot combined with parts(brain, sensory system, arms, legs) of living organisms (animals, insects) to improve performance
26. CAx technology using 3D hologram
57. Aircraft control technology using brain signal of the pilot
76. Automobile available for emergency parking by itself, if necessary, or warning with checking status of drivers (drowsy driving, heart attach)
Field 2. Agriculture and Forestry/Fisheries (1 technology)
130. Wearable robot technology for agricultural work or forestry work that can perform work promptly, accurately, and conveniently, by wearing agricultural and forestry worker
Field 3. Urban/Construction/Transport (6 technologies)
189. Technology of operating customized interior equipment based on human sensibility ergonomics
190. Senior citizen-friendly house that can remove space that can be a barrier to the senior citizen, provide bilateral medical service, and monitoring emergency situation
191. Housing technology that can provide educational, shopping, and medical support based on 3D image and control house-keeping robot's activities
194. Wearable or ride-on assisting robot to make construction easy
199. Small construction equipment technology to be adjusted by long-distance worker motion remote
256. BIM(Building Information Modeling) ㅎㅎ ㅎㅎㅎㅎㅎㅎㅎㅎ Integrated design system using BIM(Building Information Modeling) available for designing, modeling, and production
Field 4. Life/Medical (13 technologies)
267. Optimized medication notification system for patients with chronic diseases through measuring drug concentration
268. Medical treatment and medical science simulation technology with using virtual reality
270. Smart pills technology that can sending information related to functional abnormality by wireless with moving gastro-intestinal tract.
273. Fine treatment robot that can process treatment after diagnosing abnormal areas with roaming around various organs and blood vessels by using bio-mass energy.
274. Nano-antibody robot that can detect and neutralize/destruct specific viruses with direct input inside the human body
281. Technology of clarifying recognition, memories, perception, learning, and sensory function of brain with using high resolution brain map imaging technology
287. Bilateral thought recognition interface technology between machinery and human body
290. Brain scan technology for recording memory
291. Brain implant technology for memory loss with using chip/ substitute
306. Technology of developing customized sport outfits interlocking with real time biometric data monitoring system
314. Instrument that can assist activities by monitoring biometrics of the aged who have difficult in normal activities in real time
315. Technology of designing and manufacturing human nerve connecting type cochlear implantation, prosthetic leg, prosthetic hand
316. Artificial intelligent eye technology
Field 7. Information/Electronics/Communication (13 technologies)
517. High precision augmented reality technology for Industry or in the medical field
518. Virtual reality technology using human senses
519. Holographic technology to deliver texture to virtual object such as clothing
521. Holographic mobile terminal technology
525. Multi-modal interface technology which can change input method for the environment and conditions of user to movement, facial expressions and brain waves
547. Technology to transfer smell and taste in real-time by analyzing and synthesizing.
551. Technology which can express movement(3D motion recognition) such as sign language with character
552. Speaker-independent voice recognition technology with more than 95% accuracy
559. Personal life log technology which can make database by saving personal life with sound and image data
561. Korean Automatic Ontology Generation Technology
562. Technology which provide service considering current condition and emotions by synthesizing personal Physiological information, history, and preferences through installed sensors and devices
564. Customized interactive advertising services
568. Technology which simulate the environment change for the external factors with global weather, ocean, environment, ecosystems, infectious diseases, economic, movement of people based on real time data

2 Review of HCI in the 4th Korean Technology Foresight

The 4th technology foresight was processed for the purpose of providing the basic index related to national S&T/R&D policy, such as technical completion time and social distribution time of the future technologies, importance, necessity of governmental investment and priority enforcement measures, portfolio of R&D agent and necessity of collaboration, etc., through Delphi survey for experts in science & technology [1]. The main results are as following [1].

- (Related trends) average 1.8 trends each technology, and totally 15 trends from 22 mega-trends
- (Technical Completion) average time of Korea is 2021, world is 2018
- (Social Propagation) average time of Korea is 2024, world is 2021
- (Tech. Level) average level of Korea is 61.8% compared to World-best countries, such as U.S. (best in 34 technologies), Japan (best in 6 technologies), and Germany (best in 1 technology).
- (Government priority invested technology) 2 priority invested technologies (No. 316, 561) and 12 nominee technologies (No. 10, 16, 18, 274, 281, 291, 314, 315, 316, 517, 518, 552, 561)

3 Approach

To find national R&D strategery about HCI technologies for the future, some results of the 4th Foresight was compared to similar index of present R&D activities. If there is a significant difference between future foresight and present status, measures to bridge the gap can be the trigger to make better the related policy or to plan the new one.

National Science and Technology Statics (FY2011) as the result of governmental R&D survey are used [2]. From this data, the recent R&D status information related to 40 HCI technologies in the 4th Technology Foresight was gotten through the process consisting of keyword-search, S&T classification-comparing, and expert-check. Used Statics is about R&D activities in FY2011, when the 4th Foresight began.

Only one index is found to compare the 4th Foresight and present R&D. Both data contained the ratio in 3 kinds of R&D Agent, university, governmental research institute (GRI), industry. All types of agent have unique roles in national R&D, and import play in the policy flow. Additionally, R&D status in terms of collaboration and Technical Life Cycle (TLC) was analyzed, and conducted comprehensive analysis through integration with agent related analysis results.

4 Results

4.1 R&D Agents

The result of comparing analysis shows decreasing of ratio of university, and increasing of ration of GRI and industry. This result means necessity of strengthen policy for GRI and industry.

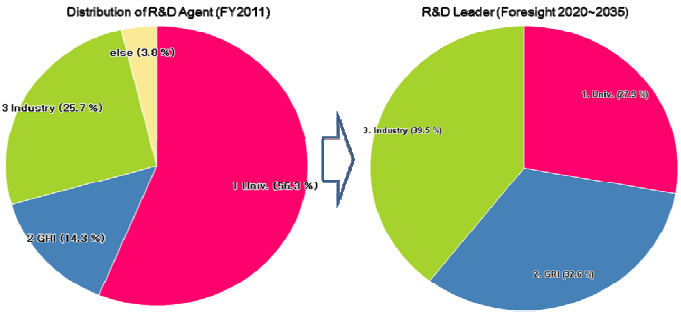

Fig. 1. Comparing R&D leadership on HCI tech R&D

4.2 R&D Collaboration

The result of comparing analysis shows increasing of necessity of international collaboration on HCI R&D in the future.

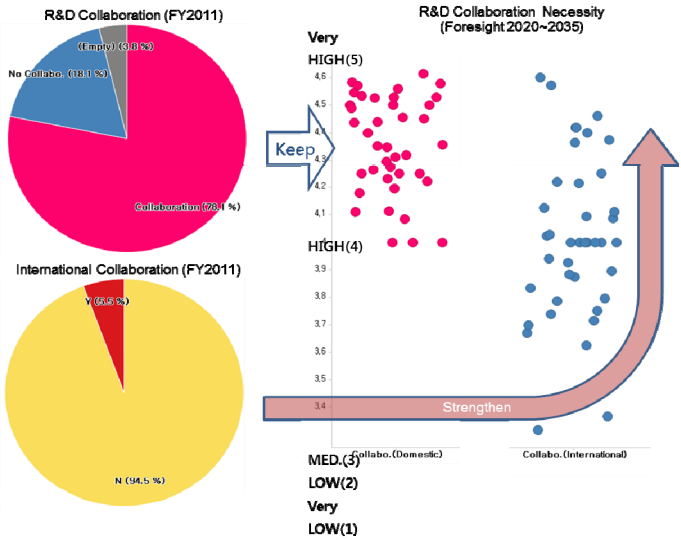

Fig. 2. Comparing R&D collaboration on HCI tech R&D

4.3 TLC Analysis

The analysis result suggest considering necessity to strengthen R&D in higher TLC stage by GRI and industry in the future.

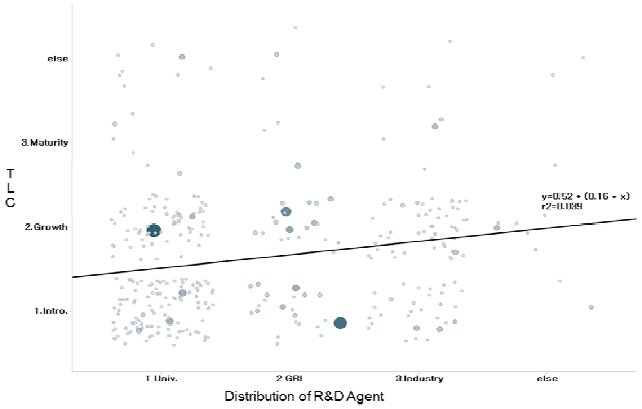

Fig. 3. TLC analysis of each R&D agent

5 Conclusion

HCI is one of important future technology field. 14 technologies selected as 'Government priority invested technology analyses through the 4th Korean Technology Foresight can be reflected importantly on government's policy in Korea. In addition, as appears by review and analysis results in this study, some change should be considered in the planning of HCI related R&D policy for future. Comparing analysis of 'technology foresight-present R&D result' shows that supporting GRI and industry could be an important way. To put it concretely, strengthening their R&D by governmental R&D investment or other institutional benefits, activation of international collaboration and advancement of time to enter the in higher TLC stage could be effective way to catch up with world-best level countries, such as U.S., Japan, Germany.

References

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