
IEICE Global Plaza

— Monthly community plaza in English for students, faculties and engineers —

Essay

Paradigm shift from two to four dimensional space in ICT evolution



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The technological evolution in the field of ICT has been achieved mostly with the scope of two dimensions so far. Those are the quantity and quality of information. For an example of the dimension of quantity, their R&D activities were focused on computers capable of processing more information, networks with higher speed and more capacity, data storage functions capable of storing more information, and devices to implement those functions. On the other hand, from the quality viewpoint, relevant R&D activities were focused on the higher fidelity, stereo or stereoscopic presentation, higher presence of analogue information represented by voice and video, the enhancement of accuracy, normality and reliability of digital information, the robustness of information to illegal misuse. These dimensions are not always independent each other, the improvement of quality may cause the enlargement of quantity, or the enlargement of quantity may cause the deterioration of quality. Thus, it proves that the current technologies have been enhanced to evolve the first quadrant on the horizontal axis of quantity and vertical axis of quality. Then, digital technologies have accelerated the enhancement of technological evolution.

However, it has come out that we would face some substantial difficulties which could not be solved with the technological evolution based on only the two dimensional factors. One of the required additional dimensions is time axis. The main issues are how long and accurately the information can remain in any storage function, and simultaneously how long the stored information would be available. The digital technologies can provide quite a lot of advantages so that it has been commenced or discussed in libraries, museums, hospitals, design offices or film centers and so on to digitize and preserve books, documents, design charts, clinical records, photos, movies into archives, while they have faced the sustainability of these digital contents well known as "Digital Dilemma". Most of current storage functions have the lifetime around 10 years so that they have to complete the migration of information to copy the information before it might be in error. Suppose that the information should be migrated in coming ten years, the overall quantity of information to be copied promptly will increase and fall into a fatal failure. It will be difficult to reserve the budget required for the migration. If the migration cannot be implemented, the digital information will be lost in due course. We can read the ancient history of Egypt existed several thousand years ago through papyrus and read the tale of Genji written one thousand years ago, through Japanese traditional Washi. Then, can the current information be read one thousand years later even if it would not cover the whole information? We have often experienced that conventional storage systems were replaced with newly developed storage systems to be obsolete. Unless we do not develop technologies to permanently reserve and reactivate the information, the history of human kind will disappear without doubt.

The last one of the required additional new dimensions is the energy to realize the green ICT. It has become distinct and inevitable as the most important issue that we are facing

an urgent situation without redundant time to solve the drastic change of global environment and exhaustion of natural resources, in the age of 2010 where every people in every country experience or positively work toward an apparent goal of evenly enjoying the life with high quality which is supported by the modern technologies. It proves an evidence of urgent issue that not only some intelligent people pointed out the importance of the issue in the forum of international politics since Post Kyoto Protocol in 1997, but also the worldwide politics have moved. This issue must be discussed in every field of science and technology. In the field of ICT as well, the dimension of energy required for the evolution of the other three dimensions will not be allowed to increase. Therefore, the technology to enhance the efficiency of energy required for processing, transfer and storage of information per bit will be indispensable.

Thus, the evolution of ICT which will extend the overall four dimensional space in harmony is expected, and the research activities focused on the overall aspects of these four dimensions are strongly expected in IEICE as well.

Useful Remarks

Technical Committee successfully held at 'Yakushima' island with the world level natural heritages in Japan

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Technical Committee on Non-linear Problems is one of Technical Committees in Non-linear Problem and its Applications Sub-society under IEICE Engineering and Sciences Society. It is managed by Chair, Prof. Kiyotaka Yamamura/Chuo University, two Secretaries, Prof. Yoshihiko Horio/Tokyo Denki University and Prof. Isao Tokuda/Japan Advance Institute of Science and Technology. It provides monthly workshops for the members to mutually exchange opinions and encourage their relevant research activities. This committee has a long history of research activities and it is one of the representative Committees, while its management has been taken over by younger generation members so far. Thus, they organized a workshop from 11-th to 14-th in November 2009, at Yakushima island which has been well-known through a lot of world level natural heritages.

Most of the monthly Technical Committee meetings/workshops/symposiums have been normally held at academic institutions in urban area or local cities in Japan, so far. Therefore, the workshop at the remote island enabled the drastic change of the Committee environment in the long history of the Committee. The author coordinated the planning and management of the workshop as the local conference manager. Many participants over 60 persons joined the workshop and it was successfully held through quite many discussions and communications after each presentation. Though the island is far from any urban area in Japan, it rather promoted the participants to know each other. It was very unique in comparison with the other normal Committees from the following viewpoints:

(1) The number of participants in the special field of non-linear physics was major and above all, they had presentations by many outstanding researchers leading the research activities in the special field but without membership yet. The workshop will encourage them to join the Committee with the membership.

Prof. Yasumasa Nishiura of Hokkaido University presented a valuable invited talk entitled "Can Mathematical Science Resolve Social Issues?", considering the mathematical science which has been regarded as "Invisible Technology" with a great potential to settle the current social issues. His talk exactly matched the natural environment of the island.



Fig.1 Enjoying the mutual human relations development between Technical Committee participants through recreation

(2) Most of the workshop participants joined an excursion in the island and they could recover their power in the natural heritages. Furthermore, they enjoyed the final social with acquaintance cultivated through the workshop.

Many workshop participants replied their satisfaction to the workshop and planned events, to the questionnaires given by the Committee. It is expected to extend the fundamental idea of the workshop to the other workshops/symposiums/conferences.

Hot Topics

Language Grid: Multilingual Service Platform for Intercultural Collaboration



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The Internet allows people to be linked together regardless of location, however language remains the biggest barrier. In fact, it is not possible for anyone to learn the languages needed to access all possible information from the Internet. Though there are many successful language resources (both data and software) on the Internet, difficulties often arise when people try to use those language resources in their own intercultural activities. Intellectual property rights, and non-standard application interfaces make it difficult for users to create customized language services that support their activities.

To address this kind of issues, collective intelligence might be a promising solution like Wikipedia, which deals with how to connect people and computers so that collectively they act more intelligently than any individuals or computers. Applying this approach to the language service domain, we have developed the Language Grid, which would be a multilingual service platform. In the Language Grid, end-users can combine existing language services provided by researchers and professionals, and create new language services for their own purposes by adding their own language services.

The Language Grid is built on the P2P Grid Infrastructure, which connects two kinds of servers (core nodes and service nodes). Core nodes manage all requests to language services, while service nodes actually invoke atomic services. If the requested service is a composite one, core nodes invoke several atomic services according to a corresponding Web service workflow. All the language resources and language services can be managed by using the Language Grid Service Manager. Different types of collaboration tools have been developed using the language services provided by the Language Grid. We have also provided Language Grid Toolbox, a customizable framework for collection of modules to support multilingual communication in a community. Language Grid Toolbox enables users to start their own services, such as multilingual BBS and multilingual Web page creation. Moreover, since Language Grid Toolbox is provided as an open-source software, users can easily extend it by developing modules by user communities to meet different requirements for intercultural collaboration.

IEICE-TFIPP will employ Language Grid Toolbox to construct Language-Barrier Free Cyberspace (LFCS). In this system, volunteer participants from each section in Asia will multilingualize IEICE announcements by creating multilingual dictionaries specific to IEICE and ICT domain and modifying translation results produced by language services on the Language Grid.

International Conference Calendar in 2010

IEICE Symposium (IEICE)

Rejuvenating the ICT industry-How can Industry, Academia, Government and IEICE contribute to it? At University of Tokyo, Bldg.2-1F-213, on May 8, free of charge, capacity holding 300 seats, <http://www.ieice.org/jpn/sympo-ict/index.html>

IMQA 2010 (IEICE Engineering Sciences Soc.)
The 4th International Workshop on Image Media Quality and its Applications, at Tokyo in Japan, on May 13-14, <http://www.imqa.jp/IMQA2010/>.

ISOME 2010 (IEICE Electronics Soc.)

The 6th International Symposium on Organic Molecular Electronics, at Chiba in Japan, on Jun. 10-11, <http://www.ieice.org/~ome/ISOME/Welcome.html>.

APSITT 2010 (IEICE Communications Soc.)

The 8th Asia-Pacific Symposium on Information and Telecommunication Technologies, at Kuching in Malaysia, on Jun. 15-18, <http://www.ieice.org/cs/in/APSITT/2010/>.

OECC 2010 (IEICE Communications Soc. & Electronics Soc.)

The 15th OptoElectronics and Communications Conference, at Sapporo in Japan, on Jul. 5-9, <http://www.oecc2010.org/>.

NOLTA 2010 (IEICE Engineering Sciences Soc.)

2010 International Symposium on Non-linear Theory and Its Applications, at Krakow in Poland, on Sept. 5-8, <http://nolta10.is.tokushima-u.ac.jp/>.

SISA 2010 (IEICE Engineering Sciences Soc.)

2010 International Workshop on Smart Info-Media Systems in Asia, at Manila in Philippines, on Sept. 8-9, <http://splab.cs.kitami-it.ac.jp/sisa2010/>.

GJS2010 (IEICE Communications Soc.)

The 13th German Japanese Symposium, at Osaka in Japan, on Sept. 13-14, <http://www.ieice.org/cs/conf/calendar.html>.

ICCE 2010 (IEICE Electronics Soc. & Communications Soc.)

The 3rd International Conference on Communications and Electronics, at Nha Trang in Vietnam, on Aug. 11-13, <http://www.hut-icce.org/2010/>.

AP-RASC'10 (IEICE)

2010 Asia Pacific Radio Science Conference, at Toyama in Japan, on Sep. 22-25, <http://www.ap.ide.titech.ac.jp/ap-rasc10/>.

IWSEC 2010 (IEICE Engineering Sciences Soc.)

2010 International Workshop on Security, at Kobe in Japan, on Nov. 22-24, <http://www.iwsec.org/2010/>

APARM 2010 (IEICE Engineering Sciences Soc.)

The 4th Asia-Pacific International Symposium on Advanced Reliability and Maintenance Modeling, at Wellington in New Zealand, on Dec. 2-4, <http://msor.victoria.ac.nz/Events/APARM2010/>.

Message from TFIPP Secretariat

This issue is delivered also by a free mail magazine "IEICE Global Plaza on Line" with updated news of interest for you. Please contact Prof. Takahashi, TFIPP at global@ieice.org, if you need. Back numbers are available in archives at http://www.ieice.org/eng/global_plaza/index.html.

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