

Trilateral Seminar on Science, Society and the Internet

Section IIC: Access and Fair Use Issues: Plenary Session II

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Development of Broader Coverage of Broadband Internet Infrastructure for Higher Education and Leading-edge R&D Activities

Suguru Yamaguchi

Nara Institute of Science and Technology (NAIST)

I. Issues We Have to Tackle

Internet Development in the last decade

Broader coverage in the 1990's

Adding more bandwidth

- Backbone is 10Gbps / 40Gbps
- Access is 10Mbps to 1Gbps
- Cheap enough for enterprise as well as individuals

Adding more devices to be connected

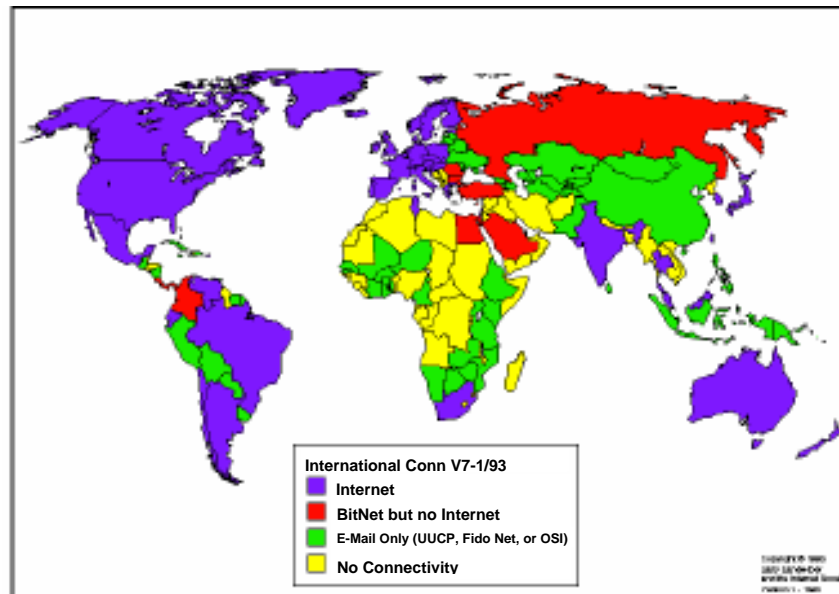
- Appliances

Adding more leading-edge applications

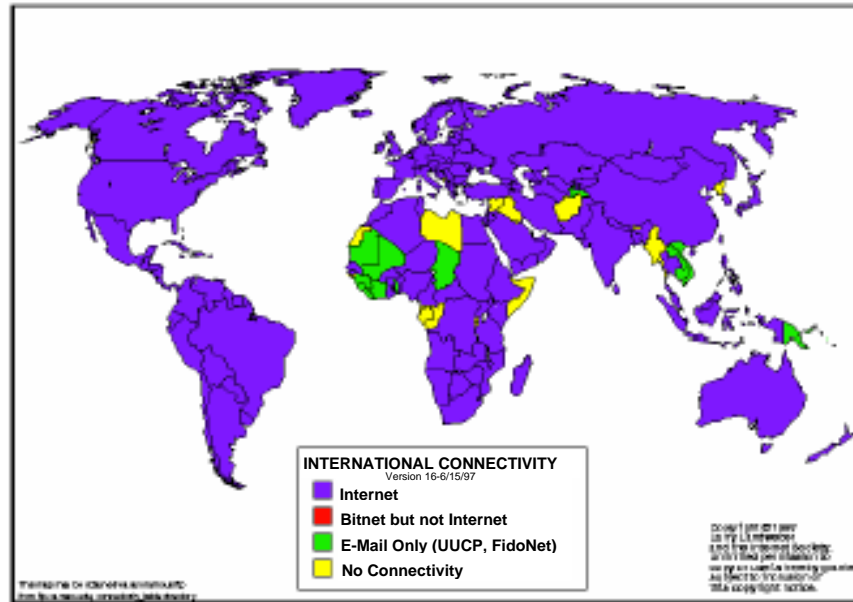
- iGRID
- ITBL

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Internet Coverage as of Jan. 1993



Internet Coverage as of June 1997



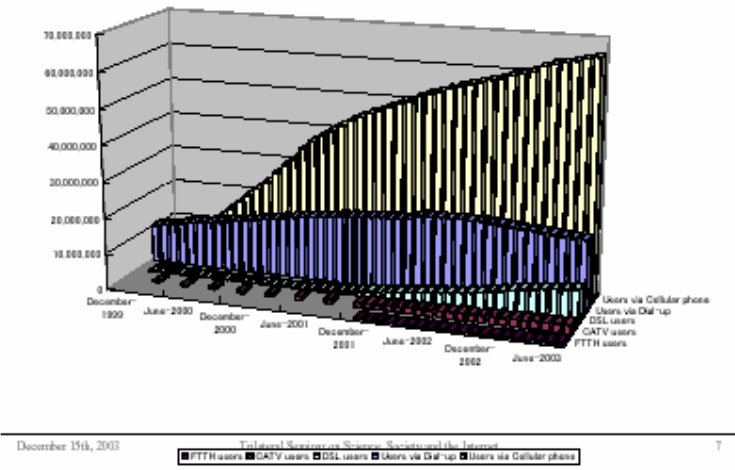
Internet for Everything

Always connected with global address

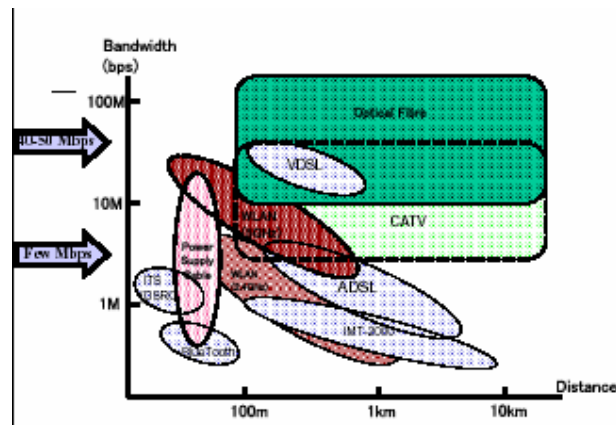
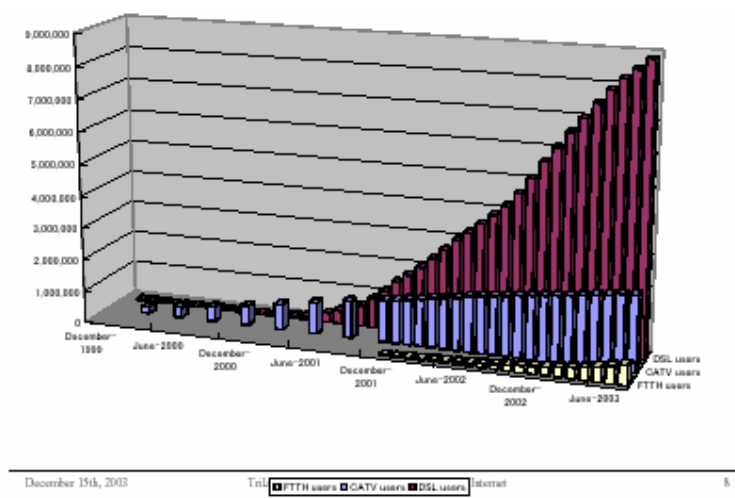
New services with various kinds of devices



Internet is an Infrastructure



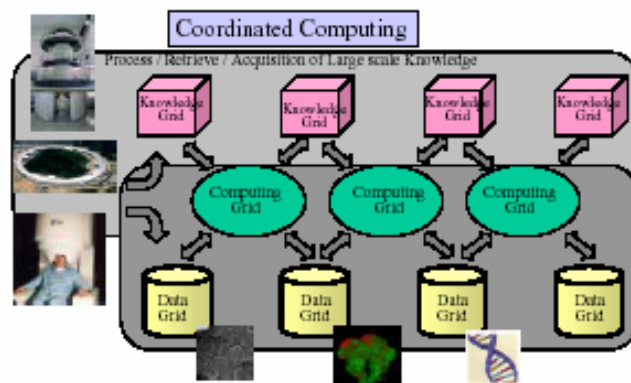
Broadband Internet



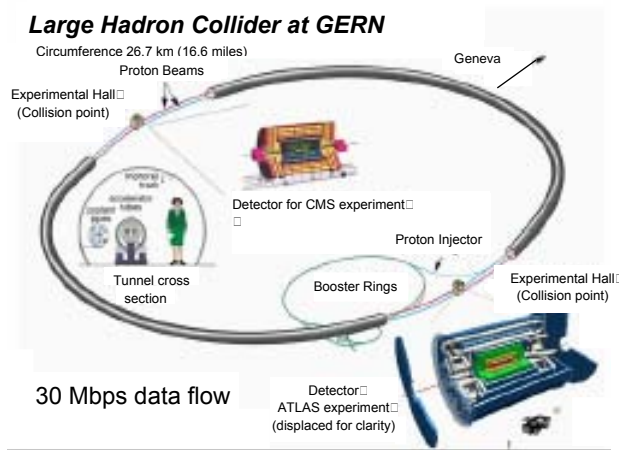
Available Bandwidth vs. Time to wait: transfer all the data in a single CD-Rom (600MB)

- V. 32 524288 (sec) 146 hr.
- ISDN B channel 76800 (sec) 21.3 hr.
- T 1 3200 (sec) 53 min.
- Ethernet 480 (sec) 8 min.
- T 3 106 (sec) 1.78 min.
- OC-3 31 (sec)
- OC-48 1.9 (sec)
- OC-192 0.4 (sec)

II. Technical Challenge of the Grid



Sample Data Grid Project



Current Issues (1)

Quite limited group can use “broadband” Internet and its specific applications: e.g., iGRID, ITBL

Only the countries and regions with

- 1) Dense installation of fiber optics for telecommunication use;
- 2) Information processing resources widely available for R&D communities; and
3. Human resource adequate enough for developing and managing these leading edge environments.

Current Issues (2)

Systematic approach to solve this “divide”

- This is not straightforward.
- Not only by infrastructure
 - Human resource
 - Accessibility
- Roles of government/private sector/academia should be defined

Our Approach: WIDE Project

Established in 1988

Pioneer group of Internet development

Since 1996, AI3 for Internet development in Asia Pacific region and SOI-Asia for digital support in human resource development are working together

Our Model

Infrastructure development

Human resource development

Toward broadband Internet

III. AI3 and SOI-Asia

Asian Internet Interconnection Initiative (AI3) project as R&D networking since 1996

- our infrastructure

UDL: Uni-Directional Link (RFC3077 and op)

- our key technology

School of Internet for the Asian region (SOI-Asia): AI3+UDL+SOI a la *Asia*

Project Overview

AI3 is a research group

- established by WIDE Project in October 1995

- NGO/not donor program

- focused areas: technologies for the international Internet infrastructure

- mainly for new data link and protocol technologies

- more development on applications

- test bed network operation for our technology deployment
- promotion of the Internet

- at the initial stage of this project (in 1996 and 1997).

- AI3 (*ei-tripl-ai*)

- ○
- × AIII

History

Established in 1995

- Asia: vast diversity, but collaboration had been initiated (APNG, etc.)

- demand was high

Satellite Internet test-bed network

- for R&D purposes

- There is no other satellite Internet test-bed

- since 1996 for Ku-band

- since 1999 for C band

- since 2001 for UDL

Research Consortium

– develop technologies for leading edge, as well as ones for sustainable Internet development in AP region.

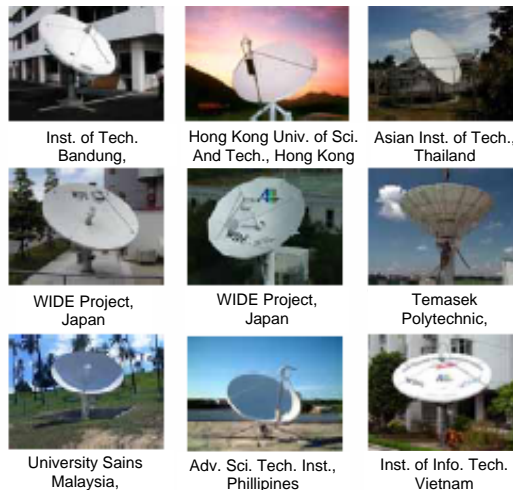
AI3 Earth Stations



AI3 Partners

Institute of Technology Bandung (Indonesia)
Asian Inst. of Technology (Thailand)
Hong Kong University of Science and Technology (Hong Kong)
Institute of Information Technology (Vietnam)
Temasek Polytechnic & SINGAREN (Singapore)
Universiti Sains Malaysia (Malaysia)
Advanced Science and Technology Institute (Philippines)
Univ. of Colombo (Sri Lanka)
WIDE Project (Japan)

AI3 Partners Satellite Antennae



UDL (Uni-Directional Link)

Feed packets via unidirectional link

- high bandwidth and broader coverage
- satellite communication channel in AI3

Return path from remote site is on a terrestrial link

- only limited “request” traffic is carried on this link.
- assumption: client-server

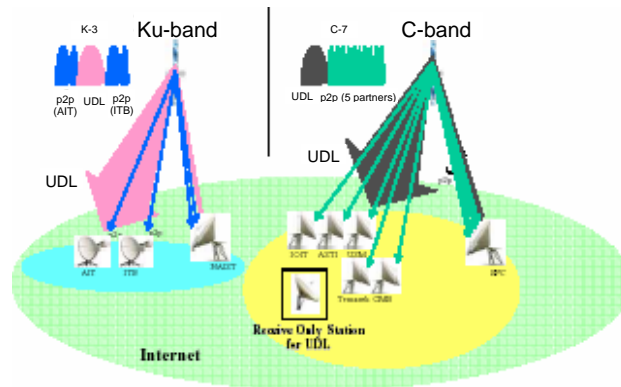
Maintain consistency on routing system

- many routing management system do not assume that all the Internet links are bidirectional.

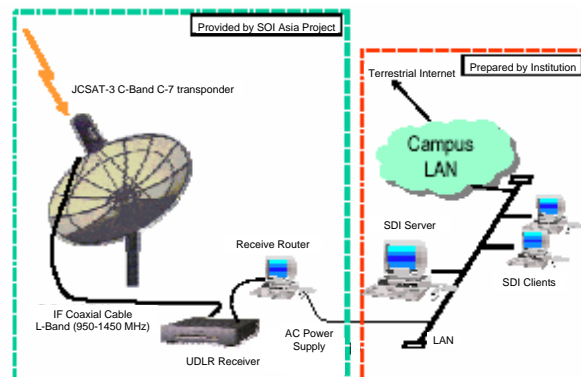
RFC3077: still enhanced for supporting IPv6, multicast, . . .

- one way only:” receive only” (RO) site support

UDL Experiment in AI3



Site Configuration



A13 C-band UDL Partners (SOI-ASIA)

Brawijaya University (Indonesia)
Hasanuddin University (Indonesia)
Sam Ratulangi University (Indonesia)
Asian Institute of Technology (Thailand)
Chulalongkorn University (Thailand)
Laos National University (Laos)
University of Computer Studies, Yangon (Myanmar)
Asian Youth Fellowship (Malaysia)
Advanced Science and Technology Institute (Philippines)
Institute of Information Technology (Vietnam)
Universiti Sains Malaysia (Malaysia)
WIDE Project (Japan)

Driving force

Distance Education infrastructure

– no one can reject providing “good” service in education.

SOI-Asia

– A13+UDL: infrastructure

- UDL is a cost-effective way to have Internet connectivity
- A13 can cover several countries in S. E. Asia

– Providing e-learning services on this infrastructure

IV. SOI Asia Project

Purpose: human resource development for Asia using information technology

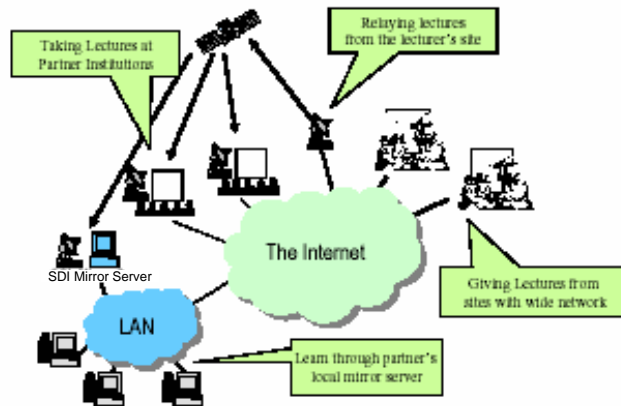
Challenges:

- development of the Internet infrastructure in Asia
- tools for sharing on-demand classes among university classroom
- tools for academic discussion among students and professors
- internationalization of tools
- development of educational content in English

Cooperation with AI3:

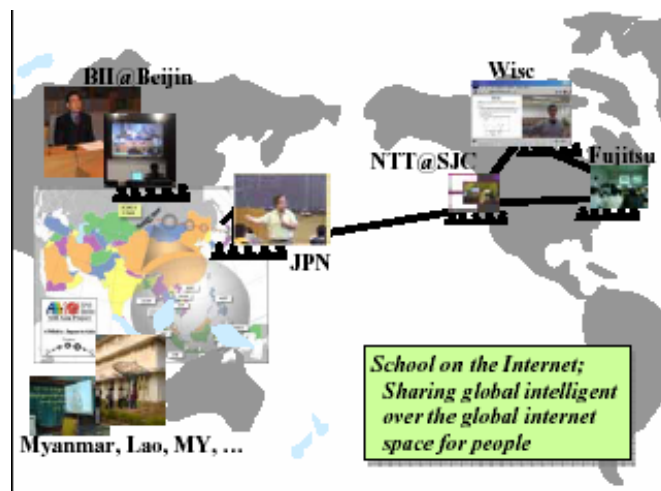
- using satellite Internet technology (C-Band Receive-only site)
- applications for mirroring and sharing using satellite Internet

Distance Learning Program



Digital Campus

<http://www soi.wide.ad.jp/>



AI3 UDL Test Bed Network



AI3 Earth Stations



SOI-ASIA Partners Satellite Antennae



SOI Asia Sites

Laos



Thailand

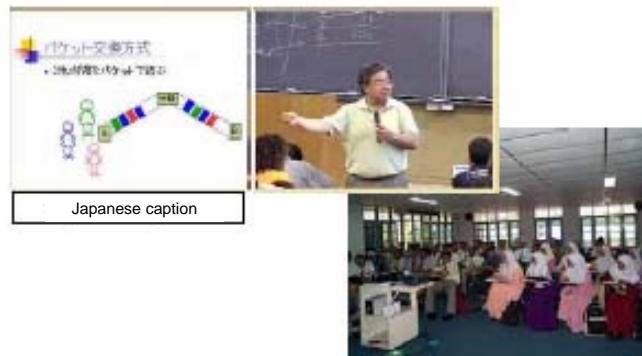


Myanmar

Site Setup Status



Sharing Classes between Keio University, Tokyo, and the University of Computer Studies, Myanmar: On-demand Style



Sharing Classes between Keio University, Tokyo, and the University of Computer Studies, Myanmar: Real-time Style



ASEAN-JAPAN Exchange February 20, 2003

– Myanmar, Thailand, Japan and ASEAN

<http://www.soi.wide.ad.jp/conference/20030220asean/>

<http://www.misu.ait.ac.th/newsandevents/NewsById.cfm?NewsID=2458>



Resources

AI3: <http://www.ai3.net/>

SOI-Asia: <http://www.soi.wide.ad.jp/soi-asia/>

Creating a Global Research Commons for Scientific Information

Paul F. Uhler¹

Office of International Scientific and Technical Information Programs
The National Academies

Editor's note: There follows an outline of the presentation made by Paul F. Uhler at the December 2003 Trilateral Seminar; derived from a set of PowerPoint slides used in conjunction with that presentation. This presentation was based on a recent article by J.H. Reichman and Paul F. Uhler: Reichman, J.H. and Paul F. Uhler, "A Contractually Reconstructed Research Commons for Scientific Data in a Highly Protectionist Intellectual Property Environment," 66 Law & Contemporary Problems 315-462 (Winter/Spring 2003). This paper is available at: <http://www.law.duke.edu/journals/66LCPReichman>.

I. Key Aspects of Scientific Research Using Global Digital Networks

Data-driven science through collection and creation of ever-increasing amounts and types of raw data; interpreting and transforming the data into unlimited new configurations of information; collapsing the space and time in which data and information can be made available and used to advance science; and facilitating entirely new forms of distributed research collaboration and information production.

II. U.S. Legal and Policy Regime Has Traditionally:

Supported the open availability and unfettered use of data, and placed a premium on the broadest possible dissemination and use of scientific data and information produced by government and, to a lesser extent, government-funded sources.

This has been implemented in complementary ways by:

1. Expressly prohibiting intellectual property protection of all information produced by the federal government and in many state governments;
2. Contractually reinforcing the traditional sharing norms of science through open data terms in federal research grants and contracts; and
3. Carving out a very large and robust public domain for non-copyrightable data, as well as other immunities and exceptions favoring science and education.

¹ Note: The views expressed here are those of the author and not necessarily those of the National Academies.

III. Compelling Reasons for Placing Government-generated Data and Information in the Public Domain:

1. A government entity needs no legal incentives from exclusive property rights to create information. Both the activities that the government undertakes and the information produced by it in the course of those activities are a public good.
2. The taxpayer has already paid for the production of the information.
3. Transparency of governance is undermined by restricting citizens from access to and use of public data and information. Rights of freedom of expression are compromised by restrictions on re-dissemination of public information, particularly of factual data.
4. Numerous economic and non-economic positive externalities—especially through network effects—can be realized on an exponential basis through the open dissemination of public-domain data and information on the Internet.

IV. Countervailing Policies and Practices that Limit the Free and Unrestricted Access to and Use of U.S. Government Information:

1. Statutory exemptions to public-domain access and use based on national security concerns, the need to protect personal privacy of human subjects in research, and to respect confidential information (plus other FOIA exemptions).
2. Government-generated data are not necessarily provided without cost, even if there are no restrictions on reuse.
3. Failure of agencies to disseminate data and information, or to preserve them for long-term availability.
4. The White House Office of Management and Budget (OMB Circular A-76) bars the government from directly competing with the private sector in providing information products and services.
5. The government is required to respect the proprietary rights in data and information originating from the private sector that are made available for government use or, more generally, for regulatory and other purposes, unless expressly exempted.

V. Considerations Regarding Academic Databases

Government-funded databases and other forms of information in academia are presumptively protectible unless funding sources require sharing or open access. Federal U.S. government policy of “full and open” data access or exchange is: “data and information derived from publicly funded research are [to be] made available with as few restrictions as possible, on a nondiscriminatory basis, for no more than the cost of reproduction and distribution” (that is, the marginal cost of data dissemination, which on the Internet is zero). There is no equivalent

top-down government policy for “open access” journals, but many such activities being initiated from bottom up.

VI. Pressures on the Public Domain Status and on Open Access to Publicly Funded Scientific Data and Information

1. Economic—including privatization of government research and data collection activities, and commercialization of academic research (and of government data outside U.S.).
2. Technological (digital rights management technologies).
3. Legal—intellectual property and other laws broader, deeper, and longer including in: copyright, restrictive licenses, statutory database protection, and other laws.

VII. Broad Implications of Pressures on Public Science:

1. General diminution in the scope of S&T data and databases in the public domain that can be openly accessed and used.
2. Sole-source problems exacerbated in S&T database market.
3. Higher transaction costs.
4. Less data-intensive research and significant lost opportunity costs.
5. Less effective international, inter-institutional, and interdisciplinary cooperation using digital networks.

VIII. Proposals for Government Science Agencies Include:

1. Provide funding for public domain or open access data centers and active archives of foundational data sets derived from publicly funded research as an essential component of the research infrastructure. Facilitate open-access journals and repositories.
2. Review and enforce government research contract and grant clauses regarding open data availability and use.
3. Develop guiding principles and contractual provisions for licensing data products and services from the private sector, or for privatizing such government activities, that protect research user interests.
4. Work with universities to establish broad inter-institutional agreements and specific contractual provisions for maintaining open access to and use of data in the academic sector (for not-for-profit purposes).
5. Work with foreign governments and their science agencies through multilateral and bilateral fora to promote public domain or open access to their public information resources on a reciprocal basis.

IX. Proposals for Universities Include:

1. Develop inter-institutional agreements and cooperative institutional approaches to ensure unimpeded access to and liberal uses of scientific data and information in a not-for-profit research commons, while allowing for commercial exploitation of those resources vis-à-vis the private sector.
2. Develop model contractual provisions for inter-university and scientist-to-scientist relationships, and for cooperative research with the private sector, that protect access to and unrestricted use of publicly funded research data by not-for-profit scientists.
3. Vigorously promote non-exclusive licensing by authors of their scientific articles and any linked databases to STM journals, rather than assigning exclusive copyrights.
4. Establish open-access archives for scientific data and information.
5. Conduct empirical research of the underlying issues and initiate pilot projects for certain disciplines or categories of data to test the results.

Suggestions for Further Reading from the National Academies Press, www.nap.edu:

Bits of Power: Issues in Global Access to Scientific Data (1997)

A Question of Balance: Private Rights and the Public Interest in Scientific and Technical (S&T) Databases (1999)

The Role of S&T Data and Information in the Public Domain (2003)

Open Access and the Public Domain in Digital Data and Information for Science (forthcoming, 2004)

Some Characteristics of Web Data and their Reflection on Our Society: an Empirical Approach^{*}

Li Xiaoming and Zhu Jiayi
Institute for Internet Information Studies (i³S)
Peking University

1. Introduction

The Web, since its emergence about 10 years ago, has grown dramatically in every aspect—not only in size, from a few HTTP servers and a few thousand pages to millions of servers and billions of pages; but also in nature, from academic play ground to full fledged business vehicle and pervasive public domain.

The fact that hundreds of millions of people are accessing the web every day, not only consuming its content, but also producing its content, collectively forms a layered complex system. At least four layers can be identified, which are of great interest to researchers from many different areas.

- Network layer (or IP layer), where people are interested in traffic patterns, congestion control, quality of service (QoS), etc.
- Web layer (or HTTP layer), where people are interested in how the web is growing and how web pages or web sites are connected via HTML hyperlinks.
- Content layer, where people are interested in kinds of content that are emerging and disappearing on the web; and how they are distributed in terms of time, space, and content categories.
- Reflection layer (or interaction layer), where people are interested in how the web's evolution is in concert with the evolution of our society, and how web data reflect other societal phenomena.

This article will, using the Chinese web as an example, address some of the issues related to the latter three layers.

Our Basic Tools. The web data in question mainly come from two systems developed and maintained in our lab: Tianwang search engine¹ and Web InfoMall². Tianwang is a general

^{*}The related research work is partially supported by a 973 Program Grant G1999032706

¹<http://e.pku.edu.cn>

purpose non commercial search engine which has been in service and developed since 1997. It is equipped with a scalable crawler that is capable to crawl 5 million pages a day and normally maintains an index for 30 million pages for search service. It's now one of the most popular search engines in China, collecting about 200,000 queries per day. Web InfoMall is a by-product of Tianwang search engine, which provides a service similar to Internet Archive³. In particular, Web InfoMall maintains a history of the Chinese web since 2001, archiving as many pages (together with link structure) as possible and allowing users to browse the history of the Chinese web. It now has over 500 millions distinct web pages mostly in Chinese and is increasing at a speed of 1,000,000 pages per day. Tianwang search engine and Web InfoMall are integrated as a whole platform for scientific research and provide open and free access to every one. Web pages in our studies are crawled by Tianwang and stored in Web InfoMall; queries are collected from Tianwang, which include the time when the query is received, user's IP and the query term. We also have a complete toolkit for page analysis.

II. Some Characteristics of the Chinese Web

Although China almost missed the “old” Internet (in fact, there was no substantial internetworking effort in China until 1989 when Zhongguancun Pilot Network was launched), she quite aggressively caught the web tide in 1995. Multiple government initiatives made universities and major cities networked in a few years. According to CNNIC (China National Network Information Center), there were more than 200,000 web servers installed, hosting more than 100 million surface web pages, as of July of 2003. And, based on the result of a large scale search service, together with extensive analysis, we have obtained the following conclusions about the Chinese web:

- 1) Starting from 1995, the growth of the number of Chinese web pages has been following exponential function nicely (in fact, a study showed a $2^{1.04*x}$ yearly growth⁴).

This conclusion is based on three assumptions. First, as we mentioned above, China quite timely caught the web tide in 1995; there were few web pages before 1995 in China. It is hard to say how many Chinese web pages existed in 1995, but some what between 10 thousand and 1 million is a good estimate. Second, through a thorough crawl conducted by Tianwang, we believe there were

² <http://www.infomall.cn>

³ <http://web.archive.org>

⁴ Li Xiaoming. An Estimate on Static Web Pages China Ever Has. *Journal of Peking University*, 2002(5)

about 50 million web pages in China as of end of 2001. This estimate was verified with some reference data from Baidu (the largest commercial search engine in China) and a report of *Internet Archive* issued in August 2001 addressing that they had collected 30 million web pages in simple Chinese⁵. Third, the life time of a page is modeled by an exponential distribution, that is, the probability of a web page's deletion in time t is⁶:

$$D(t) = 1 - e^{-\mu t}.$$

Based on the above three assumptions and our statistics on the last-modified time distribution of Chinese web pages, we made the conclusion that, starting from 1995, the growth of number of Chinese web pages has been following exponential function nicely. Figure 1 is our logarithmic result with base 2 by linear regression analysis. On X axis the year 1994 is the origin point, so the year 1995 is represented by 1, the year 1996 is represented by 2 and so on.

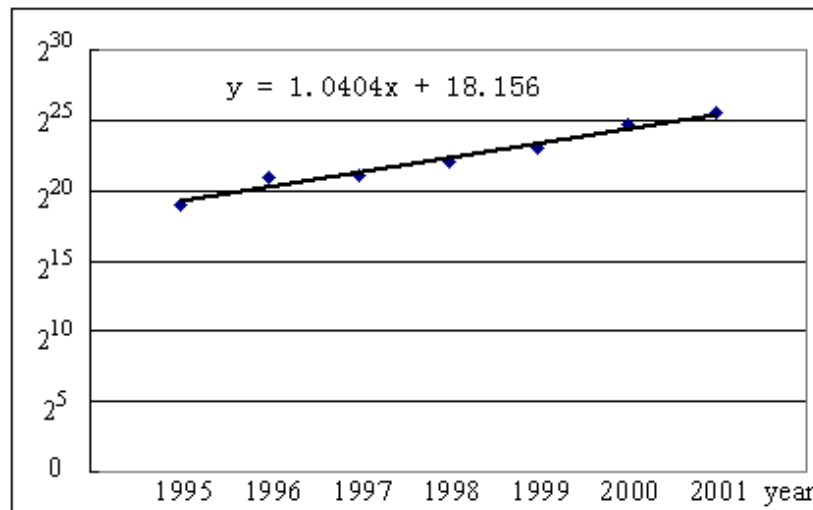


Figure 1: Logarithmic result of Chinese web growth

The parameter 1.04 indicates that the Chinese web doubles every year, exceeded 100 million at the beginning of 2003 and now has more than 200 million, which is verified by actual statistics. Note that this increase is not stable, the increases in 1996 and 2000 are prominent, which reflect some strong promotion for IT development in the country.

2) The average life cycle of a page is about 1.4 year. This is a byproduct of the above study. The parameter μ equals to 0.70. By this, the average life of a web page is:

⁵ Brewster Kahle and Biall O'Driscoll, Interesting Web Facts, *Internet Archive Report*, August 2001.

⁶ Junghoo Cho and Hector Garcia-Molina, The Evolution of the Web and Implications for an Incremental Crawler, In *Proceedings of 26th International Conference on Very Large Databases (VLDB)*, Cairo, Egypt September, 2000.

$$T = \frac{1}{\mu} = \frac{1}{0.7} \approx 1.43 \text{ year}$$

This result is different from that of [6], which estimates 99 days. The use of different data sets should be a primary reason for the difference, which may reflect the status or stages of web development in different countries.

3) The average size of the web pages is about 12KB. This figure has been obtained and verified on many batches of our collection. Comparing with Allison Woodruff's result in 1996 (4.4 KB)⁷, we see the number is significantly increased.

4) It is observed that page replicas or near replicas are common on the web, a factor of four is observed on the average. Page replicas are easy to find on the web, but may be more prevalent than we expected. In fact, based on our large collections and repeating analyses, every page has four replicas on the average. Also as expected, we've found that the more replicas a page has on the web, the more important it appears.

5) For the distribution of number of links among pages, a power law is verified by millions of web pages⁸. In brief, the power law for in-degree is stated as: the probability of a page which has i effective links into it (also called effective in-degrees) is proportional to $1/i^x$, for some $x > 1$. We find that Chinese web obeys this law. This provides useful assistance to estimate the page coverage of our search engine⁹. Figure 2 is our statistics on the distribution of effective in-degrees.

⁷ Allison Woodruff, Paul M. Aoki, Eric Brewer, Paul Gauthier, and Lawrence Rowe, "An Investigation of Documents from the World Wide Web". In *Proceedings of the Fifth International World Wide Web Conference*. World Wide Web Consortium, Elsevier, 1996.

⁸ Yan Hongfei, and Li Xiaoming. "On the Structure of Chinese Web 2002, Beijing: *Journal of Computer Research and Development*, 2002, vol.39(8):958-967.

⁹ Andrei Broder, Ravi Kumar, Farzin Maghoul, Prabhakar Raghavan, Sridhar Rajagopalan, Raymie Stata, Andrew Tomkins, and Janet Wiener. "Graph Structure in the Web: Experiments and Models". In *Proceedings of the Ninth International World-Wide Web Conference*, 2000: 309-320.

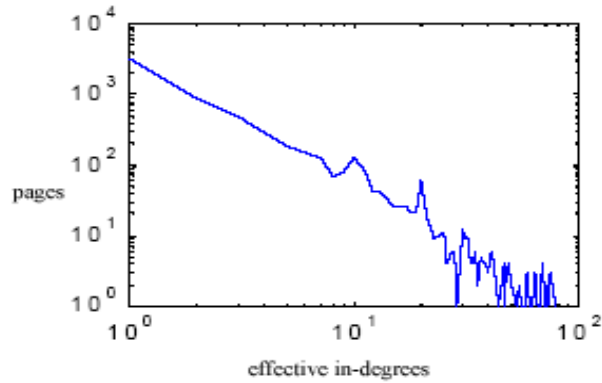


Figure 2: Distribution of effective in-degrees

6) The average diameter is about 20. The whole web can be viewed as a large directed graph where vertices are web pages and edges are links (URLs) that point from one page to another. The diameter of web is defined to be the length of the shortest path from page u to page v , averaged over all ordered pairs (u,v) . According to¹⁰, the function of the web diameter is

$$D = 0.35 + 2.06 \log(N)$$

where N is the number of the whole web pages. We tested with a collection of 20 million pages, and found if a pair of pages has a directed path, we can traverse between the 2 pages by about 20 clicks on the average when navigating the Chinese web.

7) For queries to a search engine, considering them as a sequence of terms, temporal locality in terms of contents is observed. Furthermore, it exhibits a clear self similarity¹¹. Mining the query logs revealed some facts more interesting. To this end, let's assume a search engine received a query sequence $S1 = \{q_1, q_2, \dots, q_n\}$, in which there are m distinct query terms, $m \leq n$. Let $S2 = \langle p_1, p_2, \dots, p_m \rangle$ be the sequence of the m distinct terms in descending order by their numbers of occurrences in $S1$, and $S3 = \langle C_1, C_2, \dots, C_m \rangle$ be the sequence of numbers of occurrences corresponding to $S2$. Our interest is how many percents of the total queries the $x\%$ frontal terms in $S2$ hold, that is

¹⁰ Reka Albert, Hawoong Jeong and Albert-Laszlo Barabasi. Internet: Diameter of the World-Wide Web, *Nature*, Sept. 1999, 401:130-131.

¹¹ Wang Jianyong, Li Xiaoming, Shan Songwei, Lei Ming, and Xie Zhengmao., Massive Web Search Engine: User Behaviors' Distribution Characteristics and their Implications. *Chinese Science Bulletin*, 2002, E Edition, vol.31(4):372~384.

$$Y = \frac{\sum_{i=1}^{\lfloor m * x / 100 \rfloor} C_i}{\sum_{j=1}^m C_j} \quad (1)$$

Figure 3 is the result (X axis is the percent of distinct query terms and Y axis is the percent of the total queries. As it shows, the query terms are concentrative. For example, 20 percent of query terms hold nearly 80 percent of all queries. This phenomenon is verified many times for $n \approx 1,000,000$.

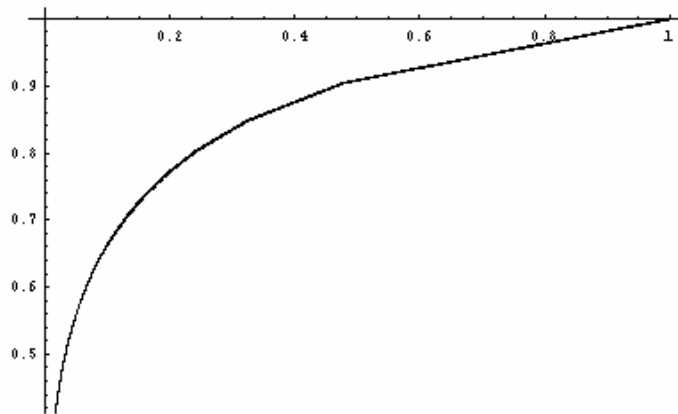


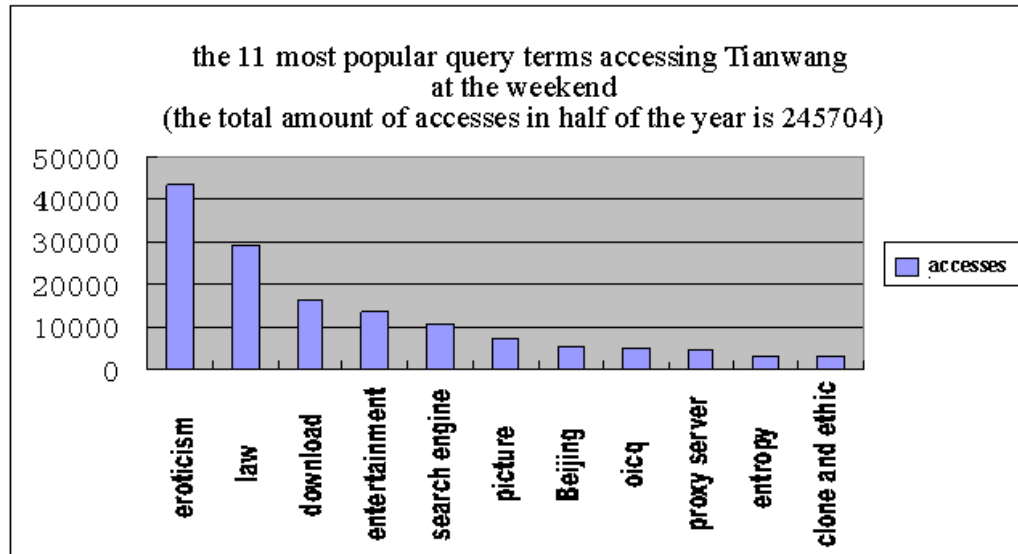
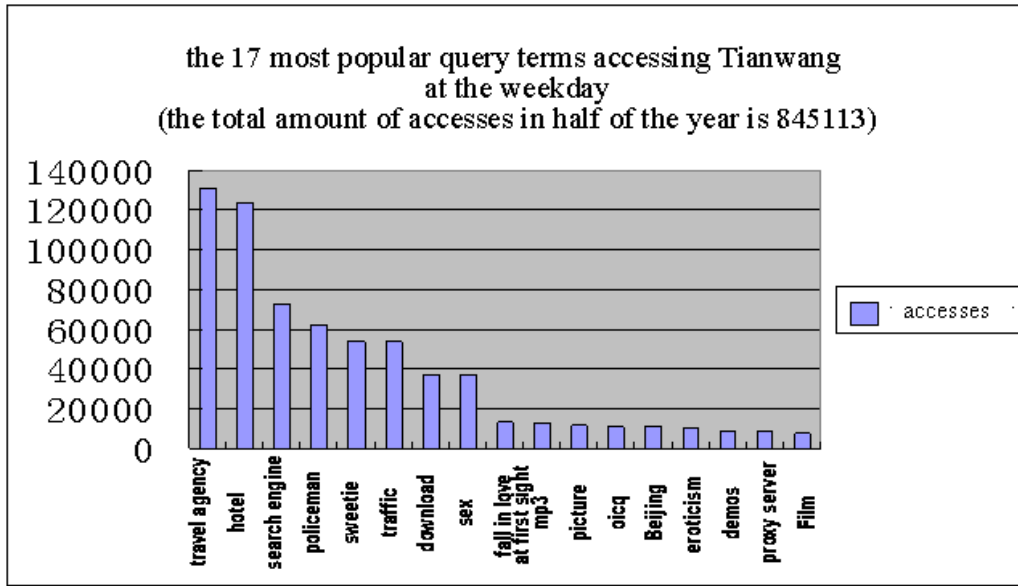
Figure 3: Distribution of query terms

III. A Selective Study on the Correlation of Web Data and Societal Issues

In terms of media, why is the web of particular interest? Compared with newspapers, radio or TV broadcast, we see the following factors collectively make the web unique:

- the number of authors and the number of readers are about the same order;
- vast amount of content;
- a good portion of web contents are casual, not well edited;
- elapsed in nature, pages are coming and going; and
- pages are born digitized, networked, and readily accessible and manipulated

1) A study, conducted in 2002, of query logs to search engine reveals not only a profile of search interests, but also a level of maturity of Chinese web users. e.g., “search” and “download” are often used as commands to the search engine, which we consider indicators that the user was not familiar with the use of search engine.



2) Correlation of search engine logs with stock market information. A study was conducted for a sequence of query logs against actual stock market information during the same time period¹². Correlations were identified.

First, we collected influential articles from the three major sources which address to China's stock market, *China Securities Journal*, *Securities Times* and *Shanghai Securities News*. Then, 383 keywords were extracted from them. We delegated these keywords to the whole domain of negotiable securities and calculated their occurrence frequencies in search engine query logs spanning 276 days (from April 1, 2001 to January 31, 2002). To use these frequencies to weight

¹² Wei Zili and Hu Jian., Research on Web Information and Stock Market Supervision.

the degree of people's attention to stocks, we defined the attention index as follows. Assume there are n keywords (for this, $n=383$); each keyword has an identity i , $i = 1, 2, \dots, 383$; the frequency of the i^{th} keyword in a day's queries is X_{ij} , and $j=1, 2, \dots, 276$; the frequency of the i^{th} keyword in stock information we collected is Y_i ; the attention index on the j^{th} day $P_j = \sum (X_{ij}/Y_i)/n$.

From these definitions, we studied how the attention index changes with the stock prices and stock exchanges.

The conclusions are the following: a) the web is becoming a more and more important source of stock information; b) the attention index is positively correlated with the stock index and its exchanges; c) the attention index has roughly the same important changes with the stock index and has evident precessions.

Figure 4(a) is the stock indexes of The Shanghai Stock Exchange (the lower curve) and The Shenzhen Stock Exchange (the upper curve). Figure 4(b) is the attention index's curve plotted against time. The zigzagged curve is the original data, which is accompanied by a polynomial trend curve and a linear trend.

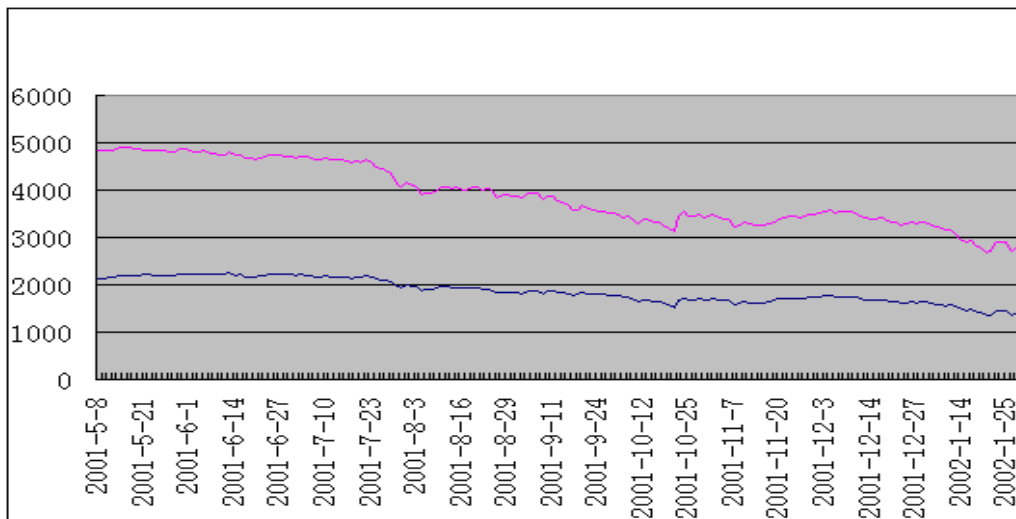


Figure 4(a): stock indexes of The Shanghai and Shenzhen Stock Exchange

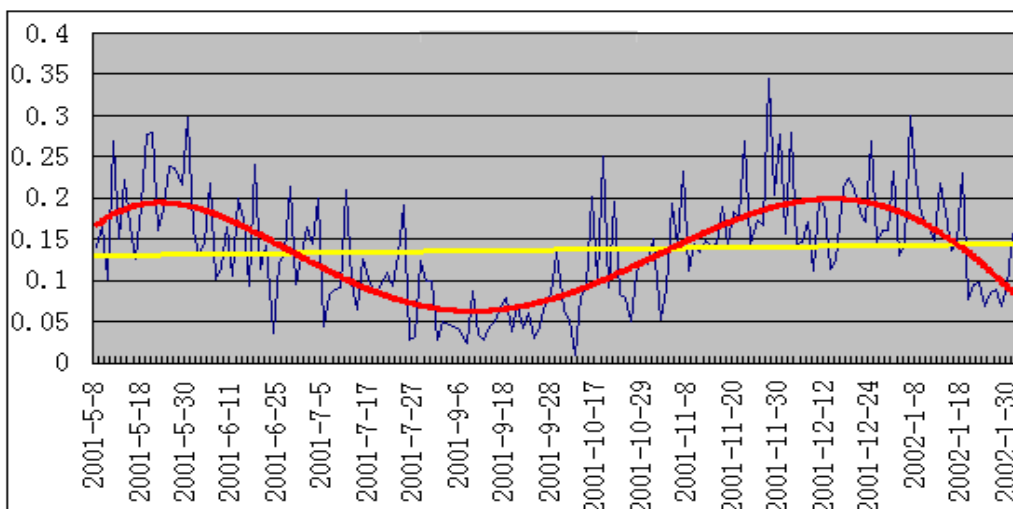


Figure 4(b): Attention index on stocks

3) Reflection to a major national event. A study was conducted that tracked the web data in a period of 30 days that covered the 16th Congress of CCP, the most important political event that took place in China in 2002. It was observed that the amount of information for this event went up to 30 percent of all information on the web, and the peak occurred several days later than the climax of the event itself, which shows kind of “delay” in the media¹³.

First, we collected 262 pages reporting on the 16th Congress of CCP from Sina¹⁴ and extracted featured words for use in identifying other pages on this topic. Then, we collected pages from the 143 most influential websites in a breadth-first search fashion for the top three levels every day from October 22, 2002 to November 11, 2002¹⁵. At last, we got the metrics of web information on the 16th Congress of the CCP.

Our data show that there were, on average, more than 9,000 pages correlative with the reports of the 16th Congress every day, accounting for 2.9 percent of all collected pages. After replicas were removed, there were, on average, about 4,000 pages correlative with the reports of the 16th Congress every day, accounting for 5.6 percent of all different pages collected. Also, we found that the peak number of the pages on this didn't occur on November 8 when the 16th Congress opened,

¹³Li Xiaoming and Zhu Jiaji., Statistics and Analysis on WWW Information of 16th Congress, *Technical Report of Institute for Internet Information Studies at Peking University*, 2002

¹⁴<http://www.sina.com.cn>

¹⁵Li Xiaoming and Zhu Jiaji., Statistics and Analysis on WWW Information of 16th Congress, *Technical Report of Institute for Internet Information Studies at Peking University*, 2002

but on November 20, six days after the Congress had ended. This “delay” is leading us to further study. Figure 5 shows the number of pages on the 16th Congress as a function on time.

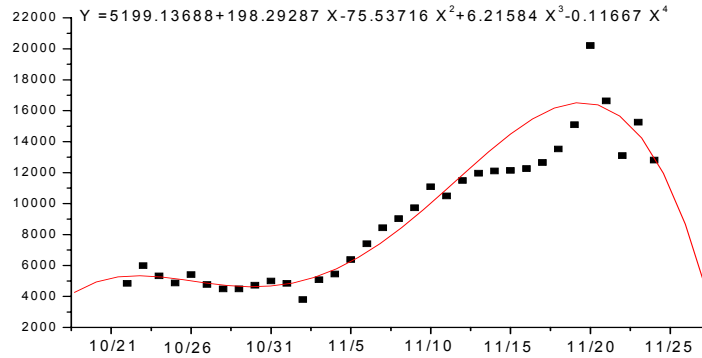


Figure 5: pages on 16th Congress from October 22, 2002 to November 24, 2002

4) Informatization and e-government are popular buzzwords these days. To evaluate how local government agencies are informatizing their businesses, their web sites are being thoroughly analyzed though a computer tool. Some metrics are being developed. In particular, the number of pages contained in a site is used as an indicator of the level of activity, the number of out links as an indicator of openness, and the number of FORMs as an indicator for interaction service support. Through a thorough crawl of some representative agencies website, a statistical analysis of their pages, and a comparison of the data with the actual performance of the agencies, little correlation is found. Namely some agencies may have a relatively well developed websites but do not perform well in their duty services, which in turn may tells us that informatization in China is in fact at a very early stage.

IV. Conclusion

Based on vast amounts of data collected over time, we have reported a few results about the reflection of Chinese web data on other social activities, as well as some basic facts about the web in China. These results enhance our belief that studies in many areas of social science may be well supplemented by studying web data, since they are good reflections of social phenomena. We believe that studying the relations of the Web and society is a valid approach in understanding the direction in which our world is moving. And around this kind of study scientific methodology is not only applied, but may also be developed.

Discussion: Plenary Session II

Following **Suguru Yamaguchi**'s presentation, **Li Xiaoming** inquired as to the efforts that the initiatives that had been described focused on establishing an infrastructure for routine, daily use. **Yamaguchi** responded that adequate infrastructure exists to permit daily use of the system. This was expensive to maintain so that the funding provided by the Japanese government remains crucial.

Paul Uhlir expressed surprise that in light of Myanmar's tight control over information that the government permits foreign course material to enter the country. **Yamaguchi** responded that even though the government fears externally developed information, it has an even greater fear for the future of the country. Following a demonstration of the power of the combined satellite and Internet system, the government agreed to permit the system to be used in a single, top ranking university¹⁶. **Yamaguchi** suggested that in a few years students from this university would be high level officials in the government so that little by little, the country might open up.

Toshihiko Hayashi asked whether **Yamaguchi** and his colleagues were in contact with the Association of Asian Universities's initiative on distance learning. **Yamaguchi** said that they are. **Hayashi** also asked about the content of the curricula distributed to the universities in Southeast Asia. **Yamaguchi** responded that in the first phase of the projects, course materials are prepared and transmitted in English, based on Japanese curricula. In the second phase (currently being developed in cooperation with several Indonesian universities), local languages and local curricula will be used. He also noted that broadcast materials could be used in conjunction with local, face-to-face teaching, citing in this regard a laboratory course in biology developed jointly by Osaka University and a university in Thailand.

Li remarked that in China, both the Ministry of Education and the Ministry of Science and Technology are investing significant sums in distance learning, with a special emphasis on the western part of the country. By the end of 2004, there should be 3,000 courses on line, with the aim of having 10,000 on line within a few years.

¹⁶The University of Computer Studies in Yangon

Wang Zhiqiang noted that UN Secretary-General Kofi Annan has advocated the development of an electronic system which would combine an international warning system for natural hazards throughout the world with national policies. **Yamaguchi** was uncertain about whether the systems he had described could provide the basis for such a system. More sophistication would be required, particularly to ensure the security and reliability of the system that the Secretary-General seems to have had in mind.

Following **Paul Uhler**'s presentation, **Pauline Newman** provided a short summary relevant to the evolution of university-industry research cooperation in the United States. Her point of departure was passage of the Bayh-Dole Act in 1980 which assigned intellectual property rights to discoveries made with US government support to the researchers who had made those discoveries. Previously, such intellectual property had been held by the government. The intent of the Act was to get promising results of academic research off the shelf and into a process of possible commercialization by encouraging academic-industrial research cooperation. Such cooperation has grown substantially as a result and, additionally, university faculty have been encouraged to create their own start-up firms. When the Bayh-Dole Act came into force in 1980, no one dreamed that the time might arrive when it might encourage to a situation in which academic scientists would hold their results as proprietary information. Clearly a balance has to be struck between the fundamental value of openness and possible proprietary rights to discovery.

Following **Li Xiaoming**'s presentation, **Tom Ratchford** inquired about the quantity of the information in **Li**'s archive. **Li** responded that they now have approximately 50 million websites, compared with an estimated number of 3 billion world wide. He and his colleagues monitor business-related websites every few days to update their archive, and university and related websites every two or three weeks.

In response to a question from **Tsunee Nakahara**, **Li** noted that he and his colleagues simply archive websites. They do not take responsibility for accuracy of their content. He went on to emphasize that the archive is completely open. It is organized on a monthly basis and anyone who so requests can obtain a CD of any portion of its content.

Toshihiko Hayashi noted that as recently as five years ago, the Chinese government had not permitted use of the Internet for commercial or personal transactions. Has there been a shift in government policy? **Li** responded that he knew of no such explicit change in government policy. Specific types of content such as pornography or discussion of various policy issues could not be

presented on the web. Otherwise, there do not seem to be any government restrictions about material posted on the Internet.

Commentary. Following the three presentations, **Geoffrey Bowker** offered a series of comments. He began by noting that although the Internet is often characterized as being removed from reality, all three papers were firmly based on reality. He also noted the centrality of web-based data to all of them. **Suguru Yamaguchi** had spoken about digitizing education-based data with a view towards making it widely accessible in 10 less developed Asian countries. **Paul Uhlir** had dealt with issues of data access. **Li Xiaoming** had provided a case study demonstrating how data on the web could be used as a basis for socially-and politically-relevant studies. **Bowker** went on provide examples of the significance of web-based data in several areas of public policy: e.g., biodiversity preservation, famines, global change, and health.

Bowker emphasized, however, that the three presentations also suggest that there are matters beyond data that need to be considered in formulating public policy related to Internet access. One must also consider the mediation and oversight of models and simulations made possible by advanced digital technologies. Other issues are associated with the question of whether or not science really is a public good. If so, then it is essential to make data available and useful within and across disciplines. Funding choices must also be faced such as: who pays? how can cost recovery be managed? what about long-term data preservation? who should make technical choices such as those regarding standards?

As an illustration of the data-gap between rich and poor countries, **Bowker** presented a pair of slides. The first showed, in red, the countries that possess the overwhelming amounts of information on global biodiversity; the second showed, again in red, the countries where most of the world's biodiversity exists. The two maps are almost completely complementary.

Bowker is convinced that science must indeed be regarded as a public good, and that public policies associated with access and fair use must be consistent with that fundamental value. Additionally, it is obvious that education cannot be commodified; that is, there are no cheap options. Developing the full potential of the Internet and assuring that public policies are consistent with full access and fair use will require a range of social, technical, and socio-technical skills (e.g., evaluation).

Open Discussion. Responding to **Bowker's** commentary, **Uhlir** suggested that funds for archiving and mining data—activities that make the data themselves valuable as a contribution to

knowledge—should receive considerably greater attention by funding agencies than at present. He also noted that when scientists from developed countries put their scientific data on the web, it provides valuable information to scientists in less developed countries and thereby reduces the information gap.

Tsuneo Nakahara noted that very large quantities of scientific information are generated on a daily basis and stored in sophisticated memory devices. Yet a paucity of funds is available to assess the accuracy of these data. Unless considerably more attention is focused on the problem of accuracy, the entire system of web-based data could crash. International cooperation might help resolve the significant yet seemingly overwhelming problem of assuring data accuracy.

Trilateral Seminar on Science, Society and the Internet

Section IID: Societal Aspects of Information and Communication

Technology: Plenary Session III

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Teaching (Roppongi/Hawaiian/Global) Science & Engineering Ethics Online*

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Science and engineering ethics is about creating good for society through the way we do science or engineering. Thus, the scientist who discovers valid knowledge and does not harm or disrespect people is being ethical. The engineer who builds safe structures and respects the environment is being ethical. Ethics often involves dilemmas in which we find ourselves doing harm or being disrespectful or unfair as an unintended side effect of our efforts to do good. Scientists and engineers who do such unethical things usually do not realize the harm they are doing until it is too late. For example, the scientist who harms a human subject while experimenting on him, or the engineer who builds buildings that destroy some of the natural environment probably did not intend those outcomes. They lacked awareness. The problem developed before they thought to prevent it.

Scientists and engineers who work in global contexts with colleagues from other cultures and countries face a more complex and as yet poorly understood problem of recognizing ethical problems that may arise in contexts that they do not fully understand.

Ethical sensitivity is about recognizing when problems are likely to arise. The ethical scientist or engineer recognizes problems quickly, is a good problem solver, and prevents the problem from developing and causing harm. Major goals of science and engineering ethics is development of ethical sensitivity and effective ethical problem solving.

The word *ethics* is sometimes used to mean *morals*. According to this definition, someone who is unethical is intentionally bad or immoral. In this paper, I do not define ethics in this way. I define ethics as inquiry into how to do good and avoid harm in our complicated world of science and technology. “Unethical” scientists may be those who fail to analyze the ways they might do harm.

*Discussion at the Tri-Lateral Seminar included the imaginative development of the concept of “hamburger” technologies which ignore the needs and cultures of the end users, versus technologies that are designed for the end-users, and that reflect culture-friendliness as a part of user friendliness. *Roppongi* or *Hawaiian* are terms suggested by Masao Sakauchi at the National Institute of Informatics, Tokyo, intended to reflect the diversity and complexity of the user cultures. The text of Prof. Sakauchi’s presentation appears in Section IIB.

Perhaps they are naïve and uneducated in ethics. Alternatively, they may indeed be immoral, and not care about the harm they inflict on others. Training in ethics can only educate and sharpen persons' sense of goodwill and their desire to help create a better world. It cannot cure evil intent.

I. Teaching Science and Engineering Ethics in a Global Culture

When teaching science and engineering ethics in today's world, where scientists in one culture may collaborate with scientists from other cultures, and perhaps work in one another's laboratories, there are likely to be serious conflicts over ethical issues. Such conflicts can arise among highly moral persons, especially when those persons come from different cultures. Consider the following differences:

- We learn our ethics and values from our culture(s); hence our ethics and values (or at least our priorities among these) differ.
- Some differences in science and engineering practice result from national differences in materials, equipment, standards, national priorities, . . .
- Within cultures, there are disciplinary differences in ethical issues, e.g. engineering: safety; social science: respect for persons and protection of persons. Hence any interdisciplinary work, even within the same culture, is likely to present ethical issues that are unrecognized by persons outside of the given discipline.
- New ideas and technologies bring new ethical issues.

In global collaboration there will be cultural and scientific differences between and within cultures. How, then, do scientists respond to these differences in the way they perceive, analyze and resolve ethical dilemmas? Untutored, scientists and engineers might conclude "I'm right and they are wrong." Tutored to look for such differences and to discuss and analyze, the conclusion is likely to be mutual understanding and effective conflict resolution or reconciliation.

When teaching ethics and values in science and technology, there are major differences to be considered, including:

- Cultural (national) differences: A person's ethics and values come from their culture – so being from different cultures, we will have many interesting differences to discuss after my talk.

- Differences between disciplines: Each field has its own special ethical issues. We see these differences, for example, when we examine the codes of ethics that each field creates for itself.
- Differences between old and new issues: As science evolves, new ethical issues will arise.
- As our global society evolves, scientist-collaborators from different countries will recognize that they view ethical issues differently. Successful globalization will require an ability to cope with these differences.

In my initial discussion of online pedagogy, I will ignore these differences. At the conclusion, however, I will suggest ways these differences may be addressed. Through cross-cultural research on students' responses to ethical issues, it is hoped that a better understanding can be gained of cross-cultural differences in perception and resolution of ethical issues, and of ways that international teams can effectively resolve or reconcile these differences.

II. The Goals of Science and Engineering Ethics Education

The main goals of science and engineering ethics are to enable students to:

- Identify the ethical issues in the cases that are presented as course material, and then in their own work in science or engineering. Since it is best to prevent ethical problems from developing, the next step is enabling students to perceive where certain ethical issues are likely to arise and how to prevent harm.
- Formulate and evaluate possible solutions. There are usually various approaches to ethical problem solving. The creative ethical problem solver is able to generate and evaluate many alternative ways to deal with ethical problems.
- Discuss ethical issues productively with others. Ethical problems are problems that have bad consequences for people. Ethical problem solving requires understanding the rights and responsibilities of those who are affected by the issue or who have the power to change the circumstances.
- Be able to critically analyze one's own and others' solutions to ethical issues.
- Develop and defend the ethical conclusions that one reaches.

Kinds of Ethical Issues to Raise: Micro- or Macro-ethical Issues? *Micro-issues.* In science and engineering ethics, each discipline raises its own problems. For example, the social sciences study people. Researchers may invade privacy, and reveal to others information that is meant to be private. Thus privacy and confidentiality are important issues in social research, but are less important in the natural or physical sciences. The code of ethics of each discipline identifies the issues that are important in that science. These “within-scientific discipline” issues are micro-issues.

Macro-issues. These are larger issues having to do with the larger society and its environment. For example, now that we have explored the human genome, should we try to clone humans? When an engineer builds a structure, should it be built in a way that does the least harm to the surrounding environment? Macro-issues go beyond simply “doing science or technology” to consider what it means to be a socially responsible scientist or engineer. There are often severe and conflicting economic, social, ecological and scientific constraints such that it is easier to ignore the macro issues – at our ultimate peril.

When discussing science and engineering ethics it is useful to begin with micro-ethical issues so that the student is grounded in the rules of doing their science or engineering, and then to broaden the scope of inquiry to include broader social and environmental issues.

III. Strategies for Teaching Online

Since ethical problem solving is largely a collaborative effort, the online environment should require that students collaborate in identifying and solving ethical dilemmas. The online setting offers:

Asynchronous discussions. Students work collaboratively but not necessarily at the same time. Student A contributes his written ideas online. When student B logs in, he responds to what Student A has written. Thus, team members can work “together” without contributing in the same time period. People whose daily work schedules are vastly different can still work together. Asynchronous discussions give shy or reflective people all the time they need to formulate their contributions.

Online office hours. Students communicate asynchronously with the professor. The professor does not have to sit in an office and wait for students to come in. Students can seek help or advice from the professor at any time and receive a reply within a day.

Interesting projects. Students can work individually or together on projects that help them build knowledge, confidence and ability to consult with others.

Free information. The Internet offers increasingly vast and up-to-date information, and is an excellent supplement to textbooks and libraries. Thus, some courses can be taught with no added expense of materials.

Student homepages (web pages). Some students may become interested in presenting their special work and insights on their own web page. This, in turn, will attract communication with persons outside of the course who share that student's interest in ethics.

Space for tangents. The online course is an excellent venue for presentation of the views of relevant experts, for debates among students, for contests, for students to share Internet links that offer one another opportunities for exploration of issues they find interesting, and so on. It is also an opportunity for students to develop and share ethical case studies, based their own professional experience (fictionalized to protect the privacy of those who were involved in the cases.)

IV. Advantages and Caveats

As these strategies illustrate, online learning offers special advantages:

- It can reach audiences that would be unable to attend school or to work together.
- People who are timid, disabled, unattractive, or otherwise stigmatized in society can collaborate with others and be judged according to the value of their contribution alone, not their looks or social skills.
- A course can be created that uses only free web-based curriculum materials, costing students nothing.
- An international course could be created that would enable scientists and engineers to learn the ethical perspectives of their colleagues in other parts of the world.

Caveats. There are several things the professor should bear in mind when designing and offering an online course:

- Online teaching of ethics is very labor intensive. Begin with no more than 12 students. As you gain confidence in the structure of your course, you may be able to enlarge subsequent classes.
- Classes should be relatively homogeneous in ability and training, otherwise collaborative learning projects will be unrewarding to all, and the teacher's role of teaching, facilitating and evaluating will be frustrating.
- Know your objectives and communicate them clearly to potential students before the course begins. Then communicate all requirements very clearly in an online course syllabus and throughout the course. Encourage students to contact you when they are unsure of what they are supposed to be doing.
- Keep instructions simple.
- Require students to arrange for access to other computers which they may use if their own computer fails.
- Design materials that students' (possibly older-model) computers can handle.
- Design the course around a format and software that is unlikely to fail or to confuse. An initial course could be organized using email alone.

V. Levels and Capabilities

Many levels of sophistication are possible on line. Here I describe the basic levels which most teachers and students can handle. At a very limited level, the online course is like a correspondence course in which the professor puts assignments online (or sends them by email), the professor and students can communicate by email, and students can use the Internet to access course materials. At a more advanced level, the possibilities for communication and collaboration are more sophisticated but also require new learning and provide many opportunities for confusion:

| | Limited | Moderate |
|---------------|--------------------|----------------------------|
| Communication | E-mail | Chat space |
| Production | Text, graphics | Collaborative writing |
| Distribution | Syllabus | Exchange of student papers |
| Archiving | Video of lecture | Analysis of transcript |
| Access | Links to resources | Online expert |

Adapted from Michael Loui

VI. Free On-Line Materials

To teach science and engineering ethics effectively, one needs appropriate, intriguing cases for students to analyze. The Internet offers an endless array of cases. The best source of cases is the Online Ethics Center for Engineering and Science at <http://www.onlineethics.org>. There are hundreds of science cases at <http://www.onlineethics.org/sci/index.html> and on other parts of the Center's web site. Additionally, there are literally hundreds of engineering ethics cases which may be accessed at <http://www.onlineethics.org/eng/cases.html>. The center's web page offers many links to other web pages dealing with science and engineering ethics.

American codes of ethics for all fields of science, engineering and other professions can be found at <http://www.iit.edu/departments/csep/PublicWWW/codes/index.html>. At this website, there are extremely valuable curriculum resources in science and engineering ethics including:

- An explanation of the function of codes of ethics.
- Instructions on how to use a code of ethics to solve a problem in one's profession.
- Instructions on how to construct a code of ethics.

A knowledge of the various theories of normative ethics does not, in and of itself, make one a more ethical scientist or engineer. However, it offers an important background for scientists and engineers, enabling them to understand that there are diverse, and often conflicting, rules for choosing right actions. Ethical theories are very useful when thinking through the justification of one's position on an issue, or the public justification of some policy. An introduction to the various theories of ethics may be found at <http://www.stedwards.edu/ursery/norm.htm#utility>.

VII. Elements of a Case

In the case "Incident at Morales" a company wants to quickly build a plant to produce a new chemical process before its competitors do so, and wants to do so as inexpensively as possible.

The company locates the new plant in a place with few environmental laws, to avoid a long plan-review process. The chemical process is a dangerous one, and is to be computer automated. Many technical, environmental, financial and safety problems arise that must be decided. Each has important ethical implications. At various points in the case, students are asked to identify the ethical issues, to suggest alternative solutions, to identify constraints on solutions, to try applying an ethical code, and to discuss which solutions seem best. The case takes the student through many stages of the plant construction and raises many questions for the student to consider.

What to do with Cases. Students can work individually or in teams, to:

- Identify micro-and macro-ethical issues within each case.
- Analyze cases (typically communicating asynchronously online).
- Develop papers that other students react to.
- Develop a code of ethics for dealing with new (emerging) problems in their field.
- Discover what ethical theories help define a course of right action, and use it to justify their solution.
- Write policy statements based on their conclusions and justifications.

Some Case -Based Assignments. In relation to any of the cases found at the websites listed above, students might be asked to respond to the following:

- What are the technical, social, or economic issues in this case? Do these become ethical issues? If so, how?
- From our personal perspective, prioritize these issues.
- Which are micro-and which are macro-ethical issues?
- Who are the stakeholders? What are their rights and responsibilities?
- What are the constraints on possible solutions?
- Are there any relevant codes of ethics that offer guidance in solving this problem?
- What is your solution? Justify it on ethical grounds, using an appropriate ethical theory or principle.

Some more advanced assignments are the following:

- Do a project in your field and identify the ethical issues that should be anticipated. Consider both the micro-and macro-ethical issues. Identify ways to prevent risks and optimize benefits.

- In interdisciplinary work, identify how major ethical issues differ by discipline or context.
- Identify new problems in your discipline that the relevant ethical codes do not address.
- Identify factors that may underlie differences in ethics and values from one culture or nation to another.
- Engage in cross-cultural ethical problem solving online, or interview scientists or engineers who have worked in a cross-cultural context. Identify ways issues are resolved and obstacles to ethical problem solving in these contexts.

VIII. Evaluating Student Performance

Evaluation of students' learning to be ethical problem solvers is complex because there are no simple right and wrong answers to the kinds of ethical problems that arise. There often are several different approaches to ethical problem solving that are effective. Attempts to grade students on whether their preferred solution matches that of the professor may defeat the purpose of the course. When grading ethical problem solving skills, the professor must evaluate the quality of the reasoning, not the specific solution that is proposed. This is challenging and time-consuming but is owed to students. It is one reason to keep class size small.

Fortunately for the professor, there are some skills that can be graded on a "right-wrong" basis. For example, one may develop multiple-choice questions on:

- how to develop a code of ethics,
- the characteristics of major theories of normative ethics,
- differences between micro- and macro-ethical issues

Another fairly simple aspect of grading in such courses is on participation in online discussions. Since all students are required to participate in these, students can be graded on whether they:

- Participate regularly and demonstrate leadership by proposing useful ideas.
- Participate regularly and contribute some good ideas
- Participate regularly but contribute little towards analyses or solutions
- Participate irregularly but offer high quality ideas
- Participate irregularly and contribute little.

However, a major basis of students' grades should be based on their ability to individually recognize and analyze an ethical dilemma, generate alternative solutions, and select and justify an adequate solution. This requires that the teacher carefully read student's analyses and solutions to see whether the student has done an original and thoughtful job of this. The mark of a good teacher is the ability to recognize and reward the skills that the course is designed to teach, not to grade student solutions as right or wrong, or according to whether they meet the teacher's preconceptions about how the problem should be analyzed and solved.

VIII. A Proposal

I concluded my presentation at the Tri-Lateral Seminar ended with a proposal that members of this seminar engage in a brief course, via email, to experience not only the use of case-based assignments, but also the role of cultural differences and differences in the contexts of science or engineering, in producing different perceptions of ethical issues. Instead, or in addition, groups of graduate students in a given field of study might engage in such a course.

Internet Association in China: An Ethical Approach

Liu Gang

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It should be made clear from the outset that China's reform started from everyday economic life some 25 years ago rather than from the political level far away from the common people. To observe the impact of the Internet, in my opinion, should also start from such a perspective, otherwise it would lead to the following conclusion that since the conventional wisdom failed to see the insurmountable impact of the Internet on China, "the long-term political impact of the Internet remains an open question" so that the argument goes to the strategies for control that "may continue to be viable in the short to medium term."¹ However, I'd like to argue from another perspective to see the substantial impact of the Internet on the everyday economic life in China.

I. Introduction

Ideally it might be expected that in the social evolution of China that, with the deepening of reform and opening to the outside world, the government would gradually withdraw from social life so that a void would be created in the socio-economic space that it had occupied. According to this model, the void would be filled with new social spaces or new organizational entities representing different interest groups. However, realistically institutional arrangements in China have not fully accepted the phenomena of such groups. The institutional framework does not permit the interests of these groups to have any on the policy-making and government administration in any organized manner. First, the consciousness of such groups is still very weak. Second, there are not any smooth pathways for the expression of these groups in the present socio-political environment. Therefore, it frequently occurs in the social life in China that any legal expression of interests is invalid and any valid expression of interests is illegal. Nonetheless, the framework of multiple socio-economic lives is being shaped. And it is hoped that with the popularization of the Internet, this situation can be relieved. People could express different opinions on economic policies in the virtual world and could make an impact on policy-making and implementation via legal operations in the actual world to maintain their interests.

¹Kalathil, Shanthi and Taylor C. Boas (2001), *Working Papers: The Internet and State Control Authoritarian Regimes: China, Cuba, and the Counterrevolution*, Information Revolution and World Politics Project Global Policy Program Number 21 July 2001. 2001 by the Carnegie Endowment for International Peace.

II. Explanation of Concepts

In China's discourse, the '*stake-holding group*' is by all means an introduced concept, however, the concept of '*association*' under discussion is an old one. We would rather link the shaping of '*stake-holding group*' with activities of '*association*' in the present context. For the sake of analysis, the two concepts are treated as equivalent in this paper, although the extension of the former can be larger than the latter. Associations have existed for thousands of years in our society. Since the building of the infrastructure of the Internet, some of the behavior of associations or the forming of stake-holding groups can be embodied in the activities of virtual communities over the Internet, some of which have even gone further than traditional associations. Recently, this phenomenon came over the horizon and a corresponding survey was carried out.²

In China the right of association is usually taken as a *political right of the citizen*; i.e., an association is relative to political life only when it is for the politics and tries to show its impact on political life, therefore, the right of association comes into being only when it is for the political purposes³. But what is meant by the term "political right of the citizen" here? According to the definition given by legal scholars, the political right of the citizen is "the right assigned by law to enjoy participation in the political life of the state, the administration of the government and the expression of the individual understandings and opinions in politics."⁴ It is not difficult to see there are three elements in the political right of the citizen, i.e., participation in the state's political life, administration of the government, and the expression of the individual understanding and opinions. The definition describes the elements of political rights, yet it is only in form, and it fails to indicate the functions and the essentials of political rights of the citizen as the institutional design in the Constitution⁵. Therefore, the term of the political right of the citizen needs to be understood in the sense of political science. For example, political rights are defined in accordance with the function of the right to participate in the administration of the government and have an impact on public policies. This definition clearly suggests that the function of the political rights of the citizen is to have an impact on political life. But the definition still is biased in taking political right into account.⁶ Political right is further defined as the "qualification to realize the interest allocation of social members."⁷ And this definition links political rights with interest allocation, i.e., it

²Liu, Gang (2002): A Preliminary Survey on 'the Internet Association, in Bao Zonhao (ed.) *Being Digital and the 21st Spirits of Humanities*, Shanghai: Shanghai Sanlian Bookstore, pp. 297-309.

³Luo, Houru (1996): On the Citizen's Direct Right of Legislation, *Law and Science*, No. 2, pp. 23-28.

⁴Xu, Chongde (ed.) (1995): Volume of Constitution, Encyclopedia Dictionary of Chinese Legal Science, China's Procuratorial Press, p. 788.

⁵Li, Qi (1997): Elements and Structures of the Political Right of the Citizen, *Acta of Amoi University*, No 3, pp. 41-46.

⁶Wang, Pu (ed.) (1995): *The Foundation of Political Science*, Beijing University Press, p. 105; p.106.

⁷*ibid*

establishes coherence with form and content, indicating more clearly the function of political rights.

This combination of three aspects of the political rights of the citizen is adequate for the purposes of our research. On the one side, the form of political rights of the citizen is signified by the keywords: participating in political life. On the other hand, the content is signified by the keywords: realizing the allocation of interests. With respect to the present situation of our country and the scope of our research, we put forward a functional definition of an association in terms of the political rights of the citizen: *an association is a mass movement aimed at realizing the allocation of interests for its members and their stake-holders in order to have an impact on policy-making and implementation.*

Political association is underdeveloped in China. There is hardly any association activity that could qualify according our definition of the political rights of the citizen. Even if they, they would be on a small scale and would be limited or cancelled as soon as they are discovered. However, new possibilities emerged with the rise of the Internet.

III. Shaping Stake-Holding Groups over the Internet

The virtual community provides an alternative space for us, though this space is intangible. The Internet has its surreal features. It has a significant impact on the mind and on the idea of the human life in that it provides us with an infinite space of imagination. The Internet belongs to the virtual world that goes beyond the actual world we live in. But we also know that there are close relations between the virtual and actual worlds; the activities carried out in both worlds have their interactions. Special attention should be paid to the impact of the virtual world on the actual world in studying the Internet. Doubtless the most significant impact is *association via the Internet*, or in short the *Internet association*. With respect to our analysis, the activities or behavior in the virtual communities have already gone beyond those in traditional associations, for all of the activities whether they are political or nonpolitical are carried out in the virtual world. And their impacts on human behavior in the actual world are not necessarily specific or perceivable.

The Internet association is a new form of association. And the right of free association is a political right of the citizen. The Internet association, therefore, is doubtless consistent with the political rights of the citizen. However, we make a strict distinction between the concepts of virtual community and the Internet association. That is, the activities in the virtual communities should not be taken as the Internet association when they are irrelevant to the right of association in the actual world, while activities in the virtual communities should be regarded as Internet associations

when they are related to the right of association in the actual world. According to this distinction, *the Internet association is defined as group behavior for realizing the allocation of the interests for its members and their stakeholders in the virtual communities in order to have an impact on policy-making and implementation in the actual world.*

The reason why we make such a strict distinction between the two concepts of virtual community and Internet association is that almost all activities in the virtual world that have something to do with politics can be seen in terms of political rights, which, in our opinion, is unrealistic and unnecessary. For instance, when someone is dissatisfied or even resentful of the policies of the government, he can formulate his opinions in the virtual community where he would elicit both positive and negative responses. Such behavior is consistent with free expression and might have an impact on actual policies. But since a single individual initiates such responses, the group of respondents does not qualify as an Internet association. Likewise, the activities of communities such as hackers could lead to the collapse of servers, damage to hardware and software of the websites, etc. These are not considered as Internet associations. To sum up, so far as the events are concerned purely within the virtual world, they would not be taken account in our definition of Internet associations.

The essence of the Internet is that it can make a link to every person in every corner of the world. In theory, whenever someone is connected to the Internet he could make a contact with anyone in the virtual world. Such contact can be either for the purpose of politics or have nothing to do with it. Therefore, not all of the activities in the virtual communities should be regarded as those of Internet associations on the one hand, and on the other, we must pay attention to the actual effects resulting from these activities. This leads to the following three aspects of Internet associations: First, the sufficient condition of Internet associations, i.e., the activities in the virtual communities are in the hope of making an impact on policy-making and implementation; second, the necessary condition of Internet associations, that is, such activities in the virtual communities really produce a practical effect on a policy, e.g., the revision, suspension or repossession of a policy; third, the criterion, i.e., only the activities in the virtual communities that meet with the both sufficient and necessary conditions are taken as Internet associations. As to our understanding of the concept of Internet associations, such mass behavior implies that people participate in political life via the Internet so as to have an impact on policy-making and implementation to attain their final aim of realizing interest allocation. Internet associations should involve the following aspects: The Internet, in the first place, is the necessary tool for people to participate in free associations, i.e., the Internet provides the formal aspect for people to express their desire to participate in political life, since if there were no Internet there would not be any Internet associations. That is to say,

cyberspace is a place for people to participate in political life. In the second place, the content of Internet associations should be grounded in the actual world, i.e., in order to attain the goal of making an impact on public policy, the present framework of the game should be altered. Otherwise it would be impossible to reach to goal of interest allocation. This is the principal aspect we are concerned with Internet associations.

The purpose of Internet associations is to realize the goal of interest allocation, but how to achieve it? Is it enough only to participate in the form of the Internet? Considering the present situation in China, it can't help but being more than pure form. An essential for Internet associations is to change the framework of the game of the policy-making in the actual world. Without such a goal, there would be no difference between the so-called Internet associations and the activities carried out in virtual communities. That would completely virtual, i.e., it would be an event that is "real in effect but not in fact."⁸ In other words, the Internet association is taken as a new form of association the aim of which is to change the framework of the game. In this new framework the goal is a transformation from the virtual to actual, i.e., a shift from design to embodiment and to realization. Why the Internet association is possible is not only dependent on the form of the Internet, but also the interface that links it to the actual world. If there weren't such an interface, Internet associations would be impossible. However, if there is such an interface, the goal of Internet associations can be attained.

Then, is there an interface in our actual world in China? In our opinion, such an interface does exist. The debate via the Internet on the policy of reducing the state's stakes in the listed companies and the process towards the repossession of the policy, can be taken as a typical case of an Internet association.⁹

IV. A Case Study of an Internet Association in China

According to our survey, an Internet association has been closely related stock market policy. The strong interactions between the government's will and the will of interest groups inaugurated a typical model of an Internet association in China.

⁸Heim, Michael (1993): *The Metaphysics of Virtual Reality*, Oxford: Oxford University Press, p. 109

⁹Liu, Gang (2003): Perspective of the Social Shaping of the Internet of China's Economic Democracy – From Two Civic Schemes of Reducing the State's Stake in Listed Companies. *Proceeding of the Sino-European Symposium on the Social Shaping of Technology*, Sino-European Symposium on the Social Shaping of Technology, Beijing, September 15-16, 2002.

The State Council issued a policy called *The Interim Measures on Reducing State's Stake in Listed Companies to Raise Social Securities Fund* (*The Measures* for short) on June 12, 2001. The aim of the policy is to explore new ways to raise social securities fund and to support the reform and development of the state-owned enterprises. However, the market did not show any recognition of this policy. Four months later, the Chinese Securities and Regulation Commission (the Commission for short) announced a suspension of the execution of the relevant stipulations in *The Measure* and publicly called for schemes on the reduction of the state-owned shares. After the announcement, the Commission got some 4300 copies of schemes and proposals. In the beginning of 2002, the Commission issued its interim achievements of the investigation over the Internet, which stirred up a white-hot reaction on the market. On June 23, 2002 the State Council decided to suspend the execution of the stipulations on reducing state's stake in listed companies by means of the stock market in *The Measures* and promised not to issue any implementation measures. This decision was regarded as the repossession of the policy of reducing the state's stake in listed companies.

During the strong interactions between the government and the market, the gate sites and the websites of financial expertise over the Internet opened various forums, where the opinions of experts and the masses, various analyses, answers, viewpoints emerged, not to mention chat rooms and emails. Technically, it is not really easy to formulate the essentials behind the policy of reducing state's stake in listed companies. However, through plain explanation and scenario analysis over the Internet, the purposes of the administration were thoroughly understood among the laymen. In a case without the Internet, it is hard to imagine that these non-official analyses could find their way to the public. And in the case with the Internet, laymen could have immediate information on the evolution and the changes in the situation and make their prompt reaction via the stock market.

The debate on the public calling for the schemes and proposals went into a substantial period in the mid-November of 2001. This operation of the Commission directly induced the transition of the debate from the stock market proper to the outside, jumping from the debate among the experts to the stake holding groups, transforming a pure economic debate into a deeper political discussion. The gathering of thousands of schemes and proposals in such a short period showed that there is a strong expectation that public policy-making should be consistent with public choices. Two of these schemes proposed by the stake holding groups were paid special attention. These represented a will not completely complying with that of the government. One of the designers of the schemes was invited to take part in a seminar held by the administration bureau. And the interim achievements were first issued over the Internet. After comparison and analysis of various

schemes via the Internet, the interest group of the shareholders of the circulation stock was able to weigh out clearly how far the distance was between the state's will and their expectations.

The issuance of the interim achievements induced a sharp fall of stock markets both in Shanghai and Shenzhen. It was believed that if the markets were allowed to fall, the negative impact would spread over the overall financial industry, provoking the systemic risk to nation's economy. Seeing this, the administrative bureau rapidly made remedies, e.g., relieving essays were issued on the website of the Commission and other principal mass media. Then the stock markets stopped falling for the time being. Analyses showed that the falling of the stock market could be divided into three phases in a year or so. It is obvious that the falling of the stock market began when a policy was issued and stopped falling when the policy was suspended, which showed that the tension of the decisive powers came from the gaming among the different players in the market. In a year's gaming, it was the first time for the shareholders of the circulation stock to have had an opportunity to make an equal dialogue with the state-owned shareholders so that a new framework of the game was found. The model of an Internet association was thus established.

What we are concerned with is the role that an Internet association played in this large adjustment of the framework of economic interests. Our conclusion is that the Internet association is significantly heuristic in the shaping of the coming economic democracy of China.

In the debate over the Internet, the interest groups finally began to appeal to the principle of justice in the market. However, had there no such a large scale debate over the Internet to express the claims of interests from different groups, there would no such a thing as the Internet association. The Internet association condensed the intelligence of the wisdom of the masses to work out the innovation of the Internet association. And this innovation further pushed policy-making in the direction of public choice in economic policy-making.

V. An Ethical Approach to Vulnerability

Ethical approaches to the debate of the public policy have been a popular topic.¹⁰ However, the discussions on ethical aspects of public policy have been rare in China. With the deepening of the reforms towards the market-oriented economy, the discussion has become more and more popular, especially on the policy-making in agriculture, gene engineering and public health, etc. In this

¹⁰Amy, Douglas (1987): Can Policy Analysis be Ethical? in *Confronting Values in Policy Analysis: The Policies of Criteria*, Frank Fischer & John Forester (ed.), Newbury Park, CA: Sage, p. 53.

paper we want to make a trial analysis on Internet associations from the perspective of the ethical principle of vulnerability.

The concept of vulnerability is very common in the field of network security. Whenever the network security is concerned, we would talk about vulnerability. Usually around the cases of the network being attacked, such as probing, scanning, account and root compromising, packet sniffing, denial of service, misuse of trust relations and evil codes (Trojan, virus and worms, etc.) as well as the attack of the Internet infrastructure such as DNS system and routers in the network.

In effect, the concept of vulnerability has already become a general principle in ethics applicable to all sorts of human relationship, especially in the time when ICT and ICS become permissive in nearly every aspect of our social life. Just as Pellegrino and Thomasma put it: "In human relations generally, if there are inequities of power, knowledge, or material means, the obligation is upon the stronger to respect and protect the vulnerability of the other, and not to exploit the less advantaged. This principle of general ethics is applicable to all sorts of human relationships."¹¹

In the market-oriented economy, vulnerability can be seen in every subject of interests. In the analysis of the Internet association, it would also be feasible to start from this general principle of vulnerability, i.e., the stronger has its obligation to respect and protect the vulnerability of the other, and what's more, not to exploit the less advantaged. However, in the market-oriented economy with Chinese characteristics, the power of government is generally regarded as absolute. As far as the stock market is concerned, it is believed that the government is not only the organizer of the market but also one of the biggest players in this market. Obviously, this policy plays a critical role in the economic process. In addition, in the stock market in China from the very beginning has been assigned other values.

The stock market in China has a fundamental difference from those of other countries. China's stock markets are not efficiency-driven. Rather are said to be policy-driven. A policy-driven market means that policy-making has a transcendental power over the market. From the principle of vulnerability, therefore, the administrative bureau has an obligation to respect and protect the vulnerability of other subjects in the market. However, in our case study, we failed to see that the vulnerability of other subjects in the market had been well respected and protected. Inevitably other

¹¹Pellegrino, Edmund D., and David C. Thomasma (1981): *For the Patient's Good: The Restoration of Beneficence in Health Care* New York: Oxford University Press.

subjects had to struggle during the game for their own sake of vulnerability protection. We finally see the result of how the power in a policy-driven market had shifted due to its failure to protect its own vulnerability with the repossession of the policy.

When we did not have the Internet, the power of the government was thought to be transcendental. However, in a situation in which association via the Internet is possible, the power will though the powerful has become only one of the contingent factors in the market. But policy-makers were still immersed with their myth, imagining the necessity of their power. During the process of policy-making, the balance seems to incline to other value charges and to overlook the value charges of the market proper. For instance, in the case of reducing the state's stake in the listed companies, the policy background was covered with value charges such as raising the social securities fund and promoting the reform of the state-owned enterprises. Thus it was inevitable that the vulnerability of other subjects in the market would be free from respect and protect. With the increase of social freedom, policy-makers should be clear that the interaction between the society and state has emerged indicating that the position and the role of society have been elevated.

From the present situation, when most of important elements, such as resources, mass media and speak power are still under the control of the state, the degree of organization of society is very low and the representation mechanism is also very weak, so that the state power is much larger than that of the society. The state still has the obligation to respect and protect the vulnerability of others. Otherwise, it would be impossible to establish a good interaction between the state and society.

VI. Conclusion

In China, groups of multiple levels of interests come into being showing the multiple interests in a market-oriented economy. In a situation of market-oriented economy and continuously developing information technology, the Internet association could fill some spaces in underdeveloped political associations. Generally, Internet associations are favorable to the good interaction between society and the state. With the deepening of the market-oriented economy and the administrative reform, especially the re-location of the government's role and the gradual formation of the new idea of the government, the government would be back to the position it should be: administrating its own affairs and the practice of power endowed by law. It is obvious that Internet associations are a good way for the government to achieve its goal. In effect, prior to the issuance of public policies, the principal ideas can be issued over the Internet to be reviewed by different interest groups. This is definitely favorable to the effective administration of the government.

Sense of Place in the Information Society

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I. The Advance of Technology

As an anthropological concept, there are two types of culture in a local society, one of which is based on technology and the other on values. The culture of technology is identified with efficiency and promises advancement. On the other hand, the culture of values is unique to place. The advance of science and technology has been expanding human abilities in physical and perceptual aspects through creating various tools and goods that increase convenience and comfort in daily life and activities. These experiences historically bring irreversible changes in values and sometimes come with both positive and negative impacts on our society.

Considering modern technologies in relation to the local environment, it appears they often result in social and economic assimilation in any place and are promoted together with globalization. Assimilation means that every place is possibly structured in the same way and, on the other hand, the local differences become distinguishable in the process of social and economical globalization.

As long as we have our home and activity base within a local place and its culture of values, we cannot so easily be free from the influences of our experiences of the place. This results from diversity in our culture and ways of thinking that arouse our curiosity to know and understand, which stimulates communications, even though we sometimes face severe conflict in the process.

The Internet and various information technologies are expected to make us free from the restrictions of time and distance in communication and activities. However, if these technologies deprive us of the unique culture of values in places and promote standardization of places, they are no more than the culture of modern technology. If we call future society the post-modern society, information and communication science and technology are expected to create a new manner of living associated with prosperity, but what does this mean in respect to sustainability of the culture of values related to place?

From this point of view, the culture of information and communication technology should be discussed and some critical issues should be pointed out.

II. What Will Information and Communication Technology Bring to Us?

As information and communication technology are expected to make us free from the restrictions of time and place and to create virtual communities without corporeal and coexistent interaction in physical conditions, the impact of this change on the experience of place and the related question of the sustainability of the culture of values will be the focus of this discussion by introducing two examples below.

The mobile phone is now very common and has developed as a compact and personal interface to the Internet and communication infrastructure in Japan. We can observe significant phenomena that might alter the concept of place. These phenomena and possible transformation of place concepts are:

- 1) No time and no exact spot are necessary for an appointed meeting in a town as long as simultaneous exchange of information about visible objects at the place is available. In this case, *place is not necessarily experienced and recognized as the common knowledge of locality, and the context of place will easily be lost.*
- 2) We will be free from the need for a time and place for communication. *Place loses the value of situation or coexistence in communication that often generates sympathy and stimulates the imagination with nonverbal interaction.*
- 3) One can always connect with the Web database which is decoded by a personal code: for example, place will be no more than the physical conditions of GPS. *Place is possibly dissolved losing collective experience and meanings.*

The Internet is now coming to be a social infrastructure. This is surely generating a new manner of living and activity style that is hard to overview, but some possibilities can be examined even though we are not sure yet whether these manners and styles will be popularized. Some possibilities have already appeared:

- 1) A new community, a virtual community, is emerging on the Net with a guarantee to be anonymous and with personal autonomy to plug in and out. *A place to live as home or for use as an activity base will represent one's whole social identity, and one will possibly appear as a different character in various communities.*

2) One will be able to work in anyplace supported by the global network. Houses or buildings will be one of the nodes of interface within the global network. *Place might be divided into points of interface.*

3) It is not necessary to go out to meet people for communication or to seek information or even to obtain goods for life within the Net order. One will be less conscious about one's place and local environment as long as comfortable living space for interface to the Net is secured. Place is not necessarily always associated with ordinary living conditions.

III. What Is a Sense of Place?

As observed above, the relation between man and place might be changed in an information society with a loss of consciousness about place. Therefore, it is necessary to examine what is significant for the sustainability of a culture of values. Sense of place is one of the concepts to generate local values and meaning of place and to enable us to recognize and regenerate the identity of the place. Sense of place:

1) is acquired not only by visual information about the environment but also through interactive experience of the place as a whole.

2) functions as a local code to recognize and understand the culture of values in the place that often appears in townscape and living settings.

Moreover, sense of place is based on cognition of historical time related to the setting as well as to the physical conditions of the place. Thus, it recognizes and values the quality of the environment.

IV. Sense of Place as Local Code

We conducted research on residents Kobe's evaluation of a townscape where drastic urban renewal is ongoing. These four photos (Fig.1) were taken by the residents in the course of research in which we asked them to show their favorite townscape. Through interviews about the photos that they took, it became clear that these four photos reflected the same image, which is specific to the area. This was "mountain." This area in which we conducted this research is a narrow

urbanized area located between the mountains and the Inland Sea. Thus, the mountain is always in our sight somehow or another that gives residents orientation and a comfortable sense of home, and they, perhaps without consciousness, realized the basic image of the area even if the buildings had been changed.



Fig.1 Typical Photos of Favorite Places

In the course of our interviews, the people who took these photos often referred to the mountain. However, students who worked together did not take note of this reference for awhile because they had no familiar experience of mountains in their lives as did the residents. However, I could easily understand their reference to mountain as I had lived in the same local area. This is a very similar experience to one I had with an American friend who once insisted that it was not a “mountain” but a “hill” when he saw the photo of the area. Even though we observe the same visual information, various understandings come out depending on diversity of experience of places.

These four photos are completely different in appearance but have the same image and meaning of place. Without an interview to examine by verbal interactive communication what the people who took these photos wanted to present, we could hardly recognize it. We often experience that a photo shows a fragment of landscape and it is hard to fully comprehend the image of the landscape when focusing on the object. These photos were also either too fragmentary or excessively wide

views including unfocused settings around the objects to transfer what they experienced and focused on.

V. Understanding Local Code Based on Common Experience and Culture

Through the discussion about the four photos, we understand that common experience and local culture are necessary to read the local context of the place that generates a sense of place. The visual information or data does not guarantee that it represents the local meaning of the place without sharing the local special code, and three issues will emerge indicating the possible diversity of understanding of visual data. These are:

1) *Does anyone recognize the meaning of mountain in the interview?* Local value in the physical settings is very much based on local context that is shared among those who have the same experiences in the place. Both visual data and written texts are understood in many ways, and even words used in communication are selectively focused to reflect various kinds of information depending on listeners' knowledge and interests.

2) *Is this a mountain or a hill?* Visual data and text are not necessarily synchronized. It is always difficult to transfer the exact concept or meaning even by visual data as long as our image perception and cognitive processes depend on our language.

3) *What is focused on in the picture?* Visual data that is framed as a picture and a fragment of a setting can sometime fail to carry the image or meaning of an environment as a whole. Thus, such data can easily lose the environmental context of the place.

These issues imply that in a Net society based on processed information, we always face misinterpretations because of the lack of sharing of common local contexts for understanding settings, because of the diversity in images based on differences in language, and because of ignorance of intentions in processing information.

VI. Sense of Place for Local Sustainability

This is also the type of visual data that explains urban issues in Kyoto. Most people regard Kyoto as an historical old city in Japan. However, the temples, shrines and traditional gardens that produce the typical popular image of Kyoto are located at the edge of the urban area. The historical urban center is now the commercial and business district though, and except for the area along the

main street, many traditional shop houses, which are called *Machiya* in Japan, still exist as part of this picture. The big issue now is high rise condominiums in this historical urban center (Fig. 2).

As it is the commercial and business district now, economic pressure for redevelopment is comparatively high. Even though people are willing to accept urban renewal which is expected to result in an increase of local population and activation of local economy, they also are concerned to find how the old and new concepts can coexist in an historical context.



Fig.2 Confusion of townscape with high rise condominiums

VII. Urban Center Conflict and Transfer of Local Special Codes

Machiya are designed not to disrupt the neighborhood, and the quality of the living environment has been maintained as long as the *Machiya* style is followed. The conflicts between the traditional shop house or *Machiya* and the condominium emerge in living environment concepts such as passive control or technological control of comfort as well as physical aspects such as the difference of building height and facade design. The sense of place has to be reorganized to be understandable so as to be shared with those coming from outside of the local community for coexistence.

The conflicts created by high rise condominium development also emerge in social aspects such as difficulty in community management of the living environment as well as physical aspects such as confusion of townscape and transformation of the spatial structure of the block. In the old days, people living in a community had an ordinance as written text, which perhaps is now most necessary.

The central issue of sustainability in the historical urban center is how to develop local control both through effective regulations and community management to manage the coexistence of urban renewal and preservation of the physical aspects of historical characteristics and sense of place, while recognizing the importance of economic and social redevelopment. Understanding the sense of place unique to the local place is necessary to evaluate essential environmental values that should be economically equivalent to land value.

VIII. Information of Place and Sense of Place

Physical aspects and conditions are measurable to create various data, and these phenomena can be recorded as visual and other types of data. Spatial structure and activities in the place can be translated into a large quantity of text. Even though the place might be objectified and transformed into precise data and images, these data and images often fail to share the culture of values in a local place that are more accurately embodied in the collective experiences in the place.

We can use a universal yardstick to compare numerical data and/or statements. However, there are many yardsticks available when the numerical data and/or statements are translated for meanings and value. Sense of place might be one of them. Information and communication technology provide us with large quantities of data, text, image and other types of information that are possible to be digitally coded, but it is critical whether we can share the meaning and value without some adjustments to find a common language.

From this viewpoint, the questions will be to what degree can information in any form on the Net carry meaning and specific values about place and whether communication on the Net supported by technology will be sufficient to make us recognize the differences in each other's understandings and drive us to find a common language in such a highly anonymous world?

IX. Net Community and Real Community

It will not be far in the future when we will be faced with the need to cope with a society where Net communication works as the premise for our living. The sphere of living in Net communication refers to a virtual community and it is in contrast to our real places. The virtual sphere is incorporeal, antispacial and asynchronous, but real places where our bodies exist are corporeal, spatial and synchronous. There must be more contradictions between the two spheres, but these three aspects are significant when we discuss the conditions of interaction between persons or between people and their environment in which identities are always suspected.

In the virtual sphere, it is possible to avoid negative feelings or sharing as well as hazards related to physical encounters as long as one keeps one's autonomy to plug in and out. It is easy to quit the interaction without excuse. In a sense, one has physical security. The word "security" originally derives from "se-" meaning "without" and "-curity" meaning "care." Thus, "security" implies "without care." The virtual sphere demands security in access to information and personal identification for interaction and the real sphere demands mutual care, in other words, consciousness of others for interaction to identify with each other.

At the same time, however, the virtual sphere is always available to anyone, which sometimes threatens the security level of the real sphere in which a sense of care and consciousness will take an important role in reducing risk based on the unknown differences and diversity in the society.

The advancement of technology, which will help us to realize what we desire, should also be sufficient enough to make us recognize the differences in each other's understanding in a highly anonymous world. By its nature, to live in a Net society, we are required to be aware of the necessity for a more sensitive consciousness about the high possibility of misinterpretation.

X. Sense of place as entrance into discussion

Sense of place is generated by interactions with caring based on experiences of the local environment in the real sphere. It is an example of what is one of the most difficult elements to be transformed into the virtual sphere where experiences are nonspatial, asynchronous and personal within the present information and communication technology.

It is useful to consider something that is hard or impossible to be transformed into data in order to evaluate the positive and negative aspects of Net communication ability. Science and technology essentially seeks for development of more advanced technology to create a new future for civilization. However, it is always left for us to decide whether we accept it socially or not with the viewpoint of its effect on the sustainability of human culture.

Discussion: Plenary Session III

Following **Joan Sieber**'s presentation, **Toshihiko Hayashi** inquired about how many professional science and engineering societies had written codes of ethics accessible on the web? **Sieber** responded that while several scientific societies had posted ethical codes of conduct on their website, the majority did not do so out of concern that ethical guidelines might become codified into rigid laws.

Hisako Koura noted that ethical issues are becoming important in Japan, where students are required to take a course in engineering ethics. Faculties of engineering were still not sure how to proceed, however. **Sieber** suggested that ethical guidelines of professional societies, as well as university courses in ethics, ought to be considered as works in progress. Professional society codes of conduct ought to be considered as guidelines rather than as provisions set in concrete. She went on to emphasize that in the event that a scientist or engineer were to be brought to court accused of wrong doing, if he or she could demonstrate that professional guidelines had been followed, the courts would be inclined towards leniency. **Pauline Newman** agreed with this interpretation.

Hayashi noted that ethical considerations, whether or not posted on the web, are based largely on personal, culturally oriented concepts. Could these guidelines be used as a basis for governing use of the Internet? There are, after all, far more serious problems than the ethics of science and engineering, such as the use of the Internet for terrorism or cyber crime. How can the international community organize itself to oversee the healthy working of the Internet?

Tom Ratchford suggested that many ethical codes of conduct developed by professional science and engineering have been used for defensive purposes. For example, civil engineers can be held liable for their misjudgments and failures. But individuals engaged in research in physics or chemistry, for example, may not even be aware that their respective professional societies have even adopted ethical codes of conduct.

Commentary. Following the three presentations, **Yang De-li** provided a general commentary on the session. He emphasized that all the presentations had involved ethical considerations. **Sieber** had discussed her own experiences in teaching an ethically-related course on the Internet. **Liu Gang**'s paper had posited the use of the Internet to further ethical conduct in the larger society. **Hisako Koura** had raised critical issues about the impacts of the Internet on traditional values.

Yang went on to note that Chinese university students must now take at least one course in ethics as a requirement for graduation. In particular, science and engineering students must now take a course in professional ethics taught by experts outside their major departments. Are their cultural differences in the perception and transmission of ethical norms. **Sieber**'s course could be useful in China to help resolve existing and persisting discussions about these issues.

Masashi Ueda suggested in the final session of the seminar the need for care in understanding and developing relations between conventional or normal human activities and the capabilities of new information and communication technologies. The three presentations, in addition to earlier presentations, had suggested potential conflicts that had been brought into relief, if not actually created by the Internet and related information and communication technologies: between globalism and local custom; between what is virtual and what is real; between long established policies and administrative practice and new capabilities; between economy and community; and between control and trust. **Ueda** suggested that a point of departure for mediating these potential conflicts might be resolved by **Koura**'s interpretation of sense of place.

Ueda denied the necessity of choosing between the polar extremes of neo-Luddism with respect to Information and Communication Technology, and uniform adoption of global standards. He asked whether in developing effective communication via the Internet we need a set of linked local codes or a new, global way of thinking. In short, we may need a new approach to social interactions with respect to the information revolution in much the same way that our forbearers struggled for a such a new approach when faced with the realities of the industrial revolution.

Open discussion. Referring to **Koura**'s presentation, **Gary Olson** noted that the Internet permits one to experience a place before actually traveling there and so may enhance enjoyment of that place. **Koura** responded that experiencing a place via the Internet is very different than growing up there. Can the Internet blur the line between reality and imagination?

Geoffrey Bowker suggested that information technologies can be used to enhance a sense of place. For example, the Active Campus project at the University of California, San Diego, makes use of wireless technologies to tell stories about specific places throughout the campus to do just that. Building on Bowker's example, **Bill Blanpied** challenged urban designers and planners, including **Koura**, to build information technologies into their plans in order to enhance a sense of place. For example, in places where an old building has been destroyed to make room for a new one, architects and urban planners could use virtual reality techniques to recreate the old building in cyberspace.

Toshihiko Hayashi noted that information communicated by a teacher to, say, 30 students is processed as knowledge in 30 different ways, depending on the context of frame or reference of each student. These frames of reference are conditioned by the sense of place in which each student grew up. If all students had the same formative sense of place, the world would be completely uninteresting. Internet users should be aware of the hazards of reducing or even destroying this vital sense of place.

Paul Uhler suggested a somewhat different, more positive perspective on sense of place and the Internet. The Internet allows individuals throughout the world who share common values and interests to form virtual sub-cultures distinct from the values that may be imposed upon them by the localities in which they reside. **Olson** pointed to scattered communities in the Arctic regions to bolster **Uhler's** point.

Shinji Shimojo suggested that while it certainly easy to lose a sense of locality in cyberspace that may be because the technology is still too simple. As the Internet becomes increasingly sophisticated, the threatened loss of a sense of locality that **Koura** had discussed might well recede.

Elaborating on this suggestion, **Bowker** invoked an historical example. The first industrial revolution, centered on steam, brought urban dwellers to cities and concentrated them in locations close to factories dependent upon steam power. The second wave of the industrial revolution, based on electric power, led to a dispersion of laborers and a consequent change in the quality of their lives. Likewise, before the advent of personal computers and the Internet, people who wanted to make use of information technology were obliged to go to a central facility where a main-frame computer was housed and most often needed to spend several hours to learn whether the programs they had given to a technician would work or not. With the advent of personal computers, wireless technology and the Internet, it is possible to work in many different locations—by a stream, for example, where one might choose to sit and read a book. So perhaps the Internet has the capacity to broaden the sense of place concept.