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National Institute of Informatics

# NII News

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Detailed information on the research and projects of NII is available at our Website.

- http://www.nii.ac.jp/index.html
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# Ph.D. Program in Informatics (Ph.D. course) Accepts 14 New Students

Beginning in fiscal 2002, NII has participated in the Graduate University for Advanced Studies, which offers Ph.D. courses. This participation is in response to the significant need to provide graduate education unique to NII and to meet the societal need to educate advanced IT specialists. After making adequate preparations, NII gave an entrance examination on April 10, 2002. The selection committee for the Ph.D. program conducted a careful selection process before selecting 14 students, although only six were originally planned to be accepted.


On April 18, the Graduate University for Advanced Studies held the entrance ceremony in Hayama-machi, Miura-gun, in Kanagawa Prefecture. Lectures for the Ph.D. program in informatics began at NII in late April.

This Ph.D. program in informatics is intended to train and educate researchers and engineers so that they may acquire a basic understanding of informatics and develop broader perspectives, more flexible thinking, and more advanced technical expertise. To this end, NII intends to further enhance and improve graduate education, including the NII facilities, faculty, and curricula.

On July 25, 2002, NII held the "2002 NII Open House" to introduce the Ph.D. program in informatics to applicants with poster exhibits, and with individual guidance offered as well.

NII's Ph.D. program in informatics also established an international graduate course in October 2002 to admit elite students, mainly from Asian countries, for education in an international atmosphere, in an effort to develop internationally minded and creative researchers capable of responding to new trends in academic research. Six non-Japanese students are currently enrolled.

Lectures in this international graduate course are generally given in English. Upon completing the course, students are expected to work actively in their home countries or other places as leaders in respective international arenas.

# Graduate Course Education

The Department of Informatics (Ph.D program) has been established in April, 2002 with 14 regular course students (including one foreign student) as a new department of the School of Mathematical and Physical Science of The Graduate University for Advanced Studies (Sokendai), as it is informed on the NII official Web page. The regular course begins in both April and October, and one student entered in October, 2002 as a regular course student.

Moreover, the international graduate course began in October, 2002 as an additional program of the department. Six foreign students (2 governmental scholarships and 4 NII scholarships) have entered to the course. Therefore, the first-term students are 21 in total. We could say it is a promising start. Especially 4 foreign students in the international course are supported by the NII scholarship, which was funded by the cooperation of Japan's leading IT enterprises in order to gain the excellent students from primarily Asian countries. It should be noted that regular-course students and international course students are learning jointly, and most of the lectures as well as seminars are in English. It would be one of the

important features of the Department of Informatics.

The department consists of four research and education areas covering from the Computer Science and Engineering to Humanity and Social Science, which are Foundations and Infrastructure Science, Software Science, Intelligent Systems Science, and Information Environment Science.

It aims to foster leading researchers with a wide-vision of informatics and advanced IT specialists, in our ideal environment as an institute of advanced Informatics.

*(Prof. Haruki Ueno, Human-Machine Symbiosis Research, Intelligent Systems Research Division)*

# NII Symposium ("Advanced Informatics Opening Up the Future") Held to Commemorate Opening of Graduate University

The National Institute of Informatics (NII) began participating in the Graduate University for Advanced Studies in April 2002 with the goal of nurturing specialists (researchers and engineers) in information technology (IT), which is regarded as an important component of Japan's national strategy. The university will offer a doctoral program in Informatics. In February 27, 2002, immediately prior to the opening of the graduate school, NII held a commemorative symposium entitled "Advanced Informatics Opening Up the Future" at the National Center of Sciences.

*(Research Cooperation Division)*

## ■ About the Doctoral Program in Informatics

The Graduate University for Advanced Studies (based in Hayama, Kanagawa Prefecture) conducts educational and research activities consisting exclusively of graduate programs (doctoral courses) provided through the cooperative efforts of inter-university research institutes. Educational and research activities are basically conducted at inter-university research institutes. Students at the Department of Informatics are educated and conduct research at NII, then are awarded degrees at the Graduate University for Advanced Studies.

The "Ph.D. program in Informatics" established by NII at the Graduate School of Mathematical and Physical Science of the Graduate University for Advanced Studies is intended to educate researchers and advanced specialists in the field of informatics based on systematic and comprehensive studies on informatics. Informatics is a new and comprehensive academic field of information, encompassing not only basic concepts, basic theories, and basic sciences / technologies, but also various issues concerning information systems science and social information science, and related disciplines.

The doctoral program in informatics primarily consists of four educational / research fields: information infrastructure science, software science, intelligent systems science, and information environment science. The faculty of NII teaches these courses. The Ph.D. program in Informatics has the following distinctive features:

1. The program targets the development of a new kind of informatics researcher possessing a broad perspective and highly specialized knowledge in informatics.
2. The program targets the training of informatics researchers capable of conducting research at the international level.
3. By organically integrating the very practical environment of NII and advanced informatics research, researchers can be trained to solve real-world problems.
4. The program provides opportunities for working professionals, who can draw on accumulated experience and expertise to receive further training and become expert informatics researchers able to participate in international research activities.

*NII offers a flexible curriculum and educational environment for those already working in the field of informatics.

5. Many foreign students have expressed interest in continuing study on information technologies based on a broader perspective, with a view to earning a doctorate degree at a graduate school of informatics in Japan. Consequently, this program will also accept distinguished foreign students to help them become outstanding IT researchers and technologists.

Research demonstrations and poster sessions at NII Open House

For details about the contents of the NII doctoral program in informatics, please refer to the NII web page (URL : http://www.nii.ac.jp/daigakuin/).

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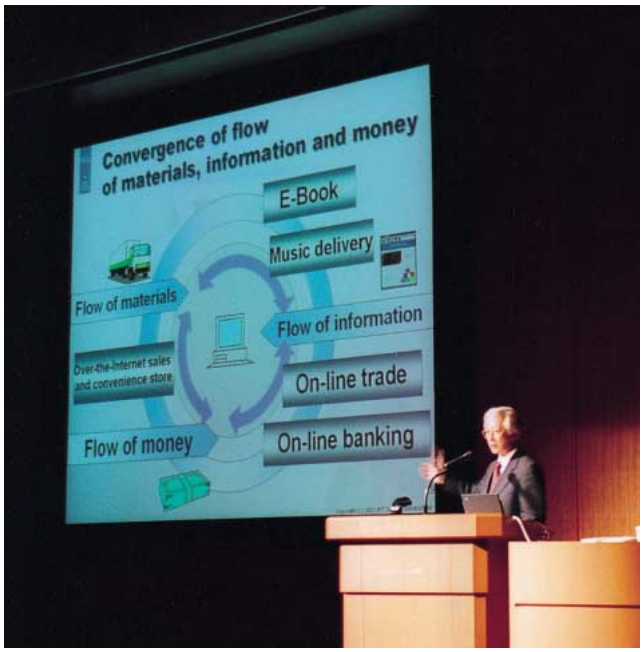
## ■ NII Symposium "Advanced Informatics Opening Up the Future"

Prior to opening of the NII Ph.D. program in informatics in April 2002, an NII Symposium entitled "Advanced Informatics Opening Up the Future" was held to publicize the National Institute of Informatics and Ph.D. program in informatics.

After the welcoming greeting offered by Prof. Yasuharu Suematsu (NII's Director General), Prof. Kinji Ono (NII's Executive Director of Research) presented general information about the National Institute of Informatics. Prof. Haruki Ueno, Director of NII's Intelligent Systems Research Division and chairman of the Symposium Steering Committee, explained the contents of the Ph.D. program in informatics.

These opening remarks were followed by a lecture given by Professor Takamitsu Sawa (the former Deputy Director General of NII and Director of the Institute of Economics Research at Kyoto University) on the extent scientific methodology has deepened our insight into society. He emphasized the progress and limitations of economics structured as a "science" based on the model of classical mechanics.




Lecture by Prof. Takamitsu Sawa, the former Deputy Director General of NII

Dr. Toshiharu Aoki, President of NTT Data and a member of NII's Board of Councilors, then delivered a lecture on the "Progress of IT and Changing Values." He gave an overview of changing values in society brought about by the progress made in IT, and the consequential effects on industrial and corporate structures, as well as the repercussions for new business initiatives.

Prof. Lotfi Zadeh (Professor Emeritus from the University of California at Berkeley and a member of NII's Advisory Board) delivered the final lecture

Lecture by Dr. Toshiharu Aoki, President of NTT Data

Lecture by Prof. Lotfi Zadeh, Professor Emeritus, University of California at Berkeley

on the "Concept of Protoform — Search Engines with Deduction Capability," concerning the basic concept of adding deduction capability (fuzzy reference function) to search engines.

The lectures were followed by a brief overview of the educational and research activities in the Ph.D. Program in informatics. In the field of information infrastructure science, Prof. Ken Hayami introduced the "mathematics of interactive solvers." In the field of software science, Assoc. Prof. Ichiro Sato gave a brief presentation on "Mobile Agents." In the field of intelligent systems science, Prof. Ken Sato introduced "speculative computation using abduction." In the field of information environment science, Assoc. Prof. Noriko Kando presented research findings on " information retrieval and technology to make information immediately usable." Assoc. Prof. Frederic Andres also gave an academic demonstration over the Internet from France.

Finally, the symposium was concluded with advice offered to candidate graduate students.

Simultaneously with these lecturers, NII Open House was held in the afternoon on the first floor of the National Center of Sciences Building to introduce latest research achievements of the National Institute of Informatics. About 30 research achievements were presented in PC demonstrations and poster sessions. There were also dynamic demonstrations, such as an experiment involving the remote control of mobile robots through a network connection with Chiba Annex, and a demonstration of cooperative studies utilizing a multipoint entry device. Candidate graduate students as well as others interested attended the NII Open House. Some of those attending engaged in enthusiastic discussions with presenters. Many non-Japanese visitors from foreign embassies in Japan also attended and listened attentively to explanations given in English

# Successful Launch of Super SINET —World's Fastest 10-Gbps Network

On January 4, 2002, the National Institute of Informatics (NII) initiated the operation of "Super SINET," the world's fastest academic information network using the latest optical communications technology.

Super SINET, introduced in the "Initiative of e-Japan" announced by IT Strategy Headquarters in March 2001, connects such research institutions as the University of Tokyo and the National Astronomical Observatory using OXC (optical cross connect) devices capable of instantaneously switching optical signals and WDM (wavelength division multiplexing) devices. This is the world's first network to connect research institutions solely with optical technology.

The 10-Gbps backbone circuits connect each research institution in a radial manner with one of the OXC devices installed in Tokyo, Nagoya, and Osaka. These circuits will be used for the time being as the communication base for research information in such fields as high energy and nuclear fusion science, genetic information analysis (bio-informatics), space and astronomical science, supercomputer-interlocking distributed computing (GRID: Global Resource Information Database ), and nanotechnology.

To commemorate the launch of Super SINET, the "Second Super SINET Promotion Council meeting" and "Super SINET opening ceremony" were held on January 9 at the National Center of Sciences.

The ribbon-cutting ceremony which celebrates the launch was performed by six people. Parliamentary Secretary Tokio Kano of the Ministry of Education, Culture, Sports, Science and Technology, Research Promotion Bureau Chief Akio Endo of the Ministry of Education, Culture, Sports, Science and Technology, Secretariat Councilor Toichi Sakata of the Ministry of Education, Culture, Sports, Science and Technology, Senior Executive Advisor Koichi Sakata of Japan Telecom (which provides communication lines), Director General Yasuharu Suematsu of NII, and Professor Shoichiro Asano, chairman of the Super SINET Promotion Council.

After the ceremony, commemorative speeches were delivered by Parliamentary Secretary Kano of the Ministry of Education, Culture, Sports, Science and Technology, Director General Suematsu of NII, and Senior Executive Advisor Sakata of Japan Telecom. This was followed by an ultra-high-speed visual remote communication demonstration conducted over Super SINET lines with the High Energy Accelerator Research Organization in Tsukuba. Organization Director General Hirotaka Sugawara then offered greetings, and exchanged words with Director General Suematsu of NII .

Cutting the ribbon at the opening ceremony

At the “Second Super SINET Promotion Council meeting” held prior to the opening ceremony, activity reports were presented from five research divisions of Super SINET (on the topics of high energy and nuclear fusion science, space and astronomical science, genetic information analysis, supercomputer-interlocking distributed computing (GRID: Global Resource Information Database) and nano-technology)..Activity report on ITBL (Information Technology Based Laboratory) as a related research was also presented /

Extending its target to new advanced research fields, Super SINET planned to be expanded not only to universities and inter-university research institutes, but also to other kinds of institutions such as research institutions of independent administrative agencies.

*(Network System Division)*

Congratulatory speech by Parliamentary Secretary Tokio Kano of the Ministry of Education, Culture, Sports, Science and Technology

Congratulatory speech by Director General Yasuharu Suematsu of NII

High-Vision live communication with the High Energy Accelerator Research Organization

# A Project Meeting of the Research Project "Informatics Studies for the Foundation of IT Evolution"

## (supported by Grant-in-Aid for Scientific Research on Priority Areas) was held on 19 and 20 June 2002.

The research project "Informatics Studies for the Foundation of IT Evolution" started in FY2001 and continues for five years. This project is supported by MEXT (Ministry of Education, Culture, Sports, Science and Technology) under "Grant-in-Aid for Scientific Research on Priority Areas". The project leader is Professor Yuichiro Anzai, Keio University. Since the start of this project, NII has been assisting this project in various ways with fulfilling the responsibility of the inter-university organization that was established for informatics research.

Snapshot of the Meeting.

IT (Information Technology) is progressing very rapidly and having a significant influence on our society and daily life. The aim of this project is to conduct informatics studies which would contribute for laying the foundation of continuous and profound evolution of information technology. As information technology has a broad impact on our society, informatics studies are essentially related to various research fields. Therefore, this project is organized so that a wide scope of informatics studies could be covered by this project with reflecting the social needs for information technology. By taking this approach, this project is expected not only to promote IT evolution but also to accomplish comprehensive informatics studies that build the scientific and interdisciplinary foundation for both informatics and information technology.

This project consists of six groups, each of which mainly focuses on a particular subject: software engineering, digital contents, human information processing, information security, grid technology, and social institution, respectively. Each group consists of 10 to 30 research teams which are generally composed of university researchers. Altogether, about ninety research teams are participating in this project. Nine of them are research teams from NII.

A project meeting was held on 19 and 20 June 2002. More than 100 members, who were leaders and members of research teams, attended this meeting. A progress report was presented by each research team and plans for the further advancement were discussed with participants. The next project meeting is scheduled on 22 and 23 January 2003.

Snapshot of the Meeting.

# Inaugural Address

Planning and Coordination Director
(Deputy Director General)

Masao Sakauchi

I had the privilege of taking the office of Deputy Director General of National Institute of Informatics (NII) in July 2002. I'd like to do my best for activating NII by supporting Dr. Suematsu, Director General, with Institute's staff members.

Through four years experience as Director General of Institute of Industrial Science Univ. of Tokyo, I deeply recognize sever environment of academic institute under present reforming of Japanese national universities. However, I surely understand this situation as 'big chance' for advancing of NII. Making our own features more clear, I'd like to promote NII's research and service activity.

Our research target, Information field (IT) , is now considered as a "criminal" of economical recession or IT bubble collapse. However, I believe this means the paradigm shift for surfacial or fast food type of IT services to new and true IT services based on advanced and sophisticated research and development.

From these two viewpoints, I again recognize the importance of activating NII's research. I hope you would give us your kind assistance and cooperation.

# Seminar on Numerical Analysis and Applied Mathematics

On May 23rd, 24th and 27th, a seminar on numerical analysis and applied mathematics was held on the 12th floor of the Center for Sciences, cosponsored by Japan Society for Industrial and Applied Mathematics (JSIAM) and the National Institute of Informatics.

The invited lecturers were mainly foreign researchers in numerical analysis and applied mathematics,who had assembled to attend the ICIAM (International Council for Industrial and Applied Mathematics) Board Meeting, also held in the same building on May 25th.

Approximately 30 people attended, including Japanese researchers in numerical analysis. Lively discussion took place for each of the interesting lectures. The program was as below.

*( The photos were taken by Professor Damlamian. )*

May 23rd ( Thursday )

(1) Opening ( Nagoya University, Professor TaketomoMitsui )

(2) Professsor Olavi Nevanlinna ( Helsinki University of Technology, Finland )
Meromorphic Resolvents and Iterative Methods

(3) Professor Ian H. Sloan ( The University of New South Wales, Australia )
Numerical Integration with Many, Many Variables.

(4) Professor Alain Damlamian ( University of Paris 12, France )
Multi-Scale Homogenization and Periodic Unfolding.

May 24th ( Friday )

(1) Professor Reinhard Mennicken ( University of Regensburg, Germany )
Spectral Theory for Systems of Differential Operators of Mixed Order and Applications

(2) Professor Rolf Jeltsch ( ETH Zuerich, Switzerland )
The Method of Transport for Systems of Hyperbolic Conservation Laws.

(3) Professor LI Tatsien ( Fudan University, China )
Exact Boundary Controllability for Quasilinear Hyperbolic Systems and its Applications

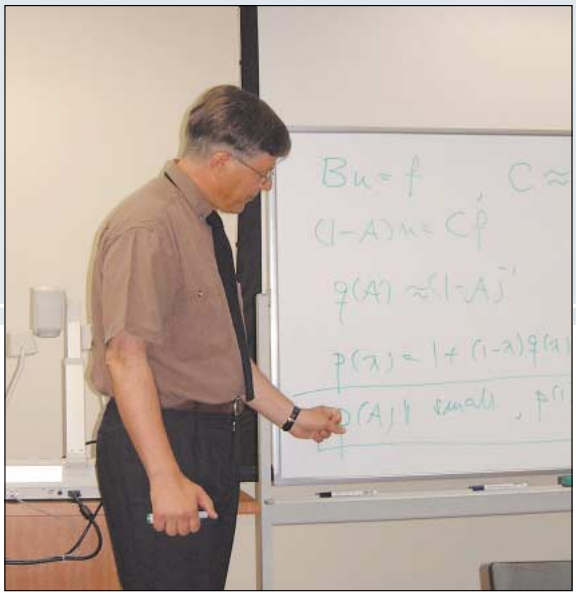
May 27th (Monday)

(1) Professor Bob Russell ( Simon Fraser University, Canada )
Adaptive Algorithms for Solving Time-Dependent PDEs.

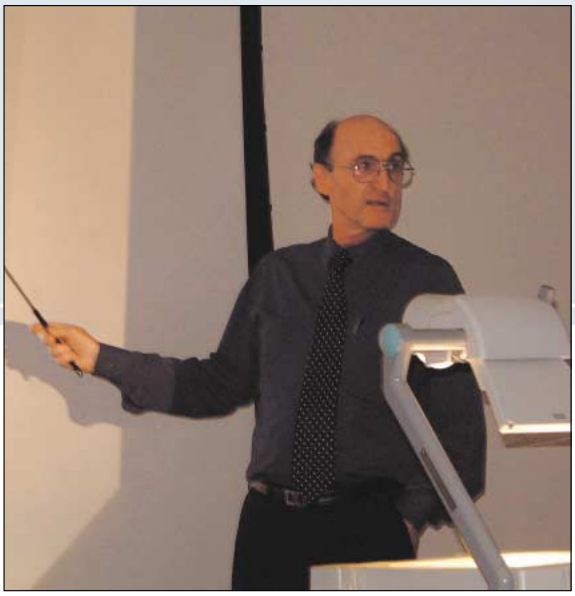
(2) Professor Robert O'Malley ( University of Washington, U.S.A. )
Shock Motion for Singularly Perturbed Partial Differential Equations.

(3) Professor Siegfried M. Rump ( Technical University Hamburg-Harburg, Germany )
Structured Perturbations

*(Ken Hayami)*



Professor Olavi Nevanlinna



Professor Ian H. Sloan

# IA Framework for Dynamic Clustering in Text-based Information Spaces

Associate Professor
Information Networking Research
Infrastructure Systems Research Division

## Akiko Aizawa

Graduated in 1985 from Dep. of Engineer, University of Tokyo; completed in 1990 the doctor course in engineering of the University; Dr. Eng.: Took the present office in April 2000, after an Associate Professor, Systems Research Division, NACSIS; covers specialty in information and knowledge engineering.

A framework for clustering in text-based information retrieval systems is presented, where collections of micro-sized clusters are generated and utilized as indispensable resources of retrieval systems. The prominent features of the proposed method are (i) documents, terms, and other related elements of textual information are clustered simultaneously into small overlapping clusters, and

# Ultra-High-Speed Networking Systems

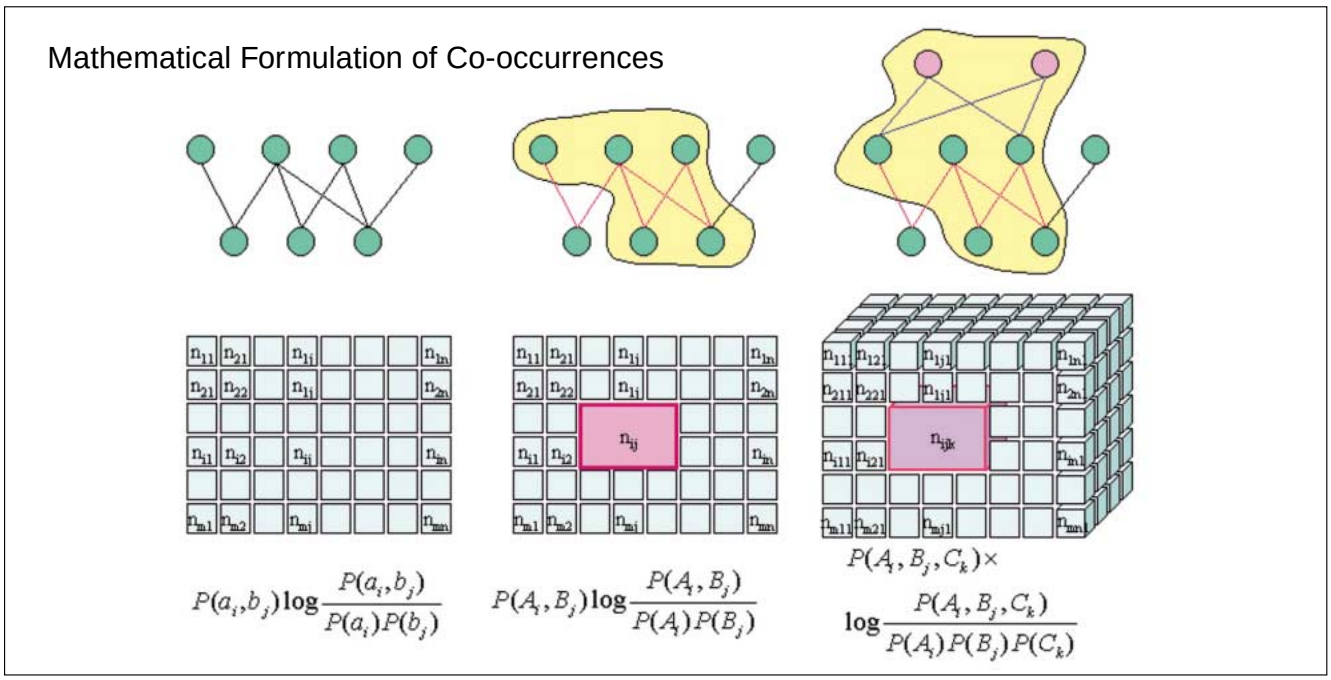
Visiting Associate Professor, High-Speed Network Laboratory,
Research Center for Testbeds and Prototyping, NII
Group Leader, NTT Network Service Systems Laboratories

## Shigeo Urushidani

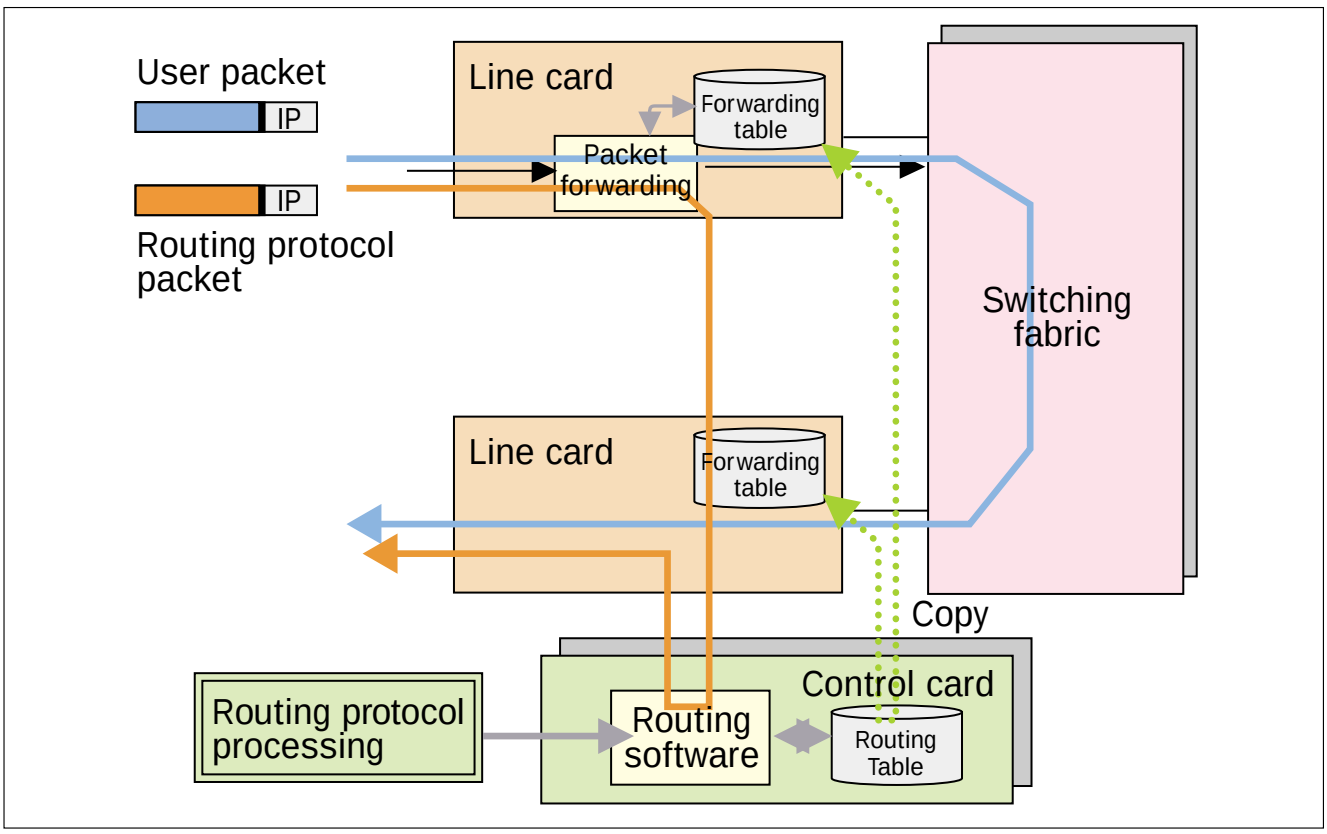
received B.E. degree in electrical engineering and M.E. degree in electronic engineering from Kobe University in 1983 and 1985, respectively, and Ph.D. in electronic engineering from the University of Tokyo in 2002. He joined the Nippon Telegraph and Telephone Corporation (NTT) in 1985. His research interests include high-speed network architectures, high-speed switching /routing systems, high-speed switching fabrics, and routing /signaling protocols.

Explosive growth of broadband internet access services has accelerated the widespread construction of high-speed IP backbone networks, where high-speed networking systems such as high-speed IP routers and DWDM systems play a major role. Recent high-speed IP routers are required to attain wire-rate packet transfer for up to an OC-192 (10Gbps) line, sophisticated quality of service (QoS) control for several QoS classes using Differentiated Services (DiffServ) functions and advanced traffic coloring mechanisms, IPv4 and IPv6 dual stack packet transfer, and traffic engineering using MultiProtocol Label Switching (MPLS). Various architectural ideas for high-speed and sophisticated packet processing have encouraged the development of advanced IP routers. The core switching fabrics employ the ATM-like architecture to attain high-performance in terms of throughput and switching delay. Optical technologies such as compact WDM modules and wavelength routers as well as high-integrated and high-density technologies are promising to enlarge the capacity of switching fabrics. We have strong prospect of up to 5 Tbps switching fabric using packet-by-packet wavelength allocation and switching mechanism and very small WDM devices through some feasibility tests. In future cooperation between

(ii) clusters are generated dynamically based on some statistical sampling policy. In the talk, the mathematical formulation and implementation of the clustering method are briefly introduced, together with some experimental results.




IP and optical layers will be required to sustain rapid expansion of IP backbone networks and reduce the network operation cost. The system architecture for the backbone networks will drastically evolve by employing the advanced technologies such as optical switching devices, ultra-high-speed programmable processing devices, and multi-layer protocols including Generalized MPLS (GMPLS).



# Research and Development for Remote Factory Management System

Visiting Associate Professor,
National Institute of Informatics
Intelligent Systems Research Division

## Shin-yo Muto

Graduated in 1988 from Dep.of Science and Engineering ,Waseda University; completed in 1990 the master's course in Science and Engineering ,Waseda University; NTT Human Interface Laboratories 1990-1999, NTT Cyber Solutions Laboratories Senior Research Engineer 1999-, also Visiting associate professor at NII 2000- , His research interests are in robotics, human-machine interface, contact sensing.

Since the introduction of IT technologies into corporate offices, communication system has found many applications in assisting human's daily operations. At NTT Cyber Solutions Laboratories, we focus on applying IT technologies to the tasks of manufacturing machine operations and maintenance. This presentation introduces our remote factory management system, emphasizing on the "Factory Data Center", which links the manufacturing machine vendors to the machine operators in factories.

The important role of "Factory Data Center" is to improve maintenance efficiency, and manufacturing performance of the machine by utilizing data collected from the machine in manufacturing

# Associative Information Access using *DualNAVI*

Professor, Programming Languages Research,
Software Research Division

## Akihiko Takano

Received his BA in Mathematics from Univ. of Tokyo in 1980 and his Ph.D in Computer Science from Univ. of Tokyo in 2000. He was a Senior Research Scientist at Hitachi Central Research Laboratory before joining NII in 2001. He is also an Adjunct Professor at Dept. of Computer Science at Univ. of Tokyo since April 2002. His research interest lies in Functional Programming, Program Transformation, and Informatics of Association.

The associative methods of information gathering, analyzing, and visualization in information space should be related to the associative retrieval or implicit memory in the human brain. This is crucial to realize the interactive method that stimulates our creativity. We study "Informatics of Association" to provide the theoretical basis for this creative interaction, and apply it to design a new interactive method with which users can self-navigate in vast document space without losing themselves.

In this talk we introduced an information retrieval system ***DualNAVI*** that provides users with rich interaction both in document space and in word space. Its dual view interface always returns the retrieved results in two views: a list of titles for document space and "Topic Word Graph" for word space. They are tightly coupled with their cross-reference relation, and inspire the users for further interaction. ***DualNAVI*** supports two kinds of associative search: document associative search

factory, and from the machine operators. In such a circumstance, the first research step consists of three objectives : —

1) to collect and manage data from heterogeneous manufacturing machines,
2) to provide assistive information to on-site operators, and
3) to combine the machine data, and operational data.

XML schema for representing manufacturing machine data, and computer network environment to support on-site operators have been developed.

First, an XML-based FDML (Field Data Markup Language) is defined to be capable of handling both digital and analog information, with time stamps at msecs interval, of machines from various vendors. Using FDML, the multi-vendor machine data can be collected and managed at the data center, making it possible to fire emergency alerts of invalid data, automate the collection of related-data, and provide analytical views of each data.

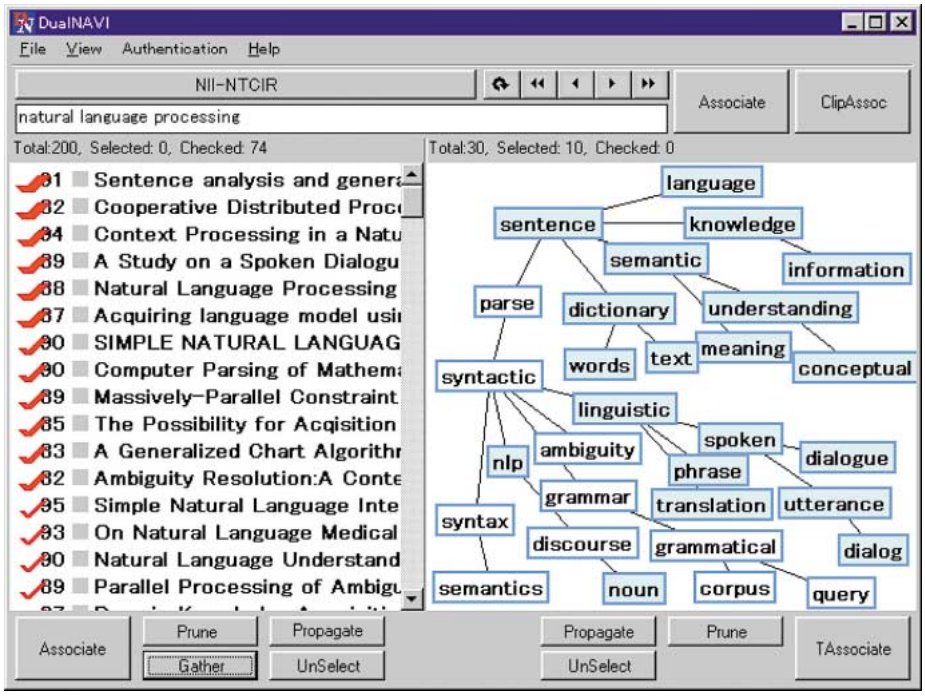
Next, the wearable/mobile PC are used to develop the operator-support computing environment which provide the operators with access to various machinery databases such as the operational manuals, and allow the servicemen to create service records of the machine, and register them to the service databases. In order to enable assistance from a remote support center, multi-point video/audio conference function, and hand-free operations using voice-based commands are also integrated into the system.

Also developed are hardware devices which act as a network gateway for various factory machines, to collect and manage machine data securely.

Currently the system is being tested and evaluated thru experiments, and submitted to various committee and consortium for standardizations. The future step will be to incorporate the feedbacks from the experiments and progress into the commercializing phase.



and keywords associative search. Both of them are similarity-based search from given set of items as a query. The dual view provides a natural interface to invoke these two search functions.




***DualNAVI*** has been already used in the public services for a digitalized Encyclopaedia and biomedical databases. The success of ***DualNAVI*** is a good proof of the effectiveness of our "Informatics of Association" approach.

# Experience with the Planet System for Mobile Object Computing and Design of the SoftwarePot System for Secure Software Circulation

Institute of Information Sciences and Electronics,
University of Tsukuba and NII

## Kazuhiko Kato

Kazuhiko Kato received BE and ME degrees from the University of Tsukuba, Japan, in 1985 and 1987, respectively. He earned a Doctor of Science degree from the University of Tokyo, Japan, in 1992. From 1989 to 1993, he was a research associate in the Department of Information Sciences, within the Faculty of Sciences at the University of Tokyo. From 1993 to 1996, he was an assistant professor in the Institute of Information Sciences and Electronics at the University of Tsukuba, where he is currently an associate professor. His current research interests include distributed systems, operating systems, programming languages, and persistent object management. He is a member of IPSJ, IEICE, JSSST, ACM, and IEEE.

Our research group is studying the design of system software for an open, distributed computing environment. In the first part of the talk, I discuss the experience we have obtained from our research on a

# Mining of the Entire Genomic Information by Means of Comparative Genomics
## — A New Standard of the Life Science in the Genome Era —

Professor Biosciences Information Research,
Research Information Research Division
Director of Research Division

## Asao Fujiyama

Graduated in 1978 from Graduate school of Nagoya University and received Ph.D. in 1983 from Nagoya University; Assistant Professor at Institute of Molecular and Cellular Biology, Osaka University 1982-1987, also Visiting Scientist at Cold Spring Harbor Laboratory and the University of Chicago; Associate Professor at National Institute of Genetics 1987-2001; Professor at NII 2002-. Research Areas: Molecular Biology, Genomics, Bioinformatics

Human genome sequencing is scheduled to be finished early in the next year, 50 years after the discovery of the double-helical structure of a DNA molecule, leading biology into the genome era (so-called post-genome is quite an inadequate terminology). However, our knowledge on biology is still limited when compared with the vast amount of the sequence data accumulated in various databases, because DNA is not a simple polymer consists of random sequence of As, Ts, Gs, and Cs. On the contrary, the sequence itself is the very hard target to draw out any biological information such as control mechanism of gene regulation during developmental stages. If so, by using the current technology, how do we disclose valuable information written in the genomes of human and other species.

One of the strategies to resolve this problem is to compare a variety of genomes, including human, chimpanzee, mouse, and so on; a method called Comparative Genomics. Looking at the conserved

mobile object system, named Planet, which was designed for a wide-area network environment. In the second part, I present our ongoing work on attempting to create a secure software circulation system, named SoftwarePot.

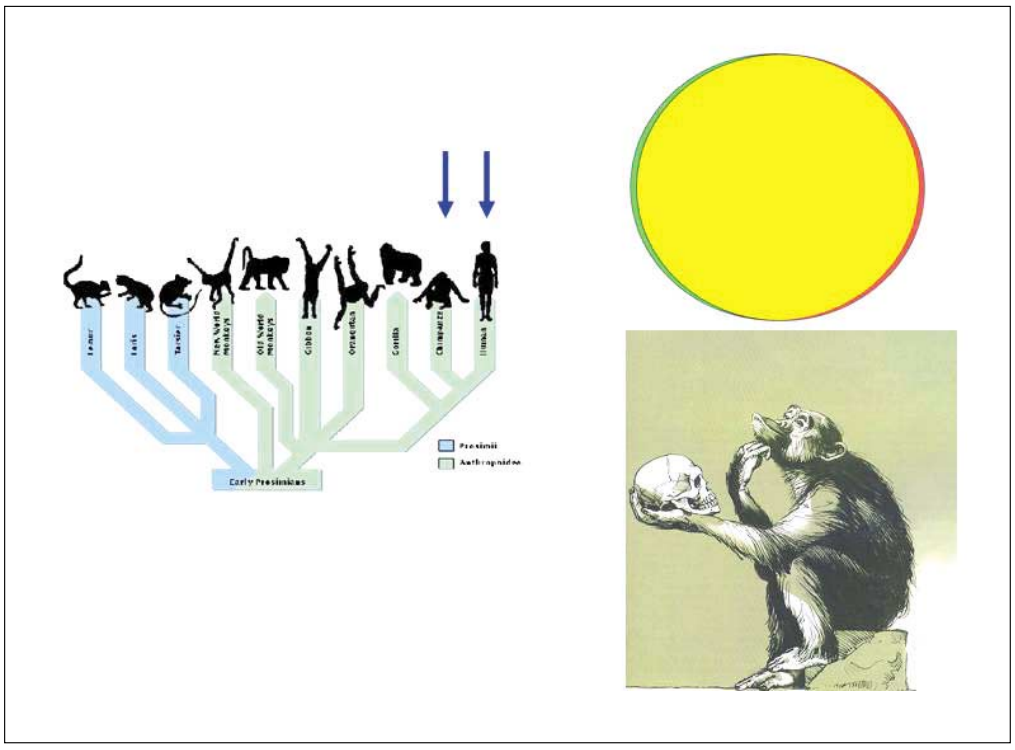
The Planet system is system software that provides mobile object computing functionalities without fixing the design of programming languages or virtual machines. This is achieved by fully utilizing operating system and middleware-level techniques. I give an overview of the system's design and discuss our experiences, including the implementation of mobile programming languages, object mobility between heterogeneous architectures by using mobile, just-in-time compilers, and mobile Web-search robots.

Based on the experience with Planet, our research group is now working on creating a general software circulation system, SoftwarePot, for use in the Internet environment. The conventional software distribution concept is limited by the fact that it is unidirectional and one time. Also, the security issues caused by the execution of transferred software have not been dealt with technically. The SoftwarePot system provides an encapsulated, transferable virtual file system called a pot. All the files for transfer, including executable or interpreted code, are encapsulated in a pot. The pot is transferred to a user site and then executed in a secure way, and it can be transferred again to another site. If necessary, the user can specify a mapping in a controlled manner between the resources inside the pot and those outside.

In this talk, I describe the basic model, system design, implementation techniques, and experimental results.



regions of genomes within species will reveal functional commodities of the region that may be playing an essential role in different species. Furthermore, the results will lead us to clarify the critical regions for a gene function and a biological property. Thus, it is necessary for us to select and extract the particular data to study basic as well as applied biology. Development of the novel methodology from the informatics field is largely awaited.



# Studies on Establish High-Function and Robust Information Network

Network Architecture Research,
Infrastructure Systems Research Division
Research Associate

## Takayuki Fujino

Graduated in 1994 from Graduate School of Computer Science, Meiji University; received his PhD in Electrical Engineering in 1994; joind the Information Processing Center at Tokyo University of Science in 1994; took the present office in April 2000; covers speciality in high-speed network archtecture, quality-of-service evaluation of network, network security.

I presented two topics, one was study on establish robust network using label switch networking technology, the other one was study on improving inter-AS (Autonomous System) peering design. Here, I mention latter one.

There are several factors that prevent "confortable" communication on the Internet. This study intend to find a network bottle neck point, especially bottle neck on inter-AS connection by using passive network monitoring method. In this study, AS-Path database has been built via Route Server, then several points. Collected information are analyzed for get "desired AS distribution" of packet destination. By analyzing this information with additional information such as TCP retransmit information and TCP window size information, we can find the network bottle neck point on inter-AS connection.

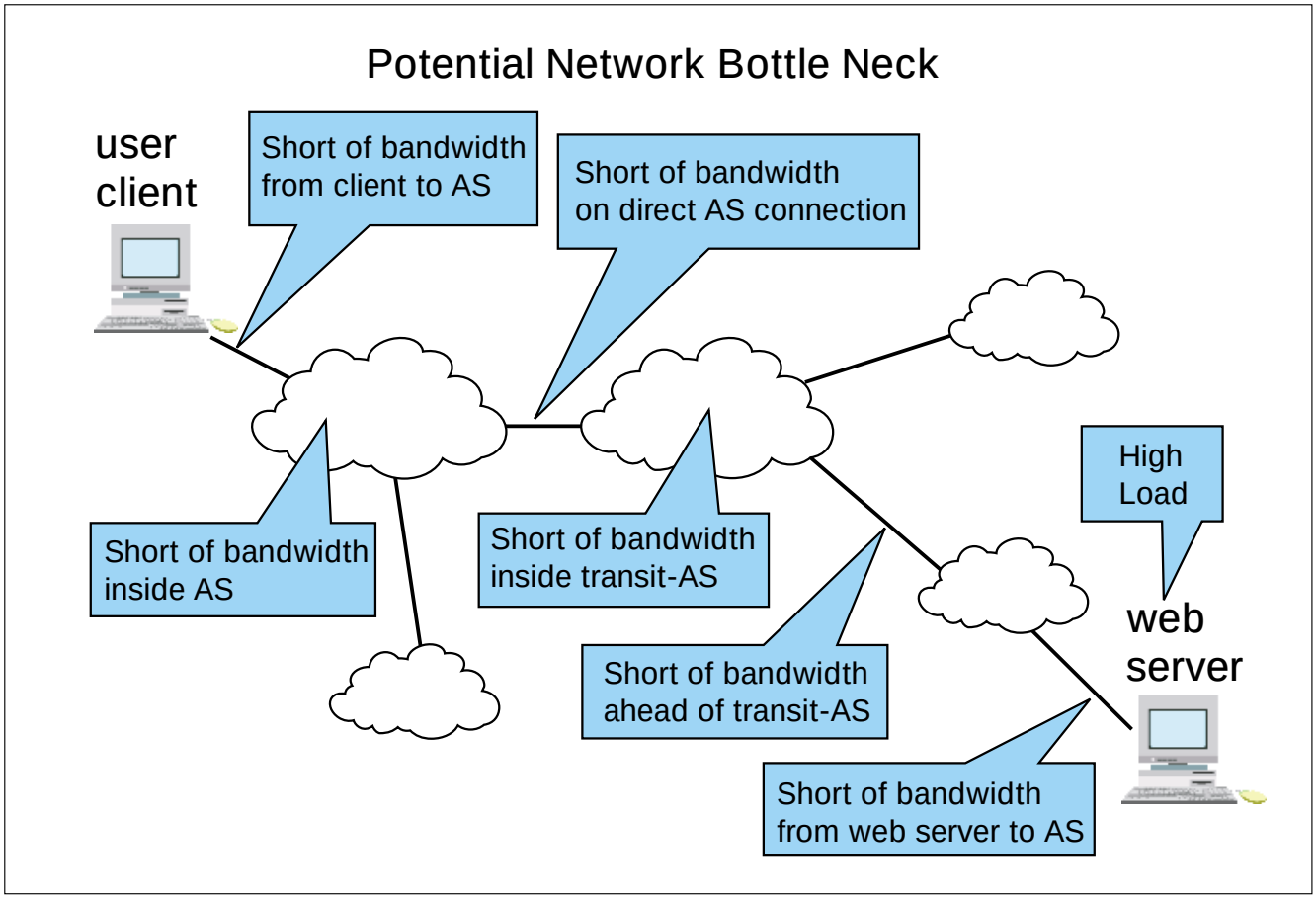
# Constraint-based and Agent-centered Search

Visiting Professor, Data Collection Network Laboratory,
Research Center for Information Resource, NII

Professor, University of Paris 6

## Philippe Codognet

Philippe Codognet received his Ph.D. in Computer Science from the University of Bordeaux (France) in 1989. He joined INRIA (French National Research Center in Computer Science) as senior researcher in 1990. After a sabbatical year at SONY Computer Science Laboratory in Paris , he joined University of Paris 6 as Professor in Computer Science in 1998. His main research domains are Artificial Intelligence and Virtual Reality, and more especially logic-based and constraint-based languages, combinatorial optimization, concurrent and multi-agent systems, intelligent virtual environments. More than 60 papers in international conferences and journals describe his researches. He has served in the program committee of many conferences in the field of logic and constraint programming and he is currently in the editorial board of Constraints, an International Journal (Kluwer Academic Press) and ACM transactions on Computational Logic (ACM Press).






Combinatorial search problems are a key topic in the area of Artificial Intelligence since several decades, and many algorithms and frameworks has been proposed over the years. Our work is concerned with Constraint Satisfaction Problems (CSP), a field which has proved to be very successful since the mid 90's for many applications and crystalized as the paradigm of Contraint Pogramming. Recently, a new family of algorithms have been proposed for constraint solving, based on local search techniques, meta-heuristics and stochastics aspects. We describe in this seminar the basic notions of constraint solving and search techniques, then focus on new agent-based considerations and detail our work on "Adaptive Search" and compare it with classical techniques. The new heuristic method that we propose takes advantage of the structure of the problem in terms of constraints and variables, and can guide the search more precisely than a global cost function to optimize. This method is also well-suited to over-constrained problems, that appear in many real-life applications.

An interesting application of this work is in the domain of path-planning. It is interesting to note that path-planning for artifical creature in virtual world can be seen as an optimization problem and solved by local search methods. We also generalize classical point-to-point path-planning to multi-goal path-planning, allowing for opportunistic behaviors.

NII Monthly Seminar
19th < June 26, 2002 >

# The Text Encoding Initiative and the GENIA Corpus

Dept. of Intelligent Systems Institute Jozef Stefan

## Tomaz Erjavec

Tomaz Erjavec obtained his B.Sc and M.Sc.and Ph.D. degrees in Computer Science, University of Ljubljana, and received an M.Sc.at the Centre for Cognitive Science, University of Edinburgh. He works at the Dept. of Intelligent Systems at the research Institute "Jozef Stefan" in Ljubljana, Slovenia.
His research interests lie in the fields of computational linguistics and language technologies. A large part of his work focuses on the Slovene language and multilingual applications. Areas of work include corpus linguistics, language encoding standards and machine learning of language structure.
Tomaz Erjavec has published over 50 papers, participated in a number of domestic and EU research projects and taught at several summer schools and seminars. He is on the editorial board of the International Journal of Corpus Linguistics, and a Commissioning Editor for the journal Computers and the Humanities, is on the Board of the European Chapter of the Association of Computational Linguistics, on the Council of Text Encoding Initiative Consortium and is the president of the Slovenian Language Technologies Society.

The Text Encoding Initiative is an international effort established in 1987 under the joint sponsorship of the Association for Computers and the Humanities, the Association for Computational Linguistics, and the Association for Literary and Linguistic Computing. TEI is the only systematised attempt to develop a fully general text encoding model and set of encoding conventions based upon it; it is suitable for processing and analysis of any type of text, in any language, and intended to serve the increasing range of existing (and potential) applications and use.

The main achievement of the TEI are the Guidelines for Electronic Text Encoding and Interchange, a set of recommendations for text encoding based on SGML. The Guidelines have become the de facto standard for scholarly work with digital text since their first publication in 1994. A few years ago, the TEI Consortium (www.tei-c.org) was established in order to oversee the development TEI. The Consortium has recently announced the publication of a new, updated version of their Guidelines, which are known as TEI P4 and are based on XML, the new standard language of the Internet. The Guidelines have a modular and parametrisable architecture, and currently there are over 80 projects using TEI, a number of them from Japan.

The GENIA corpus is being compiled at the Tsujii Laboratory, Department of Information Science, University of Tokyo (www-tsujii.is.s.u-tokyo.ac.jp/). The GENIA project seeks to automatically extract useful information from texts written by scientists to help overcome the problems caused by information overload. The project is building an annotated corpus of abstracts from bio-medical papers, which is to be used as a test-bed for the application domain.

Given the rich linguistic annotation included in the corpus and the complex retrieval that will operate over this information, a standardised and modular digital encoding of the data is of prime importance. A TEI parametrisation was therefore developed, suitable for encoding the GENIA corpus, as well as other resources from the growing body of biomedical information available on-line.

# Academic Research Seminar (No.1) Held — Academic Research Forum —

On June 12, 2002, the "Academic Research Seminar (No.1)" held at Hitotsubashi Memorial Hall was presented by the Academic Forum (headed by Dr. Yasuharu Suematsu, director general of NII) established in April 2002 to help promote academic research. This seminar maintained that the message expressed in the "Discussion of the Future of Academic Research in Japan: In Celebration of Successive Japanese Nobel Prize Winners" held on November 27, 2001, should be realized. The seminar was attended by about 350 participants from universities, the private sector, and other organizations throughout the country.

The seminar opened with a keynote address by Dr. Akito Arima, former president of Tokyo University, on the topic of "University Research and Society/ the Economy." Dr. Akito Arima identified current research problems to be rectified through cooperation between universities and industry, urged both sides to rethink and revise their approaches, and encouraged university and industry personnel to cooperate to build mutually respectful relationships. The keynote address was followed by a panel discussion that included Mr. Toshiharu Aoki (president and CEO of NTT Data), Dr. Setsuho Ikehata (president of Tokyo University of Foreign Studies), Dr. Kiyoshi Kurokawa (dean of the School of Medicine at Tokai University), Mr. Yohtaro Kobayashi (chairman of Fuji Xerox), and Dr. Ryoji Noyori (director of the Research Center for Materials Science at Nagoya University), and chaired by Goro Koide (an executive commentator for NHK). Distinguished figures from both universities and industry engaged in a very lively discussion.

Dr. Arima, former president of University of Tokyo

Participants in the seminar listened attentively to the keynote address and to the valuable opinions expressed in the panel discussion, through the end of the seminar.

The forum plans to hold more seminars, and is open to new member. Refer to the Web site at

(http://wwwsoc.nii.ac.jp/arf/index.html)


Panel discussion

*(General Affairs Division)*

# Introduction of New Charging System for Information Retrieval Services

## Site license from April 2002

For NII information retrieval services, specific charging systems have been applied to individual researchers and others at universities. However, such standard systems have not been favorably received; this is reflected in a number of complaints about the difficulty of determining budgets in advance under systems.

NII thus introduced a site license for universities and other institutional users on April 1, 2002.

This institutional site license is expected to make services more user-friendly and accessible, as explained below.

1) Once the annual institutional fixed charges are paid, users can freely use the services within the institution without worrying about changes.
2) Individual users need not submit applications.
3) Users need not enter IDs or passwords for each connection because each institution is identified by its own IP address.
4) Since anyone can use the services within an institution, even students can access the services.

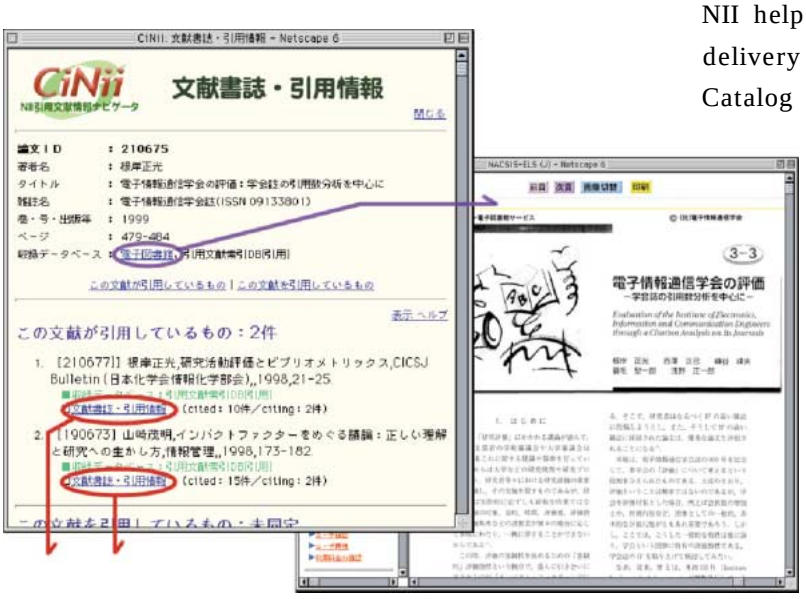
The system is also connected to the Electronic Library Service, which allows users to access academic journals available for free of copyright fee (representing about 70 % of all titles).

The amounts to be paid in this new charging system are set by number of faculty members of the applying institution. This dramatically simplifies payment operation, since only one annual payment is required.

For more details on this new institutional fixed-charge system and on applying for services, visit the NII Web site of the institutional fixed-charge system (URL : http://www.nii.ac.jp/service/teigaku/index.html). (Japanese only)

[Contact] User Support Section,
Planning and Coordination Division,
Development
and Operations Department
E-mail : user-request@nii.ac.jp

# GeNii (Grobal Environment for Networked Intellectual Information) Now Available




NII helps improve the infrastructure and facilitate delivery of academic information through the Catalog Information Service, Information Retrieval Service, and Electronic Library Service. To further enhance the usability of these services, NII launched its unique academic content portal (called “GeNii”) in fiscal 2002. This site is designed to integrate the content offered by respective services and link with valuable domestic and overseas sources of academic information.

The functions to be incorporated are currently being reviewed and developed from various perspectives. For example, in April 2002, Citation Information by

NII (known as “CiNii”) was launched. This function allows researchers to track down information on cited references (which papers cite, from which papers are cited), and refer to full-text. For now, services are only provided on a trial basis for limited academic fields, but an expansion of content and functions is scheduled.

New functions, such as integrating information about content, will also be gradually added to simplify information retrieval for similar books.

For the latest information, refer to the GeNii Web site (URL : http://ge.nii.ac.jp/ ).

*(Application Division )*

## Increasing Subscribers to Science Information Network (SINET) by Revising Rules on Subscription

In line with its policy of gradually integrating SINET and IMnet beginning in fiscal 2002, on January 1, 2002, NII revised the rules on subscribing to SINET. This revision enables private research institutions working jointly with universities and national laboratories to subscribe to SINET.

For more details, refer to the rules on subscription to SINET available at the SINET Web site at ( URL : http://www.sinet.ad.jp/ ).

*(Network System Division)*

## Launch of SPCAT

NII has provided NACSIS-CAT that comprises union catalog databases of academic documents (books and serials), with the assistance of institutions such as university libraries that participates Catalog Information Service. To support the activities of small-and-medium-sized participating libraries, especially their OPAC service, NII has also provided “SPCAT” since fiscal 2002.

SPCAT provides bibliographic and holding data of each participating library with retrieval software and it has network connectivity and simple usability through commonly used WWW browsers. It is a new service for conventional “Individual library version of CD-ROM” and responds to the changes in environment.

SPCAT supports two search methods: the browsing search method (looking for required materials in the list of items), and the keyword search method (searching required materials by entering keywords, such as title or author)

The data format has also been changed from the conventional proprietary forma. It is compatibility with MS-Access 2000. This change has thus been possible to utilize SPCAT data on MS-Access 2000. The data is installed on hard disks for retrieval.

The system configuration is based on a client-server model. The server provides retrieval capability using the system of WWW. It has thus been possible to provide OPAC service through a network, such as a campus LAN. Users can utilize this service through a WWW browser in any environment that supports them, and need not install any new software in their PC environment.

SPCAT supports two data character sets, Shift JIS, but also UCS. The UCS version of SPCAT can also diplay characters with phonotypes and simplified Chinese characters.

Please refer our WWW site (http://www.nii.ac.jp/CAT-ILL/contents-e/e_home.html) about application and other relevant information of SPCAT. With the introduction of this SPCAT service, the conventional “Individual library version of CD-ROM” will be discontinued.

*(Contents Division )*

# IT Promotion Assistance for the Library of the Beijing Center for Japanese Studies in Fiscal 2001

As part of a project for exchanging academic information with China (made possible through the assistance of the Japan Foundation), NII has been assisting in the computerization of catalog records of the library of the Beijing Center for Japanese Studies. (For related articles, refer to Nos. 1, 3, 6, and 8 of NII News).

The library of the Beijing Center is scheduled to open its new building in fall 2003, and is currently designing new facilities and library systems, organizing materials, and deploying new services (information-providing services, for example).

Staff members of the library of the Beijing Center for Japanese Studies visited Japan as guests of the Japan Foundation, and underwent training in computerization. In addition to attending lectures, undergoing practical training, and exchanging opinions, the visitors toured university libraries for an on-site study.

Below are the itineraries and contents of training.

### (1) First guest training

Training period : November 16, 2001 to November 22, 2001

Trainees : (Head librarian Hong Qinghua of the library of the Beijing Center for Japanese Studies)
(Librarian Zhang Shuying of the library of the Beijing Center for Japanese studies)

Training objectives :

(1) To study latest user services at university libraries
(2) To conduct on-site study of library systems, facilities, etc.

Training conducted :

(1) Introduction and practical training relating to services offered by NII (NACSIS-IR, ELS)
(2) On-site study at libraries (Meiji University Library, University of Tokyo Library System, University of Tokyo Information Technology Center, Tokyo Institute of Technology Library, National Diet Library, Keio University SFC Media Center <in order of visits>)
(3) Visit to Library Fair 2001 (Tokyo International Forum)
(4) Preparing training reports and exchanging opinions

### (2) Second guest training

Training period : January 21, 2002 to February 1, 2002

Trainee : (Assistant head librarian Miao Huajian of the library of the Beijing Center for Japanese Studies)

Training objectives :

(1) To understand the current state of information transmission among university libraries
(2) Reference operations utilizing the Internet
(3) Study the latest trends in library systems

On-site study at Tokyo Institute of Technology Library (first guest training) Head librarian Hong Qingha (center right) and librarian Zhang Shuying (center left)

Training at Meiji University Library
(third guest training)
Librarian Li Lin (center)
and librarian Yuan Hong (right)

Training conducted :

(1) Lectures and practical training on information transmission, portal sites, databases, and related topics at libraries
(2) On-site study at libraries (Chiba University Library, American Center Reference Service, University of Tokyo Library System, University of Tokyo Information Technology Center, Library of Goethe Institute Tokyo <in order of visits>)
(3) Latest trends in library information systems, and exchanging opinions at Fujitsu, NTT Data, and Maruzen
(4) Participating in "Web Resources as an Cultural Heritage: International Symposium on Web Archiving," sponsored by the National Diet Library
(5) Summary and exchange of opinions

**(3) Third guest training**

Training period : February 18, 2002 to March 8, 2002

Trainees : (Librarian Yuan Hong of the library of the Beijing Center for Japanese Studies)
(Librarian Li Lin of the library of the Beijing Center for Japanese Studies)

Training objectives :

(1) To acquire basic knowledge required to hold a catalog system workshop
(2) To receive practical training relating to user services
(3) To learn how to operate NACSIS-ILL

Training conducted :

(1) Lectures and practical training on creating catalogs, data quality control, and holding workshops
(2) Lectures and practical training on an overview of how to request the copying of documents through NACSIS-ILL and how to operate the equipment,
(3) On-site training at Meiji University Library (two weeks of practical training on selecting and accepting books, catalog registration, and reception counter operations)
(4) Preparing reports and exchanging opinions

After the three training sessions, the participants said they learned a lot about issues concerning libraries. These included the importance and adequacy of services at Japanese university libraries, the development of IT through Web sites and Internet technologies (e.g., using OPAC, ILL, applications, electronic journals, various databases), user education, and prospective library plans. They expressed satisfaction about having had the opportunity to consider prospective future developments, including improved availability in China of Japanese materials and data, more efficient transmission of information, Japanese study workshops in China, and future ILL services to be implemented in China with Japan's assistance.

*(Dissemination Activities Division)*

# Recent Utilization Status of NACSIS-CAT and NACSIS-ILL at Research Institutes in Germ

Introduced at a workshop entitled "Japanese Information in the 21st Century" held in November 2000 at the Japanese-German Center Berlin, and further popularized by subsequent demonstrations at Heidelberg University(1), NACSIS-CAT has since attracted great attention from various organizations. These organizations have expressed interest in participating in the system throughout German-speaking circles(3), which we perceived firsthand while attending the practical training session for the catalog system held overseas for the first time at the Japanese Cultural Institute in Cologne in November 2001(2). The second catalog system workshop held at Munich University at the end of July 2002 for training new applicants and conducting reviews. Moreover, a German translation of the user's manual for SPCAT(4), an individualized NII service that can be utilized as an Online Public Access Catalog (OPAC) at each library was completed.

Some libraries also expressed an intention to participate in NACSIS-ILL. As Japanese university libraries are expected to receive requests for copying or borrowing documents from Germany before long, these libraries, particularly university libraries, must prepare to receive such German ILL requests.

We also discussed the prospects for future cooperation with NII at the Graman National Library in Frankfurt am Main.

Meeting at the German National Library

(Note 1): NII News No. 2, p.13 (Dec. 2000)

(Note 2): NII News No. 8, p.14 (Jan. 2002)

(Note 3): In the German-speaking world, nine organizations have already participated.

(Note 4): NII News No. 9, p.10 (Mar. 2002)

*(Development and Operations Department)*

# Launch of Global ILL

On April 15, 2002, the operation of Global ILL has begun. This was realized by using the ILL system link between the NACSIS-ILL (Interlibrary Loan) of NII and the ILL system of OCLC Online Computer Library Center, Inc., which is a bibliographic utility and ILL service organization in the U.S.

The participating Japanese libraries have been able to request North American libraries to photocopy documents or receive such requests from their North American counterparts, just as with other Japanese libraries. Implementation has been based on deliberations between NII and OCLC, which were conducted in parallel with deliberations among Japanese universities, North American universities and ARL (Association of Research Libraries). This ILL system link utilizes the ISO ILL protocol. This marks the first time in the world that such connection has been made possible on a practical

level, based on the ISO ILL protocol between bibliographic utilities.

As of January 2003, 75 Japanese lib-raries and 31 North American libraries are using this service. When this service is fully implemented, academic information will be more smoothly distributed, thus it will significantly contribute to research activities.

*( Contents Division )*

Meeting at ARL

## Workshop on Authority Control among Chinese, Korean, and Japanese Languages

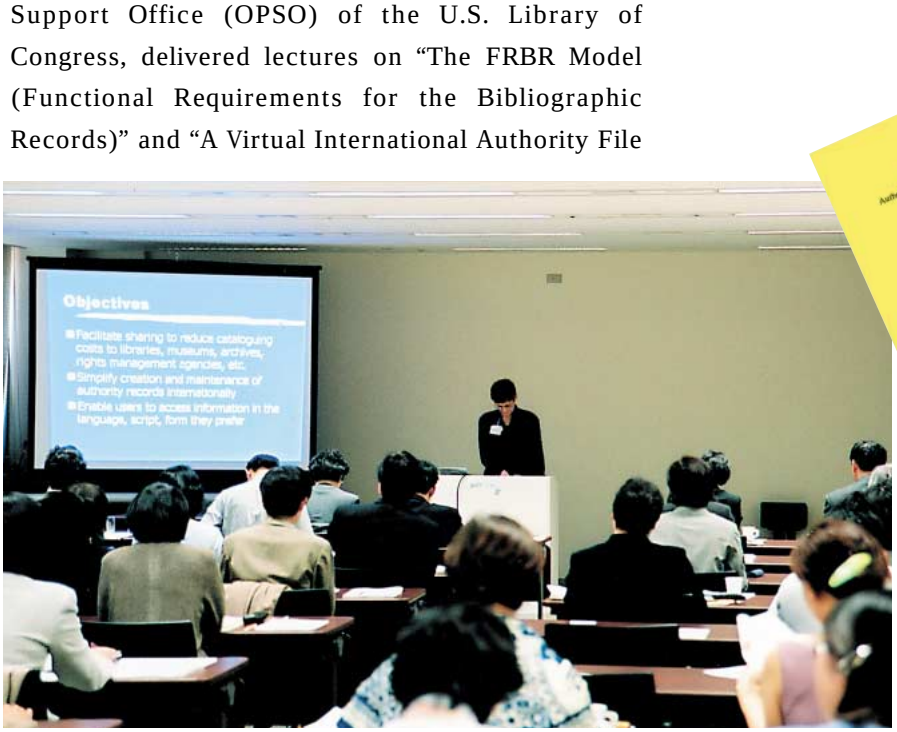
NII held the " Third Workshop on Authority Control among Chinese, Korean, and Japanese Languages (CJK Authority 3)" from March 14 to 18, 2002, in Karuizawa, Tokyo, and Kyoto.

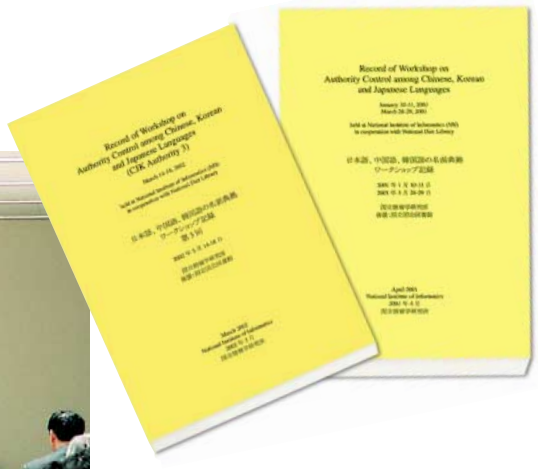
As in fiscal 2002, representatives from NACSIS-CAT, JAPAN/MARC, China MARC, KORMARC, and KERIS-Union Catalog reported on standard handling procedures at the respective organizations and on levels of progress.

Ms. Barbara Tillett, chief of the Cataloging Policy and Support Office (OPSO) of the U.S. Library of Congress, delivered lectures on "The FRBR Model (Functional Requirements for the Bibliographic Records)" and "A Virtual International Authority File (VIAF)" designed for the smooth sharing of bibliographic and authority information. Ms. Tillett previously helped develop models for functionality of bibliographical records as a consultant to the International Federation of Library Associations (IFLA).

There were lively discussions between the participating librarians and the lecturers at each lecture session.

*( Contents Division )*




Lecture by Ms. Barbara Tillett

# "Research Report on Information Security Policy for universities" Made Publicly Available

On July 18, 2000, the IT Security Promotion Committee in the Cabinet Office issued its "Guidelines for IT Security Policy" in its efforts to promote an information security. Security concerns have been addressed at all levels of the government. At the university level, the methods of enhancing information security remains a challenging issue.

As complex university networks are being constructed for connecting computers that handle enormous amounts of diverse information for research, education, and clerical activities, however, there are no past examples of how to formulate policies on maintaining information security within these networks.

To rectify this situation, the "Working group on information security policy for universities" (secretariat established at NII) was established in fiscal 2001, primarily at the initiative of the meeting on computer and network under directors meeting of national academic computing service of Japan to conduct practical studies on how to formulate policy regarding the security of university information."An Approach to University Information Security Policy" was compiled at the end of March 2002 and made available at the SINET web site etc at (http://www.sinet.ad.jp/info/policy/index.html).

From fiscal 2002 on, NII is scheduled to hold a six training courses "Network Security Training Course" six times per year specifically designed for personnel responsible for such security. This will include the latest developments in information security and practical training on security measures. NII will also offer an introductory course on information security policy for university network managers, at six locations throughout the country.

For more details on "Network Security Training Cource," refer to the "NII fiscal 2002 Education and Training Program Summary" at (URL: http//www.nii.ac.jp/hrd/).

Details of the introductory course for information security policies will be presented on the NII Web site as soon as they are determined.

*(Network System Division/Dissemination Activities Division)*

# Intersystem Linkage of Catalogs with RLG in U.S.

From June 2002, bibliographic data provided by the RLG (The Research Libraries Group, Inc.) Union Catalog has been available through NACSIS-CAT.

This service was made possible by developing a connection system with RLG via Z39.50 protocol.

RLG is a nonprofit corporation established in 1974 to provide assistance for academic research, with current participation by more than 160 university libraries, national libraries, archives, museums and others. It provides services to help libraries construct and provide union catalogs. The RLG Union Catalog contains about 100 million linguistic documents covering Arabic, Cyrillic, Hebrew and other languages. RLG is the second largest bibliographic utility after OCLC.

This service will allow users to retrieve information from seven databases, books, serials, musical scores, etc., contained in the RLG Union Catalog. The RLG Union Catalog is expected to be a highly useful tool as a reference Machine Readable Catalog (MARC) on NACSIS-CAT.

*(Contents Division)*

# Commencement of a Joint Project for Constructing NII Metadata Database

Metadata (e.g., titles, creators, URLs) has recently attracted greater attention as a means of systematically integrating academic information resources available in networks.

NII initiated a joint project for constructing a metadata database for networked information resources of universities, research institutes, and other organizations in Japan. For this project, data input will be shared and generated collaboratively by libraries as in the case of NACSIS-CAT, and the constructed database will be made public and offered on "GeNii" (NII's comprehensive platform for academic information).

*(Contents Division)*


# Commencement of IPv6 Service on Science Information Network (SINET)

Internet Protocol version 6 (IPv6) is the a next-generation Internet protocol that offers a much larger address space and greater security capability than existing IPv4. Given the clear emphasis on the dissemination and promotion of IPv6 in the government's "e-Japan Priority Policy Program," and the growing number of requests by SINET member organizations for connection via IPv6, SINET has long studied the possibility of providing IPv6 service, and made the necessary preparations. Consequently, SINET expects the service to become available beginning on September 2, 2002.

An overview of the IPv6 service to be offered is given below.

### (1) Address assignment

Addresses are assigned to organizations that have applied for IPv6 addresses (①②③) as follows:

① SINET member organizations (including regional local networks)

② Laboratories belonging to SINET member organizations

③ Research projects involving many universities and other organizations

### (2) Method of connection and provision of reverse domain name server (DNS)

After the commencement of the new service, connections are offered by means of carrying IPv6 packets on the SINET IPv4 backbone. As soon as required conditions are satisfied (e.g., SINET router compatibility with IPv6), connection service using native IPv6 and both IPv6 and IPv4 will be provided.

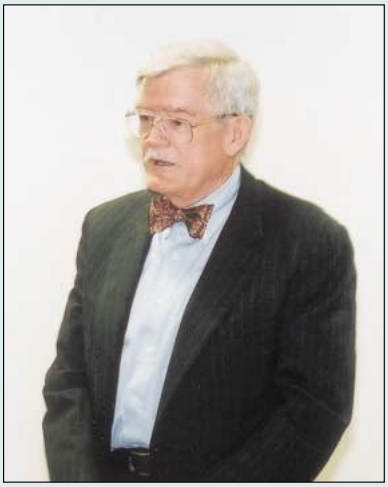
IPv6 reverse DNS servers are is installed to undertake registration of reverse lookup information on the assigned.

For more details on application applying for the service, refer to the SINET web site at (http://www.sinet.ad.jp/).

*(Network System Division)*

Special Lecture

# TECHNOLOGY TRANSFER at University of Wisconsin-Madison and at University of Washington-Seattle



Professor Emeritus at University of Washington-Seattle

Visiting Professor Kyoto University International Innovation Center

## Ray BOWEN

1956 B.Eng Massachusetts Institute of Technology
1957 M.Eng Massachusetts Institute of Technology
1963 Ph D University of California-Berkeley
1962-1963 Post-doctoral Cambridge University(UK)
1963-1981 University of Wisconsin-Madison, Professor and Chair Department Chemical Engineering, Associate Vice Chancellor
1968 Visiting Professor Imperial College London (UK)
1976-1977 Visiting Professor Karlsruhe University (Germany)
1981-1996 University of Washington-Seattle, Professor, Dean Faculty of Engineering
1992-1993 President of the American Society for Engineering Education
1996-2001 University of Washington-Seattle, Professor Department of Chemical Engineering

For the past five decades, basic research at American universities has been supported largely by research grants and contracts from the federal government. Prior to 1980, research discoveries of faculty had to remain in the public domain when the underlying research had been "tainted" by federal support. As a consequence, universities or companies had few incentives to commercialize of those discoveries. In 1980 the Bayh-Dole Act was passed to increase commercialization of federally funded inventions. This act enabled American universities to derive further benefit from faculty research through patenting and licensing of those discoveries. As a consequence many American universities created programs/mechanisms to support technology transfer. The necessary conditions for successful transfer of a technology are:

1. Universities have experienced IP managers and well-established infrastructures to support TT.
2. Entrepreneurs who wish to commercialize those technologies should have easy access to Venture Capital.
3. There should be a supportive environment of Start-Up companies.

These conditions are met at the two most famous US Universities for Technology Transfer, MIT and Stanford. The statistics for are impressive. In 2001 invention disclosures have been 446 at MIT and 277 at Stanford, licenses concluded 144 from MIT and 137 from Stanford and royalties generated 25.0 US $ millions for MIT and 41.2 for Stanford with around 1/3 in software domain.

The total budget of the University of Wisconsin-Madison (UWM) in fiscal year 2000-2001 was 1,511 US$ Millions, the Federal support been 367 M US$. The TLO, Wisconsin Alumni Research Foundation-WARF, started in 1925. The eight decade experience of WARF suggests that: 1/100 patents recover legal expenses and 1/1000 generate a substantial royalty stream. Since 1925 over 620 MUS$ have been returned to the University, the current annual return is about 35 MUS$. In 1960 UWM established the University-Industry Relations to increase partnerships and technology transfer. In 1984 the University Research Park (URP), a separate non-profit entity, was created. URP also manages the technology incubator. In 2000, there are 102 companies established inside the URP employing around 3,500 people.

The budget of the University of Washington-Seattle (UWS) in fiscal year 2000-2001 was 1,637 MUS$, the Federal support 533 M US$. UWS's first TLO, Washington Research Foundation (WRF), was modeled on WARF and was created in 1981. It is now an organization for transferring the technology developed at the University and other State Research Institutions. As of June 2001 it has paid 77.3 MUS$ to the various State Research Institutions and has given 7.3 MUS$ in gifts. It also manages 40 MUS$ in

seed venture funds. WFR invests up to 2 MUS$ per project but actively seeks co-investors. WRF invests only in a company located in the State of Washington and that meets the following criteria: It must be commercializing technology from not-for-profit institution, have a strong intellectual property, have large market and growth potential, have defined products with a strategic advantage in the market. Moreover, it should have experienced managers or ability to attract them, a definable milestone for investment and a clear exit strategy within 2 to 7 years.

In 1983 the State of Washington Legislature established the Washington Technology Center (WTC) to facilitate University-Industry collaboration. The WTC Concept is illustrated in the foregoing figure. As WRF preferred to license a technology to the highest bidder, it agreed that WTC should manage IP resulting from a WTC supported project. As UWS did not agree with this division of responsibility, it removed IP management responsibility from both WRF and WTC and created, in 1986, the Office of Technology Transfer, now named "Intellectual Property & Technology Transfer".

According to WTC statistics more than 2 MUS$ are awarded annually to in average 25 projects, the awards range from 5 K$ to 100 K$ (no overhead). The emphasis is put on Small and Start-Up companies.

WTC programs include:

- Technology Development where there is a partnership between company and university in one of the following areas: microelectronics and computer system, advanced material and manufacturing, and biotechnology and biomedical devices,
- Technology Initiatives, which require there is an expertise at Washington Universities, (MEMS, Photonics Systems,)
- Business internships
- Micro-fabrication user facility
- Access to Federal funding.

A proposal to the WTC for support under its technology development program must satisfy the following requirements, good match of industry need with a university technical capability, company partner committed to implement results to meet a market, cash matching by company, job creation, and agreement to terms of research contract and to review six months after project starts.

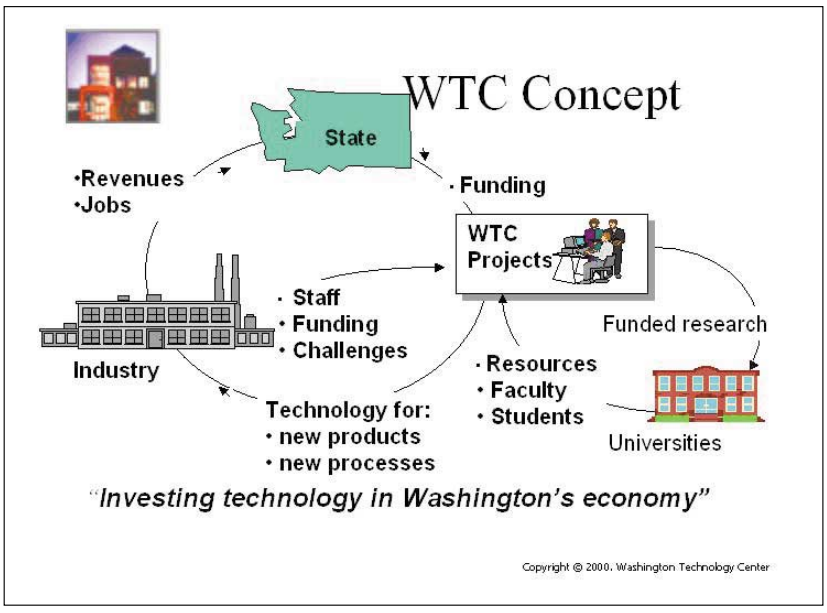
During the discussion in partnerships there are central questions to be resolved: Who owns the Intellectual Property? Will confidential material be safe in public university? Will university publication rights be compromised?

The evaluation of a project involves two stages with different committees:

- Industrialists look at economic impact in Washington State.
- Academics look at the scientific merit.

As a result of the WTC support many different companies have been launched.

In conclusion the Bayh-Dole Act has had a very positive influence on the number of patents registered by US universities: 589 in 1985, 3,151 in 1998 which represent almost 5.4 times more, at the same time the total number of patents in US were 71,611 and 147,520, only two times more. For UWM the increase was from 17 to 83 and for UWS 1 to 47! Public Universities benefit from interaction with industry and local economic conditions. The Industry support for University research was 630 MUS$ in 1985 and reached 1,896 MUS$ in 1998 an in percentage that represented 6.1% in 1985 and 7.2% in 1998 as the Federal Budget also increased. Not all Start-Ups are successes, and many fail, as has been the case for "dotcom" and telecom.



# A Lecture Session Entitled "SPARC and Academic Communication in Japan"

SPARC (Scholarly Publishing & Academic Resources Coalition), a new initiative to enhance scholarly communication, has recently received broad academic attention. To commemorate the visit of Associate Enterprise Director Alison Buckholtz, a lecture session to introduce SPARC activities and scholarly communication trends in Japan was held on January 9, 2002, in the conference room on the 12th floor of the National Center of Sciences Building. This session was jointly sponsored by the Association of National University Libraries and the Japanese Coordinating Committees for University Libraries.

Lecture by Mrs. Alison Buckholtz


Lecture by Prof. Tutiya, director of Chiba University Library

Lecture by Prof. Gonokami,
School of Engineering, University of Tokyo

The session was attended by about 80 researchers, interested parties from academic societies, university library staff members, and others who exchanged opinions on SPARC, trends in overseas scholarly communication, and the possibility of SPARC-type projects being conducted in Japan.

The lectures presented there have also been publicized in overseas academic media, including Science (Vol.295, no.5554, 18 January 2002, p.429) and Library Journal Academic Newswire (January 29, 2002), thus revealing heightened international interest in the development of SPARC activities and innovations in delivering academic information.

The lectures presented there were as follows:

- Igniting Change in Scholarly Communication, Alison Buckholtz, associate enterprise director of SPARC
- Short term perspectives on scholarly communication : From Japanese university librarie's point of view. Syun Tutiya, director of Chiba University Library

• Trends and Challenges in Academic Information Dissemination Viewed by Researchers, Prof. Makoto Gonokami School of Engineering, University of Tokyo (also a visiting professor at scientific research center, National Institute of Informatics)

▶SPARC Web Site
URL http://www.arl.org/sparc/

*(Dissemination Activities Division)*

# Attending the Intergovernmental Council for the Information for All Program

Professor, Dr.
Multimedia Information Research Division

Mitsutoshi Hatori

I attended the Intergovernmental Council for the Information for All Program (First Session), UNESCO, Paris, 15-17 April, 2002. Among recent ICT(Info-Communication Technologies) relating UNESCO activities, the promotion and the use of multilingualism and the universal access to the cyberspaces and the ICT Initiative are very important. The fund to UNESCO from Japan might be appreciated to be used for the information policy making by choosing the most important projects.

The promotion and use of multilingualism has a long history but is new and interesting problem to be investigated in. How to read the name of Japanese, Chinese, Korean and people in western countries is an example of the interest which Prof. Naito and Prof. Miyazawa do research in. Universal access is strongly related to the copyright, the special discount of which is the interest of developing countries and the respect of which is the interest of developed countries, especially USA. Relating the international ICT initiatives, the effort of ITU to built ICT infrastructure in developing countries and the effort of UNESCO to promote making good contents and services especially for educations in developing countries should be appreciated.

The six formal languages (French, English, Russian, Chinese, Spanish and Arabic) are used in the Intergovernmental Council for IFA, and simultaneous translations are done without preparing the manuscripts in advance, which is still very difficult for a acoumputer translation system and should be investigated.

Relating to the introduction of virtual communication technologies to the Intergovernmental Council, the virtual technologies are useful but they have still a big week point, which is that they can not yet support members to find the timing of speaking, that is, in order to find the proper timing of a quick response to other speakers, each member must be looking at his computer always. This is an interesting point to be investigated. At the real Council, Mr. Takahashi, Ambassador, taught me the timing of my speech.

Co-operating with Professor Naito and Professor Yamamoto, who are members of the national committee for the IFA, I am glad to work for the IFA Program of UNESCO.

# 2002 NII Open House Successfully Held

NII held an Open House on July 25, 2002, to publicize its research activities and contributions.

In the morning, Dr. Suematsu, director general of NII, delivered a welcoming speech. This was followed by a special lecture given by Dr. Sakauchi (deputy director general of NII) and seven introductory lectures covering all seven areas of research at NII. In the afternoon, research activities were presented with posters and PC terminals with explanations given by relevant faculty members. A total of 40 demonstrations and exhibitions were held, including an introduction to information services with GeNii, Webcat, and NACSIS-ELS provided by the Development and Organizations Department. In conjunction with these events, faculty members and three graduate students offered guidance on graduate school.

Special lecture by Dr. Sakauchi (Deputy Director General)

Despite the bad weather, the event was favorably received by more than 200 visitors who enjoyed a rare public opportunity to become acquainted with NII activities, thanks in part to the efforts of presenters who gave simple, easy to understand explanations.

*( Dissemination Activities Division )*


Entrance of NII

Demonstrations

# Fifth Anniversary of the NII International Seminar House for Advanced Studies Celebrated in Karuizawa with Commemorative Lecture

On May 11, 2002, NII celebrated the fifth anniversary of the founding of the International Seminar House for Advanced Studies in Karuizawa, holding a commemorative lecture session there. The Seminar House was built on a plot of land donated by the late Hiroshi Inose, a former director general of NII. Since being established, the site has been a popular venue for various seminars and workshops that have been favorably received by participating researchers from around the country and the world. This site has also been used to host the Karuizawa Saturday Salon and other events to which local residents are invited. In attendance at the ceremony were Mr. Akio Endo, bureau chief of research promotion at the Ministry of Education, Culture, Sports, Science and Technology, Mr. Yoshinari Akeno, division chief of information at the Ministry of Education, Culture, Sports, Science and Technology, local representatives such as Karuzawa Mayor Masayoshi Sato and Municipal Superintendent of Education Tatsuji Yoda, and many others.

After the ceremony, a commemorative lecture was delivered by Dr. Wataru Mori (President of the Japanese Association of Medical Sciences, professor

The commemorative lecture by Dr. Mori


The commemoration tree planting

emeritus of the University of Tokyo, and a member of NII's Board of Councilors) on the topic of "Desirable Medical Services" as the first part of the Karuizawa Saturday Salon in 2002. His career includes service as a member of the Science Council of Japan, chairman of the Medical Ethics Council, and acting chairman of the Provisional Commission for a Study on Brain Death and Organ Transplantation, to name a few. Dr. Mori based his lecture on the following introductory remarks:

Perhaps the most important aspect of medical services is the trust between a doctor and patient. Consequently, it is essential first and foremost to educate doctors to be trustworthy and provide them with an environment that facilitates trust. Then, what kind of people can be considered "trustworthy" doctors and what kind of hospitals can we trust? These have long been and still remain the big issues in the field of medicine, and these are the issues I would like to comment on today.(excerpt quoted in leaflets handed out that day)

After the lecture a commemorative tree-planting ceremony was held. Among the participants were Mr. Hideki Hayashida, grand master of the crown prince's household and former Director-General for the Bureau of Science and International Affairs, Ministry of Education, Science, Sports and Culture (when NII was first organized), and Mrs. Mariko Inose, widow of the late Dr. Hiroshi Inose, as well as other distinguished guests.

*(Dissemination Activities Division)*

# 2001 Karuizawa Saturday Salon (March 23)

Automotive journalist
Student of automotive history
Chairman of the Classic Car Club of Japan

## Shotaro Kobayashi


## Classic Cars as Cultural Assets

Automobiles are the greatest invention of the 20th century. Henry Ford deserves full credit for lowering the prices to make the automobile affordable to the public through unprecedented mass production and sales systems. At the opposite end of this phenomenon, however, were very high-quality automobiles known as "classic cars." Some may even deserve to be deemed "cultural assets." Let's view some of these vehicles with the slides.

(excerpt quoted in leaflets handed out that day)

The contents of Karuizawa Saturday Salon from this one forward will be publicly available this fall on "el-Net" and the Web site of NII.

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# 2002 Karuizawa Saturday Salon (June 29, July 13)

On June 29 and July 13, 2002, the second and third Karuizawa Saturday Salon for fiscal 2002 were held at the International Seminar House for Advanced Studies at Karuizawa. A summary of the lectures is given below.

## Second salon on June 29 : Lecture on "The Virgin Mary in the sky — An Invitation to Western Art"

Former director of the National Museum of Western Art

Shuji Takashina

Mr. Takashina, a renowned art critic and director of the Ohara Museum of Art, delivered a fascinating lecture entitled "The Virgin Mary in the sky," illuminating one aspect of western art history. The pamphlets handed out that day gave a concise summary of the lecture as follows:

Using various images of the Holy Mother depicted as symbols of ideal beauty and holy devotion from the Renaissance to the Baroque periods as a key, the fertile realm of art can be explored through historical background, change in mode, symbolic meaning, and episodes in creation.

## Third salon on July 13 : Challenges posed by Earthquake Prediction

Professor of Tokai University
Professor emeritus of the University of Tokyo

Seiya Uyeda


As the author of "Earthquakes Can Be Predicted" (Iwanami Science Library) and many books on other topics covering the earth and natural environment, Dr. Uyeda's lecture enthralled the audience and lasted an extra hour due to the enthusiastic and in-depth questions posed by the audience. Perhaps the high level of interest had something to do with the fact that earthquakes are everyone's concern, since Japan is an earthquake-prone archipelago. The pamphlets handed out that day gave a concise summary of the lecture as follows:

Earthquakes have caused many tragedies throughout the world. To mitigate the extent of damage caused by earthquakes, both preventive measures and earthquake prediction are important. Predicting a major earthquake several weeks or few days before it strikes would dramatically reduce human casualties. Earthquake prediction is one of the last and major challenges remaining in geoscience. Although recently there has been a growing pessimistic view regarding the possibility of predicting earthquakes, particularly in the short-term, we cannot abandon research in this field. In fact, research on earthquake prediction has steadily progressed as a new field of science. Moreover, there have been many instances of successful short-term prediction based on scientific methodologies. We wish to discuss the difficulties involved in predicting earthquakes, as well as new developments in approaches to overcome such difficulties.

*(Dissemination Activities Division)*



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