

# NII Today

National Institute of Informatics News

## [Special feature] Security Towards a Safe, Secure Society

Preventing Surreptitious Filming in the Divide  
Between Digital and Physical

Reliability and Safety of Software for Social Infrastructure  
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## Towards a Safe, Secure Society

The development of information technology has had a hugely beneficial impact on our lives. However, at the same time, problems and crimes which were heretofore unimaginable are now on the rise. We talked to NII researchers working on countermeasures employing a variety of approaches.

### NII Interview

# Preventing Surreptitious Filming in the Divide Between Digital and Physical

## Digital Information Becomes Unprotected and Subject to Surreptitious Filming the Moment It Becomes Analog

**Motomura** Advances in information technology have given us instant access to all types of information. On the other hand, they have also resulted in a host of information security problems, such as the leakage of personal information and surreptitious filming. One approach to improving this situation has been the technology used in preventing surreptitious filming in cinemas, the product of your research. This was discussed in one of our articles, and I read it with great interest. The unfamiliar term “analog hole” came up many times. Could you explain exactly what that is?

**Echizen** That term was originally used in research regarding how to prevent the unauthorized copying of DVDs using DVD players. The video data on commercial DVDs is encrypted, and can only be played back using a DVD player with decryption functionality, but when that video is then sent out via a DVD player’s analog outputs, the protection offered by that encryption is eliminated, and copying is possible. This is a security flaw -- in other words, a hole -- and hence the term “analog hole”. In recent years, the resolution of mass market video cameras and camera phones has risen, so we are faced with a growing problem of unauthorized copying performed by surreptitiously filming the video shown on screens at cinemas. This is the new analog hole that I have focused on. According to the Japan and International Motion picture Copyright Association (JIMCA), the amount lost due to surreptitious filming in cinemas totals approximately 18 billion yen per year in Japan alone.

**Motomura** In other words, the nature of the analog hole has changed.

**Echizen** Exactly. Until now, mass market video camera and camera phone video quality was not so high, so people didn’t envision their use in this type of unauthorized copying.

**Motomura** The issue isn’t only movies, either. On video sharing sites, you can do searches on musicians’ names, and find concert footage that clearly wasn’t authorized. Once something gets onto the Internet, there is the risk that it will be spread uncontrollably. This is an example of the very modern issue of copyright infringement.

**Echizen** Not only that, but there are also personal information leakage cases like the recent one, in which a staff member at a medical institution used a digital camera to take a photo of a computer which was showing patients’ medical histories, and used the image

in a presentation outside the institution. Regardless of how strictly digital security management is implemented, once that digital information has been converted into visible, analogue form, surreptitious filming and photography are possible.

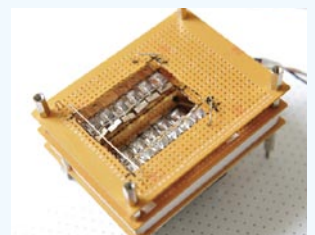
**Motomura** Are there any other researchers, besides yourself, working to resolve the problem of surreptitious filming?

**Echizen** There are people researching digital stage security measures, such as unauthorized copying prevention technologies for protecting digital content, focusing on “encryption technologies”, and technologies for the prevention of unauthorized information transmission. Hollywood is also using “digital watermarking technologies”, which embeds cinema ID information in digital content, which is difficult to see with the naked eye, but which can be used to determine, from surreptitiously filmed material, when the filming was done, and at which cinema. However, while digital watermarking technology has a psychological damping effect on surreptitious filming, it does not directly prevent surreptitious filming by recording devices. It also appears that creators, who also feel a strong attachment to their works, would rather avoid processing content itself.

## Introducing Noise into Video Recorded by Digital Cameras Using Light Which Is Not Visible to the Naked Eye

**Motomura** You came up with the idea of using special devices using LEDs to interfere with surreptitious filming without actually modifying the digital content. Can you briefly explain the device?

**Echizen** Movie screens contain countless 1mm diameter holes to allow sound to pass through them. This device is installed behind the movie screen, and radiates near-infrared light with wavelengths near 870 nanometers, invisible to the human eye, through these holes. However, in order to maintain sensitivity, mass produced cameras are designed to be sensitive to the near-infrared spectrum as well, recording near-infrared light as color information such as red or green. When this video is played back, the near-infrared light



The surreptitious video filming prevention device developed by Associate Professor Echizen



**Isao Echizen**

Associate Professor  
Digital Content and  
Media Sciences Research Division, NII

emitted by the LEDs appears as unpleasant flickering noise. Of course, there are no physical effects due to this light.

**Motomura** So this method of preventing surreptitious filming uses the high sensitivity of cameras against them. Was there a lot of trial and error involved?

**Echizen** We went through around 100 failures. We had also researched whether there were any audio noise sources we could use which people could not hear, but which would be picked up by camera microphones. As a result of trying a range of different approaches, we hit on the 870 nanometer near-infrared spectrum.

**Motomura** Looking at the actual device, it looks simple and analogue, something that one could easily make with parts found in Akihabara.

**Echizen** That's right. In fact, we did buy these parts in Akihabara (laughs). Before working at NII, I worked in a regular company for around 10 years, involved in research and development targeted at the user level. Because of this background, I believe that it is important, when developing new devices, to keep them simple, low cost, and easy to use.

**Motomura** The structure of the device is simple, but the idea of looking at analog holes that other researchers had overlooked, while appearing simple in retrospect, was actually a revolutionary idea. When will the device start seeing actual use in cinemas?

**Echizen** We're receiving offers from around the world. There are licensing issues to be handled, but I think we're very close to the actual field application stage.

**Motomura** But as soon as surreptitious filming prevention technologies such as this are developed, new technologies are created to circumvent them, starting a vicious circle.

**Echizen** Emitting infrared light from behind a screen to prevent surreptitious filming is fine, but what happens when someone develops a filter to block that light, right? Thinking about that led me to consider the fact that infrared light filters reflect that infrared light, and I developed a technology using an infrared camera installed on the screen side to detect, in real-time, the use of infrared blocking filters by people filming screens surreptitiously.

**Motomura** So when you see suspicious reflections from the audience, you would catch the person doing the filming?

**Echizen** Exactly. We've already created a prototype, winning the Best Demonstration Award at the 2010 IPSJ Computer Security Symposium, which is one of the famous national symposium on information security.

**Motomura** That will be very exciting, having the technology you developed used in theaters around the world. Do you see any other applications for it?

**Echizen** Yes, displays. As with the case of the medical institution I mentioned before, in the future the protection of not only entertainment but also personal information

and confidential information stored on computers will also be critical. I would like to develop technology which would render photographs of display contents illegible by introducing noise.

## Arriving at an Age Where We Rethink the "Hide Everything or Show Everything" Approach to Information Security

**Motomura** Listening to you, the topic of "WikiLeaks(\*)", which has the world abuzz, came to mind. Even when confidential information is being strictly managed by organizations, people with access to that information are contacting the WikiLeaks people and providing them with information in the name of "righteousness". That must include interaction in the physical world of communication between people.

**Echizen** This kind of contact, including the buying of secrets, will never disappear.

**Motomura** It also shows the limitless amounts of "confidential information" in this world. Isn't there a need to determine whether all of this information really needs to be protected?

**Echizen** Yes. Until now, information security has focused on the information being handled, and decided whether either that information had to be steadfastly protected, or left unprotected. A binary decision. The stance was that if even part of the information contained elements that needed to be kept confidential, all of the information would be restricted from viewing.

**Motomura** When thinking about information security, some people take the position of just hiding everything, right?

**Echizen** But that also results in less communication, which might result in a less interesting world. Instead, I think there is a need for services which offer flexibility, revealing some information on a case-by-case and person-by-person basis.

**Motomura** Last, a basic question: in the end, what is "human friendly information security"? What types of initiatives should be taken?

**Echizen** There is, of course, a need for researchers to develop new technologies, but there is also a need for awareness raising and education that "surreptitious filming is a crime". In 2007, a law was passed regarding filming in cinemas, and I've heard reports that this has resulted in a decrease in surreptitious filming. I believe that it is important to thoroughly review the three pillars that support the creation of an information society in which we can live comfortably: "technology", "morals", and "systems".

\*WikiLeaks: Global whistleblower site that publishes confidential information from governments, companies, and research organizations.



**Yukiko Motomura**

Journalist, Science &  
Environment News Dept.  
The Mainichi Newspapers

### Comment from the Interviewer

An accepted theory of failure theory is that "failures occur where technologies meet other technologies". The same goes for the analog hole. One can't help but laughing to think that there are "holes" in the digital society that people created, and it is people that are digging those holes, and filling those holes. Professor Echizen's "ultra-analog", homemade-looking surreptitious filming prevention device fills one of those holes. I felt his conviction as a researcher when he said that if we strengthen security too much, communication between people will vanish, resulting in a less interesting society.

# Reliability and Safety of Software for Social Infrastructure

## The Role of DSF in Disseminating Formal Methods

Enterprise software-intensive systems that support our social infrastructure are currently faced with security issues. To overcome these difficulties, attention is being paid to “formal methods”. In September, 2009, major IT companies in Japan got together to launch the “Dependable Software Forum (DSF),” a research group whose objective is to accumulate industrial experience to disseminate formal methods. We conducted an interview with those who were involved in such activities on the effectiveness and promise of formal methods in achieving the expected secure society.



**Hideaki Tsukamoto**  
Senior Expert  
Center for Applied  
Software Engineering  
Research and Development  
Headquarters  
NTT DATA CORPORATION

### Formal Methods Born in Europe

The importance of the reliability and safety is increasing for software-intensive systems that support our social infrastructure. These include online banking systems and embedded software in automobiles. Against this backdrop, much attention is being paid to “formal methods”, which provide methods to systematically assure the correctness of software from the early stages of software development.

Formal methods are a generic term referring to software development methods that are based on unambiguous formal languages, whose foundation is given in terms of mathematical concepts. Software design specifications are currently often described using the UML (Unified Modeling Language) diagram based description method. It, however, has several drawbacks; a diagrammatic notation may have a lot of interpretations. The use of formal methods to express software design specifications in a rigorous and unambiguous manner has just begun.

Formal methods, however, are not understood correctly by software engineers in Japanese industry; what formal methods are, what they can accomplish, and how they can be used—all these have not yet been answered in a satisfactory manner. Professor Shin Nakajima of the NII Information Systems Architecture Science Research Division states his view.

“The term ‘Formal methods’ does not refer to certain particular technologies, but should be understood as a generic term for methods which are based on mathematical logic. It may be hard to understand what they are, in a concrete and specific way, because the term is generic. Usually there is no single method that is a panacea, since large and complex software systems may have many aspects to make clear in their development stages. UML, for example, provides more than seven diagram notations, each of which is employed to express only a particular aspect. There are also many formal methods such as VDM, Event-B, and SPIN.”

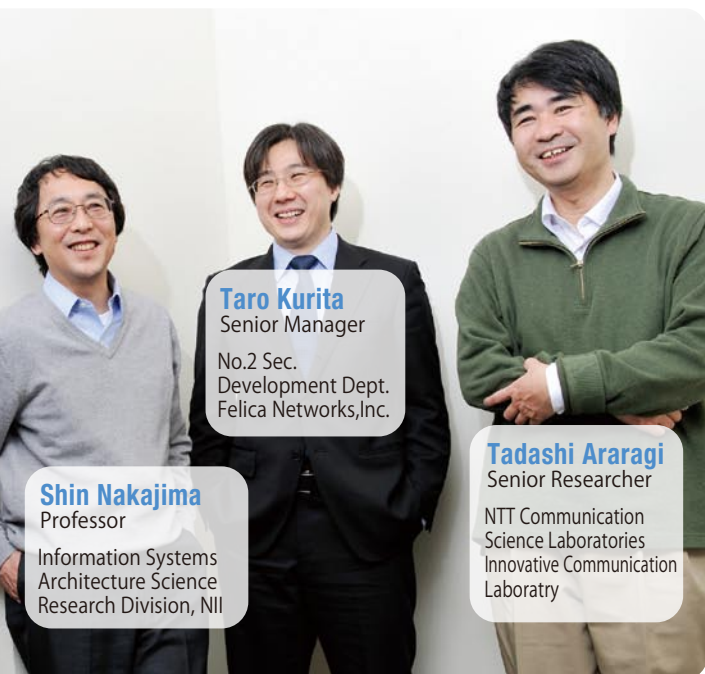
Formal methods were born in a project at IBM’s Vienna Research Lab in the 1960s. The newly invented method was used to verify the correctness of a compiler(\*1) for PL/I, a general-purpose programming language. Further research activities have followed, primarily in Europe. The aim of the methods has been expanded to cover software-intensive systems in general. After the 1980’s, a variety of formal methods were proposed, and there has been a lot of progress in their theoretical foundations ever since.

“In the West, software specifications are similar to business contracts, and are desirable to define rigorously. They help clarify the responsibility of stakeholders involved in development. On the contrary, in Japan, as exemplified by the Japanese word *Suriawase*, a kind of negotiation between those with adequate expertise has been considered important. It may be true between software engineers as well as between stakeholders. Therefore, a focus had been put on the management of software development process. Although the view here is very simplistic, the notion of Formal Methods is owed somewhat to this difference in culture.

In the U.S.A., technologies related to formal methods have been underway in a slightly different context; they have been investigated regarding security issues since the 1970’s.

Government agencies such as the NSA (National Security Agency) and the NCSC (National Computer Security Center) have been at the center of such research activities. Funding has been provided for the research and development of formal methods for creating secure systems. Mathematical rigor can help guarantee the correctness of security properties. Furthermore, subtle defects have actually been found using formal methods in software previously believed to be correct. Tadashi Araragi, a member of the NTT Communications Science Laboratories who supports DSF activities from a theoretical foundation view point, explains.

“For example, there is a security protocol called the



**Taro Kurita**  
Senior Manager

No.2 Sec.  
Development Dept.  
FeliCa Networks, Inc.

**Shin Nakajima**  
Professor

Information Systems  
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**Tadashi Araragi**  
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Needham-Schroeder protocol, used in two-way authentication. Verification with formal methods revealed that the protocol had a vulnerability; a third party attacker could spoof one of the two authenticating parties. Usually, software testing involves investigating as many conceivable behaviors as possible and confirming whether or not there are defects. In the case of security software, even a single hole cannot be tolerated, and it is impossible to know exactly a priori what attackers may do. This is what makes security testing difficult. With formal methods, attackers are mathematically modeled, assuring the reliability of the software.”

## CC Certified FeliCa

Some software-intensive products have already been developed using formal methods. One is the software in the mobile FeliCa IC chip developed by FeliCa Network. The chips are used every day all over the country, since they are embedded in electronic money devices such as OsaiFu-Keitai. Using VDM++ specification description language, the high reliability of the firmware, a kind of software running directly on the chip, has been achieved, receiving the Common Criteria (CC\*2) EAL4+ rating in 2006. Taro Kurita, who has been involved in the development of FeliCa, says “the FeliCa, currently embedded in mobile phones, was developed in 2004 - 2005, and has the highest level certification of any IC card in Japan. However, EAL5+ is becoming the desirable standard for IC cards now. We are currently focusing our development efforts on enhancing its security aspects in order to receive this certification, so that people may feel secure in using FeliCa.”

Professor Nakajima believes that formal methods will play an even more important role in satisfying EAL5 and higher assurance requirements than before.

“At present, I don’t know if there are any systems in the world which have achieved the highest level, EAL7, which may be evidence of how difficult it is to achieve EAL7 with conventional technologies alone. Needless to say, there are strong needs for security in IC cards and online banking systems, so I believe that formal methods will be even more important going into the future than ever.”

## Formal Methods Are the Seven Gods of Fortune?!

5 companies (\*3), who would usually be regarded as business rivals, have gathered together with NII to form the “Dependable Software Form” research group. NTT Data’s Hideaki Tsukamoto, who acts as the group’s bureau, explains.

“Companies who produce enterprise software had come together in the past, bringing together their knowledge and contributing to industry through community activities, without compensation. With the DSF, a new study group was formed in order to achieve the high reliability of software-intensive systems. First, in order to actually gain some experience in applying formal methods, an experiment was carried out to use formal descriptions for a book reservation system, which

was used for educating novice engineers. Based on this experiment, we have assembled a set of idioms (fragments of specification descriptions), and guidelines which may help engineers to conduct their own work using formal methods.

All the documents are publicly available from our Web site. Through DSF activities, we will disseminate these technologies to show how useful formal methods can be.”

He went on to explain their plans for extending their application procedures and idiom collections, increasing their suitability for wide applications. He adds that they plan to apply the techniques using formal methods to the development of software systems. The feedback obtained from this experience may be fruitful and beneficial to all industry software engineers. .

“Formal methods are technologies which started in Europe, where there have been many debates on which is better, leading to a kind of rivalry. The DSF’s activities, however, use the distinctly Japanese approach of bouncing ideas off each other to produce high quality end results. I think that formal methods are like the Seven Gods of Fortune: there may be many different methods, each being suitable for a particular purpose, but we can just gather together their good points and benefit from them. I hope that we can use this Japanese approach in creating new technologies,” said Professor Nakajima.

(Written by Madoka Tainaka)

\*1 **Compiler**: Software which converts programs written in languages which can be read by humans into forms which are executable by computers.

\*2 **CC**: Evaluation standard for information technology security. It is used around the world as the ISO/IEC 15408 standard, and is also used as the JIS standard.

\*3 : NTT Data, Fujitsu, NEC, Hitachi, and Toshiba.

# Internet Security in the Information Explosion Age

The enhancement of Internet security will grow even more important in the coming years, as online banking and shopping become more popular, and cloud computing, which uses the Internet to provide a variety of services, continues its advancement. We asked about anomaly detection research—how anomalies can be detected from the explosively growing sea of information, and how people can be protected from viruses, worms, and cyber-terrorism.



**Kensuke Fukuda**  
Associate Professor  
Information Systems  
Architecture Research Division

## Measuring Traffic and Detecting Anomalies

Associate Professor Kensuke Fukuda of the NII Information Systems Architecture Science Research Division is currently researching how to measure Internet traffic, assess what is occurring in it, and detect anomalies. Traffic, in Internet terms, refers to information itself, as well as the volume and flow of that information. Associate Professor Fukuda's approach is to derive anomalies caused by worms and viruses, which threaten the safety of users, from information volume and spatiotemporal changes, and statistically analyze them.

"I started my research being interested in how Internet networks behave, and their dynamics, but now, in addition, for example, to investigating, together with the Ministry of Internal Affairs and Communications and Internet service providers the total traffic volume inside

Japan, what times people are using the Internet, and for what purposes they're using it, I am recently especially dedicating my efforts to detecting Internet traffic anomalies from a security perspective.

That said, viruses and worms are a constant presence on the Internet, so it is difficult to decide precisely what an "anomaly" is. In our research, we have defined it as "a state different than the normal state". We would like to accurately and rapidly detect critical anomalies—not only viruses, but also equipment misconfigurations and equipment failures—from the massive and constantly growing volume of data."

There are many types of Internet anomalies: "flash crowds", where websites are accessed a large number of times, or a large number of downloads occurs, "botnets", in which large numbers of computers infected with malicious software are controlled by a third party, "phishing", in which users are tricked into visiting and using fraudulent websites, and "DDoS attacks", in which multiple computers direct traffic at a target computer, attacking it by forcing a huge processing load on it. The tools used in these are malicious programs called viruses, worms, and Trojan horses. What makes things even more difficult is that they are constantly being modified by malware creators, mutating like the influenza virus.

"There are essentially two methods for detecting abnormal behavior. One is the method used by companies supplying vaccine software: compare it against the characteristics of individual viruses or worms to detect anomalies. However, this does not address unknown viruses or constantly mutating new viruses, and detecting all of them from the massive sea of data is not an easy task. Our method, on the other hand, does not check each and every individual item, instead using statistical algorithms to look at traffic behavior, comparing it against the

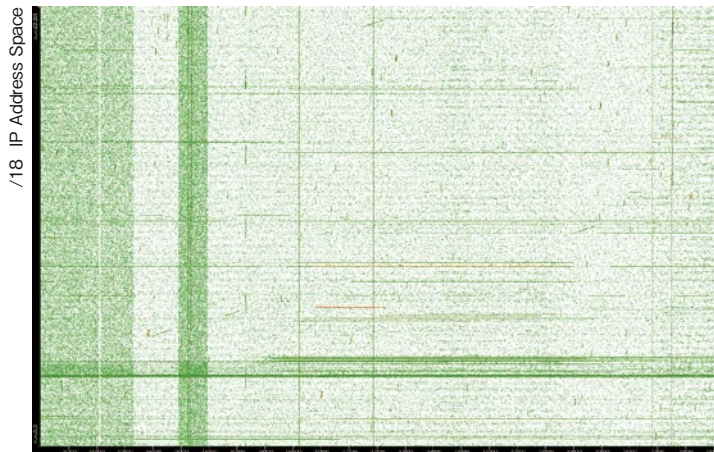


Figure Anomaly Traffic Shown via Two Dimensional Image Time (24 Hour Notation)  
By plotting anomalies detected by sensors with multiple IP addresses, and analyzing line patterns, anomaly detection is possible. Vertical line patterns indicate simultaneous attacks on multiple hosts. Horizontal lines indicate continuous attacks on a single host.

“normal state” of traffic to detect anomalies. Some detection devices using this approach have already been developed, but what sets our research apart is that we evaluate the capabilities of each of those devices, combining multiple devices to increase anomaly detection accuracy,” explains Associate Professor Fukuda.

### Combining Anomaly Detection Algorithms to Increase Accuracy

But in the current state of the Internet, constant host to viruses and worms, how can “normal states” be determined and used in comparisons?

“We are investigating the last ten year’s worth of data on Internet circuits between Japan and America, but, indeed, there has not been a single day without an anomaly. Given this situation, it is impossible to create a perfect “Grand Truth” model of normal conditions. Plus, of course, the data sets (collections of data processed by programs) used by individual researchers all vary. This is precisely why we believe it is important to have multiple detection devices using different algorithms work together complementarily, feeding back results to increase Grand Truth accuracy.”

Anomalies are not detected by traffic volume alone. According to Associate Professor Fukuda, by combining algorithms, such as PCA (Principal Component Analysis), which assesses and compares the relationships between multiple variables, gamma function-based fitting, KL information volume, and the like, the accuracy of anomaly detection can be raised. Associate Professor Fukuda also believes that it is important to determine the strengths and weaknesses of each detection device (such two devices being best used together to detect a certain virus, or a certain device which generally detects few anomalies, but is particularly good at detecting a certain worm) and

how best to combine them.

### Looking at Massive Amounts of Data in Timeline Form, and Making Anomalies Visible

Massive amounts of information can also be looked at in timeline form, resulting in many new discoveries.

“For example, looking back over the last 10 years, we see that many anomalies were detected between 2004 and 2006. This was just the period when viruses such as Blaster and Sasser were at their peaks. We can also map the anomalous traffic arriving at a sensor with multiple IP addresses in chronological order on a world map, seeing when the traffic came, and from what country. This shows us that around 2005, there were an unusual number of server attacks from America to Japan.”

Currently, Associate Professor Fukuda, as part of the JST “PRESTO” project, etc. is researching a new anomaly detection approach, differing from conventional timeline analysis in that it uses two dimensional image analysis.

“With this method, the detection results from each device can be mapped to one enormous graph, with locations in which the devices detected anomalies having higher graph density, making the presence of anomalies visually noticeable. By plotting anomalies detected by sensors with multiple IP addresses, and analyzing line patterns, anomaly detection is possible. For example, a horizontal line indicates a continuous attack on a single host, while a diagonal line indicates a staggered attack.”

Associate Professor Fukuda speaks of his dream. “In the future, I would like to hold a detection device contest.” The fight against computer viruses has been called a game of cat and mouse. We can only hope that many researchers, such as Associate Professor Fukuda, pool their wisdom to secure a safe Internet environment.

(Written by Madoka Tainaka)

# Explaining Information Problems Students often Experience through Interactive Content



Hitoshi Okada  
Associate Professor

Information and  
Society Research Division  
NII

Improved user information literacy is essential to prevent problems

such as computer virus infection and phishing.

Associate Professor Hitoshi Okada of the Information

and Science Research Division has led a team in developing teaching materials aimed

at cultivating in students a security outlook and an understanding of what is dangerous, and what is best avoided.

The fruit of their labors is “Hikari and Tsubasa’s Information Security Three Choice Class”.

We talked to him about the background behind this development work.

## The Government is Leading the Way in Enhancing Information Security. This Tide Has Reached National Universities

An incident happened at the turn of the century which boosted awareness of the importance of information security: one after another, the front pages of ministry websites were being rewritten. In response, Prime Minister Mori’s Cabinet established an IT strategy headquarters to prevent security holes, virus infections, and other information security problems. In 2005, the information security policies of individual ministries were unified, and a common standard was created for government institutions.

This wave of information security fortification reached national universities. Associate Professor Hitoshi Okada of the NII Information and Science Research Division, who was involved in a university information security improvement project at the time, looks back.

“We came to the conclusion that, unlike governmental institutions, it is important not only that academic institutions establish appropriate information security rules and apply them to operations, but also that they cultivate security-mindedness among students. This is why we decided to develop information security related teaching materials. When I say ‘teaching

materials’, I’m not referring to primarily textual documents or PowerPoint presentations. Instead, our goal was to create interactive teaching materials which students could voluntarily experience and participate in, with a game-like feel, in order to capture the interest of, and educate, many students. What we produced was “Hikari and Tsubasa’s Information Security Three Choice Class” (hereafter “Three Choice Class”), which used a Flash-based quiz approach to learning about information security.

## Puzzling Students with Difficult to Decide Three Choice Questions

Many characters, including university students “Hikari” and “Tsubasa”, appear throughout the Three Choice Class, presenting issues and problems that come up in their everyday computer use in the form of dialogs between characters. There are 14 topics in all, from basic computer related items such as “computer viruses” and “OS upgrades” to problems related to “online shopping” and “dating sites”.

Each topic progresses in the following order: “(1) Dialog -> (2) 3 Choice Question -> (3) Answer and Explanation -> (4) Column -> (5) Case Studies -> (6) Self Check” (see diagram). In order to make the dialog between the characters easy to read even for students with little computer knowledge, it is

structured as a rapid-fire comic dialog. That may give it the impression of being oversimplified, but the main content, the three choice questions, are structured so as to make even heavy users pause and think carefully before answering. It’s not that the content of the questions themselves is too advanced and difficult to understand, but that the choices presented all seem reasonable. Associate Professor Okada says, regarding this structure, “For each three choice question, in addition to the correct answer, there is one that is completely wrong, and one that is worded just slightly incorrectly. This is because our objective is for students to understand the very essence of information security.”

“Let me explain, using an easy example. For example, there have recently been reports about a hotel employee who revealed on Twitter visits by famous people travelling incognito. This is a clear violation of hotel industry confidentiality obligations. On the other hand, whistle blowing about the unethical behavior of an organization cannot always be punished on the basis that it is a violation of confidentiality. In other words, it is very difficult to make absolute judgments regarding information security problems. We made sure to include choices which were just slightly off in order to convey that in an immediate way to students.”

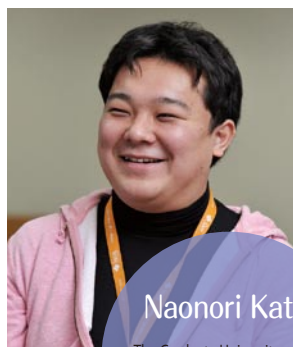
One student who took the Three Choice Class,





Yusaku Kokubu

Tokyo University of Marine Science and Technology  
Laboratory of Ocean Ecosystem Dynamics



Naonori Kato

The Graduate University for Advanced Studies  
School of Multidisciplinary Sciences  
Department of Informatics  
doctoral course

Tokyo University of Marine Science and Technology Laboratory of Ocean Ecosystem Dynamics' Yusaku Kokubu, had this to say, "I'm constantly using the internet, so I just skimmed through the first conversation, but, just as Professor Okada intended, the 3 choice question had me puzzled. It seemed easy, but was tricky."

Once students gain an understanding of the essential nature of information security through a 3 choice question, they move on to the rest of the content, in (4) "Column" and beyond. Here, actual case examples of security problems are laid out, and explanations are given regarding how users should protect themselves from trouble.

As mentioned earlier, the Three Choice Class contains 14 sections in all. Authorial duties were divided between specialists in information security education in universities and businesses, and each were inventive in what they produced, but Naonori Kato of the Information Science Doctoral Course at the Graduate University for Advanced Studies' School of Multidisciplinary Sciences, who has worked together with Associate Professor Okada to promote the usage of the materials, says that "the issue we particularly wish students to learn about is copyright".

"Losses due to the incident in which junior high school students uploaded comic books to a video sharing site are estimated to be as high as 2 billion yen. I think that we are in an era in which, in order to avoid incidents such as this, students must gain a deeper understanding of copyright, and decide for themselves not to take actions which may be

deemed illegal."

Kokubu would like these materials to be made available not only to students, but also to the general public.

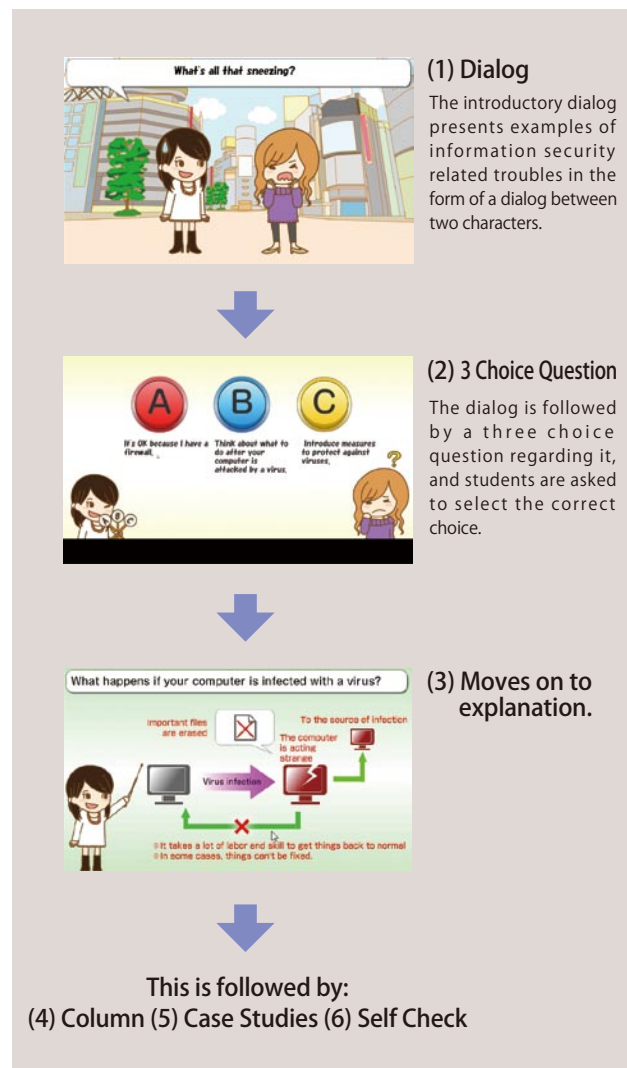
"They are written at a level that can be understood even by people with little knowledge of the Internet, and the length of each section is just right. I would even recommend it to people of my parents' generation."

### Japan, Leading the World in Improving Student Information Literacy

The Three Choice Class teaching material described herein has been distributed to all national universities. The Tokyo University of the Arts is using it in campus-wide education, while multiple other universities have stored it as a lendable teaching resource. How will Associate Professor Okada continue to polish it in order to have it be used by an even greater number of students?

"The 14 topics reflect technological trends. However, technology advances rapidly, meaning that there is the risk that some of the content will become outdated, or that what it should say in the explanatory sections makes a complete about-face. This is why we have made it possible

Figure The Structure of "Hikari and Tsubasa's Information Security Three Choice Class"



to immediately customize the teaching materials. I would also like to create a system for obtaining and analyzing statistical data based on the results of the 3 choice questions and the self-assessment.

Even on a global scale, there aren't many educational materials regarding information security directed at students. An English version of the Three Choice Class has already been published, and there are plans to publish a Thai version in the near future. I would also like to have it adapted for other languages as well, so that it may be proactively used by exchange students visiting Japan from other countries."

The importance of information security will continue to rise. In order to raise the baseline, NII will be called on in the future to further the adoption of teaching materials like this, while spreading word of information security on an international level.

(Written by Junichi Morimoto)

# The Wave of Informatics Spreads, from Shonan to the World at Large

The residential informatics seminars held in the small town of Dagstuhl, in the southwest of Germany, offer researchers a place to exchange ideas and discuss the issues they are currently working on, playing an important role in the promotion of the informatics field. February of this year marked the holding of the first “NII Shonan Meeting”, modelled on the Dagstuhl seminars. We asked about the initiatives and hopes of the NII Shonan Meeting, which aims to become a center for informatics in Asia.

## Becoming a Center of Informatics in Asia

This February marked the start of the “NII Shonan Meeting” (hereafter, the “Shonan Meeting”), a residential seminar held by the NII. The Shonan Meeting is an international seminar aimed at global top class informatics researchers and young informatics researchers, as well as engineers from the world of industry. Meetings are held at the “Shonan Village Center” in Zushi City, which is also where participants lodge. What was the reasoning behind NII launching this type of seminar? Junji Oshima, section chief in charge of providing administrative support to the Shonan Meeting, explains.

### Junji Oshima

Chief of Planning and International Affairs  
Planning and Promotion  
Strategy Department



“There are many opportunities for the announcement of research results, such as international conferences and symposiums, both inside Japan and out. However, there weren’t many places where researchers can focus on discussion in the informatics field. In terms of residential seminars, the Dagstuhl seminars in Germany have produced results for around 20 years, and we wanted to create that kind of place for sharing research and making new discoveries in Japan as well.”

The level of informatics in Asian countries such as Japan, China, and Korea is currently extremely high. However, it is geographically difficult for Asian researchers to regularly participate in European and American seminars. There has therefore been a desire among Asian informatics researchers for a nearby, convenient location for them to exchange ideas. A similar seminar was planned several years ago in Singapore, but the plans never came to fruition, making the long-awaited Shonan Meeting the first residential informatics seminar in Asia.

“By holding the Shonan Meeting, the NII hopes to establish Japan as a hub for informatics in Asia, and to take a position of leadership in the Asian informatics world.”

## Sharing Meals and Lodging while Engaging in Discussion and Deepening Friendships

Let us look back on the process leading up to the actual meeting itself. First, organizers decide on the research theme. Suggested theme

submissions are open to everyone, both inside Japan and out. There are two submission deadlines per year, and submitted themes are judged by the NII academic committee, which selects a theme which is appropriate both in terms of quality and content. The February theme was “Graphing Algorithms and Combination Optimization”, and the theme for March was “The Future of Multimedia Analysis and Mining”. There was not sufficient time for a public submission process for these, and they were selected from NII researcher proposals.

“After a theme is selected, invitations are sent to central figures, top class researchers, and top class engineers in corresponding fields around the world. The researchers being invited are extremely busy, so invitations are sent as early as possible, as securing a position in their schedules is one of the keys to success. The participation of key people spurs participation by other researchers, leading to a more vital and robust meeting,” explains Section Chief Oshima.

20 to 30 people were expected to participate in the first meeting, but 40 people participated in the February seminar. This number reflects the high hopes held for the Shonan Meeting. The Shonan Meeting, as a general rule, lasts 4 nights and 5 days. Detailed programs are not decided in advance; instead, they are decided by all participants, based on the intentions of the organizers, and the presentations and intentions of participants on the first day. “This flexible approach ensures that the Shonan Meeting is not dominated by research which has

already been concluded, but ongoing issues, and what is going on inside of the heads of the researchers at the time,” says Section Chief Oshima.

The site, the Shonan Village Center, is located on top of a tree-covered hill, far from the hustle and bustle of Tokyo. Sagami Bay spreads below it, and it offers a beautiful view of Mount Fuji. Researchers from around the world eat and sleep together for several days in this relaxing atmosphere, engaging in discussions and deepening their friendships.

“We hope that it serves as a place for people to find clues to new informatics research fields and the solutions to open problems, and for the creation of a new community.”

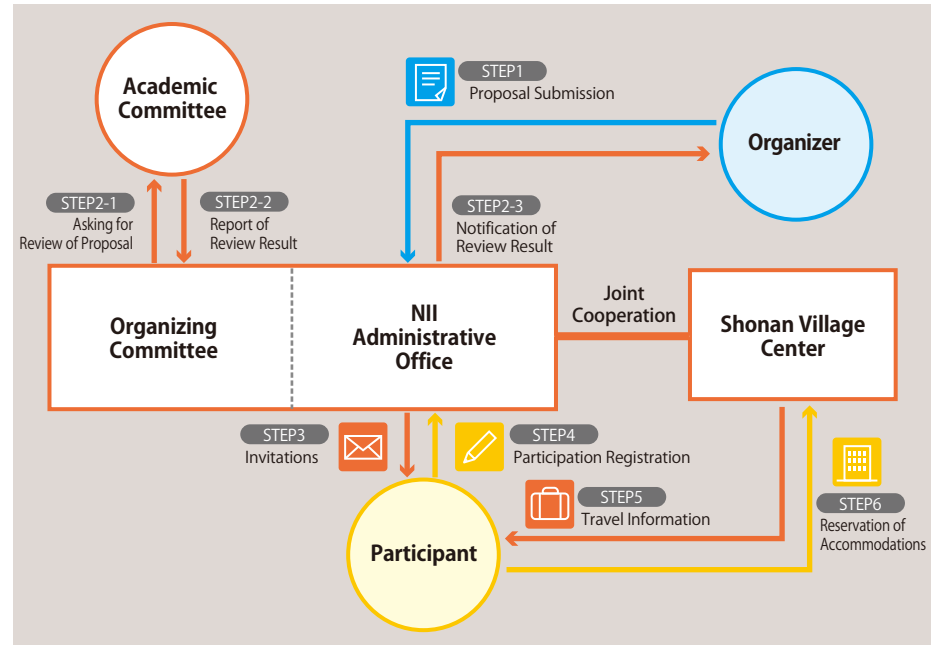
### Cooperation and Coordination with the Shonan Village Center is Vital

The idea of the Shonan Meeting traces back to the “GRACE International Meeting on Bidirectional Transformations” in December, 2008. GRACE (Center for Global Research in Advanced Software Science and Engineering) is an NII organization. Professor Hu Zhenjiang of GRACE held a test pilot residential seminar. This meeting, also held at the Shonan Village Center, was attended by approximately 30 people from around the world, who engaged in discussions for 4 days and 3 nights.

“This international meeting was very well received by all those who attended. Based on it, we started in June 2010 checking seminar sites, holding meetings regarding paperwork and procedures, making pamphlets, and the like in close cooperation with Shonan Village Center, preparing for the holding of the Shonan Meeting.”

Having only around 9 months till the first Shonan Meeting is not by any means a long preparation period by international large scale conference standards. The planning team, led by Section Chief Oshima, worked together with the Shonan Village Center, taking care of all

Figure NII Shonan Meeting Scheme



administrative work, from the sending of invitations to the confirmation of invitee participation, lodging and meeting room arrangements, financial arrangements, and website construction, in order to ensure that the meeting organizers could focus on academic matters.

“I have had experience with research cooperation and international exchange clerical work, but the Shonan Meeting is a large scale and continuous operation. I realize that my role is very important, and I take particular care in carrying out my duties.”

### Promoting Collaboration between Industry and Academia and Contributing to Informatics in the world

The model for the Shonan Meeting was the German Dagstuhl seminars described above. Dagstuhl is a small town near the borders of France and Luxembourg, and informatics seminars are held each week in a chateau in town. It has produced countless leading edge ideas in the informatics field over its roughly 20 year history, and is highly praised by researchers. The competition rate for public theme selection is roughly 200%, and meeting plans have already been established for the next two years. Holding a similar meeting in Asia, and spurring on research activities throughout Asia, is an

extremely meaningful effort.

“Our goal is for this residential seminar, the only one in Asia, attended by top class researchers from around the world, to become a center for informatics in Asia. Eventually, we would like to coordinate with Dagstuhl, and enhance PR for the Shonan Meeting.”

Issues going into the future include financial ones. Dagstuhl is supported by both national and corporate funding. In the case of the Shonan Meeting, support through business sponsorship is under consideration, as well as Kanagawa Prefecture providing Shonan Village Center meeting rooms free of charge.

“The field of informatics is a wide one, and it is connected to a diverse range of other fields. I believe that in the future, bringing in the corporate world and promoting informatics using a cross-disciplinary approach will be important. We need the sponsorship of the business world and the government, but to get them, we must first establish a track record and make the meeting a success.”

The Shonan Meeting has just started, but hopes are high that it will succeed in bringing together industry and academia, serving as a driving force for the promotion of informatics, not only in Japan, but worldwide.

(Written by Yuko Sakurai)

# NII ESSAY

## Raising Reliability to “Newspaper-Like Levels” ...

Masami Nakamura

(Special Appointment Professor, Organization for Promoting Cooperation with Society and Industry, NII)



Since leaving my position at a newspaper publisher, I now teach network society theory at a university in the Tokyo area (my lectures are culturally related, and offer an introduction to network social theory). At the start of my course, I ask my students, “Which of you read a newspaper this morning?” Out of a classroom of 60 or so students, only one or two raise their hands. This trend has continued, year after year.

“Well, then, how many of you checked the news via a computer or mobile phone?” This time, many more raise their hands.

### Changing Lifestyles

With the advent of the network era, lifestyle patterns have changed. When I were hard (?) at work, I felt uncomfortable if I didn’t check the news every morning on TV or in newspapers — as if the day hadn’t really started. The young people of today are different, though. They have no problem being without a newspaper.

An information communication white paper from 2008 said this: “In terms of household media utilization in 2004, Internet use accounted for 37 minutes, and newspapers for 31. In 2003, newspaper use outstripped Internet use by one minute, making this year the first year in which the net has surpassed newspapers.”

The white paper goes on to say that the average time

young people spend with newspapers is 14.2 minutes, while they spend from 70 minutes to 2 hours and 23 minutes with computers. The reason for the decline of newspapers as media is apparent. The average time that people aged 50 and older spend with newspapers, by the way, is 44.8 minutes. As is often said, the newspaper industry is being supported by the elderly.

### The Internet is the Media of the Future

While the negative effects of anonymity and lack of transparency in information found on the Internet are often pointed out, the Internet is superior in offering the latest information, and in its bidirectionality. Its biggest feature is its lack of need for special methods for issuing information. Anyone can be a source of information. The Internet is a means of conveying this information, and the advance of the Internet is unavoidable. This can clearly be seen by looking at my students’ situation.

Internet information is now a mix of valuable and worthless information. I am sure I am not the only one who wishes it were made more reliable -- that one could feel more secure with the information it offers. Just as we simply (?) believed that “if it says it in the newspaper, it must be true”. I feel that this will be the cornerstone of the continued growth of the Internet.

This month’s cover illustration: While networked society grows at breakneck speed, is security being left behind? Pitfalls lie where least expected, and doctors must use their stethoscopes to check patients every day, so there is a need for overall network security technologies.

Weaving Information into Knowledge



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