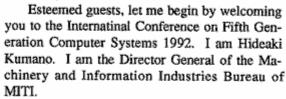# Perspective on Information Technology Policy

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Esteemed guests, let me begin by welcoming you to the Internatinal Conference on Fifth Generation Computer Systems 1992. I am Hideaki Kumano. I am the Director General of the Machinery and Information Industries Bureau of MITI.

We have been promoting the Fifth Generation Computer Systems Project, with the mission of international contributions to technological development by promoting the research and development of information technology in the basic research phase and distributing the achievements of that research worldwide. This international conference is thus of great importance in making our achievements available to all. It is, therefore, a great honor for me to be given the opportunity to make the keynote speech today.

## 1. Achievements of the Project

Since I took up my current post, I have had several opportunities to visit the project site. This made a great impression on me since it proved to me that Japanese technology can produce spectacular results in an area of highly advanced technology, covering the fields of parallel inference machine hardware and its basic software such as operating systems and programming languages; fields in which no one had any previous experience.

Furthermore, I caught a glimpse of the future use of fifth generation computer technology when I saw the results of its application to genetics and law. I was especially interested in the demonstration of the parallel legal inference system, since I have been engaged in the enactment and operation of laws at MITI. I now believe that the machines using the concepts of fifth generation computers will find practical applications in the enactment and operation of laws in the near future.

The research and development phase of our project will be completed by the end of this fiscal year. We will evaluate all the results. The committee for development of basic computer technology, comprised of distinguished members selected from a broad spectrum of fields, will make a formal evaluation of the project. This evaluation will take into account the opinions of those attending the conference, as well as the results of a questionnaire completed by overseas experts in each field. Even before this evaluation, however, I am convinced that the project has produced results that will have a great impact on future computer technology.

## 2. Features of the Fifth Generation Computer Systems Project

I will explain how we set our goals and developed a scheme that would achieve these high-level technological advances.

The commencement of the project coincided

with the time when Japan was coming to be recognized as a major economic and technological power in the world community. Given these circumstances, the objectives of the project included not only the development of original and creative technology, but also the making of valuable international contributions. In this regard, we selected a theme of "knowledge information processing", which would have a major impact on a wide area from technology through to the economy. The project took as its research goal the development of a parallel inference system, representing the paradigm of computer technology as applied to the theme.

The goal was particularly challenging at that time. I recalled the words of a participant at the first conference held in 1981. He commented that it was doubtful whether Japanese researchers could succeed in such a project since we, at that time, had very little experience in these fields.

However, despite the difficulties of the task ahead of us, we promoted the project from the viewpoint of contributing to the international community through research. In this regard, our endeavors in this area were targeted as pre-competitive technologies, namely basic research. This meant that we would have to start from scratch, assembling and training a group of researchers.

To achieve our goal of creating a paradigm of new computer technology, taking an integrated approach starting from basic research, we settled on a research scheme after exhaustive preliminary deliberations.

As part of its efforts to promote the dissemination of basic research results as international public assets, the government of Japan, reflecting its firm commitment to this area, decided to finance all research costs.

The Institute for New Generation Computer Technology (ICOT), the sponsor of this conference, was established to act as a central research laboratory where brainpower could be concentrated. Such an organization was considered essential to the development of an integrated technology that could be applied to both hardware and software. The Institute's research laboratory, that actually conducted the project's research and development, was founded precisely ten years ago,

today, on June 1 of 1982. A number of highly qualified personnel, all of whom were excited by the ideal that the project pursued, were recruited from the government and industry. Furthermore, various ad hoc groups were formed to promote discussions among researchers in various fields, making ICOT the key center for research communication in this field.

The duration of the project was divided into three phases. Reviews were conducted at the end of each phase, from the viewpoint of human resources and technological advances, which made it possible to entrust various areas of the research. I believe that this approach increased efficiency, and also allowed flexibility by eliminating redundant areas of research.

We have also been heavily involved in international exchanges, with the aim of promoting international contributions. Currently, we are involved in five different international research collaboration projects. These include work in the theorem proving field with the Australian National University (ANU), and research into constraint logic programming with the Swedish Institute of Computer Science (SICS). The results of these two collaborations, on display in the demonstration hall, are excellent examples of what research collaboration can achieve. We have also promoted international exchange by holding international conferences and by hosting researchers from abroad at ICOT. And, we have gone to great lengths to make public our project's achievements, including intermediate results.

## 3. Succession of the Project's Ideal

This project is regared as being the prototype for all subsequent projects to be sponsored by MITI.

It is largely due to the herculean efforts of the researchers, under the leadership of Dr. Fuchi and other excellent research leaders, that have led to the revolutionary advances being demonstrated at this conference.

In the light of these achievements, and with an eye to the future, I can now state that there is no question of the need to make international contributions the basis of the policies governing future

technological development at MITI. This ideal will be passed on to all subsequent research and development projects.

A case in point is the Real World Computing (RWC) project scheduled to start this year. This project rests on a foundation of international coopereation. Indeed, the basic plan, approved by a committee a few days ago, specifically reflects the international exchange of opinions. The RWC project is a particularly challenging project that aims to investigate the fundamental principles of human-like flexible information processing and to implement it as a new information processing technology, taking full advantage of advancing hardware technologies. We will not fail to make every effort to achieve the project's objectives for use as common assets for all mankind.

## 4. International Response

As I mentioned earlier, I believe that the Fifth Generation Computer System Project has made valuable international contributions from its earliest stages. The project has stimulated international interest and responses from its outset. The great number of foreign participants present today illustrates this point.

Around the world, a number of projects received their initial impetus from our project: these include the Strategic Computing Initiative in the U.S.A., the EC's Esprit project, and the Alvey Project in the United Kingdom.

These projects were initially launched to compete with the Fifth Generation Computer Systems Project. Now, however, I strongly believe that since our ideal of internatioinal contributions has come to be understood around the globe, together with the realization that technology can not and should not be divided by borders, each project is providing the stimulus for the others, and all are making major contributions to the advancement of information processing technologies.

## 5. Free Access to the Project's Software

One of the great virtues of science, given an open environment, is the collaboration between researchers using a common base of technology.

Considering this, it would be impractical for one person or even one nation to attempt to cover the whole range of technological research and development. Therefore, the necessity of international cooperation is self-evident from the standpoint of advancing the human race as a whole.

In this vein, MITI has decided to promote technology globalism in the fields of science and technology, based on a concept of "international cooperative effort for creative activity and international exchange to maximize the total benefit of science and technology to mankind." We call this concept "techno-globalism".

It is also important to establish an environment based on "techno-globalism", that supports internatinal collaboration in basic and original research as a resource to solve problems common to all mankind as well as the dissemination of the resulting achievements. This could be done through international cooperation.

To achieve this "techno-globalism" all countries should, as far as possible, allow free and easy access to their domestic technologies. This kind of openness requires the voluntary establishment of environments where anyone can access technological achievements freely, rather than merely asking other countries for information. It is this kind of international cooperation, with the efforts of both sides complementing each other, that can best accelerate the advancement of technology.

We at MITI have examined our policies from the viewpoint of promoting international technological advancement by using the technologies developed as part of this project, the superbness of which has encouraged us to set a new policy.

Our project's resources focused mainly on a variety of software, including parallel operating systems and parallel logic programming languages. To date, the results of such a national project, sponsored by the government, were available only for a fee and could be used only under various conditions once they became the property of the government. Therefore, generally speaking, although the results have been available to the public, in principle, they have not been available to be used freely and widely.

As I mentioned earlier, in the push toward reaching the goal of promoting international coop-

eration for technological advancement, Japan should take the initiative in creating an environment where the results of all technological research can be accessed easily. Now, I can formally announce that MITI has adopted a policy where the research phase software developed as part of the Fifth Generation Computer Systems Project, including the Parallel OS, Parallel Logic Programming Language, and all other software demonstrated at this conference, will be made available without charge and free of any constraints that would impede the progress of research and development. In line with this policy, ICOT, that has been responsible for all research and development, is now preparing to enable the free use of the copyrights of this software.

The adoption of this policy not only allows anyone free access to the software technologies developed as part of the project, but also make it possible for interested parties to inherit the results of our research, to further advance the technology. I sincerely hope that our adopting this policy will maximize the utilization of researchers' abilities, and promote the advancement of the technologies of knowledge information processing and parallel processing, toward which all efforts have been concentrated during the project.

This means that our adopting this policy will not merely result in a one-way flow of technologies from Japan, but enhance the benefit to all mankind of the technological advancements brought on by a two-way flow of technology and the mutual benefits thus obtained.

I should say that, from the outset of the Fifth Generation Computer Systems Project, we decided make international contributions an important objective of the project. We fashioned the project as the model for managing the MITI-sponsored research and development projects that were to follow. Now, as we near the completion of the project, we have decided to adopt a policy of free access to the software to inspire further international contributions to technological development.

I ask all of you to understand the message in this decision. I very much hope that the world's researchers will make effective use of the technologies resulting from the project and will devote themselves to further developing the technologies.

Finally, I'd like to close by expressing my heartfelt desire for this international conference to succeed in providing a productive forum for information exchange between participants and to act as a springboard for further advancements.

Thank you very much for bearing with me.