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Directions which International Industry/Academia/Government Cooperation Centers Should Aim For
~ Tsukuba Innovation Arena (TIA): Outline and Outlook ~

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1 Introduction

Tsukuba Innovation Arena (TIA) was launched as an international industry/academia/government nanotechnology cooperation center on June 17, 2009. This paper provides a summary of the background and concepts for launching this center, and also takes up the discussion continually needed regarding the direction which an international industry/academia/government cooperation center should aim for.

2 Background of its Launch

2-1 Background in Japan and History until its Launch

The New Growth Strategy was decided in the Cabinet on June 18, 2010. The New Growth Strategy Execution Plan which is its schedule was created, aiming at its solid execution.

The New Growth Strategy aims to achieve a "Strong Economy," "Fiscal Strength" and "Strong Social Security." This shows seven strategy fields: 1) Green innovation to be a great environmental and energy country strategy, 2) Life innovation to be a great health country strategy, 3) Asian economic strategy, 4) Build a tourism country & regional stimulation strategy, 5) Build a country of science, technology, and information and communications strategy, 6) Employment and human resources strategy, 7) Finance strategy. Among these, fields in the build a country of science, technology, and information and communications strategy are expected to serve as innovation platforms for various strategic fields, and Japan is expected to be highly competitive in these fields both today and in the future. This core policy strengthens international competitiveness by promoting combined public and private R&D investments at 4% of GDP, the Leading Graduate Schools Initiative, etc.

Along with these is the initiative to launch Tsukuba Innovation Arena as an international industry/academia/ government cooperation center. In the background of building such a cooperation center is the awareness that Japan "must build and execute a strategy to confront the severely deadlocked position of Japanese industry, which has lagged behind the world's major players and market changes, and overcome barriers between government and industry, ministries and agencies, and central and regional governments, in order to win in this era of strong global competition," as written in the Industrial Structure Vision (Ministry of Economy, Trade and Industry, June 2010, Figure 1).

Tsukuba Innovation Arena (TIA, also called "Tsukuba Nanotech Arena" in Japanese) was launched on June 17, 2008 with strong support from the Ministry of Education, Culture, Sports, Science and Technology, and the Ministry of Economy, Trade and Industry. TIA has four core institutions: University of Tsukuba, National Institute for Materials Science (NIMS), National Institute of Advanced Industrial Science and Technology (AIST), and Nippon Keidanren. TIA is an institution to execute and operate the international industry/ academia/ government nanotechnology cooperation center initiative. After preparations by large budget measures for forming the center in supplementary budgets since FY2008, about 400 people participated in the first public symposium held on June 30 at the Keidanren Kaikan.

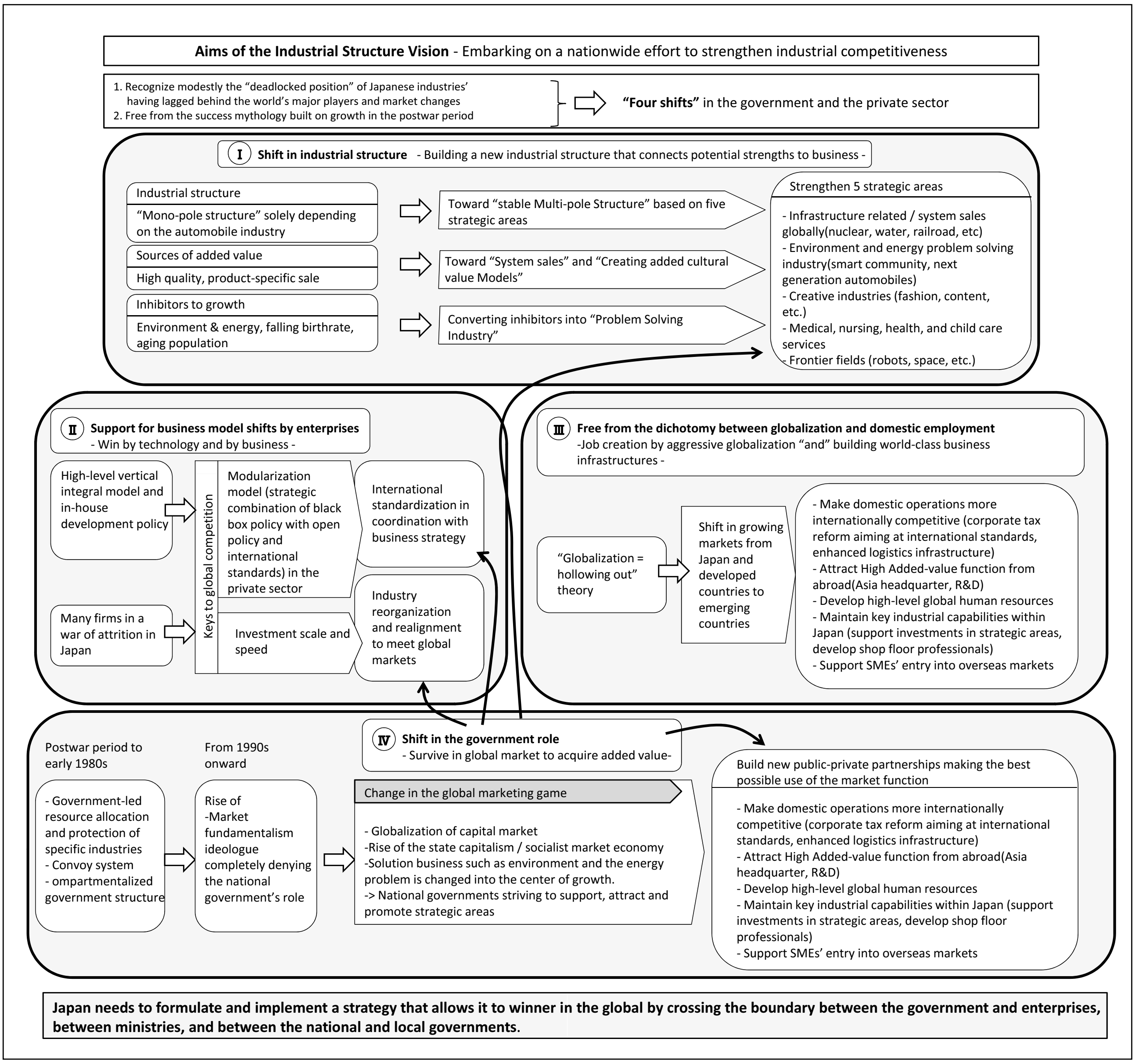

Figure 1 : From Industrial Structure Vision Document (June 2010, Ministry of Economy, Trade and Industry)

Source: The Industrial Structure Vision 2010 (June), Ministry of Economy, Trade and Industry

2-2 Overseas Trends in Background

With the domestic discussions like those described above as a starting point, since the National Nanotechnology Initiative (NNI) was launched under the U.S. Clinton administration in FY2001, various countries made large R&D investments in nanotechnology and formed centers, and there is awareness that Japan's previous leading position is steadily becoming threatened.

When it launched the NNI, the U.S. evaluated its competitive strengths in the nanotechnology field. Japan was evaluated as highly competitive in materials research and electronic device research, etc. There was a debate as to what strategy the U.S. should adopt in response. There was an argument that "The U.S. has advantages in information system technologies, but regarding material and device technologies which are fundamental for competitiveness, the U.S does not compare with the Japanese approach of comprehensively changing the composition of materials with repeated experiments to meticulously discover material properties, so if the U.S. does not become competitive in these materials and device technologies, it may eventually also lose competitiveness in information system technologies." After that, the Earth Simulator was developed, which ranked as the world's top supercomputer for two years in a row. Thus, boosting competitiveness vs. Japan in the nanotechnology field became an urgent task.

As a result, according to interviews documented by the U.S. Council on Competitiveness, the U.S. strategy vs. Japan is that "The U.S. does not compare with

Japan's materials research by repeated experiments to meticulously discover material properties. For the U.S. to become competitive, it should largely change material research techniques themselves: sufficiently understand physical phenomena at a nano-level, utilize advanced academic knowledge of quantum mechanics and molecular theory, and do large scale computer simulations." In response thereafter, with support from the U.S. NSF, the National Nanotechnology Infrastructure Network (NNIN) was selected from multiple universities. Also, a large nanotechnology R&D complex was established in Albany in New York State.

This Albany NanoTech complex was established by New York State, State University of New York, Semiconductor Manufacturing Technology (SEMATEC, a consortium established with investments by the Department of Defense and 14 private companies. Since 1998, a consortium with only private investments.) and IBM. It is a very large complex with at least about the equivalent of 400 billion yen of R&D investment (about 100 billion yen of this was government investment), and over 250 private companies participating.

Meanwhile in Europe, in 2001 during almost the same period when the U.S. NNI was launched, the Micro and Nanotechnology Center (MINATEC) was established as an industry/academia/government nanotechnology research center in Grenoble, France. At its core are national research centers such as the Atomic Energy Commission - Laboratory for Electronics & Information Technology (CEA LETI) and the National Centre for Scientific Research (CNRS), together with the Grenoble Institute of Technology (INPG), and the Grenoble-Isere Economic Development Agency (AEPI). MINATEC constructed a building complex in FY2006 which serves as a symbol of industry/ academia/ government cooperation, with support from a central governmental agency for investment in France, and from AEPI, which is a regional government investment agency. It operates with a research budget equivalent to about 36 billion yen. With a focus on semiconductor device research, MINATEC Center has its own advanced process line using 300mm wafers. It also set up a large 300mm development line with the equivalent of about 300 billion yen invested jointly by the ST-Microelectronics semiconductor company, U.S. Motorola (now divested as Freescale Semiconductor), and Texas Instruments. Over 250 private companies have gathered around Grenoble, which is now building into a large R&D cluster.

There has also been great progress at the Interuniversity Microelectronics Center (IMEC, a nonprofit R&D corporation established in 1984 by the Flemish Region and Katholieke Universiteit Leuven). IMEC proposed an R&D program based on the future vision in the EU Framework Programme, and an R&D program derived from analysis of industrial needs. The number of participating companies has quickly increased due to its consortium type research model (IIAP) which recruits participating companies, and its unique intellectual property model which enables members to use IMEC's intellectual property and joint results with companies signing contracts with IMEC. It is a large R&D center, with an annual budget currently equivalent to about 30 billion yen (about 5 billion yen of this is public funding), and about 600 participating companies.

With the rapid establishment and expansion of these European and U.S. nanotechnology R&D centers, Japan is aware that it is steadily losing its relative competitive advantages in the nanotechnology field. In Europe and the U.S., large research centers and large investments have been made with organization and system design based on open innovation, and various incentives and policies to attract private companies. Japan in contrast has individual companies, public research institutes and universities which do advanced research, but Japan did not have a large cooperative center. Thus the Council on Competitiveness-Nippon (COCN) and Keidanren made a recommendation seeking to establish a center in order to maintain and build competitive advantages in Japan. This developed into conception of the Tsukuba Innovation Arena.

3 Outline of Tsukuba Innovation Arena

The following is an outline of Tsukuba Innovation Arena's basic principles, organizational design, research fields and infrastructure.

1) Five Basic Principles

Figure 2 shows the five basic principles of Tsukuba Innovation Arena.

Principle 1. Create Global Value

Aim to create new global businesses by practical demonstration on shared infrastructure.
With strong science and technology of industry/academia/government and their shared infrastructure as a basis, do R&D which rapidly creates new global businesses.

Principle 2. Under One Roof

Provide a place for shared creation "Under One Roof," which combines and fuses researchers and research bodies of industry, academia and government, across barriers between organizations.
Build a place which demonstrates synergies, breaking down barriers between industries which provide assembly, devices, equipment and materials, between industry/academia/government sectors, between technology and scientific fields, etc.

Principle 3. Independence and Positive Cycle

Shared infrastructure provides internationally advantageous usage value to both Japan and overseas.
Shared infrastructure is differentiated internationally, providing complementary value for researchers and research bodies both in Japan and overseas. For outside researchers and research bodies, provide knowledge creation which justifies its price.

Principle 4. Win-Win Cooperative Network

Expand its network both in Japan and overseas, strengthen its cooperative power, and create value.
As a national center, the research bodies of the center will build a cooperative all-Japan industry/academia/government network. Instead of falling into individual optimization, always aim to optimize from a neutral and overall standpoint. To do this, produce partnering which becomes win-win relationships, and promote formation of neutral and fair contract relations.

Principle 5. Foster Next Generation Human Resources

Enhance education (next generation human resources development) function via industry/academia/government cooperation.
Use industry/academia/government cooperation to establish globally essential graduate school education and industry human resources development functions, for developing next generation human resources. Aim to be an "International Graduate School of Nano-Technologies," via cooperation with the University of Tsukuba and other universities in Japan and overseas.

Figure 3 : Five Basic Principles of Tsukuba Innovation Arena

Source: Tsukuba Innovation Arena pamphlet

2) Organizational Management

Figure 3 shows the organizational structure of Tsukuba Innovation Arena.

AIST, NIMS and the University of Tsukuba form the core of management for Tsukuba Innovation Arena. The Executive Board (Chairman: Teruo Kishi) was established as the highest decision-making body, comprised of the heads of these three institutions, plus five people who are industry representatives or neutral people with academic experience.

The Executive Board deliberates on important matters and determines policies. The Management Meeting and Secretariat Meeting were also set up: the Management Meeting to manage the center's operations, and the Secretariat to handle general coordination.

The three core institutions cooperate to perform the Secretariat functions, and in order to handle operations of each core research field and infrastructure, eight working groups were set up with members including experts to investigate research strategy, intellectual property policy, human resource development strategy, etc.

3) Core Research Fields and Core Infrastructure

Figure 4 shows an outline of research at Tsukuba Innovation Arena.

Tsukuba Innovation Arena considered Japan's industry/academia/government competitiveness in the nanotech field, cutting edge research facilities in Tsukuba Science City and attracting human resources, and focuses on six core research fields, promoting research management of the center which concentrates funding and human resources from industry, academia and government. It also constructs three core infrastructure to support its operations, aiming

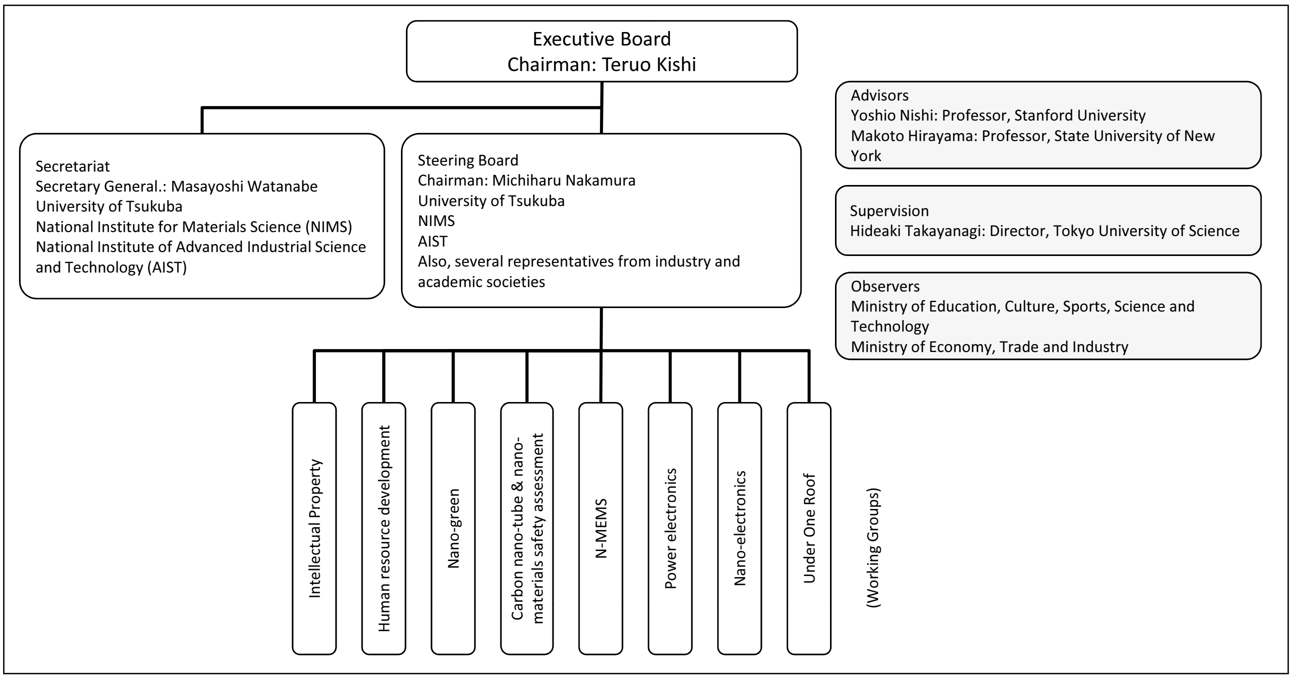

Figure 3 : Organization Structure of Tsukuba Innovation Arena

Source: Tsukuba Innovation Arena pamphlet

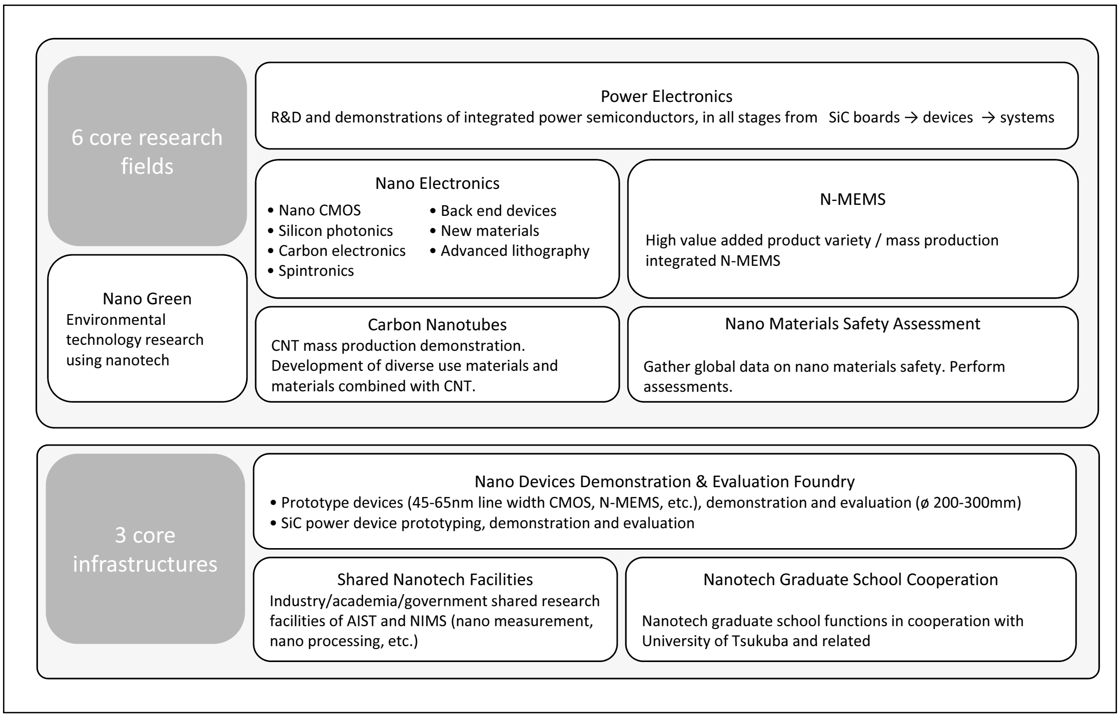

Figure 4 : Core Research Fields and Core Infrastructure of Tsukuba Innovation Arena

Source: Tsukuba Innovation Arena pamphlet

to provide consistent functions, from education and human resources development which are upstream of innovation, to downstream prototyping and evaluation functions.

4) Core Research Fields and their Core Infrastructure

i) Power Electronics

Green innovation is raised as a large pillar of the New Growth Strategy, as there are strong needs to reduce environmental burdens and boost energy efficiency.

In electric power related fields, there is remarkable progress in reducing power consumption for various types of equipment, but there is surprisingly little progress in technology development related to reducing transformer loss. For example, in cases where PCs and home electronics operate on 3.3V, 5V or 12V DC, there is up to 20% loss in conversion from AC100V to DC. To reduce this loss, there is a need for

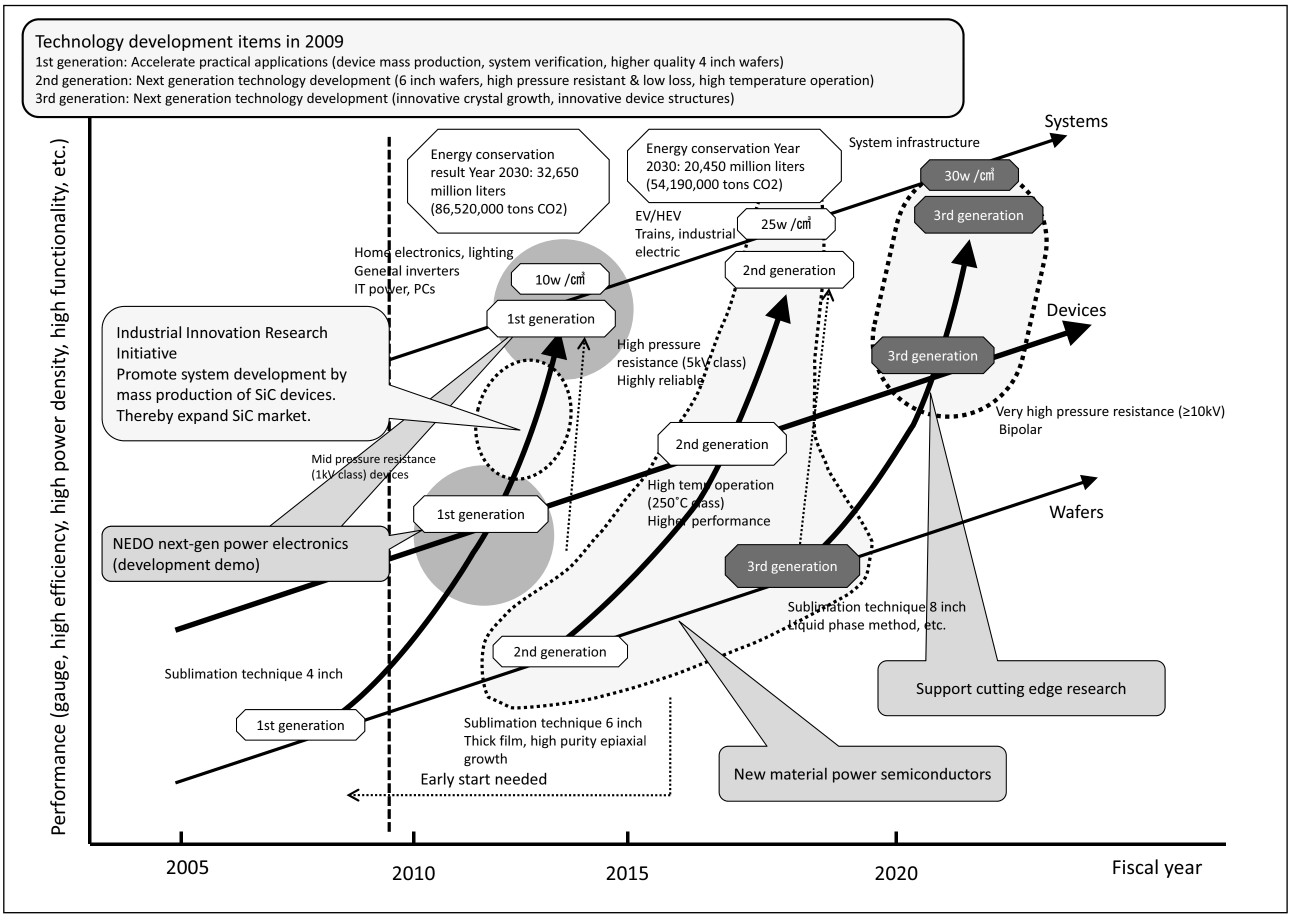

Figure 5 : SiC Power Semiconductor Road Map
From the Technology Strategy Map 2010, of the Ministry of Economy, Trade and Industry

high pressure resistance and low on-state resistance switching devices and inverters, etc. It is difficult to achieve this with existing silicon devices, so there is a need for R&D on composite semiconductor materials such as Silicon Carbide (SiC) and Gallium Nitride (GaN).

In the power electronics research field, Tsukuba Innovation Arena will focus on SiC power semiconductors (Figure 5), which are expected to achieve practical applications at an early stage. It will use the expanded R&D Partnership for Future Power Electronics Technology (FUPET, a technology research partnership) and the recently launched SiC Alliance in order to do fundamental research centering on universities and public research institutes, applications research by industry, and to work on building an innovation hub which leads to seamless development and prototyping.

ii) Nano Electronics

Nanoelectronics research includes fields called "More Moore" with continuing technology development to advance scaling in silicon CMOS, fields called "More than Moore" which fuse and combine technologies to create new value, and fields called "Beyond CMOS" which create new devices using totally new principles and materials.

Technology development for CMOS scaling has been done for the past 10 years in NEDO's "MIRAI Project," and in Semiconductor Leading Edge Technologies, Inc. (Selete) with joint investment by private companies. Tsukuba Innovation Arena is working to create new value by combining the CMOS related fundamental technologies built up in these two projects, together with with nano-material technologies, nano-measurement technologies, nano-manufacturing technologies, etc. researched and developed in the University of Tsukuba, NIMS and AIST.

Meanwhile, cooperation is also encouraged among programs by core researchers selected for the Cabinet's Funding Program for World-Leading Innovative R&D on Science and Technology: Development of Photonics-Electronics Convergence System Technology(Yasuhiko Arakawa, The University of Tokyo Professor), Energy Conserving Spintronics Logic Integrated Circuits (Hideo Ohno, Tohoku University Professor), and Green Nanoelectronics (Naoki Yokoyama, Fujitsu Laboratories Limited

Fellow). This large framework also combines the Low-power Electronics Association & Project (LEAP, a technology research partnership), the Very Low Voltage Device Project for Achieving a Low Carbon Society contracted by the Ministry of Economy, Trade and Industry, and over 100 researchers. There are hopes that this framework will give birth to new concepts in the field of nano-electronics, which correspond to More than Moore and Beyond CMOS (Figure 6).

iii) N-MEMS

MEMS devices are based on semiconductor manufacturing technologies, and incorporate actuator functions. Typical products are Deformable Mirror Devices (DMD) used in projectors, etc. Other typical products are the acceleration sensors in automotive airbag and car navigation systems. Their diverse uses recently include video game machines. There are expectations for much greater developments by combining MEMS devices with various sensor technologies, and with highly integrated CMOS devices which have advanced processing functions.

Among these, Tsukuba Innovation Arena is focusing on N-MEMS. N-MEMS is a set of technologies which utilizes nano-level processing technology to manufacture networked miniature machines, sensors, power sources, etc. R&D is being done for miniature, energy conserving and high performance devices which can contribute to energy conservation and enhanced quality of life. Examples are devices for health monitoring, five senses assistance, energy consumption visualization and bio-analysis.

Research projects done at the Tsukuba Innovation Arena are the Micro System Integration project (jointly with Tohoku University Professor Masayoshi Esashi) under the Funding Program for World-Leading Innovative R&D on Science and Technology, and the Development of High Function Sensor Net Systems and Low Environmental Burden Processes project (jointly with the BEANS Laboratory) which is a NEDO project.

iv) Carbon Nanotubes

Carbon nanotubes (CNT) were discovered in Japan by Professors Morinobu Endo and Sumio Iijima, who are also working on their analyses. There are great expectations for the future of such materials.

The Tsukuba Innovation Arena is especially targeting CNT related R&D in order to boost quality and create components of single-walled CNT. With this aim, it is organically organizing the world's highest level of single-walled CNT synthesis, separation and formation processing technologies, together with plans and development technical abilities and applied product development technologies of private companies. To achieve this, a single-walled CNT mass production demonstration plant was built under a FY2009 supplemental budget project. The Very Low Volume & High Strength Composite Materials Project to Achieve a Low Carbon Society contracted by the Ministry of Economy, Trade and Industry (FY2010-2014) is being executed at the Tsukuba Innovation Arena.

v) Nano Green

In the nano green field, research is done which contributes to a low carbon society, especially around a core of environmental and material technologies built up over many years in NIMS. NIMS, AIST and the University of Tsukuba cooperate with industry to utilize nano technologies for R&D on high efficiency low cost materials with few resource restrictions: innovative solar power materials, high performance energy conversion and storage materials (i.e. for fuel cells, thermoelectric conversion, rechargeable batteries, superconductors), low environmental burden environmental reuse material using photocatalysts, etc.

vi) Safety Assessment of Nanomaterials

The nano level size and diverse shapes (spherical and needle shapes, etc.) of nanomaterials creates safety concerns about biological effects on a cellular level. To promote nanotechnology R&D, it is important to eliminate these concerns. There is a need for thorough study when investigating new materials and manufacturing methods. Regarding nanomaterial safety assessment, there are projects including the Facilitation of Public Acceptance of Nanotechnology funded by the FY2006-2007 Special Coordination Funds for Promoting Science and Technology, and New Step for Nanotechnology R&D and its Social Acceptance (under the FY2007-2009 Cabinet Cooperation Policy Group). AIST and NIMS are thus studying this from safety assessment at the initial stage of nanotechnology research, until public acceptance. This is part of an effort to lead the world

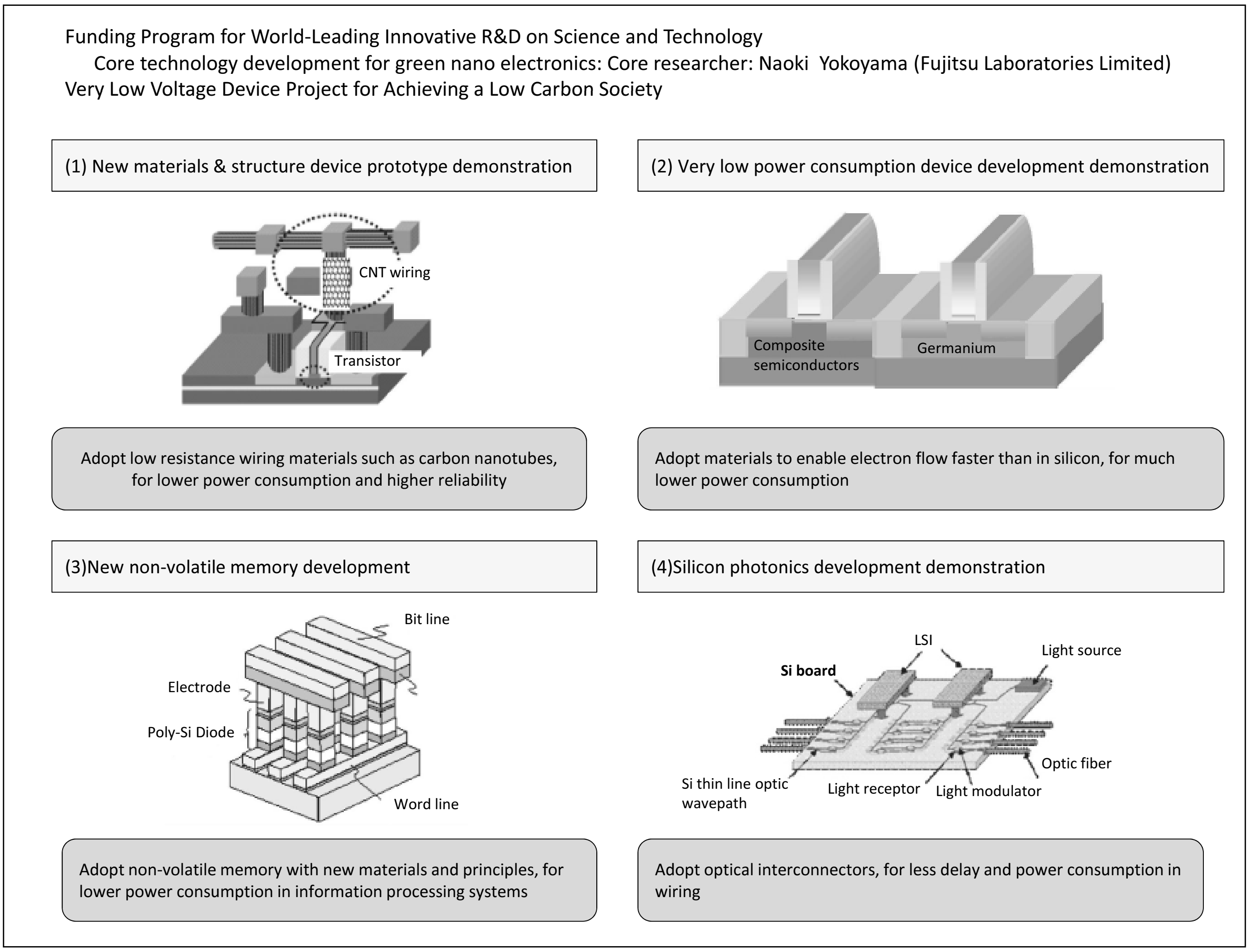

Figure 6 : Research Program to Create New Concepts in the Nano-electronics Field

Source: Tsukuba Innovation Arena pamphlet

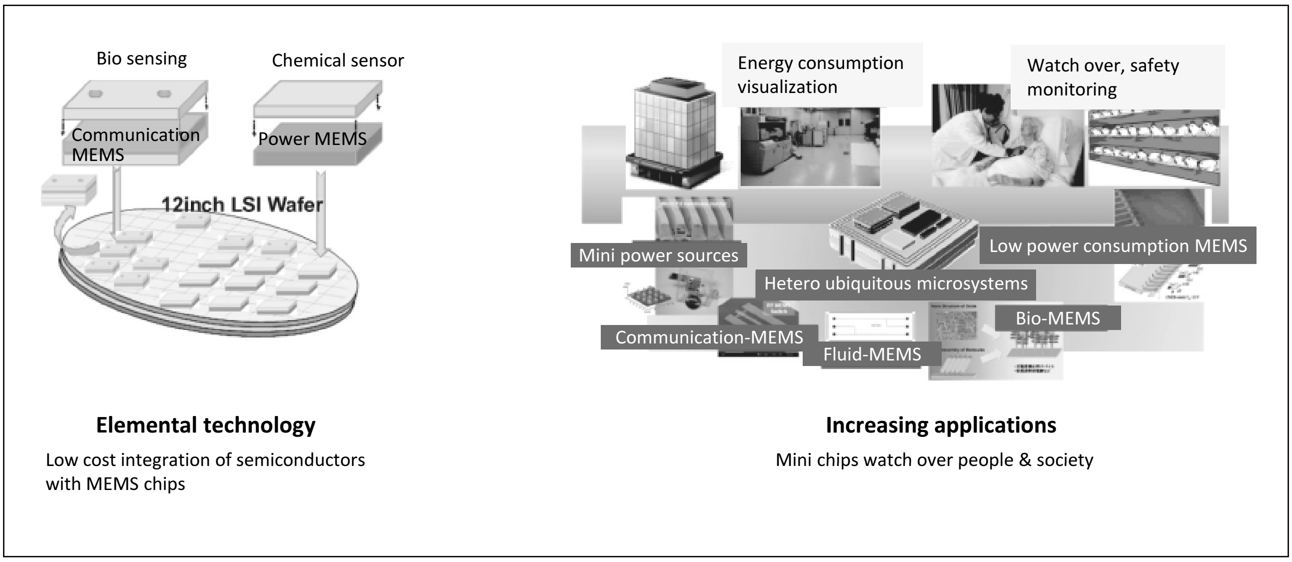

Figure 7 : N-MEMS Outline and Applications

Source: Tsukuba Innovation Arena pamphlet

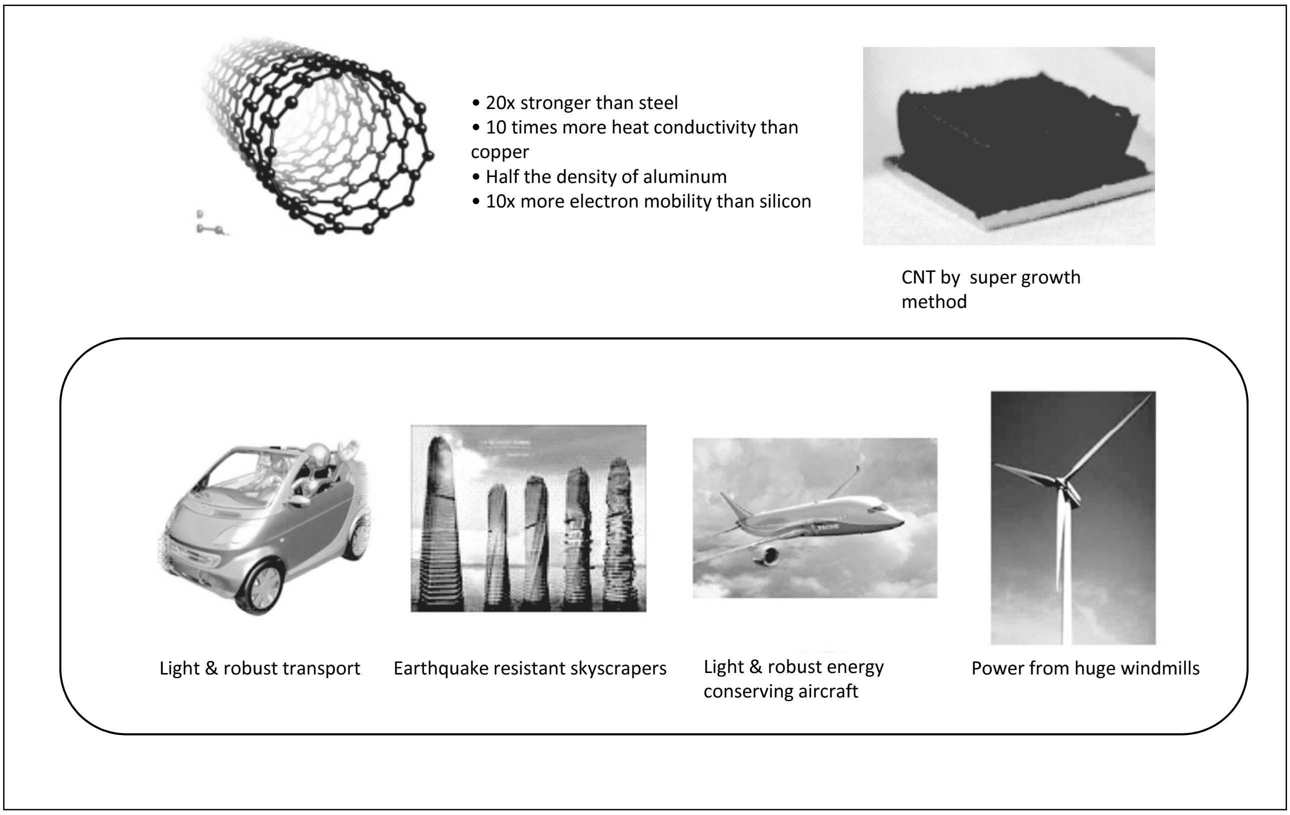

Figure 8 : Single-walled Carbon Nanotubes and Range of Hoped for Applications
Source: Tsukuba Innovation Arena pamphlet

in establishing and standardizing nanomaterial risk assessment techniques.

Based on these results, Tsukuba Innovation Arena has also determined that nanomaterials safety assessment is one of its core research fields, and is actively working on this.

4 Future Challenges and Issues

As described above, Tsukuba Innovation Arena has begun, but points still remain to be discussed in working groups, etc. These issues are summarized below.

1) Clarification of Strategy

Tsukuba Innovation Arena is also specifically noted in the New Growth Strategy. Therefore, it is expected to hold a key to the strategy for building a country of science, technology, and information and communications, which will be the driving force for Japan's economic growth. It is also expected to be a center which provides core technologies in green innovation and life innovation, which are two pillars of Japan's innovation policy.

However, Tsukuba Innovation Arena needs to clarify its strategy to somehow build competitive advantages compared to the large U.S. and European open innovation centers of Albany USA, MINATEC in France, and IMEC in Belgium.

For example, Albany has over 350 partner companies, MINATEC has over 250, and IMEC over 600. Each has more than several hundred billion yen of cumulative investments, and feature both domestic and many foreign participating companies.

In order to guide Tsukuba Innovation Arena to success, as written in its five principles, it must utilize Japan's strengths and build win-win relationships with industry, that is, break down the barriers between industry/ academia/ government sectors and between disciplines, advancing projects in "Under One Roof" relationships.

2) Organization Design, System Design

In advancing projects, both organization design and system design are important points. The Tsukuba Innovation Arena is especially focused on utilizing the technology research partnership system.

Previously in Japan, in cases of consortium type research, cooperation was handled in voluntary organizations and in corporate organizations. The voluntary organizations cannot become parties to contracts, so they cannot become owners

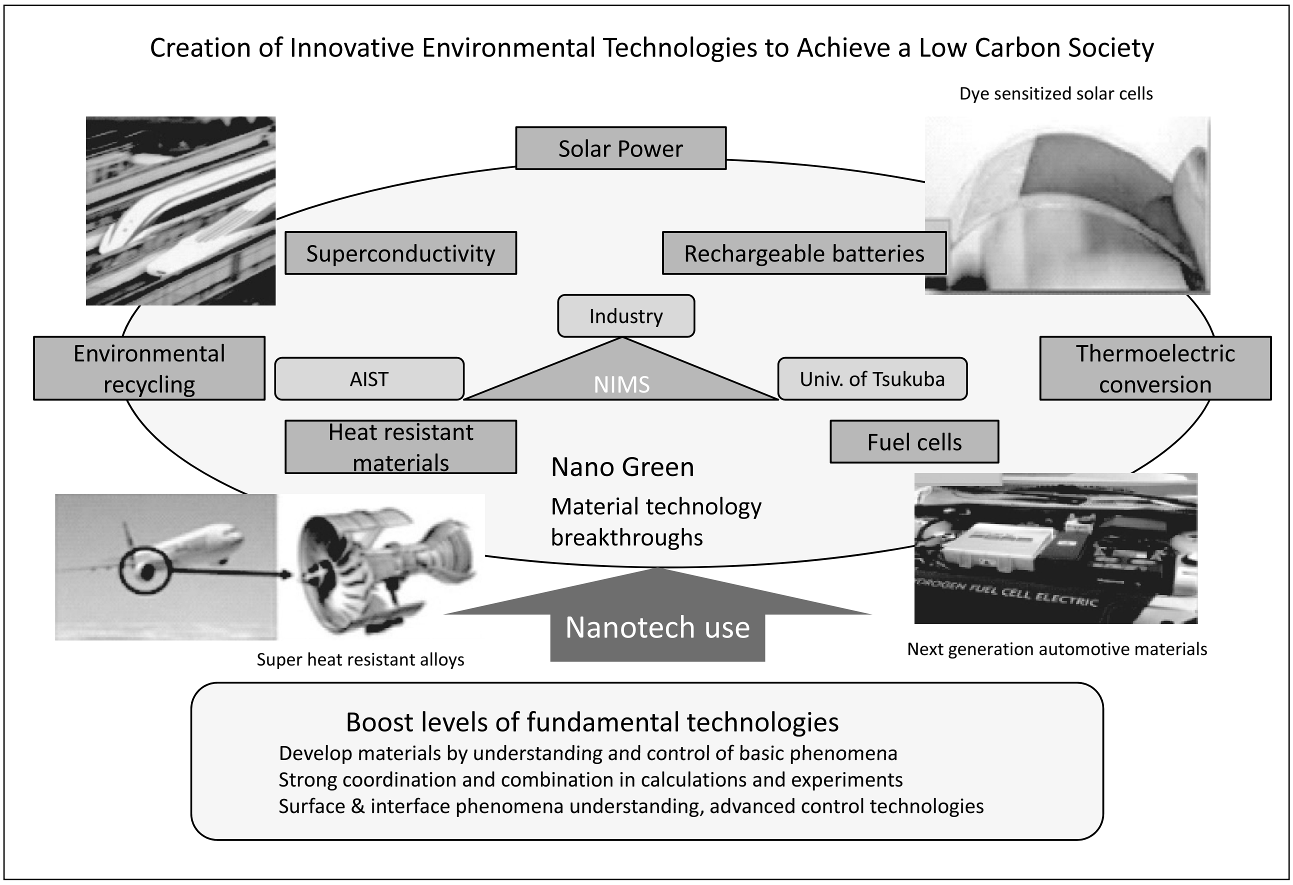

Figure 9 : Single-walled Carbon Nanotubes and Range of Hoped for Applications
Source: Tsukuba Innovation Arena pamphlet

of intellectual property rights. In a corporate organization, results are allocated according to percentages of capital invested, regardless of relative R&D efforts. Therefore, many of these systems do not have participants fully feel incentives.

In the U.S., consortiums generally apply the LLC system (Limited Liability Company). Japan also introduced the LLC system in FY2005, but it differs from the U.S. type LLC system, resulting in a system in between the U.S. LLP (Limited Liability Partnership) and LLC. Thus there was no advantage to using an LLC for consortium type research in Japan. However in FY2009, the Act on Research and Development Partnership concerning Mining and Manufacturing Technology was amended to become the Act on Research and Development Partnership concerning Technology, becoming a system close to the U.S. type LLC. Also, universities and Research and Development Incorporated Administrative Agencies could not previously participate in technology research partnerships, but they gained the status enabling participation. Private companies also became able to treat R&D expenses in technology research partnerships as allotment money, which also gave them favorable tax treatment. Thus Japan has also formed incentives for industry/ academia/ government cooperative research organizations.

Belgium's IMEC has opted for the organizational form of a non-profit corporation. This differs from both the LLC organization which assumes a limited time period, and from the technology research partnership. One can say that IMEC has put together an intellectual property accumulation model which assumes a permanent organization.

3) Intellectual Property Accumulation Model

Process technologies generally have intellectual property in the form of written patents, and also implicit knowledge such as know-how. This implicit knowledge type of intellectual property (intangible assets) is generally accumulated in facilities where the equipment etc. is located, thus it is important to have a long term organization. For example in the semiconductor industry, a foundry company which receives contract manufacturing work is not just a simple subcontractor; it gains very strong competitive advantages because it can obtain and accumulate such intangible assets, including those of multiple contracting companies.

For example, IMEC is an organization which receives R&D contracts. For the same reason, it obtains intangible assets of multiple companies, and also succeeds in expanding its tangible assets under its very clever intellectual asset system. A feature of the intellectual property model generally known as the IMEC model is that the contract with each company is basically bilateral, but it incorporates clauses for sharing jointly obtained results, and it outwardly appears that IMEC's intellectual property is expanding. When a new company joins the R&D program later, it can use that expanded intellectual property. If that company also generates results, that intellectual property is also added. As a result, the larger the number of participating companies, the more intellectual property it gathers, which accelerates the motivation of companies to join thereafter.

However, contracts regarding intellectual property of Albany, MINATEC and IMEC are not comprehensive. They are all bilateral, and one should keep in mind that they do not necessarily mean "anyone can freely use intellectual property generated there." "Intellectual property which anyone can use" is equivalent to "public knowledge," and competitive advantage is not created from that.

4) System Integration

High technology and research are not necessarily the only factors which promote industry/ academia/ government cooperation. At Albany, MINATEC and IMEC, all research content is not necessarily cutting edge technology. They instead feature the "ability to provide total and one-stop system integration according to needs," including technology which can be considered low technology and already generic technology.

Large research centers need organization and system design suitable for system integration, not a linear model starting from nascent technologies. In response to changes in industry/ academia/ government cooperation models, Tsukuba Innovation Arena established eight working groups, and is studying both intellectual property and the organization system. There is a need to execute a strategy of performing R&D which maximizes use of resources inside and outside the organization, and build differentiation in the system integration field while cooperating on intellectual property in elemental technology precompetitive fields.

5) Open Innovation

There are also differences between Japan and Europe/U.S. in their interpretations of open innovation. In Japan, open innovation is often thought to be where anyone can participate in the cooperative research framework, and anyone in that framework can use intellectual property created there.

However, that is not its interpretation in Europe and the U.S. According to the definition of UC Berkeley Professor Chesbrough (University of California, Berkeley), a leading promoter of open innovation, it means "In an organization of research implementers, R&D resources are utilized to create innovation, without segregating them into internal and external resources." To do this, in its practice, a style is adopted in which for example part of the company's R&D organization is placed in a public research institute, or part of the R&D of a public research institute enters the company. Very many companies have been attracted to participate, with over 250 companies in Albany, over 250 in MINATEC, and over 600 in IMEC. This can only be due to the practice of open innovation in the sense of organizational theory. For example, IBM's R&D organization is very deeply involved in U.S. Albany's center, and ST Microelectronics is deeply involved in France's MINATEC center. Also, Philips has been deeply involved in Belgium's IMEC since it was first established, though IMEC appears independent at first glance. And Intel recently announced that it would establish an industry/academia cooperative laboratory for processor architecture, in cooperation with five Belgian universities. These are truly the practice of open innovation based on Professor Chesbrough's definition.

5 Conclusion

Aware of the issues raised in this paper's four sections, Tsukuba Innovation Arena is attempting to build a large vertical cooperative type R&D model not found at any center overseas. For example in the power electronics field, this would include universities, public research institutes, material and device manufacturers, automotive manufacturers, etc.

Of course, top level research results are necessary, but it will also be important to form a center conscious of such R&D management.

As an industry/academia/government cooperative center functioning as an "open innovation hub" which becomes a core for creating new industries, Tsukuba Innovation Arena's progress will be attracting attention.

References

[1] Tsukuba Innovation Arena website http://tia-nano.jp/

[2] New Growth Strategy http://www.kantei.go.jp/jp/sinseichousenryaku/sinseichou01.pdf

[3] Industrial Structure Council, Industrial Competitiveness Committee website http://www.meti.go.jp/committee/summary/0004660/index.html

[4] Council on Competitiveness-Nippon (COCN) website http://www.cocn.jp/

[5] Keidanren website http://www.keidanren.or.jp/indexj.html

[6] Science and Technology Innovation Policy Trends in France, by Atsushi Ogasawara, Science & Technology Trends (2002) http://www.nistep.go.jp/achiev/ftx/jpn/stfc/stt012j/feature5.html

[7] 2nd Coordinator Network Tsukuba Kaigi, lecture materials, Tsukuba Science City Network, January 27, 2010 http://www.tsukuba-network.jp/sangakukan/No2coordinatornetwork_shiryo.htm

[8] Theory on How to Create Innovation, Kogyo Chosakai Publishing Co., April 2007

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(Original Japanese version: published in October 2010)