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IIPS

Institute for
International Policy Studies
・Tokyo・
2008

21 世紀の国際秩序と我が国の国家像

海洋国家日本の行方
“Japan’s Position as a Maritime Nation”

グローバリゼーションと我が国の科学技術戦略
“Globalization and
Japan’s Science and Technology Strategy”

国際社会の変容と日本の役割

・平和研会議報告 2008・

（資料編）

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IIPS International Conference

海洋国家日本の行方
“Japan’s Position as a Maritime Nation”

2007 年 10 月 16～17 日
於　ANAインターコンチネンタルホテル東京

（資料編：会議提出論文集）

IIPS

海洋国家日本の行方

2007 年 10 月 16 日～17 日

ANA インターコンチネンタルホテル東京

アジェンダ

10 月 16 日（火）

10:00~12:30　**第 1 セッション**　*(地下 1 階　オーロラ)*

グローバリゼーションと海洋の安定

チェアパーソン：柿澤弘治（IIPS 研究顧問）

プレゼンテーション (各 15～20 分) :

西原　正（財団法人平和・安全保障研究所理事長）

関根　博 (日本郵船株式会社経営委員)

王　少普 (上海交通大学教授)

14:00~17:00　**第２セッション**　*(地下 1 階　オーロラ)*

海洋との共存（海洋資源の開発と環境問題等）

チェアパーソン：薬師寺泰蔵（IIPS 研究主幹）

プレゼンテーション (各 15～20 分):

松井孝典　(東京大学教授)

タン・キム・ホー (マレーシア海洋研究所主任研究員)

秋山昌廣　(海洋政策研究財団会長)

10 月 17 日（水）

10:00~12:30　**第３セッション**　*(地下 1 階　オーロラ)*

海洋国家の戦略（経済連携、文明的考察）

チェアパーソン：小堀深三（IIPS 首席研究員）

プレゼンテーション (各 15～20 分):

川勝平太 (静岡文化芸術大学学長)

塚本　弘　(財団法人貿易研修センター理事長)

フィリップ・トゥール　(ケンブリッジ大学教授)

15:00~17:30　**公開シンポジウム**　*(地下 1 階　ギャラクシー)*

海洋国家日本の行方

チェアパーソン　大河原良雄（IIPS 理事長）

（敬称略）

Japan's Position as a Maritime Nation

16 – 17 October 2007

ANA InterContinental Hotel Tokyo

AGENDA

Tuesday, 16 October

10:00~12:30 **Session 1** *(Aurora Room, B1F)*

Globalization and Maritime Security

Chaired by IIPS Senior Advisor Koji Kakizawa (Former Foreign Minister)

Introductory presentations (15 to 20 minutes per person) by:

Dr. Masashi Nishihara (President, Research Institute for Peace and Security)

Capt. Hiroshi Sekine (Corporate Officer and General Manager, NYK Line)

Prof. Wang Shaopu (Shanghai Jiao Tong University)

14:00~17:00 **Session 2** *(Aurora Room, B1F)*

Exploitation of Maritime Resources and Related Environmental Issues

Chaired by IIPS Research Director Taizo Yakushiji

Introductory presentations (15 to 20 minutes per person) by:

Professor Takafumi Matsui (University of Tokyo)

Mr. Tan Kim Hooi (Centre for Coastal and Marine Environment, Maritime Institute of Malaysia)

Mr. Masahiro Akiyama (Chairman, Ocean Policy Research Foundation)

Wednesday, 17 October

10:00~12:30 **Session 3** *(Aurora Room, B1F)*

Strategy as a Maritime Nation

Chaired by IIPS Distinguished Research Fellow Shinzo Kobori

Introductory presentations (15 to 20 minutes per person) by:

Prof. Heita Kawakatsu (President, Shizuoka University of Art and Culture)

Mr. Hiroshi Tsukamoto (President, Japan External Trade Organization)

Dr. Philip Towle (University of Cambridge)

15:00~17:30 **Public Symposium** *(Galaxy Room, B1F)*

Japan's Position as a Maritime Nation

Chaired by IIPS President Yoshio Okawara

（余白）

IIPS

Prepared for the IIPS Symposium on

Japan's Position as a Maritime Nation

16 – 17 October 2007

Tokyo

Session 1

Tuesday, 16 October 2007

Maintaining Maritime Security and Building a Multilateral Cooperation Regime

Masashi Nishihara

Research Institute for Peace and Security

October 16, 2007, IIPS Symposium: Japan's Position as a Maritime Nation

Session 1: Globalization and Maritime Security

Maintaining Maritime Security and Building a Multilateral Cooperation Regime

Masashi Nishihara

1. Globalization and the Importance of the Sea

Since 1990, globalization has advanced considerably. This is the result of many factors: the globalization of finance through the Plaza Accord in 1985, China's reform and open-door policy, India's shift to a market economy policy, and the economic reforms in the Russian Federation after the breakup of the Soviet Union in 1991. China, India, and Russia's participation in the world economy has spurred a remarkable increase in the international movement of people, goods, and money.

Globalization has dramatically increased the number of air routes and has also stimulated maritime activity. This is most visible in Asia. The regular container shipping routes between Asia and North America are the busiest in the world. In 2004, for example the number of containers shipped from Asia to North America grew by a startling 15.9%. From 1990 to 2003, cargo unloading in North America rose from 16% to 19% of the world total, while that in Asia rose from 24% to 50%. Though freight volumes in North America dropped by 14% to -1 %, those in Asia rose from 8% to 32%. *(Maritime White Paper 2006*, pp. 78-81; 2006; Ocean Policy Research Foundation)

However, as the economic power of Asian countries grows, so does their naval power. From 1990 to 2006, India, Indonesia, Korea, and China dramatically increased the size of the surface fleet. South Korea built the largest landing vessel of any Asian country, and increased the number of submarines by a factor of 5. (IISS, *Military Balance*, 1991-92 and 2007) They have also begun construction of a new naval base within easy reach of Cheju Island. The remarkable buildup of China's naval strength in recent years has shifted the balance of power from Taiwan to the mainland. The Chinese navy is building a strong submarine fleet and will acquire its first aircraft carrier in the early 2010s. Anticipating deployment in East Asia, the Indian Ocean, and the Middle East, the United States will station a nuclear powered aircraft carrier at the Yokosuka naval base in 2008, and they are working on plans to increase US military capacity in Guam, such as deploying attack submarines and building ports with sufficient depth for aircraft carriers.

In addition, the maritime trade in drugs, weapons, nuclear material, missiles, counterfeit bills, and other goods that threaten international stability is increasing. One example of this is the clandestine nuclear distribution network built by the head of Pakistan's nuclear program, A. Q. Khan. Even recently, North Korea is suspected of smuggling in nuclear materials to Syria, and a North Korean ship delivering weapons and ammunition to rebel forces in Sri Lanka was discovered and attacked.

The growing importance of maritime trade routes in the East Asian and Western Pacific region, the growing rivalry in naval strength in the region, and the surging trade in goods that threaten regional security—these once again underscore the importance of the sea.

2. The Instability of Marine Security in Asia

Despite the growing importance of marine security in the Western Pacific—namely the East China Sea, the South China Sea, the Strait of Malacca, and the Indian Ocean—security is still lacking in the area. Marine security is made up of many elements, but the core element is the security of the sea lanes. Security includes reasonable solutions to disputes over territorial waters, and sea lane security. Elements that influence the latter range from rules governing the use of shipping lanes and the maintenance of channel markers in narrow channels, to cracking down on smuggling (weapons, ammunition, drugs, nuclear technology, etc.), piracy, and terrorism on the high seas, as well as naval arms control.
At the present, there are several concerns regarding the sea lanes in East Asia and the Western Pacific. Recent problems include disputes over territorial waters between Japan and China, Chinese claims of sovereignty over the Senkaku Islands, China's refusal to acknowledge Japan's sovereignty over Okinotori Island, South Korea's occupation of Takeshima Island, Chinese oceanographic research vessels and others illegally entering Japanese territory and Japan's exclusive economic zone. In 2004, a Chinese nuclear submarine entered Japanese waters while fully submerged, and an American aircraft carrier was tracked by another Chinese submarine. These incidents are just some of the examples of the provocative behavior of the Chinese navy. The potential for collisions at sea between ships—and even between submarines—is growing. In addition, there is concern about the military buildup on both sides of the Strait of Taiwan. Territorial rights to the islands in the South China Sea are also undecided. Smuggling and piracy are also common occurrences.

3. Creating Stable Marine Security

The creation of stable marine security will require the engagement of the countries involved in each area, plus the cooperation of many others.

(1) Bilateral Discussions and the Japan-US Alliance

Bilateral talks are needed between Japan and South Korea to work out a diplomatic solution to the Takeshima Island problem and the use of the fishing resources in the surrounding area. The key actions to improve relations between Japan and China include (1) China policing its own ships and oceanographic research vessels, (2) progress in discussions regarding the Japan-China border, and (3) progress on the relationship based on the Japan-China Strategic Reciprocity agreed to at the Japan-China summit meeting in October 2006.

For US-China relations, both sides need to show self-restraint regarding military action in the Strait of Taiwan. Japan and the US also require mutual restraint to avoid raising military tensions over the strait, such as was generated by the declaration of "common strategic concerns" in the Strait of Taiwan at the two-plus-two Japan-US ministerial conference attended by foreign relations and national defense officials in October 2005. Through the Japan-US alliance, the United States has military bases in Japan and is strengthening its position on Guam, which it uses to maintain security on the sea lanes through the East Asian and Western Pacific waters, and this a role most reliably filled by the United States.

The US-Korea and US-Australia alliances also contribute to the stability of marine security. Nascent Japan-India strategic discussions also show promise.

(2) The Potential for a Multilateral Cooperation Regime

Stable marine security will require a regime that fosters multilateral cooperation. All countries pursuing economic prosperity through international trade depend on the security of the sea lanes. Policing criminal activities on the high seas is also most effectively implemented through multilateral cooperation.

The naval forces of 10 or so countries are participating in Operation Enduring Freedom in the Indian Ocean and Arabian Sea, and this most closely approximates a multilateral cooperation regime for creating stable maritime security. These naval forces target suspicious vessels carrying suspected terrorists, drugs, and weapons and ammunition. In this regime, the commander in charge of naval strategy changes every four months. The Maritime Self-Defense Force has the mission of supplying oil and water, and though they are in practice a participating member of the regime, they never will take a leadership role because their mission is different from that of other navies. However, India, Russia, and China are not participating.

A similar regime should be created for the East China Sea and South China Sea. This topic should be discussed at the ASEAN Regional Forum (ARF), and though such a regime is considered a desirable objective, it has yet to come to fruition. The ARF comprises 25 member countries with varying interests, making it extremely difficult to create a cooperative framework. In fact, some countries do not possess a naval force capable of participating in such a regime, which means that participation would be limited. Multinational training exercises were conducted in Tokyo Bay in 2004 as part of Asia's first proliferation security initiative (PSI), and of the five participants, Japan and Australia were Asia's sole representatives.

To address the territorial issues over islands in the South China Sea and to avoid friction with China, ASEAN established a code of conduct in 2002 and has demanded that China comply with the code. ASEAN also has the Treaty of Amity and Cooperation (TAC), concluded in 1976, whose members include many countries from outside the region. This is also a low-level regime to ensure stability of maritime security. The security of the Strait of Malacca is managed by Malaysia, Singapore, and Indonesia, with Japan providing technical support.

4. Japan's Role as a Maritime Nation

Japan also is dependent upon the stability of maritime security, and based on the Basic Law on Oceans adopted in July of this year, it should make solid progress in developing a diplomatic policy that ensures security in its own territorial waters and protects its rights in its exclusive economic zone. Japan should also implement sufficient fiscal measures to this end. It should also conduct a review of its sea and air defense forces to determine if their level of readiness is sufficient to the task at hand. The Maritime Self-Defense Force is not able to protect Japan's rights in its exclusive economic zone. This is another reason why Japan needs a minister in charge of maritime security.

Concomitantly, maintenance of sea lane security stretching from the Pacific region to the South China Sea and the Indian Ocean should be a fundamental concern of Japan as a maritime nation. Thus, the alliance with the United States should be maintained, and while maintaining the power balance in the Western Pacific, Japan should create a framework for multilateral cooperation that includes China. If China is hesitant to participate, Japan should build a cooperative framework that includes the United States, South Korea, Australia, Singapore, and others. Rather than creating a multilateral framework such as the ARF, gathering a group of like-minded countries would be more effective. Japan should also increase its level of participation in the PSI system.

（余白）

IIPS

Prepared for the IIPS Symposium on

Japan's Position as a Maritime Nation

16 – 17 October 2007

Tokyo

Session 1
Tuesday, 16 October 2007

Sea Lane and Shipping Industry

Hiroshi "Jack" Sekine
NYK Line

Sea Lane and Shipping Industry

October 16, 2007

IIPS International Conference

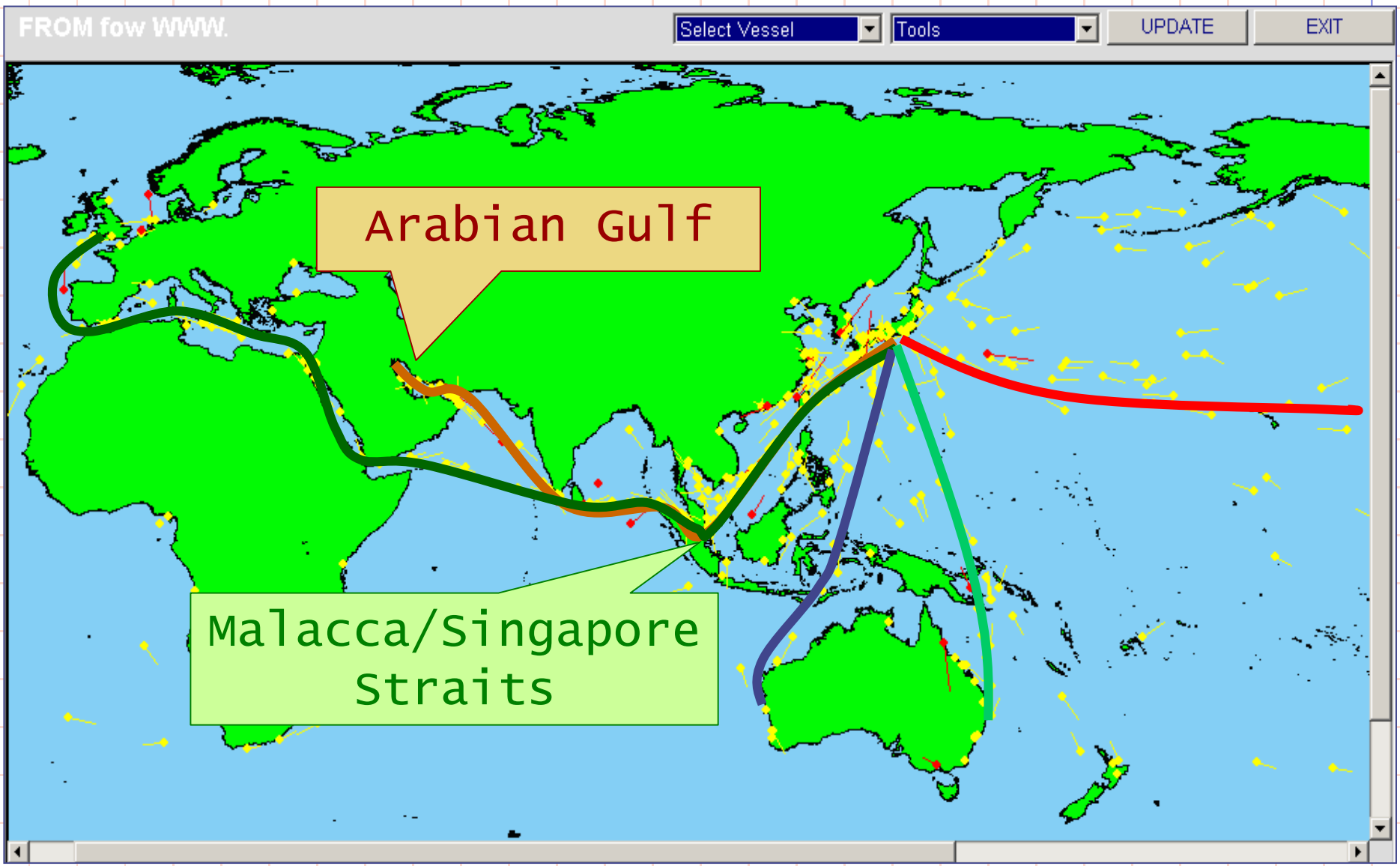
Capt. Hiroshi “Jack” Sekine
Corporate Officer & GM
NYK LINE

Sea Lane and Shipping Industry

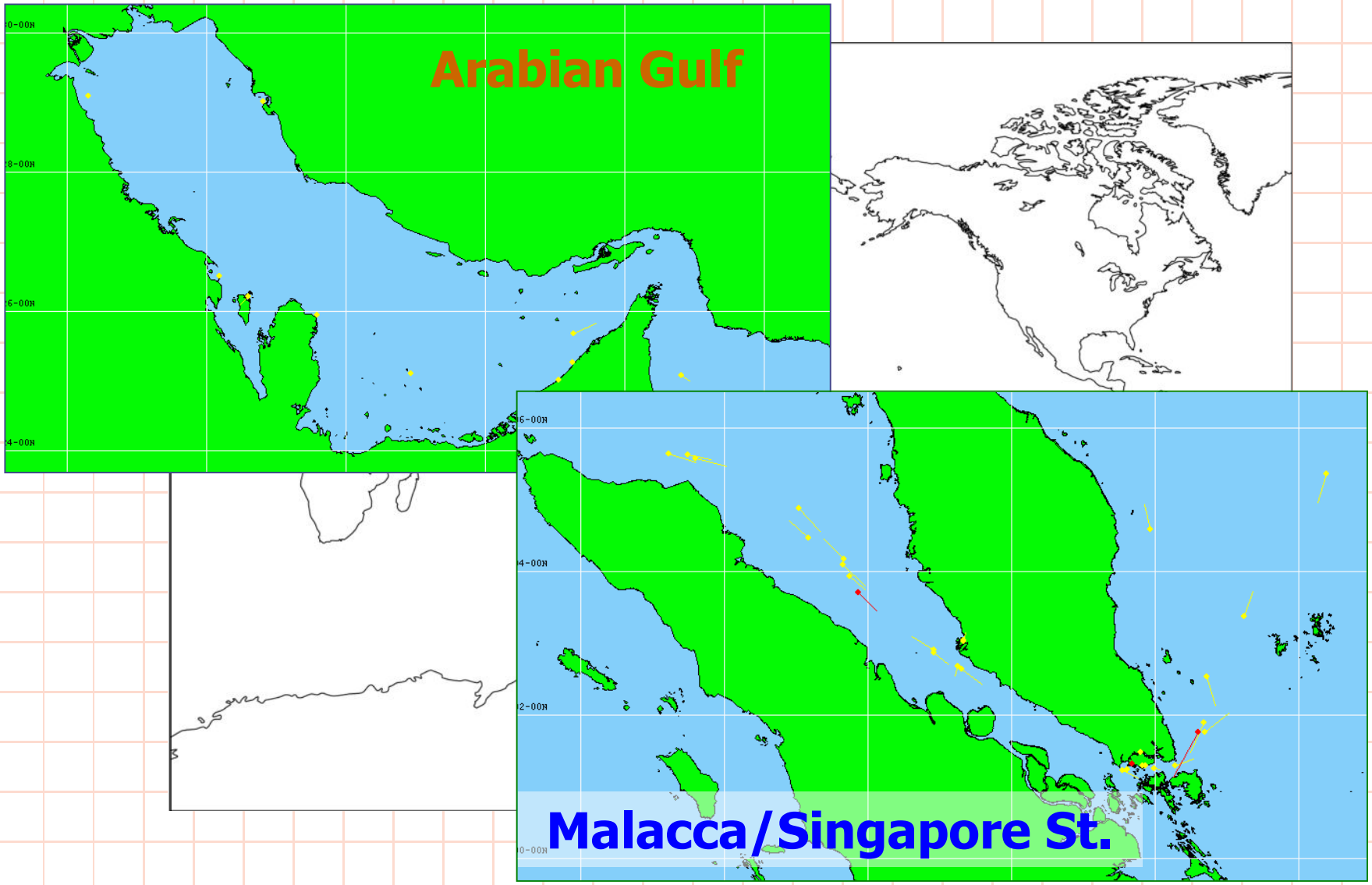
1. The Sea Lane
2. Malacca-Singapore Straits
   - *2.1 Navigational hazards*
   - *2.2 Security Issues (Piracy)*
   - *2.3 Countermeasures*
3. Arabian Gulf
   - *3.1 Basrah Tragedy*
   - *3.2 Countermeasures*

1. The Sea Lane

The Sea Lane


FROM fow WWW.
Select Vessel
Tools
UPDATE
EXIT
Arabian Gulf
Malacca/Singapore Straits

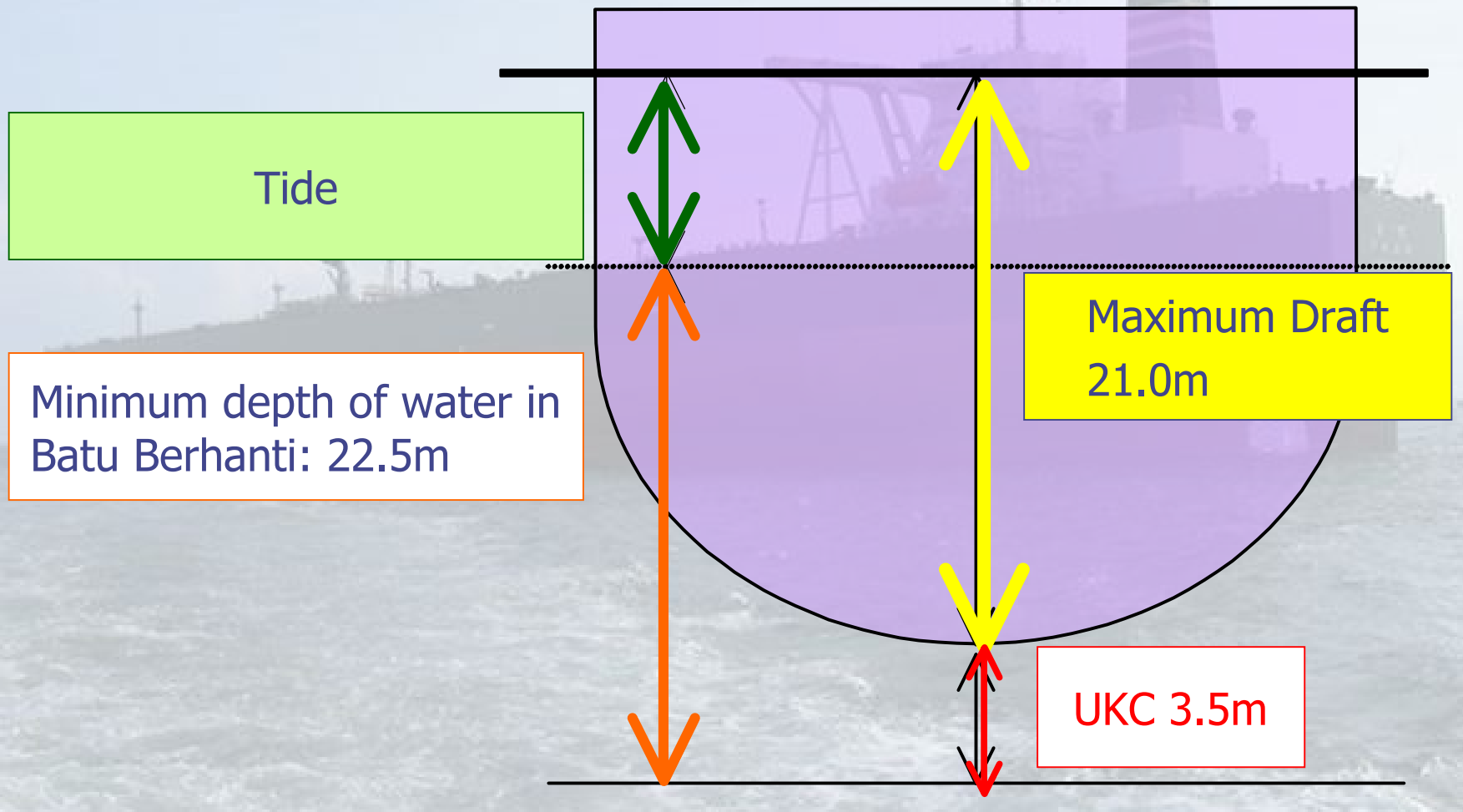
Today's focus: Japan-Arabian Gulf Lane



2. Malacca-Singapore Straits

2.1 Navigation Hazards

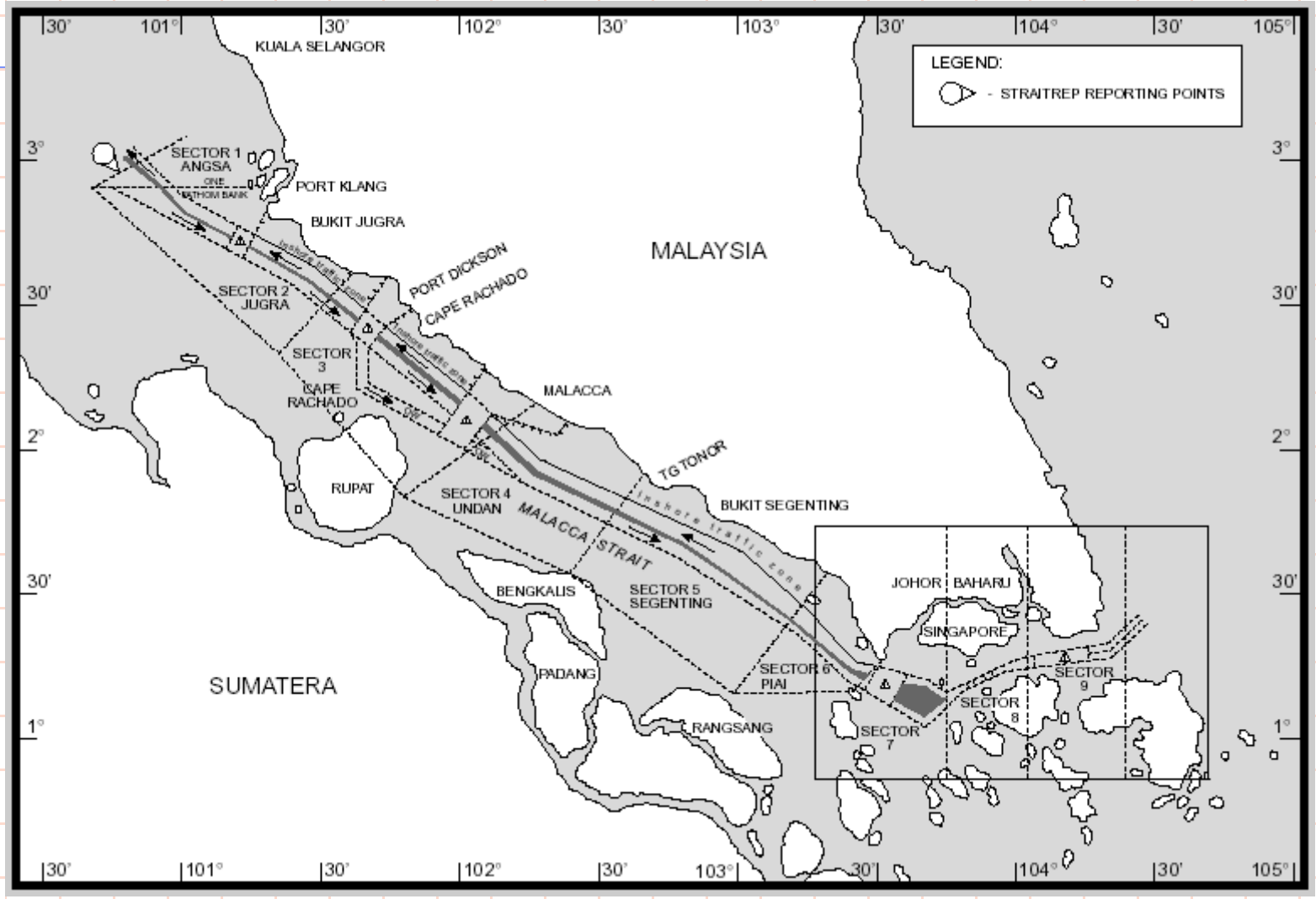
Narrow passage window for shallow water



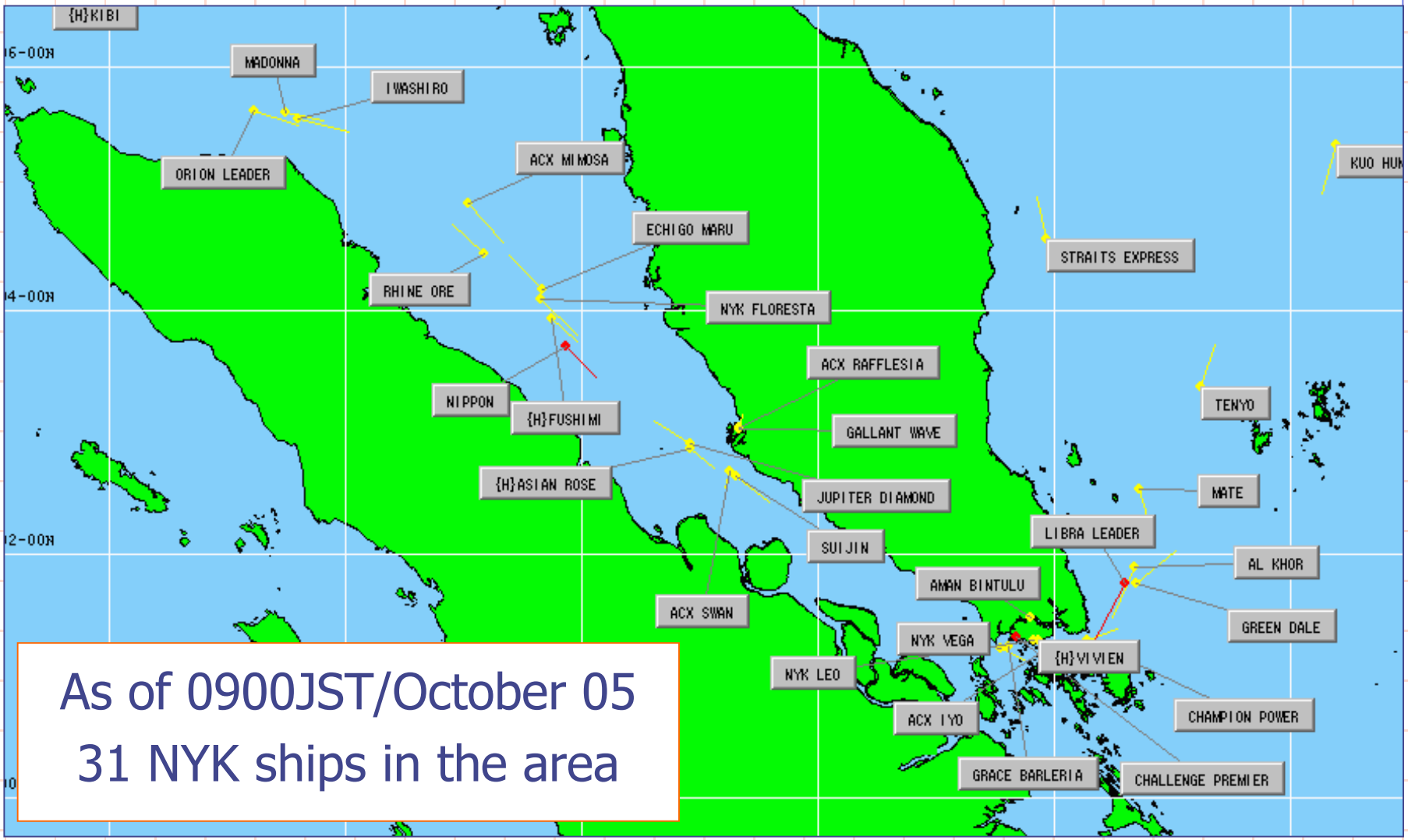
Poor maintenance of navigational aids

Takong Beacon Found
20 Kilometers away from
Normal Location

Vessel Traffic Control

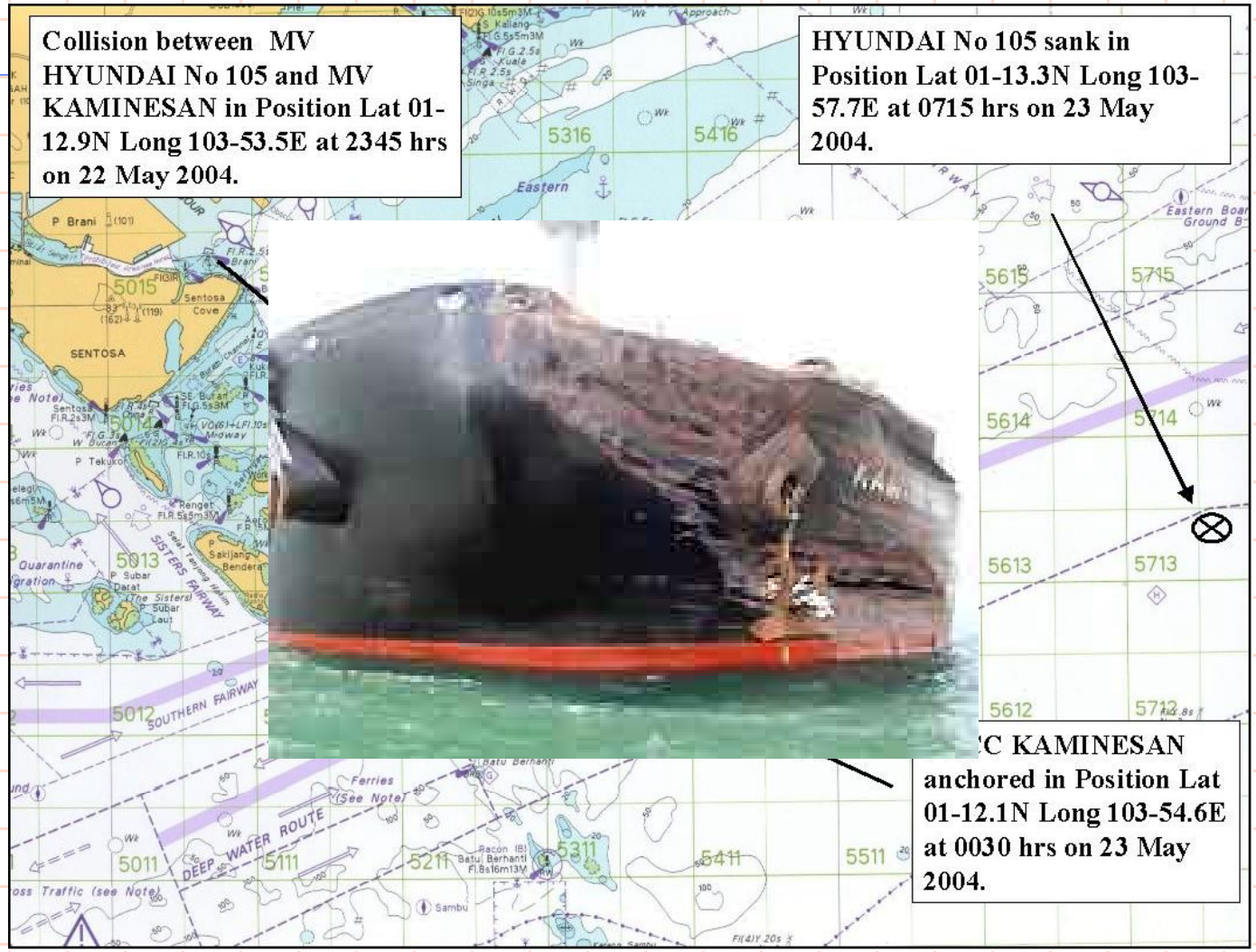


Heavy traffic



As of 0900JST/October 05
31 NYK ships in the area

Collision case off Singapore



2.2 Security issues (Piracy)

- Simple burglary cases
- Armed piracy to knock over whole ship and /or cargo
- Kidnapping (Including politicaly-motivated case)

ALANDRO RAINBOW case

1999.10.22

The vessel being hijacked by pirates after sailing Sumatra. The pirates blinded all crew and took them to small boat, then took control of ALANDRO RAINBOW.

1999.11.21

Found by Indian Navy vessels at 300 nautical miles from Mumbai.

Ship's name had been changed, and 7,000 tons of aluminum ingots had been sold already.

2.3 Countermeasures

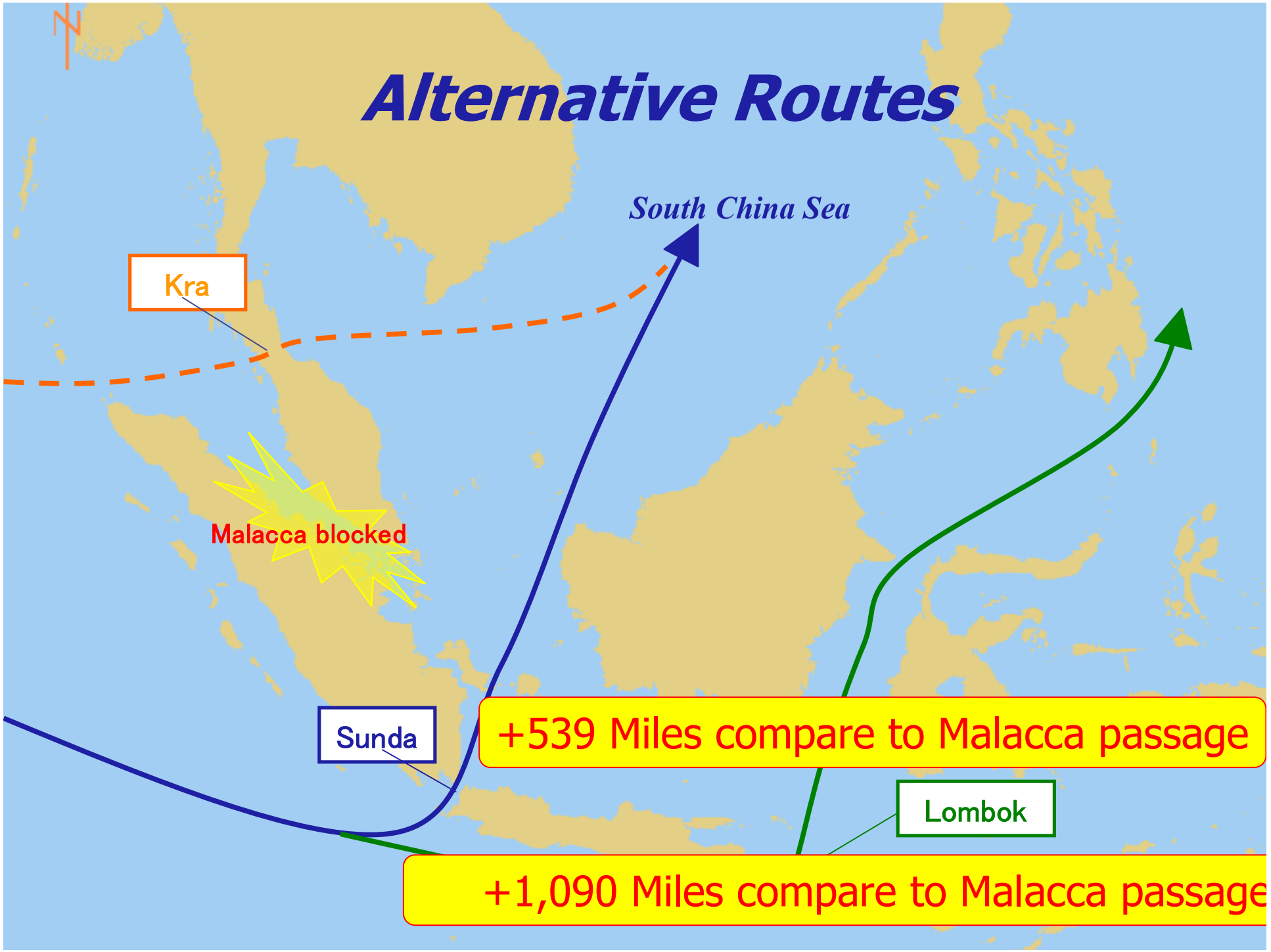
<Navigation>

◆Enhance BTM (Bridge Team Management) by establishing the training program by simulators

◆Standardized and well-planned Passage Plan

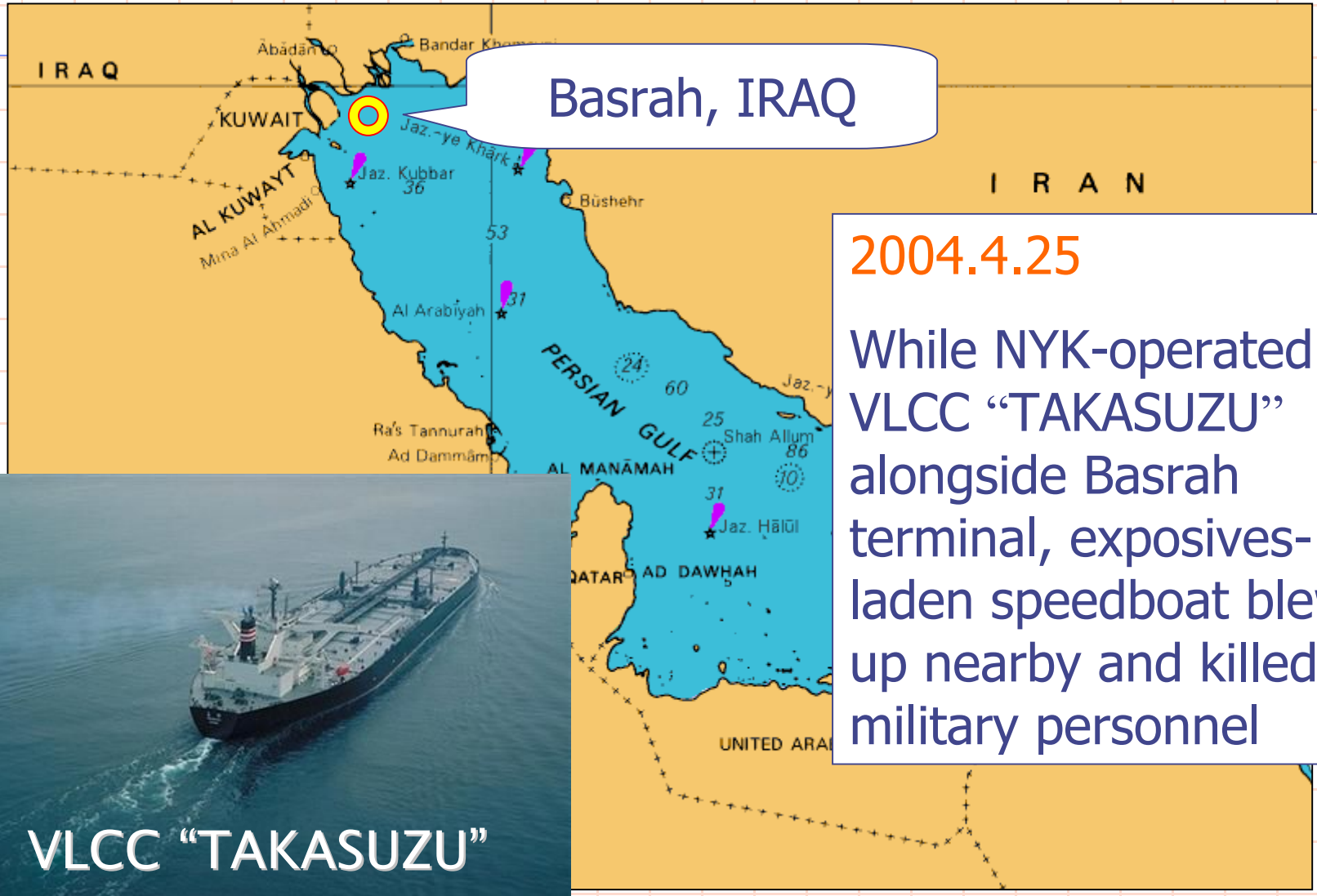
<Maintenance of navigational aids>

◆45 navigational aids out of 51 in the straits were built by the Malacca Straits Council, with funding from The Nippon Foundation.


Alternative Routes
South China Sea
Kra
Malacca blocked
Sunda
+539 Miles compare to Malacca passage
Lombok
+1,090 Miles compare to Malacca passage

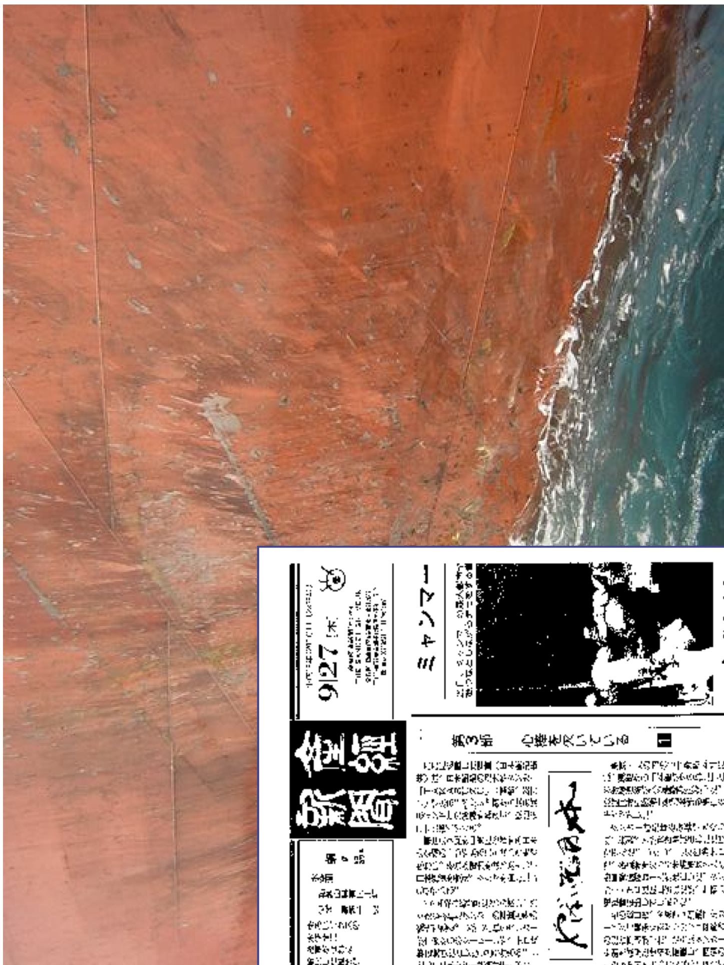
3. Arabian Gulf

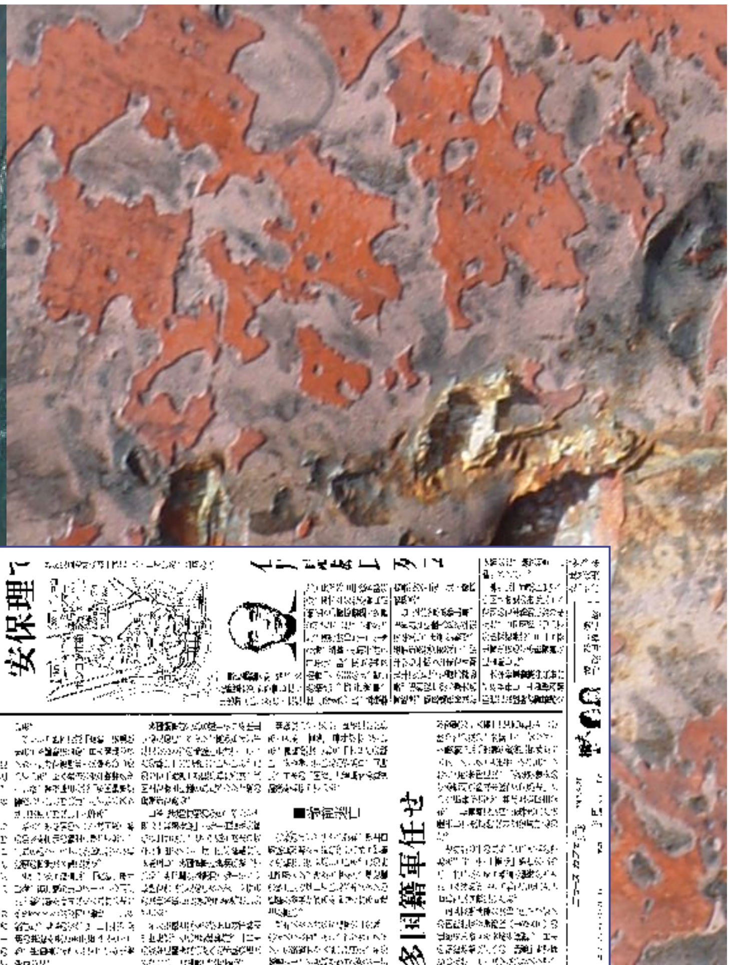
3.1 Basrah Tragedy

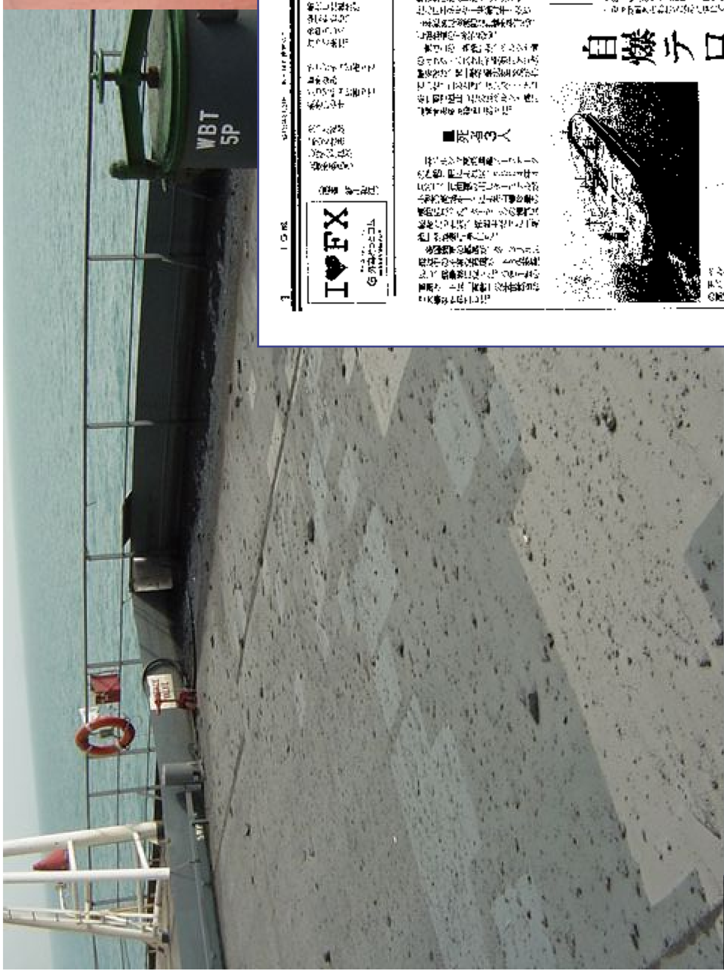


2004.4.25

While NYK-operated VLCC “TAKASUZU” alongside Basrah terminal, exposives-laden speedboat blew up nearby and killed 3 military personnel







産経新聞

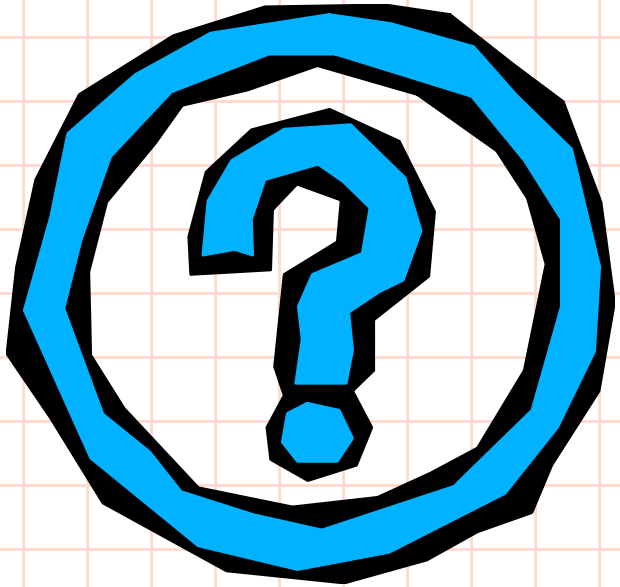
9月27日(木)

自爆テロに攻撃された日本船

「命綱」の守りは多国籍軍任せ

3.2 Countermeasures

What can shipping lines do to protect the fleet?



"Passive" security only...

Hardware

- FROM（Fleet Remote Monitoring System）
  - SEA-JACK Alarm
- Satellite Phone “ILLEDIUM system”
- Development of High-illumination searchlights (JACK LIGHT)


Ship
NYKGHQ
Carry out joint exercises with authorities
ERT Singapore
MPA Singapore
2004 9 16

Collecting Information

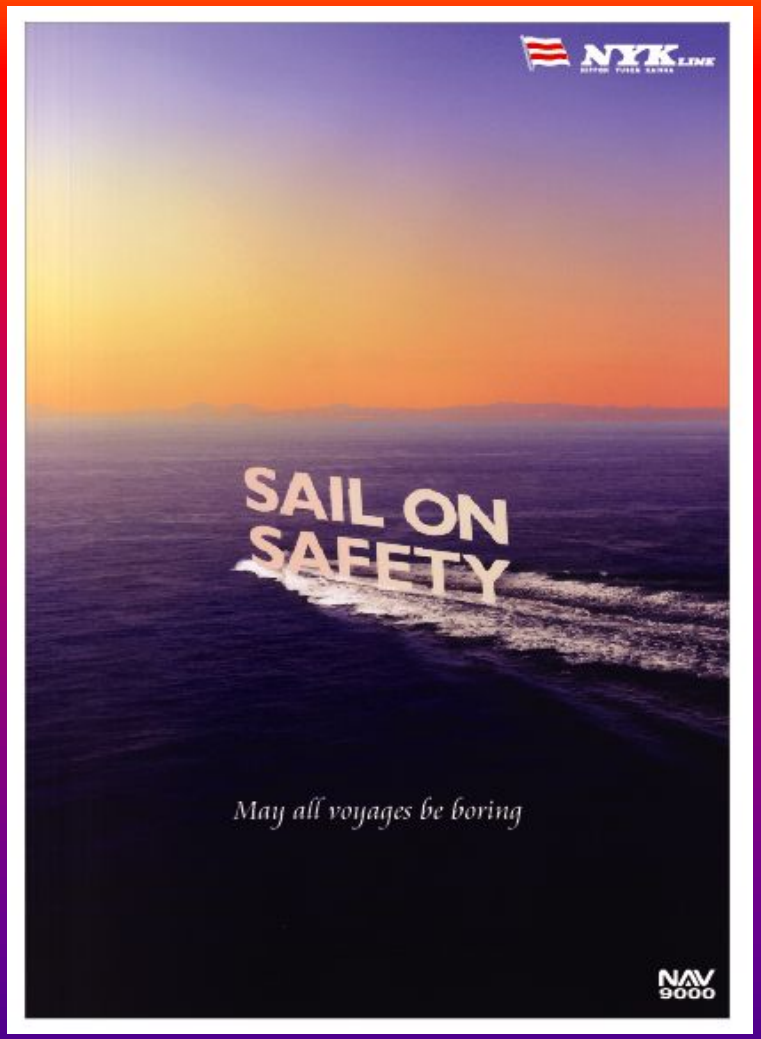
Lloyd's, UK

NYK LOGISTICS & MEGACARRIER

Security Consultants

MARLO, Bahrain

UKMTO, Dubai



May all voyages be boring…

（余白）

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Globalization and Ocean Security

Wang Shaopu

Shanghai Jiao Tong University

Globalization and Ocean Security

Director of Japan's Study Center of SASS Pro Wang

Abstract: Globalization makes ocean security more important and complicated; Globalization provides more sufficient conditions for strengthening international ocean security; Both of China and Japan should make great efforts to build the East Sea into a peaceful, friendly and cooperative sea.

一、Globalization makes ocean security more important and complicated

As we all know, the sea accounts for 71% of the earth's surface with the rich resources, which bears much significance for the survival and livelihood of Mankind. The protein in the seafood takes up 22% of the total amount consumed by people; The reserve of the seabed oil and natural gas occupies about 45% of the oil resources in the world. Moreover, according to the statistics, about three fourths of the cities, 70% of industrial capital and population lie within 200 kilometers of the coastline.

As the economic globalization further develops, whether in the resources exploration and goods transportation or in the communications and environmental protection, these greatly increase people's demand for the sea. The sea becomes more important as the key carrier of the economic globalization. The protection of ocean security has invited the world's attention to this.

However, with the economic globalization developing further, there occurred some new elements affecting the ocean security.

First, the non-traditional threats increase.

The economic globalization is a double-edged knife. It increases the productivity with productive factors distributed around the world, which meanwhile expands the South—North gap. At the same time, as maritime transportation develops rapidly, some bandits show more greed. Because of the multi-factors' interaction, some maritime non-traditional threats appear more serious such as pirate、smuggling、drug trafficing etc. For instance, according to the statistics by the pirate report center of international maritime bureau, in the Malacca Strait, there occurred 37 recorded pirate accidents in 2004 alone. If Indonesian sea area over the west of the Malacca Strait and South China Sea is included, the number of pirate accidents reached 169. And it is shown that Al-Qaeda and some extremist forces are engaging or attempting to launch the maritime terror activity.

Secondly, the conflicts of maritime interests increase among various countries, especially some neighboring countries.

In 1982, "United Nations Convention on the Law of the Sea" was passed and came into force in 1994. It firstly stipulated that the coastal state has the right to establish the breadth of its territorial sea reaching 12 nautical miles, the adjacent area reaching 24 nautical miles and the exclusive economic zone reaching 200 nautical miles, and redefined "the continental structure." Complying with the relevant regulations of the Convention, many coastal states speed up the process of sea legislation, adjust or enact ocean policy to reestablish their "maritime territory,"

implement the effective ocean management to realize the sustainable development. Therefore, Ocean Policy Research Foundation of Japan states: “since *UNCLOS* came into force in 1994, tremendous changes have taken place on the ocean order of the world. Sea isn’t the neutral buffer area any longer but becomes the state boundary once delimited. As for these structural changes, various countries in the world are attentively taking some measures on the comprehensive ocean management. Japan ranks high in the world depending on its tremendous economic strength and advanced science-tech capability. If Japan still follows the out-of-date regulations and act the same as before, it may fall behind the process of the world-scale ocean management, and lose the development opportunity.”

In China, some law bills have been passed such as the law on the territorial sea and adjacent areas, the law on the exclusive economic zone and the continental structure; In Japan, there have been the Basic Ocean Law and the Set Law on the Safe Water Area of Marine Structures; In South Korea, there has been the law on the exclusive economic zone, and so on. They regard the protection of ocean interests as the vital part of national strategy, elevate the status of maritime policy in the national internal and external policy, which cause the great changes in ocean structure and order of the world.

In these situations, the conflict of ocean interests grow more stronger among various countries, especially the neighbouring countries. The contradiction and struggle caused by Sino-Japan delimitation on the East Sea happened in this context.

二、globalizaion provides more convenient conditions for strengthening international ocean security and cooperation

Globalization makes ocean security more important and complicated, but it also provides more convenient conditions for strengthening international ocean security and cooperation. Its basic reason lies in the rapid development of globalization, which causes inter-dependence and the demand for regional cooperation among various countries apparently strong, whether in the depth or in the scale.

We could take the East-Asia as an example. In the post-world war II, especially since the Cold War, the conditions which help the regional cooperation in the East-Asia are further increasing. These conditions might be relegated as three kinds: 1. more common features of the direction for national development;2.the expansion of the scale of regional economy and the increase for the degree of intro-regional economic inter-dependence.3.more common security interests.

1. more common features of the direction for national development

(1) Japan’s democratic reform

Since Meiji Restoration, the causes for seeking the road to foreign expansion for Japan are complicated, one of which is politically feudal autarchy and militarism. After the end of the World War Two, the democratic reform was implemented in Japan. Pre-war Meiji constitution was based on all powers controlled by emperor. Then though there was the parliament too, the members of the upper house were not elected by the people but appointed by the aristocracy and emperor. The military occupied the central position in the political life of Japan. However, post-war constitution stipulates that the sovereign belongs to people, and the position of emperor is based on national

will. The members of the Diet are elected by people. The legislation belongs to the Diet. The prime minister and other state councilors in the cabinet are appointed the civilians, while the military has no former special status longer. Japan's democratic reform and post-war peaceful development form an important basis for Japan to establish broad and equal regional cooperation.

(2) China's reform and opening-up

Since the Third Plenary of the CPC 11th Central Committee was held in 1978, China has sought the road to reform and open up to the outside world. The basic requirements for reform and opening-up policy are as follows: internally China devotes itself to economically establish socialism market economy system and politically pursue socialism democratic politics. China's socialism democratic politics comes into being based on relating Marxism democratic theory and Chinese actual situations, borrowing from the valuable fruit of political civilization of mankind including Western democracy, and taking in the democratic factors in Chinese traditional culture and systematic civilization, so this democratic politics has evident Chinese characteristics; Externally China will be comprehensively integrated into international community. while respecting the current international order, China, as well as the rest of the world, will lead this order to develop along a more fair and rational direction. The objectives for China's reform and opening-up are (1)China's modernization;(2)China's reunification;(3)the world's peace and prosperity. Chinese leaders put forward and implement the reform and opening-up policy, which reflects China has quitted the previous policy of following the domestic revolution under the guidance of the Continual Revolution Theory of the conditions of proletariat autarchy and the world revolution under the guidance of Three World Teory, and turns its focus to pursue the lines of placing China's modernization as the core requirements and catering to the world tendency of the market economy and democracy. This provides the important basis for establishing the broad and equal regional cooperation between China and the East-Asia.

(3) Vietnam's reform and opening-up

Vietnam chose the similar road of the reform and opening-up policy as China. It has made obvious progress in socialism market economy and democratic politics.

(4) North-Korea starts to adjust its economic policy. Beside requiring to safeguard the principle of socialism, it struggles for the maximum profit in the operation of economy. This adjustment inevitably leads to the influence of expanding the principle of market economy on national economic system of North-Korea.

2. the expansion of the scale of regional economy.

the expansion of the scale of regional economy. In the post war, Japan takes the lead in the East-Asia economity, and experiences three rises of development. The sustainable high-speed development makes the economic scale of the East-Aisa areas gradually expand. In China, Japan, South-Korea, ASEAN, Hongkong and Taiwan of China, their total value of GDP reaches about ＄80,000 bilion, which accounts for 30% of the world's GDP or so. The reserve of foreign exchange has been far beyond Euro zone.

The degree of economic inter-dependence in the East-Asia area increases, not only in the increase of the trade volume but within the region in which a multi-facets industry distribution system has basically formed: Japan, as a super-economic power in the East Asia, is not only the supplier of regional capital and high-tech products, but the important market of energy, raw materials and consuming products; The "Four Tigers" in the Asia are the important providers of equipments and parts in this area, the supplier of capital and the important consumers of energy and raw materials; China and ASEAN are the key providers of raw materials and labour-intensive products , the important investment market and high-tech consuming market for Japan and Asian "Four Tigers."

(3) Chinese mainland and Taiwan join the APEC and WTO together

3. more common security interests

During the Cold-War period, the contradiction of the two military alliances formed by China-Soviet Union and US-Japan divides the East-Asia area into the two opposite camp. In this case, it is impossible for the East Assa to build the equal and broad multilateral cooperation. In the late 1960s, China-Soviet Union alliance broke apart. In the 1970s, the improvement of Sino-US and Sino-Japan relations incurred the establishment of diplomatic relations. This led to the existence of not only such bilateral military alliances as US-Japan relations, but the Sino-US-Japan triangle relations beyond the bilateral military alliances in the East Asia. The relatively balanced Sino-US-Japan triangle relations play the important role in stabilizing the East Asia. This multilateral relations beyond the bilateral military alliances makes regional cooperation possible in the East Asia.

After the end of the Cold War, the camp confrontation disappeared. In 1989, the Berlin Wall collapsed; In 1991, the Soviet Union disintegrated. The tremendous changes occurred to the international structure and the market limitation has been broken between the soviet union camp and the US-EU-Japan camp. In the 1980s, the opening-up policy was carried out in China, which makes the international market integrated and the confrontation between the West Camp and the East Camp basically disappeared. These changes further increase the possibility of the East-Asia regional cooperation.

Many more problems require the cooperation of various countries of the Asia , even the world to deal with the anti-terrorism, the crack-down of the maritime criminal, and the prevention of the mass destruction weapons, environmental protection. After the anniversary of the September 11th accident, US president Bush said in the report "US National Security Strategy": "today the great powers of the world find they stand together—the common threats of terrorism violence and turbulence unit them." (4) This estimation is correct. Not only the anti-terror problem but also the above problems mentioned expand their common interests of those countries from the Asia and world.

Based on those estimations on the international situations, China recognizes we can realize our modernization through the road of the peaceful development. Therefore, we place the establishment of harmonious world and harmonious society as our development objective. In the security strategy, we hope to realize "Two

Beyonds," that is, the model of mutual benefit and double-winnings goes beyond that of interest conflicts and the model of sustainable development and social harmony beyond that of blindfold capital expansion.

The similar changes could be seen in the other areas to a certain extent. These obviously offer the suitable conditions for speeding up the cooperation of ocean security internationally.

三、China and Japan should make the East sea a peaceful, friendly and cooperative sea.

Since the Abe administration, Sino-Japan high-level leaders reached the consensus on the strategically mutual benefit relations and its connotation of both sides, and confirm the Sino-Japan strategically mutual benefit relations have five characters: Firstly, construction. Both sides state clearly that: the strategically mutual benefit relations derives from "making the constructive contribution for the peace, stability and development in the Asia and world together." Secondly, continuality. Both sides agree: in the new phase of Sino-Japan relations, both sides will continue to follow the principles written down in the Sino-Japan joint statement, Sino-Japan peaceful and friendly treaty, Sino-Japan joint declaration and stress both sides will face up to the history and look forward to the future; in the meantime, on the Taiwan issue, Japan insists on its position stated in Sino-Japan joint statement. Thirdly, comprehensiveness. Both sides agree: "comprehensively develop the mutual cooperation in the multi-levels such as the bilateral, regional and international level", the fields of cooperation cover economics, politics, security and social art etc. Fourthly, common interest. Both sides require in the process of cooperation, both could gain the interest and expand the common interest so as to push the relations to a new high level. Fifthly, pragmatism. Both decide that they will conduct exact cooperation for building strategically mutual benefit relations, and clearly stipulates the specific content, approach and institution of the cooperation in the respect of "regional and international affairs and cooperation." Sino-Japan strategically mutual benefit relations and its connotation lay the foundation for both sides to realize the stable and smooth development to a new phase.

In this framework, some disputes between China and Japan are being led to the rational and cooperative track such as the East sea issue etc.

In October, 2006, Prime Minister Abe paid his first visit to China. Both sides regarded the policy "joint exploration" as the fundamental principle of solving the East sea issue. While the former Sino-Japan Joint Statement or Declaration didn't directly touch the East Sea, Prime Minister Abe and president Hu both confirmed in the released press communique, "in order to make the East Sea a peaceful, friendly and cooperative sea, both should adhere to properly solve the relevant discrepancy through the dialogue and negotiation; speed up the process of negotiation on the issue of the East Sea, stick to the general direction of joint exploration, and explore the way out acceptable by both sides." These break a new path to peacefully resolve the East Sea issue.

In April 2007, premier Wen Jiabao paid a state visit to Japan. Both sides stressed again “they will make the East Sea a peaceful, friendly and cooperative sea,” meanwhile they reached a provisional arrangement on the final delimitation, that is, “in the pretext of no damage to both sides’ position on some issues relevant with the ocean law, both launch the joint exploration according to the principle of mutual benefit.” This makes the peaceful settlement of the East Sea issue more likely.

In accordance to Sea Power Theory by American strategist Mahan, people give the definition of maritime power “a country utilizes the military means to exercise its capability to control the sea.” Actually, since Mahan’s Sea Power Theory came out, the world has experienced the unexpected changes. Mankind’s common interest is unprecendentedly expanded and militarily the ability to mutually balance each other is also enhancing among the various countries of the world, especially those great powers. If any state disregards the above changes and merely pursue its ability to control the sea by the military means, this will cause the disaster for itself, the region and even the world.

Not long ago, in a conference of the security navigation in Malacca Strait held in Singapore by International Maritime Organization (IMO) and some countries concerned, those countries reached a consensus that a cooperative framework to provide the support in the respect of security will be built by Japan, America, China and some other countries. This reflects that with the rapid development of globalization, the agreement to properly resolve the East Sea issue suit the current tide. We should relentlessly pursue it. Only like this could the East Sea become a peaceful, friendly and cooperative sea, and benefit people from China, Japan, the East Asia and the world.

（余白）

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Present Status of Civilization (homo-sphere) and the Future of Japan

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海洋国家日本の行方
セッション２：海洋との共存(海洋資源の開発と環境問題等）

人間圏の現状と日本の未来

１．岐路に立つ文明（人間圏）：維新(アルカディア）か、革命（ユートピア）か？

２．岐路に立つ日本：中国、インド、イスラムとどう向き合うのか？

Present status of civilization (homo-sphere) and the future of Japan

1. We are standing at the cross-roads of civilization for its future: The restoration (to pursue an Utopia in the past) or the revolution (to pursue an Utopia in the future)
2. The future of Japan: how to involve the progress in civilization of China, India, and Islamic world

岐路に立つ文明(人間圏)

- 文明とは人間圏を作って生きる生き方：人間圏とは？→地球学的人間論
- 人間圏の発展段階：フロー依存型(内に蓄積する文明？)→ストック依存型(外に進出する文明？）
- ストック依存型人間圏：地球システムにおける物質循環の加速→現在約10万倍→人間圏の拡大
- 地球システムからの負のフィードバック：地球環境問題、巨大化する自然災害、資源・エネルギー問題
- 地球システムと調和的な人間圏とは：維新(アルカディア)か、革命(ユートピア)か？

We are standing at the cross-roads of the civilization (homo-sphere) for its future

- Civilization is such a life-style that we are living on earth by creating homo-sphere in the earth system: what is the homo-sphere? → new view on the Homo sapiens
- Development of the homo-sphere: From flow-dependent to stock-dependent stages
- Stock-dependent homo-sphere: acceleration of earth's material cycle → presently ~10 thousand times faster than that of the original cycle → explosive expansion of homo-sphere
- We are facing a negative feedback from the earth system: the environmental issues, increasing risk of natural disaster, energy and resource deficiency
- What is the homo-sphere to be in harmony with the earth system?

岐路に立つ日本の課題

- 文明先進国（日本）と文明発展途上国（中国、インド、イスラム）
- 日本と同様の道をたどれば、人間圏の破綻
- １５０年前は、文明途上国(日本)と植民地(アジア）
  →アジア主義、国内問題としての都市と農村
- 日本の直面する問題→人間圏の維新か、革命か？
  →現代のアジア主義？
- 海洋：人間圏の共有地？(現在は囲い込み？）

Option of Japan facing at the cross-roads of civilization (homo-sphere)

- Actual issues on homo-sphere : civilization of China, India and Islamic countries
- If they trace the past way which Japan and other developed countries follow, catastrophe of homo-sphere will become realistic → how to create a new internal system of homo-sphere to be in harmony with the earth system
- Japan is facing basically the same issues since the Meiji restoration era : What is the civilization and how do we understand the difference in status between Japan and other Asian countries?
- Two options for the future of homo-sphere : restoration or revolution. What are they and which do we choose?
- Is ocean a common property of the homo-sphere or the area to be enclosed by nation states?

IIPS

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Japan's Role as a Responsible Maritime Nation – Enhancing Global Presence and Commitments
(with special reference to resource exploitation and conservation)

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JAPAN'S ROLE AS RESPONSIBLE MARITIME NATION – ENHANCING GLOBAL PRESENCE AND COMMITMENTS

(With Special Reference to Resource Exploitation and Conservation)

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Introduction

Geographically, economically and environmentally, Japan is undoubtedly a maritime nation. Japan is also a global maritime player, at least from fisheries and maritime transport perspectives. The global marine environment and its resources are facing more pressure from human amid rapid growing coastal population and development. Some of the pertinent issues are decline of fisheries resources, degradation of coastal marine ecosystems, loss of marine biodiversity, marine pollution, and potential impacts of global warming and rising sea level (Gray 1997; GESAMP 2001a, 2001b; MEA Board 2005; Worm *et al*. 2006, FAO 2007). Some of these issues are closely related to Japan. Over the years, Japan has contributed significantly to address some of these issues at the domestic as well as the global level. This paper highlights the current problems, reviews Japan's role and contribution, and seeks to provide future directions for enhancing Japan's global presence and commitments as a responsible maritime nation.

Current Status of Global Marine Environmental Problems

Global fisheries decline

There is no doubt that the world's capture fisheries are in crisis as statistics and scientific evidences point to dramatic declines in global stocks. Except the Indian Ocean, most of the major fisheries areas in Pacific and Atlantic Oceans have been fully exploited, if not overexploited (FAO 2007; Lundgren *et al*. 2006). In addition, a study released last year found that all seafood populations face potential collapse by 2048 (Worm *et al*. 2006).

Japan is very much attached to this issue as fish contributes around 50% of total animal protein in Japan and the fact Japan is now the world's largest importer of fish products. The import of fisheries products is critical to Japan as the fisheries production from coastal, offshore and distant-water fisheries has steadily declined since 1985. Therefore, it is no surprise that the fisheries policy in Japan is gears towards ensuring the long-term sustainability of fisheries resources.

Some of the outstanding issues include the over exploitation of tuna resources, scientific (research) whaling, and significant bycatch of non-targeted species (sharks, dolphins and marine turtles). The over capacity of fishing fleets and the potential high

levels of illegal, unreported and unregulated (IUU) fishing are also main concerns. Most recently, the potential collapse of bluefin tuna stocks was making front page news worldwide. Several reports (Gillett, 2004; Miyake *et al*, 2004; Lundgren *et al*., 2006; WWF, 2007; FAO, 2007) concluded that the world's tuna fisheries are facing a drastic decline in stock. This reminds us of the collapsed of "Northern Atlantic Cod" in 1992. Despite a ten year fishing moratorium on northern cod, however, these stocks are showing no convincing signs of recovery.

The rise of aquaculture: solution or problem?

Most of the net growth in global fish production over the past 20 years has come from the development of aquaculture which accounted to about 30% of the world's food fish (Delgado *et al*. 2006, FAO 2007). With an average annual growth rate for the world of 8.8% per year since 1970, aquaculture is the fastest growing food production sector. Hence, coastal marine aquaculture is seems as a tool to supply the future of world fish demands and alleviate the pressure on marine capture fisheries.

On the other hand, marine and coastal aquaculture can create environmental and social problems. For example, shrimp farming in coastal areas has created a lot of problems over the years, and these problems include the destruction of mangroves, depletion of wild stocks, land-use conflicts, displacement of local community, and marine pollution.

Global degradation and destruction of marine coastal ecosystems

The coastal marine ecosystems provide many goods and services to human and environment worth at least US$20.9 trillion annually (Costanza *et al*. 1997). This is about 63% of total contribution of the world's ecosystems. The most important ecosystems are undoubtedly the mangroves, coral reefs and seagrass beds. Most notably, these ecosystems serve as nursery, breeding and feeding grounds of many commercially important finfish and prawns. Hence, these ecosystems maintain marine biodiversity, ensure food security and support coastal livelihood and well-being of coastal people.

According to the new FAO assessment on the state of the world's mangrove forests, the mangrove area worldwide had fallen below 15 million ha by the end of 2000, down from an estimated 19.8 million ha in 1980. This indicates a 20% reduction in mangrove area worldwide in 20 years. Similarly, the report on the "Status of Coral Reefs around the World" notes that 20% of the world's coral reefs have been effectively destroyed and show no immediate prospects of recovery, and predicts that another 24% of the world's reefs are under imminent risk of collapse through human pressures (Wilkinson 2004). Seagrass, a lesser known but important habitat, does not fair better. Short and Wyllie-Echeverria (2000) estimated 290,000 ha of seagrass loss globally from documented sources and projected over 1.2 million ha of seagrass have likely been lost from undocumented parts of the world.

The widespread destruction of these critical ecosystems has serious consequences to global fisheries production. Many areas are experiencing decline in fisheries

landings especially prawn and high commercial value finfish which are dependent on these ecosystems for some part of their lifecycle.

Marine pollution and dead zones

The report compiled by UNEP's Global Programme of Action for the Protection of the Marine Environment from Land-Based Sources shows that the number of "dead zones" in the world's oceans has grown from 150 in 2004 to about 200 in 2006, threatening marine fish stocks and the people who depend upon fisheries for food and livelihoods. These ocean dead zones are becoming more common in developing countries.

An estimated 80% of marine pollution originates from the land and major causes are untreated sewage discharge, industrial pollutants, and nutrient and fertilizer run-off. The sea-based marine pollution is mainly from accidental and intentional oil discharge from ship operation and offshore exploration and production facilities. The estimated average annual inputs of oil entering the marine environment is 1,245,200 tonnes per year (GESAMP 2007). These marine pollution problems is expected to rise significantly by 2050 due to rapid increased in coastal populations and development, oil and gas demands, and action to combat marine pollution is not accelerated.

Global warming and rising sea level

Climate change will affect the physical, biological and biogeochemical characteristics of the oceans and coasts at different time and space scales (IPCC 2007). The major predicted impacts are increased incidence and intensity of extreme weather (cyclones, typhoons, and storm surges), severe coastal erosion, alteration and destruction of coastal ecosystems (i.e. coral bleaching and mangrove land-ward migration patterns), decline of fish stock, saltwater intrusion, decreased freshwater availability in coastal area, flooding in low lying coastal areas, and salinization of groundwater, estuaries, freshwater and irrigation systems.

Apart from making the coastal marine ecosystems and fisheries resources more resilience to climate change and providing proper coastal protection measures, the other critical challenge is addressing the issue of water scarcity in coastal areas with mega-cities and small islands. The world is already facing a drastic decline in clean water supply, the saltwater intrusion and potential salinization of freshwater systems will make the matter worse.

Review of Japan’s Role and Contribution

The promotion of active regional and international cooperation to address global environmental issues is one of the main agendas in Japan’s foreign policy. Over the years, Japan has provided financial and technical assistance to many countries and organizations for addressing global marine environmental issues. This effort has been implemented through various channels including Japan’s Official Development Assistance (ODA), contributions from foundations, corporate sector and non-governmental organizations (NGOs).

The ODA remains the most important source and mechanism, and Japan is one of the top contributors in the world. Much of the allocations are given to bilateral cooperation projects, regional programmes, World Bank and regional banks, Global Environment Facility (GEF), and United Nations (i.e. UNEP, UNESCO and UNDP). The bulk of the total allocation is for the infrastructure development projects and about 20% is allocated for the social and environmental projects. The allocation for the environmental projects is very small, marine environmental projects in particular.

As an aid implementing agency, Japan International Cooperation Agency (JICA) has been tasked to implement most of the ODA projects. Some of the significant marine related projects are fisheries and aquaculture programmes under the Southeast Asian Fisheries Development Center (SEAFDEC), marine conservation projects for Galapagos Islands Marine Reserve, and training course on coral reef and mangrove conservation and management. For example, Japan's contribution to SEAFDEC in terms of financial, technical and experience for 40 years is enormous. One of such project was the regionalization of FAO's Code of Conduct for Responsible Fisheries which emphasize on responsible fisheries and aquaculture and sustainable utilization of coastal resources.

From the maritime transport perspective, Japan's contribution to safety of navigation and environmental protection in the major sea routes (i.e. Straits of Malacca and Singapore) is very significant. From 1969 to 2006, Japan contributed about US$130 million on various project and this included the donation to the Malacca Straits Revolving Fund in 1981 which has been accessed by Malaysia and Indonesia in 1992 following the *Nagasaki Spirit – Ocean Blessing* incident. Most of the funding was from the Nippon Foundation and small contribution from the Japan Shipowners' Association (JSA) to the Malacca Straits Maritime Council. More recent contributions include the provision of a training vessel to Malaysia's Maritime Enforcement Agency and the pledge by the Nippon Foundation to contribute one-third of the initial five year running cost of the Aids to Navigation Fund in the Straits valued at over US$9 million. These contributions reflect Japan's commitment towards ensuring safety of navigation and environmental protection in the Straits and its dependence on the Straits of Malacca and Singapore which carry 90% of its fuel.

Japan has a very high standard of corporate social responsibility (CSR) and is ranked 19th in the Global Responsible Competitiveness Index 2007, and has the most companies participating in the Global CSR Reporting Initiative. Most of the multinational companies do produce annual communication, sustainability, social and environmental reports. Over the years, many companies have contributed the land-based environmental improvement projects or "green projects". The involvement in coastal marine conservation projects is rather limited presumably due to low awareness of the marine environment. The increased of intensity of typhoons and storm surges in western Pacific Ocean and the recent Indian Ocean Tsunami did provide the opportunity for these companies to contribute in coastal marine ecosystem rehabilitation projects. Many multinational companies have made donation and some even involved actively in the rehabilitation projects, such as AEON, Toshiba, Ricoh, Epson, Hitachi, and Fujitsu.

Some NGOs based in Japan also play an active role in various capacities in promoting sustainable utilization and rehabilitation of coastal marine ecosystems and their resources. They are the International Society for Mangrove ecosystems (ISME), RAMSAR Japan, WWF-Japan, ACTMANG, and Japanese Red Cross (JRC). For example, ISME was established in 1990 as an international non-profit and non-governmental society and based in Okinawa for the conservation, rational management, and sustainable utilization of mangrove ecosystems. ISME has over 950 members from 86 countries and is presently working on various mangrove related projects, such as rehabilitation of mangroves aftermath the Indian Ocean tsunami. One of the critical problems facing by the NGOs is securing constant funding from the governments, relevant organizations and corporate sector.

In addition to the above mentioned organizations and their efforts, there are many other organizations and institutions involve significantly in various capacities in addressing the marine environmental issues, from promoting science, conducting research, providing funding to policy analysis. They are the International Center for Environmental Management of Enclosed Coastal Seas (EMECS), Japan International Research Center for Agricultural Sciences (JIRCAS), Japan Society for Promoting Science (JSPS), Japan Fund for Global Environment (JFGE), Ocean Policy Research Foundation (OPRF), local universities, and Japan-based UN organizations (i.e. UNU and UNITAR).

From the climate change perspective, the ratifying of Kyoto Protocol on 16 February 2005 represents a major achievement for Japan. The Kyoto Protocol is an international agreement setting targets for industrialized countries to cut their greenhouse gas emissions to 5% below 1990 levels by 2008 - 2012. Japan is committed to reduce the greenhouse gases by 2012 under the Kyoto Protocol.

Future Directions and Challenges

Japan has in the past contributed significantly in addressing some of the marine resource exploitation and other environmental issues. In view of future new challenges and uncertainties, Japan may wish to consider several approaches and policy changes to enhance its responsibility and commitments towards marine resource exploitation and other environmental issues. This is also in line with the global shift of focus to the environment and sustainable development, and the fact environment means business.

Ocean policy on a global scale

With limited and decreasing ocean resources, and the very importance of fisheries resources and maritime sea routes to Japan’s food and economy security, Japan will need a comprehensive ocean policy on a global scale. The ocean policy will not only address issues within the 200-mile Exclusive Economic Zone (EEZ), but also highlight the need to sustain and secure strategic resources beyond the EEZ deems critical to Japan in a responsible manner. From environmental perspective, the policy should basically provide strategies for harvesting fisheries resources in sustainable and responsible ways, domestic and global fish species recovery plan, securing the bilateral and regional fisheries agreements, enhancing sustainable production of

coastal and marine aquaculture, promoting rehabilitation of critical coastal marine ecosystems, promoting marine research and use of science for sound decision making, reducing marine pollution, and not least, further enhancing regional and global cooperation on environmental issues.

Delivering the promise of aquaculture

Tuna culture is definitely a main agenda for Japan to address the issue of decline of global tuna resources. At the same time, the demand of tuna is expected to grow along with the increased popularity of tuna-based sushi and sashimi worldwide. Tuna culture has emerged as a significant industry over the last ten year (Lundgren et al. 2006; FAO 2007) and is presently practiced in Australia, Japan, United States, Mexico and the Mediterranean Sea. However, most of present tuna culture involves tuna fattening and relies on wild juvenile stocks. The ability of tuna hatcheries to produce high quantity of high quality tuna fry to meet the market demands remains a challenge. Many areas especially in Indonesia and the Philippines have been identified as potential areas for tuna farming. The future of investment is good provided we can supply enough quality tuna fry and there is a further advancement of culture technology

Shifting the focus of the ODA to marine environmental issues

Over the last 15 years, the ODA has emphasized on infrastructure and energy sector. Some of these projects also caused environmental problems to the recipient countries. It is high time to focus more on environmental issues. This is also to fulfill the commitments by development countries to achieve the objectives of the Millennium Development Goals. Besides the restructuring of the ODA's sector allocation, more funding should be allocated to NGOs as they have a very limited fund to commit to various environmental projects. This is also to recognize and reward their significant contribution in various environmental projects and marine conservation.

CSR as the next driver

As the ODA is limited and decreasing, the contribution from the corporate sector through CSR is very crucial in the future. Apart from compensating the decline of the ODA, the contribution from the corporate sector will compliment, or even enhance the objectives of the foreign policy. Unlike the ODA, gaining public support for CSR's contribution is easy as most of the projects are small and targeted at local community level. The benefit of such projects is also tangible especially at local level and always received more attention and publicity from the media. In addition, the communication and sustainability reports published by companies also deliver the message not only to shareholders, but to people all over the world. Besides tax rebate, all these advantages give free advertisement to the product brand and enhance the green image of the companies. Potentially, their investment projects and products are also more acceptable by foreign governments and their local people. Generally, investing in environmental improvement project is good for business and enhances global presence in a responsible manner.

To encourage the contribution of corporate sector in marine conservation projects, the government can play a greater by promoting maritime awareness to the

corporate sector. The fact coastal marine ecosystems are more valuable than terrestrial ecosystems deserves more attention from the governments as well as corporate sector. Due to limited knowledge about coastal marine environment and to ensure the successful implementation of projects, the corporate sector should be encouraged to work together with Japanese and local NGOs, and in some cases, with UN organizations.

Sharing the experience and technology

Japan has learned by experience the lesson of coastal and marine environmental degradation due to rapid economic and industrial development. Perhaps the bitterest lesson is the tragedy of Minamata Bay known as “Minamata Disease”. On the other hand, Japan also made advancements in marine technology, including sustainable aquaculture system, disaster warning system, coastal protection system, water treatment technology, seawater desalination system, etc.

Japan can offer these valuable experience and lesson to the developing countries, especially to avoid or minimize environmental and social costs while pursuing economic development. Some of the technologies will be urgently needed to tackle the impacts of rising sea level. For example, good coastal protection system and seawater desalination system will be in high demand to address the issues of coastal erosion and serious water shortage in the coastal areas, respectively. This also provides business opportunity for Japanese companies. Of course, the commitment is to make this technology available to poor developing countries at an affordable cost. In future, there will be more coastal marine rehabilitation projects to make the ecosystems more resilience to the climate change. The experience of various coastal rehabilitation projects implemented by JICA and NGOs (i.e. ISME, ACTMANG and JRC) will be very useful.

Setting the next target for the Kyoto Protocol

The recent IPCC’s report has confirmed that the climate change is real and urges all countries to take responsibility to address this issue seriously. It is anticipated that more effort should be done on the reduction of greenhouse gases. Japan is committed to provide further contribution to the future framework after 2013. The challenge for Japan is to engage with United States, China, India and some other developing countries and encourage these countries to join effort in reducing greenhouse gas emissions. Of course, to play this leading role, Japan must fulfill its own responsibility to reduce greenhouse gas emissions by 6% from the 1990 level.

Conclusions

The global marine environment and its resources are in crisis. Global warming and rising sea level will not only further worsening the existing problems, but create new problems and challenges. Japan has in the past contributed significantly in addressing some of the issues especially fisheries and maritime transport sectors, and lately on climate change initiative. To further enhance Japan’s role as responsible maritime nation in the global level, Japan may wish to consider several approaches and policy changes, including of having an ocean policy on the global

scale, increasing ODA's allocation for marine environmental projects, promoting CSR in marine environmental projects, sharing experience and technology with developing countries, and increasing commitments on tackling the climate change issues.

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Enacting the Basic Ocean Law—the Process and the Background

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Chairman of the Ocean Policy Research Foundation
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1 Enacting the Basic Ocean Law

In April 2007, Japan enacted its first ever Basic Ocean Law, which then came into effect in July. Although this was a members' bill, it received backing in the Diet not only from the governing Liberal Democratic Party (LDP) and New Komeito, but also from the main opposition parties—the Democratic Party of Japan (DPJ), the Japanese Communist Party, and the People's New Party—and it was passed by overwhelming majorities in both houses.

What is the Basic Ocean Law? Its objectives are outlined in the first article of the law, as follows: "The ocean is essential in sustaining human life. In recognition of the importance of seeking accord on the development and use of the oceans and on conservation of the ocean environment through international collaboration based on the UN Convention on the Law of the Sea and international initiatives such as the Rio Earth Summit, the Basic Ocean Law prescribes fundamental principles, specifies the responsibilities of the national government, local authorities, businesses, and the public, formulates a Basic Plan for the Ocean, and identifies issues to serve as a basis for other policy measures concerning the ocean. It also provides for the creation of a Headquarters for Comprehensive Ocean Policy within the cabinet to promote ocean policy measures in a comprehensive and systematic manner. In this way, Japan aims to attempt to bring about the healthy development of economic society, to attempt to improve the stability of people's lives, and to make a contribution to coexistence between mankind and the oceans."

As is common knowledge, the UN Convention on the Law of the Sea (UNCLOS) introduced a maritime system encompassing territorial waters of 12 nautical miles, exclusive economic zones of 200 nautical miles, and the new concept of the continental shelf.

Based on the Basic Ocean Law, the cabinet's Headquarters for Ocean Policy, headed by the prime minister, has already held its first meeting. An expanded body, consisting of the Headquarters for Ocean Policy supplemented by a group of councilors made up of private citizens, is to hold its first meeting this week, on 18 October. The speaker has been appointed a member of this group. The law creates the new position of Ocean Policy Minister, and it has been announced that Minister of Land, Infrastructure and Transportation Tetsuzo Fuyushiba will assume this post.

For Japan, taking on the problems of the oceans was a key issue that brooked no delay. However, the reason why the fully fledged Basic Ocean Law, consisting of 38 articles, was enacted as a members' bill is that, in simple terms, it was not possible for the government to enact it (that is, it could not come to fruition in the form of a government-proposed law approved by the cabinet), since the management of maritime issues, which must be addressed in a comprehensive and systematic fashion, and the management of maritime policy is divided up between eight different government ministries and agencies. Moreover, the activities of private organizations exerted a significant influence on the process by which this members' bill was drafted. As will be described in this presentation, this process of enacting the Basic Ocean Law is of vital significance to the debate over maritime issues and deliberation over maritime policy in Japan.

2 Opinions Offered by the Public and Inauguration of the Basic Ocean Law Study Group

The process of drafting this legislation was directly influenced by the Basic Ocean Law Study Group, a combined government, public-sector, and private-sector body founded in April 2006.

The Basic Ocean Law Study Group was a non-partisan study group that included Diet members from the LDP, New Komeito, and the DPJ, and which boasted former member of the House of Councilors Keizo Takemi as caretaker representative and Shigeru Ishiba, the current minister of defense, as chairman. The group also included academic experts involved with maritime issues, representing the private sector, and government officials. Discussion commenced in April, and in December general principles for maritime policy and the outline of a basic ocean law were adopted and published.

The requisite background to the enactment of the Basic Ocean Law in terms of these general principles for maritime policy may be summarized as follows.

"While recent years have seen growing antagonism between states over the enclosing of areas of the ocean, progressive over-fishing of resources, and intensifying environmental problems, the oceans play a hugely important role in guaranteeing the water, food, natural resources, and energy required by a growing global population as well as its importance in transportation. It was against this backdrop that UNCLOS was concluded. While the convention adhered to freedom of navigation, it granted sovereign rights and jurisdiction to coastal nations, at the same time imposing on them obligations with regard to environmental protection. The Rio Earth Summit adopted Agenda 21, an action program that touted sustainable development and required that coastal nations engage in integrated management of oceans beset by mutually inter-related problems.

Japan has thus far derived various benefits from the ocean, and protected by the ocean, it has succeeded in developing as a state.

In terms of the exclusive economic zones established by UNCLOS, Japan boasts the sixth most extensive waters in the world. However, development of policy and infrastructure for the integrated management of the ocean has not advanced—ocean issues are being dealt with by dividing them up between different departments according to function, just as has always been the case, and ocean issues are not being resolved. This is causing major delays in the demarcation of territorial waters, the development and use of natural resources, and protection of the environment. There has likewise been virtually no progress on the legal structure for the preservation of maritime security and order. It would be no exaggeration to say that Japan is the most laggardly maritime state of all, in terms of international action based on international cooperation.

To cope with these conditions, Japan must develop a new system for dealing with ocean issues and develop a comprehensive and integrated maritime policy. To this end, the most pressing issue has been the enactment of a Basic Ocean Law."

In fact, in 2005 the Nippon Foundation (chaired by Yohei Sasakawa) and the Ocean Policy Research Foundation (chaired by Masahiro Akiyama) published "Japan and the Oceans—Recommendations for Maritime Policy in the Twenty-First Century," based on the work of the Basic Ocean Law Study Group. These recommendations emphasized the need for a basic ocean law, and in substance it essentially constituted a prototype of the current Basic Ocean Law. These recommendations immediately caught on within the government and the LDP, and motivated the LDP to enact the Basic Ocean Law. Hidenao Nakagawa, then-chairman of the LDP's Policy Research Council, handed these recommendations down to Keizo Takemi, member of the House of Councilors; a Select Committee on Maritime Policy, chaired by Shigeru Ishiba, was set up within the LDP; and externally the Basic Ocean Law Study Group was established. The study group was a non-partisan body, and New Komeito and the DPJ also engaged constructively in the enactment of the Basic Ocean Law.

3 Oil and Gas Resource Development on the Continental Shelf in the East China Sea

The background to why the ruling LDP and New Komeito, as well as the DPJ, the major opposition party, were all so responsive to the recommendations of a private organization is as follows.

The landing by Chinese activists on the Senkaku Islands in March 2003 led the LDP to form the Select Committee on Maritime Rights, and the protection of Japan's maritime rights in the form of its territories, territorial waters, and exclusive economic zones became a major political issue. Since 2004, China's active expansion of its oil and gas development efforts on the continental shelf in the East China Sea in the vicinity of the intermediate line between China and Japan has been a problem. China has also frequently attempted to conduct oceanographic surveys unannounced in Japan's extensive exclusive economic zones in the western Pacific, and has asserted that the Okinotorishima Islands do not constitute part of Japan's coastline and thus are not a point of reference for a Japanese exclusive economic zone. At the same time there have also been many incidences in the area around Takeshima island and in the area around the Northern Territories in which Japan's sovereignty and jurisdiction have been ignored. Although Japan is a nation that has never really expressed strong concerns over maritime rights, this string of incidents has caused Japan to turn its attention to these rights and other maritime issues. With the formation of its Select Committee on Maritime Rights, the LDP has responded strongly to these incidents, in addition to which the DPJ, the major opposition party, has also swung into action over the protection of Japan's maritime rights. For its part, the DPJ submitted a member's bill to the Diet for the development of natural resources on the seabed and another to promote resource exploration and scientific surveys in exclusive economic zones.

At the instigation of the LDP, New Komeito has undertaken to submit a "secure waters" bill to the Diet aimed at countering China's oil and gas development, and has at the same time asserted the importance of developing domestic laws to accommodate UNCLOS. In this way, New Komeito demonstrated a positive response towards the proposed enactment of the Basic Ocean Law.

The national press has begun to focus on maritime issues as a topic of profound interest. With newspaper organizations having handled ocean issues in a disjointed fashion and proven incapable of reporting on them accurately, some national newspapers have established special multi-disciplinary teams and developed specific reporting programs for ocean strategy planning. When the Basic Ocean Law Study Group published its general principles for maritime policy and its outline of a basic ocean law, there was extensive press coverage regarding the possibility of enacting such a law, and the press played a major role in shaping public opinion.

In addition, the Ministry of Land, Infrastructure and Transport—newly formed in the major administrative reforms of 2001 through the amalgamation of the old Ministry of Construction, Ministry of Transport, National Land Agency, and Hokkaido Development Agency—enjoys wide-ranging responsibility for maritime administration and took great interest in the Basic Ocean Law, exhibiting a desire to see it passed and the Headquarters for Comprehensive Ocean Policy established. As a result, the minister of land, infrastructure and transportation has been appointed to the additional post of ocean policy minister.

4 The UN Convention on the Law of the Sea and a Paradigm Shift in Maritime Affairs

Given this background, maritime issues—in particular the protection of Japan's maritime rights—have become a major political issue. Why, however, has Japan opted for a comprehensive response in the form of the Basic Ocean Law, instead of responding to problems such as ocean resource development, disputes with China, and oceanographic surveys individually?

In fact, these maritime issues that had begun to draw the attention of the nation were essentially issues that were closely related to the legal framework of UNCLOS. Oil and gas development on the continental shelf in the East China Sea is bound up with the issues of the demarcation of the exclusive economic zones and the continental shelf that were introduced by UNCLOS. Likewise, the issue of the Okinotorishima Islands relates in reality to the way in which UNCLOS is interpreted. Regarding oceanographic surveys (as in the case of the issue over the area around Takeshima island), under the convention surveys are handled differently according to their nature—that is, depending on whether they are scientific surveys, natural resource development surveys, or military surveys. In line with UNCLOS, the Rio Summit's Agenda 21, which is heavily stressed within the international community, strongly advocates the sustainable development and use of the oceans. The preservation of the ocean environment and the regulation of the development and use of the oceans are major topics of Agenda 21, and Agenda 21 also relates to the UN Convention on Biological Diversity. The way forward for the fishing industry is also closely related to this latter convention. In recent years these types of maritime environment issues, such as the bleaching and decrease of coral, the problem of rubbish on seashores, the massive proliferation of echizen jellyfish, and meteorological fluctuations have grabbed Japan's attention.

There has been various coverage relating to the preservation of maritime security and order. Chinese submarine incursions into Japan's territorial waters; attacks by pirates and the rise of terrorism at sea that threatens the security of the sea lanes, which are fundamental to Japan's existence as a state;, military surveys by other nations in Japan's exclusive economic zones; and the occurrence of large-scale natural disasters in the oceans have stoked major fears among the Japanese people.

The various issues relating to the oceans, as described above, are in reality closely bound up with one another. Accordingly, the necessity for comprehensive and integrated management of the oceans is clearly stated in both the preamble to UNCLOS and in Agenda 21. This is precisely why the development of a comprehensive ocean policy is required.

For long periods of history, it was possible to use the oceans freely—in other words, there was "freedom of the seas." Maritime states made free use of the oceans for fishing and other activities. However, after the end of World War Two, there was a shift to "management of the seas," with the expansion of territorial waters, the appropriation of natural resources on the continental shelf, the establishment of exclusive fishing grounds, and the introduction of exclusive economic zones. At present, 40 percent of the world's seas are under the jurisdiction of one coastal nation or another. For a long time Japan's strategy was to continue to insist on broad international waters and limited territorial waters; unfortunately, however, it proved unable to adapt to the global trend and the paradigm shift in maritime affairs. UNCLOS came into effect in 1994 and was ratified by Japan two years later. However, in the intervening period Japan has thus far failed to tackle maritime issues adequately.

These conditions are probably a major reason for the sudden turnaround and enactment of a basic ocean law to deal with the various maritime issues of which the nation is now keenly aware, as recommended by a public organization.

5 Future Development of Maritime Policy

The Basic Ocean Law requires the government to formulate a Basic Plan for the Ocean. The immediate issue is that while the Headquarters for Comprehensive Ocean Policy will formulate this basic plan, the fundamental principles for dealing with these maritime issues are determined by the basic law. There are six fundamental principles as follows.

Coordination of the development and use of the ocean with preservation of the ocean environment
Securing safety on the ocean
Improvement of scientific knowledge regarding the ocean
Improvement of the health of maritime industries
Management of the ocean in a comprehensive fashion
International cooperation with regard to the ocean

In terms of substance, the basic law also enumerates 12 articles that spell out basic measures. The law thus elucidates specific measures based on the six principles, thereby determining the Basic Plan for the Ocean. It is understood that this work is scheduled to proceed on the premise that the plan will be defined by the beginning of next year. In addition to the presentation of policy, changes to the law and new legislative work will probably be necessary. The development of organizations for building a system for comprehensive management of the ocean is again likely to become a major issue.

Japan has only just begun to develop a comprehensive maritime policy. The Basic Ocean Law that has been enacted and the accompanying framework enshrines coexistence between mankind and the ocean, and currently ranks among the best in the world. However, the key issue is whether Japan as a newly emerging maritime nation can put its heart and soul into this framework.

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Maritime Asia as the Pivot of Globalization in Historical Perspective

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Maritime Asia as the Pivot of Globalization in Historical Perspective

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The globalization process is generally understood in a context of the great transformation from an agricultural to an industrialized society. The Industrial Revolution in Britain played a decisive role in that transformation, followed by other European nations and North America. Japan caught up with the West and became the first industrial nation in Asia in the late 19th century, other East Asian economies (NIES and ASEAN) followed suit, and BRICs (Brasilia, India, and China) have joined recently. A purpose of my talk is to look at this process from Maritime Asia, so as to see the globalization process was not necessarily initiated by the West. There were other ways, one of which was the way Japan has experienced. I would take Japan as a special reference in comparison with the West. The main argument is that the rise of the Modern West was possible by their relationship with Maritime Asia dating back to the 16th century.

(1) Industrial Revolution vs. Industrious Revolution

During the 16th century, which is often called the Age of Discovery, the Europeans were embarking on the sea voyages, while Japanese were also involved in overseas ventures. Both Europeans and Japanese were present on the seas around Asia. I called that region 'Maritime Asia' which consists of Indian Ocean, Southeast Asian Seas, and China Seas.

Seen from the old Asian civilizations, Europe and Japan were located on the periphery of the huge Eurasian continent where the Asian civilizations flourished. Both Europe and Japan were underdeveloped for a long time until, say, the 18th century, and introduced culture and goods from these old civilizations through the trade in Maritime Asia, which resulted in large trade deficits.

These trade deficits turned into surpluses around 1800. The dramatic transformation from the deficit to the surplus in trade, or importer from to exporter to the Maritime Asia, occurred not only in Europe but in Japan. This was realized by a revolution in production which took place not only at Britain, but also at Japan almost simultaneously in the 18th century. In Britain this became known as the Industrial Revolution, while Japan underwent the Industrious Revolution.

Let me explain briefly about the production revolution. Production needs the three factors: capital, labor, and land. In the West, as the American continents were discovered, land was plentiful for Europeans, but the labor was scarce. It was logical for them to economize on labor while raising its

productivity. As a logical outcome of this process, technological innovation took place and capital intensive industry was born, that was the Industrial Revolution.

In contrast, Japan had a relatively large population (already 30 million in c.1700) but a shortage of land, because she is a mountainous country. The logical choice was to raise the productivity of land. By spending a large amount of labor on a limited area of land, Japan increased per acre productivity to the highest in the world. This was a production revolution which we call the Industrious Revolution. Typical examples of this could be observed in the rice and cotton crops.

As a result of these production revolutions in Britain and Japan, Britain formed the Atlantic economy, linking Europe, Africa, and America in a self-sustaining, oceanic triangular trade system, while Japan adopted a policy of seclusion (Sakoku). Both experienced the production revolution, but in a different ways attained economic self-sufficiency and cultural independence from the old Asian civilizations.

Britain is an island nation, and so is Japan. Ancient civilization was a land-based, continental civilization, while modern civilization is maritime in nature.

If one were to say that the modern West and the Japanese Sakoku (national seclusion) arose at the same time yet were not linked at all, one would be mistaken.

(1) 17th-Century Netherlands and Japan

It is said that the 17th was the Dutch century. The Dutch was the strongest in the West. A trip to the Rijksmuseum (Dutch National Museum) in Amsterdam is instructive in this regard. Most of the treasures on display there date to the 17th century, reflective of the fact that this was when Dutch power was at its peak. The Netherlands declared independence from Spain in 1581. The destruction of Spanish Invincible Armada in 1588 by the British fleet gave a big boost to the Dutch in their war of independence, and they achieved de facto independence in 1609, long before the independence was formally recognized by a number of nations in 1648 under the Treaty of Westphalia. The year 1609 also marked the founding of the Bank of Amsterdam, which served as the major Europe's trade settlement center until the 18th century.

What was the foundation of Dutch prosperity? It was trade with Asia. To be more precise, it was trade with "Maritime Asia," centered in Southeast Asia. To be even more specific, it was a "South China Sea trading world" that encompassed Southeast Asia, China and Japan. Japan was the lynchpin of this maritime world, as it was far and away the leading supplier of the gold, silver and copper used for trade settlements in Maritime Asia. Japan was then among the world's leading producers of gold, silver and copper.

Many different European nations joined the South China Sea trading world. Portugal and Spain arrived first, followed by Britain and the Netherlands, which established the British East India Company and Dutch East India Company in 1600 and 1602, respectively. The Dutch were based in Batavia (present-day Jakarta). After the Amboina Massacre of 1623, the British lost out in their competition with the Dutch and withdrew from the South China Sea trading world. Japanese wanted such goods deerskins, medicines, perfumes and others which the Dutch merchant acquired in Southeast Asia. The Dutch also invited Chinese to Batavia to buy silk, silk fabrics and other goods from Chinese merchants. These they shipped to Japan at enormous profit.

It is interesting to compare the power of the Netherlands and Japan at that time. The Dutch people on Dejima Island at Nagasaki wore nothing on their persons that would identify them as Christians. And every year they were required to visit Edo (now Tokyo) at their own cost to report to the Shogunate about what was going on in Europe, which they obediently did. It will be apparent to you about which party enjoyed the stronger position.

People tend to have the distorted view that Japan was somehow isolated from the rest of the world during the period of national seclusion. Japanese themselves have had that sort of view influenced especially by the book Sakoku (National Seclusion), in which Watsuji Tetsuro champions the idea that "as a result of national seclusion, Japan was left behind by the West." In reality, however, the Japanese economy was linked to the world economy through the Dutch monopoly on trade with Japan. I would go so far as to say that it was Japan's policy of national seclusion that kept the Dutch prosperous.

The 19th century was the British century. Britain alone controlled the seven seas, a quarter of the world's population and a quarter of the world's landmass. It was the time of the British Empire. The period from 1870 to World War I was the era of classical imperialism.

The biggest market for Britain during the age of classical imperialism was Maritime Asia. Japan was forced at this time to open its ports. Some 40 years later, in 1902, Japan and Britain entered into the Anglo-Japanese Alliance. Japan came to be called "the Britain of the Far East." The alliance was renewed in 1905 and 1911, expanding the territory of its coverage to include the region from the Far East to South Asia (Maritime Asia), and developed into an equal military alliance. But as Britain ferociously battled away against its European enemies in World War I, Japan was busy entering Maritime Asian markets and undermining the economic foundation of the British Empire.

How did Japan become so powerful in such a short period?

One common feature shared by all global power states in the modern West is their possession of both economic and militarily power. Yes, Meiji Japan strove after these two strengths, as is evident

from the government slogan, "fukoku kyohei" (enrich the country and strengthen the military power).

May I remind you that, at the end of the 16th century, Japan was manufacturing and using more guns than any other country in the world, and militarily speaking, Japan was very strong. The power of Japanese guns made it possible for the army of Toyotomi Hideyoshi (1537-1598) to invade the Korean Peninsula and penetrate as far as the area of Pyongyang.

But in Japan, where the society had experienced more musket-fired revolution than anything seen in the West, guns lost their place on the battlefield in the early 17th century. Strangely enough, guns were practically abandoned ever since to the end of the Edo period. The idea that a country's enrichment must be based on a strong military is a Western assumption, an assumption Japan did not share until around the time of the Meiji period.

So, let me examine some peculiarities to Japan.

(1)Two Social Revolutions: The Bourgeois and the Gentlemen Samurai

The ruling stratum during the Edo period (1603-1867) was the bushi (samurai) class. In this period, society was divided into four classes: shi, no, ko and sho (samurai, farmers, artisans and merchants). Today, the word "samurai" is known around the world, even appearing in the titles of movies made in other countries. In Japanese dictionaries, the kanji (Chinese) character given for "samurai" is always 侍, the main meaning of which is "to serve," and this is what the samurai originally did - they served the aristocracy by protecting them with their weapons. The original meaning of "samurai" was men with weapons, military men.

But in the Edo period, samurai became 士 ("shi," which means a "man of learning and virtue," or a "civilized gentleman"). Historians today consider some of the Tokugawa Shoguns and lords of feudal domains like Uesugi Yozan (1751-1822) to have been benevolent leaders. Uesugi was called a "man typifying the best of the Japanese," by an eminent opinion leader, Uchimura Kanzo (1861-1930) in his Japan and Japanese (or The Representatives of Japan). These shoguns and lords should be characterized more as literary gentlemen than as military men. But this was not the case before the Edo period. For example, as late as the end of the 16th century, the warlord Oda Nobunaga (1534-1582) publicly declared that his goal was tenka fubu (place all of Japan under military control). Beginning with the military government in Kamakura (1192-1333) and continuing through to the end of the 16th century, samurai did exercise military power. This dramatically changed under the Edo Shogunate, when samurai were

expected to set aside the military side of their occupation and cultivate their civilized side.

Before then, the violence included samurai of inferior status rising up against their superiors. This type of revolt, known as gekokujo (inferiors overpowering superiors), changed during the Edo period to what Prof. Kasaya Kazuhiko calls shukun oshikome no kanko (detention of a lord by retainers). In the 17th century, before this practice developed fully, any retainer who rebelled against a lord, no matter how tyrannical, could be punished for the crime of treason. But a system developed in the 18th century to deal with tyranny - a group of higher ranked retainers was permitted to present their case to the karo (the highest ranking official in the feudal lord's government), who would investigate the matter and have the tyrannical lord detained in a room for that purpose. This practice, which removed the need for assassination, was based on the moral code studied by all samurai, bushido (the way of the samurai).

Thus, between the 16th and 17th centuries, the cornerstone of the ruling class's ethical system was formed; Bushido changed the samurai from "military-oriented" to "learning and virtue-oriented." This change was so dramatic I would call it the "gentlemanly samurai revolution."

The modern Western society was grounded on the middle class. In 17th century Britain, a bourgeois social revolution introduced a modern capitalist society, with bourgeois citizens owning land and other assets. Their assets were converted into capital, making them capitalists. In Edo Japan, on the other hand, gentlemanly samurai did not own land, which they lost by the heino bunri reforms that separated the samurai from peasants. Gentlemanly samurai did not depend on possession of land and capital – Their professional role (SHOKUBUN) was to manage their lord's domain and look after the people's needs (keisei saimin). In Europe, the bourgeois social revolution gave rise to gentlemanly capitalists, but in Japan the gentlemanly samurai revolution led to the rise of managers.

(2)The Early "Managerial Revolution"

In The Protestant Ethic and the Spirit of Capitalism, Max Weber asserts that modern capitalist society embodies an entirely new type of people who engaged not so much in commerce but in production. Weber's admirable thesis is that production only became paramount in society after the appearance of this new class of people who, instead of consuming whatever they had, saved and invested it.

In the Modern West, the capitalist class sprang from the middle class after the bourgeois revolution. Working class' roots go back to the cruel enclosure system, under which lands were taken from peasants, forcing them to migrate to cities. The enclosures of the latter part of the 16th century were criticized by a contemporary, Thomas More: "sheep ... may be said now to devour men." The

enclosure system was applied intermittently from around More's time until the rise of capitalism. This process, called the first condition of accumulation, is roundly criticized as inhumane by Karl Marx in Das Kapital, in a passage that perhaps represents his most masterly prose. Marx considered the enclosure system to be so brutal that he named it "primitive accumulation."

Around the time of the primitive accumulation, the gentlemanly samurai social revolution removed samurai from the means of production (land) and transformed them into managers. Land-based peasants became the producers. In the Edo period, land was an asset to be used by producer (farmers and peasants), not by gentlemen samurai. The land tax reforms of 1873-1881 confirmed the owners of lands - it proved that it was the farmers and peasants who owned the means of production.

British society was typical of its division into two classes: people with capital assets and workers with no assets. Japanese society was also divided, but quite differently, into managers who had no assets and workers who had them. The European modern society sprang from the "primitive accumulation," while so did the Japanese modern society from the "primary accumulation."

In the West, economic historians became aware in the early 20th century of the importance signified by the separation of capital (ownership) and management. In The Theory of Economic Development (1912), Joseph A. Schumpeter posited that economic development is promoted not so much by capitalists, as by entrepreneurs. The importance of entrepreneurs and managers has been widely recognized since James Burnham's The Managerial Revolution (1941).

Japanese economy has always been propelled, right up to the present day, by managers more than by capitalists. As an example, Shibusawa Eiichi (1840-1931), the "father of Japanese capitalism," was a masterless samurai when the Shogunate fell, not a man with capital. Yet in his lifetime he founded more than 500 enterprises, and is remembered today as a manager of businesses. In Japan, managerial revolution following the primary accumulation occurred long before it did in the West.

In the West, a "bourgeois revolution" created the capitalists who owned land and other assets, while in Japan, gentlemanly samurai promoted economic development not through ownership of land and capital but by managing them. In the West, asset ownership and management were not separated until capitalism reached its prime in the 20th century. In Japan the separation occurred much earlier in the Edo period.

(4)Intra-Asian Competition

We have glimpsed the historical processes that began in the 16th century, in which Japan emerged as Asia's first modern civilization.

Were Edo Japan's demilitarization, gentleman samurai (managerial) revolution and Industrious Revolution influenced by models from other countries? Yes, they were derived from ideas originating in China of the Ming dynasty (1368-1644). The European model is based in good part on the world of Islamic Asia - for example, Europe's industrial revolutions were influenced by the "Arab Agricultural Revolution" (described by Andrew Watson), and its concepts on international law sprang from the Arab view of "House of Islam and House of War."

Firearms were used in China at the time of the Yuan (Mongols), but Ming China and Yi Korea did not develop into strong military powers, even though they remained aware of gun manufacturing methods. Instead, governments there fostered the study of Confucianism and the rule of virtue. This stands in contrast to the Western cult of power supremacy. Japan's gentlemen samurai based their moral outlook on the Confucian Four Books studied throughout East Asia: The Great Learning, The Doctrine of the Mean, The Analects and Mencius. Many other attributes of civilization were also introduced to Japan from China. Japan's labor-intensive Industrious Revolution was inspired partly by agricultural methods practiced in Jiangnan (the Yangtze Delta), according to Prof. Shiba Yoshinobu. Edo Japan's policies of national seclusion reflected Ming China and Yi Korea policies prohibiting maritime trade. The alternate attendance requirement system of the Edo period may have been a variation of a similar tribute custom on the continent.

These various ancient models demonstrate that East Asian systems developed quite independently from the West. They also imply the existence of regional rivalry. The outcome of this intra-Asian competition was that Japan assumed top place in the Edo period, a status exploited to the full after the Meiji Restoration. Against this backdrop of intra-Asian competition, the two biggest rivals have been Japan and China. China has launched its own campaign to "enrich the country and strengthen the military." Now that American hegemony has already peaked, Japan and China could enter a new phase of rivalry. Will this rivalry promote world peace? The answer depends on whether the two countries once again reduce military capacity by embracing their common heritage of cultivating knowledge and virtue.

To conclude:

To conclude, let me come back to the future possibility of creating a new civilization in the region of Maritime Asia.

The term ‘East Asia’ evokes the idea of c continental landmass, because this is what China is. But the areas in East Asia where economic ties are growing are not in the interior of the continent, but on near the coast. I have called this region Maritime East Asia. And Indian Ocean rim sphere can be called

Maritime South Asia. Southeast Asia, which is located between them, can be called the Central Maritime Asia, (if we choose the one among others as the center of the Central Maritime Asia, it can be Singapore)

As I mentioned it was the Maritime Asia which created as the pivot of the emergence the Modern Civilization both at the Western edge of Eurasia and at its Eastern edge: Japan. Maritime Asia influenced both westward and eastward.

Now, it is a high time to change the view and the direction from horizontal to vertical, viz. from East-West dimension to North-South dimension.

To the south of Central Maritime Asia is Western Oceania, the center of which is Australia. Australia is presently strengthening economic ties with Maritime Asia, and the entire West Pacific coastal zone is integrating economically. To the north of Central Maritime Asia is Japan. The thousands of islands, from Japan in the north to Australia and New Zealand in the south, extend in the shape of a crescent. The archipelago along the Western Pacific has numerous islands and indeed the greatest in size in the world, the countries there being so diversified – whether racial, religious, ethnic or cultural –, still they have one thing in common: the ocean. With rich potential in the arc, we can call it 'the Fertile Crescent of the Sea.'

The Maritime Asia today is a base for commercial activities and has great economic significance. From the viewpoint of both environmental conservation and economic development, it would be worthwhile to establish a network of harbors and coastal waters, from the Bering Sea through Maritime East Asia to Western Oceania. Ancient Mesopotamia, the home of an ancient land-based civilization has been called as 'the Fertile Crescent', which is now beset by tension and war. There is all the more reason, therefore, for us to promote the vision of Pax Maritime-Asiana, or a maritime civilization of peace in the Fertile Crescent of the Sea.

If we are to transcend the issues produced by a civilization base on power, we need to switch a civilization based on beauty. Why do I say so? This is not a romantic idea. The preservation of the global environment includes not polluting the earth, and not polluting is based on beauty as a value.

To exemplify a new civilization of beauty, Singapore's dramatic transformation from a colonial island to an independent and attractive Garden Island is something that we can seriously learn from it. The garden islands will be an ideal vision for Maritime Asia. Japanese archipelago, too, should follow the suit and be made into garden islands, with a wider vision of the Fertile Crescent of the Sea in the Western Pacific to be the garden islands on the Earth.

（余白）

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The Japanese and British Naval Heritage

Philip Towle
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THE JAPANESE AND BRITISH NAVAL HERITAGE

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Geopolitics

Japan and Britain share many geopolitical features as small, densely-populated islands, dependent on trade and located off great continents. They have both 'learnt the hard way' that the sea can be a defensive shield if it is in friendly hands and an avenue for invaders if it is dominated by hostile states. For a thousand years from the Romans to the Normans the British Isles were subject to successive waves of invaders, it was hardly surprising that the English devoted so much effort, however intermittently, over the next millennium to building a strong navy and to monitoring political change on the continent.[1] The Japanese tried to isolate themselves from the outside world for 200 years and then also began to build up one of the world's great navies at the end of the 19th Century.[2]

Yet the culture and circumstances of the two states have also been very different. China was the predominant land power in East Asia until it was crippled by Western aggression in the 19th Century. Europe, by contrast, has never had such a power after the fall of the Roman Empire. When a hegemonial state threatened to arise, the weaker states combined against it often financed and led by Britain as the predominant naval power. European history has, therefore, been more turbulent than Asian, since the object of the balance has not been to keep the peace but to preserve the independence of individual states, however small.[3]

Historic Precedents

There are, nevertheless, some parallels between the current East Asian situation and the correlation of European forces before 1914. Then, as now, a number of new great powers had begun to emerge. Just as British naval dominance, investments by the City of London and Britain's free trade policy facilitated world-wide economic development in the 19th Century, so US naval dominance since 1945 and its free trade policy have enormously benefited the rising powers. The greatest economic and political success story since 1945 has been the export-led development first of Japan, then of the Asian Tigers and China, and now of India. But Asian economic success has naturally led to the emergence of new naval and military powers, precisely the situation which the Europeans failed to manage before 1914. Chun Kun Lee of the Korean Institute for Maritime Strategy calculated that World military spending fell by 31.4% between 1985 and 1996 while East Asian spending grew by 39.9%, representing a very

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[1] Admiral Sir Herbert Richmond, *Statesmen and Seapower*, Clarendon, Oxford, 1946; Garrett Mattingley, *The Defeat of the Spanish Armada*, Penguin, Harmondsworth, 1962; Norman Longmate, *Defending the Island: From Caesar to the Armada*, Grafton, London, 1989; N A M Rodger, *The Command of the Ocean: A Naval History of Britain, 1649-1815*, Allen Lane, London, 2004.

[2] For a brief history see Stephen Howarth, *Morning Glory: A History of the Imperial Japanese Navy*, Hamish Hamilton, London, 1983.

[3] Max Beloff, *The Balance of Power*, George Allen and Unwin, London, 1968.

considerable East Asian arms race, particularly when the collapse of the Soviet Navy in the area is taken into consideration. [4]

It is, of course, the rise of China and the Chinese Navy, which causes most anxiety in Washington and Tokyo. The official 2006 Chinese paper on National Defence states that:

> The Navy aims at gradual extension of the strategic depth for offshore defensive operations and enhancing its capabilities in integrated maritime operations and nuclear counterattacks. The Air Force aims at speeding up its transition from territorial air defense to both offensive and defensive operations, and increasing its capabilities in the areas of air strike, air and missile defense, early warning and reconnaissance, and strategic projection.[5]

In fact, the Chinese are apparently not, for the moment, planning to follow the policy pursued by Germany under Tirpitz and Doenitz of threatening both their potential enemies' trade and their main fleet, but rather they seem to see their navy as a wing of the land forces in the protection of the homeland and its vicinity. Nevertheless, their 2006 paper revealed that the 'official', annual average increase in Chinese defence expenditure from 1990 to 2005 was some 15.35%, despite the end of the Cold War. Of course the Chinese fleet still does not compare technically with the carrier battle groups of the US Navy but, like the German High Seas Fleet in 1914, its rise will make it more difficult for the predominant navy to operate close to its coasts. This is all the more the case since it would coordinate its activities with land based anti-ship missiles which have already proved their effectiveness against the warships of other navies.

Before 1914 the great powers made a number of abortive efforts to enhance international security by reducing the arms race. The Tsar convened the Hague Peace Conferences of 1899 and 1908 to control military spending, but these succeeded only in negotiating relatively peripheral agreements. Bilateral Anglo-German negotiations to abate the most important naval arms race failed because the Germans insisted that Britain should promise to be neutral in the event of a continental war and this was precisely what the British could not agree because of the fear that Germany would become the continental hegemon.[6] In the last days of peace the British Foreign Secretary, Sir Edward Grey tried desperately to convene a conference to arbitrate the dispute between Austria-Hungary and Germany on one side and Russia and Serbia on the other, but this too failed because the Austrian and German Emperors insisted that the assassination of the Austrian Archduke, Franz Ferdinand was an affair of honour not open to a negotiated solution.[7] The Concert of Europe, arms control and disarmament had all proved abortive.

One further reason for that failure was the assumption by the European general staffs that they had to mobilise, or strike first, in the event of a crisis. This greatly shortened the time available to statesmen to find a solution and enabled the armed forces to overrule the German, Austrian and Russian Emperors and insist that, once started, their mobilisation timetables could not be halted or reversed, even if this

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[4] Chun Kun Lee, 'Seapower and security at the close of the Twentieth Century', in David Wilson and Dick Sherwood (Editors), *Oceans Governance and Maritime Strategy*, Allen and Unwin, St Leonards NSW, 2000, p 33 ff.

[5] *China's National Defense in 2006*, Information Office, Beijing, 2006, p. 13.

[6] Fritz Fischer, *War of Illusions: German Politics from 1911 to 1914*, Chatto and Windus, London, 1975. pp 129-130; Zara S Steiner, *Britain and the Origins of the First World War*, Macmillan, Basingstoke, 1977, pp. 94-99.

[7] Prince Lichnowsky, *Heading for the Abyss: Reminiscences*, Constable, London, 1928.

made war inevitable. Despite fears expressed at the time, the naval balance was, in fact, more stable. The British First Sea Lord, Sir John Fisher had suggested on a number of occasions before 1914 that the Royal Navy should launch a preventive attack to destroy the German High Seas Fleet before it became too powerful, but, fortunately, the government dismissed his suggestions. The British have pre-empted navies in wartime- at Copenhagen in the Napoleonic Wars and at Mers el Kebir in the Second- but they have not generally staged preventive or pre-emptive attacks in peacetime. The Japanese may have gained militarily more than they lost politically by their pre-emptive attack on the Russian fleet moored outside Port Arthur in 1914, but their similar attack on Pearl Harbor in December 1941 made the United States absolutely determined to crush its opponents at whatever cost and however long it took. Powerful democracies are not likely to compromise, as the Russian autocracy did at Portsmouth in 1905, without avenging their hurts.

Wartime Precedents

While Britain gave priority to its navy rather than its land forces, both Services often languished for lack of finance in peacetime. The consequence was usually a series of defeats at the beginning of a great war from whose effects Britain was only saved by the protection offered by the English Channel. Before the Battle of Trafalgar in October 1805 and again before the Battle of Britain in 1940, the country was under direct threat of invasion. Only once, before the First World War because of the efforts of Sir John Fisher, was the Royal Navy generally well prepared for the ensuing conflict with many more battleships than the High Seas Fleet and with most battleships withdrawn to home waters and the Mediterranean, thanks to the Anglo-Japanese alliance.[8] In the inter-war period the Royal Navy was much less successful than the Imperial Japanese Navy or the US Navy in developing large aircraft carriers with the most modern aircraft- a development which was all the more ironic since the RN had pioneered this area. This was in part due to faulty RN doctrine, partly due to continual financing problems and, above all, due to the way in which priority was given to the Royal Air Force and particularly bombers in the 1930s, at the expense of RN aircraft. [9]

In the Falklands War, the RN's last major engagement, its forces had been developed for anti-submarine operations in the North Atlantic on the assumption that the Soviets would be the enemy. Instead, the Royal Navy had to cope with Argentine anti-air operations in the South Atlantic despite the lack of airborne early warning aircraft or conventional fighters. The consequence was, and was expected to be, the loss of a number ships including two cruisers and a converted helicopter carrier during the recapture of the Islands. However the British claimed to have shot down at least 72 Argentine aircraft, 20 of those by STOVL Sea Harriers and 21 with shipborne missiles.[10] It was a typical triumph of determination over resources.

Despite inadequate finances, the British naval tradition, following Sir Francis Drake and Admiral Nelson, has been offensive. In practice, this was often disadvantageous, as when the RN was reluctant to form convoys of merchant ships

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[8] Arthur J Marder, *From the Dreadnought to Scapa Flow*, five volumes, Oxford University Press, 1961-1970; Jon Tetsuro Sumida, *In Defence of Naval Supremacy 1889-1914*, Routledge, London, 1989.

[9] Richard Harding, (Editor), *The Royal Navy 1930-2000*, Frank Cass, London, 2005, chapter three; Andrew Field, *Royal Navy Strategy in the Far East 1919-1939*, Frank Cass, London, 2004.

[10] *The Falklands Campaign: The Lessons*, Cmnd 8758, London, December 1982.

against submarine attacks during the First World War and almost starved the country as a consequence.[11] The Imperial Japanese Navy similarly failed to devote sufficient attention to the protection of seaborne trade in the Second World War with calamitous affects. By the end of the conflict, Japan and the whole of its Empire were reverting to a subsistence economy and slowly starving.[12] The Japanese armed forces were both extremely daring and resourceful, often carrying out operations which Occidental armed forces would have regarded as impossible, such as using their air forces in a number of theatres at the same time and transporting personnel over the sea before maritime control had been gained. This paid off during the first phase of the war, it became increasingly wasteful as the tide of battle turned against them.[13]

The Royal Navy is currently following its tradition of preparing for offensive operations by procuring two aircraft carriers over 50,000 tons, more than twice the size of the Harrier carriers currently in operation. Equally, it is still hampered by peacetime finances, and the procurement of suitable Joint Strike Fighters for the carriers from the United States is currently causing budgetary problems because the RAF is rearming with Typhoon aircraft, the RN also needs to replace the Trident submarines and the army needs fighting vehicles appropriate for the wars in Iraq and Afghanistan.

In contrast, the Maritime Self Defence Force has been based on much greater financial stability and has focused its attention on convoy protection. This focus is hardly surprising given the experience of the Second World War and Japan's position as a maritime nation. The MSDF is slightly larger than the Royal Navy with some 44,000 personnel against under 40,000 in the Royal Navy and with the International Institute for Strategic Studies listing over 53 principal surface combatants in the MSDF against 34 in the RN.[14]

Conclusion

Both the Royal Navy and the Maritime Self Defence Force operate in uncharted waters because they depend upon their stronger ally to balance the power of potential enemies. Japan, the other Asian nations and the United States have to manage the re-emergence of China as a great power without a calamity of the sort that the Europeans brought upon themselves in 1914 and 1939. There are many more maritime and territorial disputes in East Asia today between Japan and Korea, Korea and China, Taiwan and China, China and Japan, Russia and Japan, than there were between the major European nations before the First World War; then the only significant one was between France and Germany over Alsace and Lorraine and the French were not going to wage war over that issue. Naval power and the introduction of confidence building measures between navies are going to play a major role in Asia and the Pacific over coming decades.

On the positive side is, firstly, the cat's cradle of regional bodies to improve relations which the Asian states have established in recent decades and which are of a

[11] John Winton, *Convoy: The Defence of Seaborne Trade 1890-1990*, Michael Joseph, London, 1993: John B Hattendorf el at, (Editors), *British Naval Documents*, Scolar Press, Aldershot, 1993, pp.76-766.
[12] Philip Towle, *From Ally to Enemy: Anglo-Japanese Military Relations 1900-45*, Global Oriental, Folkestone, 1905, chapter 10.
[13] Jeremy Black (Editor), *The Second World War Volume 111: The Japanese War 1941-1945*, Ashgate, Aldershot, 2007, pp. 160, 172.
[14] *The Military Balance 2006*, Routledge, 2006.

sort undreamt of in Europe before 1914.[15] Secondly, trade between the USA and China is now regarded as symbiotic, rather than strictly competitive, as Anglo-German trade was before 1914.[16] Thirdly, all the major regional powers, -Japan, China and the Republic of Korea- have played a constructive role in the recent Six Party Talks on the North Korean nuclear programme which appear, as of September 2007, to have been successful. Fourthly and most importantly, the nuclear arsenals of the Great Powers have made them much more cautious about allowing themselves to be drawn into conflicts than their predecessors were in 1914.

[15] Melissa G Currey and Nicholas Thomas Editors, *Advancing East Asian* R*egionalism*, Routledge, London and New York, 2007.
[16] Bernard Semmel, *Imperialism and Social Reform*, George Allen and Unwin, London, 1960.

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IIPS

Institute for
International Policy Studies
・Tokyo・

IIPS International Conference

グローバリゼーションと我が国の科学技術戦略
“Globalization and Japan’s Science and Technology Strategy”

2007 年11月19日～20日
於　ANA インターコンチネンタルホテル東京

（資料編：会議提出論文集）

21 世紀の国際秩序と我が国の国家像
「グローバリゼーションと我が国の科学技術戦略」
2007 年 11 月 19 日～20 日
ANA インターコンチネンタルホテル東京

IIPS

アジェンダ

11 月 19 日（月）

10:00~12:30　**第 1 セッション**　*(地下1階　オーロラ)*
各国・地域の科学技術戦略
議長：IIPS　薬師寺研究主幹
プレゼンテーション (各 15～20 分) :
フィリップ　ド・タクシー・デュ・ポエット（駐日欧州委員会代表部　科学技術部長）
陳　向東シャンドン・チェン (北京航空航天大学教授)
北澤宏一（科学技術振興機構理事長）

14:00~17:00　**第２セッション**　*(地下 1 階　オーロラ)*
イノベーションと社会
議長：IIPS　小堀首席研究員
プレゼンテーション (各 15～20 分):
アナベル・ガワー　(ロンドン　インペリアルカレッジ)
長岡貞男 (経済産業研究所　研究主幹、
一橋大学イノベーション研究センター長・教授)
城山英明（東京大学大学院教授）

11 月 20 日（火）

10:00~12:30　**第３セッション**　*(地下1階　オーロラ)*
イノベーション政策とグローバルな課題
議長：IIPS 大河原理事長
プレゼンテーション (各 15～20 分):
ロバート・セキュータ（駐日米国大使館　経済部公使）
佐和隆光 （立命館大学大学院教授)
石倉洋子 (一橋大学大学院教授)
ニコール　W.　パイヤセッキ（ボーイング・ジャパン社　社長）

15:00~17:00　**公開シンポジウム**　*(地下1階　グローリー)*
グローバリゼーションと我が国の科学技術戦略
議長　IIPS　薬師寺研究主幹

（敬称略）

The World Order and a Vision of Japan in the 21st Century

Globalization and Japan's Science and Technology Strategy

November 19 – 20, 2007

ANA INTERCONTINENTAL Hotel, Tokyo

IIPS

AGENDA

November 19, Monday

10:00~12:30 **Session 1** *(Aurora Room, B1F)*

Science and Technology of Each Country and Region

Chaired by IIPS Research Director Taizo Yakushiji

Introductory presentations (15 to 20 minutes per person) by:

Dr. Philippe De Taxis Du Poet ((EU) Delegation of the European Commission to Japan,)

Professor Xiangdong Chen (Beijing University of Aeronautics & Astronautics)

Dr. Koichi Kitazawa (Japan Science and Technology Agency)

14:00~17:00 **Session 2** *(Aurora Room, B1F)*

Innovation and Society

Chaired by IIPS Distinguished Research Fellow Shinzo Kobori

Introductory presentations (15 to 20 minutes per person) by:

Dr. Annabelle Gawer (Imperial College London)

Professor Sadao Nagaoka (Research Institute of Economy Trade & Industry、Hitotsubashi University)

Professor Hideaki Shiroyama (The University of Tokyo)

November 20, Tuesday

10:00~12:30 **Session 3** *(Aurora Room, B1F)*

Innovation Policy and Global Issues

Chaired by IIPS President Yoshio Okawara

Introductory presentations (15 to 20 minutes per person) by:

Mr. Robert Cekuta (US Embassy Japan)

Professor Takamitsu Sawa (Ritsumeikan University)

Professor Yoko Ishikura (Hitotsubashi University)

Ms. Nicole W. Piasecki (Boeing International Corporation-Japan)

15:00~17:00 **Public Symposium** *(Glory Room, B1F)*

Globalization and Japan's Science and Technology Strategy

Chaired by IIPS Research Director Taizo Yakushiji

（余白）

IIPS

Prepared for the IIPS Symposium on

Globalization and Japan's Science and Technology Strategy

19 – 20 November 2007

Tokyo

Session 1
Monday, 19 November 2007

The European Research and Innovation Area: Setting the pace for global Europe

Philippe de Taxis du Poët
European Union - Delegation of the European Commission to Japan

The European Research and Innovation Area:
Setting the pace for global Europe

In a changing world characterised by the accelerating globalisation of research and innovation and the emergence of new scientific and technological powers, the European Research and Innovation Area is more than ever a cornerstone for a European knowledge society. Such a society is one where research, education, training and innovation are fully mobilised to fulfil the economic, social and environmental ambitions of the EU and the expectations of its citizens.

The European research and innovation area concept combines: a European "internal market" for research, where researchers, technology and knowledge freely circulate; effective European-level coordination of national and regional research activities, programmes and policies; and initiatives implemented and funded at European level. The European Research and innovation Area that the scientific community, business and citizens need should have the following features:

– An adequate flow of competent researchers with high levels of mobility between institutions, disciplines, sectors and countries;
– World-class research infrastructures, integrated, networked and accessible to research teams from across Europe and the world;
– Excellent research institutions engaged in effective public-private cooperation and partnerships, forming the core of research and innovation 'clusters' including 'virtual research communities', mostly specialised in interdisciplinary areas and attracting a critical mass of human and financial resources;
– Effective knowledge-sharing notably between public research and industry, as well as with the public at large;
– Well-coordinated research programmes and priorities, including a significant volume of jointly-programmed public research investment at European level involving common priorities, coordinated implementation and joint evaluation; and
– A wide opening of the European Research Area to the world with special emphasis on neighbouring countries and a strong commitment to addressing global challenges with Europe's partners.

Some progress has been made since the concept was endorsed at the Lisbon European Council in 2000. The European research and innovation area has become a key reference and many initiatives have been launched in Europe over the last years, notably:

– The EU Research Framework Programme is explicitly designed to support the creation of ERA and its funding has been substantially increased. New initiatives launched in conjunction with the 7th Framework Programme (2007-2013), such as the European Research Council, will have an important impact on the European research and innovation landscape. The future European Institute of Technology also has the potential to play a substantial role in creating world-class 'knowledge and innovation communities'.

– Initiatives have been launched to improve the coordination of research activities and programmes. They include the European Technology Platforms, through which industry and other stakeholders develop shared long-term visions and strategic research agendas in areas of

business interest, and the bottom-up 'ERA-Net' scheme which supports the coordination of national and regional programmes.

– Policy coordination is addressed through the 'open method of coordination' and the use of voluntary guidelines and recommendations. This is stimulating a process of debate and reforms at national level, which has resulted in all Member States setting national R&D investment targets in the context of the overall EU 3% of GDP R&D investment objective and taking measures to improve their research and innovation systems.

– The EU has adopted a 'broad-based innovation strategy', which will improve the framework conditions for research and innovation[5]. In this context, a modernised Community framework for State aid for research and innovation[6] and guidance for a more effective use of tax incentives for R&D were adopted in November 2006, a European patent strategy is being proposed to overcome the deadlock on the Community patent[8], and initiatives are being prepared to support the emergence of European 'lead markets' in promising technology-intensive sectors.

– EU cohesion policy and its financial instruments - the Structural Funds - give strong priority to the development of research and innovation capacities, particularly in less developed regions. Together with the priority given in most Member States' internal policies, this can help the whole of Europe to participate in and derive full benefit from the European Research Area.

These initiatives are valuable steps on which further progress can be built. But much ground work remains to be done to build the European research and innovation area, particularly to overcome the fragmentation which remains a prevailing characteristic of the European public research base.

– Researchers still see career opportunities curtailed by legal and practical barriers hampering their mobility across institutions, sectors and countries.
– Businesses often find it difficult to cooperate and enter into partnerships with research institutions in Europe, particularly across countries.
– National and regional research funding (programmes, infrastructures, core funding of research institutions) remains largely uncoordinated. This leads to dispersion of resources, excessive duplication, unrealised benefits from potential spillovers, and failure to play the global role that Europe's R&D capability would otherwise allow, notably in addressing major global challenges.
– Reforms undertaken at national level often lack a true European perspective and transnational coherence.
– Fragmentation of public research diminishes Europe's attractiveness for business as a location for R&D investment.

A sense of urgency in revisiting the European research and innovation area stems from the fact that globalisation of research and technology is accelerating. These developments bring new opportunities for Europe and the world. Science knows no boundaries and the issues that research and innovation are asked to deal with are increasingly global. The European research and innovation area should therefore be open to the world. A coherent approach towards international

S&T cooperation, under the banner of global sustainable development, can assist in building bridges between nations and continents. A success story such as ITER shows that Europe can have the will and capacity for leadership to address global challenges with partners around the world. In other areas such as the environment, Europe is increasingly involved in global initiatives.

In recent years the response to globalisation has moved to the heart of the EU policy agenda. The relaunch of the Lisbon Strategy in Spring 2005 put Europe back on track to face up to competition as the touchstone for creating growth and jobs in the modern global economy. In their informal meeting at Hampton Court in October 2005, the Heads of State and Government set out the key challenges posed by globalisation in areas like innovation, energy, migration, education and demography.

At the Spring European Council in 2006, it was agreed to move up a gear in the work of the renewed Lisbon strategy for growth and jobs to spearhead the response of the European economy. The Lisbon strategy for growth and jobs can continue to provide the backbone for a European approach to globalisation. The four priority areas agreed by the 2006 Spring European Council provide the right frame for the Strategy at both EU and national level:

- More R&D and innovation: Globalisation has stepped up the pace of change for technology and for ideas. The emphasis in this area has been on increasing R&D expenditure and Member States are making progress towards the 3% GDP target. All Member States have set national targets; the challenge for public and in particular the private sector is to meet them. But investment alone will not guarantee an improved R&D performance. We need a market which cuts the lead time to transform innovation into new products and services. Europe needs the right conditions for research and innovation to flourish – such as attractive careers for researchers, a modern IPR system and interoperable standards. A knowledge economy needs free movement for ideas and researchers, adding a "fifth freedom" to the four freedoms of the Internal Market and creating a genuine European Research Area.

- A more dynamic business environment: SME and entrepreneurship has been put high on the reform agenda. The task now is to fully unlock the growth and jobs potential of SMEs and make full use of their innovative capacities. The Commission will seek the views of SMEs and their representatives to help design a "Small Business Act" for Europe with a view to making a wide range of proposals to support SMEs by the end of 2008.

- Greater employability and investment in people: Both globalisation and technological change risk increased inequality, opening up the gap between the skilled and the unskilled. The best solution is to help each individual to adapt, by improving the quality and availability of education and training for all ages. There is a growing interest in "flexicurity." This can help people to manage employment transitions more successfully in times of accelerating economic change. By upgrading their skills, and protecting people rather than particular jobs, it helps people to move into better paid, more satisfying jobs, or even start their own businesses.

- Energy and climate change: The ambitious targets set by the European Union to cut greenhouse gas emissions and drive low-carbon energy are based on two key foundations: a conviction that, with mechanisms like trading to let the market lead the process, fundamental change is within our economic reach; and confidence that there has been a real sea change in citizens' commitment to reform. At the same time, this ambitious approach provides the best possible platform for international negotiations to tackle climate change worldwide. The Lisbon strategy can promote a new ecological approach to industrial and innovation policy – to stimulate and mainstream sustainable and environmentally-friendly technologies.

The climate change and energy challenge is particularly important as the future of the planet depends on the response of governments and societies. The response will call for a significant mobilisation of the scientific community. The research efforts committed to deal with this challenge will depend not only on the credibility of the technological responses but also on the rhythm of adaptation and the suitability of solutions introduced by societies and their political, economic and social actors.

The European Union has made the fight against climate change one of its main objectives for action. The stakes are crucial. Without changes in the current situation, energy demand will increase by 50% by 2030 and result – combined with the increase in world population – in a doubling of CO2 emissions, accelerating global warming with a whole series of uncontrollable consequences that will affect the living conditions of the world population.

At the European Council in March 2007, the Union adopted the strategic objective to limit global warming to no more than two degrees Celsius above pre-industrial levels. It set the 3 times "20 objectives" for 2020: -20% greenhouse gas emissions, +20% improvement in energy efficiency, with 20% coming from renewable energy sources. The Union's aim is that by 2050, the developed countries will have reduced their emissions by 60-80%.

Research and innovation are concerned at multiple levels through providing new knowledge, new technologies and new concepts. It is instrumental at the level of problem analysis and related solutions, in the policy-making process and in the economy and society at large. Research and innovation are important elements in the success of the three objectives set by the Union:

- Reduction of greenhouse gas emissions by 20% by 2020, and in case of a global and comprehensive agreement, by 30%, and call for a global reduction of up to 50% by 2050 compared to 1990 levels. Research and technological innovation have a strong bearing on the process, methods, technologies, materials which allow a reduction in the negative impacts of energy production and consumption on the climate and environment particularly through: Power stations (e.g. capture of CO_2, advanced reactors); Energy Intensive Sectors (steelworks, cement works, chemical/paper/aluminium industries); and Transportation (air, water, rail, road).

- Increase in energy efficiency with a view to saving 20% of EU energy consumption compared to projections for 2020. Research and innovation here are concerned with such issues as energy efficiency of transportation (air, water, rail and road) and the efficiency of heating and lighting in buildings and homes.

- Renewable energy: 20% of the total energy consumption in 2020 should come from renewable energies, including a minimal proportion of 10% of biofuels in the total petrol and diesel consumption for transport. Research and innovation cover the improvement in the efficiency of alternative energy technologies (solar, wind, biofuels) resulting in a reduction in their cost to encourage them to be used more widely, new fuel sources (new generation of bioethanols).

Research and innovation, in general, are preparing for the setting-up in the medium to long term of a low carbon economy and society in all its economic, social, and technological dimensions, by looking at the implications of the transition for the different sectors and in particular for the energy-intensive sectors such as the iron and steel industry, chemical industry, transport and agriculture. Research also covers new energy sources (hydrogen, thermonuclear fusion, etc), while at the same time addressing new generation nuclear fission reactors.

Most of the EU 7th Research Framework programme themes are already largely driven towards the achievement of sustainable development objectives, which cover climate change as a top priority. The FP7 budget allocated for research, energy and transport has been increased and amounts to EUR 8.4 billion for the period 2007-2013. But the contribution of research to the CCE challenge goes beyond these three areas. Indeed, the contribution includes all research aiming at moving towards a low-carbon economy and diminishing the other greenhouse gas emissions. This includes agricultural research, ICT research, materials research, social sciences & humanities, spatial research, nuclear research (fission and fusion), science in society, and research infrastructures.

As to the implementing instruments, European research is strongly committed to reaching the objectives set by the European Union, notably:

- Of the 34 European technology platforms, 15 focus on energy/climate change questions: aeronautics, advanced engineering materials construction, biofuels, rail road, steel, electricity networks, wind energy, hydrogen and fuel cell, photovoltaics, sustainable chemistry, waterborne, zero emission fossil fuel power plants, forestry. A further related platform in the energy field, the Sustainable Nuclear Energy Technology Platform is in preparation.

- Of the active ERANETS, 14 are working on the climate change - energy challenge: renewable energies, zero emission power plants, hydrogen and fuel cells, solar photovoltaic, innovative energy, sustainable businesses, sustainable buildings, climate change, sustainable urban environment, road research, efficient transport systems, cooperation with South America, China, and South-East Europe.

- The objective of the Fusion part of the Euratom programme in the near term is the successful realisation of the ITER project and preparations for the earliest possible start of the experimental demonstration activities.

- Of the six Joint Technology Initiatives (JTIs), 2 are directly related to the CCE challenge, i.e. "Hydrogen and Fuel Cells Initiative" and "Clean Sky", and two are closely linked: "Nanoelectronics Technologies 2020" and "Global monitoring for Environment and security". The "Clean Sky" JTI in particular aims at developing environmentally friendly technologies in the EU air transport sector. The target is to reduce CO_2 emissions from planes by 50% in 2020 through drastic reduction in fuel consumption (improvement of engine efficiency and aircraft operation).

- The Earth Observation activity (GEO) is strongly "climate change impacts" oriented and it is expected to provide essential information for the understanding and prediction of climate change.

- In the area of research infrastructures, the Sixth Framework Programme set up "Integrated Infrastructures Initiatives" (for airborne environmental research, for atmospheric processes, research on atmospheric aerosols, characterisation of the European terrestrial biosphere) to support research in the area of climate change. In the roadmap established by ESFRI for FP7, 7 of the preparatory phase projects are directly linked to climate change.

The global dimension of the challenge related to climate change has initiated a number of international research efforts and collaborations, in which Europe has played and continues to play a key role. International co-operation for research and technological innovation is crucial and can have many benefits, including exchange and sharing of knowledge, skills, and providing effective and equitable responses on the scale required.

It is clearer than ever that the EU can only achieve its objectives at home by being active and united on the global stage. The Lisbon Strategy for Growth and Jobs is the right backbone for the European response to globalisation. Its further deepening is the way to create the wealth that can give practical meaning to core European values of social inclusion and of European and international solidarity. As globalisation is constantly evolving, Europe must ensure that its external and internal policies are mutually reinforcing and be ready to refine them.

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Communication from the European Commission 'The European interest: succeeding in the age of globalisation', 3 October 2007, http://ec.europa.eu/commission_barroso/president/pdf/COM2007_581_en.pdf
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Comparative Study over Innovative Region vs. Innovative Nation China and Other Countries

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China and Other Countries

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Introduction:

It is no doubt that the most determined source for generating sustainable economic progress lies in technology innovation and continual knowledge accumulation. Based on this crucial resource, national and regional technology capability as well as economic development can be continually running on a competitive base, therefore, strategic policy for effective technology development becomes key issue for both country level national innovation system (NIS) and for regional level innovation system (RIS). However, these two systems are different, and strategic policy consideration for technology capabilities is usually a more relevant topic on a national level, rather than in regional boundaries, in spite of social, cultural, and regional varieties (Archibugi, 2005). On the other hand, ownership based technology capability / innovation resources has been discussed actively along with National Innovation System in China as well as in other countries in recent years, together with international background of rapid pace of globalization in which technology innovation occurs almost without country boundaries. The key question here is how do we combine regional innovation movement in an international sense, with ownership based national innovation system as a key policy issue, in a rather national sense. This research paper, based on author's recent research work, focuses on relationships between regional innovation and national innovation, in order to provide implication for strategic policy purposes. The paper argues that regional innovation movement is fundamental and RIS is basic platform in composition of national innovation system, while ownership based technology innovation policy is playing a vitally important role only in complementary cases where market failure may exist.

II Regional innovation vs. National Innovation system: related Concepts.

It should be noted that regional innovation system and NIS are in common in many important characters, such as knowledge generation and knowledge diffusion process. According to Archibugi and Coco (2005), technology side of national innovation capability can be summarized as following three parts, which can also characterize important nature in regional innovation movement:

(a) Embodied/Disembodied, since it is recognized that technological capabilities are embodied in capital goods, equipment, infrastructures, and in disembodied forms such as human skills and scientific and technical expertise, and both types of capability contribute vitally to the technological base of a country

(b) Codified/Tacit, As codified component of knowledge is usually represented by manuals, blueprints, patents, and scientific publications are as important as the tacit components associated with learning by doing and by using (Lundvall and Johnson, 1994).

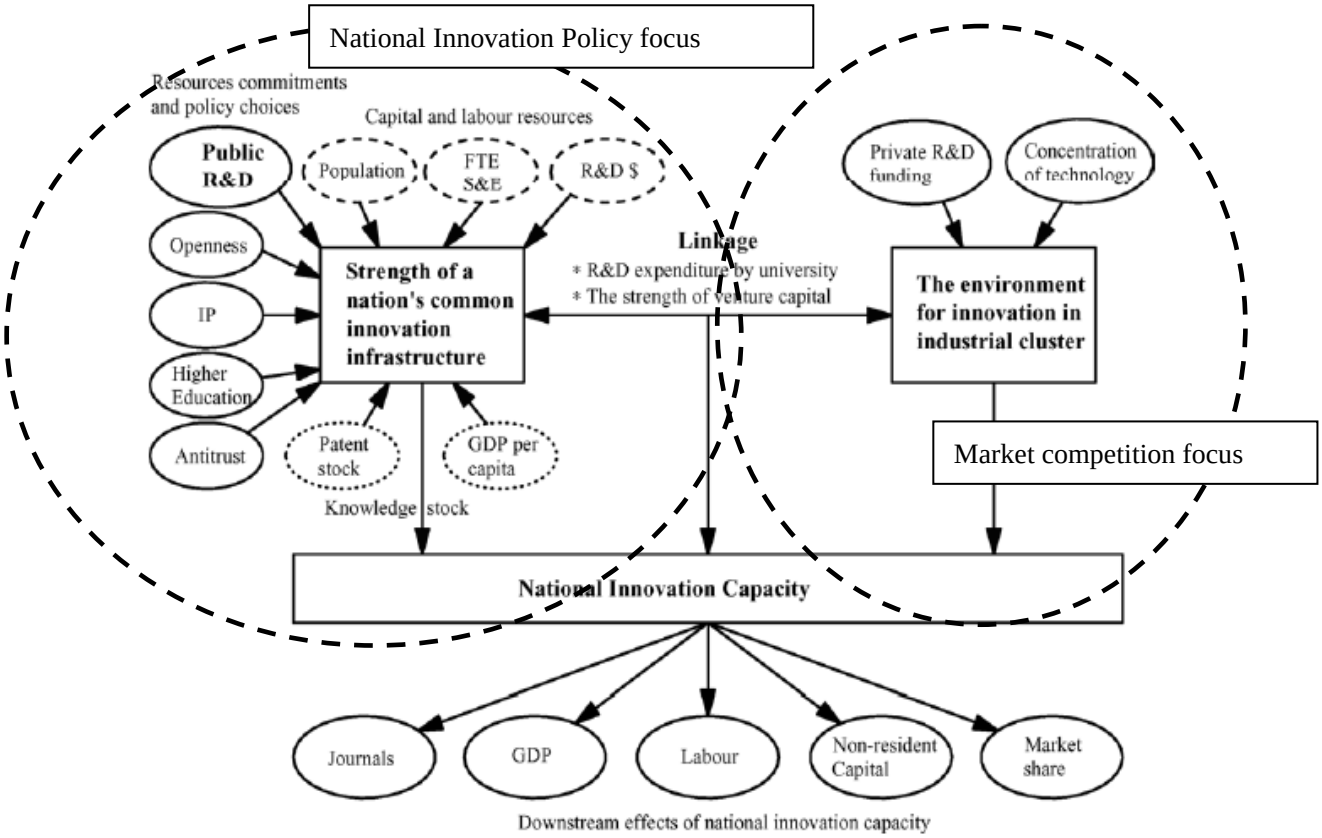
(c) Generation/Diffusion. As it has been long recognized that both the production of knowledge

and its diffusion and imitation provide a valuable technological resource for the country and the region concerned.

The three parts of movement can actually cover development of technology based resources both in regional and national level in three stages, namely, dynamic part as new knowledge production and diffusion (described in C), technology transfer part as a knowledge formation process (described in B), and technology accumulation part as knowledge integration (described in A).

However, there are policy sides of innovation systems, and the concepts of both NIS and RIS in strategic policy terms focuses on different phenomena, which may further imply important policy differences.

Major components and related activities related to national level system usually include development factors on both market competitive resources and resources which may encounter market failure. Thus an appropriate framework of National Innovation System or national technology capability system can be shown as follows (*Furma, Porter, Stern,* FSM model, 2002):



Based on this model, it can be summarized that Regional Innovation System (RIS) is different from NIS in following three aspects:

1. National Innovation System (NIS) is a policy oriented nation-wide commitment and an action system with more strategic planning for the whole country, which may cover typical concerns as follows:
   a) Government – University – Industry collaboration and relationships focused;
   b) Start-Ups and high tech enterpreneourial companies focused
   c) Key industrial sector development oriented;
   d) Key product / media component focused;
   e) Energy / Environmental sustainable technology focused;
   f) National security focused;
   g) Overseas company competition concerned.

   Therefore, NIS is a system of action primarily from government of particular countries, vision oriented, strategies focused, and international political and economical relation backed;
2. Regional Innovation System (RIS) is a primarily local market driven network, clustering based and technology accumulation with technical traditions in local industries, generated and developed through market competition and market selection, combined with local innovation resources including local government policies which can only have limited impact under market mechanism.
3. Externalities are usually effective only in bounded regions. Although access to international technology and knowledge flows is especially important for developing countries, as Romer (1986); Lucas (1988), Grossman and Helpman (1991) argue, that externalities such as knowledge spillovers or learning by doing

are the driving force for today's economic growth in a long run, however, such learning by doing activities and tacit type innovation are usually bounded in particular region, and externalities do have geographic limits, external knowledge and technology transfer can be effective usually within certain regions and serve as important vehicle for regional economic growth. With such kind of evidence that knowledge spillovers are geographically localized (Jaffe et al., 1993; Branstetter, 2001), some further implications can be drawn as important reference on regional innovation.

(1) Regions with a larger agglomeration of firms grow faster because regional concentration of firms facilitates knowledge spillovers.

(2) Foreign trade and FDI policy are more regional bounded, which provide important source for technology spillovers;

(3) High tech policy is usually localized as high tech sectors need important support from local resources, such as higher education facilities, qualified human resource, technology accumulation from certain traditional sectors, and market preference, as well as local purchasing power.

It can be concluded that RIS is a platform for NIS and therefore innovation activities in regional level is fundamental to national innovation performance on the whole.

However, differences between NIS and RIS can vary from country to country. It can be sharply significant in some countries (mainly latecomers or developing countries such as in China), also can be modestly marked or even faded in some other countries (typically in European countries).

In order to clarify differences and relationships between RIS and NIS, this paper provide following chart to combine different type of innovation activities and provide concept of two kinds of policy, namely, Ownership Oriented Policy and Lead Market Oriented Policy.

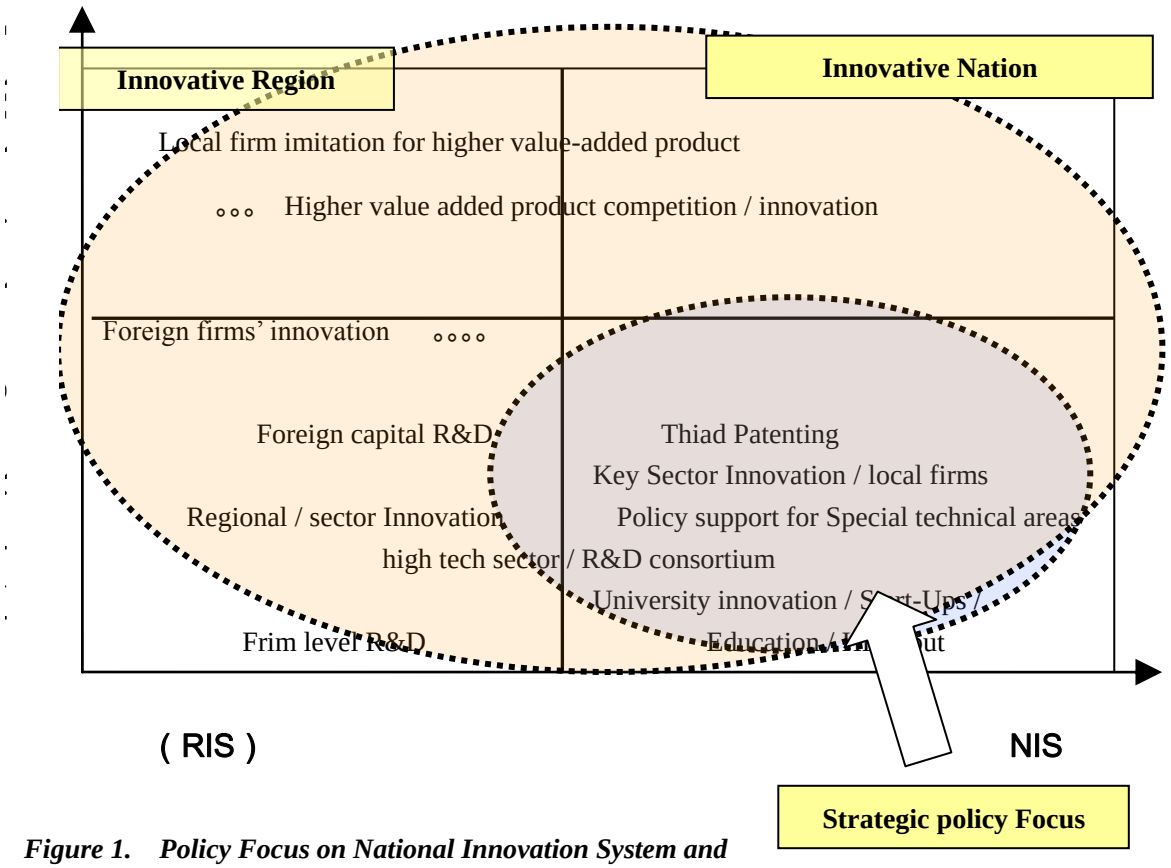


Figure 1. Policy Focus on National Innovation System and Regional Innovation system

The differences in two kinds of policies can be further described through following five issues.

(1) NIS is established based on regional innovation platform, in which innovation activities are clustering from various kinds of sources including overseas, thus Lead Market Orientation policy is the most important in defining promising regional market.

(2) NIS related strategic policy is primarily ownership oriented, indicating important positioning for certain type of technology as well as particular sectors in which market mechanism can not fully apply.

(3) Ownership Oriented policy / strategy is fundamental for both local firms and for the nation as a whole that owns capabilities competing in national and international market; however, Lead Market Oriented policy is equally important in that the market in innovative region is usually functioned as clustering to host high tech firms as well as high tech itself.

(4) Lead Market Oriented policy is primarily regional and is fundamental for innovative region as well as for innovative nation, which accept various kinds of collaborations, while ownership based national innovation movement accept collaboration with policy limitations.

(5) Innovative nation and innovative region can be evaluated according to appropriate indicator system, reflecting ownership innovation performance of the nation in the former case and reflecting activeness of innovation in regions in the later case.

Finally, it should be further noted that Lead Market indicates, according to Bartlett

and Ghoshal (1990), a geographical location, where the market is created by local demand and nature resource embedded. The Lead Market Oriented policy emphasizes places with the first adoption of new designs and techniques rather than the place to host first invention. Thus the related region can be considered as a kind of multinational corporation that host a globalized product (Raffée and Kreutzer, 1989), and of cause still retain possibility to host both (including first invention). Moreover, under Lead Market framework, collaboration space can be further developed and extended. Following chart shows space and possible positioning of different policy system.

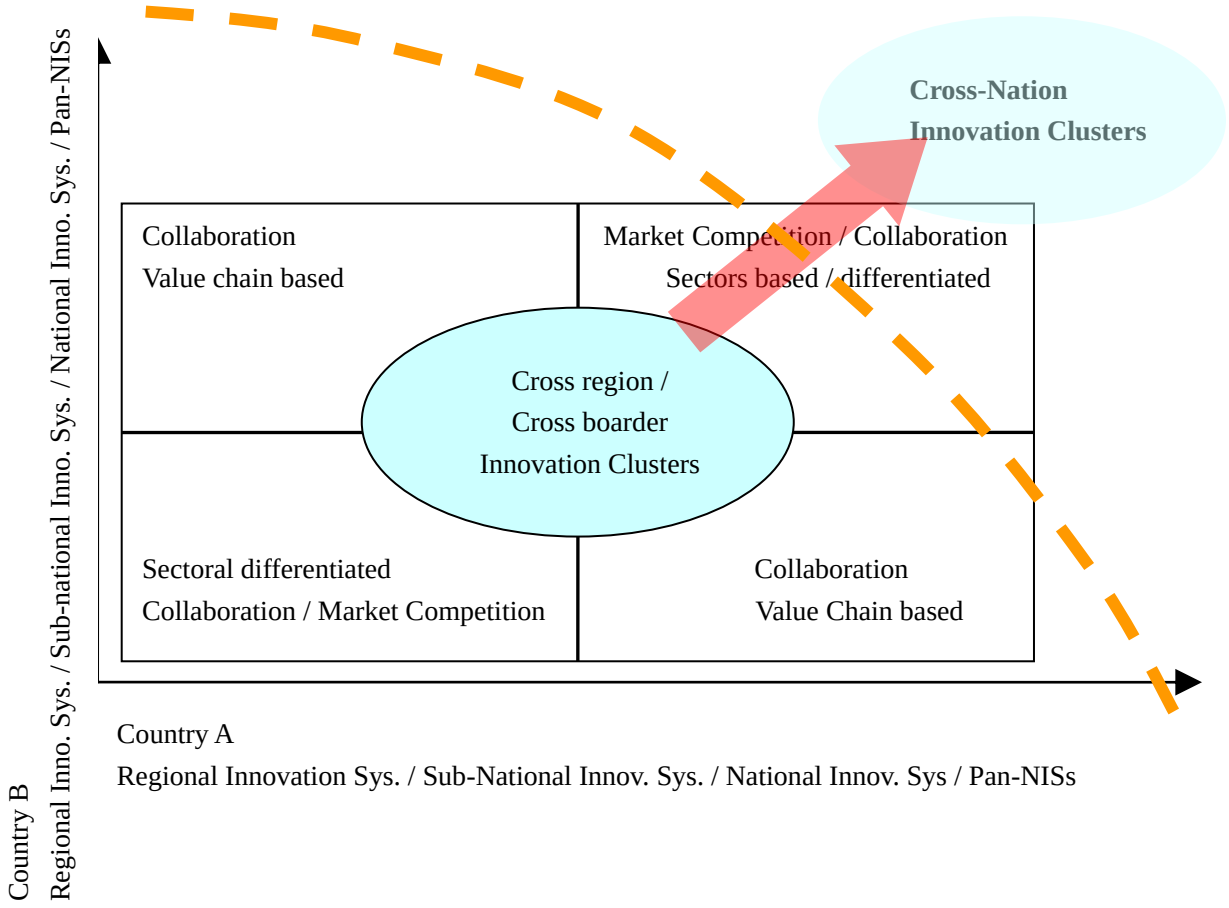


Figure 2. Collaboration Space under Different Innovation Policy in Two Countries A & B

Under this framework, other two special innovation systems can be further suggested, Sub-National Innovation System between Regional Innovation System and National Innovation System, and the other, Pan-National Innovation Systems which are widely extended over different NISs.. Sub-NIS is a Clustering based innovation system which emphasizes innovation networking and clustering, while the Pan-NISs indicates collaboration in a wider scope across borders but on the country level. Clearly, both NIS and Pan-NIS's can be heavily strategic issue.

III. China's Case on Regional Technology Innovation, in Comparison with Policy Support.

This paper now turns to regional innovation issues, particularly on un-evenly distribution of innovation resources and innovation performances, which can provide important implications for policy studies.

(1) Regional Innovation in China: Input and Outcome

This paper will use R&D input data and patent data as major indicators for policy oriented innovation performance.

Patent system is one of effective way to protect technical inventions, and patent can be used not only as an indicator for innovation outcome, but also as a kind of resources for further innovation in production place. Apparently, patent data have weakness as only about 50% of patent can be adopted in real production (Guellec and Van Pottelsberghe,1999), on the other hand, not all manufacturing companies are willing to patent their new designs. Therefore, values of patent protection for innovation output can vary from industry to industry. However, patent data are still acceptable for most policy researchers regarding to innovation activities, especially when considering those inventions that can bring gains through upgrading productivity（Acs et al 2002)**.**

High tech export data are also taken into consideration in this paper, however, it should be noted that Foreign Direct Investment (FDI) firms play very important role in high tech sectors in China, almost dominating high tech export from China.

Figure 1 contrasts typical economic performance in each region in China with overall R&D input and government based science and technology financial input, in a relative terms (R&D ratio to local gross regional production, R&D / GRP; and local government S&T financial input to all input from local government). It is very clear that innovation input develops partially in parallel with economic performance, however, there are exceptions in several typical regions.

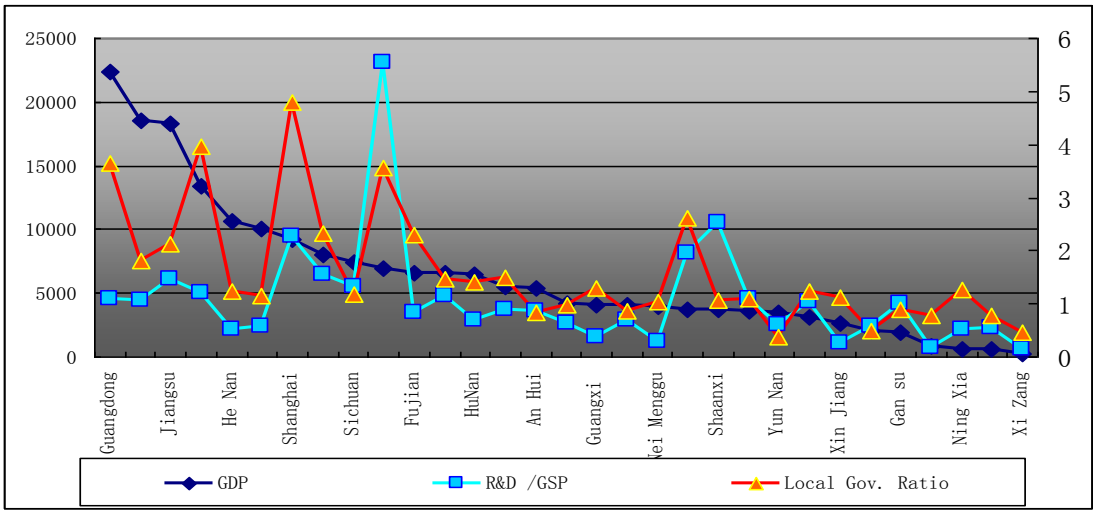


Figure 1. Comparison of Regional Economic Development and Innovation Input (2005)

Source: edited based on China Science & Technology Statistic Year Book, 2006

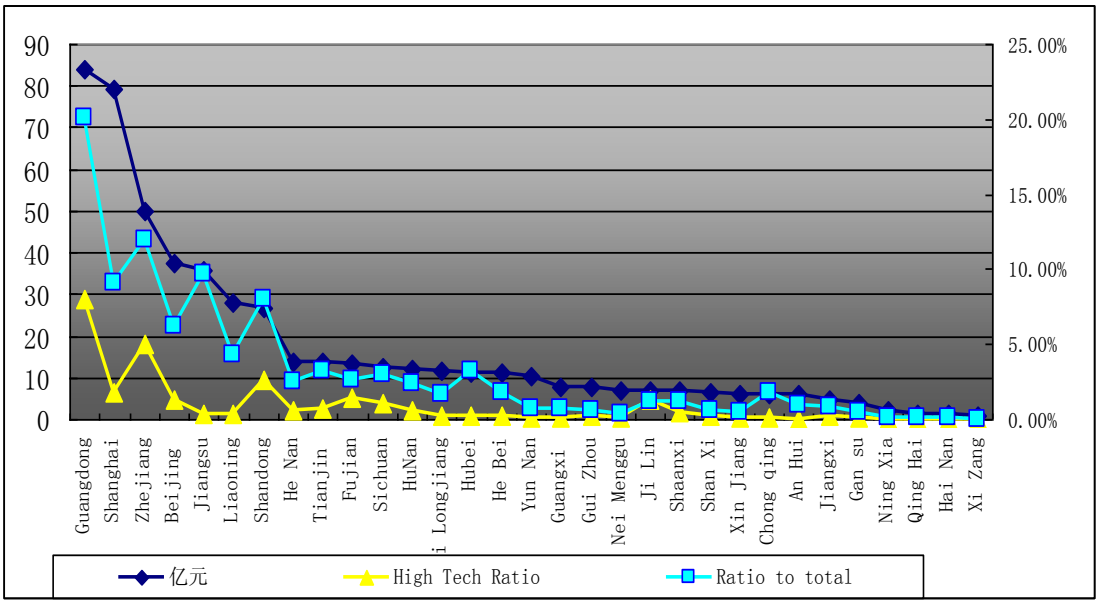


Figure 2. Comparison of Regional Innovation Input and High Tech Output

(patent share and high tech export share, 2005)

Source: edited based on China Science & Technology Statistic Year Book, 2006

Figure 2, on the other hand, indicates how effective local innovation input is correlated to economic performance in high tech sectors. All regions in China are ranked by R&D input value (0.1 billion RMB, 2005), with comparison of regional output in patent (patenting share to national total in 2005) and in high tech product export (share of export value to national total)

It can be summarized that innovation performance is independent in certain important regions, not in parallel with economic development, while the innovation output in terms of patenting records and high tech export shares follows similar pattern, as Figure 1 shown, with levels of innovation input in Chinese regions, however, the innovation output in different regions: namely patent share and high tech export share, provide the most closely correlated pattern, which may suggest that innovation in most regions in China are driven by market forces, primarily in foreign capital dominated high tech sectors.

(2) Regional Innovation in China: Innovation Performance through Multiple Indicator Analysis

In order to investigate through multiple characters, this paper also adopts Principle Component Analysis (PCA) methodology on following seven different indicators over 31 Chinese geographical regions. Two principle components are achieved, representing primarily on market driving forces (F1) and Policy driving forces (F2). Correlation parameters among the seven indicators and extracted principle components are listed below for further reference.

Table 1. ***Principle Components on Typical Innovation Indicators (2005)***

Items	Component	
	F1: Component I	F2: Component II
Local Government Techn Development Support Ratio	**.583**	**.559**
R&F / GRP	.126	**.943**
Invention Patent Ratio	-.383	**.687**
Ratio of Transaction Volume of Local Technology Market	.311	**.845**
High Tech Firm Ratio	**.942**	.137
High Tech Export Ratio	**.917**	.154
Patenting Ratio	**.932**	.220

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 3 iterations.

A two-dimensioned chart can be achieved based on values of each region along these two principle measures (refer to following Figure 3).

It can be clearly shown that some typical regions (in red) in China are mainly policy driven while others (in blue and green) are market driven, with Beijing and Guangdong as two representative in two extremes.

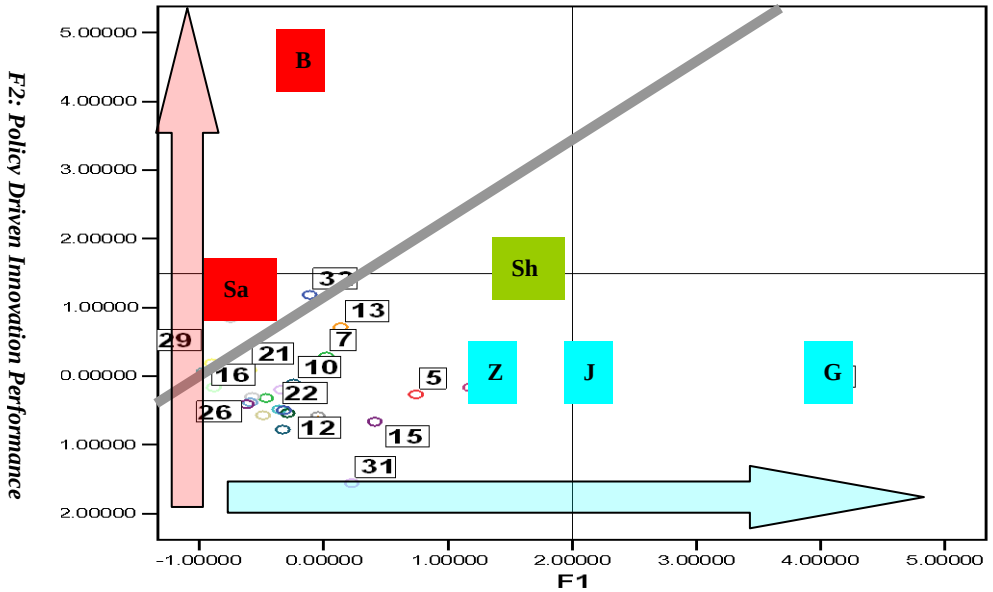


Figure 3. ***Principle Component Analysis, Regional Innovation Performance in China (2005)***

Notice: B: Beijing; Sh: Shanghai; G: Guangdong; J: Jiangsu; Z: Zhejiang; Sa: Shaanxi province.

II. Dispersion of Innovation Performances: China's Case.

Un-evenly distribution of innovation activities is a common rule in technology transferring and technology diffusion process, especially among different countries

and nations. It is usually considered that increased concentration of innovation is generated after industrial concentration, or clustering. Glaeser et. Al (1992) suggested that the increased concentration of a particular industrial sector within specific geographic region will facilitate knowledge spillovers across firms, thus to some extent create geographically bounded clustering and so called sub-national innovation can occur through geographically bounded networking.

Krugman（1994）states that the regional performance in economy and innovation does not always parallel with each other, rather it is less inequality in regional economy than in the regional innovative ability. Countries which cover larger geographic range and maintain higher level hierarchical clusters of industry production are more likely to show uneven distribution of innovative resources. Although there is close relation between regional economic development and innovation activities, inherent relative independent rule exist, which inject more research value to the study about how regional innovation activities differ with each other on the broader international level.

Empirical study on innovation based convergence test in this study include following parts:

***(1) . σ* Convergence:**

The convergence parameter indicates degree of over time dispersion on innovation indicators across different geographical regions. There are numbers of typical measures to examine the σ Convergence, such as Coefficient of Variation， Herfindhal-Hirshman（HHI），Theil Index (TEC)，Entropy Index (GEI) etc.. This paper use Coefficient of Variation (CV):

$$\sigma_{rt} = \frac{\sqrt{\sum_{i=1}^{n_r}\left(p_{it} - \bar{p}_{rt}\right)^2}}{\bar{p}_{rt}} \qquad (1)$$

Where r indicates sample geographical district（r =1,2,3）, namely, Eastern China, Mid

China, and Western China, i represents sample regions within certain country（i =1,2,… n_r ）, $\bar{p}_{rt}$ stands for sample country r ’s average number of patent application in duration t.

The empirical test on China’s case on σ Convergence over three geographical districts proves that CV in all three district as well as in national level increase over the investigation time duration window, which indicates that along with faster growth of local technology capability, un-evenness or dispersion level become more significant. Comparatively speaking, Western China district, although with the least innovation performance, is the strongest part in terms of dispersion of innovation activities, while Mid China district behaves as the most evenly distributed location on innovation performance.

On the other hand, CV level in different province is usually higher than level of dispersion on district level, intra-district dispersion is not the major explanatory factor for nation-wide dispersion, inter-district dispersion in fact has stronger impact.

(2) β convergence and Club Convergence hypothesis:

According to Barro，Sala-I-Martin (1992,2002) and Sala-I-Martin (1996) based on convergence hypothesis of neoclassic economic growth theory（Solow,1956；

Swan,1956）which indicates faster pace of regional economic growth if the region initiated with lower economic development level. This study applies regional patent data in China between 1996 and 2005, instead of GRP (Gross Regional Production) per capita, to related model to test the convergence level. By applying regional parameter X, estimation of β convergence can also prove if there is Club Convergence, meaning that within each of the three typical geographical districts in China, if there is a significant convergence among related regions in terms of innovation measurements. Following testing formula can be further applied to this purpose

$$\frac{\ln p_{i,T} - \ln p_{i,0}}{T} = \alpha + \beta \ln p_{i,0} + \phi X_{i,0} + \mu_i \qquad (2)$$

i represents sample region in China（i=1,2……31），T is end year (2005) of time window, while 0 indicates base year (1996), P_{iT} P_{i0} is patenting numbers in sample region i at end year and base year respectively. Club Convergence can be tested if β is less than 0, otherwise regions in a geographical district are rather diversified in terms of innovation performance.

Since β is achieved positive in this study, but not pass through test, the $\boldsymbol{\beta}$ convergence hypothesis cannot be supported. However, when a regional virtual variables is introduced, test on $\boldsymbol{\beta}$ is significant, which indicates that dispersion on innovation performance over the three geographical districts is much stronger than regional level dispersion.

(3) Gini coefficient

Gini Coefficient can also be applied to examine un-evenly distributed pattern over different

Geographical districts under according to certain innovation performances. The Gini Coefficient can reveal inter-district and intra-district differences, as well as levels of technology based convergence and related Club Convergence, usually with condition that intra-district Gini Coefficient decrease and inter-district Gini Coefficient increase.

Following formula applies when such conditions are satisfied:

$$G = G_I + G_N + R \qquad (3)$$

$$G_I = \sum_{r=1}^{K} w_r s_r G_r \qquad (4)$$

Where G represents patenting number in certain region within a district, which can be further classified into three parts: G_I for inter-district Gini Coefficient, G_N for inter-district Gini Coefficient among three major geographical districts, and R indicates cross effect between the two; K further represents total number of sample districts, w_r is share of region r to total numbers of regions in the country; and s_r is also share of r on patenting numbers to total level of the nation.

Gini Coefficient in this study reveals that nation-wide dispersion of innovation capacity in China comes mainly from inter-district dispersion movement on

innovation sources, with larger contribution level (more than 60% for continuously 10 years). However, there is a tendency after 2002 that inter-district dispersion gradually less influential on overall national dispersion, which may imply that economic and technical support on Western China district helps local regions to upgrade technology level through adoption of technical hardware as well as capabilities of learning by doing.

Compared with economic performance dispersion over different district and regions in China, the Gini Coefficient in innovation terms indicates that there is higher degree of dispersion in innovation performance than in economic performances, however, the degree of such difference is rather modest.

After all, regional convergence study indicates that China does not hold robust prove for convergence hypothesis that backward region develops continually faster than advanced region in terms of innovation performance.. Both innovation wealthy region and less innovative region in China have a tendency increasing gaps among regions as well among districts in innovation terms. Policy on appropriate transfer of technology and advanced technical knowledge is still keen in the near future. .

Table 2 Dispersion Degree (Gini Coefficient) on Regional Innovation Performance (Patent) in China between 1996-2005

Year	Nation-wide Disp. Innovat.. perform	Typical Districts			Intra-Dist. Gini Coef.	Inter-Dist. Gini Coef.	Contribution of Intra-Dist.Dispers	Contribution of Inter-Dist.Dispers	Contribution of Cross Intra / Inter Dist.
		Eastern China	Mid China	Western China					
1996	0.4734	0.3172	0.2198	0.4478	0.1100	0.3279	23.24%	69.26%	7.49%
1997	0.4870	0.3398	0.2056	0.4289	0.1136	0.3433	23.32%	70.51%	6.17%
1998	0.4916	0.3419	0.2067	0.4243	0.1137	0.3489	23.13%	70.96%	5.91%
1999	0.5105	0.3579	0.2016	0.4326	0.1180	0.3636	23.11%	71.23%	5.66%
2000	0.5222	0.3478	0.2008	0.4244	0.1164	0.3795	22.29%	72.67%	5.04%
2001	0.5469	0.3674	0.2042	0.4484	0.1228	0.3980	22.45%	72.78%	4.76%
2002	0.5621	0.3656	0.1996	0.4644	0.1235	0.4162	21.98%	74.05%	3.97%
2003	0.5699	0.3707	0.2233	0.4956	0.1273	0.4169	22.33%	73.16%	4.51%
2004	0.5853	0.3859	0.2574	0.4915	0.1319	0.4290	22.53%	73.31%	4.16%
2005	0.6138	0.4167	0.3020	0.4963	0.1428	0.4448	23.26%	72.47%	4.27%

Table 3. Reference: Dispersion Degree (Gini Coefficient) on Regional Economic Performance (GDP) in China between 1996-2005

Year	Nation-wide Disp. Econom. Perform	Typical Districts			Intra-Dist Gini Coef.	Inter-Dist Gini Coef.	Contributioof Intra-Dis.Dis	Contributioof Inter-Dispers	Contribution of Cross Intra / Inter Dist.
		Eastern China	Mid China	Western China					
1996	0.4140	0.3218	0.1920	0.4470	0.1090	0.2379	26.34%	57.47%	16.20%
1997	0.4103	0.3182	0.1944	0.3984	0.1038	0.2551	25.29%	62.18%	12.54%
1998	0.4129	0.3151	0.1989	0.3913	0.1031	0.2604	24.96%	63.08%	11.95%
1999	0.4152	0.3121	0.2034	0.3833	0.1024	0.2659	24.67%	64.06%	11.27%
2000	0.4208	0.3139	0.2089	0.3805	0.1029	0.2728	24.45%	64.83%	10.71%
2001	0.4194	0.3137	0.1833	0.3673	0.1012	0.2801	24.13%	66.78%	9.10%
2002	0.4211	0.3146	0.1766	0.3661	0.1011	0.2832	24.00%	67.25%	8.75%
2003	0.4248	0.3199	0.1716	0.3605	0.1017	0.2876	23.95%	67.71%	8.34%
2004	0.4257	0.3241	0.1746	0.3627	0.1029	0.2860	24.16%	67.19%	8.65%
2005	0.4317	0.3317	0.1839	0.3656	0.1053	0.2885	24.38%	66.81%	8.80%

III. Dispersion of Innovation Performance: Comparative Study among the US, Japan, and China

The empirical part of this study aims to reflect dispersion degree among regions in typical countries, through analysis of indices of innovation activities. By selecting internationally adaptable indicators in China, the US, and Japan in the recent years, the study is using effective means to compare the distribution pattern of innovation activities in regional level.

This paper selects 51 states in the US, 47 provincial regions in Japan, and 31 provincial and cities in China, 129 sample regions in total over the three countries, investigating seven typical innovation performance indicators, in contrast to common economic performance measures

(1) Comparison of Regional Innovation Activities among the Three Countries: Regional Dispersion Level Analysis.

This paper applies a Regional Dispersion Coefficient Index (RDCI = standard deviation / average value of specific innovation indicator) to measure degree of concentration of regional innovation activities, and further compare the RDCI with typical economic performance indicators among corresponding region and countries. As dispersion coefficient is adjusted by the average value of innovation indicator of the sample regions in specific country, it can, to great extent, explain regional uneven distribution pattern in specific country. It is commonly recognized that the larger the dispersion coefficient, the more significant degree of uneven characteristic of innovation activities in the region.

Typical innovation performance indicators are selected (refer to Table 4) through China's statistical yearbook as well as websites from the US and Japan, in contrast to typical economic indicator. As is widely accepted, Gross Regional Production (GRP)

is an aggregate measure of the value of goods and services produced in corresponding region, indicating measure local production capacity, and thus a level of wealth, while GRP per capita provides a measure of qualitative local market, as higher GSP per capita will provide higher local demand for highly elastic and higher value added market.

Table 4: Typical innovation indicators

Fist-class index	Second-class index	Description
Innovation Input	Total R&D expenditure	Absolute value, representing volume of innovation input
	R&D personnel	
	Government granted fund / R&D expenditure	Relative value, representing innovation density in terms R&D input
	R&D / GRP	
Innovation Output	Inventive patent granted	Indicators for regional innovation output
Innovative Environment	Number of local universities	Regional innovation environment in terms of potentiality of innovation resource

The value of RDCI for each of innovation indicators among China, the US, and Japan is presented in Figure 4. It can be shown that the US is holding the highest RDCI score on most innovative indicators, except on patent record on which Japan positions the highest dispersion. RDCI level for indicator in all three countries exceeds regional dispersion coefficient on GDP per capita, which proves Krugman's statement (1994) in particular. In China's case, dispersion in economic performance is significantly higher than that in other two countries, while dispersions in innovation are in the lowest place in most indicators among the three, which addresses the biggest difference from other two developed countries.

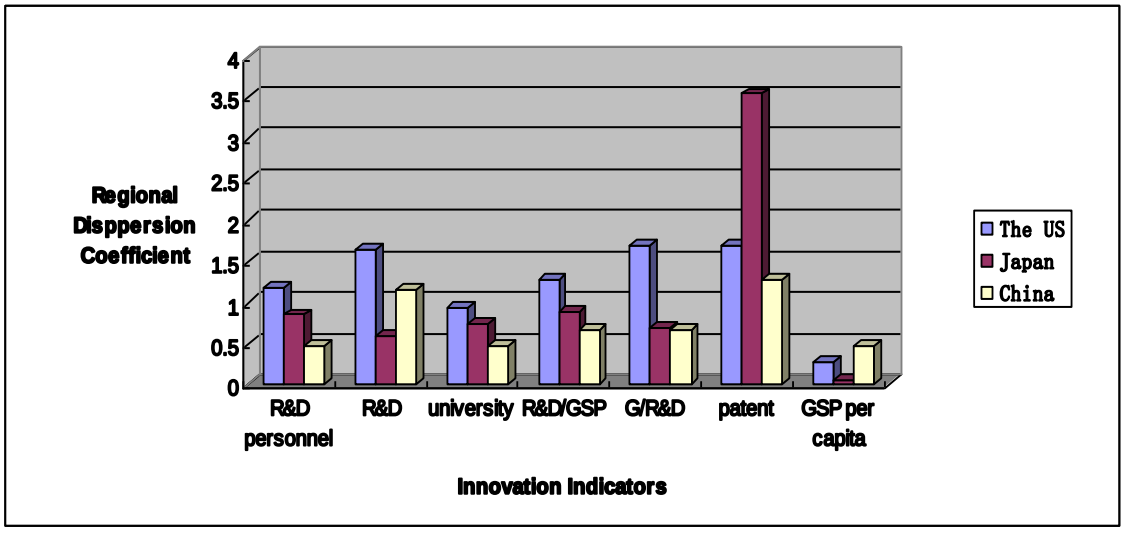


Table 4. Comparison of Dispersion Level on Typical Innovation Performance in Contrast to Dispersion of Economic Performance among the US, Japan, and China.

Source: edited based on data from China Science & Technology Statistic Year Book, 2006, China bureau of statistics, http://www.jpo.go.jp, http://www.census.gov

Based on theoretical findings from Glaeser et. al (1992) and Krugman (1994), facts reflected in this study that geographical dispersion of innovation performance is a more common case in developed nations, it could be further concluded that local policy support for geographically bounded innovation should be selective and should be well harmonized in terms of sector difference with other regions, and to some extent highly relate to local market and resource backed endowment factors, rather than one size policy for whole nation. On the other hand, regional economic performance in terms of typical income indicators such as GDP per capita, should be more evenly distributed, which may be benefit from more effective innovation output and cross region transfer of both tangibles and intangibles in a more economic way.

(2) Comparison of Regional Innovation Activities among the Three Countries: Market Driven vs. Policy Driven

This study also applies Principle Component Analysis (PCA) method to this three-country analysis in order to find difference in regional innovation activities among total 129 regions in three countries.

Through KMO and Bartlett Test (KMO value: 0.628 and significant probability of Bartlett is less than 1%), six innovation indicators are proved eligible for FCA process. All indicators are standardized for the analysis. Table 5 provides correlation between original indicators and the two principle components extracted, with 80% of accumulated variance contribution over total variation, which indicates that the two principle components containing enough information from original performance measures.

Table 5. Correlation between principle component and original indicators

	Principle Component	
Typical Innovation Indicators	***The 1st principle component Composite Innovation Indicator (F1)***	***The 2nd principle component Innovation Intensity (F2)***
Number of Universities	***0.886***	*-0.199*
Number of Patent	***0.817***	*-0.076*
R&D personnel	***0.789***	*-0.047*
Total R&D expenditure	***0.721***	*0.083*
Government / R&D	*-0.035*	***0.991***
R&D/GRP	*-0.062*	***0.986***

Based on these correlations, first principle component (F1) can be considered as geographical composite indicators of innovation in absolute value, including innovation environment (university numbers), innovation input (R&D expenditure, R&D personnel), and typical innovation output (numbers of invention patent granted), while the second principle component (F2) mainly refers to proportional measures on policy oriented nature and innovation intensity indicators, such as R&D/GRP、government granted fund to total R&D.

A two-dimensional chart (Figure 5) can also be produced based on these two principle components to reveal distribution of 129 regions in three countries regarding innovation performance.

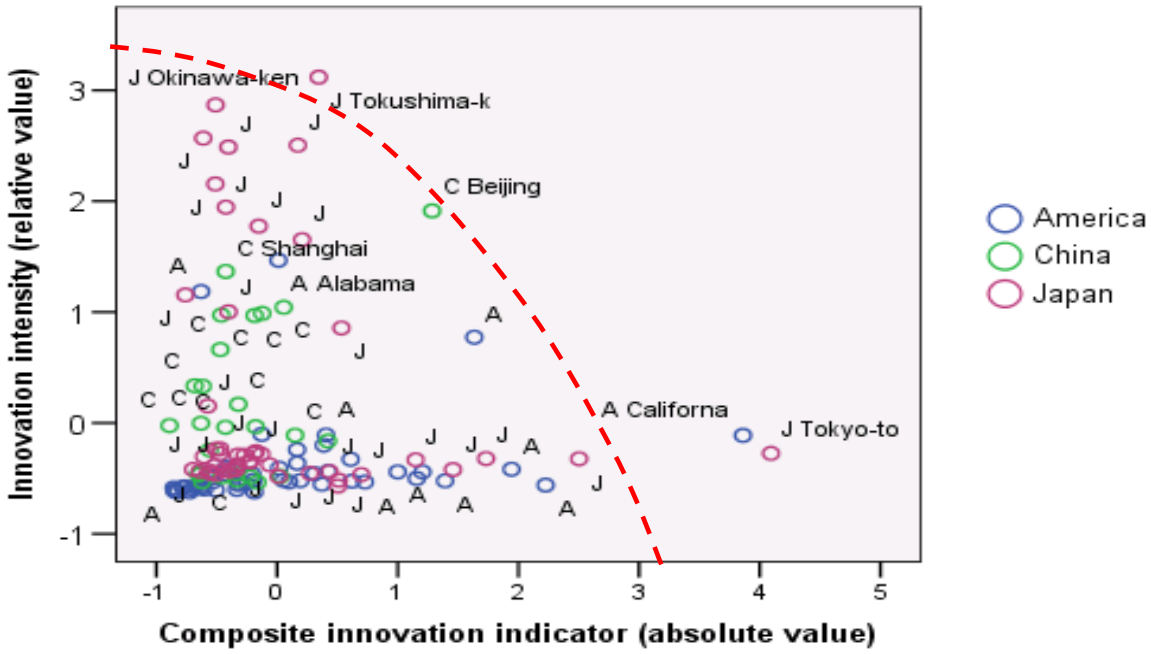


Figure 5: Regional dispersion coefficients for three countries (2003)

Source: edited based on data from China Science & Technology Statistic Year Book, 2006, China bureau of statistics, http://www.jpo.go.jp, http://www.census.gov

It can be seen from Figure 5 that the regions enjoy the highest scores are mostly market driven, and, regions in the US are mostly market driven type, while regions in China are primarily policy driven, and Japanese regions are somehow in between, however also can be clearly classified into two groups of market driven and policy driven.

Conclusion:

The paper concludes on following findings:

1. Innovation performance defined dispersion can be driven by policy as well as market forces, and higher dispersion might be a effective form of innovation resource development in a country if at the same time, economic dispersion over regions can be thus diminished. Therefore, innovation policy at regional and national level should clearly define ownership oriented and innovative region / country oriented functions, leaving appropriate space for active market force operating in local regions, no matter collaborative or competitive. This innovative region based policy framework with ownership innovation policy at national level as a complimentary instrument, can provide better and more effective platform for sustainable development of technology capability in the country concerned.
2. Since there is weak influence on innovation activities cross regions and cross district, regional bounded innovation is rather separate in China, and this may imply that innovation policy in regional level and nation level need to encourage cross region and cross district technology and knowledge transfer, especially cross district innovation networking or cross region innovation clusters.
3. Intra-district and inter-district dispersion on innovation performance (especially

through patent data investigation) in China tends to be high over time and thus nation-wide dispersion becomes wider, therefore, innovation convergence hypothesis in China’s case does not hold.

4. Overall increased dispersion level in China, both on innovation and economic performance is primarily contributed by increasingly larger gaps among the three districts. Based on the fact that both intra-district and inter-district dispersion increase over the time duration between 1996 and 2005, not converging to certain level over different geographical regions, it may indicates that such kind of un-evenly distributed pattern in China is an inefficiently and rather fluctuate, which is different from other two typical developed countries, the US and Japan, and regional as well as national innovation policy is therefore highly demanding for effectively developing innovation resources in connection with economic development.

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New Trends in the Innovation Policy of Japan

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New Trends in the Innovation Policy of Japan

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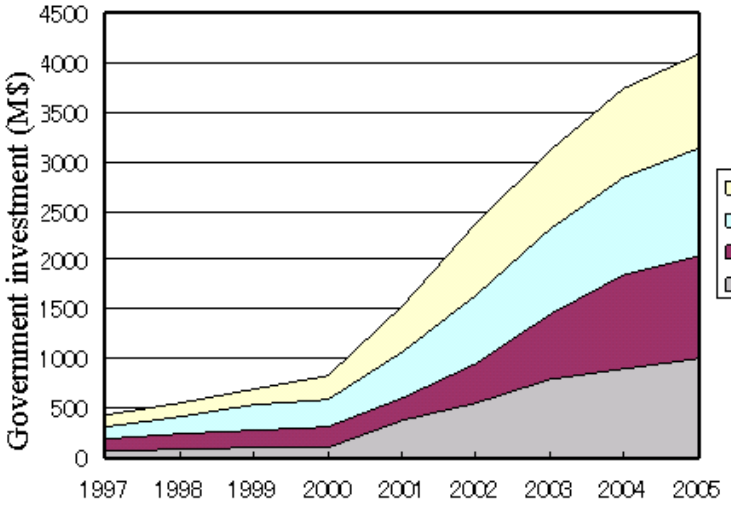
1. The era of "innovation"

The world is said to have entered the "era of R&D mega-competition" in the beginning of the 21st century. This means that it has been noticed that the science and technology policy of a government possesses a significant influence on the future of the country. According to the report submitted by the American Academy of Science, "Rising above the gathering storm", it is said "85% of measured growth in US income per capita was due to technological change".



Nano-Technology Expenditures of various governments

In 2004 when the 2nd period of Bush administration started, so called "Parmisano report" was announced by the Council on Competitiveness in the US with title "Innovate America". This is thought to nave triggered the world to enter the era of "innovation". EU and Asian countries soon followed the trend in US. According to my observation the reason why "innovation" was so quickly accepted by the world was because the word "innovation" has some extra meaning than just R&D. In case of innovation the difference is the tint of "changing the society" in addition to the technological change.

In order to remain competitive in the world in R&D budget, every country has started to feel it necessary to explain to the public and justify their policy. It seems to have become more important for the government to express the intention to "return the R&D outcome to the public".

Looking into "Rising above the gathering storm" report issued in the US it is understood that the high ratio of R&D investment of such countries as northern Europe, Korea and Japan relative to the GDP of each country, respectively, and high growth rate of BRICs countries are the major reasons which had led the US to plan "the national innovation initiatives".

2. Different background to affect Japanese policy on innovation

Therefore, in the innovation plans of various countries so far "competitiveness" has been the major background concept on which the whole plan is based. In case of Japan, however, there is another aspect, differing from the other countries. Namely, the key words "the youth" and "challenge". According to recent polls taken by institutions related with the youth, Japanese high and junior high school students do not have optimistic views for the future. The ratio of having dreams for the future is 89% in China, and 63-65% in US, Korea, and France. Japan is the only exception. Only 35% of students in Japan have hopes for the future. They also express their views that their parents do not have dreams either.

As far as the relative success in economy is concerned, in relation with the indications of industrial competitiveness, Japan has been remaining among the other successful OECD countries and hence there are no reasons that her young people should loose the dreams in the future. In every developed country, there was once a period when the youth lost dreams. In the US it was in the 1960s and 1970s just after the Vietnam War. I understand that such projects like NASA and the Peace Corps were planned in order to activate dreams among the youth in the US. I see the current situation in Japan overlapping with the period in the US 40 years ago. Simply, Japanese youth seem to be facing the situation that they cannot easily find something worth devoting their lives to.

3. New factors introduced in the innovation plan

In the recent plan authorized in June 2007 by the Japanese cabinet "innovation 25", it is stressed that Japan should contribute to solve the problems shared commonly by the human kind and hence they are difficult as well as important ones. The Japanese premier then, Mr. Shinzo Abe, called many countries to cooperate with each other for the final goal to reduce emission of global warming gas to half of the present level by the target year 2050, i.e., the plan "Cool earth 50", including the US, China, Russia, India as well as EU countries. The present premier Mr. Fukuda made clear his intention to succeed this standpoint in his speech when he visited the US shortly after his inauguration. This attitude of the Japanese government seems to be quite significant in the sense that it is backed by the "cabinet decision" and has been explicitly pushed forward as the plan of "cool earth 50".

My personal view is that this decision of Japanese government will be acquiring the support from the youth gradually in spite of the fact that the plan is creating some skepticism among industries.

4. Challenging topics

According to my personal views, examples of attractive research topics to the youth proposed in the "innovation 25" publicized by the cabinet July 2007, are as in the following,

- sustainable earth, preventing climate change, new energy technology, recycling technology, no gas emission car, high speed-no gas emission train;
- health: preventive medicine (life free from fear of disease), emerging infectious disease;
- frontier science: understanding the origin of life and universe;
- amenity towns and our lives harmonious with the nature;
- safe and sustainable transportation.

5. Roles of the government

Although a future need has a value from the aspects of the society, it is not necessarily the case for industry because it is not clear whether it pays in an economic sense. The major role to promote innovation for the future is achieved by the non-governmental organizations, private sectors, universities, etc. However, regarding technological research in relation to

environmental problems, a difficult problem is that the economic merit is invisible at least in the beginning unless economic incentives are provided intentionally by the government.

The incentives can be introduced in various ways through various channels. For example, it could be through a future prediction of some tax such as carbon tax. It could be a formation of a research group with a small fund for certain research topic. It could be a setting of a new type of regulations. The incentives may be introduced at differing stages in the process of “innovation”. But once a new measure is announced, it has the immediate effect to let research efforts initiated as far as the plan is firm.

The role of government is, therefore, to set visions and measures in order to “transform the societal values into economic values”. The role seems to be relatively important in the current innovation policy of Japan.

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Strategies for Platform-Leader Wannabes

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Strategies for Platform-Leader Wannabes

26 August 2007

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I. Introduction

In recent years, many high-technology industries, ranging from "smart" cell phones to video game consoles, have become platform battlegrounds. These markets require distinctive competitive strategies because the products are parts of systems that combine core components with complements usually made by a variety of firms. If a leader emerges and complementors work together, they can form an "ecosystem" of innovation that can greatly increase the value of their innovations as more users adopt the platform and its complements. The problem is that companies often fail to turn their products into industry platforms.

Our previous research focused on understanding the levers or strategic mechanisms that existing platform leaders use to maintain their positions (see About the Research). In this article, we focus on the special problems of firms that want to *become* platform leaders – we call them *platform-leader wannabes*. We have seen many hopeful companies fail because their platform strategy was too narrowly focused (either on technology, or on business). We argue that companies must be able to tackle both the technology and business sides of platform leadership otherwise their efforts are doomed to fail. The technological challenges come under what we previously labeled as Lever 2 – designing the right architecture, the right interfaces/connectors, and disclosing intellectual property selectively, in order to facilitate third-parties' provision of complements. The business challenges include what we discussed as parts of Levers 1, 3, and 4 – making key complements yourself or introducing incentives for third-party firms to create the complementary innovations necessary to build market momentum and defeat competing platforms.

Our strategic recommendations consist of two basic approaches (see Table 1). One strategy, which we call "coring," tackles the problem of how to create a new platform where one has not existed before. The second strategy, which we call "tipping," tackles the problem of how to win platform wars by building market momentum.[1]

2. The Platform vs. Product Strategy Choice

First, we need to clarify the difference between a *product* and an *industry platform*, and how this misunderstanding can lead to strategic mistakes. Put simply, a product is largely proprietary and under one firm's control, whereas an industry platform is a foundation technology or service that is essential for a broader interdependent ecosystem of firms. The platform requires complementary innovations to be useful, and vice-versa. An industry platform, therefore, is no longer under the full control of the originator, even though it may contain certain proprietary elements.

Managers sometimes underestimate the importance of deciding early on between pursuing a product or a platform strategy. This decision matters because the industry conditions and choices that favor a platform business differ from those that favor a product business -- leading to conflicting incentives between owners of industry platforms and firms that assemble proprietary products. In particular, owners of industry platforms benefit from lots of innovation in complementary products as well as from competition at the overall system level which would bring its price down. Just as

Microsoft benefits from the competition between products firms Dell and Hewlett-Packard, they, in contrast, benefit when customers perceive their products as unique, and therefore do not want cut-throat competition at the product or system level in which they compete. They would rather see Microsoft face tough competition on computer operating systems in order to be able to bargain better prices for the OS they will load on the PCs they sell. So platform firms and product firms generally want to see different industry configurations.

Table 1: Strategic Options for Platform-Leader Wannabes

	Technology	**Business**
Coring How to create a new platform where none existed before	▪ Solve an essential "system" problem ▪ Facilitate external firms' provision of add-ons, e.g., through provision of open IP on connectors ▪ Keep IP closed on the innards of your technology	▪ Create and preserve complementors' incentives to contribute and innovate, e.g., by subsidizing them and reducing their risks ▪ Protect your main source of revenue and profit
Tipping How to win platform wars by building market momentum	▪ Tip across markets: absorb and bundle technical features from an adjacent market	▪ Provide more incentives for complementors than your competitors ▪ Rally competitors to form a coalition

Failure to decide early between product or platform strategy can result in dangerous states of strategic confusion (such as in the case of Palm with the PDA, which we shall discuss later). Achieving platform status requires specific decisions that govern technology evolution, product and system design, and business relationships within the ecosystem – different decisions from when pursuing a product strategy. Another common mistake is that managers can simply overlook the platform potential of their products, such as in the well-known examples of Apple's Macintosh or Sony's Betamax video recorder – both excellent products that could have but failed to become industry platforms. Apple may be making the same mistake with the new iPhone by limiting its initial diffusion to only selected telecommunications providers.

But, while the benefits of becoming a platform seem clear, we do not believe that "every product can become a platform".[2] To have *platform potential*, and for the promoting firm to succeed in platform leadership, we found that a product (or a technology or service) must satisfy two pre-requisite conditions:

(1) It should perform at least one essential function within what can be described as a "system of use," or solve an essential technological problem for many actors in the industry.

(2) It should be easy to connect to or to build-upon to expand the system of use as well as to allow new, even unintended end-uses.

It is possible to test for these conditions. For the first, we can evaluate whether the overall system could function without the particular product or technology. If the system cannot operate, then the product does indeed perform an essential function. For example, the Windows operating system and the Intel microprocessor are both essential platform components of the original IBM and IBM-compatible personal computer. For the second condition, the challenge is to test whether a product or a technology is easy to connect to or to build-upon. A way to do this is to see whether external firms have indeed succeeded in developing complementary and interoperable products, or have at least started to do so. Without fulfilling these two conditions, the strategic game of platforms cannot begin. But they are far from sufficient to *win* the platform game.

3. Coring: How to Create a New Industry Platform

Coring is the set of activities a firm can use to identify or design an element (it can be a technology, a product or a service) and make this fundamental to a technological system as well as to a market. From a functional or technological point of view, an element or a component of a system is "core" when it resolves technical problems affecting a large proportion of other parts of the system (this simply reflects our previous pre-requisite Condition 1). Our research also suggests that coming up with platform-like technologies is easier than coming up with business strategies that encourage partners and customers to adopt a particular technology. We also noted that platforms open the overall system to new usage possibilities (this simply reflects our previous pre-requisite Condition 2).

These different uses are essential to the growth of the installed base, but one question arises: who will develop these new uses? The platform-leader wannabe may have some application skills and its engineers can certainly design a good platform solely by focusing on product architecture and interfaces. But a thriving ecosystem will rely on lots of externally-created innovation. So how can platform-leader wannabes successfully encourage other firms to join their ecosystem – and develop the essential complementary applications? That is one of the two essential business aspects of coring: It requires that the platform leader create economic incentives for ecosystem members to invest in creating complementary innovations, and to keep at it over time. Last but not least, platform-leader wannabes need to protect, just as any innovator firm should, their ability to profit financially from their innovations. The balancing act – protecting one's sources of profit while enabling complementors to make an adequate profit and protect their proprietary knowledge – is perhaps the greatest challenge to platform leadership. There is no simple framework on how to do this, but looking at successful and unsuccessful firms can provide ideas on what to do and what not to do.

a. Examples of Successful Coring

We know of many cases of coring or attempts at coring in practice. Google is a particularly well-known and clear example of successful coring in internet search technology and establishing the underlying business model for itself and complementors. Qualcomm in wireless technology has done very well in coring from a technology standpoint, though the business side of its ecosystem shows some signs of instability. In contrast, General Motors with its OnStar mobile communications technology and EMC with data storage software are failed attempts at coring, primarily from the business side. The digital home is an example of coring in process for a potentially enormous but still ill-defined platform market.

i. Google in Internet Search

Google, founded in 1998, started off as a simple search engine company and went on to establish its proprietary search technology as a foundation for navigating the Internet. Let's see whether Google satisfied the two conditions of platform potential: (1) performs at least one essential function within the system, (2) easy to connect to or to build-upon, in part to allow different end-uses.

First, since the Internet quickly became an un-chartered universe of information, Google brilliantly solved an essential technical problem – how to find anything in the maze of the Internet, with millions of web sites, documents, and other content online. Google's search function provided an essential function to use the Internet. Second, Google distributed its technology to web site developers and users as an embedded toolbar, making it easy to connect to and to develop upon. It also allowed different uses (such as combining search with different kinds of information or graphics) due to the inherently versatile nature of Internet search.

But where Google really won the platform leadership battle for Internet search was on the business side. Google solved a fundamental problem, which was that in the early years there was a lot of confusion in the industry about just how to make money on the Internet. Google found a way to link focused advertising to user searches. Ads appear only along with specific searches, so users should have some interest in the advertisers. Google's advertising fees also seem low or modest relative to their effectiveness and ultimately are based on what the advertisers choose to pay. In effect, Google revolutionized the advertising business by re-architecting the relationships between advertisers and Internet users. Today, Google's market value is $145 billion, eight times that of the largest advertising agencies such as WPP. Of course, Google had competition. In the mid-1990s, Digital Equipment created a powerful search engine tool for the Internet, AltaVista; several other firms created equally powerful search engines, such as Inktomi and Yahoo!. But these and other competitors did not offer targeted ads or prices based on bidding and effectiveness. We therefore contend that Google's competitors failed in the business aspect of market coring.

Google continues to extend and promote what has become the basic Internet usage platform. In June 2007, Google held its first developers' conference with 1000 programmers in attendance and another 5,000 at 10 other locations around the world. The agenda included presentations on Google's Application Programming Interfaces (APIs) to enable developers to embed Google applications such as search, maps, calendars on

websites, or to develop custom search engines. Google also presented APIs for the Web 2.0 social networking site YouTube, which it purchased in 2006. Google has increased the amount of free online software it provides, ranging from e-mail to word processing, and is expanding its ambitions. Google's goal today is to provide to millions of users advertising-supported online software, moving from being a complementary platform to Microsoft, to become a direct competitor. Google even has indicated that it will provide free wireless internet access in some locations.

ii. Qualcomm with Wireless Technology

Qualcomm provides an example of coring that, in terms of profitability, has been wildly successful in recent years. Founded in 1985, Qualcomm started out designing communications technology for satellites and military applications and went on to establish its proprietary wireless communications technology as a platform for the cellular phone industry.[3] However, the company also has been threatened by growing opposition among powerful third parties within its ecosystem.

One major issue is that, unlike Google, Qualcomm may not have permitted its partners and customers to make enough profit. But another issue is that wireless technology is evolving relatively fast. In any market where there is a rapid pace of technological change, we think it is much more difficult to establish and maintain a position of platform leadership because new competitors appear and customers can switch with each new technology generation. At the same time, in rapidly evolving markets, platform leader wannabes must make special efforts to create strong economic incentives for their partners and customers to continue using and investing in the common technology and applications to help the platform evolve. But let's see whether Qualcomm satisfied our two pre-requisite conditions for platform leadership potential. Then we shall return to how Qualcomm is faring on the business side of coring.

First, Qualcomm solved a basic technical problem of the late 1980s and early 1990s of incompatible and inefficient wireless cell phone technologies. This problem affected negatively other industry players such as telecom operators and handset manufacturers. Qualcomm invented the CDMA (Code Division Multiple Access) technology, which breaks phone calls into small bits and then reassembles them much like the Internet does with data packets. Key industry players such as AT&T (later Lucent) and Motorola soon considered CDMA as the most efficient technology for cell phones and licensed the technology. We conclude that Qualcomm met the first condition for platform potential.

Second, Qualcomm specifically invested in chipset designs embedding its technology to facilitate third-parties' adoption, and made CDMA widely available for licensing. The chipsets were compact integrated circuits which had physical connectors that made it easy to plug them inside cell phone handsets – and Qualcomm licensing of its intellectual property made it easy for operators to use CDMA protocols. This strategy enabled dozens of companies to include Qualcomm technology in most "2G" (second-generation) and many 3G cell phones as well as in hundreds of other wireless devices. Qualcomm therefore passed the second pre-requisite condition for platform potential.

On the business side, Qualcomm has a more checkered performance. In its business model, an important source of revenue is from licensing its intellectual property. Qualcomm therefore filed thousands of patents and challenged regularly and aggressively, in court, any potential violators. Third parties may not have appreciated this litigious approach. But, since Qualcomm owned approximately 80 percent of the patents for CDMA and CDMA2000 technology, for many years, customers had little choice. Also, Qualcomm lessened some of the conflicts with third parties in the late 1990s, such as by selling its cell phone handset business, which had competed with its own handset-maker customers such as Nokia, Ericsson, and Motorola.

In fiscal 2006, Qualcomm reported an astounding net income of $2.5 billion on sales of $7.5 billion, selling both chipsets as well as licensing its patents. However, as the technology and market continues to evolve, we can see Qualcomm's position weakening. European companies led by Nokia as well as companies sponsored by the Chinese government have been developing or exploring alternatives to Qualcomm patents to avoid paying high license fees. In 2007, Qualcomm only owned 20 percent of the patents for the newer WCDMA standard, popular in Europe. Nokia also has gone to court to challenge Qualcomm's high licensing fees. Qualcomm might have avoided this situation in the cell phone market by investing more of its profits in R&D for the next-generation technology as well as making more aggressive efforts to work with, not against, customers such as Nokia. Qualcomm is also trying to diversify. It is attempting the same coring strategy for mobile broadband connectivity on laptops, with 70 models embedding Qualcomm chipsets as of May 2007.[4]

We think that the fast pace of technological evolution in the cell phone industry and degree of opposition within the ecosystem will make it difficult for Qualcomm to maintain its position and profit margins. Still, it may well be able to establish a strong business in wireless technology for other mobile devices. But Qualcomm probably needs to change its philosophy and pay much more attention to the business side of coring. It could make its technology cheaper to license. It could also work more cooperatively with partners and customers to prepare better for generation changes in the technology and to encourage the development of complementary innovations.

b. Examples of Failed Coring

i. GM OnStar in Automotive Telematics

In 1995, General Motors started an effort towards launching a new industry platform, OnStar, with the goal to give wireless capabilities to the automobile for navigation systems, directions, notification of accidents, remote diagnostics, maintenance reminders, internet connectivity, remote opening of locked vehicles, and other services. GM established OnStar as a wholly owned subsidiary in collaboration with its EDS and Hughes Electronics divisions. The technology platform consists of hardware, software, and service agreements with a wireless provider.

Initially, GM managed to get various automakers (Toyota/Lexus, Honda, Audi/Volkswagen, and Subaru) to adopt the OnStar platform. Gradually, however, other automakers concluded that these capabilities and, in particular, the information on the

customer that OnStar generated about driving habits, was too valuable to let a competing company control. Consequently, these firms decided to build or buy competing systems and stopped licensing OnStar.

In our analysis, GM had not found a way to position its new technology as an essential part of a neutral industry platform. It might have spun off OnStar as an independent company. Or GM might have done what Intel is famous for: creating the equivalent of a "Chinese wall" around its architecture labs, the core microprocessor business, and various chipset businesses that compete with Intel customers. We think GM failed at the business aspect of coring, though OnStar remains an attractive service platform for GM customers and, with internal transfer payments, generates a profit for the automaker.[5]

ii. EMC in data storage

EMC, a market leader in data storage technology founded in 1979, launched a strategy in the early 2000s that aimed to establish its hardware and software technology, known as Wide Sky, as a new industry-wide platform. Wide Sky was a middleware software layer that made it possible to integrate and manage third-party hardware. By doing so, it solved an important technical industry problem that affected all IT customers: the efficient management of a growing assortment of heterogeneous information systems, which store more and more mission-critical data. Like GM, we can say that EMC succeeded in the technological aspect of coring, but failed at the business side.

EMC was unable to convince its competitors – principally IBM, Hewlett-Packard, Hitachi, and Sun Microsystems – to adopt Wide Sky. Non-EMC customers were also reluctant to adopt a proprietary standard. Perhaps EMC should simply have given away its technology for free or spun it off into an independent, neutral entity, making every effort possible to get the input and cooperation of key industry players. If a common platform for data storage benefited the storage market, EMC could have benefited more than competitors because it had the largest market share. In any case, EMC's competitors decided to establish their own open-standards platform controlled by a newly formed organization, the SNIA (Storage Networking Industry Association). The number of firms and users supporting this open technology eventually forced EMC to abandon its platform-leadership effort and adopt the SNIA standards.[6]

Adoption of the consortium's SMI (Storage Management Initiative) specification (SMI-S) is on the rise since it has received the formal backing of most of the storage industry firms. However, this standard has not yet fulfilled the promise of enabling centralized management of heterogeneous systems. This coalition of firms has therefore succeeded at the business aspect of coring, but failed at reaching a technical solution that effectively solves the industry's main technological problem. The functionality provided by this industry coalition still lags the functionality that EMC could have provided. This situation still leaves the possibility for EMC to reassert itself as a potential platform leader, but it would probably have to work through the consortium and make more of its technology open and perhaps even free or nearly free.

c. An Example of Coring in Process

i. The Digital Home (Intel, Microsoft, and others)

The digital home represents a market where many technology vendors are ready to proceed but there are few customers and related technology and business sides have not yet come together to define a coherent platform and ecosystem. The goal since the mid-1990s for the digital home has been to connect entertainment devices (e.g., television, stereos and music players) and appliances (e.g. heating or air conditioning systems, refrigerators) with a home computer network. To further this vision, several companies in 1999 formed a group called the Internet Home Alliance, bringing together Sears, Panasonic (Matsushita), General Motors, Intel, and Cisco to deal with the various challenges, such as wiring homes with high-bandwidth Internet service or making wireless functionality available.[7]

While at least some consumers should want their digital systems to communicate with each other and with a PC, demand for such a platform has progressed extremely slowly. We think this is a coring problem because no company has managed to insert the necessary technologies into all the relevant products or to create the business incentives to motivate industry players to converge on a common technology. The two firms that ultimately took control of the PC platform are once more vying for platform leadership in the digital home market, though it is not clear that either will succeed without lots of help.

On the software side, Microsoft, in 2002, launched its Windows Media Center software, which enables Windows to perform some of the necessary digital home functions. Microsoft continues to evolve the Windows software, though usage of the Media Center software is minuscule. Slow adoption on the Windows side has allowed Apple, Hewlett Packard, Sony, and other firms to enter this market segment with their own software and hardware combinations. On the hardware side, Intel, in 2003, launched a new digital home business division and began marketing a bundle of microprocessors intended to be the core chips in new home PCs and perhaps other devices. As it did with the personal computer, Intel put in place a series of initiatives to encourage the adoption of its microprocessors and networking standards among customers, partners, and software developers interested in home applications. Also in 2003, Intel co-founded the Digital Living Network Alliance to promote interoperable common standards for audio and video within a home network. This group, whose board of directors now consists of representatives from Intel as well as Microsoft, Sony, Phillips, Hewlett Packard, Matsushita-Panasonic, and Nokia, has grown to over 130 members.

Our assessment is that this market will require many years for a platform and a leader to emerge. On the technology side, there are too many diverse products involved, and connectivity adds cost. Moreover, the communications protocols and wireless technologies keep evolving and there is no common standard followed by appliance producers around the world. Business-wise, the major challenges include how to justify the additional cost of adding technology and features that few users demand. There are also issues such as digital rights management for audio and video content. Another challenge is the different product replacement cycles: Customers buy new computer hardware and software or multimedia content much more frequently than they replace

their heating and air conditioning systems or buy new durable goods like refrigerators and television sets, which can last a couple of decades.

So, although Microsoft, Intel, Apple, Sony, and many other firms already produce the key components necessary to create a digital home platform, the business drivers are not there and the digital home remains more an idea than a market. This diverse market may require a different type of platform leader and a different approach to coring. For example, the digital home might require coordination through a governmental or industry organization that can identify the relevant technical standards and technologies, encourage the development of interoperable as well as complementary products and services, and use this consensus to promote both the technology and the business sides of the platform. In fact, we can already see signs of this happening. A large non-profit industry coalition for home builders, the Continental Automated Buildings Association, has taken over the Internet Home Alliance and continues working on the long-term platform goals. Key directors of this organization include executives not only from builders such as Tridel and Leviton but also from technology companies such as Bell Canada, Honeywell, Hewlett Packard, Microsoft, AT&T, Invensys, Cisco, Siemens, Panasonic, Whirlpool, and Trane.[8]

4. Tipping: How to Win Platform Battles by Building Market Momentum

We call "tipping" the set of activities or strategic moves that wannabes can use to shape platform market dynamics and win a platform war when at least two platform candidates compete. These moves cover sales, marketing, product development, and coalition building. As with coring, successful tipping requires actions taken from both the technology and the business sides of the platform. First, though, we need to show how some key ideas discussed by other authors in another context can apply to tipping. We also have two specific suggestions for successful strategies, namely *tipping across markets* and *building coalitions*, as well as comments on some potential mistakes managers can make.

First, we need to recognize that many platform battles involve competition among technical standards and incompatible technologies (e.g. VHS vs. Beta, Windows vs. Macintosh, CDMA vs. GSM, or Toshiba's HD-DVD vs. Sony's Blu-ray standard for high-definition media storage). In these cases, as other authors have discussed, companies should try to gain control over an installed base, broadly license their intellectual property, and do other things to facilitate partner investments in complementary innovation.[9] They should also invest in building brand equity as well as manufacturing, distribution, or service capabilities to signal support of the platform. For example, Matsushita publicized its large investment in mass production facilities as an argument to convince developers of videotapes to adopt the VHS standard, which had been developed at its much smaller Japan Victor (JVC) subsidiary. Intel, when trying to convince motherboard makers to adopt their new interface for connecting peripheral devices (PCI), committed to develop it themselves in large numbers. All these approaches are helpful to master the business side of tipping.

Second, we need to recognize that pricing is another useful strategic weapon in platform battles, but it is more complex to use than in simpler product markets. We do find helpful the idea that platforms can be understood as "double-sided" markets, and that it may be necessary for platform leaders and wannabes to subsidize one side of the market (for example, software application developers) in order to bring on the other, paying, side (for example, software end users).[10] But we do not see any clear frameworks that tell mangers how much to subsidize one side of the market over the other. Moreover, the price that maximizes profits for a standalone "hit" product may not encourage a global ecosystem of complementors or make much difference if new and better platform generations appear. For example, Qualcomm clearly emerged as the leader in 2G wireless technology, but its high royalty and licensing fees have encouraged powerful non-U.S. complementors (like Nokia) and governments (like China) to seek alternatives.

At the opposite extreme, trying to stimulate demand through low or zero pricing for all or part of a platform system can destroy the business model for complementors. As we wrote in Platform Leadership, Intel made this mistake when it tried to enter the PC video-conferencing market with a line of products that competed with higher end systems made by PictureTel and other companies. Customers suddenly stopped paying for expensive video conference equipment and services, forcing these companies out of existence and probably delaying the adoption of the PC as a device for video communications. Software product companies that have to compete with free open source products of comparable functionality have faced a similar problem: Low- or zero-priced products can destroy the incentives to innovate for companies in those markets, although, in software, some firms have survived by selling services and advertising.

But there is another way to do tipping that we found quite powerful: we call this tipping *across* markets. This is when wannabes *cross over* the boundary of their existing market to absorb technical features from an adjacent market and *bundle* them to extend their platform. Such bundling across markets involves both technology (as it changes the design of a product) and business (as it involved pricing of the combined product). Tipping across markets seems particularly important in the context of technological convergence, which is pervasive among computers, telecommunications equipment, and digital appliances. Firms who tip across markets by bundling new features can leverage existing market power, technology, or reputations to help them move into adjacent markets.

Another novel tipping behavior we have observed is when competitors or users band together in a coalition, as a defense mechanism, to fight entry by a platform leader wannabe. This can be seen not only in the EMC storage example but also in cellular telephony with Nokia ganging up with competitors to back up the Symbian operating system to build a viable alternative to Microsoft's mobile operating system. Japanese, European, and Chinese telecommunications equipment producers and service providers have also worked together to oppose Qualcomm's monopoly in CDMA technology. As we later discuss, Linux users and service providers have worked together to limit the positions of Unix as well as Windows in the server operating system market.

Our research also suggests that companies can encounter specific obstacles and make common mistakes when attempting to help a market tip. Of course, established platform

leaders with monopoly power in one market, such as Microsoft, Intel, Cisco, and Qualcomm, must take care not to violate anti-trust laws. In addition, however, problems sometimes occur because tipping strategies dependent on narrow technical standards are effective only as long as platform boundaries remain relatively fixed and predictable. This is because companies that dominate in one market may fail to maintain their positions when converging technologies create opportunities to extend other platforms. For example, Palm once dominated the hand-held computer market with its PDA product but this is now giving way to smart phones. Another problem can occur when opening a platform's inner workings too much to encourage the supply of complementary innovations. Too much openness can expose the firm to imitation. IBM made this mistake when it asked Microsoft and Intel to provide key components of its PC platform and did not contractually retain rights to the operating system or the microprocessor design.

We think that Linux (for web server operating systems but not for the desktop) and Internet Explorer (for web browsers) are particularly good examples of different but successful tipping strategies. Netscape (with its browser) and Palm (with its PDA) are well-known cases of failure. There are several emerging markets where tipping has yet to occur, though video game consoles is useful to demonstrate the variety possible in tipping strategies and the difficulty of declaring a winner in large markets that can sustain differentiated or niche products.

a. Examples of Successful Market Tipping

i. Web operating systems (Linux vs. Unix and Windows)

Linux provides an excellent example of tipping through the power of a large, and still growing, coalition of service provider firms as well as users. This operating system was introduced first in 1991 by the Finnish graduate student Linux Torvalds, based largely on the Unix design, and evolved through a formal and informal community of open source programmers and users around the world. The interface and installation requirements continue to limit its popularity among average consumers, resulting in an ongoing shortage of everyday desktop applications, compared to Microsoft Windows, the dominant software platform for the PC. Nonetheless, Linux has managed to become the fastest growing operating system used in the back-office, particularly for web servers.

From about 20 percent of the installed base for server software in 2005, Linux grew to about 50 percent of the market by 2006 (compared to only about 3 percent of the desktop operating system market).[11] In contrast, Unix (whose main distributor is Sun Microsystems) remains expensive and requires more costly proprietary hardware. Windows server from Microsoft is still cheaper than Unix but is more expensive than a nominally free product. Intel also adapted its microprocessors to run Linux and this reduced hardware costs. Even Microsoft in 2007 signed an agreement with Novell to make sure that Windows interoperates with Linux in the future.

Several factors contributed to the success of Linux for back-office applications – suggesting that price alone does guarantee a market will tip.[12] Linux offered not only a seemingly low cost of ownership (the price is nominally zero, though service and training

can be expensive) but also very high quality at least for skilled IT professionals. By itself, an operating system is of very limited utility. But the open source community made sure that Linux worked exceptionally well with what we can consider the "killer" application for web masters -- the free and open source Apache web server. Still, we believe that Linux would not have become widely accepted as an enterprise software platform without the decision of numerous powerful companies, led by IBM and Hewlett Packard, to provide support services for Linux as well as to bundle it with their popular hardware servers and other software products. The legitimacy that IBM in particular gave to Linux helped startups such as Red Hat survive as service providers for Linux users, and made it more comfortable for major enterprise application vendors such as SAP and Oracle to make their products work with Linux.

ii. Internet Browsers (Internet Explorer vs. Netscape Navigator)

We have already mentioned the case of Internet browsers but here we would like to highlight Microsoft's tipping strategy. As discussed elsewhere,[13] Netscape introduced the first mass-market browser in 1994 and dominated the market for several years. Microsoft designed its own browser, Internet Explorer, and bundled this "for free" with Windows from 1995. As hundreds of millions of new PCs shipped with Internet Explorer over the next several years, and as Microsoft steadily improved its browser technology, Netscape's browser dropped from around an 80 percent market share to a negligible presence. In this case, we also have the problem of whether the browser is a separate product from the operating system and how a company with a monopoly in one market has to treat the second product. By bundling a product for free that competitors offered for sale (and sometimes for free as well), Microsoft violated antitrust law because it had such a dominant share in operating systems. What is worse is that Microsoft pressured PC manufacturers and service providers not to bundle Navigator.

Apart from the antitrust story, however, we can still learn from Microsoft's strategy. One dominant platform can be a powerful distribution mechanism for a company that wants to enter other platform markets — if there are ways to bundle the technologies or do other things, such as use the same distribution channels or create unique complementarities across the different products. Windows would have served these functions for Internet Explorer even if Microsoft had avoided antitrust problems such as by offering Windows with and without the browser at different prices and not pressured PC manufacturers to avoid the competing product. We are especially confident in this judgment because Microsoft had much greater resources to continue investing in browser R&D and Netscape management made a series of strategic and technical errors, as we discuss next.

b. Examples of Failed Market Tipping

i. Netscape

How might Netscape have maintained its early lead and prevented the market from tipping toward Microsoft? For one thing, Netscape managers misunderstood how to keep a market from tipping in a different direction. Once a comparable product is free, competitors have little choice but to reduce their prices to a similar level and find other

ways to make money, such as through services or advertising. Netscape made the mistake of continuing to charge customers such as Dell and AOL as well as corporate users for the Navigator browser even after Microsoft began bundling a competitive browser for free. Netscape was also late to see that it could generate enormous advertising revenues from its highly popular website.

But perhaps Netscape's greatest mistake was to challenge Microsoft too directly and present the browser as an alternative computing platform before it had enough of a user base and ecosystem of complementors (web site designers, web application developers, and Internet service providers as well as PC assemblers who were licensing Navigator) to sustain its position.[14] Navigator initially was a wonderful complementary application to Windows and might have remained so, at least for several more years. Netscape had million users by 1995-1996, but there were hundreds of millions of PC users out there who had yet to move to the Internet. We do not think it unreasonable that Netscape managers should have thought more carefully about the potential size of the market and how their early lead could quickly erode with a competitor such as Microsoft, which shipped hundreds of millions of copies of Windows each year.

ii. Palm with Handheld Computers

Palm involves a case of failure due to its strategic ambiguity – whether to be a product company or a platform company. After a resounding success in 1996-1999 as the pioneer of personal digital assistants (PDAs) with the Palm Pilot, Palm tried to do two things at once: establish its Palm device as the preeminent PDA product while promoting the Palm OS as an industry platform that it could license to PDA competitors. Platform leaders generally have difficulty encouraging complementors if they do not establish a position of neutrality.

Palm also has suffered from convergence – the PDA market is quickly being absorbed by the "smart phone" market. Palm did end up splitting its operations into two companies in 2003, creating palmOne for the PDA devices and PalmSource for the OS, but this was too late for the market. PalmSource became increasingly dependent on palmOne as its main customer. In 2005 it was sold to a Japanese-based software company, Access, and gave up the Palm name. Today there is less confusion between Palm as product and Palm as platform, but other platform technologies have much more market share in this space. Access continues to market the Palm OS with limited success.

c. An Example of Tipping in Progress

i. Videogames (Sony, Nintendo, Microsoft)

The videogame console market reflects the different kinds of tipping strategies possible for platform leader wannabes and the difficulty of choosing a winner where such degrees of differentiation in strategies and products is possible. The ecosystem generated $12.5 billion in sales in 2006, including games and consoles.[15] We have intense competition among three platforms. Every five or six years, new generations of consoles appear with different features or qualities, triggering a new series of investments and competition. Although some games run on all the different consoles as well as personal

computers, the game consoles represent very distinct platforms and different platform strategies.

Microsoft, the newest player in consoles, has approached games much as it has the PC market. It has tried to rally the largest possible number of developers. It has developed a highly modular software architecture based on Windows and has eagerly disseminated Windows-like programming tools to facilitate game development. [16] Microsoft is also strong in online gaming and has designed its X-box console to work seamlessly with PCs. So far, however, Microsoft loses money on each console and hopes eventually to make a profit on software.

Nintendo, the loser in the last round of console wars, is selling the cheapest product while developing in-house or through a tightly controlled network of developers a smaller number of games but potentially bigger hits. Its consoles share a lot of technology with previous generations, making new games cheaper to develop. In this last round, Nintendo also surprised the industry with a clever innovation combining hardware and software that changes the player's experience: a wireless remote control for its new Wii console. This new technology allows for a more intuitive gaming and has attracted new users interested in exercising and sports such as golf and boxing. As of mid-2007, the Wii was outselling competitors by a large margin.[17] This suggests that this is not an easy platform market to dominate. The loser in one round can win the next with the right features and complementary innovations.

Sony, which won the last round with a 70% market share for PlayStation 2, has focused on the high end and "hard core" players. Its latest console, PlayStation 3 (PS3), is the most expensive. One problem, though, is that Sony seems tied to its historical roots as a great product company with little understanding of how to turn products into industry platforms (we have in mind Sony products such as the Betamx VCR, the Walkman, and, more recently, its Blu-ray DVD players). Not surprisingly, Sony has been slow to market with its latest console (because it adopts so many state-of-the-art technologies) and slow to help game developers (though it has tried to change recently).[18]

Some platform markets are sufficiently competitive while also having enough room for differentiation and niche strategies that a winner may never emerge. Videogame consoles may fit this case. None of the competitors seems vastly superior and each has strengths. However, if PC manufacturers add more specialized capabilities for gaming, then we expect Microsoft to have an advantage. It may be able to tip across platforms by modifying Windows, appealing to the enormous network of Windows programmers, and using its software tools expertise to encourage more game developers to support Windows and X-box.

5. Final Thoughts

One issue that has surfaced in our discussions with managers is whether small or medium-sized firms can truly become platform leaders, or do you have to be a large firm like Microsoft or Cisco? We believe that coring is an option possible for small and large firms alike because technology and architectural leadership do not directly depend on the size of the firm. Qualcomm, for example, was little more than a startup company when it

introduced its technology for wireless devices. Japan Victor and even Microsoft and Intel were small firms when they first became platform leaders. And Linux was the product, at least initially, of a lone graduate student working in a remote corner of Europe. At the same time, though, smaller firms are likely to have a harder time tipping markets on their own and generally will need to establish ecosystem partnerships or coalitions of providers and users – as JVC, Microsoft, Intel, and Linux have done.

In general, success as a platform leader wannabe requires a compelling vision of the future as well as the ability to create a vibrant ecosystem by evangelizing a business model that works for the leader and potential partners. It can sometimes be hard to convince others to follow a particular vision of the future, for example, when an industry is undergoing transition and its contours are ill-defined, or when technology is evolving too rapidly. But these are the very conditions when platform leaders can stand out – precisely because they are so badly needed.

About the Research

Over the past decade, we have investigated dozens of companies that have attempted to formulate and implement platform strategies. These firms operated in a variety of industries, including computing, telecommunications, electronic appliances, semiconductors, enterprise software, data storage, automobiles, web portals, and electronic payment systems. The major firms we have studied include Intel, Microsoft, Cisco, Palm, NTT DoCoMo and NTT Data. We have also worked closely or exchanged ideas with firms such ranging from SAP and Nokia to eBay, Boeing, and Siemens Automation. In our research, we have interviewed hundreds of managers and engineers, and complemented the interviews with analysis of firms' archival records and company and industry data. The first stage of our study aimed at uncovering the drivers of success at established platform leaders. The results of that work were published in SMR (2002) as well as in our book Platform Leadership (HBS Press, 2002).

The focus of our previous work was on how Intel, Microsoft, Cisco and other firms had been able to drive industry innovation and sustain positions of platform leadership. We identified four "levers" or mechanisms through which successful platform leaders were able to "architect" or influence external innovation. The first lever was ***firm scope:*** the choice of what activities to perform in-house vs. what to leave to other firms. This decision is about whether the platform leader should make at least some of its own complements in-house. The second lever was ***technology design and intellectual property:*** what functionality or features to include in the platform, whether the platform should be modular, and to what degree the platform interfaces should be open to outside complementors and at what price. The third lever covered ***external relationships with complementors:*** the process by which the platform leader manages complementors and encourages them to contribute to a vibrant ecosystem. The fourth lever was ***internal organization:*** how and to what extent platform leaders should use their organizational structure and internal processes to give assurances to external complementors that they are genuinely working for the overall good of the ecosystem. This last lever often requires the platform leader to create a neutral group inside the company, with no direct profit-and-loss responsibility, as well as a Chinese Wall between the platform developers and other groups that are potentially competing with their own complementary products or services. Taken together, the Four Levers offer a template for sustaining a position of platform leadership.

This article presents findings from the second stage of our research. We are now focusing on drivers of success at firms that wish to become platform leaders in new or established markets.

Endnotes

[1] Since we published our work on platform leadership in 2002, a number of students at MIT and elsewhere have inspired us to continue this research and, in particular, to go beyond the 4 levers and investigate market or business factors that help platform-leader wannabes succeed. In particular, we would like to thank Ray Fung for his 2006 master's thesis, "Networking Vendor Strategy and Competition and Their Impact on Enterprise Network Design and Implementation" (MIT System Design and Management Program) and Makoto Ishii for his 2006 master's thesis, "A Strategic Method to Establish Sustainable Platform Businesses for Next-Generation Home-Network Environments" (MIT Sloan Fellows Program).
[2] We thus disagree with J. Sviokla, and A. Paoni, "Every Product's a Platform," Harvard Business Review, October 2005.
[3] This discussion of Qualcomm is based primarily on D. Yoffie, P. Yin, and L.Kind, "Qualcomm, Inc. 2004," Harvard Business School Case #N1-705-401 (January 25, 2005). See also "Qualcomm Business Model: A Formula for Innovation and Choice", http://www.qualcomm.com/about/pdf/QCOM_Business_Model_0307.pdf
[4] Source: Qualcomm Annual Report 2006
[5] This description of OnStar benefited from public information as well as an informal discussion with the president of OnStar, Chet Huber, at the MIT Sloan School on April 4, 2007.
[6] See J. Saghbini, "Standards in the Data Storage Industry: Emergence, Sustainability, and the Battle for Platform Leadership," MIT System Design and Management Master's Thesis, June 2005.
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[9] See C. Shapiro and H. Varian, "Information Rules" (Boston: Harvard Business School Press, 1998).
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[14] Cusumano and Yoffie.
[15] "Console Wars – Video Games," The Economist, 24 March 2007.
[16] M. Adkisson, V. Costan, Y. Khan, D. Kim, and L. Popov, "The 7th Console War", MIT Sloan School, Software Business Class (15.358) Group Project, December 2006.
[17] "Wii Fans Give Nintendo a Boost," Boston Globe, May 29, 2007, p. C4.
[18] "Console Wars – Video Games," The Economist*, op. cit.*

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The Major Characteristics of Inventors and Inventing Firms in Japan: Findings from the RIETI Inventor Survey

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The Major Characteristics of Inventors and Inventing Firms in Japan: Findings from the RIETI Inventor Survey[1]

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1. Introduction

Japan's economic growth depends heavily on high-quality research and development (R&D) performed by corporations, universities, and other institutions, combined with their effective commercialization. However, we have very limited social science knowledge of innovation process, including R&D objectives and motivations, knowledge sources, spillover, funding constraints on implementing R&D, constraints on utilizing results, and the inventor motivations. By directly gathering information from the inventors working on the frontlines of R&, we can deepen our understanding of the structural characteristics of Japanese R&D and this will aid in policy research. With this goal in mind, the Research Institute of Economy Trade and Industry (RIETI) undertook a survey on the inventions and the R&D projects that created them, as one component of the research project on the "Characteristics and Future Issues for Japanese Corporate Research and Development". It was conducted from January to June of 2007. The survey yielded close to 5,300 responses and marked the first such systematic survey on R&D projects in Japan.[2]

In this paper, we report the initial findings from the survey on the major characteristics of the inventors and inventing firms in Japan. The sample used in the RIETI Inventor Survey consists of three categories. Approximately 70% of the sample consisted of the inventions, the patents for which have been filed trilaterally—applying for them in Japan, the United States, and in Europe through the Europe Patent Office—and who have been granted a patent in the United States ("*triadic patents*" hereafter). Some 30% of the sample is composed of non-trilateral patent filings (Japanese patents for which the examination has been completed, "*non-triadic patents*"

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[1] This paper relies entirely on the RIETI discussion paper "Japan's Innovation Process from the Perspective of Inventors: Summary findings of the RIETI Inventors Survey" (in Japanese, 2007)

[2] While the RIETI Inventors Survey relied on the PATVAL-EU survey undertaken in Europe from 2003 to 2004, at the same time, the survey also added a number of original questions, some of which are included in this paper. For the European survey, please refer to Paola Giuri, Myriam Mariani, et al, 2007, "Inventors and invention processes in Europe: Results from the PatVal-EUsurvey", *Research policy*, Vol. 36, Issue 8, 1107-1127

hereafter), and with a very small sample (roughly 120 instances) collected from important patents in important new technology fields[3], such as nano-technology or new materials, or the essential patents of the standards. The majority of the patents claimed a priority year, or filing year, of between 1995 and 2001.

2. Profiles of the inventors who responded and their organizational of affiliations

First, we will take a look at the age, gender, academic background, and the organizational affiliations of the inventors who responded to the RIETI Inventor Survey. The first point that should be noted is that this survey was carried out based upon a random sampling of the patents, not a random sampling of the inventors. As such, these results do not depict a representative sample of inventors. In Table 1, results are displayed in comparison with European survey results (targeting the six countries of Germany, France, England, Italy, Spain, and the Netherlands).

The academic background of inventors is diverse. Of the inventors with trilateral patents, some 86% were university graduates, while 14% did not have a university degree, when they made the inventions. In addition, 12% had doctoral degrees (including the degrees obtained based only on the dissertations). Among those with trilateral patents, the ratio of respondents with doctoral degrees was much higher than among those with non-trilateral patents. 29% of the inventors for important patents in standard and key technology sectors had doctoral degrees. Thus, a positive correlation between the quality of an invention and the educational background of an inventor is observed. In Europe, the percentage of university graduates was 77%, significantly lower than Japan, while the percentage of doctoral respondents was higher at 26%, indicating more diverse academic backgrounds in Europe. However, in all samples, the ratio of female inventors was significantly lower than their male counterparts (for trilateral filings it was 1.5%), which is extremely low even compared to the percentage of female researchers in Japan (approximately 10%, according to the Survey of Research and Development in Japan by Ministry of Internal Affairs and Communications).

[3] Such patents are identified by the experts in fields such as IT, nano-technology, and new materials in the Japan Patent Office's Sectoral Surveys of Technological Trends and Patent Applications

Table 1 Basic profile of the surveyed inventors and their organizational affiliations

		trilateral patents	non trilateral patents	Important patents in standard and key technology sectors	Europe
	Sample size	3,658	1,501	119	9,017
Academic background	University graduate (%)	85.9	86.7	94.2	76.9
	Doctorate (%)	12.4	8.7	28.6	26
	Female (%)	1.5	1.8	1.7	2.8
	Age (years old)	39.5	38.6	39.7	45.4
Organizational affiliation	Employed at large corporation (251 or more employees) (%)	87.8	87.0	85.6	70.6
	Employed at small or medium-sized corporation(%)	8.7	10.2	3.4	22.5
	Institutions of higher education(%)	2.3	1.4	4.2	3.2
	National research institutes or other government organs (%)	0.7	0.8	4.2	2.2
	Foundations and other organizations (%)	0.5	0.7	2.5	

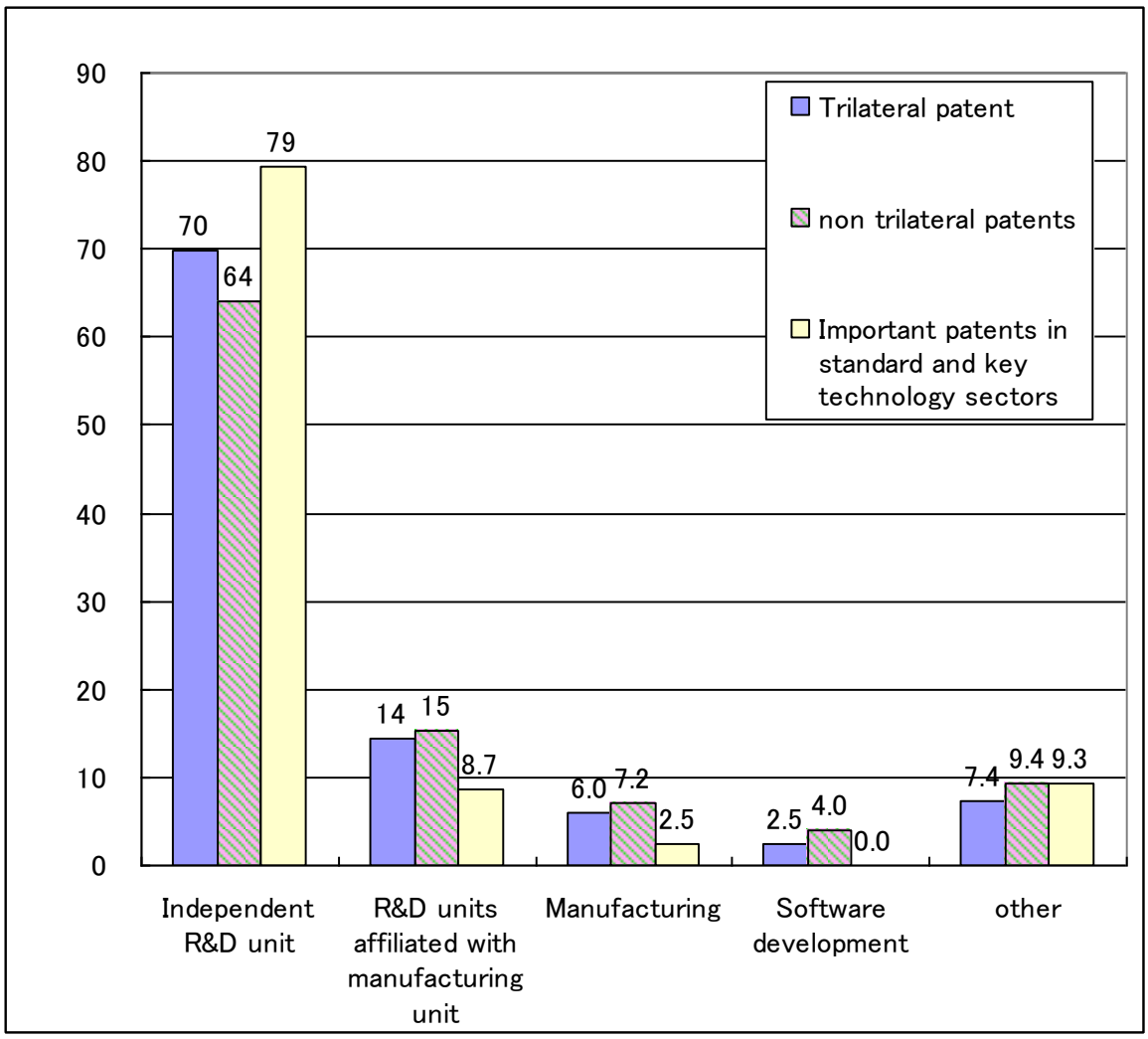
Source: Japan RIETI Inventor Survey, Europe's PatVal-EU (targeting the six countries of Germany, France, England, Italy, Spain, and the Netherlands).
Note: Individual inventors who have no organizational affiliations are extremely low in number.

Next, the survey data showed that at the time of creating their inventions, 97% of inventors were employed by the organizations so that all most all inventions were "employee inventions". The percentage of individual inventors, such as self-employed or student inventors was extremely low. As indicated in Table 1, by place of employment the data shows that employees of the corporations with more than 250 employees made up nearly 90% of all trilateral and non-trilateral patents, while employees at small to medium-size corporations were responsible for approximately 10%.

The percentages of trilateral patents stemming from higher educational institutions such as universities, national research institutions and other governmental organizations, and foundations and other organizations were responsible for 2.3%, 0.7% and 0.5% of such patents, respectively. A comparison of trilateral and non-trilateral patents shows similar patterns prevailing in terms of organizational affiliations. However, for important patents in standard and key technology sectors, the share composed by large corporations is roughly the same, but the small to medium-sized corporation share falls off and those held by universities and national research organizations increase significantly. In Europe the organizational affiliation for large corporations is on average 70%, implying that the corresponding figure is much larger for Japan. In contrast, in Europe small and medium-sized companies are responsible for roughly 20% of the patents, which is more than twice that of Japan. For universities the percentage is slightly lower in Japan.

In Japan, it is often thought that inventors are drawn from a broad base, including the manufacturing shops, but it is not clear that this is in fact the case. The RIETI Inventor Survey covers the functional affiliation of inventors, the results of which are reported below in Figure 1. For trilateral patents, the ratio of inventors affiliated with an independent R&D unit is close to 70%, by far the highest share. A distant second are those affiliated with R&D units affiliated with the other organizations such as a manufacturing unit, which logged a ratio of 14%. The remaining 16% was composed of inventors affiliated with a manufacturing unit, a software development unit, and the other units (such as from a design unit, etc.) not specialized in R&D. For non-trilateral patents, the independent R&D units account for a slightly lower proportion at 64%, with the units not specialized in R&D conversely recording a relatively larger share of 20%. However, the underlying structure is essentially the same. For the important patents in standard and key technology areas, the independent R&D sector composed a high 80% of the total patents.

Figure 1 Inventor functional affiliation



Note: The "Other" category includes design and engineering sectors.

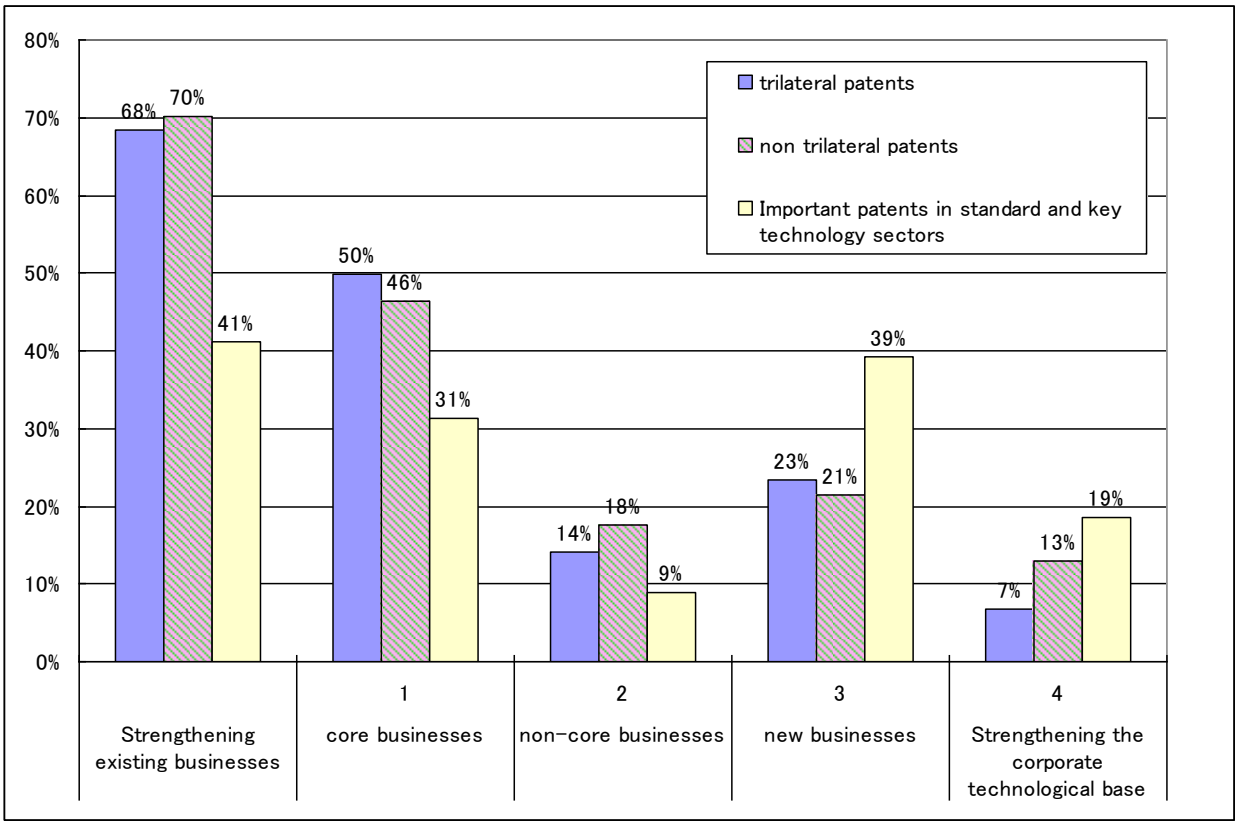
3. Business objectives of R&D

The importance of focusing on the core competency of a firm has often been argued in Japan in recent years. There is a question of how the R&D project of a firm is related to its scope of business, in particular, whether it is for strengthening R&D in its core business or for diversification.[4] It is also important to clarify what kinds of tradeoffs the firm faces in such choice. As shown in Figure 2, "Strengthening existing businesses" accounted for 70% of the responses by the inventors belonging to firms, "Starting new

[4] In the survey, "Core Business" is defined as that business in which a company has a competitive advantage in the market in this field, and that forms the core of the sales and profits of the company.

businesses," for roughly 20%, and "Strengthening the corporate technological base not linked to the current business" accounted for the remaining 10%. The results for trilateral patents and for non-trilateral patents are very similar. Therefore, when research for starting new business is included, it becomes apparent that 90% of the corporate R&D projects under the survey is closely related to the current business strategy of a firm. In addition, roughly 50% of the total R&D projects are undertaken with the objective of strengthening existing core businesses. However, it may be important to note that 40% of the R&D projects resulting in the important patents in standard and key technology areas stems from the R&Ds designed to generate new business, while 20% is for enhancing the corporation's technology base level over the long term.

Figure 2 Business objectives of the research which yielded the inventions (%)

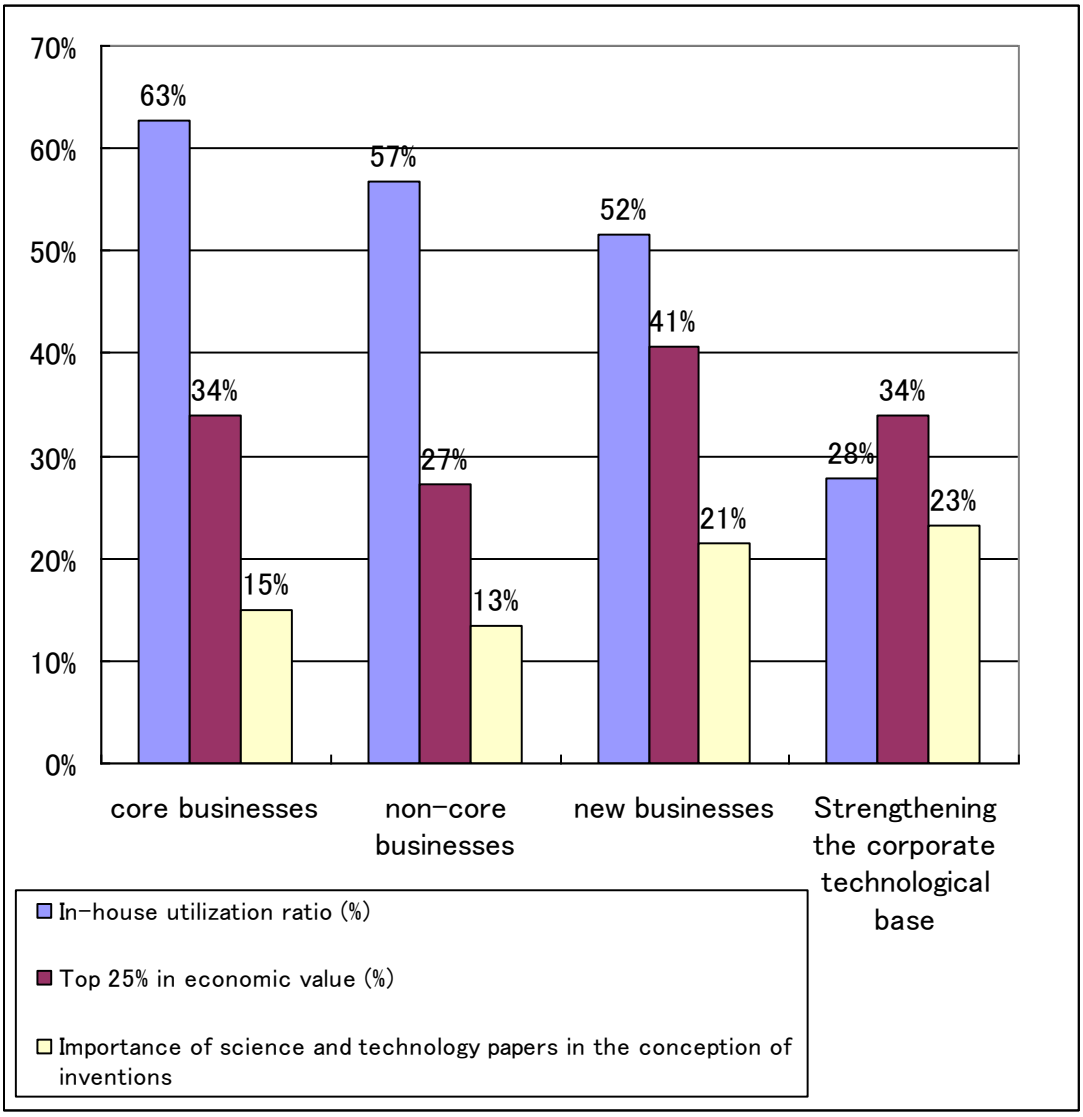


Note: Responses are limited to inventors belonging to corporations. A small number of responses said that the distinction between core business and non-core business was not clear.

4. R&D tradeoffs by business objective

The R&D project directly related to the core business of a firm would have an advantage that their results can be used easily utilized by a firm, since a firm has the complementary assets. Thus, even the research results that are relatively minor technological improvement could easily find the profitable applications. At the same time, since such R&D project aims at using the existing complementary assets, such as manufacturing facilities, it can be potentially inhibited from making a technological leap. Following this line of thought, we would expect that there is a tradeoff involving in-house utilization ratio and the use of new scientific and technological knowledge in the choice of R&D projects. In fact, as shown in Figure 3, in R&D catered for core business, the utilization ratio of the results for in-house is the highest (63%). At the same time, it is clear that the level of the use of scientific and technological knowledge for the conception of inventions is lower for such R&D than that for R&D for new businesses, or for strengthening the technology base (For the conception for inventions, only 15% of respondents answered science and technology papers were extremely important for R&D catered for core business, while the corresponding figure was 21% for R&D targeting the generation of new business). In addition, the R&D new business has substantially more valuable patents than the R&D targeting the core business, in terms of the share of top 25% inventions.

Figure 3 Distinguishing characteristics of R&D for core business and that for the other business objectives (triadic patents)

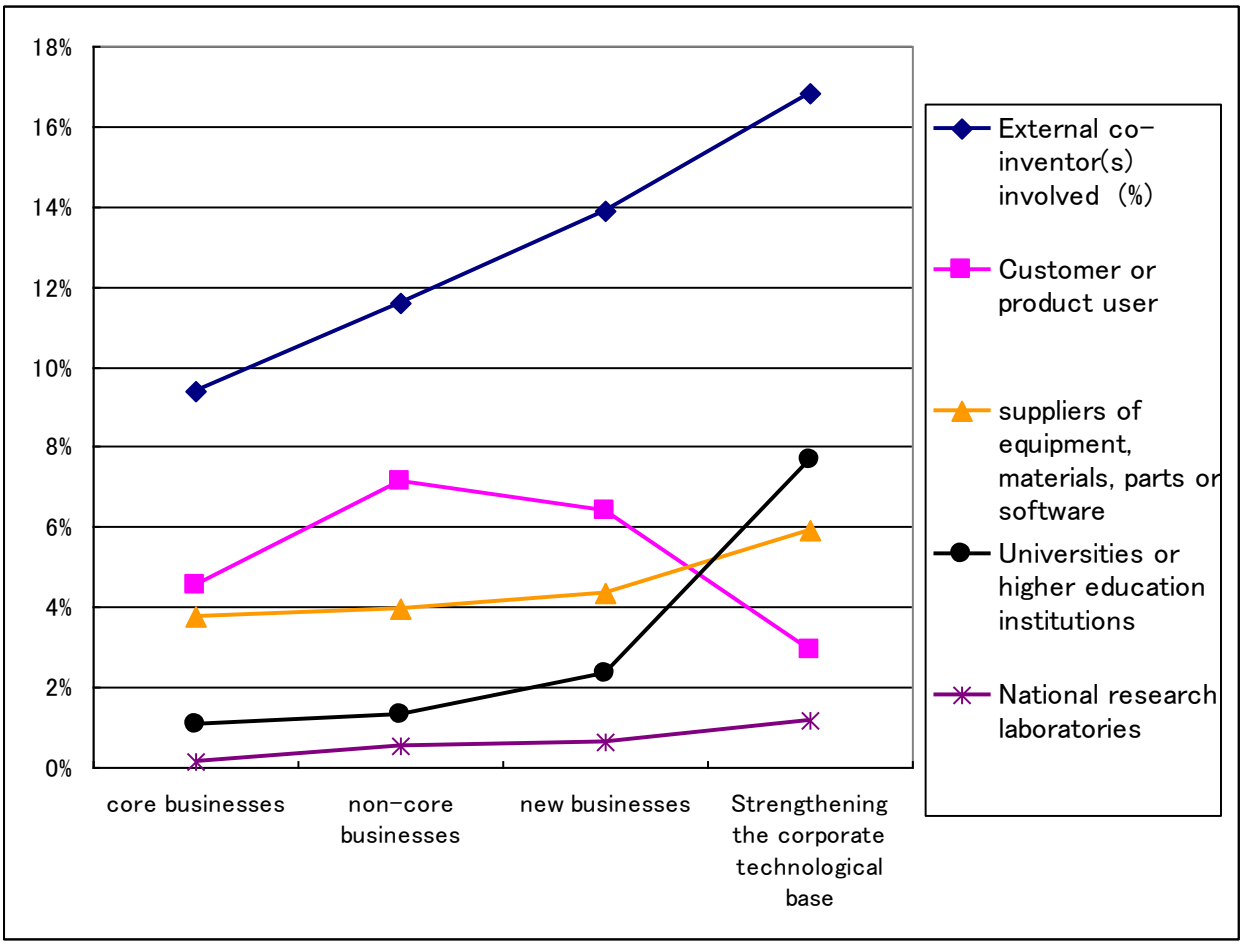


Note: “In-house utilization" indicates the ratio of inventions used in the products or production processes of the firm in question. “Top 25% in economic value” refers to the ratio judged by the inventors to fall in the nation’s economic top quarter of the technology accomplishments. “Importance of science and technology papers in the conception of invention” refers to the responses stating that such papers are very important in inspiring the invention.

5. Cooperation in R&D: Collaboration with users, suppliers and universities

The more that a firm diversifies out from its core business area, the more it needs to deepen its understanding of the market and to acquire new technological capabilities. Consequently, establishing cooperative relationships with external organizations in the area of R&D will become important. Figure 4 shows the percentage of patents with external co-inventors as well as their types by business objective. According to this, the R&D targeting the core business has the lowest probability of having external co-inventors (10% of inventions). The probability of having external co-inventors increases as the R&D of a firm targets non-core business, new businesses, and then strengthening the firm's technology base level, to a peak of 17%. Also, except for the R&D with the objective of strengthening a firm's technology base level, the most frequent collaboration is that with clients or product users, with the collaborations with suppliers of equipment, materials, parts, or software as the second most common. Users play an important role for R&D related to current business lines. In contrast, when corporations are conducting R&D with an eye to increasing their technology base level, they most often select researchers at universities or other higher education institutions as partners.

Figure 4　Frequency of external co-inventors by business objectives of R&D (%) (incidence of external co-inventors by types)



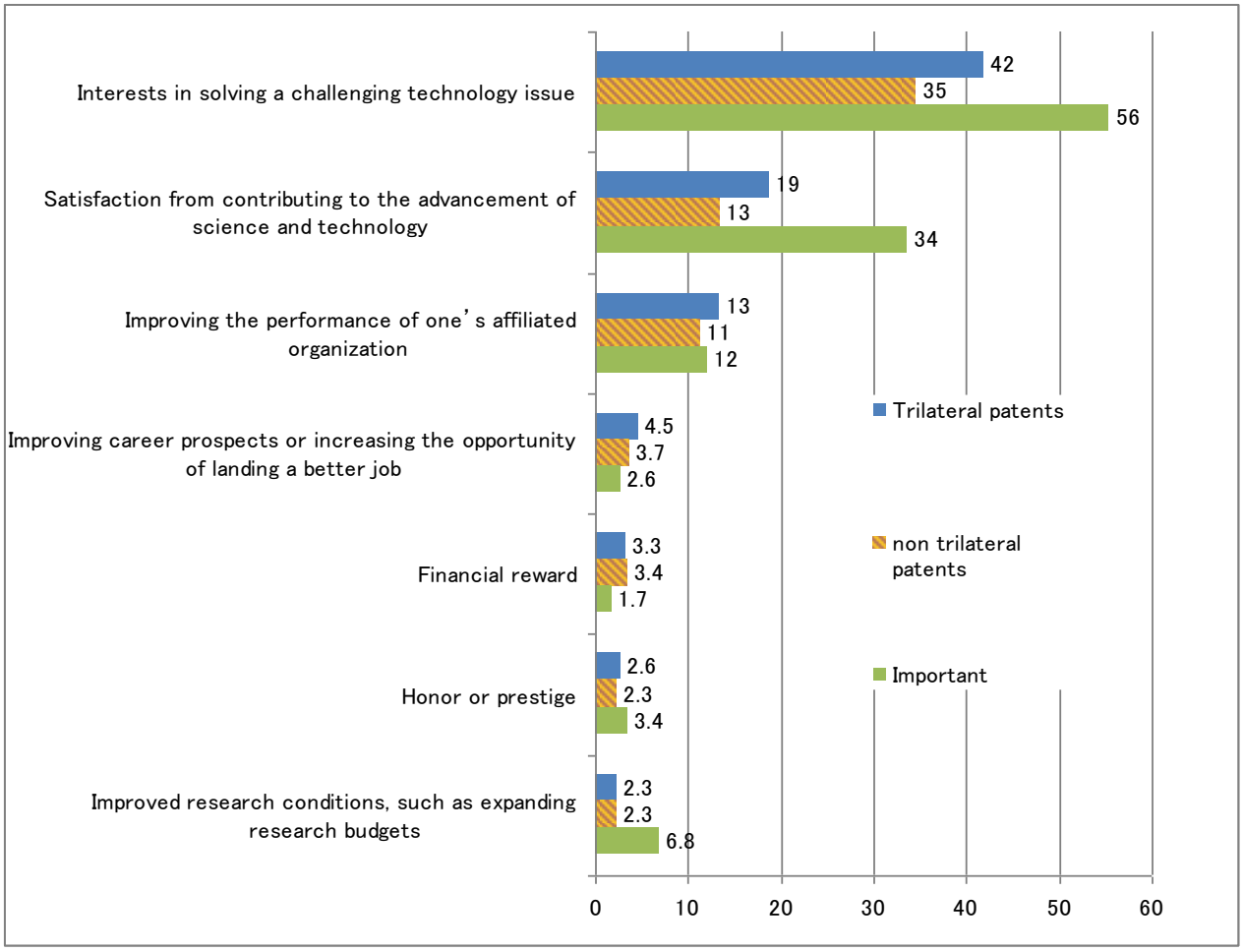
Note: Limited to R&D engaged by the inventors affiliated with firms.

6. Inventor motivation

Finally, we will address the inventor motivations, as depicted in Figure 5 (the share of the inventors who regard a particular motivation to be highly important). A look at the trilateral patents shows that the most important motivation for an inventor for the invention was the "Interest in solving a challenging technology issue," with 42% of respondents regarding this as very important. Next in importance, and representing 19% of the respondents, was the "Satisfaction of contributing to the advancement of science and technology." The third most important motivation was "Improving the performance of one's affiliate organization," indicating that organizational motivation (team success) is also important.

Those who regard personal economic motives (including improving career prospects, increasing the opportunity of landing a better job, financial reward, honor or prestige, and issues related to improved research conditions, such as expanding research budgets) to be "very important" as a motivation for invention is a relatively small minority. It is important to note that these motives do reflect the environments in which inventors work. For example, comparing the results for important patents in standard and key technology sectors and those for trilateral inventions, or those for trilateral inventions and those for non-trilateral inventions shows that both the "Interest in solving a challenging technology issue" and the "Satisfaction of contributing to the advancement of science and technology" is more important in former than in the latter. Such difference would be due to the fact that the technology level of R&D is higher for the former patents.

Figure 5 Inventor motivations (% of responses who regard each motivation to be very important)



7. Summary

The major findings of the inventors and inventing firms in Japan as uncovered by the RIETI Inventor Survey can be summarized as below.

(1) Diversity is high in terms of academic backgrounds of inventors, although the inventors engaged in producing high-quality patents tend to have higher academic backgrounds. The percentage of female inventors is extremely small.

(2) The bulk of inventions are “employee inventions”. In addition, the firms with more than 250 employees account for approximately 90% of both triadic and non-triadic patents.

(3) Approximately 70% of R&D aim at strengthening existing business lines, approximately 20% to generating new business, and approximately 10% to strengthening the firm’s long-term technology base which is unrelated to the business operations over the short term. Therefore, when generating new business is included, 90% of R&D is closely related to the current business strategy. An R&D targeting a firm’s core business often finds the application in-house, while it involves less use of new scientific and technology knowledge in its conception. In addition, as might be expected, the more removed from a company’s core business the R&D project becomes, the more important it becomes for a firm to forge cooperative relationships with external organizations.

(4) The strongest motivation for inventors for an invention is the “Interest in solving a challenging technology issue.” Next in importance is the “Satisfaction of contributing to the advancement of science and technology.” Only a minority of inventors rank the other motives such as personal economic motivations as very important.

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By Hideaki Shiroyama

Introduction

The development of science and technology is accompanied by various risks and social problems, as well as benefits. As the scope of this issue has grown wider, the range of interested actors has increased accordingly (Shiroyama, 2007).

For example, the development of nuclear physics and nuclear energy technology has had the benefit of securing sources of energy, but it has also been accompanied by constant safety risks and the security risks of nuclear proliferation. Alternatively, the development of life sciences and genetic engineering has raised issues of safety and ethics, and there is particularly strong awareness of these issues in regard to experimentation in gene therapy—the genetic manipulation of human beings. Moreover, science and technology that is pervading society—such as genetically modified crops—is being assessed by a variety of actors and from diverse points of view, such as the perspective of economic efficiency, in a manner that goes way beyond purely scientific and technological logic.

Despite the fact that scientists would brand this talk as irrational and akin to vicious harmful rumor, if this is the reality of society, the escaping from the use of specific technologies to avoid economic loss is highly rational as far as society is concerned (for example, for agricultural producers and agricultural policy makers).

So far as society decides to make use of science and technology with diverse social implications that encompass risk for society as well as benefit, there is a need for systems throughout society for the management of the development and utilization of science and technology. In other words, governance of science and technology is required.

The following sections outline how the governance of science and technology might be organized and then set out the functions that are required of it.

What is Governance of Science and Technology?

Science and technology have many implications for society. For this reason, society has to form an assessment based on the various problems and points for deliberation that exist at the borders where society meets science and technology. This function of societal assessment will require certain mechanisms, and to cope with the various issues, a specific style of institutional design will be vital. These mechanisms and specific institutional design are what constitute the governance of science and technology. A variety of actors, such as experts in various fields, various levels of government (international organizations, national government, and local government), various groups (such as professional groups and employers' associations), and citizens will then collaborate and share the effort in the governance of science and technology, and—while they will sometimes come into conflict—they will manage the various problems at the borders where society meets science and technology.

Governance and traditional government are often thought of as opposing forces. Government is taken to mean the official institutions for governing, while governance is understood as encompassing a wide range of systems—including customs of society and markets—that are outside the official institutions of government, i.e. "the whole range of institutions and relationships involved in the process of governing" and "self-organizing, inter-organizational networks" (Rhodes 1997). Whereas the organization of government is based on an internal vertical hierarchy, governance

allows for structures that include horizontal relationships between entities such as various societal groups and companies, and between various levels of government.

A wide range of actors has come to be involved in science and technology, in reaction to the numerous social implications of science and technology in specific societal contexts. Scientists and engineers also have a major role as individuals and are building various independent professional organizations. The role of companies in the introduction of technology to society is also significant. In recent years, companies have also played a noteworthy role through CSR (corporate social responsibility). On the other hand, at government level, while standardization is playing a major role at the international level, there are many matters that the national government and local governments must deal with in accordance with local conditions. Thus, it could be said that within the domain of science and technology, there is more of an appearance of governance than government.

Functions of Governance of Science and Technology —Requisite Elements of Societal Judgement

Risk management

Clarifying risks and benefits

The development of technology can entail an increase in various risks as well as various benefits. To cope with this state of affairs, risk assessment and risk management are being attempted by various segments of society (Shiroyama, 2007).

Risk assessment generally involves multiplying the probability of the occurrence of damage by the scale of the damage. Scientific knowledge based on immunological data and animal test data is essential for this assessment. As a matter of course, the scope of risk assessment can vary greatly, according to whether it is based on the number of dead or on the number of victims (such as the sick and injured), and on whether a qualitative distinction is drawn between large-scale catastrophic disasters and smaller disasters. On the other hand, risk management refers to the activity of deciding where to draw the line and what level of risk to allow—based on the risk assessment—before proceeding with the overall project.

When taking risk management decisions, it is necessary to consider how the risks are balanced by the benefits of the technology concerned. Without taking this factor into account, it would be impossible to understand why the car—which risk assessment regards as entailing a high level of risk in numerical terms—is accepted by society. When the benefits are assessed, the question of distributive implications (that is, to whom do the benefits accrue) is also important. Society may reject a certain technology, even if the overall benefits are considerable, if the benefits are directed mainly towards a certain sector. It is recognized that society has not readily accepted nuclear power generation or genetically modified foods—despite the fact that their risks are assessed as low. One reason that can be cited for this is that it is corporations who are the direct beneficiaries of these technologies (in terms of perception, at least).

Often, some risks are ignored or exaggerated. When a company engages in technological development, it is possible that it will not publicly disclose the relevant risk information—even if it is aware of the risks that accompany the technology —out of consideration for its return on investment from the development of the technology. When a company conducting technological development on site fails to disclose information, it is extremely difficult—at least in the short term—for society to obtain this information separately and independently. On the other hand, the main thrust of opposition to a particular technology (which may even emanate from a competing

company) may exaggerate some of the risks. The problem in this type of situation is how to conduct comprehensive and balanced risk mapping. For the experts too, the perceived areas of risk vary between different specialist fields.

Benefits too can be inadequately presented or exaggerated. In the cases of genetic modification technology and nano-technology, it is a long way from these technologies to concrete benefits for society. Certainly the arguments can be made that the introduction of genetically modified crops will allow increased volumes of food in developing nations, which will alleviate poverty, or that the introduction of medical diagnostic technology employing nano-technology will enable preventive medical care based on simple continual monitoring, leading to reduced medical costs. However, there are a number of variables external to the introduction of a technology that must come into play in order for its effectiveness to be realized. Thus, technology developers are discontented, because when a technology is assessed, the risks alone are adequately addressed while the benefits are not. On the other hand, technology developers tout the effectiveness of a technology in their quest to obtain research funding, and it is claimed that—as there are many variables in play that influence its effectiveness—they are apt to exaggerate the effectiveness.

Moreover, there is uncertainty over both risks and benefits. This represents both uncertainty over scientific understanding, as mentioned earlier, and uncertainty over utilization of the technology.

As regards expectations of risk assessment from science, society often expects a definitive answer, despite the fact that, as mentioned previously, science comprises a degree of uncertainty. It is of course possible that the uncertainty will recede as science progresses; however, it will be difficult to eliminate it completely. For society, the question thus arises of how to assess a certain acceptable level of uncertainty. The choice between the “precautionary principle” or the “no-regret policy” expresses the difference in attitudes to this uncertainty. The precautionary principle refers to the attitude of taking preventive control measures (even while uncertainty remains as to whether anything will happen), because if something does happen, the resulting damage will be enormous. In contrast, the no-regret policy refers to the attitude of taking only meaningful precautionally measures (even if nothing is going to happen), instead of reacting during the period of uncertainty on the assumption that something will happen. Which of these two attitudes to select is a policy selection problem for society.

There is also uncertainty over benefits. As mentioned earlier, one of the characteristics of technology is that it can be used for numerous purposes. There are also many technologies that are used in ways that differ from those envisaged by their developers. There are also technologies that are used in a manner quite distinct from their original purpose. Technology developers also sometimes advance the argument that, although in the initial experimental stage of any technology it is easy to foresee certain risks, the eventual actual benefits do not become clear until some time has passed (particularly in the case of revolutionary ground-breaking technologies), and that at the outset it is very difficult to explain the benefits, even if asked to do so. However, it should probably also be acknowledged that there are also risks that do not become evident for some time.

The multi-faceted nature of risks and benefits

Both risks and benefits are multi-faceted. For example, there are many cases in which the same technology entails different risks and benefits after the international relations dimension has been factored in.

In domestic terms, nuclear technology is an energy technology and has the benefit of providing energy. On the other hand, it also entails safety risks. However, with the addition of the international relations dimension, the picture changes. With regard to decreasing the imports of oil, the principal energy source (most of which comes from the Middle East), nuclear power generation has the benefit of increasing energy security (although maintaining this option requires imports of uranium). On the other hand, possessing the technology for nuclear power generation (particularly technology for the nuclear fuel cycle) raises the risk of nuclear proliferation on the international level.

The same applies to space technology. Normally, the benefits of maintaining the capability to launch satellites go no further than satellite communications and satellite broadcasting. However, factoring in the international dimension, the technology yields security benefits, in the form of spy satellites. In addition, in a domestic context, dual-use technology is normally technology for public civilian benefit; however, it is recognized that there is a risk that, with the addition of the international dimension, its diversion to military use may contribute to the spread of weapons of mass destruction.

Moreover, the benefits of technology have changed due to society's changing objectives. For example, up until now, the provision of energy has been recognized as the sole benefit of nuclear power generation. However, as society has come to recognize global warming as a problem, the fact that it does not emit carbon dioxide—a substance that causes global warming—has come to be recognized as an additional benefit.

Conversely, when coal-fired power generation technology is discussed in the societal context of global warming, emphasis is placed on the risk entailed in its high levels of carbon dioxide emissions—a global-warming culprit. However, as factors such as rising oil prices increase concerns over energy security, the use of coal-fired power generation technology is seen to have energy security benefits, since the regions for production of the coal on which it relies are relatively spread out throughout the world.

Assessment of trade-offs

Thus, in the debate over the introduction of a new technology to society, diverse risks and benefits must be considered. Once these risks and benefits have been considered, there is then the problem of what kind of societal assessment should be carried out, based on these diverse risks and benefits. In the current context, there are various trade-offs that must be made when this societal assessment is performed (Graham and Weiner, 1998).

Risk trade-off refers to the fact that the efforts made to reduce specific risks conversely end up increasing other risks as a result. For example, if car bodies are made lighter in order to improve gas mileage, they become less collision-resistant and safety levels fall. In this case the global-warming and energy security risks are reduced, but the safety risk increases. In addition, certain products used as substitutes for CFCs (which destroy the ozone layer) have led to reduced destruction of the ozone layer, but have accelerated global warming. In this instance, the risk of the destruction of the ozone layer and the risk of global warming are traded off against one another. Further, methyl bromide, which is used as a fumigant to lower food-related risks, increases the risk of destruction of the ozone layer. In this instance, the food safety risk and the risk of destruction of the ozone layer are traded off against one another.

In regard to the AIDS cases caused by contaminated blood products, the division chief of the ministry in charge was found guilty in the criminal cases, since the switch from unheated blood products that allowed the possibility of AIDS infection to safer heated blood products was not made quickly. In the case of this trial too, there was an

implicit trade-off assessment involved—albeit one that was tangential to the verdicts in the cases. Even before the heated blood products option had come into general use, the decision could have been made to revert to using cryo products—a possible treatment for AIDS and an option which had been available since before unheated blood products. The reason why this decision was not taken seems to have been that the risks entailed in using unheated blood products were judged to be low compared to the benefits—unheated blood products were highly effective and convenient for hemophiliacs. However, since some professional organizations were in fact championing a reversion to cryo products, logically a different decision could have been made (Hirono, 2005).

Assessing issues of values

When societal assessment of technology is carried out, it is necessary to consider issues that relate to values as well as conducting an assessment of the risks and benefits. To be more precise, the two should be carried out in concert with one another.

In regard to societal assessment of technology, it has been mentioned that a comprehensive assessment should be carried out after the risks and benefits have been widely clarified. However, when a comprehensive assessment is carried out, there is an important factor to be considered that will function as a "trump card"—whatever the other risks and benefits. This is the issue of values, as they relate to individual rights and human dignity. This frequently emerges as a key issue in the realms of life sciences and genetic engineering, which have advanced rapidly in recent years.

For example, there is now a problem in Europe with children themselves filing "wrongful life" lawsuits in complaint over their lives lived with disability or over their congenital disabilities (van Beers, 2007). These lawsuits are admissible in the Netherlands but have been banned in France. France claims that allowing these lawsuits would signify an admission that there are some lives that have no value, and that as this constitutes a eugenics-based view of human life, this violates the dignity of human life. On the other hand, the Netherlands adheres to the concept of the dignity of human life in the shape of empowerment that emphasizes giving people suitable powers as human beings, and believes instead that permitting lawsuits by children born with disabilities which could have been prevented comports with values of human dignity. This could be said to reflect differing conclusions over the importance to human dignity of values that stress the intrinsic sacred value of every living person or the need to protect the very integrity of the human body, and over whether to place an emphasis on values of self-determination or economic emancipation. This issue has now become a real problem, as technology for ante-natal diagnosis has advanced, making it technically possible to detect whether a person is disabled before birth.

Further, underpinning the current controls on animal experimentation being led by the UK is the utilitarian idea of the alleviation of suffering. This viewpoint requires that suffering be reduced as much as possible, but does not require that animal experimentation which provides experimental data essential to the development of science and technology be banned. On the other hand, if the view is based on the values of animal rights, as these were to be accorded the same importance as human rights, the conclusion could instead be drawn that animal experimentation cannot be permitted—no matter what the benefits.

Societal assessment of technology has also come to involve the issue of the image of society. With the growth of nano-technology, in recent years interest has risen in fields that integrate areas such as nano-technology, bio-technology, and information technology—that is, in converging technologies. In response to this, research is progressing in the USA and Europe on the implications for society of this technology. Research into the implications entails both finding out what the benefits for society

would be and finding out what issues exist (for example, issues relating to the management of data collected using bio-sensors that employ nano-technology, and privacy issues). It could be said that there are certain different kinds of technology assessment, and in the course of this process, attempts have been made to differentiate between the respective aims of converging technologies in the USA and Europe. In the USA, the notion of "converging technologies for improving human performance" is asserted (Roco and Bainbridge, 2002), while in Europe the concept of "converging technologies for the knowledge society" is stressed (Nordmann, 2004). In other words, it could be said that in the USA this technology is being positioned as a means to improve facets such as human military capability and memory capacity, whereas in Europe the intention is to apply it for purposes that are more oriented towards society.

Promoting the generation of knowledge

The points that have been considered so far—how will society make use of science and technology, and what concerns must society take into account in its assessment of them—have been premised on the existence of science and technology. However, the existence of scientific knowledge and technology is not self-evident. For these to emerge, society must foster those groups of people to whom we refer as scientists and technologists, and must stimulate their research activities. What kind of knowledge generation, then, deserves to be stimulated?

In this context it is necessary to try and revisit the role of the legal concepts of "academic freedom" and "freedom of research" (Yamamoto, 2007). These concepts have often been considered as justification for the concepts of "science for the sake of science" and "research for the sake of research." However, it seems that they could instead be retasked as the organizing principles for stimulating the generation of knowledge. In other words, simply carrying out research work under the directions of superiors in a hierarchical organization is insufficient to the generation of intellectual innovation. Certainly, implementation is a necessary component of research, and mechanisms to support this are essential; however, ideas—the essential component of research—are born of spontaneous investigative activity. According to this way of thinking, by enabling numerous trials and experiments in a bottom-up fashion, academic freedom and freedom of research have the resultant function of stimulating intellectual innovation, which contributes to society. The construction of a voluntary network that spans different disciplines is vital to this process. In addition, the significance of ensuring diversity in scholarship and research is that this can lead to just such intellectual innovation. Free and autonomous forms of organization made up of those involved (such as researchers) which stimulate spontaneous trials and communication are necessary to stimulate the generation of knowledge, and these are different from hierarchical organizations. In fact, promoting the generation of knowledge is essential even for risk assessment, which was mentioned earlier. A system of laws on experimentation that will allow various types of experiments is essential to stimulate the production of the information needed for risk assessment. If such a system of laws is absent and experiments cannot be carried out, there is no alternative but to rely on import of the knowledge and information needed for performing risk assessments. It has been pointed out that since safety regulations in Japan are often stringent, even the data needed to apply for approval and authorization under the safety regulations cannot be generated in Japan, and that instead foreign experimental data is used. This kind of situation does nothing to encourage the accumulation of the information and knowledge on which risk assessment is based.

On the other hand, it cannot be said that academic freedom and freedom of research command universal respect. For example, it is necessary to compare risk involved in the areas of safety and security. It is necessary to come to a decision on whether risks to safety ought to be considered and academic freedom and freedom of research curtailed, or whether shortsightedly placing the emphasis on safety and restricting research reduces the possibility of long-term innovation and increases society's vulnerability. Step-by-step clinical trials and medical technology for medical and pharmaceutical product trials are perfect examples of this. If Japan is to be independent in areas such as nuclear power technology, a legal system that enables experimentation is also required in the quest for independent technological innovation. A further issue is whether security risks should be emphasized and the publication of research (a key component of academic freedom and freedom of research) ought to be stopped when there are fears that research results might be applied by terrorists.

Institutional mechanisms for stimulating the generation of knowledge also include various other elements. Another bone of contention is whether intellectual property rights ought to be used to boost incentives for researchers. On one hand, if intellectual property rights are used as an economic incentive to spur researchers on to research success, the use of this mechanism will promote intellectual property rights. On the other hand, with people whose motivation to generate knowledge is not economic incentive, but rather the satisfaction of intellectual curiosity or the acclaim of fellow experts, the use of intellectual property rights in this fashion will not work. In addition, there is also the consideration that it will be difficult to put together knowledge by combining a variety of elements, if intellectual property rights are established separately for each component element. The basis of the traditional research community used to be the active use of the academic commons. Within research communities there has been an ethical emphasis on giving credit for an invention where it is due; however, the method that has come to be adopted involves sharing research results with the research community as soon as possible, and allowing them to be used for free, so as to stimulate the creation of further research results—and not to go to the lengths of obtaining intellectual property rights or to keep results secret. Whether to maintain the traditions of the academic commons or whether to make more use of intellectual property rights is a choice that will be crucial to the generation of knowledge.

In addition, other key issues will be how to design structures for the provision of research funding and how to plan the evaluation of research results. To make effective use of academic freedom and freedom of research, it will not be enough to simply preserve the autonomy of organizations—rather, it will be essential to allocate human resources and financial resources that will enable such activities. On the other hand, if resource allocation is carried out by the government, it is inevitable that there will be a certain level of evaluation, so as to maintain accountability; however, if short-term evaluation of individual projects is carried out, the goals of preserving diversity and maintaining the foundations for wide-ranging intellectual innovation will not be achieved.

Conclusion

This paper has outlined the substance and functions of science and technology governance. Two final points are worth identifying as fundamental science and technology governance issues.

First, it is noteworthy that different actors within society hold different viewpoints. It is important to understand the framework within which perceptions of the major issues are framed. There then has to be a from where the multiple viewpoints are shared and

the interests are coordinated. Problems of science and technology must not be confined to the experts in the science and technology fields in question, but must be opened up to other interested parties as well. In the process, dialogue between experts and citizens is important; however, it is also important that there be dialogue between experts of different areas, and that language be devised that enables them to understand one another. There is a need for stakeholder analysis as a means to this end, and for leaders who will link together experts from various fields.

Second, it is not necessary for all the actors involved in the decision-making in governance to share a common vision. The notion of "sharing the same bed, but dreaming different dreams (Doushouimu)" is an important one. As has already been emphasized, the actors within society have different viewpoints and concerns. In this kind of situation, it is rare for visions of the various actors to be in accord. For example, some actors may be interested in nuclear power technology or bio-mass energy technology as measures to combat global warming, while others may be interested in these technologies as a means to achieve energy security.

In these instances, although the perspectives that inform the concerns of the actors differ, they will be able to form a united front in support of a particular technology choice.

Conversely, clarifying the various benefits and risks for the various actors through stakeholder analysis will not only provide the data for decision-making, but also look for the potential for coallition formation between the actors, based on the notion of "same bed, different dreams."

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Innovation Policies and Global Issues

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INNOVATION POLICIES AND GLOBAL ISSUES

Remarks to the Institute for International Policy Studies (IIPS)

The World Order and a Vision of Japan in the 21st Century
Globalization and Japan's Science and Technology Strategy

November 19 – 20, 2007

Ambassador Okawara, fellow panelists, ladies and gentlemen –

One of the key questions facing us today in terms of innovation and society is how we can meet our needs for energy and also meet our needs to safeguard our environment. The topic is front and center in the news. We saw it this past weekend with the release of the IPCC [Intergovernmental Panel on Climate Change] Synthesis report. We will see it in the UN Climate Change Conference December 3 – 14 in Bali. Japan is talking about climate change and energy being focal points of its upcoming G-8 presidency.

I would like to talk a bit today about how the U.S. government sees these upcoming events and how technology can help mankind address the challenges of climate change, of other environmental problems, and the need for energy in meeting the demands of people around the world for better lives.

Let me start with a basic point, climate change has been a top priority of the United States government for years. Let me also go back to June 11, 2001 when President Bush stated:

- "First, we know the surface temperature of the earth is warming…There is a natural greenhouse effect that contributes to warming…And the National Academy of Sciences indicates that the increase is due in large part to human activity."

In the six years since the President made that statement – one of many he has made about the seriousness with which the U.S. treats this issue – countries have continued to debate how the world can and should address climate change. Scientists too have continued to look at the evidence and improve their understanding, and that of policy makers and others who need to act to meet the energy and climate change challenges. The IPCC report issued this weekend, the Fourth Assessment, synthesizes the latest thinking. I should note as well that U.S. government funding for climate change sciences helped with a major part of the science included in the report – according to one USG estimate, we are talking $12 billion in climate change science that has been funded by the U.S. Federal government.

The U.S. Strategy

The U.S. strategy looks both at the science and at the same time addresses climate change in the broad context of how it affects people, including in terms of economies, standards of living, and alleviating poverty. Energy is central to human economic activity. We certainly see this in our developed industrial economies. However, developing economies too need access to energy. Energy is not a luxury, but a key component of development, of the sort of healthy, beneficial way of living people around the world want, and indeed we talk about providing energy in the context of the internationally agreed Millennium Development Goals. People in developing countries around the world want to be able to light, heat, and cool their homes, but need electricity to do so. And as we know, generating electricity with the technologies available today generally means generating greenhouse gas emissions.

The situation may be most dramatic in large, developing countries like China and India, which are turning into the engines of economic growth of the 21st century. China recently may have surpassed the U.S. in greenhouse gas emissions. Next fall, an Indian car manufacturer is scheduled to introduce a "People's Car" with a price tag of $2500. Analysts predict the market for such a car could reach 300 million by 2020. With such an explosion in the numbers of drivers, it is easy to see why it is the fast-growing developing countries that will be the source of much of the growth in emissions in the coming decades.

Renewables can help. Improved energy efficiency and greater conservation can help. But we have to recognize coal, oil, and other sources of energy we know today, including nuclear, will remain essential. So the question we in the U.S. and other countries want to answer is: How do we move forward with an increased global use of energy, but do so in an environmentally responsible way?

I would suggest we need to employ a range of policies and other tools – conservation, new technologies, renewables – if we are to develop and implement meaningful solutions.

So, when President Bush met with his fellow G-8 leaders this past June in Heiligendamm, he presented a new strategy to help lead the way in developing a new framework on climate change to succeed the Kyoto Protocol after it expires in 2012. Our strategy is based on the successes we have achieved at home and includes a multi-part strategy.

The President's Major Economies initiative, recognizing no one country can act alone to meet the climate/energy/environment challenges, brings together the world's major consumers of energy and producers of greenhouse gas emissions for a series of meetings, planned to culminate in a leaders meeting in 2008. The first of these meetings was in Washington this past September and included high level representatives from 15 countries producing 80 percent of the world's greenhouse gas emissions. Minister Koumura represented Japan, one of his first acts as Japan's new Foreign Minister – a step on the part of the Japanese Government that we deeply appreciated.

Though these meetings, participants will develop a new approach to energy security and climate change, contributing to a global agreement under the UN Framework Convention on Climate Change by 2009. This approach will include establishing a long-term goal for

reducing greenhouse gas emissions and a strong and transparent system for measuring progress. The Initiative foresees each country designing its own strategy for achieving this goal**.** We expect other countries, like the U.S., will find they need to rely on a mix of mandatory, voluntary, and market-based policy tools. The difficulty Japan and many others are having reportedly in meeting their Kyoto Protocol commitments demonstrates that there is no one-size-fits-all answer. We need to think creatively and learn from one another's experiences.

A second part of the strategy is to involve all of the participants in the U.N. Framework Convention on Climate Change to see if we can develop a common agenda around several main areas: 1) sustainable land use through better forestry practices, better agricultural practices, and better thinking through our cities; 2) increasing energy efficiency; and 3) technology sharing to bring technologies from the developed world and help apply them in developing countries.

The third element is an accelerated program for advancing technology and its application. The U.S. has already committed to boosting investment in advanced clean energy technologies. In his State of the Union speech this year the President indicated that we will put $179 million more into advanced bio-fuels and $650 million more into clean coal, along with other technologies, as part of his $2.7 billion Advanced Energy Initiative.

Let's look further at advancing clean energy technologies. By developing new, low-emission technologies, the world's major economies can help meet the growing demand for energy while cutting air pollution and greenhouse gas emissions. For years, those who worried about climate change and those who worried about energy security were on opposite ends of the debate. But these challenges share a common solution: technology.

We have to recognize as well achieving the vision of an age of clean energy will require significant investments from all major economies. Today, the United States and Japan fund most research and development of clean energy technologies. While we hope others will do more to fund technology development, countries must also work to make clean energy technologies more widely available by eliminating tariff and non-tariff barriers on clean energy goods and services. I would also note President Bush has proposed the creation of a new international clean technology fund to help developing nations harness the power of clean energy technologies.

Since the President took office, the federal government has invested nearly $18 billion to research, develop, and promote clean and efficient energy technologies and help get them to market. The private sector has responded with significant investments, ranging from corporate research and development to the venture capital markets.

Since 2001, the United States has invested more than $2.5 billion to research and develop clean coal. In addition, in partnership with other nations and the private sector, the U.S. is moving closer to producing energy from the world's first zero emissions coal-fired plant. As the efforts to build new power plants in China and elsewhere show, coal will remain an essential source of power for years to come. That fact does not mean we should keep using our grandfathers' coal-fired technologies, however.

The United States is working as well to reduce barriers to new nuclear power plants in the country without compromising safety. Each year the world's 439 nuclear power plants prevent the release of 2 billion additional tons of carbon dioxide in the atmosphere. Nuclear power is the one existing source of energy that can generate massive amounts of electricity without causing any air pollution or greenhouse gas emissions. Japan has long played a key role in the safe development of nuclear power generation. In the U.S. this fall, a company filed the first application since the 1970s to build new nuclear reactors.

Last year, the U.S. established the Global Nuclear Energy Partnership. This partnership works with countries with advanced civilian nuclear energy programs – such as France, Japan, China, and Russia – to help developing countries obtain secure, cost-effective, and proliferation-resistant nuclear power. The U.S. has been joined by 15 partners, both developed and developing, in this partnership.

Since 2001, America has increased wind energy production by more than 300 percent and launched the Solar America initiative to lower the cost of solar power. Taken together, low-carbon technologies like wind and solar power have the potential to contribute significantly to America's electricity production.

Transportation, like power generation, is a major source of greenhouse gas emissions. An age of clean energy also requires transforming how we fuel our cars and trucks. In the U.S. we are working to develop the next generation of sustainable bio-fuels like cellulosic ethanol, made using everything from wood chips, to grasses, to agricultural wastes.

The Administration is providing a Federal tax credit of up to $3,400 to encourage Americans to buy fuel-efficient hybrid vehicles. Moreover, U.S. automakers are working to develop plug-in hybrids that could be able to travel nearly 40 miles without using a drop of gasoline. Having just been to the Tokyo Auto Show this month, I can attest that Japan's car-buyers share this interest in new, greener technology.

In the U.S. the Administration has spent more than $1.2 billion dollars over the past five years to develop advanced hydrogen technologies and hydrogen-powered vehicles that emit pure water instead of exhaust fumes. Moreover, the President's "Twenty in Ten" plan will help ensure cost-effective new technologies reach the market. The plan aims to help cut U.S. gasoline consumption by as much as 20 percent in ten years by setting a new mandatory fuels standard that requires up to 35 billion gallons of renewable and other alternative fuels in 2017. It also looks to reform mandatory fuel economy standards for cars, as the Administration did for light trucks.

Let me add another point, the U.S. government pays for a lot of research and development of new technologies. We often make that technology available to U.S. manufacturers at very low cost. We are proposing to extend that policy globally, so that Americans who are producing new clean energy systems will make them available globally, as long as other countries make the same commitment.

All this work should provide our two countries with a platform for excellent cooperation given Japan's recognized role as a world leader in climate-friendly technology. Whether it is the pioneering work done by Japanese automakers on hybrid cars, or Japan's leadership position in solar panel production, Japanese firms are developing technologies that will prove vital to halting and then reversing the build-up of greenhouse gasses.

All this discussion about energy and greenhouse gases and the environment and the role of technology thus comes back to the point that we need to think and work globally. The U.S. wants to speed up the clock on the UN process. Instead of meeting in the once-per-year UNFCCC Conferences of the Parties, we should have an ongoing conversation that in 18 months can reach agreement on the basic elements of the next climate framework. We need to realize more actions in terms of developing and applying technologies of conserving and using energy more efficiently and of reducing the amount of energy used to produce a unit of GDP. We also have to gain broad acceptance of the fact that a "one size fits all" approach to countries' greenhouse gas emissions won't bring the reductions that we need. Instead governments, scientists, engineers, businesses, and civil society need to come together and create a new conversation. And the product of that conversation will be brought into the U.N. process with several years to go before Kyoto expires.

The United States is often criticized for too much faith in technology. However our faith in human creativity and the application of those inventions, combined with financial commitments and policies, is showing positive results. Our emissions performance since 2000 is among the best in the world. According to the International Energy Agency, from 2000-2004, as our population increased and our economy grew by nearly 10%, U.S. carbon dioxide emissions increased by only 1.7%.

In sum, we think what we have achieved in moderating the growth of emissions in the U.S. speaks volumes to the value of our approach. We believe discussions among countries who are the biggest emitters of greenhouse gases – especially on how to transfer and apply clean energy technology – can lead to genuine reductions in emissions and real progress in combating climate change while helping afford the energy people need, whether in developed, emerging market, or developing countries. I talk to my counterparts in Japan's Ministry of Environment, Ministry of Foreign Affairs, and Ministry of Economy, Trade and Industry regularly about these very topics. There are continuing high-level consultations between the U.S. and Japan on climate change, the need for energy, and the role of technology. All of us in the U.S. government hope for continued close coordination between Japan and the United States and our other key partners as we proceed with our strategy this fall. These are global challenges and our countries have to work together to solve them.

Thank you.

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Science and Technology in the 21st Century — Toward an Affluent and Sustainable Society—

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Science and Technology in the 21st Century

—Toward an Affluent and Sustainable Society—

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Introduction

- 2007 has been a year of climate change: It has been 10 years since the Kyoto Protocol, 15 years since the Rio Earth Summit and 20 years since *Our Common Future* was published. The IPCC's Fourth Assessment Report was published and Al Gore's film, *An Inconvenient Truth* made headlines. Recent years have seen damage caused by climate change and made the phenomenon a reality for many.

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- Meanwhile, Japan is in the midst of revising its action plan for reaching reductions pledged under the Kyoto Protocol.

- Prime Minister Abe proposed in Heiligendamm that world greenhouse gas emissions should be halved by 2050. This debate is certain to intensify at next year's Toyako Summit.

1. What is sustainability?

- The term "sustainable development" was coined in *Our Common Future*, the 1987 report authored by the U.N. Brundtland Commission (named after the former Norwegian prime minister and chair of the World Commission on Environment and Development).

- Subsequently, debate raged on the various interpretations of this term; however, in the commission's report it is defined as: "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. In addition, sustainable development has also been defined as improving people's way of life without exceeding the bounds of the ecological carrying capacity of the environment to support it. (*Caring for the Earth: A Strategy for Sustainable Living,* 1990).

- Consequently, 20th century industrial civilization—with its pattern of mass production, mass consumption, and mass disposal—and its attendant problems of natural resource depletion, global environmental pollution, and the increasingly serious North-South divide came to be viewed as unsustainable in the 21st century.

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2. Global environmental problems are an important G7 agenda item

- The Brundtland Commission's conclusion that, if unchanged, the pace of 20th century industrial civilization would harm the welfare of future generations, was a clarion call to action that found greater traction than anticipated and resulted in global environmental issues being put on the agenda of the Toronto Summit in June 1988, the first time that this had happened.

- Immediately following the seven-nation summit, the Canadian government held a national assembly (also in Toronto) focusing on global environmental issues, at which shocking results from simulations indicated that if carbon dioxide continued to be released at current levels, the average global temperature would rise by three degrees and sea levels would rise by 60 cm.

- The following year (1989) at the Paris Arche Summit, interest was such that one-third of the economic declaration was dedicated to global environmental issues, and interest in the issue seemed to be growing daily.

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3. Kyoto Protocol's entry into force

- Subsequently, in 1992 the United Nations Framework Convention on Climate Change was adopted at the UN Conference on Environment and Development in Rio de Janeiro. Following the treaty's entry into force, the First Conference of Parties to the convention (COP1) was held in Berlin from late March to early April 1995. In December 1997, COP3 was held in Kyoto and the Kyoto Protocol was adopted.

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- After dragging its feet on ratifying the protocol, Russia finally did so in November 2004 and the Kyoto Protocol went into force on February 16, 2005.
- Abe Initiative (May 24, 2007): 1) Halve GHG emissions by 2050; 2) include all major emitters in one agreement; 3) balance emissions cuts with economic growth; and 4) require innovative technological development.

4. The 20th century—economic growth and development

- If asked to say what it was that characterized the 20th century, how would you respond? One answer might be that it was a century of economic growth and development.
- Why did the 100 years of the 20th century witness such explosive economic growth and development? One answer to this question would be the constant technological innovation. In one sense, the 20th century could also be called the century of innovation.
- When comparing the Japanese way of life in 1901 with that of the Japanese today, there is clearly an immense gap. Innovation is the engine that drives economic development.

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5. 20th century was a century of carbon dioxide

- Why did technological innovation take off in the 20th century? One answer is that in the 19th century, mankind discovered two sources of energy: oil and electricity. This technological progress has made our lives more convenient and given us a steady stream of new products that make life more enjoyable. However, these run on either electricity or oil. In this sense, it is fair to say that the 20th century was a century of electricity and oil.

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- However, the other side of this is that the 20th century was also a century of carbon dioxide. In other words, our affluence came at the cost of emitting ever greater amounts of carbon dioxide.

6. 20th-century industrial civilization already unsustainable

- As the 20th century was coming to an end, nearly 160 countries gathered in Kyoto in 1997 and agreed to cut greenhouse-gas emissions (in terms of CO2-equivalent value) in the five-year period from 2008 to 2012. The pledged cut of at least 5 percent by the 40 developed nation signatories reinforced the idea that the 20th century model of industrialized civilization was truly unsustainable.

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- Science and technology in the 20th century was pursued for the sake of economic growth and development. However, in the 21st century science and technology need to foster sustainable development. If the watchword for the 20th century was “growth,” then that for the 21st century must be “sustainability.”

7. Plotting the progress of science and technology

- Until the world was hit by the Oil Shock of 1973, the trajectory of technological progress was towards things that are bigger, faster, and more powerful, as epitomized by the Jumbo Jet and Concorde.
- However, in the last quarter of the 20th century, the trajectory of technological progress underwent significant change. In other words, technological progress came to be defined as the development of new devices or equipment, such as those with improved fuel economy or better cost-performance. As global environmental issues burst onto the radar in the 1990s, this trend accelerated.

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8 . Technological innovation: spurred by constraints and shortages

- In general, technological innovation is spurred when there is a constraint or a shortage. When the 21st century is called the “century of the environment” this has two meanings. The first is that environmental problems will only become more serious. The second is that environmental constraints will spur technological innovation.
- People often say that the world is awash with things, thanks to technological innovation. When speaking of goods that involve the transportation of people or objects (such as vehicles and airplanes), home electronics, communication devices, or computers, it might be fair to say that these technologies are approaching maturity. Put another way, from a material perspective the “shortage” or lack of things has nearly disappeared.
- Two examples of what might constitute future “constraints” or “shortages” which will fuel technological innovation are offered. First, the dream of perfect health and immortality. Second, environmental limitations. It seems reasonable to assume that only technological progress that overcomes the limitations of the environment will enable corporations to survive in the 21st century.

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9. The irreversibility of science and technology

- Next is the topic of the irreversibility of science and technology. There are few examples of technologies that, once unleashed, have been truly removed from the market. Whether this technology harms life and the environment, is banned legally, or is rejected by people, such cases are very uncommon. As far as I am aware, instances such as this have been limited to a number of harmful chemicals, such as DDT, the sedative Thalidomide, ozone-depleting fluorocarbons, and asbestos.

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- Why is science and technology irreversible? The reasons for this are that 1) there is a group of experts and engineers that will make a technological innovation their area of expertise; and 2) industries arise that are dedicated to manufacturing new products using this technological innovation.

10. Trade-offs and the precautionary principle

- It is safe to say that all technologies come with trade-offs. Some examples are as follows: the effects and side-effects of medicine, embryonic stem-cell research and bioethics, nuclear power plants and the risk of accidents, large-scale public-works projects and the destruction of nature, and the positive and negative effects of digital devices on society.

- Clearly, future deliberation on science and technology must employ the precautionary principle more aggressively. In the areas of genetically-modified crops and the early implementation of climate change measures (CO_2 reduction measures), the question of whether decisions should be based on the precautionary principle or should be rooted in sufficient scientific knowledge is being raised. The former carries with it the possibility of having to pay unnecessary costs, while the latter raises the prospect that we will find ourselves in a situation which cannot be undone.

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11. Affluence and intellectual development: preconditions for creating a society that puts a priority on the environment

- There is a gradual, yet steady transformation afoot in which environmental soundness, whether in lifestyles or business, is coming to be viewed as “cool.” Historically, in Japan lifestyles embodying the ideas of thrift, simplicity, and durability were valued. However, with the inflation of the bubble economy, the social aesthetic took an about-face and extravagance came to be regarded as “cool.”

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- Yale University historian Paul Kennedy has asked what commonalities exist between the various countries of Northwestern Europe, such as Sweden, Norway, Finland, Denmark, and Holland, that make their societies so keen on environmental protection. He answers that one common theme is their achievement of sufficient affluence, while another factor is their high level of education.

12. What will define affluence in the 21st century?

- Zeal for protecting the environment is one sign of affluence. That the Japanese do not embrace environmental protection so enthusiastically hints that, while on paper per-capita GDP is on a par with that of the five countries mentioned, affluence in Japan has not reached a level that allows people the luxury of considering the environment. In terms of the percentage of students that pursue higher education, Japan's educational levels are high; however, doubts remain about Japan's actual intellectual level.

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- With the shortage or lack of things having been virtually overcome, the trigger of economic growth in the 21st century will be environmental constraints. Tackling environmental constraints will be necessary to increase per-capita GDP.

- Addressing environmental constraints will spur economic affluence, and increased quality of life (QOL) will heighten enthusiasm for environmental protection. For Japan to become an affluent society, improving QOL and raising the intellectual level will be essential, as will successful technological innovation that overcomes environmental constraints.

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Who is capable of leading our journey toward resolving global issues through innovation?

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"Who is capable of leading our journey toward resolving global issues through innovation?"

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Yoko Ishikura, Professor, ICS, Hitotsubashi University
December 17, 2007

Introduction

It is some time now since innovation became a buzzword throughout the world. In the academic community, the number of papers on innovation has increased dramatically since the latter half of the 1990s[1]. It is almost impossible to find business articles or annual reports not containing the term "innovation", as many firms now realize that innovation is the only means to sustain their competitive advantage. A continuous race is underway for "new" products, services, and markets. Innovation has also become a key agenda for public policymakers throughout the world, often in the form of national innovation policy initiatives, regardless of the stage of a country's economic development.[2]

These efforts for innovation have achieved some results, and yet there are two fundamental issues to be addressed more explicitly today.

The first issue is the gap between the scope of these national initiatives and that of the global issues we face today, as well as the need for a more integrated and comprehensive approach at the global level. The second issue, though closely related, is the collaboration between public and private sectors and the increased role the private sector could play in efforts to resolve these issues.

In this paper, I argue that because private sector companies are the ones that create value through innovation and are in the best position to seek profitability, growth and a sustainable society at the same time, the private sector should be taking a more active role in our quest for innovation than in the past. By capitalizing on their experiences of daily global competition, private sector companies could and should be complementing the public sector. They should collaborate in a more proactive manner through joint

[1] "Oxford Handbook of Innovation" Ed. Fagerberg, Jan, Mowery David C. and Nelson, Richard, Oxford University Press pp.2
[2] "Overseas Science & Technology Trend Report"(in Japanese) Center for Research and Development Strategy, Japan Science & Technology Agency, 2006 and 2007

efforts to resolve global issues. The public sector, on the other hand, is quite limited, by definition, to address issues beyond national boundaries and is not capable on its own of achieving the goal of economic growth and a sustainable society.

Issues we face today - mostly global in scale and scope

In the face of globalization, in which economies have become inter-related and inter-dependent, thus competition transcends various national, industrial and organizational boundaries, many of the issues we face are global in scope and scale. (Exhibit 1)

The search for alternative energy sources to the fossil fuels we have depended upon so heavily has been underway for quite some time.[3] The need for alternative energy sources including nuclear energy has become even more urgent, with the demand for energy expected to rise sharply in the next decade. The general consensus today is that there is no single source of energy capable of meeting the rapidly growing demand. It is also generally agreed that this issue will not be resolved within one country, as the rising demand for energy comes mainly from emerging economies such as China and India, where many products and services are produced for export to markets such as the U.S.[4]

Environmental issues such as global warming do not recognize national borders, and thus need to be resolved as such. The fact that former U.S. Vice President Al Gore and the IPCC (Intergovernmental Panel on Climate Change) were awarded the Nobel Peace Prize in 2007 for their contributions in raising global awareness of the status and causes of global warming, calling for immediate action on a global scale indicates the global nature of the problem very clearly.[5]

Demand for resources such as food and water is more prevalent in regions such as Asia, Latin America and Africa, where civil and tribal wars take place over the fight for resources.[6] Advanced economies cannot escape from the resource constraint problem, as the battle in emerging economies affects the global price of commodities such as food.

Healthcare is also a global issue, as there are still some regions, including in Africa and Asia, where basic hygiene and health have not been secured. In a global era with people moving around constantly, there is the possibility of epidemics such as avian flu

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[3] For examples, see discussion at Science & Technology in Society (STS) Forum at http://www.stsforum.org/

[4] See the latest report by IEA http://www.worldenergyoutlook.org/ http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=239

[5] For announcements on the Nobel Peace Price 2007 and related information see http://nobelprize.org/nobel_prizes/peace/laureates/2007

[6] See discussion on STS Forum, 2007 (op.cit.)

traveling extremely quickly throughout the world once they break out. [7]

National innovation ecosystem initiatives - broad-based, but within national boundaries

Recent years have seen many national innovation ecosystem initiatives in a number of countries. Often-cited examples include the National Innovation Initiative of the U.S. (well known for its "Innovate America" report)[8], the EU's Aho report[9], and Innovation 25, a recent attempt by Japan.[10] Emerging economies such as China and India have also launched national innovation policy initiatives at an accelerating pace, catching up very quickly with initiatives in advanced economies.[11] These initiatives are characterized as having a "broad-based, ecosystem" approach, different from the traditional approach, which focuses mainly on science and technology. Aware of the need to build an innovation-friendly environment, they cover various aspects of the social system, such as human capital, education, investment and infrastructure. Japan's Innovation 25 and similar national initiatives by Singapore, South Korea and China are all broad-based in their approach, and thus comprehensively seek reform and innovation in the social system that goes beyond simple science and technology or R&D investment. (Exhibit 2)

These initiatives have had mixed results in promoting innovation through creating and enhancing an innovation-friendly environment. Some policies, for example, have been implemented with financial budget support and with actual changes in regulations and tax policies promoting the smooth flow of risk capital, while others remain as "slogans" rather than "actions" implemented by all involved parties.

What is more significant, however, is that the majority of these initiatives focus on building "national" innovation ecosystems, rather than explicitly addressing global issues. (Exhibit 3)

Initiatives such as "Five for the Future", very recently launched by the Council on Competitiveness in the U.S., recognize the need for a comprehensive and integrated approach at the global level.[12] This approach is different from the former National

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[7] For an example of this, see http://www.who.int/en/

[8] "Innovate America" (2004) "Competitiveness Index: Where America Stands" (2006) Council on Competitiveness, Washington D.C. http://www.compete.org

[9] "Creating an Innovative Europe -Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit", Aho, E., Cormu, J. Georghiou L. Subra A (2006) Rapporteur: Luke Georghiou, January 2006

[10] For an executive summary of the Innovation 25 Interim report in English, see http://www.kantei.go.jp/foreign/innovation/interimbody_e.html

For the long term strategic guideline "Innovation 25", see the summary of Kiyoshi Kurokawa's key note speech at Global Innovation Ecosystem Conference 2007
http://www.gies2007.com/en/symposium/summary/kurokawa.html

[11] Global Innovation Ecosystem 2006: http://crds.jst.go.jp/GIES/archive/summary.htm

[12] "Five for the Future" 2007 Council on Competitiveness, Washington DC

Innovation Initiative. The EU's Framework is expected to play a similar role beyond the region under immediate EU control.[13] However, these initiatives are just starting and clear action has yet to be taken to address the global nature of the issues.

Private sector companies - filling the gap?

In order to fill this gap between national innovation ecosystem initiatives and the global nature of the issues we face today, I propose a more active role on the part of private sector companies.

It is quite natural that the public sector leads initiatives in the early stage of the economic development of a nation, building basic infrastructure such as transportation, utilities and telecommunications, and putting basic education and healthcare systems in place. The aforementioned initiatives to build a national innovation ecosystem follow these basic efforts, as governments realize the need to continuously innovate to attain economic growth and prosperity. A national innovation ecosystem calls for collaboration between the public and private sectors, and the term "ecosystem" itself signifies the evolutionary interaction of various players - specifically, the government, companies of various sizes, universities, and service providers.(Exhibit 4) In actual fact, a number of efforts have been made to promote collaboration between the public sector, universities and business community. [14]

What I want to propose is an even more active role on the part of private sector companies in resolving global issues.

The rationale is as follows: (Exhibit 5)

1) The global arena is the reality for private sector companies.

Private sector companies face the reality of global competition every day and they make every effort to survive by tapping resources and reaching for markets throughout the world.[15]

With the exception of companies whose operations are constrained to one nation or region, such as utilities companies, many companies today operate in the global arena. With the progress of ICT (Information and Communication Technology), these companies are becoming increasingly able to seek and hire people with the required skills, regardless of nationality, age, background or physical location, to collaborate on

[13] For Innovation Policy and other initiatives updates, see http://cordis.europa.eu/innovation/en/home.html

[14] See "National Innovation Ecosystem Initiative for Science-based Innovation 2006" (Japanese), Center for Research and Development Strategy, Japan Science and Technology Agency, for example.

[15] For examples, see "What Matters" McKinsey & Company, 2007

projects. The possibility of tapping global talent is more significant, as the economy seems to be in the process of shifting from a knowledge-based to concept-based economy. In the concept-based economy, human capital and other intangible assets have become more critical and will be even more so for a sustainable competitive advantage, rather than tangible assets such as physical plants and equipment.

With constant access to the Internet and the emergence of companies such as Google and e-Bay, companies are able to reach consumers and penetrate markets in physically distant locations.[16]

At the same time, the competition companies face today is no longer limited to their rivals in the "industry" in certain geographic markets. Competition may emerge from anywhere in the world, such as the emerging economies of India and China, or from different industries as the definition of 'industry' becomes blurred.

This "global" scope is the reality for private sector companies as they face this issue on a daily basis. Companies have now accumulated the know-how to tap resources from throughout the world and market their products and services beyond national boundaries.[17]

2) Management of complex value chain activity networks throughout the world

As characterized by the term "globally-integrated enterprises", global giants such as IBM now locate their value chain activities at optimal locations throughout the world and manage them as a complex network.[18] They are not limited to activities in certain geographical areas, unlike the public sector. In addition to physical supply chain networks where materials and parts are sourced, processed, assembled and transported to numerous locations throughout the world, knowledge and know-how networks are being set up and utilized on a trial and error basis by companies. The virtual global network has become more important now that a certain type of knowledge (often called "explicit" knowledge) is rapidly becoming a commodity.[19] Knowledge and know-how are exchanged, shared, and re-created throughout the global network, for example, in the financial services, consulting and other knowledge-intensive sectors.[20]

In addition to the global giants, small IT entrepreneurs, such as those from India, are also targeting the world market from the outset, and thus setting up complex value

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[16] About discussion on Forces at work and their implications for business strategy, see for example, "Business Strategy in the Web2.0 era"(in Japanese), Ishikura, Y, Think, Winter, 2007

[17] See some discussion at World Economic Forum, Annual Meeting of New Champions 2007, for example, http://www.weforum.org

[18] "The Globally Integrated Enterprise" Palmissano, Samuel, Foreign Affairs, May/June, 2006

[19] See "Act Globally, Think Locally" Ishikura Y, Harvard Business Review, Feb.2007.

[20] For example, see the WEF Annual Meeting of New Champions, 2007 (op.cit)

chain activities beyond their domestic markets, which are far too small for their products and services.[21]

Private sector companies, through their efforts to manage such a complex and ever-changing network of operations, have accumulated know-how in addressing global issues such as immigration, differences in physical distribution, consumer behavior and culture etc. This kind of intangible asset base can only be accumulated through actual experiences (i.e. learning by doing) and through a great deal of trial and error. It has enormous value, as it cannot be acquired from textbooks.[22]

3) Value is only created by the private sector

Value creation, and not value distribution, is at the heart of our journey towards economic prosperity and a sustainable society. Value needs to be created before it is distributed and it is private sector companies, and not governments or universities, which translate new knowledge into the products or services which benefit consumers. As is clear from the excellent example of Singapore in the late 1970s and 80s, the more recent example of China, and the development of the Eastern bloc countries, in contrast to the struggles in Africa, economic development should precede or take place in parallel with the democratization of countries. If economic policies are not integrated with the social and political agenda and the standard of living does not rise, social unrest or political instability usually result. Value should be created first and private companies are the main players in creating value over the long run, even in developing economies.[23]

For advanced economies such as the U.S., Western European countries and Japan, wealth needs to be continuously created by innovation and entrepreneurship to maintain the dynamism of the nation and upgrade the economy.

Existing companies in the private sector, in their pursuit of profitability and growth, and new entrepreneurs, whether high tech or not, play the main role in wealth creation.[24]

4) Corporate social responsibility beyond national boundaries

Recent years have seen many more private sector companies take on issues once

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[21] For example, see the panel discussion summary at Global Innovation Ecosystem 2007, http://www.gies2007.com/en/symposium/summary/panel/html

[22] "Knowledge Creating Company," Nonaka, I and Takeuchi, H 1995, Oxford University Press

[23] See case studies and other research at Institute of Strategy and Competitiveness, Harvard Business School, http://www.isc.hbs.edu

[24] For small companies impact on U.S. competitiveness, see "Where America Stands: Entrepreneurship" Council on Competitiveness, 2007

thought of as public.[25] This includes various efforts to develop human capital – for example, science and technology education at primary and secondary schools, immigration policies, and the retraining of displaced workers in manufacturing. In addition to efforts to build and upgrade the regions that private sector companies locate to, more companies have begun "philanthropic" activities beyond national boundaries.[26]

Various activities by the private sector in the U.S., for example, concerning energy efficiency and environmental issues, provide us with one such example. Unlike the Bush administration, which has not been known for its strong commitment to the issue of global warming, private companies such as IBM, BP, Wal-Mart, and P&G have led recent efforts to re-build and re-design value chain activities with energy efficiency and environmental friendliness in mind. CSR investment funds have become quite popular and have become a part of investment portfolios. The ranking of companies in terms of their social responsibility and contribution to a friendly environment for customers, employees and the community, and not only in terms of profitability, has become more prevalent today.[27]

Judging from the agenda and issues discussed at world-level conferences such as the World Economic Forum, it is clear that the trend toward a more socially-conscious corporate agenda will remain an important standard. More evidence and studies have become available which show that social responsibility and long-term profitability is not a trade-off.[28]

5) Social entrepreneurs

There are an increasing number of social entrepreneurs emerging. The Gates Foundation, headed by Bill and Melinda Gates, is the organization with the largest endowment in the world and is known for its business approach to social issues. Various activities of the Gates Foundation, such as its Global Health project, and the announcement by Bill Gates of the full commitment to the Foundation in 2008 have encouraged more people to take this combined approach.[29] Heightened interest in developing countries among the younger generation in the U.S., for example, indicates a clear awareness of the issues at large beyond national boundaries.

Most social entrepreneurs are, in a way, a hybrid between the private and public

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[25] "Strategy and Society: Linking Competitive Advantage and Corporate Social Responsibility" Porter, M.E, and Kramer Mark ,Harvard Business Review, December 2006

[26] See panel discussion at GIES2007, also New York Academy of Sciences, http://www.nyas.org

[27] "The McKinsey Global Survey of Business Executives" McKinsey Quarterly, January 2006, November 2007

[28] "CEOs on strategy and social issues" The McKinsey Quarterly, October 2007

[29] Gates Foundation, http://www.gatesfoundation.org/default.htm

sector. The aggressive use and application of business skills and concepts, in particular entrepreneurship and innovation, is expected to help resolve global issues in the future.

The Nobel Peace Prize of 2006 went to the Grameen Bank and its founder Muhammad Yunus for his microfinance to help impoverished women in Bangladesh to become self-sufficient and independent. This is another example of social entrepreneurship.

Implementation - existing or new organization?

How, then, could private sector companies become more proactive in this ambitious and challenging task of resolving global issues? It is clear that a single company, however large, cannot do this job alone. The private sector cannot accomplish this job on its own, either.

I would like to propose a new type of diverse and open organization, which is a hybrid of the real and virtual (more virtual than real in its activities), as an agent for change for this purpose. (Exhibits 6 and 7)

The reasons for this are as follows:

1) The organization needs to have a clear, distinctive mission and vision beyond those of any particular organization, whether company, government, or university, to resolve global issues. Thus it needs to be diverse, covering a variety of sectors.

Most of the existing organizations, including established business associations, semi-governmental organizations or university consortiums in Japan have a long history and tradition, which would limit their activities. The majority of these organizations tend to have an origin in one of the three sectors - business, government or academic. In that sense, they do not meet the requirement for diversity. Furthermore, they tend to be "perceived" as representing a certain sector or group, which would hinder their activities.

Existing organizations, in addition, have members who have worked hard to make the organizations into what they are today. It is natural that they have pride in building such institutions. It requires more energy and time to transform an existing organization with a long tradition, certain culture and administrative heritage than to create a new organization with a clear vision and mission for the future.

2) The organization needs to have a clear strategy of applying "innovation" to resolve global issues. As global issues requires complex problem solving (see Exhibit 8 for the typical problem solving process) in the unexplored area, the new organization

needs collaborative and competitive style where new ideas and concepts can be developed, tried and implemented, preferably in an open space.

3) The organization needs to make the best use of the most up-to-date technology, in particular, ICT which functions as an enabler for connecting individuals, groups and organizations beyond various borders.

The new organization should take every advantage of current and upcoming technology. ICT has progressed and will continue to progress at an unprecedented speed, enabling communication, whether audio or visual, regardless of global location. Existing organizations, on the other hand, are in most cases trapped by both technologies and mediums of communication which are less up-to-date and by working together through conferences or meetings, with written reports completed months later.

It is easier to design an organization with virtual forums and a virtual platform from scratch than to attempt to transform existing systems and upgrade them, as the latter approach tends to face many obstacles and challenges from inherited systems and processes. In a virtual platform and forum, people can share knowledge and know-how and interact freely beyond physical space.

In addition, it is often pointed out that the economic and social revolution and change triggered by the progress of ICT, is still only half complete, leaving many more new opportunities for the future.[30] The major features and requirements of more advanced ICT, both present and future, such as the personalization, decentralization, importance of intangible assets and co-existence of two elements once considered a trade-off (global and local, individual and organizational, competition and collaboration etc.) sometimes go against the traditional mentality of mass market, centralization, physical assets, and above all, existing power structures.[31]

It is far more efficient (speedy) and effective (fits the objective) to start a new organization in cooperation with people who are ready for the new requirements and mind-set. Virtual medium will go a long way toward resolving the problem of increasingly scarce time resources of the members and member organizations.

4) The organization needs to have readiness to collaborate with similar action-oriented, adaptive and evolving organizations in other countries.

As one of the major objectives of the new organization is the tackling of global issues,

[30] "Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages" Perez, Carlota, Edward Elgar Publications, 2002

[31]"Business Strategy in the Web2.0 era" Ishikura, Y. (2007) op.cit

it is imperative that the organization has a global perspectives AND infrastructure for global collaboration.

A global perspective is easier to accomplish as it is more of a mind-set and mentality based upon real experiences. It would be possible to ensure that the participating organizations and/or members have a global perspective rather than national or regional perspectives.

The difficulty lies in the infrastructure for global activities. In order for a diverse organization to have collaborative/competitive interaction, the communication medium needs to be based upon a de-facto (common) global standard. Thanks to the progress of ICT, web-casts and You-Tube have become an extremely easy medium to transmit visual images across national boundaries. Communication takes the form of audio and/or text, thus, translation remains as an impediment. Under circumstances in which it will still take some time before automatic translation into English, now the de-facto global standard language, becomes available and easily accessible, English will function as the de-facto standard, making it imperative for the members of the new organization to communicate in English.

Another approach to take in designing a new organization is to learn from similar organizations established overseas. Learning from the history and activities of such organizations throughout the world will also open up realistic and practical avenues for collaboration on a global scale.

One such example is the Council on Competitiveness (COC) in Washington DC.[32] The Council was founded in 1986 at the initiative of John Young, then Chairman and CEO of Hewlett Packard. A predecessor to the COC was the President's Commission on Industrial Competitiveness, which was established by President Reagan in 1983. The report of this Commission "Global Competition: The New Reality", also known as the "Young Report", became the game plan for both public policymakers and the private sector in the U.S. and has resulted in many activities beyond its publications or reports. It has served as a platform for concrete action.

An additional key characteristic of the COC that we need to focus on is the fact that it is a private sector, non-partisan advocacy group of CEOs composed of all sectors of the economy, presidents from the nation's top universities, and labor leaders. The diverse nature of the COC, along with it orientation towards action, could provide a model for the new organization.[33]

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[32] http://www.compete.org

[33] There was an attempt at collaborating with the COC in Japan, at the U.S.-Japan Innovation

Though the COC originally began with a primary focus on U.S. (thus national) competitiveness, and not on global issues, the COC has made a certain shift in the issues they address, as shown in the most recent initiative "Five for the Future." Despite its 20 year-history, it has renewed and transformed itself to address most current and urgent issues. The reason for this, in my opinion, is because the organization is private-sector driven, and the private sector cannot survive unless it adapts to a changing world.

I believe there are some other organizations, private sector-driven and yet diverse, including universities, public policymakers and other relevant parties, already existing and/or emerging in other parts of the world, which we need to study. We could learn from these examples and approach them for collaboration in resolving global issues.

5) Full-time competent professional staff and dedicated support staff

Another desirable feature of the new organization, without which it will not produce tangible results, is competent staff capable of working in a "globally-networked" environment preferably on full-time basis. It would be ideal to have a leader for each project who has had some experience of project management. Speed in getting the plan implemented, follow up and an open/public format with transparent processes disclosed on the Internet will be key to this process.

Without professional staff, no matter how many well-known companies signed up for the cause, the organization would not function and would become yet another layer consisting of the members of a top management group with no time to come even to the meetings and few staff sent from the member companies.

What we need are professional members of staff who have not only considerable knowledge in certain disciplines and/or functions, but also possess a wealth of personal experience of actual project management and problem-solving. Thus, company people with extensive knowledge about how their own company tends to function, but little experience of identifying issues in a much broader space, preparing and actually carrying out project plans, and getting the solution implemented would not qualify.

Without competent staff, the organization would not work and would remain yet another Council on Innovation and Competitiveness with few tangible results.

Another critical ingredient for the new organization is support staff. Support staff who

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Summit which was held in September, 2005 in Nagoya." Summit Report, Strategies for Global Prosperity: A US-Japan Innovation Summit" COC, January 2006. However, collaborative efforts do not appear to have continued.

are young (in their 20s and/or even student interns) and interested in working for global hybrid (private-public) organizations would be a great help. They could be recruited on a project-by-project basis and trained with problem-solving skills. Communication capability in English, the global de facto standard today, will be a minimum requirement for the support staff.

Conclusion

Globally integrated enterprises are expected to play a significant role in identifying the issues which threaten the planet today. Issues such as energy efficiency, environmental protection, and global health are NOT going away, unless we take action to help resolve them soon and decisively. As these issues are very complicated, involving many nations, sectors and disciplines, it will not be easy to identify their causes or develop a portfolio of solutions.

But for this very reason, I propose that private sector companies, in particular globally-integrated enterprises, whether large or small and regardless of national origin, should and could make contributions in this field. Organizations and people will not be aware of the reality of operating in the global arena until they face both the potential and risk of global reach, global collaboration and competition for themselves. It is time for the companies who have already felt this reality and have learnt valuable lessons through trial and failure to take a more proactive role.

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http://www.worldenergyoutlook.org/

http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=239

Exhibit-1

Issues we face today

-Energy (Portfolio of energy sources to meet the growing demand)

-Environment – global warming etc.

-Demand for resources – Food, Water, cause for tribal wars

-Healthcare – Basic health in developing countries, epidemics

All Global in Scale and Scope

Exhibit-2

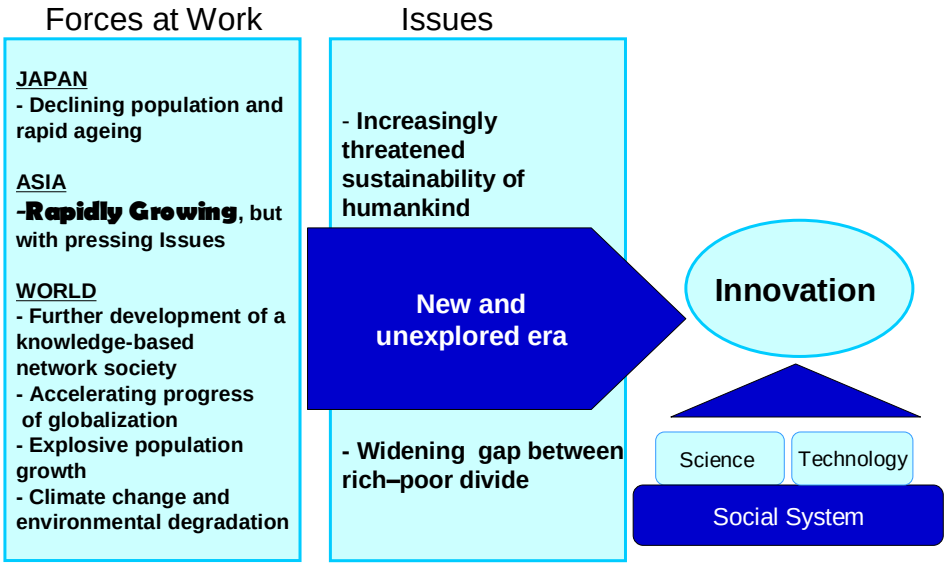


Exhibit-3

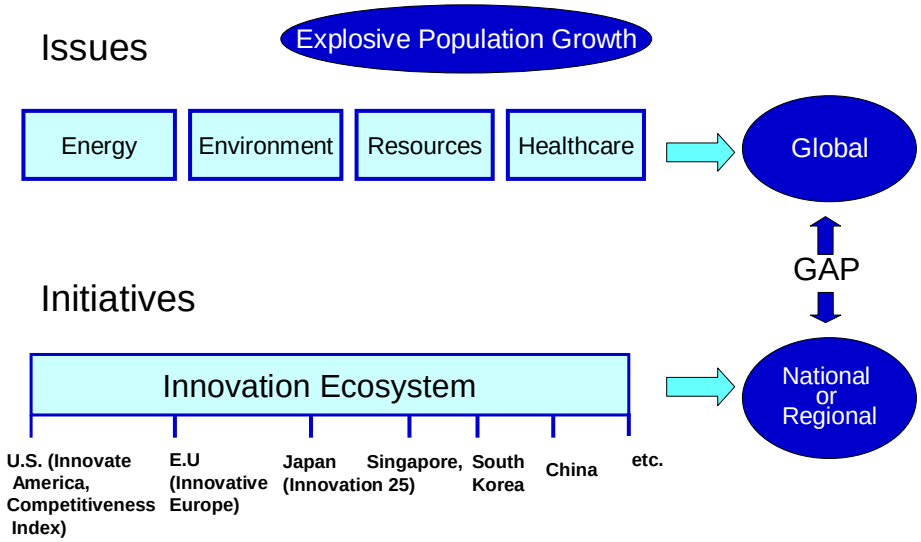


Exhibit-4

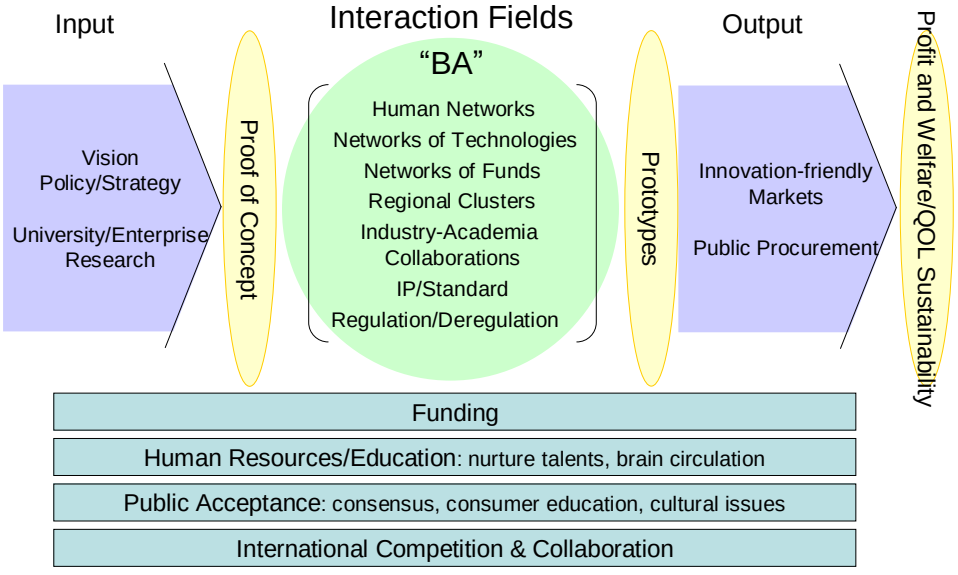


Exhibit-5

Why Private Companies?

-Global area is the reality
Resources, markets from global and local

- Management of complex VC activities throughout the world
Globally-Integrated Enterprise

-Value /Wealth Creator> Value/Wealth Distributor

-Corporate Social Responsibility beyond national boundaries

- Social Entrepreneurs
Gates Foundation, Grameen Bank

Exhibit-6

Global Issues

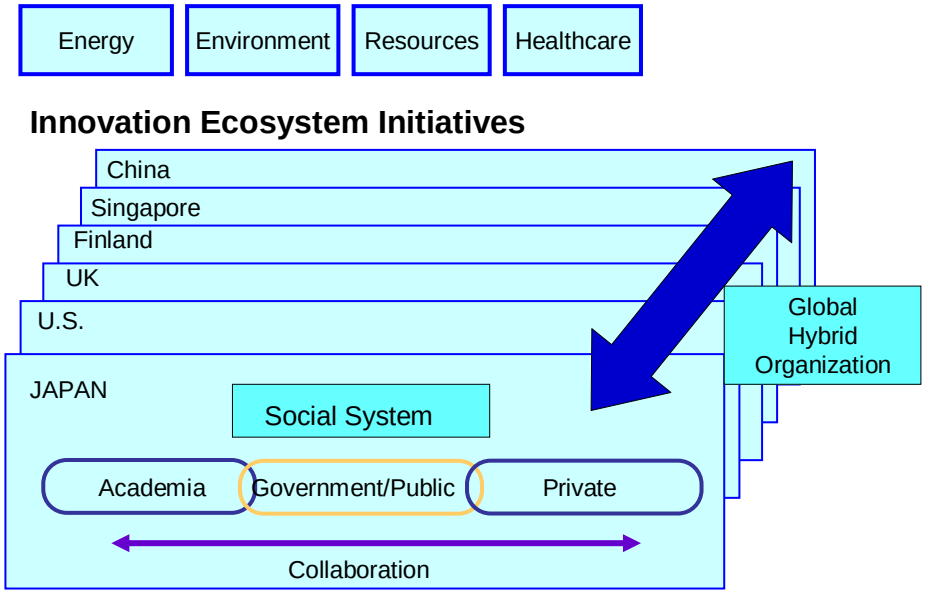


Exhibit-7

Requirement for Global Hybrid Organization

-Global; Clearly beyond national borders

- Private sector driven

-Diverse, representing not one sector

- Innovation as main driver

-Best use of current and updated ICT

-Collaborative and competitive with other organizations overseas

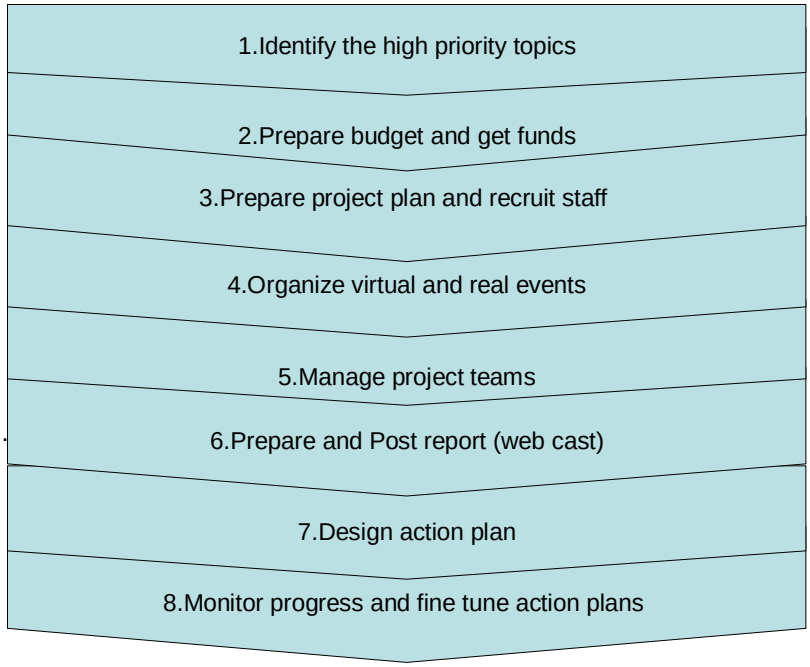
-Globally –networked Professional Staff

- Young and dedicated support staff

-Well versed in de facto global language

Exhibit-8

Typical steps in Problem Solving Process



（余白）