Proceedings of

JICA-WB JOINT SEMINAR

on February 1st, 2008

Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society

April 2008

Japan International Cooperation Agency

Proceedings of

JICA-WB JOINT SEMINAR

on February 1st, 2008

Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society

April 2008

Japan International Cooperation Agency

Contents

Contents
Photos
Abbreviations

1. Opening Address
1-1 *Mr. Yoshihisa Ueda*, Vice President, JICA (Japanese version available).....1
1-2 *Mr. Lester Dally*, Acting Special Representative, Tokyo, The World Bank.....6

2. Keynote Speech
"Sharing Knowledge of Science and Technology at Global Level by Establishing International Network of Higher Education Institutions" (Japanese version available).....8
Dr. Tsutomu Kimura, President, National Institutions for Academic Degrees and University Evaluation

3. Case Study
3-1 *"Promoting STI in Sub-Saharan Africa Collaborative Initiatives: Rationale, Lessons Learned and Future Promise"*.....24
Mr. Jeffrey Fine, Consultant, The Partnership of Higher Education in Africa
3-2 *"SOI Asia Project: As a global educational platform in Asia"*.....27
Dr. Keiko Okawa, Professor, Graduate School of Media and Governance, Keio University (Presenter: *Dr. Achmad Husni Thamrin*)
3-3 *"University Built through collaboration of Japanese and Thai business Sector: A Case of Thai-Nichi Institute of Technology, Thailand"*.....30
Assoc. Prof. Krisada Visavateeranon, Rector, Thai-Nichi Institute of Technology, Thailand
3-4 *"Present and Future: Formation of Network on Higher Education/Science and Technology through JICA Technical Cooperation"* (Japanese version available).....33
Dr. Manabu Tsunoda, Senior Advisor, JICA
3-5 Questions and Answers.....42

4. Panel Discussion
4-1 *"STI NETWORKS: Context for Africa's development"*.....44
Dr. Bonakele Mehlomakulu, Deputy Director General, RD&I Department of Science & Technology
4-2 *"Networking for Change: STI and Higher Education in the Global Society"*.....47
Mr. Alfred Watkins, World Bank S&T Program Coordinator
4-3 Discussion.....49

Attachment
1. Agenda (English/Japanese).....59
2. Curriculum Vitae.....61
3. Presentation Slide.....64
4. Reference.....145

Annex
Naoko Toriumi, International Development Center of Japan *"The Study on Higher Education Networks For Promoting Science, Technology and Innovation Final Report"*

Photos

Abbreviations

AABS	African Association of Business Schools
AEARU	Association of East Asian Research Universities
AOTS	Association for Overseas Technical Scholarship
API	Application Program Interface
BecA	Biosciences eastern and central Africa
CDFJ	the College Doctoral Franco-Japonais
HKUST	Hong Kong University of Science and Technology
ICT	Information and Communication Technology
ILRI	the International Livestock Research
INHERENT	Indonesian Higher Education Network
IP	Intellectual Property
IPR	Intellectual Property Right
ITB	Institut Teknologi Bandung
JBIC	Japan Bank for International Cooperation
JCC	Japan Chamber of Commerce
JETRO	Japan External Trade Organization
JFMF	Japan Fulbright Memorial Fund
JODC	Japan Overseas Development Corporation
JSPS	Japan Society for the Promotion of Science
JTECS	Japan-Thailand Economic Cooperation Society
KAIST	Korea Advanced Institute of Science and Technology
MAST	Mathe And Science Teaching
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MoU	Memorandum of Understanding
MYREN	Malaysia Research & Education Network
NEPAD	The New Partnership for Africa's Development
ODA	Official Development Assistance
PWR	Pressurized Water Reactor
RENs	Research and Education Networks
S&T	Science and Technology
SEED-Net	Southeast Engineering Education Development Network
SIGCOMM	Special Interest Group on Data Communications
SOI	School On the Internet
STI	Science Technology and Innovation
TICAD	Tokyo International Conference on African Development
TNI	Thai-Nichi Institute of Technology
TPA	Technology Promotion Association Thailand-Japan
UCTS	UMAP Credit Transfer Scheme
UMAP	University Mobility in Asia and the Pacific
UniNet	Inter-University Network
USHEPiA	University Science, Humanities and Engineering Partnerships in Africa
VINAREN	Vietnam Research and Education Network

1. Opening Address

Mr. Yoshihisa Ueda
Vice President, JICA

(The below is translated into English from Japanese Lecture)

Thank you very much for your introduction. This seminar is jointly hosted by JICA and the World Bank. I really appreciate for your cooperation and participation.

Let me cover the background as well as the major objectives of the seminar which we would like to achieve. Today's seminar is on "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society". So network potential will be explored through this seminar. Naturally we will have discussion on the science and technology in the context of international cooperation. This is a major intent of the seminar.

The messages we would like to share is not only the social and economic development of the developing countries, and poverty alleviation and other practical technologies, but also what is called global scale challenges such as climate change, infectious disease and disaster prevention, and the immediate need for the approach in science, technology and innovation. The developing countries should not depend only on the technology and science from the developed countries. Instead of unilateral assistance, the developing countries including the least less-developed countries, should take an initiative in solving their own challenges amid rapid globalization and technical renovation. Networking in such social condition is a background of today's seminar.

As I have just mentioned, in a globalized society, science and technology, intellectual property, human resources are easily shared by many people in a global scale. In order to promote the accessibility from developing countries, we need to develop a solid network.

However, this is not a question of just having the discussion on theory or philosophy or just providing the equipment or machinery. If we do one of these only, the effort will fail. On that sense, some networks are successful but some are not and have failed. During today's seminar, we would like to discuss how we can establish effective and sustainable network.

I would like to make the introduction of the presenters. We will have a keynote speaker who is the front runner and JICA has also received the support. He is the former chancellor of Tokyo Institute of Technology, Mr. Tsutomu Kimura.

There will be a panel discussion as well as case studies. There will be more specific examples in Asia and Africa based on their own experiences as a researcher or an active political practitioner or a head of their representative governmental agencies. In one way or another, any participants or any presenters who would be sharing their experiences today, are the personnel in the front line. I'm very looking forward to hearing their presentations and their knowledge.

JICA is also making efforts in promoting science and technology. Let me briefly explain on that effort. We need to say that JICA is offering effort in human resource development and science and technology initiatives, not just ordinary human resource development for individual, rather we are providing extensive human network, involving personnel, institutions and facilities for long term. Thanks to the effort globally, now we have a very solid human network which are international public properties beyond the nations and expand over the world. Therefore, we think we will play a role in soliciting the infrastructure and basis for the network formation here too. Science and technology have played important roles in each field such as engineering, agriculture, medical science and so on. Looking at the conference schedule of this year, there will be the fourth TICAD (Tokyo International Conference on African Development) hosted by Japan, and a G8 summit will follow. Perhaps these will not be a high profile scale, however the science and technology is supporting the new area, such as climate change and

health, as a main stage of the effort.

For example in JICA's projects, in agricultural science, there is 'Nelica' rice which is mixed by both African disease- resistant rice and Asian rice, which is a hybrid of the new rice, which is resistant to the disease. For dozens of years, we have put in efforts in capacity development for researches as well as disseminating this new type of rice to many developing countries.

In medical science, Noguchi Memorial Institute for Medical Research in Ghana supported medical research on infectious diseases and virus. In 1979, the institute has been established by Japanese Grant Aid and since then, the effort has been continuing. The fruit of the research has been shared in many African countries.

In engineering field, cooperative technical transfer has been implemented through Japan's own events such as a robot competition in Asia. ASEAN University Network/ Southeast Engineering Education Development Network (what we call SEED-Net) started in 2001 and has just 5 to 6 years long of history but there has been significant development through the network. Today the members having direct experiences in this SEED-Net would be sharing their experiences with you later.

This is a part of the strength of JICA to be shared and offered to other countries. We would like to introduce those attempts to you today later.

Regarding the stance of the Japanese government in science and technology cooperation, ODA (official development assistance) has been cut due to the difficult fiscal situations. However, from the next fiscal year, there is a plan to have a solid linkage between the science and technology and ODA budgets. There will be a new scheme to get a combination of those efforts. This could be one step forward the national government of Japan to proceed with their effort.

I would like to talk about JICA itself. JICA has offered cooperation on the knowledge and personnel and JBIC (Japan Bank for International Cooperation) has taken a major role in ODA loans for financial aid. In October this year, this yen-based loan will be transferred from the bank to JICA. So we will make a new start as a new JICA in the fall of this year. For the science and technology discipline, yen loans and grant aid will be implemented. We would like to solidify cooperation through the network, improving and enhancing approaches to the privatized field and some issues by use of comprehensive tool of the cooperation.

Last but not least, today's participants are expected to play a closer role in the sense of science and technology cooperation from now on. So I hope that this seminar would be a starting point for you to develop a close network. I believe today's seminar would be representing a first step for you to deepen your network. Today's presentation time is rather limited. After the seminar is over, all these players at this seminar would be exchanging information closely.

Lastly, I would like to invite my long time friend, who made a suggestion for this seminar for the first time, and also who kindly extended cooperation for this seminar, Mr. Dally. Mr. Dally would give an opening remark on behalf of the World Bank. Thank you.

1．開会の辞

独立行政法人国際協力機構　理事
上田　善久氏

JICAの上田でございます。冒頭、司会者からごあいさつがありましたが、本日の世界銀行・JICA共催によるセミナーに、多数ご参加いただきまして、本当にありがとうございます。

冒頭、ごあいさつにかえまして、本セミナーのねらい、もしくは背景といった点について簡単に述べさせていただきます。セミナーのテーマは「ネットワークの可能性：グローバル社会における科学技術と高等教育支援」、というようにうたっております。その中で本当にネットワークの可能性を探っていこうということですが、当然のことながら、今回議論する科学技術というのは国際協力という視野の中での議論を考えております。

その場合に一体何を発表するのかといいますと、もちろんのことながら、各途上国においての経済、社会の発展、成長、それから貧困削減等々に資するような実用的な技術ということになるわけです。しかし、一方で気候変動や感染症、防災等々の、いわゆる地球規模の課題もあり、これに対する対策としても、科学技術の活用が非常に求められております。そういう意味では、急速なグローバル化と科学技術革新が進展する中で、途上国においても単に先進国の科学技術に依存をする、先進国も科学技術を提供するということではなく、むしろ最貧国も含めまして途上国自身が諸問題を解決するための機会やリソースを提供していく。そういう文脈からのネットワーキングということが本日のセミナーの背景にございます。

セミナーのねらいですが、今述べましたようにグローバル化によって科学技術、それに伴う知識や知見、それを支える人々。こういったものが現在、簡単に共有できる環境にあるわけですが、特に途上国からのアクセスを促進するためのネットワーク構築が当然必要になってまいります。

しかし一方で、こういった理念が先行するだけでも、もしくは最先端の機材を提供するといったことだけでも、どちらかが先行しただけでは、全く機能しないということにもなります。そういう意味で、これまでいろいろなネットワークがありましたけれど、その中には機能したものもあれば、恐らく機能しなかったものもあるだろうということで、本日のセミナーでは、どういうネットワークの形成によって持続的に有効性が発揮できるのかということを議論していただこうと思っております。

本日の発表者のご紹介を致します。まず冒頭、高等教育機関を中核とするネットワーク構築という意味では我が国の第一人者であり、JICA自身も長年にわたってお世話になっている東京工業大学前学長である木村孟先生に、冒頭、基調講演をいただこうと思っております。

その後のケーススタディ、パネルディスカッションで具体的な事例を紹介していただくことになっております。アジアにおける経験、アフリカにおける経験をお持ちであり、実際に研究者、もしくは政策担当者、援助機関の責任者という形でかかわった方々にお話をいただきます。１つ共通することは、いずれの方々も実際にネットワーキングという現場の第一線で活躍しておられる方ということです。各立場からのご発表は、いずれもしっかりとした経験をもとにお話しいただけるということで大変楽しみにしております。

JICA自身の科学技術分野への取り組みについても、簡単にご紹介させていただきたいと思います。JICAは、いわゆる人的、知的協力を通じた途上国における人づくりを行なってきました。人づくりといっても単に個人の資質向上というだけではなくて、それが個人から組織、組織から国

家へと、そういう形で広がっていくような人づくりということを長年にわたって行ってきております。幸いにしまして、そういった協力の積み重ねによる人材は、国家を越えて地域、国際的な公共財になっているということで、我々としても大変誇りに思っているところでございます。したがいまして、そのような人づくりはネットワークというダイナミズムを促進する基盤としての役割も果たし得るのではないかと考えております。今申し上げた科学技術というのは、農学、医学、工学といった各分野で非常に重要な役割を果たしております。今年は、日本が主催する第4回を迎えるTICAD（アフリカ開発会議）という会議があり、その後はG8サミットがございます。恐らく、気候変動、保健といった分野において、科学技術というものが議論されることは間違いのないところでございます。

ちなみに、JICA事業で申しますと、例えば農学系統においては大変有名になっております病気に強いアフリカの稲と、それから高収量のアジアの稲を交配したネリカ米というのがあります。これにつきましては、開発、それから研究者の育成、さらには各国への普及という事業を十数年にわたり現在まで継続して行なっています。

医学分野においては、ガーナの野口記念医学研究所を通じ、感染症、ウイルス対策への医学研究を支援いたしました。これが設立されたのは1979年ですが、それ以降、営々と続いており、その研究成果、実績は広くアフリカで転用されています。

工学分野においては、アジアにおきましてロボットコンテストといった、日本独自のものを通じまして技術移転を実施しております。もう一つ、ASEAN工学系高等教育ネットワークがあります。我々は俗にSEED-Netと呼んでおりますけれども、これも2001年に開始して、まだ5、6年足らずですが、大変すばらしい進展を遂げております。そういった点につきまして、本日実際に携わってこられた方々に直接お話をいただけるものと思います。

いずれにしましても、これは世界に通ずる日本の強みというものを活用し実践してきたものでございまして、ぜひその点について、私どもとしても皆様方にご紹介したいと思っております。

科学技術協力での日本政府のあり方ですけれども、ご承知のようにODA予算というものが、現在削除されつつありますが、科学技術振興に関してその重要性を買われ、来年度の予算からODAと科学技術振興予算の連携を進める科学技術協力のスキームというものが、新たに制度化されることになりました。これも恐らく、政府における新しいステップへの第一歩ではないかと考えております。

それから、JICA自身ですが、ご承知のようにJICAはこれまで人的、知的協力を担っており、資金協力という意味ではJBIC（国際協力銀行）が円借款部門を担っていたわけですが、今年の10月からJBICの円借款部門がJICAのほうに参りまして、新生JICAとしてスタートすることになります。そういう意味では、今後、科学技術分野に関し新たに円借款、それから無償資金協力も入ってきます。人的協力といった総合的なツールを使いまして、我々としても優先分野、課題アプローチといったものを随時改善、強化しながら、ネットワークを通じた協力を実施させていきたいと思っております。

最後になりましたが、本日の参加者は今後、密接に科学技術分野、国際協力にかかわっていただける方々だと思っております。本セミナーを通じ、また新たなネットワークが構築できればと考えております。そういう意味で、きょうの会議自体が１つの効果的ネットワーキングの初めの第一歩であると思います。今回は非常に短い時間ではありますが、セミナーが終了した後においても定期的に情報交換が行えるような、そういう場にしていきたいと思っております。

それでは、最後に私の長年の友人であり、本日のシンポジウムのアイデアを最初に示し構成に

当たっても大変尽力をいただきました世銀駐日特別代表代行のレスター・ダリーに演台を譲るという形で、私の話を終えたいと思います。どうもありがとうございました。

1. Opening Address

Mr. Lester Dally
Acting Special Representative, Tokyo, The World Bank

Ueda-san, thank you for those kind words. We have worked together for many years in development and I really appreciate JICA and your colleagues for making sure this seminar moving. I do particularly want to express my appreciation to Mr. Toda and JICA. We worked very closely to make this possible. We think that this is a vital topic at a critical time in a critical year. Japan is hosting the G8 and TICAD (Tokyo International Conference on African Development) on African development. These topics were raised heavily by Japan last year, particularly through the former finance minister, Mr. Omi, in a major conference which was held in Kyoto to discuss the elements in the science and technology agenda. This also showcased Japan's global leadership in this area. I want to particularly also welcome my bank colleagues from Washington and Africa who would be able to talk more on our agenda in science and technology. My colleague, Mr. Watkins, has kindly prepared slide which will be distributed to all of you, which outlines the bank's programs and strategy to science and technology. So I'm not going to try to summarize this. Mr. Watkins would be on the panel later and we would be able to talk more about the bank's programs. I also want to particularly in the year of TICAD express my gratitude for Mr. Fine's coming who expertise on African STI network development and even more particularly to our honored guest Dr. Bonakele Mehlomakulu who is a very young, dynamic person from South Africa who is really at the fore front of South Africa's science and technology and innovation agenda. She will make a presentation later. Welcome to Tokyo.

Tokyo, Japan has huge potential for leadership and I can't sum up any better than what Prime Minister Mr. Fukuda said in his speech this week in Davos. He made a statement about this particular point and he said Japan possesses not only the state of the art in science and technology that the world needs, but also the track record and experience gained from its success in achieving a high rate of economic growth. Japan will exercise its leadership rooted in this achievement in the interest of enhancing the stability and prosperity of international society. No one could put it better than that and this explains why this is a critical topic to discuss Japan's tremendous global knowledge on this area. I just want to say a few words before allowing the distinguished panelists to proceed. To set the scene for today's discussion, we have many distinguished guests, visitors and panelists to discuss this area. I think the principal theme of today's discussion is in today's increasingly competitive global economy, the science & technology and innovation, capacity building can no longer be seen as a luxury, suitably primarily for wealthier and economically dynamic countries. Rather if the developing countries hope to prosper in a global economy and if world leaders expect globalization to foster sustainable, inclusive and quality globalization and sustainable poverty reduction, STI (science technology and innovation) capacity as we called is an absolute necessity. In today's rapidly changing global economy, the critical economic development issue is no longer whether countries should build STI capacity but what type of STI capacity to build and how to build it given each country constraints and starting points. Why do we worry about this and why we have conference on this topic? Because we know from the countries of Japan, China, Korea, Vietnam and many countries, knowledge makes a difference between poverty and wealth. The difference in GDP can definitely be correlated to how a country handles the knowledge agenda in its policy making mix. Today we would like to talk about and answer some questions: how can we help countries build STI capacity they need, to increase the value added and generate wealth? Secondly should countries focus on building capacity to create new knowledge or utilize existing knowledge? I hope you can answer these questions today in our discussions. The approach should be slightly different from our point of view as between low income countries and middle income countries. In low income countries, the tactical solutions for most of the problems are already known and widely utilized in the industrialized world. But most people in institutions in low income countries do not have the STI capacity needed to utilize the knowledge to solve the problems of their own countries. The African experience will become critical in learning more about this approach. The challenge is to create the necessary capacity starting from generally low initial capacity level. In middle income countries, they have an initial competitive advantage based on trade preferences, prior abundance of low wage and unskilled labor. But rising wages and higher standard of living are leading to a loss of competitive advantage. There is a need to move from

cheap labor to skilled labor and innovation, produced high value added and skill-intensive goods and services. How can late-comers catch up? This is a critical issue. Some of the existing laws and institutions, business practices, infrastructures in middle income countries are not necessarily designed to address these issues. We know that STI capacity building is a cross-cutting issue that involves multi sectors, high education, scientific research, private sector development, R&D, standard and quality infrastructure, agriculture role development. It's a multi sector activity. This is how we treat this issue at the World Bank. Capacity building is needed at all scale levels in an economy in order to achieve a result. Lastly I just want to point out that the most important ways to move forward is to design network and program and to provide resources so that all these linkages can be made. This afternoon's discussion will be taking a lot of time talking about network, how to get network scientists and researchers, innovationists and entrepreneurs together, how the donors like the World Bank, Japan and the private sector and the academic institutions can link all these together. I'm excited to listen to the conference here this afternoon, here the speakers. Once again I want to appreciate the JICA, Gaimusho (Ministry of Foreign Affairs), Ministry of Education for co-sponsoring this conference. I think we will be treated to a very interesting discussion on a very critical topic as I said in a very critical year of development for all of us.

Thank you very much, ladies and gentlemen.

2. Keynote Speech

"Sharing Knowledge of Science and Technology at Global Level by Establishing International Network of Higher Education Institutions"

Dr. Tsutomu Kimura
President, National Institutions for Academic Degrees and University Evaluation

(The below is translated into English from Japanese Lecture)

MC

First of all as the keynote, the head of the National Institution for Academic Degrees and University Evaluation, Dr. Kimura Tsutomu will talk about the "Sharing Knowledge of Science and Technology at Global Level by Establishing International Network of Higher Education Institutions".

He is the director of National Institution for Academic Degrees and an international committee member of MEXT (Ministry of Education, Culture, Sports, Science and Technology) Science and Technology Academic Committee as well as a chairman of University International Strategy Council in JSPS (Japan Society for the Promotion of Science). He has a rich knowledge about internationalization of Japanese universities including the network between them and foreign universities.

Kimura

<Refer: pp. 64 - 83>

My name is Kimura.

As Mr. Ueda mentioned, I have a very close relation with JICA over 25 years. I was teaching at the Earthquake Engineering course provided by JICA. There was a social development department before turning into an independent administrative corporation and I held a position as the evaluation committee member for 5 years. I was dispatched to many regions as an expert for about 7 times. Therefore JICA requested me to give a keynote speech at this JICA-World Bank Joint Seminar but I slightly regret for having a slightly different topic to this seminar. Anyway, I would like to make a speech I prepared.

It looks like there are not many foreigners attending this seminar but first I heard that there are many foreign attendants. Therefore I prepared the slides in English. I would apologize Japanese attendances may be inconvenient for the English slides.

The theme is "Sharing Knowledge of Science and Technology at Global Level by Establishing International Network of Higher Education Institutions".

The content will be a brief introduction coming first. I will talk about the foreign research student exchange policy and interchanges among researchers.

I will also talk about cross border higher education and Japanese attitude towards it. It had major change and I would touch upon that.

After that I would mention about the contribution of Japanese higher education institutions to build up international networks of higher education institutions. I will give several examples of contributions and I will come to the conclusion.

First of all as the introduction, I will explain why higher education network is necessary The national university is privatized in 2004 in Japan. After that, international activities of each institute have been enhanced. As I mentioned in the slide, universities have become aware of the necessity of network to improve the quality of each educational institution. Many universities have been mentioned in the brochures to have a close network to 50-60 universities or to be a member of a certain network. However, the reality is "dormant" as I wrote in the slide, much behind and quite ineffective, in most cases they are just ceremonial network.

The problem is how the higher education institutions linked by the network can upgrade their level and the quality.

I will also talk about the network itself in Japan. I myself am an engineer or I only know about engineering. Japan in Asia is said that it has taken the lead in the engineering field. I know that Japan has a role as a developed country in

networks with other countries in Asia.

Japan should make an up-front investment through their fruit. From some points of the developing countries, there are many excellent scholars and engineers in several universities not only in Japan but other countries. Therefore once we set up the network in Asia, it will function well with the Japanese support. Europe has established many networks as well.

For example, Nagoya University has made advanced research, in the field of economic research, or humane studies in Asia for development economy.

From the view of Japanese contribution to the global issues, establishing network is quite important.

Change of topic. Strategy for foreign research student s and researcher exchange policy in Japan will be introduced.

When I was the chairman six years ago in 2002,, this is from the report from the student exchange special committee of the Central Council for Education. The question is do we need to increase more foreign research student s. The quality is more important than the quantity. But that might not be true. Japan has been producing so many industrial products and our share of 7% in the world now slightly dropped. I stress we have to receive exchange research students constantly..

For receiving foreign research students and having exchange students, we will be important for the national defense. With that reasons, I opposed the above assertion and wrote this report.

By having foreign research student s and student exchange, mutual understanding with other countries will be enhanced. We can develop many international personnel working in the society through communication between exchange students and Japanese students.

University personnel might have seen this graph. It shows the trend of recent exchange students. We have data from 1999 or even before. It has been increasing steadily. However it has dropped two years ago which get me great shock. In 2007, the number is level or only with a slight increase.

It might be due to Japanese entry policy changed slightly. We received many foreign research student s from China. Higher education in China has matured. Many higher education universities has been established in China. Most of the campuses are much better than the ones in Japan. That is natural for the decrease in the number of Chinese students. As the representative of the special committee for exchange research students, I think it’s difficult to reach the number of the number of 300,000 students in Japan as Prime Minister Mr. Fukuda has mentioned.

As shown in the slide, Japanese students go to study to Europe and North America. 56,000 people study in the States. As of 2003, 54,000-55,000 of 74,000 students went to Europe or the States. But much fewer students come to Japan from this area. There is a challenge how we increase the number of students being sent to Oceania and Asia and some other regions.

These are the provisions for cross border higher education. Discussion has activated recently. OECD started to discuss how to provide that higher proper education with WTO discussion several years ago. The WTO, which promotes “free trade”, defined the education service is a tradable commodity.

But education cannot be consumer goods. If the goods are not good, we don’t need to use that anymore. However, if the education is not good, the effect will continue for life. OECD started the discussion about warranty of educational quality financed by Norway, Australia and Japan.

In Japan, we are quite conservative for the cross-border education. We have selected the territorial border education. When a foreign university opens a campus in Japan, they have to follow the Japanese law. If they don’t follow it, they will be regarded as a school in the miscellaneous category. On the other hand, when a Japanese university opens a campus abroad, the Japanese government is not involved in the policy, which is irresponsible. The government we cannot afford the OECD discussion no longer. Therefore the government suddenly changed the attitude a few years ago.

In the new policy, if the condition is met by the foreign university campus in Japan, or if the curriculum provided in Japan is formally

acknowledged in their home country, it would be accepted in Japan. For example, if the program is gave approval by Regional Accreditation Society in the US, it would be accepted in Japan. MEXT asks the embassy whether this is authentic program (recognized program) or not.

After the recommendation is made, then we will treat as the same as Japanese university in the case of transfer people. It is possible to transfer to Japanese colleges, enroll in graduate schools without preconditions and also exchange of credit is possible.

When a Japanese university opens the campus in the US, it's not responsible for Japanese government, but in terms of Japanese regulation, the university accreditation system was started in 2004. After that, it could not establish its campus without preconditions previously.

This is Japanese situation. When you look at the global level, OECD prepare a proposal. OECD is composed of 30 something countries, which is not affected by the Japanese system. Our suggestion was accepted by UNESCO. Three years ago when the UNESCO conference was held, the guideline was accepted as a kind of recommendation. This is a non-binding recommendation, but it is very close to binding actually. The guideline has indicated the ways of evaluation the government, the university and the certification agency should take.

The most important point is that the objective of this is to protect the consumers. The violation of institutions should be avoided. When you look at the situation, bogus institutions, degree mills and accreditation mill that have not be recognized officially are in place. From this situation, we have to prevent the consumers. Currently there is a pilot project ongoing. The project generates database of the higher education institutes which is justly accredited all over the world.

So the keyword here is "recognized" and "accredited". We say that institutions are recognized in Japan because the establishment council approved them, but that is not enough. The accredited universities in Japan will be put on the database in the future.

Actually from next week, from Feb 6, I'm going to Paris. The pilot program is ongoing right now with 25 countries. It is also included in Japan, and we are going to exchange information with the various parties and at the same time decide the direction there. The greater movement of accreditation is taking place globally now.

This is an example of actual network Mr. Ueda mentioned. In terms of network, what kind of network is available? Of course, there are many, many networks. In terms of Japanese higher education, I'm going to explain to you the network which Japanese higher education institutions are involved.

Many people may not aware of that, but this is AEARU (Association of East Asian Research Universities). It is a very ambitious program. Mr. Wu Jia Wei, the former president at HKUST (Hong Kong University of Science and Technology) before retrocession of Hong Kong to China, asked prestigious universities in the region to join some kind of student exchange program and research.

As indicated here, this program got started from 2005, 17 universities in the region joined together. The participants include Fudan, Nanjing and Beijing Universities in China, HKUST in Hong Kong, and Taiwan University. There is no issue between China and Taiwan. Taiwan, Tsinghua, KAIST (Korea Advanced Institute of Science and Technology), Pohang University of Science and Technology and Seoul National University are indicated. As for Japan, you see the list of universities which are the participants to that.

There has been already actual achievement; computer science, molecular biology and biotechnology etc. These kinds of workshops are being provided.

Not only the information exchange and exchange of scientists, one important element of that is the exchange of students. So first student camp took place at Pohang and we specified on this for 5 students from the Tokyo Institute of Technology. This was very well received and the parties participated really want to continue to hold this kind of program in which they have a discussion and play with students from different countries universities. We have 'Go' playing here. The 'Go' is a play and the Asian chess, kind of common game in this region of Asia.

It is a very good program but we do not

have enough money. There is no financial support from governments. Though this is a great idea, the activity level has been decreasing.

Next one is UMAP (University Mobility in Asia and the Pacific). It was founded in 1993 and the International Secretariat was stationed in Japan at one time. The target which the institution has is researchers, mainly students. So in terms of Asia Pacific region including Australia and US, the mobility of the students has to be enhanced. That is the objective of this UMAP program.

As indicated here, for the formal study in this scheme, one semester or two semesters you study and stay in another country to get the credit. Tuition has to be free. Some kind of fund or money is provided for this particular program.

Maybe you have heard of UCTS (UMAP Credit Transfer Scheme). This is a program for credit exchange in UMAP and in a pilot stage. The funding is there to a large degree but there is a deficiency here. Majority of the prestigious universities in US are not participating and no one from China.

Though the fund is enough, the system has deficiency. Previously as indicated to you, system with great money is lacking with AEARU. Funds are secured for UCTS to a certain degree, but the system is not perfect. UMAP has been accepted positively for a period of time, but its activities have been decreasing recently.

The challenge for UMAP is indicated here. I wrote this phrase, “Broaden the number of institutions participating in the framework” with the conscious of China and US. We are aware of the non-participation from US and China. Regarding US, there are some universities in UMAP but they are not functional because prestigious universities are not included.

Next, this is a rather successful program, CDFJ (the College Doctoral Franco-Japonais). In 1996, the then Prime Minister Mr. Hashimoto and President Chirac discussed “20 Actions for the 21st Century”, which led to prepare this program in 2004. This is the mutual exchange of Ph.D students among the Japanese and French universities consortium in a field of each country’s strong point.

Who are the participants? Currently the secretariat is served by Meiji University. Kobe, Nagoya, Osaka, TIT, Tohoku, Tokyo Metropolitan and Waseda Universities are the executive members. Many other universities also participate.

When you look at France, the number of participants is larger than Japan. You can see France is quite motivated. The French universities consortium here is served by University of Strasbourg.

This is the pie chart indicating students studying in France based on the statistics of the particular period of 2003-2007. The total number would be 148. 148 Japanese Ph.D students will be generated from this recent-started program in France. Their specialized fields are natural science that is mainly engineering and science, humanities and social science. Humanities part is a little bit larger than other two pies, basically equally divided. When you go to France, maybe Japanese students like to study humanities. How about French students studying in Japan? All together there are 64 French students studying in Japan who like to receive their Ph.D in Japan. 15, 36, 13 students belong to the above three fields respectively.

So natural science is the larger pie here. I look on the number of students as a proof that Japan has achieved success in this field and French students are attracted by this point. But anyway the number of Japan is twice larger than that of France, but quite a few number of French exchange students are also said to visit Japan.

This is the histogram for 2003-2007. This is the chart indicating Japanese students studying in France in the fields of natural science, humanities and social science. The number of Japan is a little bit larger than that of France. But a lot of students both countries participates in this program.

The French exchange students are able to visit Japan without much problems because they are financed by the government. French government grants a scholarship, the Japanese students are sponsored by the government as well. This program has decent funds and a good system.

Lastly I would like to touch upon an excellent program, AUN/SEED-Net which started in 2001. The idea which I will mention was generated in Bangkok.

In 2003, the actual implementation has taken place. 10 countries, such as Thai, Indonesia,

Philippines and Malaysia are members.

The final objective of this particular project is indicated here – to achieve sustainable development by promoting engineering in ASEAN countries. It is an example of the human resource development in the engineering discipline should be jointly promoted in this region. Engineering is universally the same as well as text books. What they learn is also the same. There could be some degree of differences but mostly what the researchers do, what the students do are the same. So we can help each other.

Target students will be the students in the Master's course or Ph.D, not undergraduate students.

Type of member universities is mentioned here. They are the prestigious universities in the 10 countries are involved. For instance, in the Philippines, De La Salle University and University of Philippines are included.

What type of schemes is taken? There are 9 engineering fields; chemical, environmental, manufacturing, material, and construction engineering, electric and electronic, and ICT. Host universities for each of the 9 were designated for their Master's and Ph.D. The Sandwich Ph.D Program students have to visit Japan at least once but not necessarily for the Master's candidates. They pursue their researches in these designated universities. There is one designated Japanese counterpart so that, they will consult with their Japanese counterpart in case of any issue coming up. Master's student will be studying to earn a Master's degree in each specialized field including chemical engineering. Japan provides the funding, however, in the playground actually located in these countries, so this is a very superb scheme.

This is their target per year. 65 students should complete their Master's degree and 36 should end their Ph.D. This is the history until 2007. 311 Master's degrees have been awarded. The Sandwich Ph.D Program students also involve those who visited Japan. Actually 122 people have been awarded with the Ph.D totalizing 66 the Sandwich Ph.D students and 56 people Ph.D in Japan involved in Japan.

The funding is not so huge. The total cost from 2003 (160 million yen) to 2007 (625 million yen) is not so significant. The reason why for this funding level is that each country has their own playground they study. Not all of them are required to come to Japan.

This is a wonderful program in this case. Temporarily there were difficulties in the program. The first phase ends in 2008 and I was worried about the sustainability of the second phase in this program temporarily, but ASEAN countries requested us to continue this program. The second phase of this program will start soon and I am glad to hear that.

This is the conclusion. This is very simple. The AEARU, the first one has the superb idea but there was no funding. Actually they needed to contribute to the funding. The UMAP, the next scheme has some sort of funds but the system did not work or was not in existence. For the CDFJ, it has a good system and there was reasonable funding, which has succeeded to some extent. Last one, the SEED-Net, I don't say there is an ample funding but it has enough funds and the system is superb.

Enough funds and an excellent system are absolutely necessary for the establishment of the network. "What are the keys to success?" The answer is easy; One is the system should be comprehensive as mentioned here. Another one is I would like to say that proper economic assistance will be essential. In fact, I'd like to use the word "sufficient" rather than "proper", but I don't intend to stimulate concerned parties. Again, financial support is essential at an appropriate level for the network construction.

There are other conditions. The success factors for the SEED-Net are that hundreds of Japanese engineering scholars visited ASEAN countries to give their lectures, to assist the human resource development there. Other than human resource development support, we have to put the system in place and also the serial funding at first as I have already mentioned

So I skip some of the presentation. There is a time-keeper there to remind me of the time. So I need to wrap up the presentation. If you have any question, please let me ask, thank you.

MC

Dr. Kimura, thank you very much for

your keynote speech. Today's seminar theme is the "Establishing of Network of Higher Education Institutions" and Dr. Kimura shared his own practical experiences in creating such academic network.

From now on, about the keynote speech by Dr. Kimura, from the audience, if you have any questions or views, we would like to have the sharing of views. We are pressed with the time. We could only select two participants from the audience.

Could you raise your hand if you have any question?

Questioner 1

I am from International Development Center.

You said that the phase 2 in SEED-Net was decided to start. How about the longer term, prospect for this program? Are there any discussions going on about this program? I heard that European universities, especially which conduct training and research cooperation with developing countries have set up network for several decades and some universities have branch campus there. So we have seen some long term approach by some European universities. How about the SEED-Net discussion about long term approach?

Kimura

I would like to make some comments about this question. You made a very good point. In Japan, we have had some successful international projects in the past. But the duration of those successful projects is very short time. There is funding for a very limited period of time. But after the period is over, they stop. This is a significant waste for the country.

For instance, in the day of the former Prime Minister Hashimoto, from Japan to United States, many Japanese students went to study there, which some of you may remember this. Intellectual property in a way was just based in one flow. There was a heated debate about that. It will be very difficult to create a scheme to invite many Americans to counter this phenomenon. The then Prime Minister Hashimoto and Foreign Ministry decided to invite American teachers instead first. 1000 researchers as the starters should be invited three weeks but finally the number is 600 200 each for spring, summer and other seasons, all together 600. They are actually not the researchers but actually the teachers for the primary and junior high schools. These 600 teachers are at various schools, experiencing home stay at Japanese homes and this is a kind of establishment to the network involving the American teachers.

There used to be 1 billion yen funding for that scheme. I have been involved in the scheme over the years. But in the 11th year, it is virtually not in existence. This is one example that the program is very successful having significant contribution and impact to the improvement of networking, funding is getting smaller and smaller and now it is close to zero. FMF (Japan Fulbright Memorial Fund), if you can search in the internet, FMF network is there, 6400 teachers have been involved in the scheme. But it is not working anymore.

So as you have indicated, there is no long term vision. So for SEED-Net, yes, we have a year-long vision of about 8 years but this is the longest length.

I have been supporting various JICA related projects and some of them were very successful, but abruptly it was suspended. I went to JICA to raise my opposition to this situation. There should be long term vision. However I have to say Japan does not have many long term visions relatively.

Questioner 2

I'm from Waseda University. JICA is supporting us. Of course we are involved in the Human Resource Development for the younger Japanese people.

Some of the Asian people are very good human resources. Some of them are better than Japanese counterparts. There should be an exchange with them. Perhaps the younger Japanese should advance to other countries, not just restricted to working only in Japan. We need to think about it.

Kimura

Yes, I totally agree with your view.

Thought this is a bit old theory, but there people trying to open up the closed country, Japan in the 19th century. Yokohama Municipal

University Professor Yuzo Kato authored the academic paper. Actually the academic paper, “Bakumatsu Gaiko to Kaikoku” (Diplomacy and Opening the Country in the 19th Century), was published by Chikuma Publishing Company when he was the president of the university. It also picked up about 150 papers about this 19th century. Japan then was a closed country. However, there was the race getting information. Why? Even though Japan was closed, some Japanese people traveled to abroad. Some of them stayed there for many years, not just one year, rather 7 or 8 years. They stayed overseas. For example, the former second chancellor of Tokyo Institute of Technology, Mr. Seiichi Tejima, traveled to US and Europe as many as 8 years then.

Right now, students may travel to overseas but just for one or two years. We should create some sort of scheme where people are able to stay for longer term for the actual interaction with people overseas. I totally agree with you. It was 19th century. We got the right information even though Japan was a closed country. Comparing with the situation then, I don’t want to criticize the incumbent Japanese politicians now. I hope there should be active communication between the Japanese young people and people overseas. We should establish such scheme and cultivate human resources for international scene.

I totally welcome such programs of JICA and I think this is the right venue and the right program. I would like to be involved in SEED-Net.

Kimura

This would be repetitively said. Instead of inviting many foreign research student s to Japan, there are many new approaches like Japan-Franco approach and the SEED-Net. SEED-Net may not be selected bilateral. However, we try to do something in the recipient country, not in Japan. I think this is the right approach.

MC

Thank you very much. Probably some of you would like to ask questions, but I’m afraid that we should start the next session.
Dr. Kimura, thank you for your keynote speech.

２．基調講演

「科学技術と高等教育支援の現状
～高等教育機関を中核としたネットワークによる科学技術のグローバルレベルでの共有～」

独立行政法人　大学評価・学位授与機構長
木村　孟氏

○　司会者

まず、基調講演といたしまして、独立行政法人大学評価・学位授与機構長・木村孟先生より「科学技術と高等教育支援の現状～高等教育機関を中心としたネットワークによる科学技術のグローバルレベルでの共有～」と題しまして、基調講演の発表をお願いいたします。

木村先生は大学評価・学位授与機構の機構長を務められるほか、文部科学省の科学技術学術審議会国際委員会の委員や、日本学術振興会の大学国際化戦略委員会の委員長を務められるなど、日本と海外の大学のネットワークを含めた日本の大学の国際化に係る豊かな知見をおもちでいらっしゃいます。

それでは、木村先生、よろしくお願いいたします。

○　木村

＜64頁 - 83頁参照＞

ただいまご紹介いただきました木村でございます。

先ほど上田理事から少し触れていただきましたが、私のJICAとの関係は大変に深いものがあります。25年ぐらいになると思いますが、JICAが行っております地震工学研修コースで教えておりました。また、独立行政法人化する以前でしたが、社会開発部の評議員も5年ほど務めさせていただきました。その他、JICAの専門家としてもあちこちへ参りまして、先ほど数えてみますと7回ぐらい派遣されたのではないかと思います。そういうことでJICA・世銀の共催セミナーで何か話をしてほしいとの依頼を受けました時に、特に抵抗なくお引き受けしたのですが、今、若干後悔をしております。少し要請されたテーマと私のこれからお話しする内容が違うのかなという気もしておりますが、私なりの解釈でやらせていただくことに致します。

今日はここから拝見しますと余り多くないようですが、外国人のお客様もいらっしゃるようですので、資料を英語で準備して良かったと思っています。日本人の方には多少ご不便かと思いますが、御容赦いただきたいと思います。

まずテーマでありますけれども、プログラムに書かれているかと思いますが、「高等教育機関を中心としたネットワークによる科学技術のグローバルレベルでの共有」ということで、それを翻訳すると、このようになるということであります。

私の話の内容でありますが、まず簡単にイントロダクションで背景を述べて、それから留学生研究者の交流のポリシーがどのようになっているかについてお話をさせて頂きます。

最近、盛んに話題になっております国境を越える高等教育の提供に対する日本の態度に、多少変化がございましたので、まずそれについてお話をいたします。

それから、本日の主題でありますネットワークづくりに、日本の高等教育機関がどのように貢献しているかということについて事例をご紹介し、最後に非常に簡単な結論を一つ申し上げたいと思います。

まず、イントロダクションでありますが、高等教育を充実していくためのネットワークづ

くりというのが非常に大切であります。国立大学が平成16年に法人化いたしました。それ以来、各大学の国際的な活動は非常に盛んになっております。しかしながら、ここに書いてございますように、以前から高等教育のような機関の質を向上するためには、このようなネットワークづくり、ネットワークを結ぶということは、非常に大切であるということは十分に認識されておりました。各大学のパンフレットをごらんになりますと、50も、60も、うちの大学はこういう大学と協定している、あるいは、こういうネットワークに入っているなどという宣伝がしてあります。しかし残念ながら、実情は極めてお粗末でありまして、ここに「dormant」と書いてありますように、ほとんど働いていないし、「ineffective」、非効率である。もっとひどいのは、ただ儀式的なものになっている。そのような状況です。

問題は、ここに書いてございますように、実際にさまざまなネットワークを結んだ高等教育機関が、いかにキャパシティービルディングをするか、あるいはクオリティーを上げるかということが大事であります。

次に、ネットワーク自体についてですが、アジアの中の日本ということでみますと、日本は、殊に工学の分野では、この地域では先陣を切っています。日本がほかの国とネットワークをつくるということになりますと、先進国としての役割を担うことになるということであります。

余りこういうことをいうと問題かと思いますけれども、日本からみてもこれは先行投資ですね。先行投資によってその後いろいろな成果が出てくるということでありますが、逆に発展途上国からみた場合には、日本の幾つかの大学には非常にすぐれた研究者がいる、すぐれた学生がいる。そういうことですから、日本が中心になってネットワークをつくればアジアの地域には非常に有効に働くだろうと思います。勿論アジアだけではなく、ヨーロッパでもネットワークは随分たくさんできています。

先行投資という意味合いもありますが、これは余り知られておりませんが、例えば名古屋大学などでは開発経済ということで、フィールドをアジアに求めて非常に先端的な研究が、経済、あるいは人文学の分野で展開されています。

何よりも大事なのは、グローバルイシューに対する取組みです。グローバルイシューに対して日本が積極的貢献をするという立場からも、こういうネットワークづくりは大事であろうと思います。

さて、話題を変えて、先ほど申し上げましたように日本の留学生政策、あるいは研究者交流政策は、一体どういう視点をもっているかということについてお話しさせて頂きます。

これは私が委員長を務めていた中央教育審議会の留学生特別部会のレポートの一部を引いたものであります。レポートは2002年に出ております。まず議論になりましたのは、留学生をこれ以上ふやす必要があるのかということです。むしろ量よりも質ではないかという議論が出てきました。私は、かなりシェアが下がったけれども、日本は世界の7%の工業製品をつくっている大きな工業国であり、それを売って生活しているわけであるから、日本として知的貢献をする必要があり、そのためにもある一定の数の留学生を引き受けるべきであるということを強調いたしました。

もう一つ、ここには書いてありませんけれども、留学生を引き受ける、研究者が交流するということは、ナショナルセキュリティーの立場から非常に重要であるということです。ですから、一部で数より質を優先すべきだという議論がありましたが、私はそれには強く反対いたしまして、レポートを仕上げた次第であります。

交流することによって相互理解が深まるし、またネットワークをつくるもとになり得るということですね。それから、日本の立場からみても、将来留学生が来て日本人とコミュニケート（交流）することによって、国際社会で働くような人材が多く出てくるという部分もあり

ます。

これは大学の方はご覧になったことがあると思いますが、留学生の最近のトレンド（傾向）であります。ずっと右肩上がりにふえてきましたが、2006年、2年前に急に下がりました。これには私、非常に大きなショックを受けました。2007年のデータは出ておりませんが、ほぼ横ばいで、この傾向は今後も続くと思います。

これは入国管理の方針の変わったこともありますけれども、やはり中国ですね。中国からたくさん来ていただいている。中国へ行かれた方はおわかりだと思いますが、中国の最近の高等教育システムの充実ぶりはすさまじいですね。新しいキャンパスが次々と作られている。それらのキャンパスのほとんどすべてが、現在の日本の大学のキャンパスよりはるかにすぐれている。そういう状況ですから、中国からの供給が減っても不思議ではありませんね。それが一つの原因だと思います。福田総理が30万人計画というものを打ち上げになりましたけれども、私、中教審の留学生特別部会の部会長を務めておりますが、どうやって30万人にもっていくのかということで反論をいたしております。

次に、日本の学生がどこへ行っているかという図であります。これをご覧いただきますと、ヨーロッパと北アメリカが中心であることがお分かり頂けるかと思います。アメリカ合衆国で5万6千人。少し統計が甘いのですが、2003年時点で7万4千人のうちの5万4千人か、5万5千人がヨーロッパ、アメリカへ行っているということで、地域的には来ていただく国と行っている国で調和がとれていません。非常なアンバランスがあります。この点は我々としては絶対に改善しなければいけないことであると思っています。要はここですね、アジア、オセアニアへ行く数をいかにして増やすかということです。

次に、先ほど申し上げた国境を越える高等教育サービスの提供ということについてであります。数年前にOECDでWTOでの議論に絡んで、正しい教育サービスをいかに出すべきかという議論が始まりました。WTOはフリートレードを促進する組織で、WTOの定義によりますと、教育サービスは貿易商品ということになります。要するに、消費グッズと同じだということですね。

ところが、教育サービスは消費グッズではないだろう。悪ければもうそれ以上使わなければいいわけですが、教育は、一遍そういうサービスを受けると、その影響が一生続きますね。ということで、ノルウェーとオーストラリアと日本がOECDに資金を出して、それで教育サービスについてはその質の保証をすべきであるという議論を始めたわけであります。

日本は国境を越える高等教育サービスの提供ということに対して極めて保守的でありまして、テリトリアルプリンシパル（属地主義）というのをとっておりました。例えば、外国の大学が日本へ来てキャンパスを開く。そのときは、日本の法律に従いなさい。従わなければ各種学校ですよということですね。それから、日本の大学がアメリカへ行ってキャンパスを開く。これについては全く関与しない。つまり日本の領地ではありませんから勝手におやりになさい、一切関知しませんということです。そういうポリシーをとっておりましたが、それでは先ほどのOECDの議論等についていけなくなったということで、急遽、数年前に方針を変えました。

今、どういうことになっているかといいますと、まず日本における海外大学のキャンパスについては条件が合えば、つまり日本で供給されるプログラムが母国できちんと――これはなかなか微妙な表現ですが、認められていればこれを認めるというものです。アメリカを例にとりますと、少なくとも権威のあるRegional Accreditation Societyで認められていればOKということです。全体的にはなかなか難しくて、いろいろな国の大学が入ってきますので、その時

には、文部科学省が各大使館に問い合わせて、これは正式なプログラムですか、あるいは、認可されたプログラムですかというのを聞いて認める方式を採っています。

いったん認められると、そこで授与された学位は日本の学位と同等に扱いましょうということです。例えば日本の大学への編入も可能だし、もちろん大学院にも進学できます。それから単位互換も可能ということになっております。

日本の大学がアメリカでキャンパスを開く場合、これまでは国としてはまったく関知しないという政策だったのですが、今はそうはいかなくなり、日本の制度に適合している場合には認めるということになりました。平成16年から認証評価が実施されていますが、これを必ず受けることという条件も課されております。

グローバルレベルの質保証がどうなったかといいますと、まずOECDで案を作りました。OECD加盟国は30だけですから影響力が極めて小さいということで、その案をUNESCOに持ち込みました。３年前のUNESCOの総会で、この案がガイドラインという形でレコメンデーションとして承認されました。効力的には、我々はノンバインディングですが、かなりバインディングに近いレコメンデーションとなっています。政府、大学、評価機関等に対してそれぞれこうやりなさいというガイドラインが出されております。

何故このようなことになったか。大事なのは、ここに書いてありますように、その目的が消費者保護であるということをボーガスインスティチューション（信頼のおけない団体）、ディグリーミル、さらに最近ではアクレディテーションミルというインチキ評価機関が出てきています。そういうものから消費者を守るために、今、世界中の正しく認証された高等教育機関のデータベースをつくるためのパイロット事業が行われています。

この認可あるいは認証というところが大事で、例えば日本の場合には設置審で全部認められていますからレコグナイズされているということになるのかもしれませんが、それでは不充分で、いくいくは認証評価を受けた大学だけを、このデータベースに載せるということになると思います。

私、来週6日からまたパリへ出張しますが、今、日本を含めて25ヵ国でパイロットプログラムをやっており、その結果を報告しお互いに情報交換をすると同時に、さらに今後どちらの方向へ向かうべきか、ということについて議論する予定です。ということで国際的にも質保証というものを、きちんとやろうという動きが出ているということです。

次は、これが先ほど上田理事もお話しになりました実際のネットワークです。つまりネットワークとは世界中にたくさんあるのですが、その中で、日本の高等教育機関が加わっているネットワークにどんなものがあるか、それを簡単にご説明いたします。

まず、ほとんどの方はご存じないと思いますが、AEARU（The Association of East Asian Research Universities・東アジア研究型大学協会）というのがあります。これは東アジア研究中心大学連合と呼ばれています。非常に野心的なプログラムでありまして、香港が中国に返還される前の香港科学技術大学の学長であった吴家偉（Wu jia wei）いう非常にダイナミックな人が、この地域の一流大学を集めて、そこで研究交流をやろう、学生交流をやろうということを言い出したのであります。

ここに書いてございますように2005年から始まりまして、この地域で17の大学を選びました。中国では復旦大学、南京大学、北京大学というところが入っておりまして、香港からは、HKUST（Hong Kong University of Science and Technology・香港科学技術大学）という新しい大学が入っております。それから、台湾も入っております。この連合では、中国、台湾の問題は全くありません。非常に仲よく議論をや

っております。台湾の清華、韓国のKAIST（Korea Advanced Institute of Science and Technology・韓国科学技術院）、浦項、ソウル国立大学も入っています。日本からは現在、こういうメンバーが入っております。

既にかなり実績がありまして、コンピューターサイエンス、モレキュラバイオロジー、バイオテクノロジーというところで、大学の間でワークショップをやっております。

研究者交流のほかに、このプログラムのターゲットは学生の交流です。第１回のスチューデントキャンプが浦項で行われました。私が学長のときに、東京工業大学からも５人の学生を出しました。学生は非常に興奮して帰ってきまして、ぜひ続けてくれと懇願されました。異なった国の大学の学生が議論したり遊んだりという機会がないので、すばらしいプログラムだったと云っていました。その後、ここに「GO」と書いてありますが、これは「ゴー」ではなく、「碁」です。この文化圏には「碁」つまり「囲碁」という共通のものがあります。そこで、囲碁の大会をやろうということで、これも実施しました。

このプログラムは、非常に秀でたプログラムなのですが、お金がありません。政府からのサポートが一切ありませんので、残念ながら、これだけすばらしいアイデアでありながら、アクティビティーはどんどん下がっています。

次に、UMAP（University Mobility in Asia and the Pacific・アジア太平洋大学交流機構）についてです。これは1993年につくられて、一時、日本が事務局を担当しました。このプログラムの対象者は、主に学生です。Asia and the Pacificといっていますが、アメリカも、オーストラリアも入っています。この地域で学生の流動性をできるだけ増そうということが目的です。外国の大学での正規の授業を、少なくとも1学期、あるいは最大で2学期受けて、その単位を認めてもらおうというスキームです。授業料は無料にしようということでありますが、このプログラムの維持にはある程度お金がかかります。

UCTS（UMAP Credit Transfer Scheme・UMAP単位互換方式）という言葉をお聞きになったことがあるかと思いますが、UMAPの単位互換のスキームです。残念ながら、UCTSのスキームはまだパイロット段階です。このプロジェクトにはかなり資金は出ているのですが、決定的な欠陥があります。アメリカの有力大学がほとんど入っていないこと、中国もが入っていないことです。

お金はある程度あるのですが、システム的には問題があります。最初のAEARUは、システムはすばらしいのですが、資金がない。UMAPはある程度資金が確保されているが、システムに欠陥がある。UMAPは一時、非常に盛んだったのですが、ここのところ活動量が下がっています。

「Challenges for UMAP」に問題点を掲げていました。Broaden the number of institutions participating in the frameworkということは、完全に中国とアメリカを意識して書いたことであります。アメリカは入っていますが、有力大学が入っていない。

次が、比較的にうまくいっている、日仏共同博士課程プログラムです。1996年に、当時の橋本総理とシラク大統領の間で「20 Actions for the 21st Century」ということについて議論がなされた結果、生まれたプログラムでありまして、ドクターレベルの学生だけを対象にしたものです。日本の得意な分野にフランスの学生が来てPh.Dを取り、日本の学生がフランスの大学へ行ってPh.Dを取るというスキームです。

参加している大学をここに書いておきましたが、現在は、総括幹事を明治大学がお務めです。幹事が神戸大学、名古屋大学、大阪大学、東京工業大学（TIT）、東北大学、首都大学東京、早稲田大学です。

フランスの大学の方は数が多くてすごいですね。1～3と書いてあるのは、第1大学から第3

までということで、フランス側の気合いの入れ具合がわかります。フランス側の総括幹事校はストラスブール第1大学です。

これは、今までどのぐらいの学生が勉強したかという図です。2003年から2007年までの統計で、フランスで勉強している日本人の学生の数であります。これを合計していただきますと148人になります。割合最近始まったプログラムですが、フランスで勉強することによって148人の日本人のPh.Dが生まれそうです。分野は自然科学のうち、工学と理学ですが、ほとんど工学です。これはヒューマニティー（humanity・人類学）、社会科学です。大体同じような分布をして、若干ヒューマニティーが多くなっております。やはりフランスではヒューマニティーをやりたいという日本人の学生が多いのだと思います。逆に日本で勉強しているフランスの学生はどのぐらいいるか。これも結構います。15、36、13のうち、64名に上っています。

フランスの学生がどの分野で勉強しているかというと、圧倒的に自然科学が多いですね。日本は自然科学が進んでいるということだと思います。日本の学生数が倍以上になっていますが、それでもフランスからも相当来ています。

これは経年変化でありまして、このような状態です。03年から07年です。先ほど申し上げた自然科学、ヒューマニティー、社会科学ということになっております。グラフの長さは日本のほうが高くなって、フランスは若干低くなっていますが、それでも、それ相当の数が来ています。このスキームについては、日本側は国費留学生の枠を使っておりますので、日本から行くのにはさして支障はない。フランスはフランスで奨学金を出してくれています。資金もそこそこあって、システムもいいプログラムであるということが出来ます。

最後、極めつけがAUN/SEED-Netプログラムであります。これは本当にすばらしいプログラムです。議論が始まったのは、2001年であり、これからお話しするアイデアについてバンコクで議論が行われておりました。

具体的に始まったのは2003年からであります。この地域の10ヵ国が加盟しております。タイ、インドネシア、フィリピン、マレーシア…などです。

ファイナルゴールでありますが、ASEAN諸国において工学を振興することによって持続性のある発展を実現しようということです。要するに、この地域で共同に工学９分野だけですが、人材育成をやっていこうということです。工学というのは、教科書も大体同じですし、やっていることも同じですから、お互いに協力し合える分野です。

対象にする学生は、修士とドクターです。学部の学生は範疇に入っておりません。

ここにどういう大学が加わっているか簡単に書いてありますが、10ヵ国から相当数の大学が入っております。例えばフィリピンだとデラサールとかユニバーシティーフィリピン（フィリピン大学）です。

スキームは、工学の九つの分野を対象としています。化学工学、環境工学、製造工学、物質工学、建設工学、電気電子、ICTなどのこういう九つの分野について、それぞれにホスト大学を決めてあります。ドクター（サンドイッチ・ドクター）は最終的に一度は日本へ来るのですが、修士は日本へ来る必要はなくて、これらの大学で研究をします。日本に来るのではないのですが、日本の世話大学を各分野で一つ決めておきまして、いろいろ相談に乗るということにしてあります。要するに、予算はすべて日本から出ていますが、実際のプレイグランドはそれぞれの国に置いてあるという非常にうまいアイデアに基づいたプロジェクトです。

ターゲットでありますが、年間65人の修士と、36人のドクターを出そうということです。今まで何人出たかといいますと、2007年までに実に311人の修士をつくり出しております。ドクターについては、サンドイッチと日本滞在型と合わせるとそれぞれ66、56ですから、 計122名の

ドクターが既に出ています。

使った資金でありますけれども、これは大したことはありません。2003年の1億6,000万円から2007年の、6億2,500万円まで足しても大したことはない。どうしてこれぐらいのお金で済むかというと、日本に全部来てもらうわけではなくて、それぞれのプレイグランドでやってもらうからです。

そういうことでこれは非常にすばらしいプログラムなのですが、一時、このプログラムが存続できないのではないかという危機がありました。ファーストフェーズが2008年までで、セカンドフェーズは存続できないのではないかという話が起こり、私、ものすごく心配しておりましたが、ASEANの国から是非続けてくれという要求がたくさん来て、またセカンドラウンドが始まるということになりました。大いに喜んでいます。

結論であります。非常に簡単です。最初の東アジア研究中心大学連合はアイデアはいいけれども、お金がない。それから、UMAPについては、お金はそこそこあるのですが、システムに落ち度がある。日仏については、そこそこお金があるし、システムもいいということでかなり成功している。1番最後のSEED-Netは、たっぷりとはいいませんけれどもお金も十分あるし、システムがすばらしいということです。

ネットワークをつくるためには、この両方がどうしても必要だということで、極めて簡単な結論なのですが「What are the keys to success？」として、要するに、システムが包括的でなければいけないということが一つ。

後一つは、「sufficient」と書きたかったのですが、余り刺激するといけないので、「proper」と書いておきました。適当な経済的な支援がなくてもいけないということです。この二つが、良いネットワークをつくるためには絶対必要だということであります。

このほかにも条件があります。先ほどのSEED-Netが非常にうまくいっているのは、日本から何百人という工科系の先生方がASEANの10ヵ国へ飛んでいって頂いている。それでいろいろ講義をしたり、あるいはアシストをしたりしている。そういう人的なサポートも大切だということですが、まずはシステムと、お金です。

これで終わらせていただいて、もしご質問があればお受けしたいと思います。

○ 司会者

木村先生、基調講演のご発表、ありがとうございました。本セミナーのテーマであります高等教育機関のネットワークについて、木村先生の豊富な経験に基づいて具体的な事例のご紹介、それからネットワークはどのようにすればうまくいくかというような一つの解決方法について、ご提起をいただきました。

それでは、ご質問がある方、いらっしゃいましたら挙手をお願いいたします。

○ 質問者1

SEED-NetのフェーズⅡが決まったということなのですが、その後の非常に長期的な展望について何か議論はなされているのか、お伺いしたいと思います。ヨーロッパの大学などで、特に途上国と研修とか研究協力をやっているところでは、例えばネットワークを何十年とつくって、その結果、途上国にも自分たちの大学の支部をつくってみたり、長期でやっているところが結構みられるので、今も非常にうまくいっているAUN/SEED-Netの場合、どのような展望が議論されているか教えてください。

○ 木村

私なりのコメントをさせて頂きたいと思います。ただ今のご質問は非常に鋭いご指摘でありまして、日本の場合には、プロジェクトが非常にうまくいっているのにそれを簡単にやめてしまいます。これは本当に無駄ですね。ある一定期間、投資はするのだが、すぐそれを縮めてしまう、やめてしまいます。これは国にとっ

てとんでもないロスだと思います。

例えば少し話が変わりますが、橋本総理の時代に、知的プロパティーがアメリカから一方的に日本に流れているではないかということで大変な議論になりました。そういうことで、いきなりアメリカの学生を日本へ大量に来て貰うことも不可能なので、アメリカの先生を呼ぼうということになりました。初めは1年間1,000人ということであったようですが、結局600人になりました。春に200人、秋に400人、合計600人の小・中学校の先生を日本に３週間お呼びすることになりました。それで日本じゅうに散っていただいてホームステイを経験して、その滞在先の学校で教えてもらう。そういうプログラムを実施しました。

最初、予算は10億円であったのです。11年目になってほとんどなくなってしまいました。これくらい日本のインパクトをアメリカに与えているプログラムはないと思うのですが、どんどん予算が出なくなって、JFMF（Japan Fulbright Memorial Fund）という言葉をインターネットで検索していただきますと、日本に来たアメリカの先生方のネットワークがたくさんできていることが分かります。今まで6,400人来ましたから大変なプロジェクトなのですが、これも終わりです。

ここで私が申し上げたいのは、ただ今御指摘の通り長期ビジョンが全くありません。SEED-Netについては、8年ぐらいの長期ビジョンはありますが、我が国ではせいぜいあってもそのぐらいということではないでしょうか。

私どもの学会もJICAのプログラムを随分支援していますが、もうすごく成果が上がっているのに突然やめというようなことが随分ありました。私どもが抗議をしてJICAまで押しかけたこともありますが、そういうロングランで物事を国際展開しようという視点は、残念ながら、日本には極めて少ないようです。お答えになったでしょうか。

○ 質問者2

今回の趣旨には反するかもしれませんけれども、アジアでもかなり優秀な、むしろ日本の人より優秀な方がいっぱいいらっしゃいますので、少し先のことを考えましたら、お互いにエクスチェンジするとか、それから日本の若手の人も、もう日本が活躍の場ではなくなると思いますので、そこら辺の展望とかコメントを何かいただけましたら、そういうこともそろそろ考えなくてはいけない時代だと思っております。

○ 木村

全くおっしゃるとおりだと思います。

古い話で恐縮ですが、ペリーが来たころに国を開くか、開かないかという大議論がありました。その時代のことを横浜市立大学の加藤祐三先生が詳細にお書きになっています。学長をしておられた際にちくま新書で『幕末外交と開国』という新書版の本をお出しになりました。加藤先生は新しい文献を 150ぐらい発掘されて、それに基づいてお書きになっていますが、鎖国をしていたにもかかわらず、ものすごい情報合戦をやっていることがはっきり書かれています。鎖国をしていたにもかかわらず、そのころ日本人ってたくさん外国へ行っているのです。しかも、それが長期に亘っている。今みたいに1年行ってきたとか、そんなものではない。7年とか8年行った人がたくさんいる。例えば東京工業大学の前身である東京職工学校の2代目の校長の手島精一先生も、アメリカ、ヨーロッパへ8年も行っています。

今外国へ、学生をやったってせいぜい1、2年ですね。そうではなくて、出来るだけ長く行かせて真の意味の国際交流をできる人材をつくる仕組みをつくるべきだと云う点で、今、先生がおっしゃったことに大賛成であります。むしろあのころのほうがはるかに外国の情報がきちんととれているし、それから、それに基づいた行動もできているのです。余りいうと政治

家の悪口になるからいいませんが、そこのところが今は足りないのではないでしょうか。ですから、先生がおっしゃったように若い人に外国人とどんどんコミュニケーションして貰って、国際舞台で働けるような人をつくっていくべきだと思います。

○ 質問者2

どうもありがとうございました。

今回、JICAのほうでこういうプログラムができたというのはもう大賛成で、今までいろいろとお願いさせていただいてもできなかったところがありますので、まず第一歩かと思いますけれども、今後、そういう広い意味でもぜひお願いできたらと思っております。よろしくお願いいたします。

○ 木村

今まで日本が何かやろうとすると日本へ引っ張ってくるということばかりを考えていた。そうではないのが日仏の博士課程の共同プログラムとSEED-Netです。これは最近出てきた発想で、私は正しい発想ではないかと思っております。

○ 司会者

木村先生、基調講演をどうもありがとうございました。

3. Case Study

3-1 "*Promoting STI in Sub-Saharan Africa Collaborative Initiatives: Rationale, Lessons Learned and Future Promise*"

Mr. Jeffrey Fine
Consultant, The Partnership of Higher Education in Africa

MC

We would like to move on to the next session. This is a report about a case study in order to promote science & technology in various cases of network of higher education. Cases will be presented from 4 speakers. As for the questions for the speakers, we will receive at the end of all the 4 speeches. First of all, the Partnership for Higher Education in Africa Consultant, Mr. Jeffrey Fine will present "Promoting STI in Sub-Saharan Africa-Collaborative Initiatives: Rationale, Lessons Learned and Future Promise". He has been involved in higher education, in science and technology and innovation, and also investigated more than 100 networks in Africa.

Jeffrey Fine

<Refer: pp. 84 - 94>

Good afternoon. Can you hear me? As you gather all of us must accommodate a very tight time constraint.

To illustrate the challenge in my own case, let me began with a personal incident, I'm an economist. Several years ago, my daughter Sarah was working with her classmates on a project dealing with third world debt. They were meeting in my house and I was working in the next room. I could hear some very strong arguments. At one point, one of her classmates said, 'Why don't you ask your father about this problem? He's an economist.' Sarah said, 'No, absolutely not.' Her classmate asked, 'Why not?' To which came the quick reply, 'We only have 5 minutes!'

I must therefore try to be briefer than usual.

My full presentation is set out in pages 30-40. However, I'm going to concentrate on those slides on pages 37-39 based principally but not entirely on work conducted between 2005 and 2006 although I should add that I have also involved in designing and implementing a number of collaborative networking partnerships.

The information is not complete. To cite one example, when I was seeking information at the University of Witwatersrand in South Africa initially I was informed that it had 3 or 4 regional partnerships. By the end of my visit, we had identified twenty. Also by their very nature, it is necessary to continuously update information on such partnerships. Some become defunct. However, the ones I shall be referring to do exist. I am also aware that new ones are emerging all the time as for example in the area of health.

I want to leave you with 4 important messages.

The first one is that we are not talking about technical assistance in the normal sense. What attract professionals from a developing country or established institution are not simply the prospect of "doing good" but also the challenge and the excitement of intellectually stimulating problems ones which also appeal to such institutions and people in Japan.

The second, also emphasized by an earlier speaker, is that partnerships of this nature can only be sustained if there are mutual benefits, in other words, real benefits to both parties. They won't last unless there is a win-win situation, a chance to explore new areas, a chance to tap into what I call area specific knowledge, in this case the Sub-Saharan Africa, which is a part of global knowledge system. There is also the attraction, one through a question raised a few minutes ago, of working with intellectually stimulating colleagues.

My third message is that in developing, growing, nurturing these networks, there is the problem of addressing what we economists term 'transaction costs' and in identifying potentially productive relation partnerships. Time is needed to forge real relationships, institutional and professional, to make this partnership work. Those supporting these efforts, often underestimate the time that is needed on a purely human or institutional level to them. I echo our keynote speaker, is pointing out the need for flexible, coordinated interventions with an assurance of

longer term funding. For example, you cannot embark on support for PhD level training without a ten year commitment. And not just formal education, but the mentoring and research required afterwards.

My forth message is that we can refer to a particular model of networking, one which we are going to have a chance of raising again in the panel discussion, namely networks of centers of excellence..

Let me turn now some examples.

I'm going to start with the African Center for Crop Improvement which is based at the University of Kwazulu Natal in South Africa. It is involved in crop breeding. What is interesting is that this effort was supported initially for 5 years by the Rockefeller Foundation. and involved several universities and public research institutes in Eastern and Southern Africa. It has now moved into a second phase with major support from the Gates Foundation because the effort had been first been validated over an initial trial period of five years. It is now looking at other crops, diffusing research results, and building capacities in partner institutions through expanded graduate training. Furthermore research efforts are being diffused since the first generation of scholars trained at the University of KwaZulu Natal is now back at their home institutions elsewhere in the region. .

Let me move on to the example, BecA (biosciences eastern and central Africa). It is based at an international institution, ILRI (the International Livestock Research), in Nairobi, which one of the more advanced facilities for biotech research in the region. It is therefore illustrates a case where there is a concentration of research infrastructure in one physical location. A network drawing on them will only be sustainable when research activities eventually involve universities and national research institutes in the region as active collaborating partners.

The third case is a network is the South African Structural Biology Initiative at the University of Cape Town. Although the necessary equipment is located at the university in Cape Town, data is being collected in other parts of the region and transmitted for analysis via the internet. In addition, ICT allows researchers in the network to discuss their findings. This example illustrates how advances in communications technology, along with a steady reduction in its real cost, will underpin the future growth of networking as a key instrument for capacity strengthening science technology and innovation in these countries.

My next example may not at first seem to deal with science, technology and innovation. It is the Center for Trade Law at the University of Pretoria. However, it is one of several networks in Sub-Saharan Africa engaged in investment and trade, including issues of intellectual property rights, which of course bear directly on the innovation and diffusion of technology. This particular initiative has developed strong links and activities across the African continent and with parallel efforts in Europe and elsewhere.

Below it is the AABS (African Association of Business Schools) bringing together the best institutions in the region and linking them with those in the Global Business School Network, set up by the International Finance Corporation of the World Bank and now managed by the Management Education and Research Consortium, based in Washington. Business Schools are the fastest growing segment of higher education in Sub-Saharan Africa. As I mentioned to my colleagues at JICA yesterday, most of these schools are terrible. However, about 12 to 15 have come together to form an association, in this case with the support from the International Finance Corporation of the World Bank Group. It is something part of the Global Business School Network. AABS is directly engaged in the issue of standards and accreditation, a key challenged mentioned by Professor Kimura, as well as staff development, updating curricula and advancing teaching methods, notably the case method approach. These schools in turn working with the private sector in their own countries and potentially comprise a key cluster in the diffusion process, one in which they are directly engaged in more developed economies. .

As I have observed directly with respect to in the medical field, often before people begin, they raise questions concerning the eventual market, the likely demand, possible sources of investment at each stage of the process, and development of a sound business plan for investors.

The next example, Africa Array, is one of my favorites and one which I think has particular meaning for some researchers in Japan. It deals with the geosciences an area which South Africa

is relatively advanced its mining industry. But what are they doing? A major aim of this network is to the earth mantle across Africa. So researchers based in South Africa must have in countries across the region. They also desire expertise from other parts of the world. This kind of research is going to be very fascinating and open up new frontiers. For example, they want to look at the whole issue of tsunamis they are also attracting support, both technical and financial, from international firms.

For my last example, I turn to USHEPiA (University Science, Humanities and Engineering Partnerships in Africa), a network of eight universities in Eastern and Southern Africa. Based at the University of Cape Town, it supports graduate level education in selected fields, including engineering. The network is now entering a second stage of growth, one in which such education is being progressively diffused among the partnering institutions, because those students trained during a first phase have now returned to their respective universities. This network is now looking at moving into a new dimension of engaging in collaborative research. It is also looking for partners internationally, i.e. outside the region, since there is an acute awareness that without it you are assigning yourself to a second rate status from a global perspective. In other words, globalization applies not just to the economy and industry, but equally to higher education.

Thank you very much.

3-2 *"SOI Asia Project: as a global educational platform in Asia"*

Dr. Keiko Okawa
Professor, Graduate School of Media and Governance, Keio University
(Presenter: Dr. Achmad Husni Thamrin)

MC

I would like to move on to the second case study. I would like to ask Dr. Achmad Thamrin to talk about "SOI (School On the Internet) Asia Project-as a global educational platform in Asia". Dr. Thamrin has a Ph.D in media governance and is an associate professor. He is going to talk about school internet and he is serving as the sub-leader. Unfortunately, Professor Okawa who is supposed to present her part could not attend this meeting. On behalf of Dr. Okawa, Dr. Thamrin is going to talk about SOI Project and we appreciate your effort to present, for your cooperation to present your project.

Thamrin

<Refer: pp. 95 - 108>

Thank you very much. As Professor Keiko Okawa cannot be here, I'm sitting here as the representative of SOI Project and I've been working with SOI Project since its beginning in 2001. After Mr. Jeffrey Fine mentioned about the stories of networks in Africa, I'll bring the story of network in Asia which is called SOI Project-school internet in Asia. We hope that we can be a model of global education platform which happens to be in Asia. I'll give you the stories in about 15 minutes. This network is based on internet.

As you can see here, there is internet connectivity from Japan to Asia and we have multilateral partnership among Asian universities. Currently we have 26 universities and institutes in 13 countries. In Asia, we have 6 time zones. We have Mongolia in the north here and we have Bangladesh here, we have Nepal, we have Indonesia. I came from ITB (Institut Teknologi Bandung) from Indonesia and we have Japan in the most eastern part of this network. We come from internet background and from that background we want to contribute something to the higher education effort.

This is what we have done. Basically we operate platform for education collaboration among universities in Asia. As you can see here, these are the pictures of the workshops we have done in the past.

This is what we do in the platform. Basically, first of all, we share our knowledge and we also want to create opportunities for our partners especially for joint research and also to study in Japan. As we come from the information technology background, we are very much keen in developing human resources in workshops and internships.

How we make this happen in the past 7 years or so is basically we put this in five layers. The first layer is infrastructure development and on top of that, we have human resource development for network administrations. Then we have educational environment development. After that, we make partnership among the universities and we put all together the educational program, development and implementation on the network.

Let me introduce each layer here. Here we have the infrastructure network, infrastructure development. Basically we connect the universities and institutions in Asia to internet using satellites because satellite is the easiest way to remotely connect sites. For example, if you have a university or institute on top of a mountain, it is difficult to bring network connectivity there unless it is satellite. This is the reason why we use satellite.

These are the satellite dishes at our partners' sites. As you can see here, these are just the satellite dish you use to receive TV broadcast.

After making the infrastructure, the question is that who will operate the infrastructure. We need to have some skilled people there. This is why we develop the human resource for this SOI Asia projects using workshops and internships. We have been doing 8 workshops so far, basically once in each year and sometimes two in each year. We have internships coming to Japan for them to learn the technology in order to know how to operate the network, how to give classes and everything. We have been doing these. We give opportunities to our partners at each batch. They come for three months in Japan and with each of

the batches, they learn a lot of things. So at most we have four persons at the Keio University Shonan Fujisawa campus. They come to our universities to do internship.

This is how we share our lectures. As I mentioned earlier, SOI Asia is a platform for education collaboration. This is how we do it. Basically this is the internet infrastructure using satellites. These are the sites our partners can receive the lectures. On the right hand side here, you can see the lecture sites. So the lecture sites using high bandwidth internet connectivity, the video, audio, power-points are delivered to Keio University where I'm sitting there. We transmit this using our satellite using internet technology called Multicast. With Multicast, you can stream the videos and audios. By sending one single stream, this single stream is received by multiple sites as long as they are within the coverage of the satellites. If we need some interaction, these sites can have low bandwidth connectivity to the internet. Here we can have real-time interaction between the lecturers and the students although they are not in the same site. This is how we share the lectures in SOI Asia.

After sharing the lectures for sometime, we know that this cannot go well without the support from the universities, deans and the presidents. We decided that we have to have a kind of cooperation from the top management of the universities. We have this MoUs (management of the Universities), we have this, what we call the Bandung Declaration in 1996 where the universities top people, the presidents, the lecturers signed this declaration in a ceremony using the internet. They are not sitting together in one place. They used the internet. We signed the MoU with Keio University as the hub. By signing the MoU, we agree to share the education resources whether there is class, professors and students. This is the goal that we aim for in the future.

These are the classes that we have. We have courses, of course this is not like in the sense that Kimura-sensei mentioned about the SEED-Net, that sending Ph.D students, master's students, but rather this is on the courses level, much smaller scale than that. For that, we have the academic committee. As we come from the IT field, most of the classes are in IT field, but we also have classes in energy, biotechnology, marine science and also disaster management.

These are the milestones that we have. First of all, as you can see, we started by developing the infrastructure and we started in 2001 by connecting universities in Laos, Myanmar, Thailand and Indonesia. We start our operator work there. Basically we developed the infrastructure and the human resource for the infrastructure.

Then we work toward the operation, how to make the operation better. While doing the classes and internships, which one is good and which one is bad, so we can get some experiment, experience using that experiments.

We have these educational challenges in 2005-2006. At this time, as you know in December 2004, there was a tsunami affecting Indonesia, Malaysia and Sri Lanka, and also Thailand. We set up the SOI Asia site in Syiah Kuala University in Bandar Aceh. We had tsunami symposium. In this year, we started the internship. We have a network of people, operators in this SOI Asia.

From now on, we would like to start with the collaboration phase. Basically we want to collaborate with other groups such as JICA. We have experience with JICA in Bandar Aceh. We have an experience with United Nations University and also UNESCO. We are collaborating with other RENs (research and education networks) such as UniNet (Inter-University Network) in Thailand and also INHERENT (Indonesian Higher Education Network) in Indonesia and VINAREN (Vietnam Research and Education Network) in Vietnam etc.

Let me briefly explain about the collaboration that I mention here.

We want to make this a platform. We want to have this platform of network. We give the guideline on how to deliver the content, the classes, on how to receive the content, and how we are going to bring this content to other entities. So this is the collaboration platform.

Types of collaboration that we have so far are content partners such as UNESCO, JICA and other academic conferences. We have bridging partners which is the research and education network in Asia as I mentioned earlier, UniNet in Thailand, INHERENT in Indonesia, VINAREN in

Vietnam and MYREN (Malaysia Research & Education Network) in Malaysia and so on. We have collaboration with other e-learning projects such as United Nations University / API (Application Program Interface) through University of Hawaii. We also have the hosting partners who are the ones who are going to invite distinguished guest speakers around the world. This one we have the collaboration with the Global Studio partners.

This is the collaboration we have with JICA. We have lectures between JICA Tokyo and Jakarta office.

This is the UNESCO. Basically UNESCO, we focus on bio-energy and solar, basically energy.

This is the United Nations University. This is the disaster management. This is for the bridging partners.

This is the collaboration with Thailand. We have cooperation with UniNet I mentioned earlier.

This is just the picture in the Keio University.

This is with Indonesia.

This is with Global Studio partners. This is what we would like to emphasize now the Global Studio Project. We have one site in Japan, one site in New York, we have one in San Francisco in Stanford University. Of course we have one in Keio University and Yonsei University in Korea, in Tsinghua and Cambridge. We can invite distinguished guest speakers to these studios and they can deliver their lectures from there to our partners.

This is the facility as you can see. This is in Keio University.

This is an example of collaboration that we had, SIGCOMM (Special Interest Group on Data Communications), which is based on conference communication. So we have connected to other education network.

So this is a brief explanation about SOI in Asia. Thank you very much. We can have Q&A later. Thank you very much.

3-3 *"University Built through collaboration of Japanese and Thai business Sector:*

A Case of Thai-Nichi Institute of Technology, Thailand"

Assoc. Prof. Krisada Visavateeranon
Rector, Thai-Nichi Institute of Technology, Thailand

MC

Next moving on to the third case study, next is Professor Krisada Visavateeranon. He is also serving as the chancellor of Thai-Nichi Institute of Technology. He would be covering the university which is established thanks to the cooperation between the two countries. He received his bachelor degree from Kyoto University and he also taught at the prestigious Thailand Chulalongkorn University. He has also been involved in Asian higher education network SEED-Net. Until last year, he served as the secretary general of SEED-Net. Since last year, he has been serving in the current position, the present Thai-Nichi Institute of Technology. Professor Krisada, please.

Krisada

<Refer: pp. 109 - 118>

Good afternoon, ladies and gentlemen, my name is Krisada, very nice to meet you. It is a great pleasure to talk about our university, the Thai-Nichi Institute of Technology.

I would like to cover the historical site, how the institute was established and how the two countries, Japan and Thailand, get together to establish our university. One of the aspects of the institute is involving the unity, the collaboration among the former foreign students having studied in Japan. So it is designed to nurture the high quality human resource. The graduates will be instrumental in developing high quality research. Let me speak to you in English from now on.

Ladies and gentlemen, it's my pleasure to be invited by JICA and the World Bank to give presentation and share my experience in Thai-Nichi Institute of Technology. This is one of the case studies for industrial cooperation and networking. Thai-Nichi Institute of Technology TNI was established last year, 2007 after 30 years of efforts of Thai former students. The aim of this project is to supply the practical engineers and graduates to the industry to match the need of the industry. First of all, I would like to mention the background of TNI (Thai-Nichi Institute of Technology). Industry in Thailand is turning from labor-intensive to technology-intensive industry, from imitation to innovation based production. Human resource in science and technology is the core of innovation driven economic growth. There is a problem of insufficient of human resource in S&T especially engineers in Thailand. All the 50,000 students from the 300,000 students study in S&T areas, it is not sufficient to feed the industry. The current engineering education does not match to industrial needs. Industry needs practical engineers in production and R&D. Another factor is Japanese investment in Thailand is very intensive nowadays. We have about 6000 companies in Thailand, employing more than 500,000 employees in the industry, mostly in automotive industry, the production based automotive hub in Asia for Japan.

Another background is the long history of a non-profit organization called Technology Promotion Association Thailand-Japan, or briefly TPA. This organization has great desire to build technical college and university to build human resources for Thai industry. TPA is the founder of TNI. It was established in 1973, so 30 years ago. TPA is run by former students graduated from Japanese universities who want to cooperate in developing the country by using their knowledge and expertise in Japan, and also cooperate with the trainees that come to Japan. Most of the TPA activities are human resource developing activities for Thai industry that do technology transfer from Japan to Thailand and to promote Thai-Japan relationship. TPA is supported by JTECS (Japan-Thailand Economic Cooperation Society) (this is the counterpart of TPA in Japan), METI (Ministry of Economy, Trade and Industry), Japanese government and private sector.

TPA activities are mostly human resource development activities-education and training center, school of languages and culture, text book and journal publishing, industrial instruments calibration services.

TPA continues to grow up the activities during the 34 years by building 3 institutes. The last one was TNI which was established last year as a university and independent from TPA.

TNI is an example of industry-university

cooperation. In the pending phase, the industry needs for human resource is surveyed. This is a joint study by TPA and JCC (Japan Chamber of Commerce), JETRO (Japan External Trade Organization) survey on Thai industry's human resource demand. We found that the production engineer, industrial management are mostly needed. Japanese speaking engineer is also required in order to transfer the technology. We also conducted a survey of the most popular university's program among high school and certificate students. We found that they would like to learn about computer engineering, automotive engineering, information technology. English, Japanese and Chinese are very popular among the students.

The TNI was established in response to the industrial need. The major features of Thai-Nichi Institute of Technology are to train practical engineers for industries, enhancing university-industries cooperation, teach concept of 'monotsukuri' to the students-the art of Japanese manufacturing, emphasize on Japanese and English language for technology transfer from Japan, and make use of Japanese universities network that would be mentioned afterwards.

TNI started operation in June 2007. Currently they have about 400 students in many academic programs. Faculty of engineering: automotive engineering, production engineering and computer engineering, information technology. In Faculty of Business Administration, we have industrial management and business administration in Japanese. We have also master degree for students working in the industry. Two courses: MBA in industrial management and executive enterprise management is open to all the students.

This year is the second year and TNI will admit 800 students in all the programs. The first batch of the master's students will graduate next year in 2009. The first batch of bachelor students will graduate in the year of 2011. At that time, TNI will have about 3000 students. There are both part-time and full-time students in TNI. Full-time students study at day time. Most of them are high school graduates and certificate students. Part-time students study on Saturday and Sunday while working on weekdays. TNI is currently composed of all subjects required by Commission of Higher Education over theory and practice, experiments and projects. All are taught in Thai and Japanese. Some are in English. English and Japanese are compulsory for each student. Industrial training and internship are compulsory for all engineering students. After graduation, students work in Thai or Japanese enterprises. Some may own their own business. Some may continue their studies in Japan or work in Japan.

TNI teaches 'monotsukuri' to all its students. 'Monotsukuri' is the art of Japanese manufacturing. It is the spirit of creating high quality product to suit the needs of customer. We teach both technology and skill. Students learn by making products. So they know all processes from design, prototype, manufacturing to testing and quality control. There are project based assignments instructed by industrial experts. They will make use of industrial equipment to teach our students do. All these students will take the industrial internship so they will experience the real world in production field.

This slide shows the TNI's network. That shows cooperative organizations, TNI and TPA's close cooperation in human resource main activities. TPA members, they have about 3000 members and they can use TNI facilities. Thai industry is linked to FTI (the Federation of Thai Industries). FTI is the Federation of Thai Industries and Ministry of Industry. About 5000 industries can be linked through this channel. Japanese companies and joint venture companies to Chamber of Commerce and JETRO and about 1000 companies will link to TNI and sending the experts and the equipment and support the university. On Japan side network, we have academic agreement with 13 universities. We have exchanged professors and students. We do conference and next we will have research together. We have cooperation and support from Japanese organizations, JTECS, METI, JICA, AOTS (Association for Overseas Technical Scholarship), JODC (Japan Overseas Development Corporation) to send the experts and link to the private sectors. This is a brief explanation of TNI network.

TNI-industry cooperation in human resource development cooperation with the industry is a main issue for us. We do curriculum development together. The instructors and equipment for training come from the industry side. Industrial internship is compulsory for all the students. We got scholarships from the industry and lastly, all the students will get employment.

TNI will provide academic services to the industry in terms of seminars, training and consulting services. In the future, we will do research together, joint research, study and survey, product testing. This is what we aim to cooperate with the industry.

About the local Japanese companies in Thailand, we have about 6000 companies in Thailand, also big enterprises and SME. We have many items that are supported by local companies. Scholarships for the students, to attract good students to the university, we need scholarships, especially for the initial stage. The donation of training equipment and machines; providing training facilities for TNI students; dispatching of staffs and experts to teach at TNI; internship in Japanese enterprises; employment at Japanese firms.

This is the photo of automotive engineering laboratory donated by JCC.

TNI scholarships, we also get many supports from JCC members. Tuition fee support; poor students support; research fund; short term study/training in Japan, for Japanese universities, we expect for exchange of students for Master's degree program.

This photo of TNI scholarship, last year we gave 120 scholarships to outstanding students. This we will give 90 scholarships to the good students too.

About the agreement of network with Japanese universities, we have signed contracts of academic cooperation with many universities. The activities are exchange of staffs and students; joint research and conference; and exchange of information.

Shibaura Institute of Technology; Kyushu University; Tokyo Agriculture University; Osaka Institute of Technology; we have exchanged MoU (Memorandum of Understanding) signing ceremony.

After this, we will start exchange of the students. This is a sample of Japanese study tour. We sent them to Sendai to study at Tohoku University and Tohoku Gakuin University. Another one is that we sent the students to Osaka Institute of Technology for internship, for short term training of the AOTS.

Well the time is over. This is a short introduction of what TNI, the academics and industrial development for society and economy. Thank you very much for your attention.

3-4 *"Present and Future: Formation on Network on Higher Education/Science and Technology through JICA Technical Cooperation"*

Dr. Manabu Tsunoda
Senior Advisor, JICA

(The below is translated into English from Japanese Lecture)

MC

It would be the last study presentation, "Present and Future: Formation on Network on Higher Education/Science and Technology through JICA Technical Cooperation", by Dr. Tsunoda Manabu for the initiative for forming network in future direction by JICA.

He was involved in various projects in Africa for 20 years such as Jomo Kenyatta University of Agriculture and Technology in Kenya, Sokoine University of Agriculture in Tanzania. Now he is an expert (academic Advisor) in the AUN/SEED-Net project to form the network in ASEAN regions and between universities in ASEAN and Japan, and also a senior advisor of Higher Education in JICA.

Tsunoda

<Refer: pp. 119 - 131>

Now I would like to explain the present and future initiative of JICA in the forming network of the higher education, and science and technology. JICA has conducted bilateral cooperation many times. It is one-on-one cooperation between Japan and the recipient country. Multilateral type of project has been increasing. Especially in the higher education field, we have been linked to various institutions and also many collaboration networks are provided by different countries. In some cases, more than 10 universities in Japan, not one or two, are linked. In recipient countries, not limited to the universities, local governments, industry, communities, NGO are also collaborated. There are many actors in this multilateral type of project.

Meanwhile, in Japan, in addition to universities, industry, community and autonomous bodies are linked together to implement the project. Such a multilateral network is widely noticed for higher education nowadays, especially for current science and technology operated by JICA. Its operation is not always easy because all of the bodies have their own opinions. However, each assertion from each institution should be well-considered to strengthen the network. As Prof. Kimura pointed out neatly, both "system" and "fund" are really important for the network. In addition to this, I would like to say that "Human resources" are also important. Excellent human resources are very essential to construct a strong network.

Continuous funding is necessary but not easy. Unless new measures to secure possible enough funds in the network will be prepared, the network may not be continued to carry out. Therefore it is extremely necessary to try to find the funding resources for the next step during the network activities.

AUN/SEED-Net, which has been explained in this seminar, is one example of the higher education network by JICA. I would like to explain more details about it. The network is composed of 11 universities in Japan and 19 universities in ASEAN.

This figure shows various programs that have been tied up in this network: Master's degree and Doctor's degree, and student supports have been provided.

This picture shows AUN/SEED-Net students who are studying in Indonesia, Malaysia, Philippines, Singapore and Thailand. Many of them came to Japan under the Ph.D program in Japan. I can see some students of AUN/SEED-Net in this hall. I wonder how many students? Would you kindly please raise your hand if you are SEED-Net students?

(Over 20 students raise their hands)

They are students who are studying now under 3-year Ph.D program of Japanese Universities in Kanto District. Thank you so much for your attendance today because you are spending one important day within your precious three years.

Many students are studying hard in ASEAN and Japan. To know each other and each country further is also very important. I want to say that the element to know each other is fundamentally more important than fund.

This is one active example of De La Salle University (DLSU) in Philippines. This photo is not included any Philippines student. They are students who came from Vietnam, Indonesia, Cambodia and Myanmar into Philippines (DLSU). Japanese teachers and secretariate staff are also participated in this network. Through these activities, various interesting stories and dramas are created day by day. This is the picture as of June 2005. Some of them went back to their home country after graduation for teaching and research, and played an important role in their home country, and some came to ASEAN or Japan to study further. These networks are expanded year by year beyond countries. This expansion has the potential to sustain the network. Personnel are very important assets for the network.

As a conclusion, in the case of AUN/SEED-Net, vital factors to make network more sustainable are resources, actors and general coordination. Coordinators play an important role. Funding is also important for the human capacity development and operation. But fund is in general limited. How to manage the fund effectively under the limited condition is a key issue.

In addition to this, there are 3 key points. First, the concept, vision, mission have to be attractive because various types of actors involved. Just having network is not enough. The network has to be attractive enough for any participants. We can have win-win relation to have mutual benefit. Secondly, mutual trust is important and mutual trust has to be generated. Human relationship is crucial. The third point is “well-functioned teamwork”. This generates the responsibility. When we look at the network, it is not evenly divided and clear-cut positioning of the responsibility has to be indicated. So if it is successful, it should be praised and if not it should be pointed out. Pressure and tension in good atmosphere have to be required for things to move ahead.

After AUN/SEED-Net phase-2, what will happen? There is a question raised in the discussion session of the former presentation. Actually in mid-January in this year, we had a Steering Committee Meeting at Bangkok. It was a discussion at the time before starting phase-2. We had a discussion what will happen after finishing phase-2. This is a stream phenomena on what will happen after phase-2. I think it is quite reasonable to discuss this matter beforehand because we have to consider what is going on ahead of time. That is common opinion made by concerned parties in ASEAN and Japan. Although it seems too early to discuss about the future issue, it is important to consider the next stage before or the early period of phase-2 by all stakeholders to encourage their ownership and initiative for sustainable network.

This is a kind of image charts of the future scheme for how to use the output. Member universities have to share and enjoy the benefits from development of industries and regions. In addition, they are to expand the network involving non-member universities. The network has to be expanded by having these actors in a global scale, from Africa, Middle Eastern Countries and Southern America. These are the regions to be involved. The linkage with various countries is needed. We are planning to take actions even during the phase-2 as possible as we can.

There are various fields in the science and technology engaged by JICA that is classified according to each role in the organization. We do have a variety of areas such as global environment, health, infectious disease and higher education. One of the important elements is the human resource development in science and technology field related to the whole network. Not only just to provide advanced technology through science and technology development, but how to provide the skillful human resources through research, is essentially important in human resource development.

At the various countries, I was often requested or consulted some fields of cooperation from different country such as natural energy, digital communication, bio-technology, distance education, and advanced technology. Japan is one of the most advanced countries in terms of science and technology. Many requests of cooperation have been received. But the issue is that each request is really appropriated for the country considering the existing and future needs of Science and Technology. This is challenging because we have to know what is going on in the localities and what will happen in the future in these localities to offer cooperation in terms of science and technology. If we advance nano-technology alone in one country in spite of many things to do in science and technology fields in that country, it does not always help proper advancement in this particular country because of only one area engagement in this discipline. It is

really important to judge to cooperate appropriately in such situation.

This is an image chart. This red circle indicates the request made from one country. What is needed for the country is assumed to be the purple circle. If we implement the cooperation of the only purple circle, it will not always reflect the country's expectation. If we implement the only red circle, it will not become realistic cooperation sometimes. We have to combine these to come up with feasible program. How to harmonize both needs more effectively with the network is a major issue for both recipient country and JICA to consider seriously.

This is an example of some engineering laboratories in Laos, East-Timor and Indonesia. The equipment in the universities has been utilized with great care in each country. As you can see from the pictures, the content and degree of technology are estimated to be different depending on the localities and technical level. We are not intended to discuss which is best. We recognize and appreciate for the present important technology most suitable for each country.

When we consider the higher education assistance in JICA, various disciplines are covered and inter-related such as agriculture, medicine and health, social science, teacher's training etc.. The time has come to consider to what the higher education could contribute under globalization, diversification and popularization. We are asked now for university how to contribute to the society. In addition to education and research, outreach and social contribution activities for universities are also one of the important factors in line with international cooperation.

This slide is an idea of university cooperation. The vertical line is the maturity of university staff, management and operation. Horizontal axis is time. If the cooperation continues through the course of time, the maturity level is going to move upwards. We need to consider how much and how long the cooperation is required. From the viewpoint of the recipient countries, it is generally apparent that they request for cooperation to become one of international class leading universities. We would like to support it, but unfortunately JICA cooperation is not permanent. Also we think whether it is really needed to support for ever for that country.

First stage ① is the minimum line which the support is essentially needed. Up to here is the minimum line, which shows the critical point. Unless we can reach this critical point, the maturity tends to go back to the starting point. This line will actually not be linear. Of course in the process there is up and down to reach here. Up to the first line here, cooperation is needed If we could estimate we can not reach this stage from the start, I think, we should not start the cooperation. After the second stage②, if you go beyond that, some kind of request for cooperation may be asked to these entities because we have enough capability and attractiveness, and other cooperation/support will be realized from not only JICA but other sources such as Japanese universities or Japanese companies.

We believe JICA's role is important in the stage of ① towards smooth taking-off. It is the network that connects strongly the period before and after the critical line. The network which was created before reaching the line is utilized in the stage ②. Whether we can reach the critical point easily or not depends on the recipient organization and our efforts of the cooperation. It is necessary to estimate and judge the above situations when we start the cooperation.

In terms of AUN/SEED-Net in phase-1, the advancement has been made in 9 core fields. It is important that everyone knows the discipline and reaches some stages. From March 2008, we proceed to the phase-2 challenging regional common issues through cooperation within the network. We cannot go to the phase-2 unless we go through phase-1. In the phase-1, we could accumulate our ability and skill to seriously tackle common issues in ASEAN utilizing the network. In the phase-2, we are planning to tackle activities of common issues in ASEAN countries such as bio-technology, disaster prevention, global environment activities.

This is just an idea from Human Development Department of JICA. When we consider all JICA activities in Science and Technology, a variety of projects are taking place in developing countries. Among those activities, further and broader network is needed with wider views covering Africa, South America and Asia, etc. We can call this as a "global network".

Why is the network efficient and necessary? We have 4 answers; 1)to provide the sustainability, 2)to meet the demand of many kinds of science and technology, 3)to react globalization of science

and technology in various countries, and 4)to enhance synergy effects through cooperation from the existing scheme. When we look at Japan as the whole, the network is crucial. JICA alone cannot do that. In order to do that, as an “all Japan”, this is the list of things that should be included to improve the network activity of Higher Education and Science and Technology such as supporting and evaluation system.

One of them is evaluation of professors of Japanese universities who will contribute to developing countries. Japanese universities are internationalized and dedicated to international cooperation. Though we really appreciate for their participation, but it does not always precisely link to individual evaluation in their own university. University professors are currently evaluated from their research rather than teaching. It is difficult to gain the cooperation from professors because of the system where they are mainly evaluated “research”.

Fortunately, Prof. Kimura, a President of National Institution for Academic Degrees, and University Evaluation is participating in this seminar here, I would sincerely appreciate for considering this kind of situation in a positive way for the future.

I listed the existing international cooperation system and schemes regarding scholarships of foreign students in the bottom of the document. The more in-depth cooperation could be made by engaging in these activities as integrated Japanese schemes.

Lastly, the network activities cannot be realized by the effort of only JICA. Cooperation with various organizations where you belong to is essential.

I’m prepared to be noted whether the global network will be actually established. JICA will continue to keep a great hope and make all efforts to conduct these activities. I would appreciate for your continuing support and cooperation as the first step for forming the network.

Thank you very much for you attention.

3-4 「JICAによるネットワーク形成への現在までの取組みと今後の方向性」

独立行政法人　国際協力専門員
角田　学氏

○ 司会者

それでは、ケーススタディの最後の発表ということになりますけれども、当機構JICAの国際協力専門員である角田学から「JICAによるネットワーク形成への現在までの取り組みと今後の方向性」ということで、発表をいたします。

角田国際協力専門員は、ケニア・ジョモケニヤッタ農工大学、タンザニア・ソコイネ農業大学など、アフリカの大学を対象とした事業に約20年の長きにわたって携わってきております。現在はASEAN工学系高等教育ネットワーク（AUN/SEED-Net）プロジェクトの専門家として、ASEANの域内、それからASEANと日本の大学のネットワークの形成について携わっております。

それでは、角田専門員、よろしくお願いいたします。

○ 角田

＜119頁‐131頁参照＞

高等教育と科学技術に関するJICAの取り組みの現在と今後について、ご説明したいと思います。JICAは、今までバイラテラルタイプの協力を数多く施してまいりました。日本と相手国で、いわゆる1対1の形の協力です。最近、特に高等教育分野において多いのですが、国の中でいろいろな機関と連携を結ぶ、あるいは国を越えて、近隣諸国も含めた連携で協力が始まっております。一つの国を越えた形で多国間による協力を行っております。日本側も1大学、2大学でなくて、場合によっては10大学以上が連携したネットワークの形で取り組む形態がふえております。いわゆるマルチラテラルタイプの連携です。また相手国側でも、例えば1つの国の中でも、大学にかかわらず、地方自治体、産業界、場合によってはコミュニティー、NGOともかかわりながら連携を進める案件です。これは、非常にアクターが多く、混み入っております。

一方、日本側も大学機関だけでなく、産業界、コミュニティー、自治体のノウハウを一緒に連携しながら活動する形態がふえております。これらの機関が全体でオーバーオールネットワークの形で取り組む必要性が出てきているのが、特に現在の科学技術系を中心にしたJICAの関る高等教育の案件でございます。この運営は易しくありません。すべての機関がいろいろな形で主張しますので、容易にまとまりませんが、それぞれの意見を配慮する必要があります。また、このようなネットワークでは、先ほど基調講演の中で木村機構長が御説明されましたが、「システム」、「お金」は非常に大事になります。

それに加えて、更にもう１つ、それを実際に実施する「人」も重要な要素です。良い人材がいなくては、やはり全体のネットワークはまとまりません。また、資金も一機関が長期にわたり提供し続けることは容易ではありません。このネットワークの中で新たな資金を獲得する方策を立てないとネットワークとして続かないことはしばしば生じます。ですから、ネットワークの活動の中で、次のステップの資金リソースをみつけるという工夫が非常に重要になってきております。

先ほどから何回も出ておりますAUN/SEED-Netは、JICAで実施中の高等教育ネットワークの代表例のひとつですので、更に詳しく説明させていただきます。SEED-Netは日本の11大学とASEAN10ヵ国、19大学のネットワークです。

これはSEED-Netの中でさまざまなプログラムが行われている図です。留学生への修士課程、博士課程への支援と共同研究を通したさまざまな活動が展開されております。

この写真は、例えばインドネシア、マレーシア、フィリピン、シンガポール、タイに留学中のSEED-Netの学生です。日本にもPh.D in Japanというプログラムで来ております。本日もSEED-Netの学生の顔が随分と見受けられます。恐れ入りますが、どのくらいいるのでしょう。

（20名を超えるSEED-Net学生が手を挙げている）

―ありがとうございます。彼ら学生は関東県内にある大学のSEED-Netの学生で、Ph.D in Japanと言う3年プログラムで留学です。本日は、貴重な3年間の中の1日を使い来ていただきまして、どうもありがとうございます。

このスライドのような形でそれぞれの国で勉強に励んでおりますが、何よりも大事な点はお互いをよく知ること、自分たちの送られてきた国を他の国の人達にわかってもらい、お互いが知り合うことがネットワークを強化する上で非常に重要な要素になっております。ネットワークは、お金ではない要素、お互いを知り合う要素も非常に大事です。

これはそのうちの一つで、フィリピンのデラサール大学の例ですが、この写真の中にはフィリピンの人はおりません。フィリピンにいるベトナムの人、インドネシアの人、カンボジアの人、ミャンマーの人が集まっている写真です。そこに日本の先生、事務局の人が集まっている写真です。このネットワークの中で、いろいろな形で物語が展開されております。

これは2005年6月の写真ですが、その後、この中からまた母国に戻って大学で中軸になって教育・研究をしている人、さらにASEANまたは日本で勉強をしている人、いろいろな形で展開が続いております。さまざまな人的なリンケージ。私たちは、これをネットワークの重要なポテンシャルと思っております。ネットワークの中で、やはり人は重要な要素を占めております。

まとめますと、SEED-Netの場合ですが、どのような形でネットワークを持続的に行えるかというのは、主にこの3点となります。リソース、アクター、及び、それらをまとめるジェネラルコーディネーションです。全体の調整役は非常に大事になっております。当然ながら、人材育成、あるいはオペレーションにおいて予算は大事です。予算は沢山あるほどいいのですが、あり得ません。限られた予算の中で、人材育成に生かしつつ、資金をどのように動かすかというのは重要なところでございます。

それとあわせ、キーポイントが3点あります。1点目は、ネットトワークはさまざまな人がかかわりますので、そのコンセプト、ビジョン、ミッションは魅力的でないといけない。ネットワークというのは、単に実施するだけでは続きません。参加者全員にとって魅力的な内容にすることが必要です。お互いにプラスになるような内容でないといけません。2点目は、人と人とのかかわり、あるいは相互信頼というのでしょうか、それが培われないとうまくいきません。3点目は、「well-functioned teamwork」です。これには責任感が伴います。ネットワークは均等にできません。いろいろな活動の中で、どこに誰に責任があるかという、責任の所在をはっきりさせることが必要です。うまくいくときには大いに褒められて、そうでないときには厳しくいわれる。ある程度のプレッシャー・緊張感を保ちつつ活動するネットワークの方がうまく機能するかと思います。

先ほどの基調講演でご質問がありましたが、フェーズⅡの後、どうするのかというご質問、私たちも盛んに議論しております。実は、今年の1月中旬に運営委員会というのがございました。その委員会はバンコクで開かれたのですが、フェーズⅡの始まる前の時期での議論です。そのときにフェーズⅡの後、どうするかという議論も出ました。フェーズⅡが始まる前という盛り上がっている時期に終わった後の議論をするというのは非常に不思議な感じがするのですが、ご指摘のように、将来どうするというのは、今から対応を考えておかないとフェーズⅡは始められないというのが、私たちネットワークにかかわっているASEAN、日本の関係者一

同の意見でございます。大変厳しいです。フェーズⅡの後どうするか、ということを今の段階で議論することについて提言しても、容易には取り上げられにくいのですが、フェーズⅡの前に、及びフェーズⅡの初期に、その次のステージを考えるというのは非常に大事なステップです。そのためには、ネットワークという大勢の参加者が皆で考えるというのが主体性を高める上でも大事なところでございます。

これは、そのイメージ図でございます。これは先のご質問を受け、急遽加えましたのでお手元のハンドアウトに載ってございませんが、将来、SEED-Netの成果がどのように生かされるかというイメージの図でございます。各メンバー大学はさらに力をつけると同時に、産業振興や地域開発で活躍する、あるいは、メンバーでない大学をさらに巻き込んでネットワークを広げていく。一方、地球規模課題など、さまざまな課題にネットワークで取り組めるようにしようと考えています。一方アフリカ、あるいは中近東、中南米等々の連携にもネットワークが発展できたらなというのが私たちの夢でございます。これらはフェーズⅡの中でも、できるところから始めたいと思っている所存です。

JICAの取り組む科学技術、JICAの中も組織上いろいろと分かれておりますが、様々な科学技術の分野がございます。地球規模の環境から保健医療、感染症、高等教育など、さまざまな分野で取り組んでおりますが、JICAにおける一つのポイントは、やはり全体にかかわる科学技術におけるヒューマン・リソース・ディベロップメント、人材育成が大きなテーマです。科学技術で研究の先端に携わるというだけでなく、研究を通して人材育成を行うというのがJICAに今求められているところです。活動の中で人が育っていくというのが重要な要素になっております。

今までいろいろな国へ参りましたが、それぞれの国からいろいろな協力要望が出されます。世界中から、さまざまな分野の要求が来ております。自然エネルギー、デジタルコミュニケーション、バイオテクノロジー、遠隔教育、あるいは、ある特定分野の先端技術。さまざまな要望が出されます。日本は科学技術立国というイメージがあります。いろいろな形で日本からの技術支援を期待する要求が来ておりますが、それぞれの技術が本当にその国に必要なのだろうかということに、時々、私たちは直面します。すべてがそのまま希望どおりに協力しようというわけにはいきません。それぞれの国のバックグラウンドに合わせた協力が必要なのではないかなと思っております。その判断が非常に難しいです。それぞれの国が現在、どういう状況にあるか。あるいは将来、どういう状態になるであろうかというのをみきわめた上で科学技術分野の協力をする必要があります。例えば、ある国でナノテクノロジーだけを進めても、その国にとって本当にプラスになるかどうかはわかりません。その辺のみきわめが非常に重要になってきております。

これはそのイメージ図ですが、ある国から要求されているものは赤丸です。本当にその国に必要なものは紫色の丸です。その２つをうまく加えたような協力を、いろいろ考えております。すべてが紫色では相手国側の要求に充分に応えられず、相手国側は元気が出ません。すべてが赤丸でも要求の度合いが高くて、目の前の実際の問題を解けないものもございます。両者をあわせた形でプログラムを組んでいくというのが大事ではないかなと思っております。ネットワークを生かしつつ、その両者をどのように調整していくかというのが、私たちJICAにとっていつも求められているところでございます。

ラオス、東ティモール、インドネシアで工学系の実験室を見学したときの例です。それぞれの国では、いろいろな形で丁寧に機材を使っております。写真をみてわかりますように、行っている内容・程度も国によって違いがあることが想像されます。どのレベルが良いのかというのはございません。それぞれの国に合った現時点での大事な技術と私たちは判断しておりま

す。

JICAの高等教育は、今、教育セクターの流れの中に位置づけられておりますけれども、現実には高等教育はさまざまな分野があります。農業、医療、社会科学、あるいは教員養成、さまざまな分野で高等教育は関る性格のものです。国際化、多様化、大衆化の中で、もう一度、高等教育で私たちに何ができるかというのが問われている時期に来ております。また、教育・研究に加えて、アウトリーチ、社会貢献活動というのも、高等教育においてますます重要視されてきております。

一つの考え方をご説明したいと思います。縦軸は熟度、ある機関の支援される側の大学のスタッフとか、マネジメント、組織などの熟度です。横軸は時間です。年々、協力しますと黒い形で成熟していくのですが、私たちは一体どこまで協力する必要があるのだろうかという点でございます。相手国側からは、世界的に通用するような大学に至るまで協力してほしいということは非常にわかります。私たちはそこまで協力したいのですが、一方で、本当にそこまで必要なのだろうかというのが、この絵でございます。

最初のステージ、①といいますのは、ミニマムラインといっております。ここまでは、一緒に協働してやらないといけない領域でございます。クリティカルポイントといっています。途中段階、この段階に達しない熟度の時点で協力を終わるともとへ戻ってしまう。その場合、むしろ協力しないほうがよかったのではないかというような限界点でございます。曖昧なご説明で済みません。これは、あくまでもイメージ図ですので、このような形でご理解いただければと思います。現実にはこのように真っすぐには行かないと思います。恐らく途中段階でいろいろな波を乗り越えて、この限界点までたどり着くのだと思いますが、ここまでは私たちJICAはぜひ協力すべきものではないかなと思います。あるいは、もし途中までしかやれないというのが最初から見えているのでしたら、協力を開始しないほうがよいというものでございます。第2ステージ以降は、恐らくこの限界点を超えたら、自分たちに力が付いてきておりますので、魅力度も増し、必ずしもJICAでなくても他の形の協力が得られるだろうと予測します。日本の大学、あるいは企業からも、この機関との協力が入ってくることも考えられます。

私たちはJICAの役割は、特に①のところが大事であると思っております。この限界点の前と後ろをつなげるものがネットワークでございます。限界点までで培ったネットワークが活かされるのが、②の更なるネットワークです。相手機関によっては、すぐに限界点に達するものとか、なかなか辿り着けないものがあります。その辺のところも、協力を行う際にみきわめる必要があるのではないかなと思っております。

SEED-Netの場合も、第Ⅰフェーズでは9基幹分野、それぞれの分野の力をつけました。いろいろなことを行いましたが、まず各分野の力をつけることが重要である。第Ⅱフェーズは、そのネットワークの力を使って、それぞれの力が連携し合った地域共通課題をやっていこうというのが2008年からの取り組みの一つです。これは第Ⅰフェーズからはできません。まず第Ⅰフェーズでそれぞれの分野の力をつけて、ようやく本当に取り組みたいASEANの共通課題にネットワークを活かして実施するというのが私たちの願いでございます。第Ⅱフェーズは、ASEANのいろいろな地域共通課題、バイオテクノロジー、災害軽減、グローバルエンバイロメント等の活動をしていきたいと思っております。

これは今、私たちJICA人間開発部で考えておりますアイデアです。今までオールJICAでみた場合、さまざまな案件が展開されております。それを更にネットワークを組んで、例えばアフリカ、南米、アジア等で、JICA内でもネットワークを組みながら、もっと広い視点で活動していく必要があるのではないかと思っております。私たちは、これをグローバルネット

ワークといっております。

なぜネットワークが効果的なのか・必要なのかということですが、それは、①サステナビリティーが期待されるため、②さまざまな技術の要求にこたえられるようになるため、③国を超えた科学技術のグローバリゼーションにこたえられるため、また、④現存スキームの連携により協力のシナジー効果を高めるためという4点が挙げられるかと思います。オールジャパンとして、私たちはぜひネットワークを組みたいと思っております。当然JICAだけではできません。サポーティングシステム、あるいは評価システムを含めて、オールジャパンで取り組む上で更に改善が必要なものは幾つかございます。

その一つが、日本の大学の先生が途上国に行くときの評価でございます。日本の大学としては国際化が進んでおりまして、国際協力には大変熱心でございます。個々の先生に来ていただいて本当にありがたいと思っていますが、なかなか個人の評価につながっておりません。現在の大学は、先生方は教育、研究のうち、特に研究で評価されております。先生方が途上国の協力をされるときに、その評価が積極的になされないものですから、なかなかご協力がえられないという問題がございます。本日はちょうど大学評価・学位授与機構の木村先生がお越しになっております。この辺のところを今後ともぜひ前向きに考えていただけますと大変うれしいかと思います。

一番下にございますが、既存の今まで行っている国際協力のシステム。留学生に関するいろいろなスキームがございます。それらを更に大きくオールジャパンとしてとらえてネットワークを組んでいくと、より深みのある協力ができるのではないかと思っております。

最後になりましたが、このようなネットワーク活動というのは、JICAだけではできるものではないと思っております。本日ご参加いただいておりますさまざまな機関の皆様方のネットワークで、初めて成り立つものだと思っております。

先ほどグローバルネットワークと申しましたけれども、そういうことが本当にできるのかというご指摘を受けるというのも覚悟しております。しかし、JICAは夢を高く抱いて、今後ともこのような活動を全力で行っていきたいと思っております。ネットワークの第一歩としまして、ぜひ今後ともご支援、ご協力をお願いしたいと思っております。どうもありがとうございました（拍手）

3-5 Questions and Answers

MC

This is all for the case study presentations. Various types of case study have been presented and they were very interesting. For the case study, we would like to entertain questions and comments from the floor. We would like to receive as many questions as possible. The questions have to be brief for each question. Any question?

Questioner 1

I have a question for Mr. Tsunoda. Higher education development in Asian region is one of the subjects I'm studying right now. The ASEAN, the SEED-Net is very, very interesting. Diversity is one of the factors. When you look at the comparison between Asian regions and European countries, the economy gap, the capacity gap is also there. Depending on countries and regions, there is a major gap. So having said that, SEED-Net, Laos, Cambodia, Indonesia, how to engage in, how to overcome the gap is something I would like to ask you. We also had a conference in Waseda University, we discussed when we are considering a network, this kind of diversity could act as a positive factor too. Could you elaborate on this point please?

Tsunoda

Thank you very much for your question. You made a very important point. When I met some younger faculties which belong to the network, they are strangers in the beginning. Actually there are inter-region discussions in this regard. After that discussion, we found that there were many challenges like the landslides or energy, or river utilization. We found that there were many common issues. Even though we met as an agent for the first time, even though there are economical gaps, we have many common challenges. We can tackle the common issues, and this is actually more positive than the strangeness we have in the beginning. Of course, among the countries there is significant gap such as Singapore and Laos. Singapore is funding this program by paying up a lot of money.

MC

Are there any questions?

Questioner 2

We know that in Asia, in Japan, the best universities are national university such as Kyoto University, Tokyo University, and so forth. I'm curious that why in this network not many national universities are participating. Is it that the Japanese private universities are setting the base? Or is there some facts that are not shared in the presentation? Thank you.

Krisada

As an institute of technology, first of our intention is technology field, so we try to make the contract with technology institute. But we are trying to jump into R&D, research and development. Then we will have an agreement with big universities such as Tokyo, Kyoto. But in this sense, we have connection with Tohoku University and Kyushu University which is a general university, quite a big one. Is that for your question?

MC

Any other questions?

Questioner 3

My question goes to SOI Asia project. I thank you very much for sharing a very comprehensive project, providing a lecture. The satellite, it was a quite learning information because we at Tokyo Tech also provides the graduate level lectures via satellite to Thailand and via internet to the Philippines. I have two specific questions. First one is probably related to Prof. Kimura's presentation as well. It is a question about credit accreditation, the credit transfer. Any of those lectures, for those students who receive the lectures, are they able to receive any credit? If so, is it with any consortium credit or by the Keio University credit? That is the first question. Second question is you mentioned this lecture provision is both in real-time and archived version of the lecture. My question is whether you find any difference in a student motivation level by receiving real-time lectures via satellite and the archived, the video lectures because from our experiences, our study shows that student motivation is a key for continuing those exchanges of the lectures and we found both credit and the real-time version of the lecture promote student motivation. If you could share your experience, it would be very useful. Thank you.

Thamrin

Thank you. That's a very good question. About the credit, as I mentioned earlier, we are doing this in a very much small scale compared to the SEED-Net. For the credit, we do not have such a consortium. The credits are given by the Keio University. What we have to this moment, as I mentioned earlier, we have this academic committee and within the committee, we have for example one of the professors in Japan. The members of the network agree that these students have to take these classes to get credits. The credits will be given eventually by their own universities the grade is going to be decided by all the professors. That is the one that we have at this moment. There is no official recognition from the universities at the top level. I understand that this is the problem that we have at this moment. As I mentioned earlier that the professors are doing the teaching and research at an outreached international cooperation, in our case our outreach is beyond the IT or internet community in the university. We understand this is a big homework for us. I hope I answered the first question. The next question, real-time versus archived. We understand from our experience, to have the students coming to the lectures, first the cooperation from the professors within the academic committee is very much important. The cooperation there will give the credit and then also we deliver certificates. But the second one is that whether the content of the lectures is really interesting or not. So this is what we have at this moment. Real-time, the students really prefer the real-time compared to looking at the archives. This is what we have because at real-time, they can have interaction with the professors even though not in the same room. This is the experience we have so far. For the credits, we very much welcome the cooperation from other universities as I mentioned earlier about the guideline for the content providers. We welcome JICA or other universities, TIT included, for this project. Thank you very much.

MC

Thank you very much. I have to say that we are running out of time for this Q&A. Today we have some members from African countries and Mr. Fine and Dr. Kimura are in charge of some areas. Please.

Kimura

My name is Tsutomu Kimura from National Institution for Academic Degrees and University Evaluation. I like to ask one question to Prof Krisada. Judging from your presentation, TNI seems to be placing a very high importance on solid, real manufacturing. In that case, you have to think about college of technology in this country (kosen in Japanese) because definitely college of technology is by far stronger than the normal university in this country as far as manufacturing is concerned. So have you thought of that? Since you were in Kyoto University, you know a lot about college of technology in this country. In fact, last year, OECD Higher Education reviewer team came to Japan. They had a look at universities and colleges of technology in this country. They are very critical about Japanese universities including even in the field of technology but they really appreciate the teaching held at colleges of technology. Perhaps you have better to take a look at the colleges of technology yourself. Thank you.

Krisada

I have to get more information about colleges. Some universities like Nagaoka, Toyohashi, Kanazawa Kogyo Daigaku (Kanazawa Institute of Technology), they do a very good in this real manufacturing technology also. At 'genba' (field), at the 'monotsukuri site' (manufacturing site), so the studying point we have to have connections, have agreements with many universities that have the same idea. One of them is the 'monotsukuri' university, this is a private university but they do very good in manufacturing. That is a very good advice for me. Thank you very much.

4. Panel Discussion

4-1 *"STI NETWORKS: Context for Africa's development"*

Dr. Bonakele Mehlomakulu
Deputy Director General, RD&I Department of Science & Technology

MC

We would like to start the panel discussion from now on. Facilitator for the panel discussion would be Mr. Alfred Watkins, who is the Science and Technology Program Coordinator at the World Bank. Before beginning the panel discussion, I would like to invite Dr. Bonakele Mehlomakulu who is the Deputy Director General of Department of Science and Technology of South Africa. She will be joining other panelists in the subsequent panel discussion. Her presentation title is "STI Networks: Context for Africa's Development". So Dr. could you start your presentation first?

Bonakele

<Refer: pp. 132 - 138>

Thank you. Distinguished guests, ladies and gentlemen, good afternoon. It's still early morning in Africa, so I'm just waking up. I know I don't have much time. So I would like to have this opportunity to thank the World Bank and JICA for making this invitation to join this seminar. We, as the Department of Science and Technology, are quite honored to represent the network and innovation as a system in Africa. With this presentation, I'm hoping to bring a context, a real life context, for this network, in a developing country. I'm going to draw from personal and institutional experiences in South Africa.

The national system of innovation that is totally network joins various aspects of innovation chasm. You have your technological continuity or new knowledge generation of IP (Intellectual Property) connected to your manufacturing activities through the technological rivalry and process innovation. You also in the same system have funding mechanism that fund from IP generation, seed, start-up, early stage, manufacturing activities, expansion, maturity of the technology to large-scale expansion of manufacturing activities. You have to have the whole value chain of the funding activities present in your national system of innovation in order for you to realize product and services from your recession development activities. The product for poverty alleviation lies at this end. Clean water, innovative energy solutions and all the products that you need in the economy lies in this end too. University doing research also.

In developed country, you find a good linkage between industries that operate and universities. But in developing countries you don't have that all the time. Usually you have universities generating new knowledge and working hard to publish. Manufacturing activities are at the other end. The two are not joined. You find that in developing countries like Africa there are no IPR (Intellectual Property Right) laws or regulations. There are no incentives for universities to commercialize their new knowledge. There are no resources to ensure that the universities can exploit their IP. The knowledge leaks. It leaves their countries and it goes to where there are opportunities to commercialize. The industries in those countries then import the developed technology. They have no belief in the local know-how, in the know-how that resides within the universities because there are no linkage between the universities and the private sector. They have short term focus so they are not going to go all the way down here to invest in the generation of new knowledge when elsewhere in the world there is already knowledge that is applicable to their immediate needs. There is no incentive to commercialize local IP. There is no risk sharing modalities from government, the modalities from the government that assists or that needs the private sector halfway in terms of commercializing local know-how.

You find that governments do spend money at universities to generate some IP but they don't have a game plan to take the IP all the way to manufacturing. The industry guys are manufacturing and they don't have interest in generating new knowledge. As a result, you find that most of African countries that have natural resources, have phenomenal costs of resources, they are stuck in creating the value out of their primary value of the resources, they have no means in downstream beneficiation of development of those natural resources to ensure that they can get sustainable industry out of those

natural resources. This would continue in Africa. The risk is that you are seeing a lot of changes now are that governments through network and individually in the countries in Southern Africa have decided that they have to invest in science and technology and innovation themselves. But most of these governments are faced with immediate developmental challenges. They see no direct and immediate value in investing in science, technology and innovation or high-end skills. They rely on imports because of their needs. Because of lack of investments by governments, you find that universities, the people that generate the new knowledge, they have many tasks. They are thin in staff; they have to lecture; they have to manage; they have to do some administration; they have to raise funds to supervise post-graduate students. They have no time for their own R&D. As a result, there is very limited new knowledge that comes out from these universities. This vicious cycle continues because there is no new knowledge, the industry continues to import factors of productions from elsewhere. The cost of production depends on external factors. There is no way the countries can contain the cost of production. They will eventually move to where is cheaper to do business, leave countries that do not give them added values for their business.

We, in Africa, are starting to look at technology transfer and opportunity to build knowledge. Often in our country, when there is a need for infrastructure, we stop here. We will import a nuclear reactor, a PWR (Pressurized Water Reactor) nuclear reactor from Arivar. We won't make any efforts to understand what a nuclear reactor is. That is changing now. South Africa will need twenty thousands megawatts in the next 10 to 15 years. The strategy from government is that we will get technology transfer but government is investing in making sure that we can go up this innovation ladder. Without government investments, their own country's government investments, countries in Africa will stagnate.

This example from a study of the World Bank shows that over 40 years, Ghana has not realized values from their science and technology investments. But countries like Republic of Korea have realized economic values from their investments in science and technology. The fact can be attributed to the knowledge in the economy that is used to generate new products and services, the availability of human capital people that are active in the economy that buy houses, buy cars and generate new products and services.

For sustainability of networking and innovation in Africa, I think we need to look at a two-pronged strategy. We develop new know-how but we should use opportunity for technology transfer and link those all together in order for us to generate sustainable networks. It is important that the country's own government to take responsibility for their own development. The investment at this end is government's responsibility. The investment that comes this way could be the collaboration with the industry but in those developing countries, I think what we are mostly looking for in developed countries is their experience. We don't want to reinvent. We don't want to go through the same failures. We don't want to go through the same path. We want to use the existing knowledge to fasten our own development. If we are looking at the partnerships as a vehicle to allow the developing countries that are investing, that are willing to invest in their own know-how to move fast and get to industrial development using their own investment. That is sustainable but relying on donor funding only is not sustainable.

You need government commitment. You need purposeful linkage to industry. You need to give researchers' time to focus on R&D so that they can generate new knowledge. We also always appreciate opportunities from developed countries to send post-doctoral fellows to supervise students and operate equipment for students. We need IPR regulations and funding mechanism along the whole value chain of technology development. We need to reward and encourage patenting. In South Africa, the researchers are fascinated by going to conferences and presenting their ideas before even they check if this is patentable. It is because that there is no reward for patents, no reward for publications and we need to educate our own system and facilitate the understanding of IP.

Now I'm looking at donor funding and sustainability. As I said, I don't think without the country own government's investment, there will be sustainability. You can get donor funding injection. You can get international networks and the students study in the most advanced universities elsewhere in the world.

But there is no industries for them to develop this knowledge, you get really good

students that are qualified, they will not return to their own countries because they will not have employment. People will go to exciting opportunities. So it is important for government to join this effort and make sure that they invest throughout this value chain.

In South Africa, we have invested in the science system over a number of years. You saw a number of networks that are supported in South Africa. But we have not connected the knowledge to the industry. This year our parliament is deliberating on the establishment of technology innovation agency. This is the agency that is going to close that innovation gap. We also are working on the IP appeal. It is in the parliament at the moment. It is out for public comment. It is all the institutional arrangements mechanism that we put in place to ensure that we are able to connect those environments. As part of this developing new mechanism through, in the Canadian model they call them Center of Excellence. In South Africa, we call them Center of Competence or Competence Center. The requirement is that you define a project in mineral beneficiation MAP and energy & social impact project. A university must come with an industry partner and the government researches this organization and together they will get a 15 year grant from the government. Industry does not have to put in money initially but they have to show that they are interested in commercializing their end goal. We hope that this model that is going to attract international companies that want to do business in Africa because government is willing to put money into research in the area that interests the private sector.

We also hope to send the Ph.D programs with international R&D centers. I personally benefited from established Ph.D programs with France. We are trying very hard to make sure that the number of South African students and African students can benefit from this.

To conclude, when the African network is presented, it appeared that South Africa has a lot of networks that they are managing. I think I should say that the development of the region in the whole continent is very important to South Africa. There is absolutely no way for South Africa to succeed if the region is poor. It is important for us that the whole region develops and our own government is investing in making sure that we create conducive environment for the rest of our partners to develop. I make a few examples there. The African Laser Center, the MAST (Mathematics And Science Teaching) institution in Cape Town, the NEPAD (The New Partnership for Africa's Development) S&T in housed within the SAR which is one of the departments and instruments. I think with all these networks, what donors can do is to support these African students to study in these Centers of Competency in South Africa and assist African countries to be able to have mobility between them in South Africa. They can prescribe how they want South Africa to participate because it is important for us for other African countries to participate. We will not say because you give Angola this, we want the same. It is important for us at South Africa that our neighbors are also developing. We help to play a facilitating role. Thank you.

4-2 *"Networking for Change: STI and Higher Education in the Global Society"*

Mr. Alfred Watkins
World Bank S&T Program Coordinator

Watkins

<Refer: pp. 161 - 166>

Thank you very much. My name is Alfred Watkins. I'm with the World Bank, the Science and Technology Program Coordinator and I have the privilege of working with colleagues in JICA to help to organize this round table on networking. I've been asked to perform two functions this afternoon. One is to make them make synthetic remarks based on what we heard so far and the second is to chair a round table discussion with all the people to my left.

I've been asked to really focus on two questions. Why science, technology and innovation? What does that have to do with economic development in Africa? In fact, one of my colleagues, a very bright man from the World Bank, a senior manager at the World Bank, asked me several years ago what I was doing. I said science, technology and innovation in Africa. He said, "Isn't that a contradiction in terms? What does science and technology have to do with Africa's development?" It is a very good question. It is something we have to answer and I want to spend a moment talking about that. The second question concerns networks. What do networks have to do with science and technology capacity building in Africa assuming that science and technology has something to do with African development?

This is probably one of the most famous World Bank power point slides. Everyone who discusses S&T uses it. I have had nothing to do with creating the slide.. Like everybody else, I just copy it and use it.

What does science and technology have to do with Africa's development? This slide provides part of the answer. It shows that Korea invested in education, science and technology and grew very rapidly. Ghana did not and Ghana was left behind.

The slide states that much of the difference between Korea and Ghana can be attributed to knowledge. But it is important to ask: 'What kind of knowledge? Where do you get it? How do you find it? How do you learn to use it?' Sitting here I realized that I omitted another important question 'What can network contribute to all these questions?' Very quickly I would argue that there are two kinds of knowledge that are critical to a country that is at an early stage of development. One is learning how to find and utilize all the knowledge that already exists in the rest of the world. We can see importance of this type of knowledge when we heard some of our colleagues discuss the role of education networks because education is really all about learning what others already know but you don't know. You need to bring this knowledge into your country so you can use it to solve your own problem. What kind of problems you are trying to solve? Problems of poverty alleviation. Problems of achieving the Millennium Development Goals. Problems of developing access in rural areas to clean water and of developing a food processing industry so that food doesn't rot while the farmers who grew the food are malnourished and hungry.

Unfortunately, in countries with low per capita incomes, most people don't have the capacity to find the knowledge they need, to adapt it to local needs, and to use it to solve their own problems. So this is one the issues we need to focus on. The other one is producing new knowledge via research and development. We need to develop networks that can support both the acquisition of existing knowledge and the production of new knowledge.

I would also want to argue very quickly and this is from a study we did it in Rwanda that capacity building in science, technology and innovation networking is needed in all skill levels, not only in research and development, but in design and engineering, as well as in technical and vocational skills. Some people this afternoon were talking about engineering network. That's very good. But we cannot forget the importance of technical and vocational training. It is not enough to have scientists and engineers if you don't have people who can install the equipment, who can maintain the equipment and who can use the equipment to produce goods and services. When you talk about capacity building, when you talk about networking, you really need to talk about the whole range of skills.

Now what does networking have to do with all of these issues? I would argue that what we have represented in this room are organizations such as JICA, the World Bank, other development partners. These organizations have money and human capital which they can invest to support capacity building in Africa, in Asia and Latin America. Developing countries have needs, they also have certain capacity but they have a lot of needs. Japan, other G-7 countries, and OECD countries have capacity building resources. So the challenge we face is combining these needs, programs, and resources into useful capacity building networks.

When we talk about networks, we are really referring to three distinct types of networks. Jeffrey Fine, for example, was primarily talking about intra-region network within Africa. Then you have the so-called BRICS which stand for Brazil, Russia, India, China and South Africa. You have network that could be created between these more advanced developing countries and less advanced developing countries. Let's call these south-south networks. Then you have another sort of network where South Africa is combining with Japan to build capacity in the rest of Africa. You can have all sorts of networks that are being developed. We need to think about how we can contribute to these different kinds of networks.
Then you have different network objectives. For example, we can have technology diffusion networks where we take the technology that is developed in the universities and transfer it to local industry or local villages or local communities so that they have this knowledge to solve their problems. Then there are networks whose primary purpose is to build up R&D capacity in Africa, Asia, or Latin America. There are also training networks which are dedicated either to training Africans in African institutions or in partner institutions outside Africa. Last but not least, we need to think about developing faculty building networks, especially for African universities. I think this could be very important. In Africa, enrolments are rising very rapidly. Faculty can't rise as quickly simply because it takes time to produce a qualified Ph.D who can become an experienced, qualified faculty member at a local university. Are there ways that you can begin to use the resources that are available in Japan and other OECD countries to supplement the faculty capacity that is needed in Africa or in other parts of the world or can you use distance education to supplement the teaching capacity?

For the panel discussion, I think it is useful to begin to go back to these three slides: the resources that are available for networking, the types of networking that we want to establish, and the objectives of the networking exercise. Last but not least, it is important to keep in mind that if you want to do networking, it has to be mutually beneficial for both parties engaged in the transaction. I will stop here. Thank you.

4-3 Discussion

Panelists ***Mr. Jeffrey Fine***

Dr. Achmad Husni Thamrin

Assoc. Prof. Krisada Visavateeranon

Dr. Manabu Tsunoda

Dr. Bonakele Mehlomakulu

Facilitator ***Mr. Alfred Watkins***

Watkins

Now, turning to my role as moderator, I think it would be useful if we began by talking about the role that Japan and JICA can play in addressing some of these issues. There are really two important issues to discuss. One concerns the sustainability of networking initiatives. The second concerns the mechanical and logistical issues associated with organizing, maintaining and sustaining network. I would now like to throw this open to colleagues around the table.

Tsunoda

Thank you, Mr. Watkins. May I start to explain about the finance issue for the sustainability? For AUN/SEED-Net phase one, we completely supported from the Japanese side. But for phase two, we requested for cost share from member institutes, rich governments, hopefully companies and also Japanese government. We are now arranging but not easy to get it without showing attractiveness to our partners from ASEAN countries. After the phase one, they recognize some merits. At present, they are willing to support. But phase one, they didn't show any interest because they didn't know the output of the network. We need some stages when we make plan for sustainability of finance.

Jeffrey

We were asked as a panelist to focus on some specific questions.

Let me begin by stating that networking is not an instrument which is used to cope with weakness alone. If you look around the world, even in Japan and my own country, Canada, you will observe that research, higher education and capacity strengthening involves networking. One reason is ICT We have global knowledge systems and the emergence of new knowledge in ever more specialized fields. It is rare to find a single university that can be at the cutting edge of research in all aspects of a particular discipline. The question is what this global trend implies for developing regions.

In this regard, let me refer to those questions put to us as panelists. One was issues related to establishing these networks. A second one was their sustainable management. The third was the challenge of networking and finally the donors.

Let me start with the establishment issue. I have three points here. The first one, is the lack of what I call vetted information, namely that which has been validated through one's own experience or through reference to a trusted source. Collecting, updating and perhaps most importantly, vetting information is a public good, since all parties stand to benefit from it. STI would argue that it is a need that JICA, the World Bank and other donors should take very seriously as a public service.

Secondly, setting up a network involves risk management. Let me give you an analogy, namely marriage. Getting married is a risk. You begin with dating. You basically go out and you look at prospective partners – on both sides. You need to finance the dating stage, but with the possibility that the prospective partners may conclude,

'Sorry, this is not for me.' The same is true about networking. At some point, you move on to a formal engagement. This is what in a way you have done by the way with your AUN/SEED-Network too. A third stage features a long term commitment, namely marriage. It will develop in different directions and in some cases can end in divorce. Like marriage, networks involved the careful management of relationships.

My third point is the need to use the correct model. I would say many of the failures that I've seen, not just in Sub-Saharan Africa but in other parts of the world come from using the wrong model, in particular what I have termed a single centre of excellence. The single centre approach doesn't work.

On the other hand, from what I have learned over the last two days, and from what I've heard from our presenter Dr. Tsunoda, you are using what I would call the right model, namely a network of centers of excellence. It is precisely what you have been evolving under AUN/SEED project. Think about it. You have got different centers, you have got a focus in terms of area; you pursue a multi-disciplinary approach. You support a variety of activities. You remain sensitive to the importance of distributing benefits among the various partners. So my advice is that you have a good model that you should be looking at replicating and deepening it elsewhere. You have started with bilateral partnerships, and have learned from past failures. You have now come up with a what I think is a very attractive model paralleling a trend in other parts of the world and one which with suitable adaptation I also believe will be applicable to Sub-Saharan Africa. I'll stop there and come back to some other points later.

Watkins

Are there any other panelists that would like to come in and take over some of the discussion?

Please, can we now hear from our colleague from Thailand?

Krisada

I would like to say two questions on why science and technology and innovation. Why networking? In my case, establishing technology is that science and technology is in need. The students who admit to the university should have the base in science and technology. The industry needs the engineers. The basic subject for them is science and technology. In the countries, we are turning from imitation production to innovative one. We need R&D, design and development of the new product. These engineers who try to create the products and create the jobs will create the economic growth. In my case, it is quite clear why STI. Why networking? In this case, networking is quite critical. We have to cooperate with the industry because all the manufacturing technology keeps changing. For example, in the automotive field, not only the manufacturing the automobile itself, you have to concentrate on the automobile parts. There are more than ten thousand automobile parts in one car. So that is quite difficult for only one college that can teach all the knowledge and all the technology that can produce a car. You need much cooperation from many institutes and many companies who have this kind of know-how. In production engineering also, it keeps growing and changing everyday. We see electronics control, computer control, and the cars are moving by electricity. In this case, we need technology from many organizations. This is why I can say of networking by exchanging of technology will be a solution that will be good for a university.

Thamrin

Thank you. I very much agree with Dr. Fine's idea on the network of centers of excellence. This is actually based on the drawing of our experience in SOI Asia because we are building networks of people based on internet. In the first part, it is hard to establish network, looking for partners and so on. Some of them, we think, are not active. The sustainability comes from the participation of our partners. One of the things that we feel lately is the importance of having networks of people will bring

sustainability such as the financial issue. In our case, it is quite difficult to do outreach and to do other fields beside the computer science and the information technology. In our case, we rely on our partners' participation. As you can see, when I presented the SOI Asia, we have not only IT but also the bio, the fisheries are also included there because the partners think that these issues, these topics will be beneficial for them. Even though Dr. Okawa and I are from information technology, we know it is important but we don't know who the best people are there. So we need to find out who are the best people in those fields, who really need this knowledge and who will benefit from that knowledge. We don't know that but we really need to have the network of people. This is what we have been doing. The next point I think really important for this sustainability in our case is that as the society we are playing in Asia becomes more affluent. They can have their own network. This is what we see in the collaboration phase of SOI Asia of what we have been doing now. We are connecting SOI Asia with satellites, connecting panels with satellites. But they also have their own network. In Thailand, there is UniNet. In Vietnam, there is VINAREN. In Indonesia, my own country, there is INHERENT. We are using this, we have to use this if we want to survive. This is the point that we think we should think of especially for the project for the future. We are also very much keen to think how this SOI Asia experience can be used in Africa. Now we are also keen to develop the internet, submarine cable from Japan, Singapore, India, Middle East and down to Africa, the east part of Africa. How are we going to manage this will be very challenging for us, not only in the financial issue but also on the networking of the people. So we believe that this model should benefit everyone in the world. The network of centers of excellence is there already and it is just how we are going to tap to that network to give the benefit to everyone in the world. This is my argument. Thank you very much.

Bonakele

Just to support the need for vetted information. I think as developing countries, we don't quite sell our advantage to the developed world. There are unique environmental opportunities that are presented by some of these destinations for advancing frontiers in science. For example, in South Africa we have lacked such as bio-diversity. In the development of vaccine for global health issues, could be stationed in that region. We don't package that information so that it is attractive to the developed world so that they can collaborate with us. The clear southern skies for radio astronomy and we don't package that as something attractive for developed country to come and work with us. The model for climate change, the meet of the cold and the warm ocean in the southern tip, the presence of Antarctica and the close to the southern tip, that kind of environment for developing the model for climate change, that is a comparative advantage for the region but we don't package and sell it to the developed world as a destination for advancing frontiers in technology. I think those opportunities present a good platform for attracting scientists from all over the world to come and work in the region, to try to answer some of the scientific questions and it adds values to their own country's scientific programs. I think that is a starting point for developing countries.

Watkins

I would like to move the discussion to a slightly different set of issues. When we started this exercise, we were aware of that we needed to produce concrete results. We don't want to gather this afternoon to talk about general philosophy but to talk about very concrete specific things. So let me ask a very concrete, specific set of questions to the panelists here. If we are agree, that networks are important, that networks can produce enormous valuable benefits for all the parties in the network, the question is what can Japan contribute concretely to these networks? What can JICA do, what can Japan do to support the promotion and development of more networks in Africa or in other parts of the world as well. But since the TICAD conference on African development is going to be taking place here in Tokyo in about 3, 4 months from now, what can Japan do to

support networks.

Jeffrey

This is a lovely position to be. I hope you take some of these messages back to Washington

One is that you and JICA should realize that you have got some important successes in particular the ANUC model. It is a product of what I call experiential knowledge. The problem in networking is that there is no formal rule book. But you are not alone in JICA; others are working along very similar track. You should share this very valuable and relevant experience with others. That's number one. Secondly, we often talk about coordination in Sub-Saharan Africa. I would argue here that there is a need for coordination in the international donor community especially with others who are similarly interested and want to experiences to share with you. They are interested to become involved. But just like Japan, they don't want to be alone. Number three, I think that you should think about some of the lessons you have learned ones which I drew from the presentation of Dr. Tsunoda. What you need a new mindset, a new way of approaching these issues. What are some of the things that go into the new mindset? Number one is perhaps the approach I used by way of an analogy to marriage. There is risk but there are ways of navigating the risk. You have some instruments for doing so. Finally, there is need for reciprocity a win-win situation. As Boni has just mentioned, 'We have very fascinating issues in our part of the world.' We welcome international collaboration. Surely there are researchers in such areas as biotechnology, biological sciences and veterinary sciences. which can attract people from Japan and other places. If they don't feel it's intellectually stimulating, they will come once, maybe twice, but never again. Another message is that at the same time, groups such as the ANUC should remain accountable You are not giving them a blank check. They should be accountable to their own societies and downstream, if they are doing serious research, as Boni has put it, they should be reaching out to to the private sector, to the community and always thinking of ways of diffusing their results. There is also need for flexibility. My final point is the need for time. This thing takes time and it is not a 3 years project. There has to be long term commitment. If you are willing to train PhD's and to mentor them, it is a minimum of ten years. But you can manage such undertakings in stages and with benchmarks. Thank you very much.

Thamrin

Drawing from Dr. Bonakele's presentation, the knowledge creation and manufacturing, I think it misses out one thing which is the digital knowledge. In digital knowledge, there is no such thing of manufacturing. Once you produce the knowledge, once you get it commercialize, there is no manufacturing there. Maybe you distribute CDs, DVDs, but that is very cheap. I think Japan and the World Bank should look into this possibility, not only in Africa, but also in other developing countries because this is very much labor intensive but it also has a high value. This is what we saw in the agricultural age because people have received a lot of money there because they cannot be changed with the machine. Then we have the industry revolution. People are being changed with the machines. The ones who made the machines are being high value. Now we are in the knowledge economy. Everyone who has the knowledge has the higher value. The manufacturing will go to wherever the cost is cheapest. In the digital industry, you can have it everywhere as long as the people there are given the opportunity to create knowledge. I think this is the point that Japan and the World Bank should emphasize for the developing countries. I think this is my argument based on my experience behind. Thank you very much.

Krisada

For my case, what I expect from JICA, we got the expert dispatched to TNI in industrial management field and another in Japanese language field. This is very good because these two experts made the curriculum development for us. But for the World Bank, I still don't have idea how you

can support us. I should have more information on this. However for AUN/SEED-Net, this is a very good network and the objective of the network is to build the capacity of the member institutes in many aspects. One of them is upgrading the faculty staff of the member institutions. This is very good and if possible I'm also expecting that we would be one of the member institutions to this AUN/SEED-Net. This SOI Asia and this is very good because it is education borderless. It can give the lecture and knowledge to all the people not only in Japan but to all the regions at the same time as Japan. This will give a very good knowledge to other students. I think there will be more to ask for assistance from this organization but I was told that TNI is a private university and it is not in the scope of JICA to make any assistance. We will try, maybe not directly but indirectly to receive some assistance from JICA. Thank you very much.

Tsunoda

Just a short one. In the floor, there are many senior JICA staffs. This is my personal view. From the law of JICA, JICA will support the initial stage of network like construction stage of network which means like incubation period. Once the network runs smoothly, we will request another supporter like the World Bank, also Japanese other societies like JSPS, Japan Society for the Promotion of Science, very active in the past and now. We consult other bodies to support more widely to strengthen the network.

Bonakele

I'm going to be rather specific of our wish list. We would like to have access to skilled, experienced faculties and skilled and experienced managers of network. When you take a researcher and you put the researcher in a management position, it doesn't matter how much money you put into the network, if you don't have a good manager to manage the network. It becomes very difficult for the network to work. We need a lot of assistance in managing those networks. Models for technology transfer and transaction of IP to products and services, that still escapes us mostly in the region. We can say that in South Africa we invest a lot of money in science and technology. We spend one percent of our GDP now. It is close to one percent. The translation of that IP generated in the universities is something that has escaped us. The management of that and translation is something that we would need. In the whole, the management of intellectual property is something that is still not well understood. We are working hard to establish network that will manage intellectual property. That's for me is a very direct intention that we would put in our wish list. Thank you.

Watkins

Thank you. Now I would like to open the proceedings to questions from the audience. We would be delighted to respond and answer. I see a lot of hands going up and we are short of time but there seems to be an abundance of interest.

Questioner 1

Thank you very much. I would like to make some comments but time is limited, so I would like to just make two points. As Dr. Mehlomakulu remarked, where there is no industrial development, there is no STI development. I think that is true, so as a donor, we have to give advice to developing countries like Rwanda from two sides. One is how to develop their industries and in which field and how they can develop. This is one and together how to develop their science and technology. Without discussing the development of industry or social development, economic development, there is no means for science and technology development. This is our role as the World Bank and JICA. Second point, many higher education institutions are suffering from ICT infrastructure. I would like to say one case in the University of South Pacific. When they have no ICT infrastructure, they have very poor teaching staff. Although they advertise all over the world about teaching staff, nobody wants to join them. But since they have very good infrastructure using submarine cables from Sydney up to Hawaii and to United States, many good teaching staff come to the university because they

have a very good environment for study. This is a key point. To develop our science and technology, for institutions in Africa, why we cannot support their ICT infrastructure? This is one very big issue from now, I think. You showed the World Bank data on Ghana and Korea. That data is just up to year 2000. I saw the recent Ghana and Uganda. Their development in ICT is remarkable. So please show the latest data. Otherwise you will give a wrong impression on Africa in general.

Watkins

Dr. Fine wants to make a quick point. I just want to make a quick point. You mentioned the importance of building up the capacity of science and technology in Rwanda and the importance of building up industry in Rwanda to use the science and technology capacity that is created. I agree completely with what you said. I also want to point out that my colleagues and I at the World Bank just published a book on science and technology and capacity building in Rwanda where we look very practically at what kind of capacity Rwanda needs to develop the food processing industry or to start adding value to the natural resources in Rwanda. That book will be available at the World Bank info shop here in Tokyo and also online in another week or so.

Jeffrey

May I offer a very quick comment since we'll have a chance to discuss at the reception this whole area of ICT. I would like to add one other aspect, namely ICT management. There has been substantial investment in leading African universities spearheaded by the such agencies as the Carnegie Foundation and the World Bank. But it is only one part of the story and not a complete solution. Universities need help in the actual management of the ICT. One such case is Makerere University in Uganda which now runs its ICT services on a cost recovery basis. This revenue is then reinvested. Dar Es Salaam University is following a similar approach.

Watkins

We would like to move on to some other questions and comments.

Questioner 2

Until October last year, for one year, I have been at the Electronics & Engineering of University of Zambia. I was at the center of volunteer and taught students classes over there. The previous two years I was in Jordan and the university in Jordan, in the engineering faculty. I also taught digital telecommunications discipline to the students and ran a laboratory for the past two years, I acknowledged that time is running out, however I felt first the motivation of the developing countries, their motivation is very low. 20 percent of those faculties are very passionate. However remaining 70 to 80 percent of the faculties, their motivation level is very low. In the meantime, students need to take examination and test. My area is related to the digitalization and it is related to the cell phone and devices. The motivation of the students was very low. There is a counter measure as I said in the terms network establishment. I would like to first propose with the neighboring countries. There should be formation of network with the neighboring countries. For example, in Arab or North Africa, there should be some region based network first. In Zambia in Southern Africa, there should be some network building there. The reason why I propose this is that residents in one area will share the customs and ideas. I think they already have some similar efforts in some Arab regions. However we need to have some discussion and also there should be higher incentives to facilitate such movement. Second, if you would like to proceed with the discussion in depth, if you are an expert from different disciplines, you cannot have a concrete specific discussion, so as a second proposal, for each discipline, there should be an invited key faculty of each university. We are saying ICT but ICT can be divided into more sub-disciplines, networking, physics layering and so on. For each discipline and areas, there should be a designated key personnel in charge of those disciplines. Thank you for your attention.

Watkins

Just comment.

Tsunoda

Thank you very much. You pointed out the importance of raising incentive. Yeah, it is really important. In the case of faculty, to obtain a PhD or master's degree in the related activities can be incentives. You can study classes in the institutions of neighboring countries. We need some facilitators leading to higher level of incentives. I acknowledge that. I have the same experience in terms of incentive in the SEED-Net. Thank you.

Watkins

I think we have time for one or two brief comments. Unfortunately we have a surplus of interest and a shortage of time. But it is a nice situation to be in after 4 hours of conversation and a good sign that people still want to keep going.

Questioner 3

Thank you. I'm from International Christian University and United Nations University, Institute of Advanced Study. UNU has a new project to start and it is regarding the science and technology governance for sustainability particularly for developing countries. We are just thinking of how to go about it. I appreciate very much the interesting discussion this afternoon and also the presentation by the panelists. Regarding the network question, people use the analogy of divorce, marriage and incubation, but I think what we do during each stage or period. I think the strategic choice should be determined in each station period. It is extremely important. According to the sociologist famous for network society, Manuel Castell, network is something like multi-throng guerrilla warfare. He split the small battalions everywhere particularly those who are with the terrains, they can link up with the joining areas where the other battalions are spread out without taking central command. They link up as necessary and as appropriate. This explains the strength and the flexibility of the network. I think there is no single model for the most successful utilization of network, particularly when you are concerned with the local needs, or country needs and region needs, you have better to think of better ways to link up the different technologies, the different networks. Therefore this part I should argue for is promiscuity. One point which was not really discussed is the appropriate technology question. Much of the appropriate technology development is already in the public domain but which is not fully utilized. The developing countries mostly ask for the cutting edge technology but they are provided by the industry from the developed country but they do not take root. Like the experience of some of the former developing countries, like Japan, it is extremely important to utilize the appropriate technology and move on to the next stage. Another point is they are thinking the technology reliance on developed part of the world, this was a question raised in 1970 by Hans Zinger and yet rejected by most developing countries, particularly at the Vienna conference on development of science and technology. It was clearly rejected. I think the reversion to that idea is really worst. Thank you very much.

Watkins

Thank you very much. I think we are running out of time. But fortunately we do have some more time for conversation bilaterally in a network sort of way at the reception in the few moments. So perhaps our colleagues from JICA will make some closing remarks. Then we will all move on to the reception. Thank you very much for your time and attention during this session and from the start of this conference 4 or 5 hours ago. Thank you very much.

Attachment

1. Agenda
2. Curriculum Vitae
3. Presentation Slide
4. Reference

【JICA-WB JOINT SEMINAR】
"Network for Change: STI and Higher Education in the Globalized Society"

Program

(1) Opening Address (13:30～13:40, 5 min. each):

- JICA: *Mr. Yoshihisa Ueda*, Vice President, JICA
- WB : *Mr. Lester Dalley*, Acting Special Representative, Tokyo, The World Bank

(2) Keynote Speech (13:40～14:20, 20 min. each):

Keynote speeches aim to share with the seminar participants the role and importance of *network* for developing countries, by ensuring the access to knowledge and technologies which are being accumulated and circulated at the global knowledge platform.

- *Dr. Tsutomu Kimura*, President, National Institution for Academic Degrees and University Evaluation

(3) Case Study (14:20～15:55, 15 min. each and 30 min Q&A):

Presentations will provide case studies of various types of *networks* centered around higher education institutions, to share the experience and lessons learnt.

- *Mr. Jeffrey Fine*, Consultant, The Partnership of Higher Education in Africa
  "Promoting STI in Sub-Saharan Africa Collaborative Initiatives: Rationale, Lessons Learned and Future Promise"
- *Dr. Keiko Okawa*, Professor, Graduate School of Media and Governance, Keio University
  "SOI Asia Project: as a global educational platform in Asia"
- *Assoc. Prof. Krisada Visavateeranon*, Rector, Thai-Nichi Institute of Technology, Thailand
  "University built through collaboration of Japanese and Thai business Sector: A Case of Thai-Nichi Institute of Technology, Thailand"
- *Dr. Manabu Tsunoda*, Senior Advisor, JICA
  "Present and Future: Formation on Network on Higher Education/Science and Technology through JICA Technical Cooperation"

Coffee Break (15:55～16:10)

(4) Panel Discussion (16:10～17:30):

This session aims 1) to categorize the types of *networks* presented in the previous session, 2) to analyze the performance and its determinants, 3) to discuss the roles and challenges of each stakeholder to enhance the effectiveness of each type of *network*, and 4) to discuss the role of donor agencies as an agent for promoting enabling environment for forging *networks*. Dr. Mehlomakulu from South Africa will give a short presentation followed by the panel discussion.

- Presentation by *Dr. Bonakele Mehlomakulu, Deputy Director General, Research, Development and Innovation, Dept. of Science and Technology, South Africa*
- Panelists: *All Presenters in the previous session*
- Facilitator: *Mr. Alfred Watkins*, Science and Technology Program Coordinator, The World Bank

JICA・世界銀行共催セミナー
「ネットワークの可能性：グローバル社会における科学技術と高等教育支援」プログラム

プログラム(13:30 開始~17:30 終了)

(1)Opening Address：(13:30〜13:40)

- ***JICA：　　上田 善久　理事***
- ***世界銀行：* Lester J. Dally *東京事務所代表代行***

(2)Keynote Speech：(13:40~14:20)

- **科学技術と高等教育支援の現状**
  〜高等教育機関と中核としたネットワークによる科学技術のグローバルレベルでの共有〜
  木村　孟 大学評価・学位授与機構長

(3)Case Study：(14:20 ~15:55)

- **科学技術振興における高等教育機関を中心とした様々な形態のネットワークの事例分析〜現在までの経験・教訓と将来の展望〜**（各発表 15 分×4＋質疑応答 30 分）
  - ***Jeffrey Fine (Consultant, Partnership for Higher Education in Africa)***
    『サブサハラ・アフリカでの科学技術振興：協力イニシアチブ〜その根拠、教訓と将来の展望』
  - ***大川　恵子 慶應義塾大学政策・メディア研究科教授***
    『SOI (School on Internet) ASIA：アジアにおけるグローバル教育基盤』
  - ***Krisada Visavateeranon 泰日工業大学学長/AUN SEED-Net 前事務局長***
    『アジアにおける途上国大学と先進国・途上国経済団体の連携: 泰日工業大学の事例』
  - ***角田　学　JICA 国際協力専門員***
    『JICA によるネットワーク形成への現在までの取組みと今後の方向性』

<コーヒーブレイク>（15:55〜16:10）

(4) Panel Discussion：(16:10〜17:30)

- **様々な形態のネットワークの可能性・有効性と各関係機関の役割**（80 分）
  - **上記参加者、*Alfred Watkins（Science and Technology Program Coordinator, 世界銀行）***

  Discussion **に先立ち *Bonakele Mehlomakulu, Deputy Director General, Research, Development and Innovation, Dept. of Science and Technology, South Africa* より発表が行われる。**

  ①Presentation **にて、発表された事例を整理する。**
  ②ネットワークの有効性を高めるための各機関の役割、課題を議論する。
  ③各機関の役割を整理した上で、開発援助機関のあり方についても参加者全員で共有する。

Curriculum Vitae　講師略歴

Fine, Jeffrey C.

An economist by profession, Mr. Jeffrey C Fine has been extensively engaged for more than three decades in research and capacity building, particularly in Sub-Saharan Africa, including establishment of the Nairobi based African Economic Research Consortium. As a consultant, he has worked on a broad range of issues, including the delivery of public goods (public health and education), private sector development (e-business and public private partnerships), macroeconomic management, and various aspects of science and technology policy.　In 2005 and 2006, Mr. Fine conducted several major inquiries into networks engaged in post-graduate education and research in Sub-Saharan Africa, on behalf of the Partnership for Higher Education in Africa, comprising 6 major American foundations. More recently, he has examined management education in Sub-Saharan Africa on behalf of the IFC and the Management Education and Research Consortium (MERC), a US based not for profit agency, which will be mounting a major survey on the management of health care systems, with support from the Melinda and Bill Gates Foundation.

ジェフリー　ファイン

経済学者。30 年以上に渡り特にサブサハラ・アフリカの研究とキャパシティ・ビルディングに取り組んできた。ナイロビに本部がある African Economic Research Consortium の設立にも関与。コンサルタントとしては、公衆衛生や教育などの公共サービス、E-business や官民連携などの民間セクター支援、マクロ経済マネジメントや科学技術政策関連の業務に携わってきている。2005 年と 2006 年には Partnership for Higher Education in Africa の業務でアメリカの 6 つの主要な団体を含むサブサハラ・アフリカの大学院教育ネットワークに関する調査を行った。最近は IFC や Management Education and Research Consortium（MERC、アメリカの非営利団体で、健康管理システムのサーベイを Melinda and Bill Gates Foundation の支援のもとに行う予定）の業務によりサブサハラ･アフリカの教育マネジメントを調査した。

Kimura, Tsutomu

Awarded an Master of Engineering in 1964 by Tokyo University and a doctoral degree by Tokyo Institute of Technology in 1968 and promoted to associate professor in the same year. From 1971 to 1973, he was engaged in research at University of Strathclyde supported by a British Council Scholarship. He was also engaged in research at the University of Cambridge under the Fellowship of the Japanese Government from 1978 to 1979. He was promoted to full professor in 1981. He was elected as Dean of Faculty of Engineering in 1992. He was then elected as President of Tokyo Institute of Technology in 1993. In 1997 he was elected as a fellow at Churchill College at University of Cambridge and spent half a year at the college until March 1998. On his retirement from Tokyo Institute of Technology in 1998, he was made the president of the National Institution for Academic Degrees. He has been in the position since then. He was elected as professor emeritus at Tokyo Institute of Technology in 1998. He was elected as Fellow of Institution of Civil Engineers in 1996. He served as President of Japanese Geotechnical Society from 1996 to 1998 and has also served as Vice President for the Japanese Society for Civil Engineers. He is currently Vice Chairman for Central Council for Education and a member of Science Council of Japan.

He received The Most Excellent Order of the British Empire (C.B.E) in 2004.

木村　孟（きむら　つとむ）

工学修士を 1964 年東京大学より取得。1968 年には東京工業大学より博士号を取得し、同年助教授となる。1971 年から 1973 年まで Strathclyde 大学でブリティッシュ・カウンシルの奨学金を受けて研究を行う。日本政府のフェローシッププログラムにより 1978 年から 1979 年までケンブリッジ大学でも研究を行い、1981 年に教授となった。1992 年に工学部長となり、翌年には東京工業大学の学長として選出された。1997 年にケンブリッジ大学チャーチルカレッジの特別研究員となり、1998 年 3 月までの半年間を同校で過ごす。1998 年に東京工業大学を退職した後、学位授与機構長となり、現在に至る（2001 年からは大学評価・学位授与機構長）。1998 年には東京工業大学の名誉教授となる。1996 年には土木エンジニア協会（英国）の特別研究員として選出され、また、（社）地盤工学会の代表も 1996 年からの 2 年間務めている。また（社）土木学会の副会長も務めた。現在は文部科学省第三期中央教育審議会の副会長であり、また日本学術会議のメンバーでもある。

2004 年には英国よりコマンダー（司令官、CBE）の勲章を受けている。

Mehlomakulu, Bonakele

Dr. Bonakele Mehlomakulu is one of the young, black female scientists who have made a lasting impression in the field that is male dominated. At age 34, she is the Deputy Director-General: Research, development and innovation at the Department of Science and Technology. She worked in the synthetic fuels industry from 1997 to August 2003.

She holds a PhD in Chemical Engineering and was responsible for developing and driving innovation plans for the energy, mining and minerals sectors and designing research and development programs in the resource-based industries at the Department of Science and Technology. She currently serves as South Africa's Energy National Contact Point for the European Union's Framework Program. She also serves on the board of directors of the Pebble Bed Modular Reactor and the Nuclear Energy Corporation of South Africa.

メショマクル　ボナケレ

若年の黒人女性科学者であり、伝統的に男性によって占められていたこの世界に大きな影響を与えている。34 歳にして南アフリカ国科学技術省の研究開発局副局長を務めている。1997 年から 2003 年までは合成燃料産業に従事していた。

化学工業博士を取得しており、エネルギー、鉱業、鉱物セクターの開発・革新プランの作成を担当し、資源ベース産業の研究開発プログラムの策定を科学技術省で担当していた。現在は EU のフレームワークプログラムの南アフリカにおける Energy National Contact Point として活動している。また、南アフリカのペブルベッド・モジュラー炉と Nuclear Energy Corporation のボードメンバーでもある。

Okawa, Keiko

Keiko Okawa, Ph.D. (Media and Governance) is a professor at Keio University Graduate School of Media and Governance and a president of "School on Internet Research Institute". After 12 years of computer industry experience, she started her research on "Internet and the higher education" area at United Nations University, Institute of Advanced Studies in 1996, continued her research at KEIO University from 1997. She has been leading the "School of Internet" research group in WIDE project since 1997 where she conducts research and experiment of distance education. She's been leading the SOI Asia project from 2001 which is focusing on the new form of educational collaboration among universities in Asia currently involving 27 universities in 13 Asian countries.

She received Ph.D. in Media and Governance from Keio University in 2001 and a master degree in engineering from Keio University in 1985.

大川　恵子（おおかわ　けいこ）

慶応義塾大学大学院政策メディア研究科教授。School on Internet 研究所所長。12 年間に渡るコンピュータ産業界での経験の後、「インターネットと高等教育」の研究を国連大学高等研究所で 1996 年に開始、1997 年からは慶応義塾大学で研究を行っている。WIDE プロジェクトでは 1997 年から School on Internet 研究グループをリードし、遠隔教育の研究と実験を行っている。School on Internet アジアプロジェクトを 2001 年から実施し、13 のアジア各国の 27 大学との協力により、新しい教育連携のあり方を模索している。

2001 年に政策メディア研究博士号を慶応義塾大学より取得、工学修士を 1985 年に同大学から取得している。

Tsunoda, Manabu

Completed B.Sc and M.Sc in the Civil Engineering Field, Faculty of Engineering. Got Doctor.of Engineering in 1986. After 6 years of Assistant Professor (Research Associate) at Faculty of Engineering, Tokyo Institute of Technology, he has done field activities as a JICA Expert for 17 years in Kenya (Jomo Kenyatta University of Agriculture and Technology, JKUAT) and in Tanzania (Sokoine University of Agriculture, SUA). Especially at Tanzania, he has implemented as a Chief Advisor of JICA Project aiming at participatory rural development in collaboration with 4 main actors, called University, Community, Local Government and NGOs. For these three years, as an Academic Advisor of AUN/SEED-Net, he has been implementing network activities through human resource development together with 19 Member Institutions of ASEAN 10 countries and 11 Supporting Universities in Japan. Also implementing capacity development of National University of East-Timor and establishment of Egypt-Japan University of Science and Technology.(EJUST). He is also engaged in Senior Advisor of Human Resources Development Department.

角田　学（つのだ　まなぶ）

JICA 国際協力専門員（高等教育・技術教育）

理工学部土木工学科卒。工学博士(1986 年)。東京工業大学工学部助手(６年間)を経て、ケニア（ジョモケニヤッタ農工大学）・タンザニア（ソコイネ農業大学）を中心にアフリカで 17 年間、JICA 専門家としてフィールドワークを行う。タンザニアでは、大学・住民・自治体・NGO と連携し、参加型地域開発プロジェクトのチーフアドバイザーとして実践する。ここ３年間は、アセアン工学系高等教育ネットワーク(AUN/SEED-Net)という JICA 広域プロジェクトのアカデミックアドバイザー(シャトル型)として、アセアン 10 カ国 19 大学・日本の支援 11 大学とともに人材育成を通したネットワーク活動を行っている。また、東ティモールでの大学工学部基盤強化やエジプトでの科学技術系大学設立支援構想など、多様な技術レベルの高等・技術教育の国際協力を実践中である。JICA 人間開発部の課題アドバイザーを務める。

Visavateeranon, Krisada

Krisada Visavateeranon received the B.Eng. and M.Eng. in Electrical Engineering from Kyoto University in 1973 and 1975, respectively. He joined as a lecturer in Department of Electrical Engineering, Chulalongkorn University from 1975 to 2006. He is currently an Associate Professor in Electrical Engineering. During his working period, he attended the training programs and received the certificates from several companies including Yokogawa Elecric in Japan, Philips International in Netherland and Northern Telecom in Canada. He was a Research Fellow at the University of Minnisota, USA from 1989 to 1990. His specialization is in the fields of Industrial Electronic Instruments, Digital Logic and Microprocessor.

He has served for the membership in many national scientific societies. He is the Regular Member of The Engineering Institute of Thailand. He was an Executive Committee of Electronic Association of Thailand from 1984 to 1986, Secretary General of Technological Promotion Association (Thailand-Japan) from 1999 to 2002, and Vice President from 2003 to 2005. He serves as an Executive Director, AUN/SEED net Secretariat and ASEAN University Network/Southeast Asia Engineering Network, Faculty of Engineering, Chulalongkorn University. Currently, he is the President of Thai-Nichi Institute of Technology, which has begun the 1st academic semester in 2007.

クリサダ　ウィサワティーラノン

1973 年電気工学学士、1975 年電気工学修士を京都大学より所得。1975 年から 2006 年までチュラロンコン大学で電気工学の講師として勤務。現在は電気工学の助教授。様々な研修事業に参加し、横河電機㈱やオランダのフィリップス・インターナショナル、カナダのノーザン・テレコムから証書を受けている。1989 年から 1990 年にかけて米国のミネソタ大学で研究員として勤務。産業電子機器、デジタル論理、マイクロプロセッサを専門としている。

数多くのタイ国の科学分野の学会のメンバーであり、タイの Engineering Institute の常任メンバーでもある。1984 年から 1986 年にかけてはタイの Electronic Association 実行委員会のメンバー、1999 年から 2002 年には泰日経済技術振興協会の事務局長、2003 年から 2005 年には同協会の副代表を務めた。AUN/SEED-Net の前事務局長であり、チュラロンコン大学工学部の事務局長である。現在は 2007 年に開校した泰日工業大学の学長である。

Watkins, Alfred

Alfred Watkins is the Science and Technology Program Coordinator for the World Bank where he is responsible for developing and helping to implement the World Bank's global Science and Technology capacity building program. He recently organized a that convened in Washington, D.C. on February 13-15, 2007. He is currently managing a science and technology capacity building program in Rwanda that will serve as a pilot for capacity building in other African countries.

Prior to assuming this assignment, Mr. Watkins helped to develop the World Bank's Science and Technology program in the former Soviet Union and produced Science and Technology policy notes and project proposals in Kazakhstan, Latvia, and Russia.

アルフレッド　ワトキンス

世界銀行の科学技術コーディネーター。グローバル科学技術キャパシティ・ビルディングプログラムの開発と実施運営補助を担当している。2007 年 2 月 13 日から 15 日にワシントン市で Global Forum on Science, Technology and Innovation Capacity Building を開催した。現在はルワンダの科学技術キャパシティ・ビルディングプログラムを実施しており、このプログラムは他のアフリカ諸国におけるキャパシティ・ビルディングプログラムのパイロット事業とされている。

現職の前には旧ソビエト連邦に対する科学技術プログラムの開発に携わり、カザフスタン、ラトビア、ロシアに対する科学技術ポリシー・ノートとプロジェクト・プロポーザルを作成した。

Sharing Knowledge of Science and Technology at Global Level by Establishing International Network of Higher Education Institutions

Tsutomu Kimura
National Institutions for Academic Degrees and University Evaluation

1

Contents

- Introduction
- Student (Academicians) Exchange Policy in Japan
- Japanese Attitudes towards Cross Boarder Higher Education
- Japanese Contribution to build up int'l networks of higher education institutions
- Conclusions

2

§ Introduction

¤Networks in Higher Education Development

- Recognized importance and role of networks in strengthening higher education institutions
- But…. Mixed performance for networks: numerous, but many dormant/ ineffective/ ceremonial networks
- Question is… How to develop network that can ACTUALLY contribute to strengthening of higher education institutions (esp in developing countries)

3

¤Benefit of Involvement for Higher Education Institutions in Developed Countries

- Fruits of "Up-front Investment"
  - possible to become attractive research partners, and source of talented students and researchers
  - "win-win relationship": Capacity development of HEIs in developing countries
- Easier Implementation of Field Research
  - in research themes related with developing countries
- Contribution to Solving Global Issues

4

§ Student (Academicians) exchange policy in Japan

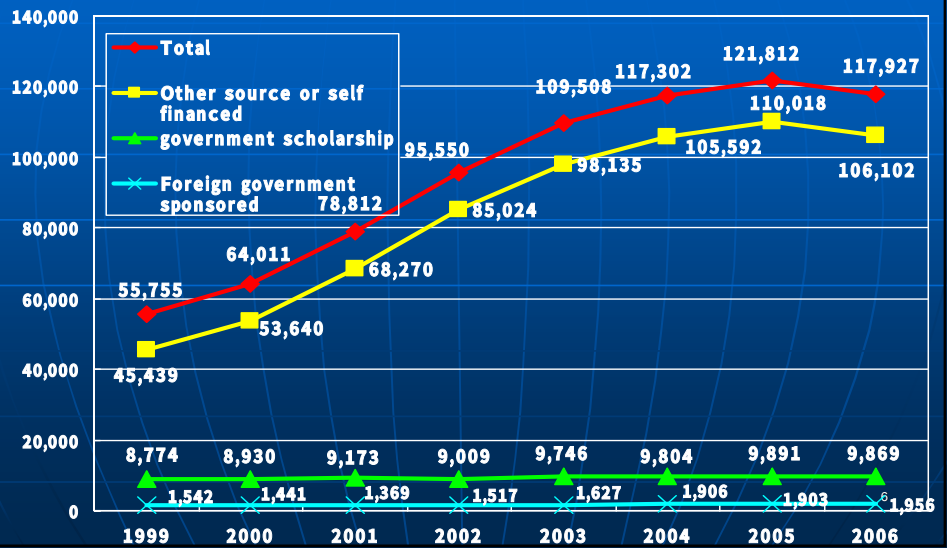
- Promote mutual understanding and establish human networks
- Nurture people capable of participating in the international community
- Internationalise Japanese universities and increase their international competitiveness
- Make intellectual contribution to the international community

(Central Council for Education, November 2002: "Development of New policies for International Student Exchanges")

5

Trends in the number of international students in JAPAN

☆Enrollment of higher educational institutions (as of May 1 each year)



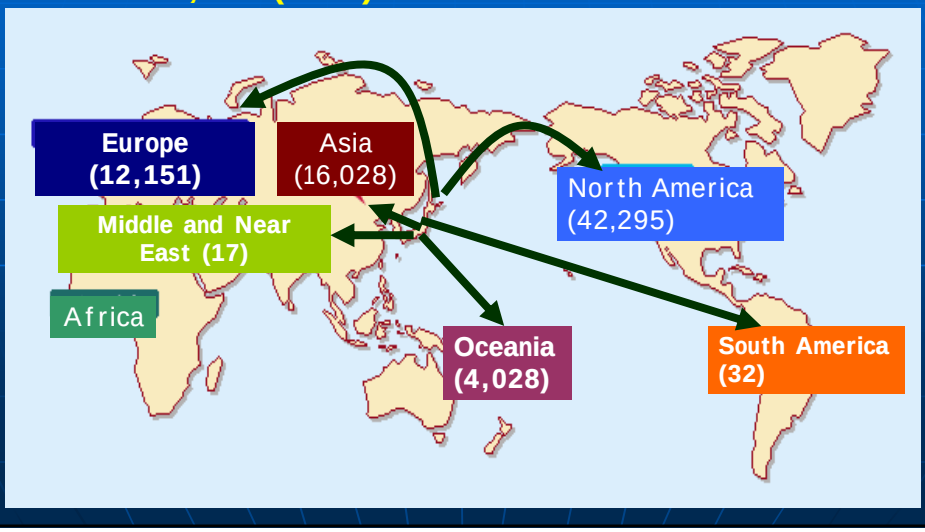
Number of international students by country/region of origin

As of May 1 2006

Country/region	Number	Country/region	Number
China	74,292	Thailand	1,734
Korea	15,974	Indonesia	1,553
Taiwan	4,211	Bangladesh	1,456
Malaysia	2,156	Sri Lanka	1,143
Vietnam	2,119	Others	11,499
U.S.	1,790	Total	117,927

Number of Japanese citizens studying abroad

Total:74,551 (2003)



§ Japanese Attitudes towards Cross-Border HE Provision;

1) At home

Amendments of regulations for branch campuses - Territorial principle abandoned

With respect to:

- Provision of Offshore Programs by Foreign Universities in Japan
- Provision of Offshore Programs by Japanese Universities outside Japan

9

Provision of offshore programs by foreign branch campuses in Japan (1)

- The Minister of MEXT designates offshore programs by a foreign branch campus in Japan.
  - Once designated, the offshore program will be treated in the same way as programs of the foreign university provided in its home country.
  - The program needs to be formally recognised in the home country.

10

Provision of offshore programs by foreign branch campuses in Japan (2)

[Effect of designation]

- Recognition of qualification for admission to a Japanese graduate school
- Recognition of qualification for admission to a Japanese university as a transfer student
- Recognition of exchange of credits with a Japanese university

11

Provision of Offshore Programs by Japanese Universities outside Japan

- Japanese universities may establish a department/faculty outside Japan.
- A department etc. established by Japanese universities outside Japan in accordance with regulations will be recognised as an authorized department etc.
- Japanese universities that provide offshore programs are also subject to the periodic evaluation by a certified evaluation organization.

12

2)At the Global level

- UNESCO/OECD Guidelines on quality provision in cross-border higher education
  - ➔Need for implementation at the national level
- Pilot project on UNESCO Portal of recognised higher education institutions

➡ Possible follow-up at the regional level?

13

§ Japanese Contributions to build up International Networks of Higher Education Institutions

14

1) The Association of East Asian Research University (AEARU)

Leadership by Dr. Chia-Wei Woo at HKUST

17 Members by Regions; 2005-09-05

Chinese Mainland

Fudan University, Nanjing University

Peking University

Tsinghua University –Beijing

University of Science & Technology of China

Hong Kong

Hong Kong University of Science & Technology

15

Taiwan

Taiwan University, Tsing Hua Univeristy-Hsinchu

Korea

Korea Advanced Institute of Science & Technology

Pohang University of Science & Technology

Seoul National University

16

Japan

Kyoto University, Osaka University
Tohoku University
Tokyo Institute of Technology
The University of Tokyo
University of Tsukuba

17

Workshop

Computer Science, Molecular Biology and Biotechnology, Science and Technology Parks Web Technology, Microelectronics, Environmental, Business School, Cultural, Advanced Materials Research, Medical Centre Network Education

Student Camp

Student Summer Camp (General and Topical)
"Go" contest

18

2)UMAP (University Mobility in Asia and the Pacific)

- Founded in 1993 (International Secretariat between 2001-2005 in Japan)
- A voluntary association of government and non-government representatives of the higher education (university) sector
- Aim at enhancement of international understanding through increased co-operation between universities (especially mobility of students and staff)

19

UMAP (University Mobility in Asia and the Pacific)

- Students participating in UMAP exchange undertake a period of formal study (minimum one semester, maximum two semesters).
- Hosting universities are expected to waive tuition fees for UMAP students on exchange.
- Credit for study undertaken while on exchange is to be accepted by the home university.

20

UCTS (UMAP Credit Transfer Scheme)

- One of the main features of the UMAP framework
- Aims to increase student mobility by facilitating the recognition of credit received by UMAP students.
- UCTS is in its trial phase and participation of universities is voluntary (not all universities in the UMAP member countries/territories take part in UCTS.)

21

Challenges for UMAP

- Broaden the number of institutions participating in the framework
- Broadening the network of universities to other regions. (For example, through linkage with the European framework (especially between UCTS and ECTS)

22

3) College Doctoral Franco-Japonais (CDFJ)

Japan-France Joint Ph. D Degree

1996 PM Hashimoto & Pres. Chirac
「20 Actions for the 21st Century」
→ Established in 2004

Mutual exchange of Ph. D students among the Japanese and French universities consortium

23

Member Universities (as of Apr.2006)

■ Japanese Universities Consortium

Chair: Meiji

Executive Members:
Kobe, Nagoya, Osaka, TIT, Tohoku, Tokyo Metropolitan, Waseda

Members:
Chuo, Doshisha, GRIPS, Ochanomizu, Osaka Prefecture, Hitotsubashi, Hokkaido, Hosei, JAIST, Keio, Kumamoto, Kyoto, Kyushu, Nihon, NUT, Rikkyo, Ritsumei, Ryukyu, Seinan Gakuin, Sophia, Tsukuba, TUS, Yokohama National

24

■ French Universities Consortium

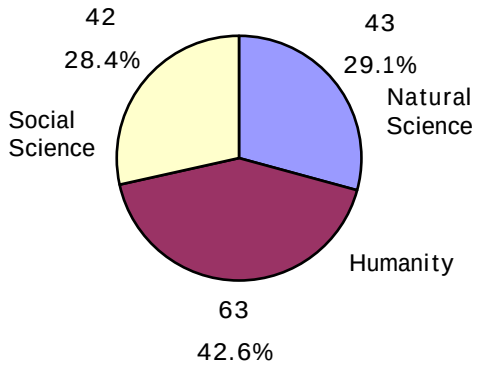
Chair: Strasbourg 1

Members:

Aix-Marseille 1~3, Besancon,
Blaise Pascal, Bordeaux 1~4, Cergy, Chambery,
E.H.E.S.S., Ecole Pratique des Hautes Etudes,
ENS de Cachan, ENS Lyon, ENS ULM, Grenoble 1,
IEP Paris, INALCO, INP Grenoble, INP Toulouse,
Lille 1, Lyon 1~3, Marne-La-Vallée, Metz,
Montpellier 3, Mulhouse, Nantes, Paris 1~13,
Pau et Pays de l'Adour, Rennes 1~2,
Strasbourg 2~3, Toulouse 1~3,
Tours - François Rabelais,
Versailles-Saint-Quentin

25

Chart 1 Japanese students Studying in France; by Sector



26

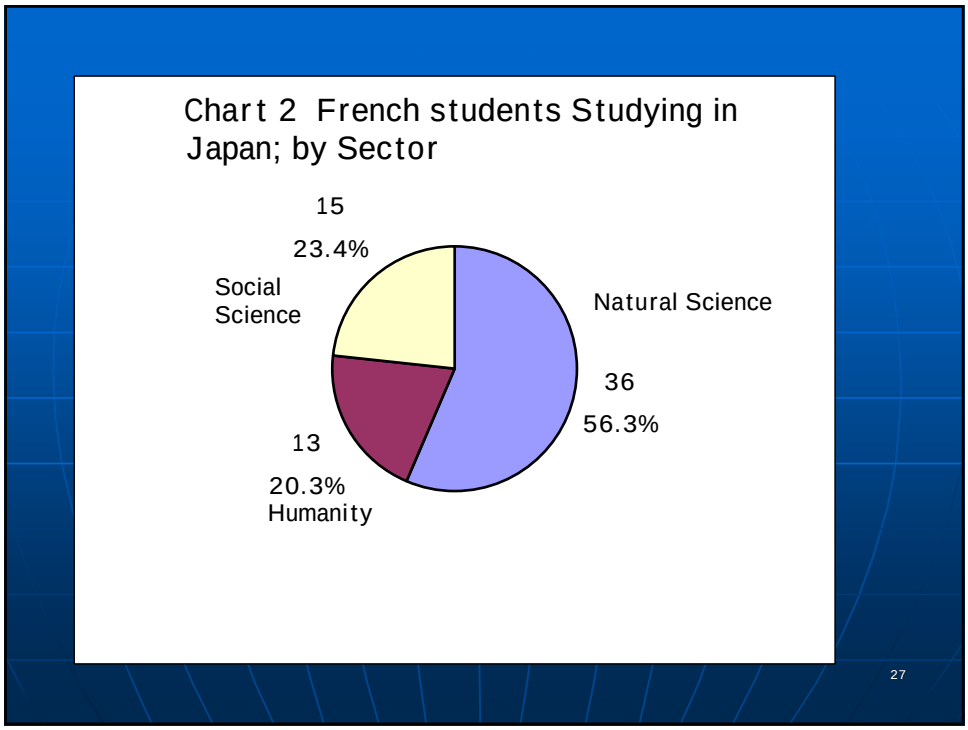


Chart 2 French students Studying in Japan; by Sector
15
23.4%
Social Science
Natural Science
36
56.3%
13
20.3%
Humanity
27

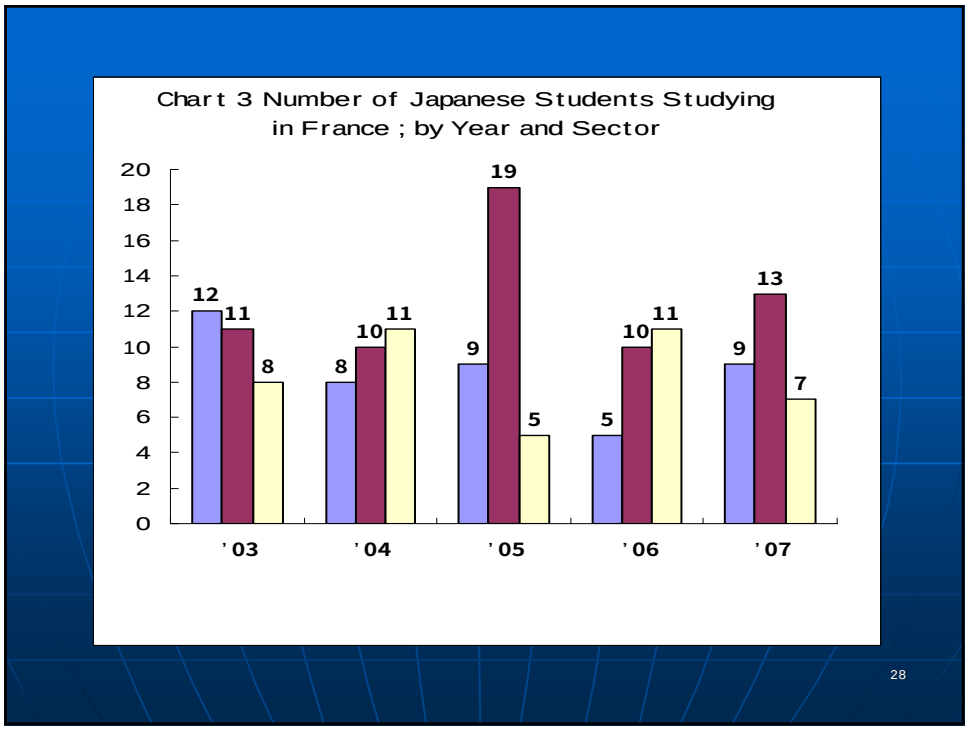


Chart 3 Number of Japanese Students Studying in France ; by Year and Sector
20
18
16
14
12
10
8
6
4
2
0
12
11
8
8
10
11
9
19
5
5
10
11
9
13
7
'03
'04
'05
'06
'07
28

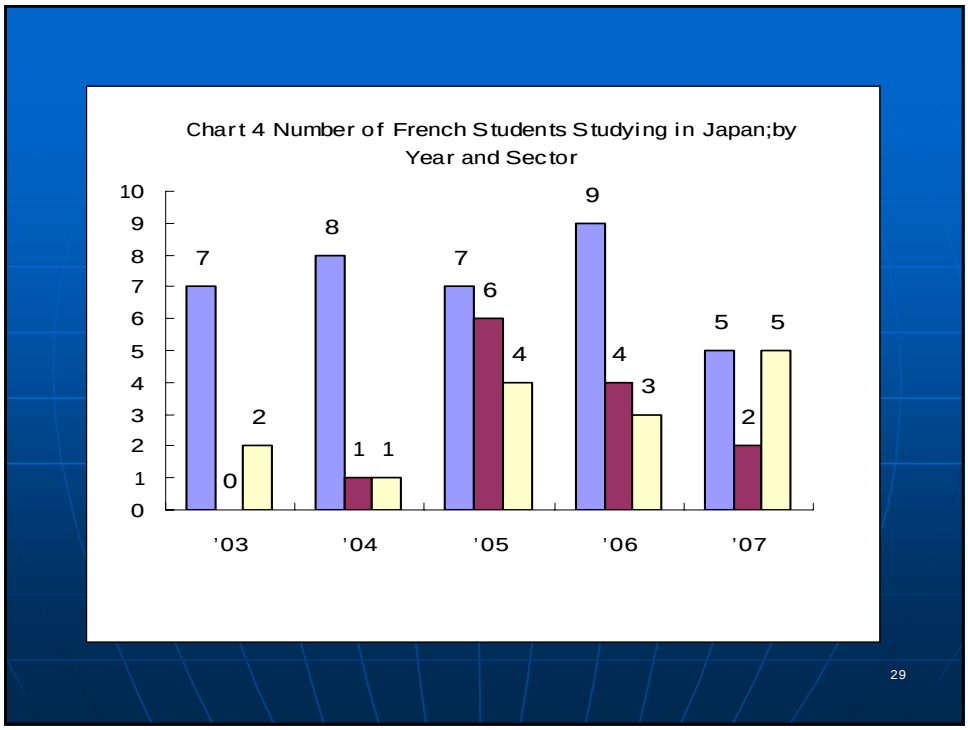


Chart 4 Number of French Students Studying in Japan;by Year and Sector
10
9
8
7
6
5
4
3
2
1
0
7
0
2
8
1
1
7
6
4
9
4
3
5
2
5
'03
'04
'05
'06
'07
29


4) AUN/SEED-Net
ASEAN University Network/
Southeast Asia Engineering
Education Development Network
30

AUN/SEED-Net -History-

◆1997	*Asian Currency Crisis*
◆1997 Dec.	*Japan－ASEAN Summit*
◆1999 Nov.	*ASEAN+3 Meeting: Capacity Building*
◆2001 Mar.	*Feasibility Studies by Experts*
◆2001 Apr.	*AUN/SEED-Net Inauguration Ceremony in Bangkok*
	Signing on the "Cooperative Framework"
	by ASEAN countries and Japan
◆2002 Oct.	*Tokyo Workshop*
◆2003 Mar.	*SEED-Net Phase I (2003.3.11-2008.3.10)*
◆2005 Nov.	*Mid-term evaluation*
◆2007 May	*Final evaluation*
◆2008.Mar.	*SEED-Net Phase II (2008.3.11-2013.3.10)*

31

○Countries in the project

10 ASEAN countries: Thailand, Indonesia, The Philippines, Malaysia, Singapore, Brunei, Myanmar, Vietnam, Laos, Cambodia

○Final Goal

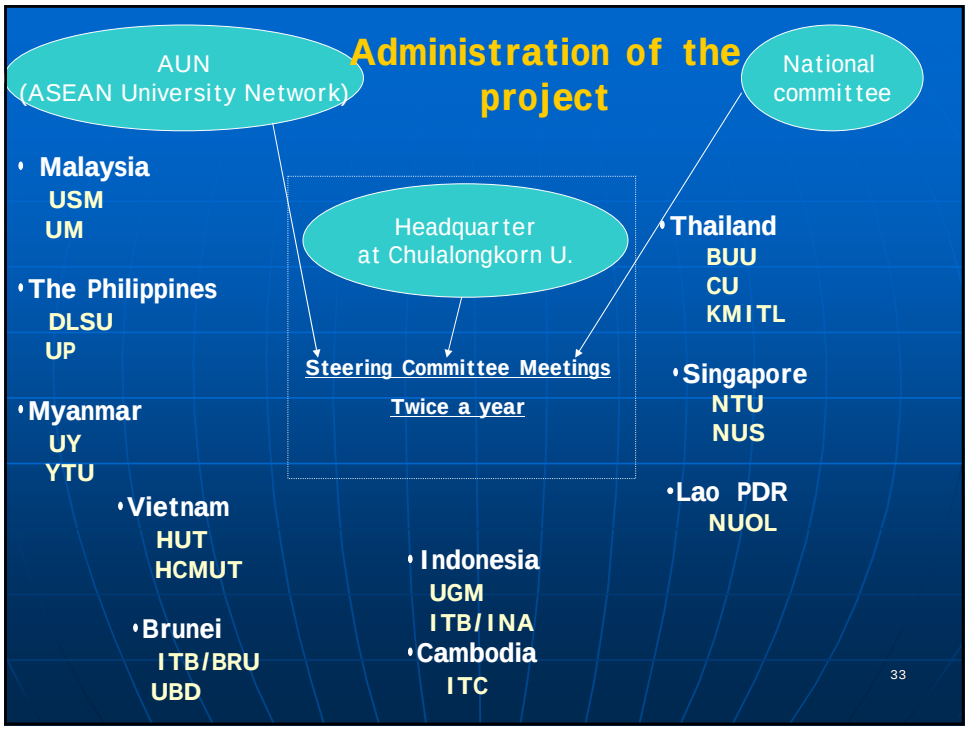
To achieve sustainable development by promoting engineering in ASEAN countries

○Target of the project

To promote level of research and teaching in engineering of the universities participating in the project by building up close link with each other and with Japanese universities

Focus: Master or Ph.D. level
Core programme: Study opportunities in the region
(Master and Ph.D.: Sandwich programme with Japan/ Ph.D.: Studying and research at Japanese universities)
Eligible applicant : Young university staff and potential candidates for university staff
Sub-programme : Joint research , Organization of Seminars

32



What has been achieved so far
(2001~ 2008)

Mode of supports	Frequency of supports
Scholarships given	445 psn (Master:311, Sandwich Ph.D:66,Ph.D in Japan:56, Ph.D in Singapore:12)
Joint research	222 Projects (US$ 2,300,379)
Equipment given (till 2005)	94 pieces (US$ 798,439)
Dispatched Japanese Academicians	372
Short visit to Japanese universities	205 times
Mutual visit between member universities	46 times
Academic seminars	92 times
Promotion tour by host universities	236 times

34

Japanese Supporting University Consortium (11)

Hokkaido University
Keio University
Kyoto University
Kyushu University
National Graduate Institute for Policy Science
Shibaura Institute of Technology
Tokai University
Tokyo Institute of Technology
Toyohashi University of Technology
University of Tokyo
Waseda University

35

Academic Fields and Host Universities

Field	Host University	Japanese Counterpart
Chemical	DLSU (P)	T.I.T
Environmental	UP (P)	T.I.T
Manufacturing	UM(ML)	Keio
Material	USM(ML)	Toyohashi
Civil	CU(T)	Hokkaido
Electric and Electronic	CU(T)	T.I.T
ICT	KMITL(T)	Tokai
Mechanical and Aeronautic	ITB(I)	Toyohashi
Geology and Mining	UGM(I)	Kyushu
All Fields	NTU(S)	
	NUS(S)	

36

Annual Plan

Programme	Number of students
Master's Degree Program	*55 (5 /Field + 10 (Singapore))*
Doctoral Degree Sandwich Program (SWP) <Ph.D (SWP)>	*18 (2 /Field)*
Doctoral Degree Program in Japan <Ph.D in Japan>	*18 (2 /Field)*

37

Annual Budget for Phase I

(Mil. Yen)

2003	2004	2005	2006	2007
160	380	490	620	625

38

Activity Plan of Phase 2

1) Continuous HRD (Higher Degree) of Faculty Staff
   - Focus on CLMV countries / Ph.D level

2) Capacity Development of Graduate Program
   - Senior ASEAN: toward regional COE
   - Junior ASEAN: establishment of graduate program

3) Institutionalization of academic network
   - Establishment of regional academic society (field wise)
   - Participation of non-member universities, industries and communities in collaborative research & academic society

4) Establishment of Joint Graduate Program Consortium
   - Mobilization and sharing of resources

5) Collaborative Research on Region's Common Issues
   - Disaster mgmt, Env. Protection, Renewable energy, etc.

39

§ Conclusions

- Some successful, some not.
- What are the keys to success?

The system has to be comprehensive and proper financial support is essential.

40

Promoting STI in Sub-Saharan Africa

Collaborative Initiatives: Rationale, Lessons Learned and Future Promise

Jeffrey C Fine *Jcfine@telepraxis.com*

Tokyo, Feb 1, 2008

1

Overview of Presentation

- Collaborative Initiatives
  - Context
  - Trends
- Fostering Innovation and Creativity
  - Issues
  - Models and Lessons Learned
- Nurturing Networks of Centres of Excellence
  - Vetted information
  - Incubation Facility
- Next Steps

2

Collaborative Initiatives: Context

Networks and partnerships transcending institutional and political boundaries

Sub-Saharan Africa

- Undifferentiated and small systems of higher education
- Small formal private sector
- Sub-optimal size: lack of scale, critical mass in specialised fields
- Pressing need for doctoral education
  - Serious underinvestment in past two decades
  - Growing demands from system expansion
  - Highly specialised requirements for doctoral thesis supervision and post-doctoral mentoring
- Underinvestment in facilities and equipment

3

Collaborative Initiatives: Trends

- Major motivations:
  - Scale economies in staff, equipment
  - ICT: (cost, accessibility, bandwidth): expanded opportunities for collaboration in research instruction and knowledge sharing
  - Specialisation required to cope with emerging fields of knowledge and sub-disciplines
  - Expanded geographical coverage e.g. geosciences, veterinary sciences
  - Greater institutional autonomy (for public universities)
  - Enlightened leadership (in some cases)
- African governments are endorsing need for collaboration
  - NEPAD and AU
  - NEPAD endorsement of Networks of Centres of Excellence for promoting STI
- Leading African universities:
  - Offices established for partnerships and collaborative activities, BUT
    - Limited knowledge of staff involvement in collaborative initiatives
    - Varying capacities to develop or take advantage of collaborative initiatives

4

Fostering Innovation and Creativity: Issues

- At least 15 to 20 potential initiatives involving post-graduate education and research
- Promising innovations in research, learning, organisation, financing
- Examples: geosciences, veterinary medicine, structural biology, biochemistry, mathematics
- Operate on a sub-optimal scale in terms of:
  - Cutting edge research
  - Doctoral education
  - Financing: core/transactions costs
- Lack of *vetted* information for: potential funders (public and private), international research networks, home institutions

5

Fostering Innovation and Creativity: Issues

- Lack of university entrepreneurship in funding research and entrepreneurship
- Absence of virtual and real clusters linking universities, industry, financiers, business service providers, and government
- Emerging role for business schools:
  - Link between academia and private sector
  - Business service provision
  - Entrepreneurship development (IFC) centred on:
    - Training featuring case writing and teaching
    - Business school staff and standards
    - Post-program networking

6

Fostering Innovation and Creativity: Issues

Project Financing

- Sound projects are the vehicles for actual investment in STI
- Funders *can* be found for sound projects
- Investment hampered by:
  - High transactions costs entailed in identifying sound projects
  - Perceived risks in financing them

Constraints

- Lack of vetted information concerning initiatives
- Inexperience in identifying sound arrangements for governance and management
- Time required to generate genuine local ownership and shared commitment
- Need for risk sharing by investors
- Investors require an exit strategy

7

Fostering Innovation and Creativity : Models and Lessons Learned

- Bilateral Partnerships
  - Rationale:
    - Knowledge and skill transfer
  - Drawbacks:
    - Limited scope for expanding range of highly specialised fields
    - Intellectual non-sustainability of asymmetrical relationships
    - Evolving interests of partners
    - Narrow platform for developing region wide networks
- Regional Centres of Excellence
  - Rationale:
    - Exploit scale economies in facilities and staffing
  - Drawbacks:
    - Hub and spoke configuration
    - Differing capacities and agendas among participants
    - Unequal distribution of benefits
    - High risk: centre selection; concentration of resources
    - Glued together by external funding
    - Lengthy record of failed efforts

8

Fostering Innovation and Creativity : Models and Lessons Learned

- *Networks* of *Centres* of Excellence focusing on discipline or issue
  - Rationale:
    - Mitigates risks associated with differing agendas, concentration of resources
    - Robust platform for post-graduate training and quality research
    - Allows for differential growth in capacities; institutional specialisation
    - Flexibility in adjusting to changes in institutional partners, research agenda
  - Challenges:
    - Need for long term sustained core funding
    - Sound governance arrangement
    - Network leadership and network management
    - Provision for exit as well as entry
    - Renewal of research activities
    - Incorporate modalities for moving from research to innovation:
      - Addressing the financing gap
      - Entrepreneurship and business support services
      - Institutional innovation esp. in universities and research centres

9

Fostering Collaboration and Creativity: Models and Lessons Learned

- Research Technology and Innovation Consortia:
  - Global and regional
  - Industry, government, academia, business service providers, investors
  - Activities:
    - Training and training materials
    - Institutional innovation
    - Services innovation and management
    - IP
    - Outsourcing
    - Supply and value chain intelligence
    - Technology centred pilot projects
    - Business start-ups
  - Application to SSA hinges on prior investment in networks of centres of excellence

10

Nurturing Networks of Centres of Excellence

Rationale:

- Many promising collaborative efforts are operating on a sub-optimal scale in terms of research, post-graduate education, and outreach
- Ramping up requires systematic incubation:
  - To design a sound project and solid business/financing plan
  - Work out governance and management
  - To secure genuine local buy-in cf. *"sign and then negotiate"*
  - To reduce perceived risks for potential funders
  - To attract potential downstream investment in innovation
  - Draw in functional and strategic management skills in research management and downstream innovation
- Already happening but not systematically: AERC, Agra, In-Depth
- Systematic incubation will produce stream of sound projects

11

Nurturing Networks of Centres of Excellence

Two Principal Thrusts:

- Vetted information on potentially promising collaborative initiatives
- Facility for incubating promising networks
  - International donor community
  - Interested African governments
  - Private sector

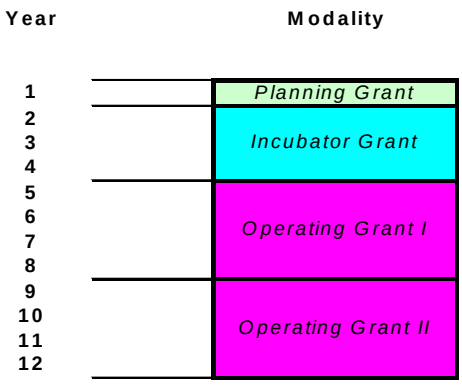
12

1. Vetted Information

- Dynamic data base of collaborative initiatives in research and higher education
- STI systems mapping
  - Centre for Research in Science and Technology (CREST)

13

2. Network Incubation Facility



Network Incubation Facility	Prepare incubator proposal Operationalise project Develop long term program Local buy-in by institutions
Long term funding by interested funders	Cutting edge collaborative research training, outreach by local and international professionals. Identify potential investors in marketable research products Wind-up or "reinvention" after second grant.

14

2. Network Incubation Facility: Possible Applications

African Networks of Centres of Excellence

- Climate Change
- Life Sciences
- Biotechnology
- Innovation Marketing
- High Speed Computing and ICT Applications
- Earth Sciences
- Marine Sciences
- Environmental Management
- Agriculture and Agribusiness
- ?

Networks (2006)

Agriculture Networks

African Centre for Crop Improvement (ACCI) (University of Kwazulu Natal)
Regional Universities for Capacity Building in Africa (RUFORUM) (Kampala)

Biotechnology Networks

Biosciences eastern and central Africa (BecA) (ILRI, Nairobi)
South African Structural Biology Initiative (University of Cape Town)

Chemistry Networks

Southern and Eastern Africa Network of Analytical Chemists (SEANAC) (University of Botswana)

Demography Networks

International Network of field sites with Continuous Demographic Evaluation of Populations and Their Health in Developing Countries (INDEPTH) (Accra)

16

Networks (2006) (2)

Economics Networks

Africa Economic Research Consortium (AERC)
Centre for Environmental Studies, University of Pretoria
Collaborative MSc Programme in Agriculture and Applied Economics for Eastern and Southern Africa

Geomatics

Africa Geomatics Network (University of Cape Town)

ICT Networks

LINK Centre, and Research ICT Africa (University of the Witwatersrand)
Centre for High Performance Computing (CHPC)

17

Networks (2006) (3)

Law Networks

Centre for Human Rights, University of Pretoria
Centre for Trade Law (University of the Western Cape and University of Pretoria)

Management

Association of African Business Schools (Gordon Institute of Business Science, Johannesburg)

Nursing Networks

School of Nursing, University of KwaZulu-Natal

18

Networks (2006) (4)

Science Networks

Africa Earth Observatory Network (AEON)
Africa Array (Witwatersrand University)
African Mathematics Millennium Science Initiative (AMMSI)
International Programme in the Physical Sciences (IPPS)

Staff Development: Sciences Humanities & Engineering Networks

University Science, Humanities and Engineering Partnerships in Africa (USHEPiA)

Veterinary Science Networks

Department of Veterinary Science, (University of Pretoria)

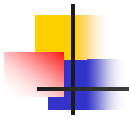
19

Rationale for North South Partnerships

- Partnerships will become increasingly prominent feature of emerging global knowledge systems
- Their sustainability ultimately rests on share intellectual interests and creativity
- *Networks* offer effective *portals* for:
  - Accessing area specific knowledge and expertise;
  - Conducting comparative research;
  - Undertaking frontier research in some fields;
  - Establishing and nurturing long term, peer based institutional and professional relationships

20

Japan? A Catalytic Role



- Update knowledge/data base of potentially creative networks
- Share knowledge with other donors and Japanese stakeholders
- Undertake detailed design study of Network Incubation Facility with other donors [IDRC, SIDA, World Bank, DFID, Netherlands and others]
- Validate design with key African stakeholders [NEPAD S & T, Association of African Universities, regional university associations etc.]
- Mobilise resources for Network Incubation Facility
- Inform potentially interested Japanese institutions and scholars
- Launch Facility
- Support directly networks of specific interest to Japanese institutions and scholars

21

SOI Asia Project

As a global educational platform in Asia

Keiko Okawa
Keio University

February 1st, 2008

What is SOI Asia ?

Multilateral partnership among Asian universities

26 universities & institutes
in 13 countries
in 6 time zones
since 2001

2

Dr. Keiko Okawa
Dr. Achmad Husni Thamrin

What is SOI Asia ?

Multilateral partnership among Asian universities
to operate a platform for educational collaboration among universities in Asia

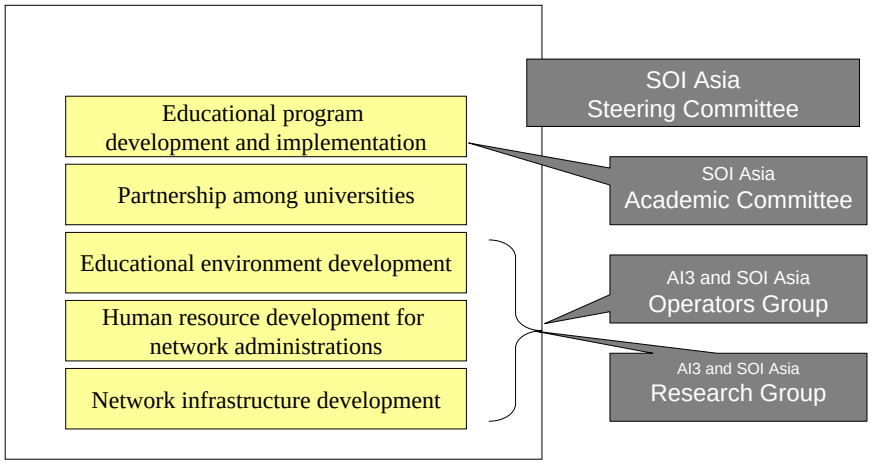
3

What is SOI Asia doing on the platform?

- Sharing Knowledge
  - Sharing university lectures in real-time and archived.
  - Organizing seminars and symposiums
  - Helping remote participation to the international conference and seminars.
- Creating opportunity
  - for joint research
  - to study in Japan
- IT HRD
  - Workshops
  - Internships

How it is operated ?

Autonomous and sustainable project
to establish and operate the Asian global educational infrastructure



5

1. Network infrastructure development

- Achievement
  - Establishing the broad band Internet environment in by utilizing receive only satellite equipment and UDLR technology.
    - 9 Mbps downlink shared by RO sites
    - IPv4/IPv6 multicast enable to the RO sites
  - Implementing the sites in low coat and in short period
    - About $1000 for setting up for 1 site.
    - About 3 months for everything.
  - Standard setup for better administration
    - Documentation
    - Equipment standardization
    - Network monitoring tools
    - 6 partners installation done in 2004.
    - 17 universities are operational, 3 universities are under preparation

6

Brawijaya University, Indonesia

Hasanuddin University, Indonesia

Sam Ratulangi University, Indonesia

Asian Institute of Technology, Thailand

National University of Laos, Laos

Advanced Science and Technology Institute, Philippines

University of Computer Studies, Yangon, Myanmar

Asian Youth Fellowship, Malaysia

Chulalonkorn University, Thailand

Institute of Technology, Bandung, Indonesia

Institute of Information Technology, Viet Nam

USM Malaysia

Mongol University of Science and Technology Mongolia

Prince of Songklang University Thailand

Chulachomklao Royal Military Academy Thailand

Keio University
Shonan Fujisawa Campus,Japan

University of Syiah Kuala Indonesia

University of San Carlos Philippines

Bangladesh University of Engineering and Technology Bangladesh

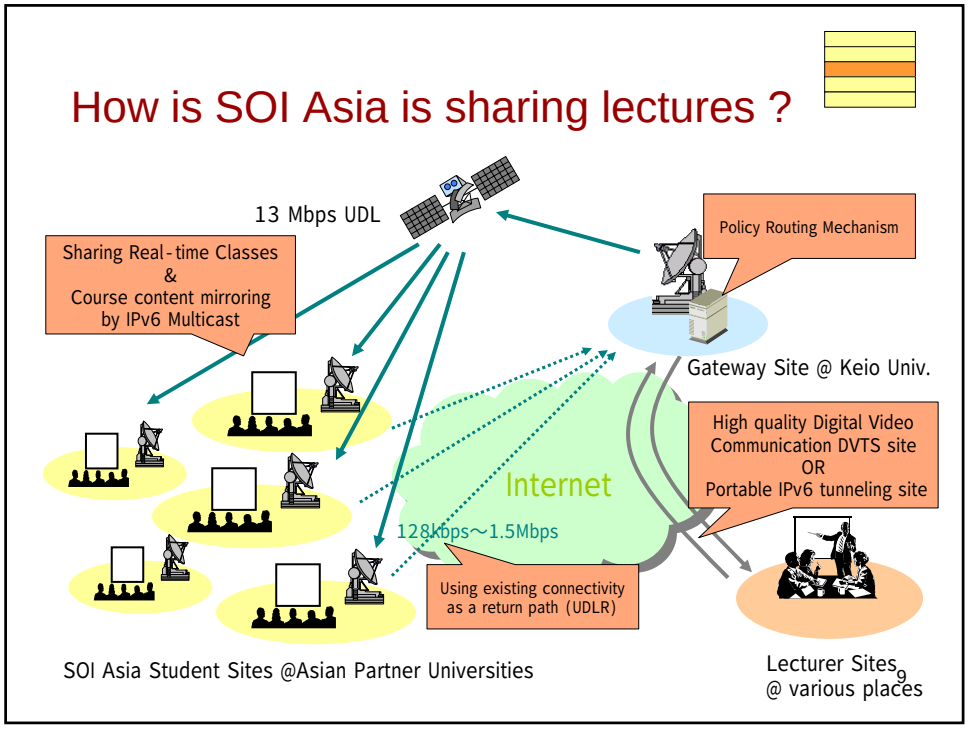
Institute of Technology of Cambodia, Cambodia

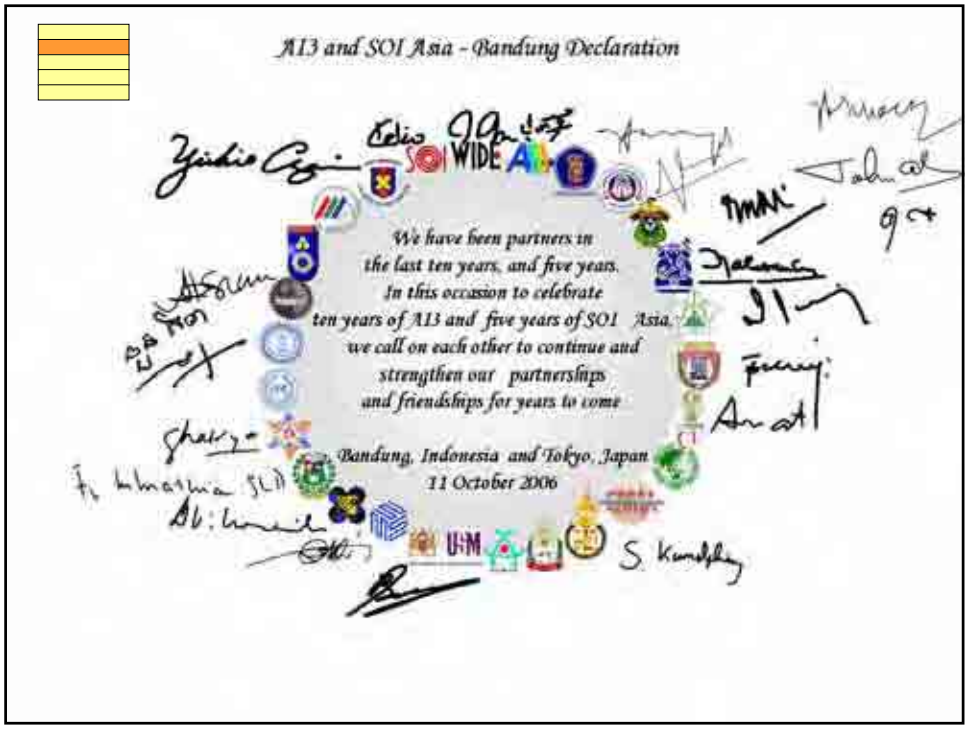
Tribhuvan University Nepal

7

IT HRD @ SOI Asia projects

- Worksohps
  - 1st Workshop : August 30th - September 4th 2002 at Keio University, SFC, Japan / 21 participants from 9 organizations in 5 countries
  - 2nd Workshop : February 17th - February 24th 2003 at Asian Institute of Technology, Thailand / 21 participants from 9 organizations in 5 countries
  - 3rd Workshop : August 9th - August 17th 2004 at Institute Teknologi Bandung, Indonesia & August 16th - August 25th 2004 at Asian Institute of Technology, Thailand / 27 participants from 10 organizations in 5 countries
  - 4th Workshop : April 4th – 8th 2005 at Asian Institute of Technology, Thailand / Participants from Tribhuvan University, Nepal
  - 5th Workshop : August 28th - September 1st, 2005 at Brawijaya University, Indonesia / 33 participants from 20 organizations in 11 countries
  - 6th Workshop : August 22th – 26th 2006 “Global-e-Workshop” / 42 participants from 19 organizations in 10 countries
  - 7th Workshop: August7th Workshop : July 31 – August 16 IPv6 only Workshop
  - 8th Workshop for Beginners @ March 2008
- Internships
  - 2 researchers short stay for network researchers
  - 16 internships for Network Operators


How is SOI Asia is sharing lectures ?
13 Mbps UDL
Sharing Real-time Classes
&
Course content mirroring
by IPv6 Multicast
Policy Routing Mechanism
Gateway Site @ Keio Univ.
High quality Digital Video
Communication DVTS site
OR
Portable IPv6 tunneling site
Internet
128kbps～1.5Mbps
Using existing connectivity
as a return path (UDLR)
SOI Asia Student Sites @Asian Partner Universities
Lecturer Sites
@ various places
9


A13 and SOI Asia - Bandung Declaration
We have been partners in
the last ten years, and five years.
In this occasion to celebrate
ten years of A13 and five years of SOI Asia,
we call on each other to continue and
strengthen our partnerships
and friendships for years to come
Bandung, Indonesia and Tokyo, Japan
11 October 2006

Educational programs

- University/Graduate school level Courses
  - The project provided more than 26 graduate level courses consisting of more than 243 lecturers were provided by 9 universities in Japan, received by more than 1000 students in region wide. Some were accredited in universities.
  - 68 real-time sessions such as special seminars, tutorials, streaming from conferences were shared.
- Course Design and Quality control
  - Topics were selected based on the partners' requirement.
    - Global issues
    - Local requirement
  - Academic committee are formed for each area for course design and quality control.
  - Focused areas
    - Marine Science and Technology
    - Bio Technology
    - IT
    - Disaster Management
    - Energy
    - Entrepreneurship
- Lecturers
  - Lectures were delivered from 19 sites from 7 countries; Japan, Indonesia, Malaysia, Thailand, Bangladesh, France and USA.

11

SOI Asia project milestones

from the experiment toward the real contributions

- 2001-2002 Research & Experiment
  - UDLR start operation by SOI Asia
  - Started in 2001 with AI3 (Keio Univ. JSAT Corp. AsiaSEED)
  - First 6 partners installation in January 2002 in Laos, Myanmar, Thailand and Indonesia
  - Philippine, Vietnam and Malaysia setup in summer.
  - 1st Operator's Workshop in August 2002.
  - Start non-IT university SOI Asia courses (Fishery)
  - 10 partners in 8 counties by the end of 2002

12

Dr. Keiko Okawa
Dr. Achmad Husni Thamrin

SOI Asia project milestones

from the experimental toward the real contributions

- 2003-2004 Working toward the operation
  - Goal and Mission revised in June 2003
  - Steering Committee / Academic Committee / Operators Committee formed
  - New Site Procedure
  - 6 Mbps -> 9 Mbps UDL Upgrade (AI3)
  - Mongolia, Cambodia, Bangladesh, Nepal joined in 2004.
  - 17 partners in 12 countries by the end of 2004

13

SOI Asia project milestones

from the experimental toward the real contributions

- 2005-2006 Educational Challenges
  - 1st accredited SOI Asia course
  - Tsunami Symposium and Syiah Kuala University Setup
  - 1st lecture sharing among Indonesian universities
  - IPv6 operation started in 2005
  - Internship program started
  - Expansion to local universities using domestic Internet infrastructure
  - 1st Global-e-Workshop in August 2006
  - 9 Mbps -> 13 Mbps UDL Upgrade (AI3) in 2006
  - Tokyo-ITB Symposium using DVTS

SOI Asia project milestones

from the experimental toward the real contributions

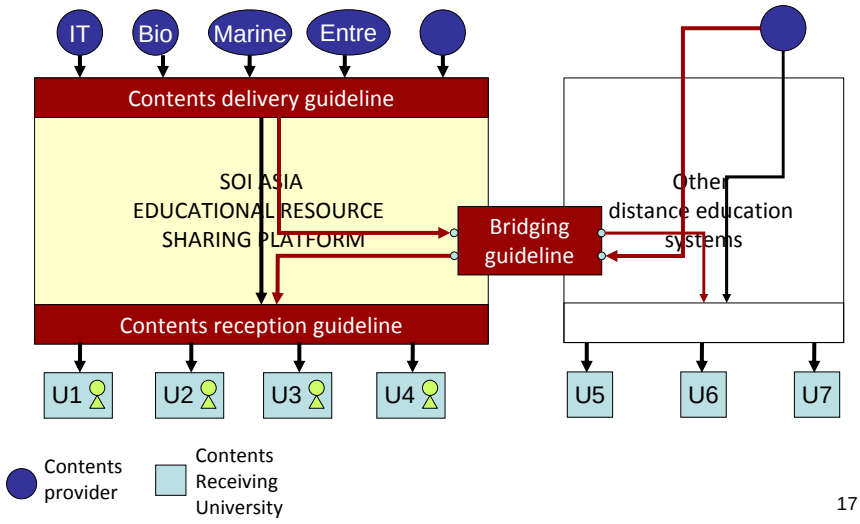
- 2007- Collaborations
  - IPv6 Transition - 1 day workshop scheme
  - Only IPv6 network operation started in 2007
  - Entrepreneurship Education and venture fund collaboration
  - Collaboration with other groups such asJICA, UNU and UNESCO
  - Collaboration with RENs such as UNINET, INHERENT, VINAREN etc
  - 26 partners in 13 countries as of today

15

Collaboration

16

SOI Asia Collaboration Platform



17

Various Types of Collaboration

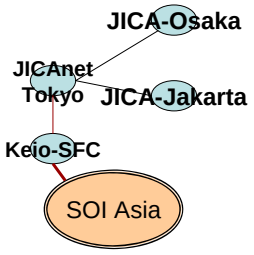
- Content partners
  - *To provide more contents in wider area*
  - Collaboration with UNESCO
  - Collaboration with JICAnet
  - Collaboration with several academic conferences
- Bridging partners
  - *To share contents each others;*
  - Collaboration with Asian REN e-learning communities
    - UniNet in Thailand
    - INHERENT in Indonesia
    - VINAREN in Vietnam
    - MYREN in Malaysia ・・・
  - Collaboration with E-learning projects
    - UNU/API through U of Hawaii
- Hosting partners
  - *To invite distinguished guest speakers around the world.*
  - Collaboration with Global Studio partners

18

Dr. Keiko Okawa
Dr. Achmad Husni Thamrin

Collaboration with content partners (1)

- JICAnet
  - 5 lectures, developed by JICA were delivered in 2006
    - Special seminar for Law firms in Aceh "Seminar Series: Alternative Dispute Resolution method"
  - Lectures were developed from JICA Tokyo
  - Audience
    - Main audience invited by JICA were hosted at UNSYIAH (SOI Asia Parnter) in Aceh, Indonesia
    - UNSYIAH students and faculty members also joined



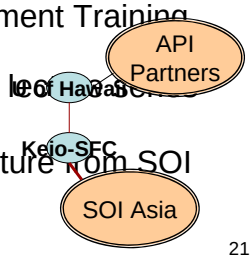
19

Collaboration with content partners (2)

- UNESCO
  - 3 courses consisting 10 lectures each developed by UNESCO
    - "BIO-energy for achieving MDGs in Asia"
    - "Renewable Energy Policy and Planning for Sustainable Development"
    - "Solar Solutions for Energy Wise Communities in Asia"
  - Lectures were delivered from 3 sites
    - Indonesia (ITB)
    - Bangladesh (BUET)
    - Thailand (AIT).
  - Audience
    - 11 SOI Asia universities participated
    - 52 students received certification of completion
    - 3 students were awarded and invited for the conference.

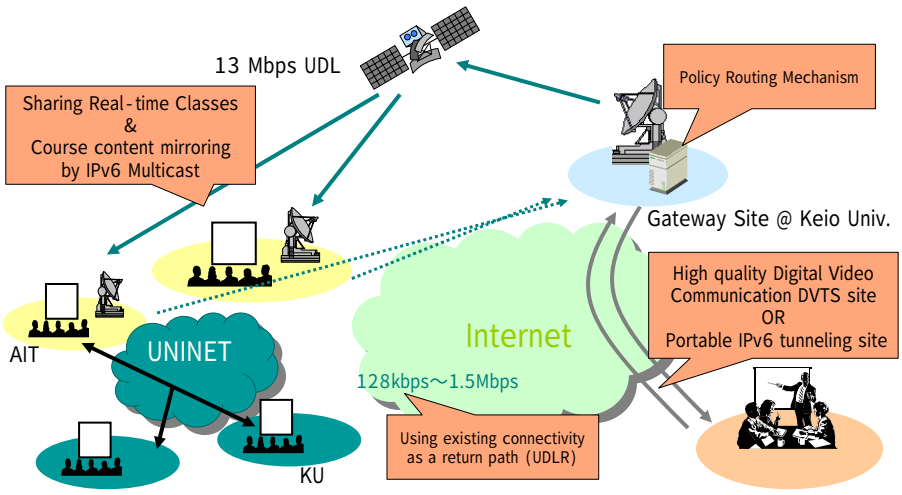
Collaboration with Bridging partners

- UNU and Asia Pacific Initiative
  - Model
    - Contents：share
    - Platform：PEACESAT and SOI Asia
    - Audience : API partners and SOI Asia partners
  - Contents and Parntners
    - UNDP/UNDRO Disaster Management Training Programme
    - SOI Asia “Disaster Management” lecture from SOI
    - UNU/ U of Hawaii, etc
    - 5 lectures from AP Initiative, 1 lecture from SOI Asia (Japan)



21

Collaboration with REN - Thailand

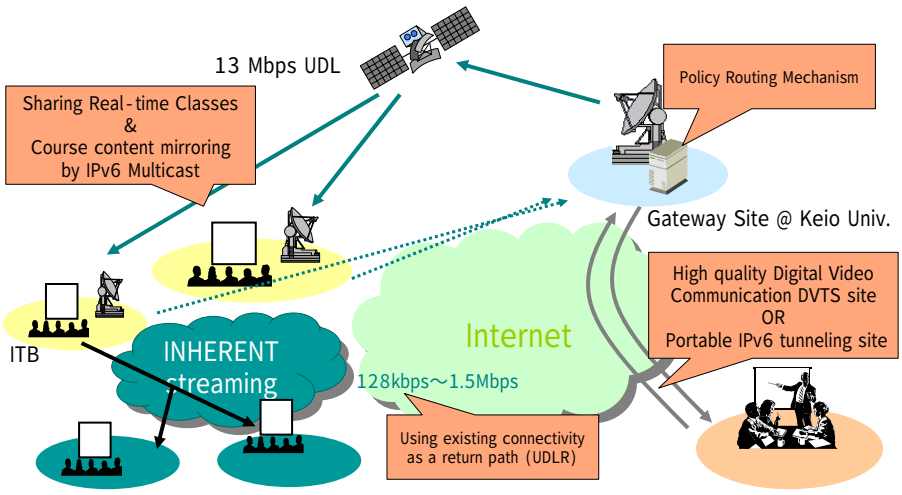


22

SOI Asia lectures @ KU

23

Collaboration with REN - Indonesia



24

Hosting partners - Global Studio Project

25

Global Studio Facilities

Yonsei Univ. / Seoul

Tsinghua Univ. / Beijin

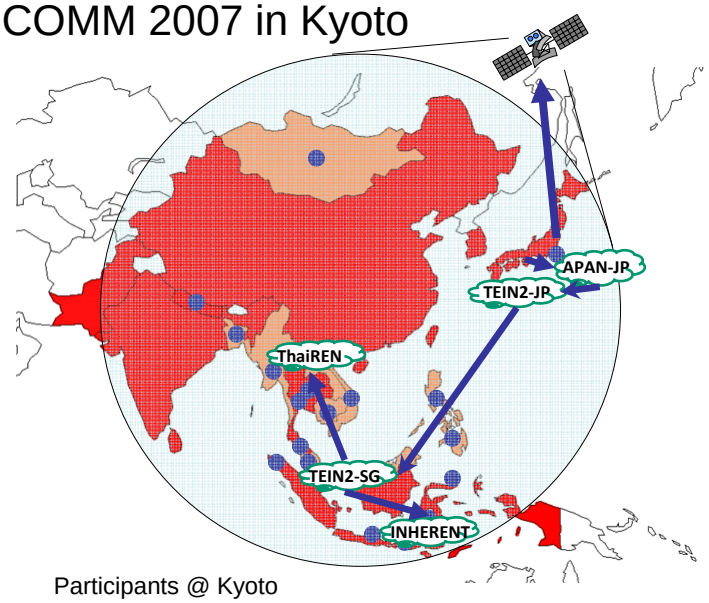
Cambridge Univ. / UK

Keio Univ. / Tokyo

Studio in SFO.

Japan Society / NY
.. Coming soon

Collaboration with conference SIGCOMM 2007 in Kyoto



Participants @ Kyoto
Multicast Streaming received

27

Thank you very much!

http://www.soi.wide.ad.jp/soi-asia/

28

泰日工業大学

Thai-Nichi Institute of Technology

Assoc. Prof. Krisada Visavateeranon (Feb 1,2008)

Page 1

Background of TNI Project

- Human resource in S&T is the core of Innovation driven economic growth.
- Insufficient of Human resource in S&T especially engineers.
- HRD in Engineering does not match to industrial needs.
- Japanese investment in Thailand.

Page 2

泰日経済技術振興協会
Technology Promotion Association (Thailand-Japan)

TPA The founder of TNI **Established since 1973.**

- Run by former students and trainees in Japan
- HRD activities for Thai industries.
- Technology transfer from Japan.
- Promote Thai-Japan relationship.
- Supported by JTECS, METI, and Gov. org and private sectors.

TPAは、今年創立34年目を迎えます。

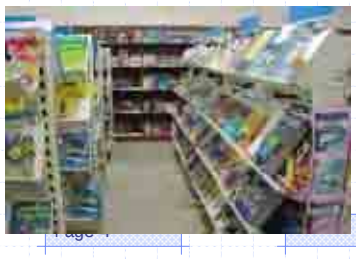
Page 3

TPA' s HRD activities

Education and Training Center

School of Languages and Culture

Text Book and Journal Publishing



Industrial Instruments Calibration services

Continuous growth of Technology Promotion Association (Thailand-Japan)

Technology Promotion Association (Thailand-Japan)

Sukhumvit 29 (1973)

Thai-Nichi Institute of Technology

Pattanakarn 37 (2007)

Technology Promotion Association Building

Pattanakarn 18 (1992)

Page 5

Industries needs survey (2005)

- TPA, JCC, JETRO survey on Thai Industry's human resource demand.
- Production Engineer, Industrial Management.
- Japanese speaking Engineer.
- TPA survey of most popular university's program among high school and Certificate students.
- Computer Eng, Automotive Eng., IT
- English, Japanese, Chinese

Page 6

Feature of Thai-Nichi Institute of Technology

1. Train practical engineers for industries.
2. University- Industries cooperation.
3. Concept of Monotsukuri.
4. Emphasize on Japanese and English .
5. Japanese Universities Network.

Page 7

TNI's Academic Programs

- Faculty of Engineering
  - Automotive Engineering
  - Production Engineering
  - Computer Engineering
- Faculty of Information Technology
  - Information Technology
- Faculty of Business Administration
  - Industrial Management
  - Industrial Management (2 Years Program)
  - Business Administration (Japanese)
- Master Degree
  - M B A (Industrial Management)
  - M B A (Executive Enterprise Management)

Page 8

Curriculum

Admission

- High School (ม6)
- Certificate (ปวช)
- Bachelor (ป.ตรี)

Admission & Direct System

TNI Curriculums

- Theory and Practice
- Experiments and Projects
- Japanese and English
- Japanese Universities exchange program
- Industrial Training

High Quality of Education & Learning system

Graduation

- Thai / Japanese Enterprises
- Own Business
- Study or work in Japan

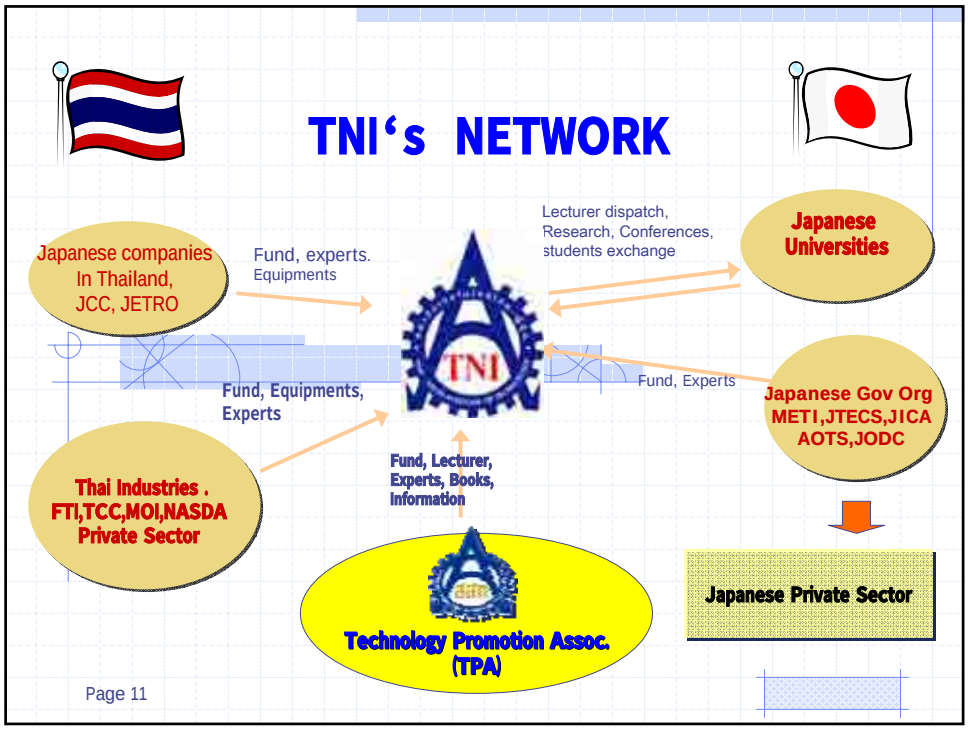
Page 9

Monotsukuri Concept

(The art of Japanese manufacturing)

- Spirit of creating high quality product to suit the needs of customer.
- Technology and skill.
- Learn by making product.
- Know all process from design, prototype, manufacturing to testing and quality control.
- Project based assignment.
- Instruction by industries' experts and equipments.
- Industrial Internship.

Page 10


TNI's NETWORK
Japanese companies In Thailand, JCC, JETRO
Fund, experts. Equipments
Lecturer dispatch, Research, Conferences, students exchange
Japanese Universities
TNI
Fund, Equipments, Experts
Fund, Experts
Japanese Gov Org METI,JTECS,JICA AOTS,JODC
Thai Industries . FTI,TCC,MOI,NASDA Private Sector
Fund, Lecturer, Experts, Books, Information
Technology Promotion Assoc. (TPA)
Japanese Private Sector
Page 11


TNI-Industry Cooperation
HRD for Industry.
Curriculum development,
Instructors and equipments for training,
Industrial Internship,
Scholarship,
Employment.
Academic services.(seminars, training, consulting services).
Research (joined research, study and survey, product testing, etc.)
Page 12

Support from Local Japanese Companies

1 . Scholarship for students.
2. Donation of Training Equipments and Machines.
3. Providing training facilities for TNI students.
4. Dispatching of staffs and experts to teach at TNI.
5. Internship in Japanese Enterprises.
6. Employment at Japanese firms.

Page 13




Automotive Eng. Laboratory

TNI Scholarships

- TNI Scholarships supported by members of JCC (Japanese Chamber of Commerce) and Thai companies
  - Tuition fee support
- Organizations or Individual Scholarships
  - Poor students support
  - Research Fund
  - Short term study/training in Japan
- Government and Japanese University Scholarships
  - Exchange of Students
  - Master degree program

Page 15

TNI scholarship

Donation from 200 Thai and Japanese firms

Page 16

Agreement for Academic Cooperation with Japanese Universities

- Shibaura I T.
- Kyushu Univ.
- Osaka I T.
- Tokyo Agricultural I T.
- Tohoku Univ. (Economics)
- Tohoku I T.
- Nagoya I T.
- Daido I T.
- Monotsukuri Univ.
- Tohoku Gakuin Univ.
- Toyota T I.
- Ritsumeikan Univ. and APU.

Activities

1.Exchange of staffs & researchers

2.Exchange of students

3.Joint research and conference

4.Exchange of Information and publication

5.Other activities

Page 17

MOU signing Ceremony

Kyushu Univ. with VP.Yanagihara

TAT with President Nobatake

SIT with President Hirata

OIT with President Nishikawa

Page 18

Japanese Study Trip at Sendai (Oct 2007)

Academics and Industrial Development for Society and Economy

Thai-Nichi Institute of Technology

Http://www.tni.ac.th

TEL: 0-2763-2600 FAX: 0-2763-2700

Page 20

JICA・世銀共催セミナー
ネットワークの可能性：グローバル社会における科学技術と高等教育支援

～科学技術振興における高等教育機関を中心とした
様々な形態のネットワーク事例分析～

「JICAによるネットワーク形成への現在までの取り組みと今後の方向性」

日時 ：**2008年2月1日(金）13:30-17:30**
会場 ：**JICA国際協力総合研修所**
講演者 ：**角田　学** **(Tsunoda.Manabu@jica.go.jp)**
国際協力専門員 Senior Advisor (Higher/Technical Education)
独立行政法人　国際協力機構(JICA)
http://www.jica.go.jp/

1 Japan International Cooperation Agency

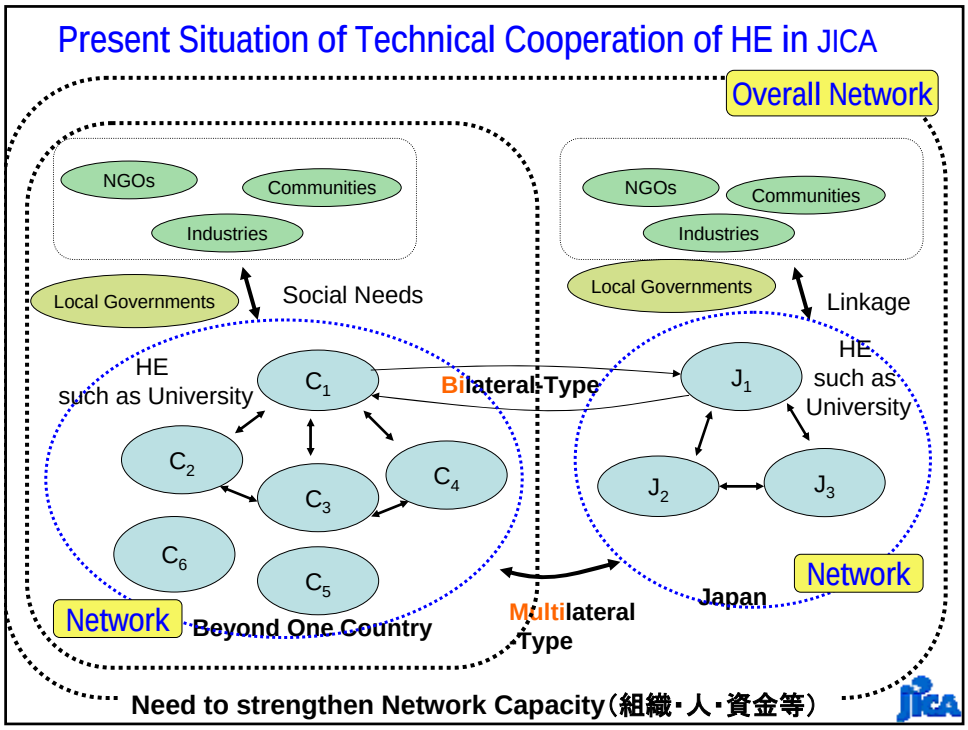
Present and Future: Formation of Network on Higher Education/Science and Technology through JICA Technical Cooperation

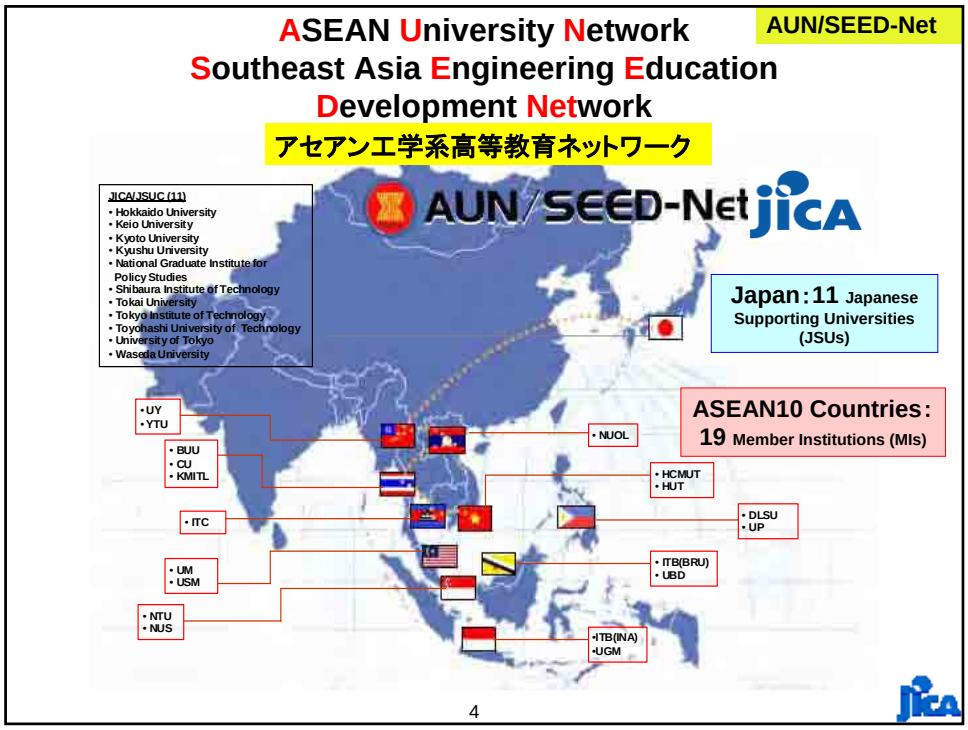
Manabu TSUNODA Tsunoda.Manabu@jica.go.jp
Senior Advisor (Higher/Technical Education)

Japan International Cooperation Agency (JICA)
http://www.jica.go.jp/

1st Feb. 2008

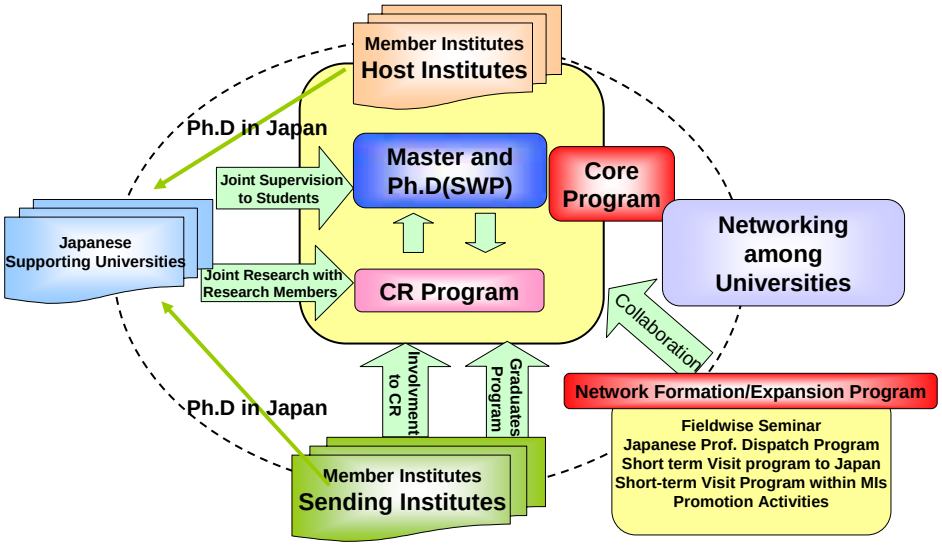
2


Present Situation of Technical Cooperation of HE in JICA
Overall Network
NGOs
Communities
Industries
Local Governments
Social Needs
HE
such as University
C1
C2
C3
C4
C5
C6
Network
Beyond One Country
Bilateral Type
Multilateral Type
Japan
J1
J2
J3
Linkage
HE
such as
University
Network
Need to strengthen Network Capacity（組織・人・資金等）


ASEAN University Network
Southeast Asia Engineering Education
Development Network
AUN/SEED-Net
アセアン工学系高等教育ネットワーク
JICA/JSUC (11)
• Hokkaido University
• Keio University
• Kyoto University
• Kyushu University
• National Graduate Institute for Policy Studies
• Shibaura Institute of Technology
• Tokai University
• Tokyo Institute of Technology
• Toyohashi University of Technology
• University of Tokyo
• Waseda University
AUN/SEED-Net
JICA
Japan：11 Japanese Supporting Universities (JSUs)
ASEAN10 Countries：19 Member Institutions (MIs)
• UY
• YTU
• BUU
• CU
• KMITL
• ITC
• UM
• USM
• NTU
• NUS
• NUOL
• HCMUT
• HUT
• DLSU
• UP
• ITB(BRU)
• UBD
•ITB(INA)
•UGM
4

Basic Framework of AUN/SEED-Net

[Graduates Program + CR] + [Network Formation]



5

AUN/SEED-Net

An Example of Network Activities

In Indonesia

In Malaysia

In Philippines

To know each other/country

In Singapore

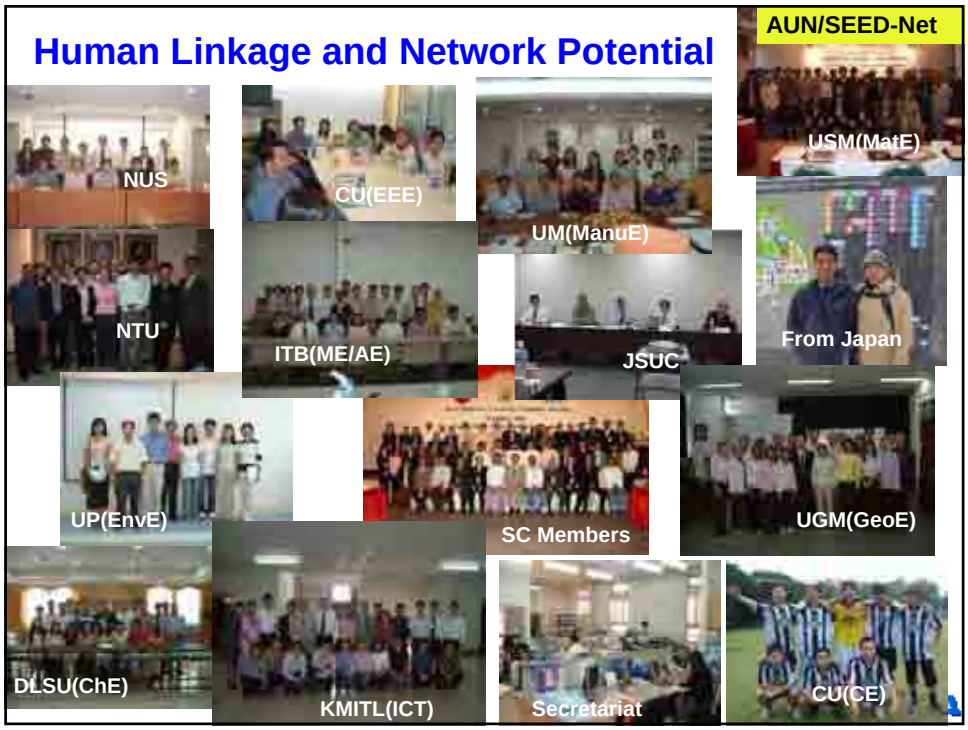
In Thailand

In Japan

AUN/SEED-Net Students

6


AUN/SEED-Net
AUN/SEED-Net Students at DLSU (Philippines)
Vietnam-11, Indonesia-2, Cambodia-3, Myanmer-1
HCMUT-8, HUT-3, UGM-2, ITC-3, UY-1 (As of 20/6/2005)
Students from ASEAN,
Profs. from Philippines and Japan,
Staff from Secretariat


Human Linkage and Network Potential
AUN/SEED-Net
NUS
CU(EEE)
UM(ManuE)
USM(MatE)
NTU
ITB(ME/AE)
JSUC
From Japan
UP(EnvE)
SC Members
UGM(GeoE)
DLSU(ChE)
KMITL(ICT)
Secretariat
CU(CE)

AUN/SEED-Net

Towards Sustainable Network in terms of :

1) Resources

- Human Resources
- Running and Operation Resources
- Physical Resources
- Intellectual Resources

Budget

2) Actors

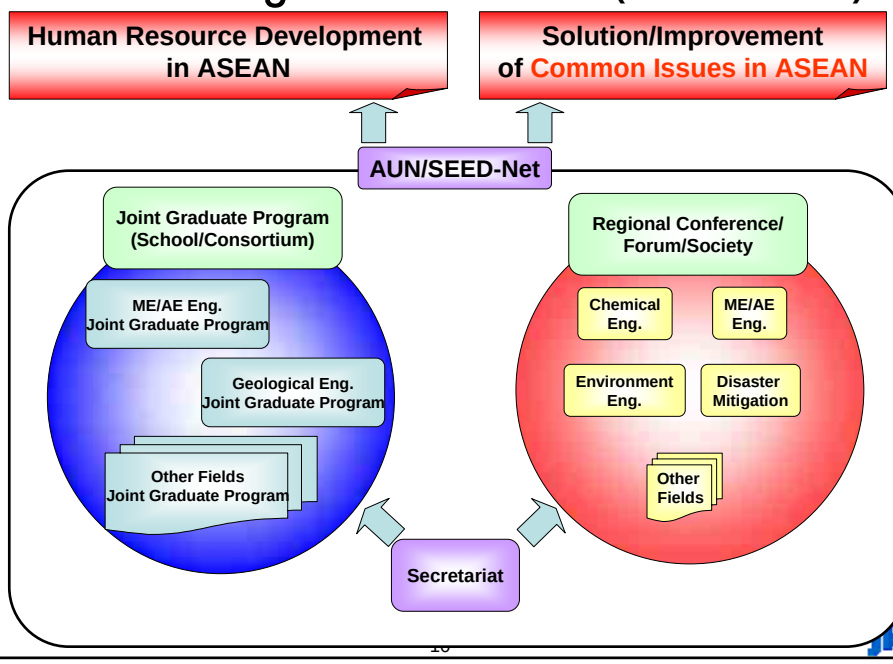
- University/Country wide
- ASEAN + Japan
- Asia and/or More International wide

3) General Coordination

Key Points

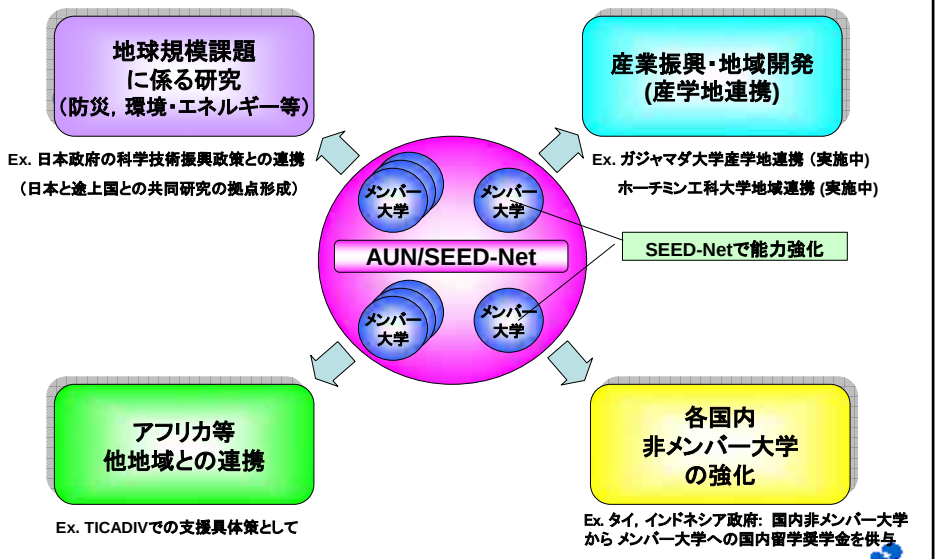
- attractive concept/vision/mission
- good human relationship (mutual trust)
- well-functioned teamwork (responsibility)

<Draft>Image after Phase-II (AUN/SEED-Net)



SEED-Netの成果の活用可能性

～強化されたメンバー大学とネットワークの戦略的活用～



11

Science and Technology （S&T）in JICA

Higher Education （HE）in JICA

12

Science and Technology (S&T) in JICA

How to understand "S&T" in the context of Development Assistance?

S&T in JICA: "practical technologies to contribute to socio-economic development and poverty reduction"

High Priority Technologies:

- New technologies which lead to solve/improve development issues including utilization of indigenous technologies
- New technologies which are widely applicable as a tool for development assistance such as ICT

Why "S&T" now?

Paradigm Shift of Development

Difficulty of achieving sufficient growth or poverty reduction, just by fulfillment of BHN with existing technologies, or with capital and unskilled labor.

Rapid Globalization and Progress of Technological Innovation

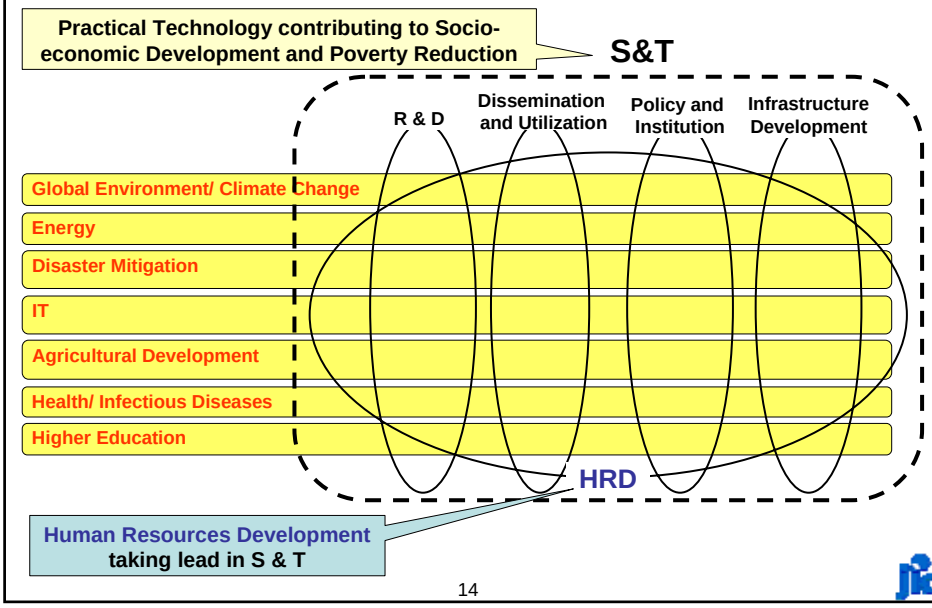
Opportunity for "Late comers' advantage" (="leap frogging") with a leverage of S&T

Progress of Development and Sophistication of Developing Countries' Needs

Partial achievement of Basic Human Needs(BHN) through years of development assistance effort (especially in basic education)

13

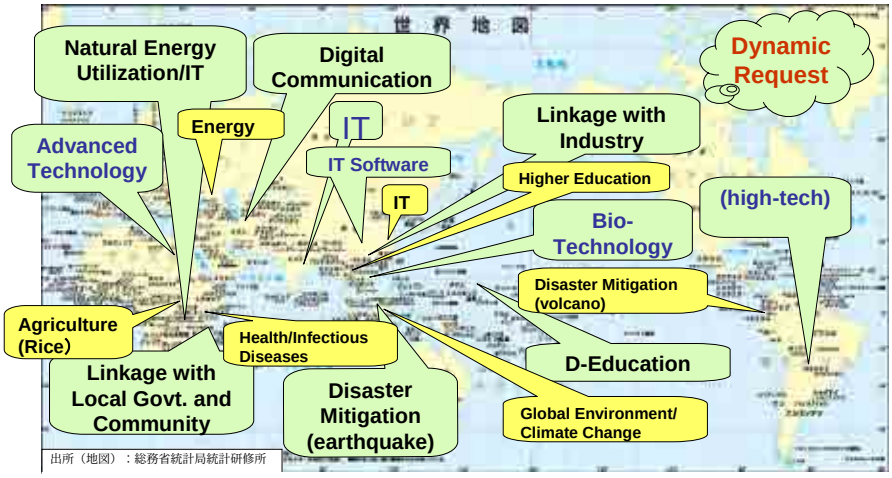
JICA's Assistance Strategy on Science and Technology (S&T)



14

Expectations:

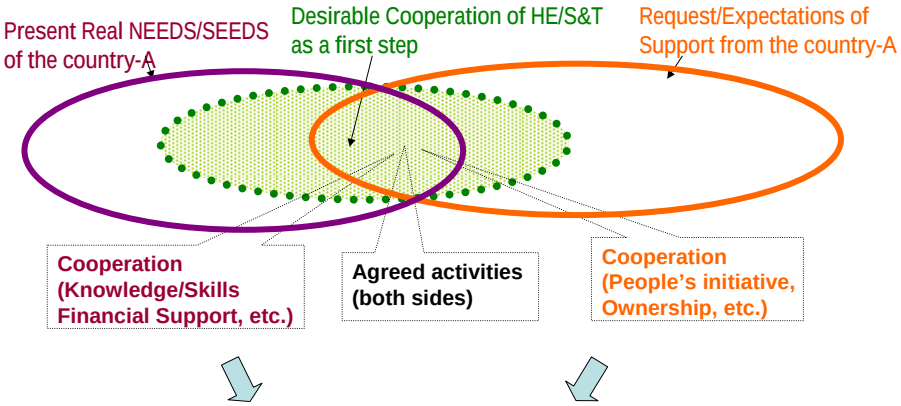
Requests from different countries, which change dynamically



Each country : What kind of S & T does it really need ?

15

How to meet expectations from both sides (country-A and Japan)



How to harmonize both needs more effectively ?

16

Some shots of Labs of different universities in ASIA

As of 2006/7

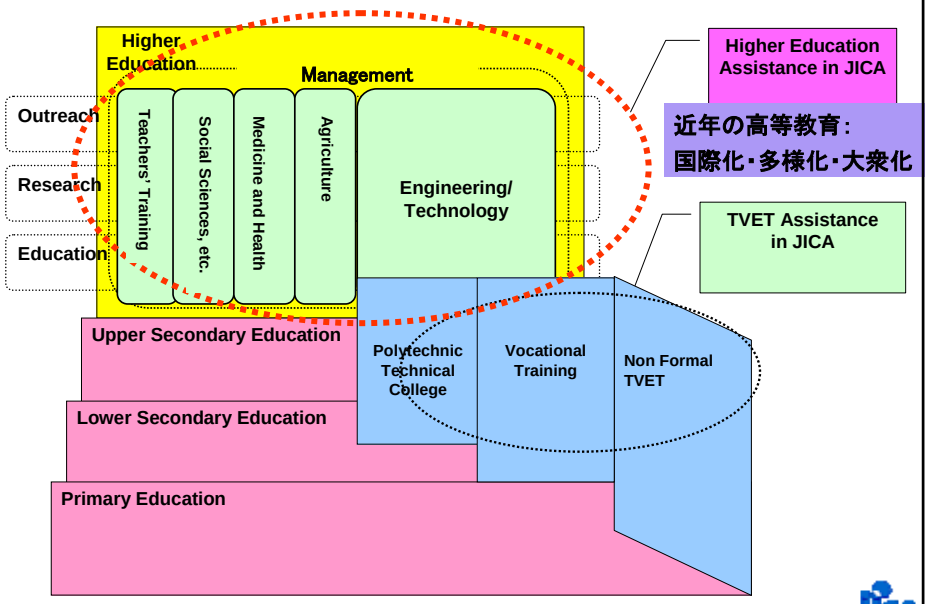
Basic Open Channel

Basic Mechanical Machine

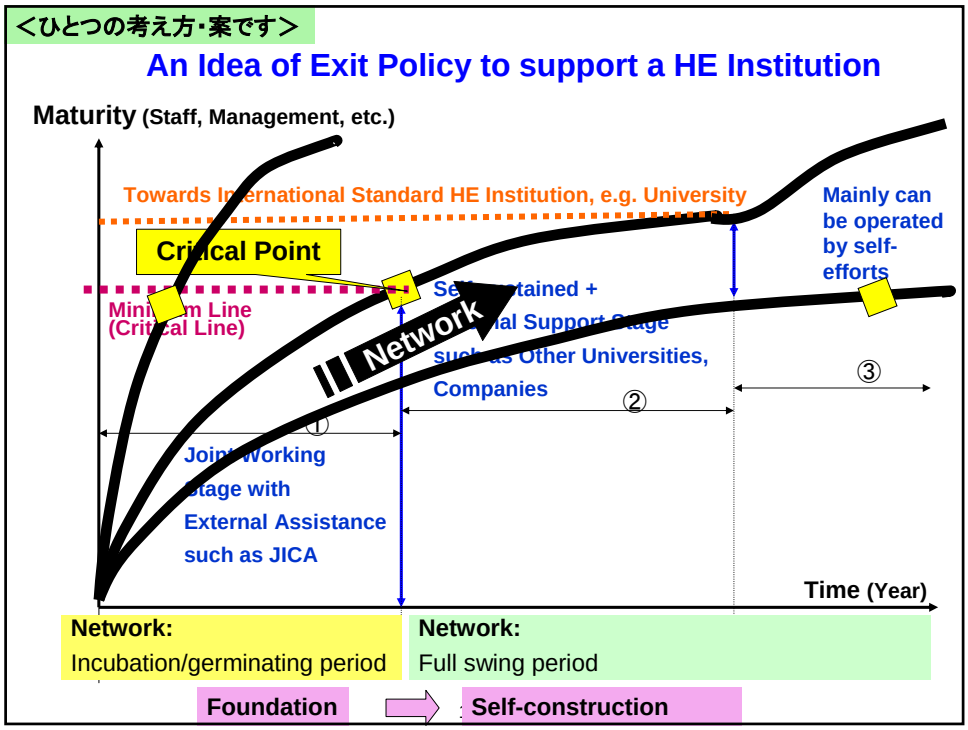
Visualization of 3-dimensional flow around an object

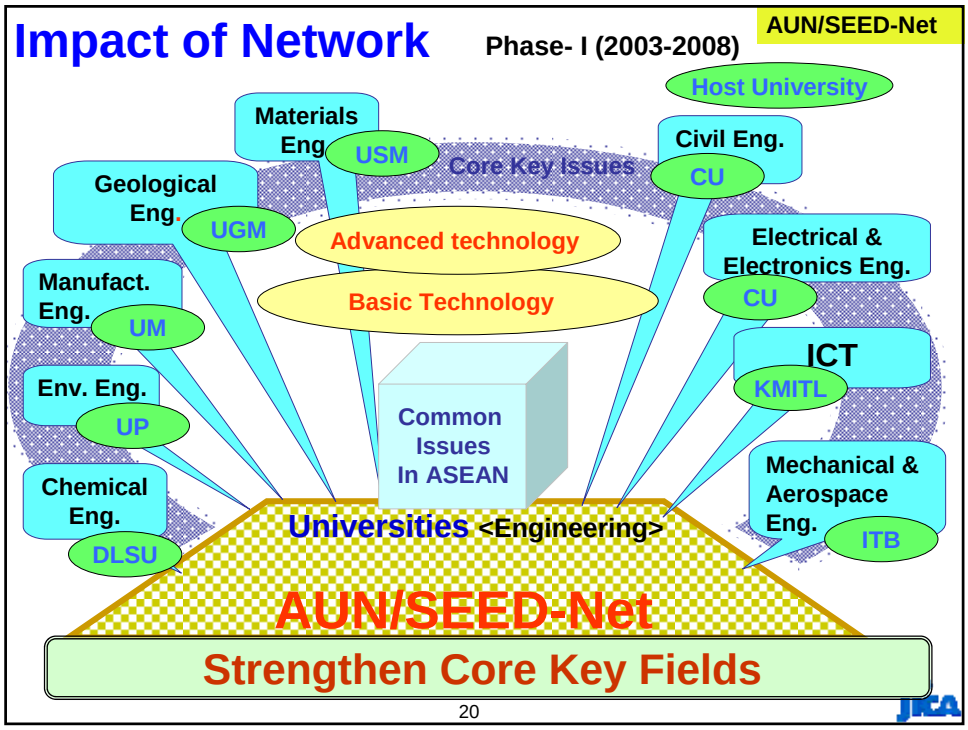
17

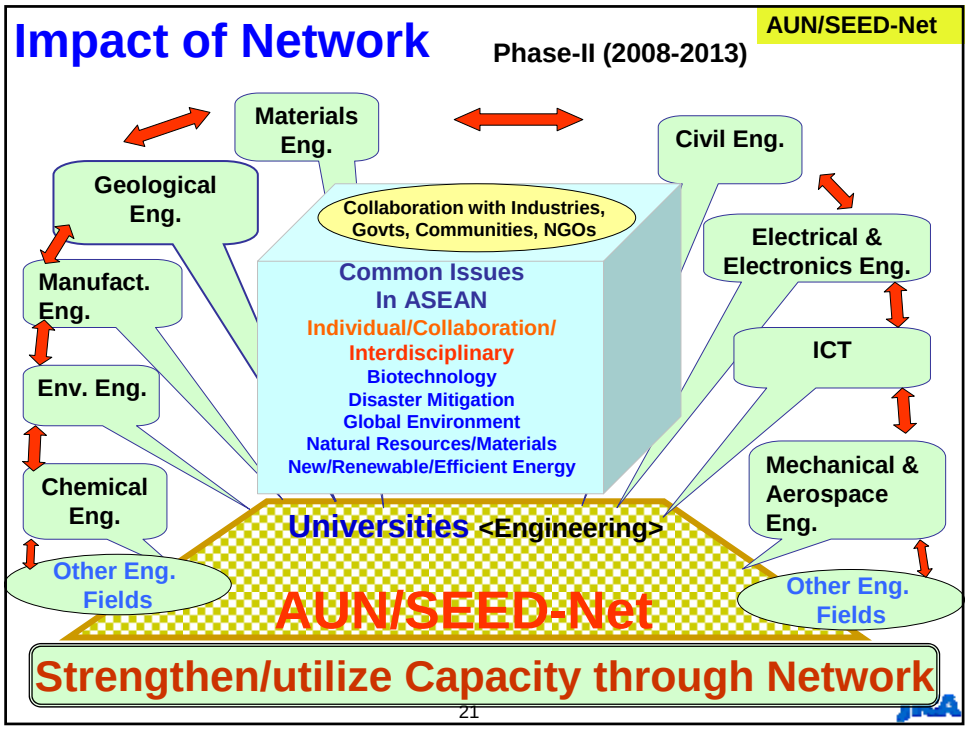
Higher Education Assistance in JICA



18


＜ひとつの考え方・案です＞
An Idea of Exit Policy to support a HE Institution
Maturity (Staff, Management, etc.)
Towards International Standard HE Institution, e.g. University
Critical Point
Mainly can be operated by self-efforts
Minimum Line (Critical Line)
Network
Companies
①
②
③
Joint Working Stage with External Assistance such as JICA
Time (Year)
Network: Incubation/germinating period
Network: Full swing period
Foundation
Self-construction


Impact of Network
Phase- I (2003-2008)
AUN/SEED-Net
Host University
Materials Eng
USM
Civil Eng.
CU
Core Key Issues
Geological Eng.
UGM
Advanced technology
Electrical & Electronics Eng.
CU
Basic Technology
Manufact. Eng.
UM
ICT
KMITL
Env. Eng.
UP
Common Issues In ASEAN
Chemical Eng.
DLSU
Mechanical & Aerospace Eng.
ITB
Universities <Engineering>
AUN/SEED-Net
Strengthen Core Key Fields
20
JICA



Towards more effective international cooperation of HE

- Secure human resources of cooperation in collaboration with Universities, Research Institutes, Companies and NGOs
- Emphasize on cooperation of R&D and Outreach through human resource development
- Efforts of cooperation with long-term vision based on past experience/lessons learned

22

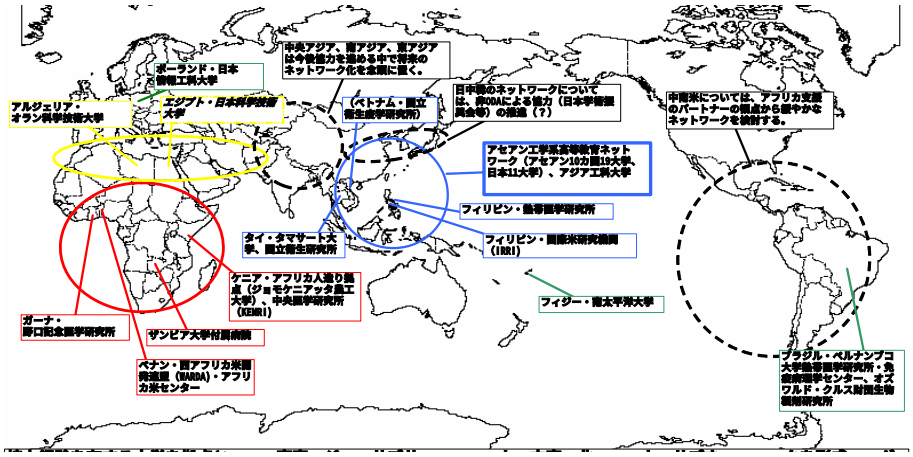
Focus Points of HE in JICA

- **Management of university/college/school**
  ・従来型：学部・大学院の新設・拡充、専門分野の能力向上
  ・成功した案件の教訓：マネジメント改善への積極的な取組み
- **Outreach activities such as collaboration with universities, industries and communities**
  ・産学連携、地域連携に係る機能の強化　（←前提：教育・研究の基本的な機能充実）
- **Stability of staff (Brain-drain →Brain-gain)**
  ・高度な教育を受けた人材が定着する環境づくりの促進　（研究環境整備、産業振興、雇用創出）
- **Introduction of competitiveness**
  ・支援への競争的研究資金の導入→インセンティブ・質の向上
- **Introduction of program approach**
  スキームの一体的実施、他セクターとの連携
- **Cooperation and evaluation with medium/long term vision**
  協力の成果発現までに時間が必要　例：モンクット王工科大学
- **Utilization of past experiences/lessons**
  SEED-Netの事例
- **Utilization of human-network**
  高等教育機関のC/Pが大臣・次官になるケースも多い　→効果的な案件形成・円滑な実施に貢献
- **Support of university linkage/network such as MOU**
  →協力終了後の自立発展性の確保へ　文科省の国際交流事業や国費留学生等の制度との連携推進

23

<Draft>

An Idea of Global Network to highly motivate current and future HE/S&T



24

Summary : Why Network ??

●**Sustainability :**
Activities after the Project through Network

●**Demand of A Variety of Technologies:**
Support by many Disciplines through Network

●**Globalization (S&T):**
Joint Work of Regional/World level issues beyond a country through Network

●**Synergy Effect:**
More efficient utilization of existing schemes through Network → Network as "all Japan"

25

Issues to be improved towards Network Activities of HE/S&T as "all Japan"

● Improvement of supporting system and evaluation system to those who are engaged in international cooperation from Universities, Companies and Research Institutes as a short-term or long-term expert

<e.g.> evaluation of Profs;

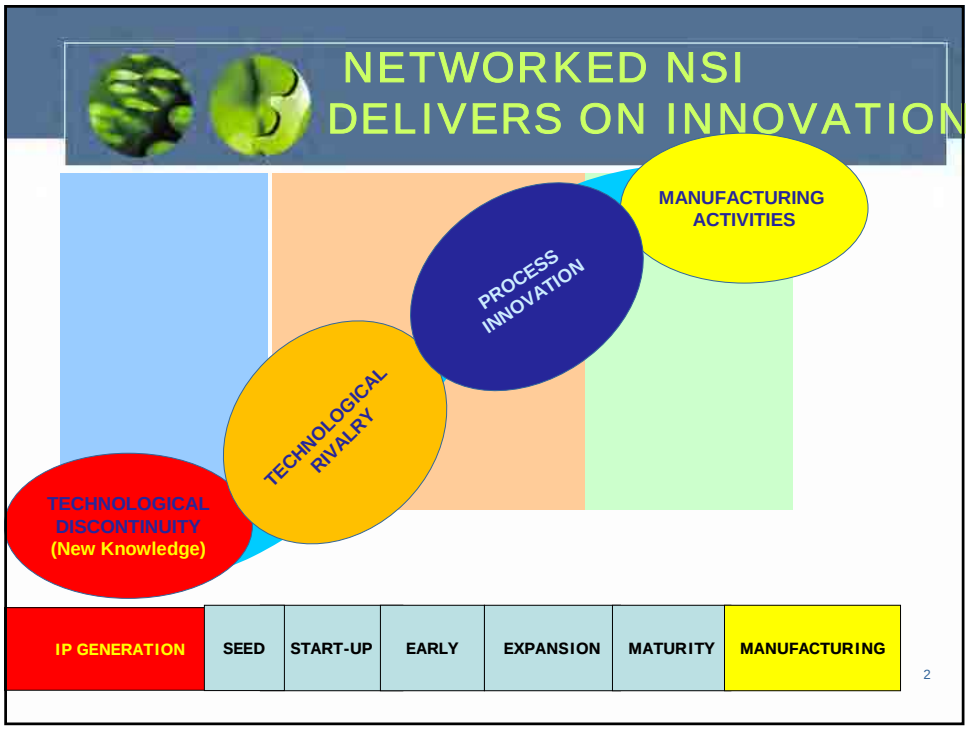
Education + Research
⇨ Education + Research + Outreach such as International Cooperation

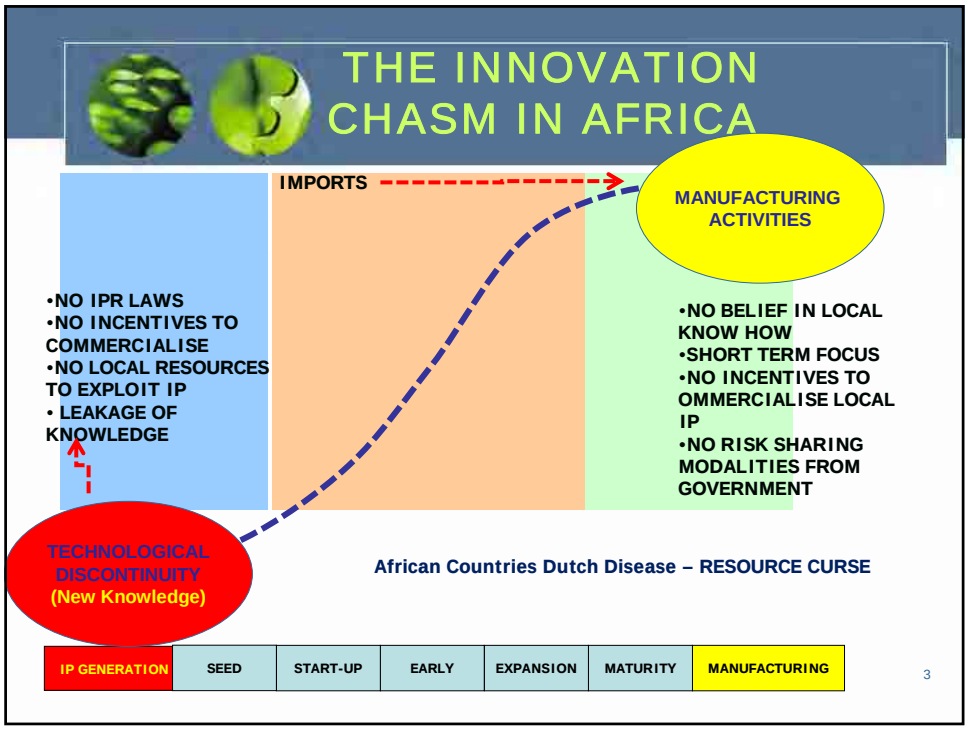
● More integrated utilization of existing schemes such as research funds and scholarships for international activities

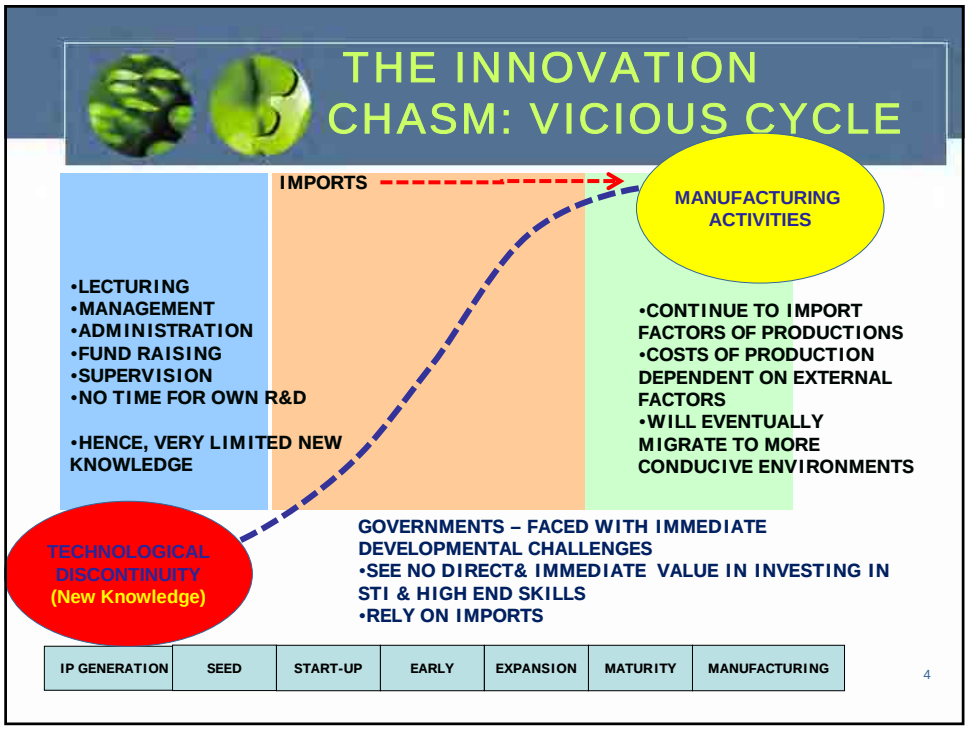
● Upgrading capacity as "all Japan" to cater for timely any technical/management issues from developing countries

26


STI NETWORKS:
Context for Africa's development
Boni Mehlomakulu, PhD
Deputy Director General, RD&I
Department of Science & Technology
01 February 2008


NETWORKED NSI
DELIVERS ON INNOVATION
MANUFACTURING ACTIVITIES
PROCESS INNOVATION
TECHNOLOGICAL RIVALRY
TECHNOLOGICAL DISCONTINUITY (New Knowledge)
IP GENERATION
SEED
START-UP
EARLY
EXPANSION
MATURITY
MANUFACTURING
2


THE INNOVATION CHASM IN AFRICA
IMPORTS
MANUFACTURING ACTIVITIES
•NO IPR LAWS
•NO INCENTIVES TO COMMERCIALISE
•NO LOCAL RESOURCES TO EXPLOIT IP
• LEAKAGE OF KNOWLEDGE
•NO BELIEF IN LOCAL KNOW HOW
•SHORT TERM FOCUS
•NO INCENTIVES TO OMMERCIALISE LOCAL IP
•NO RISK SHARING MODALITIES FROM GOVERNMENT
TECHNOLOGICAL DISCONTINUITY (New Knowledge)
African Countries Dutch Disease – RESOURCE CURSE
IP GENERATION
SEED
START-UP
EARLY
EXPANSION
MATURITY
MANUFACTURING
3


THE INNOVATION CHASM: VICIOUS CYCLE
IMPORTS
MANUFACTURING ACTIVITIES
•LECTURING
•MANAGEMENT
•ADMINISTRATION
•FUND RAISING
•SUPERVISION
•NO TIME FOR OWN R&D
•HENCE, VERY LIMITED NEW KNOWLEDGE
•CONTINUE TO IMPORT FACTORS OF PRODUCTIONS
•COSTS OF PRODUCTION DEPENDENT ON EXTERNAL FACTORS
•WILL EVENTUALLY MIGRATE TO MORE CONDUCIVE ENVIRONMENTS
TECHNOLOGICAL DISCONTINUITY (New Knowledge)
GOVERNMENTS – FACED WITH IMMEDIATE DEVELOPMENTAL CHALLENGES
•SEE NO DIRECT& IMMEDIATE VALUE IN INVESTING IN STI & HIGH END SKILLS
•RELY ON IMPORTS
IP GENERATION
SEED
START-UP
EARLY
EXPANSION
MATURITY
MANUFACTURING
4

RELOOK AT TECHNOLOGY TRANSFER

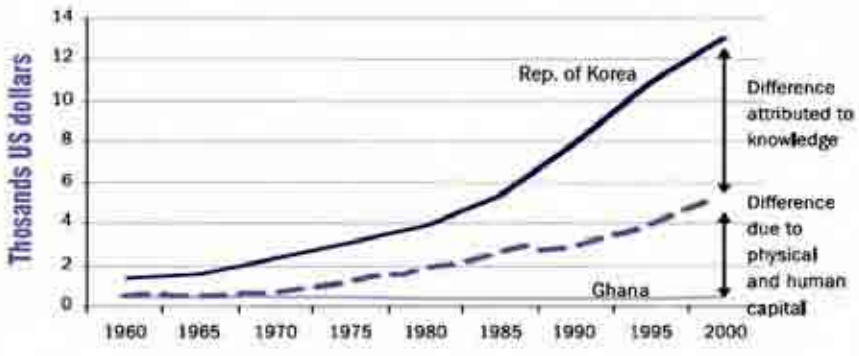
National Innovation

Technology Transfer

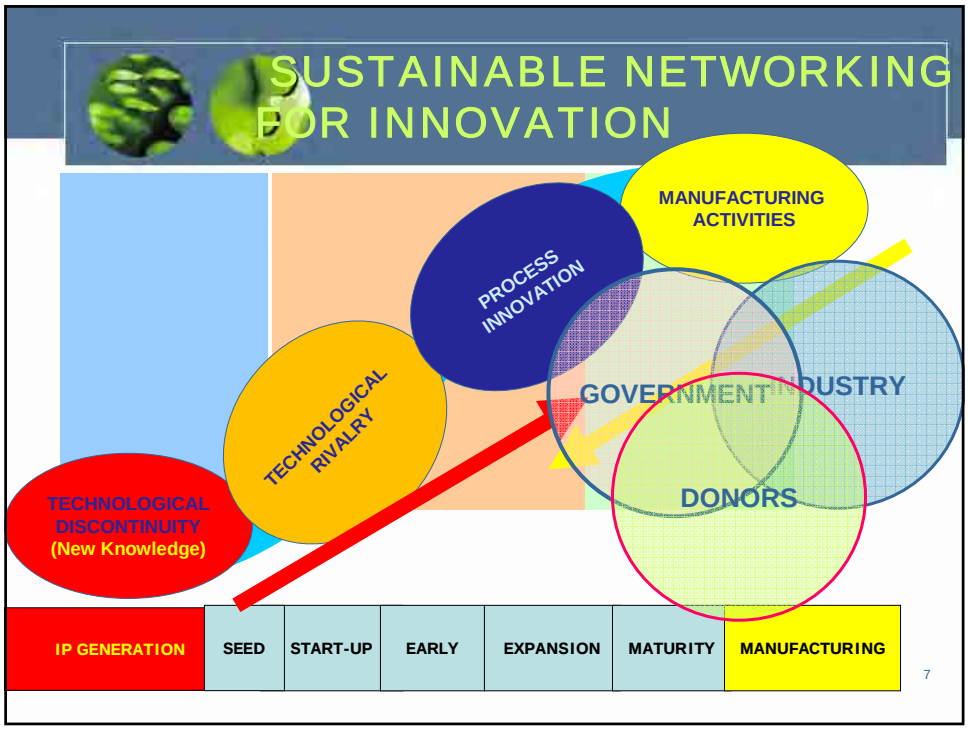
TI5	Global IP leader. Systems level: Capability to develop comprehensive innovations within a field at a systems level that provides a sustained global competitive advantage in product development at systems level
TI4	Global IP leader – component level: Capability to develop comprehensive innovations within a field at a component level that provides a sustained global competitive advantage in product development at systems level
TI3	Customisation of Licensed IP: Capability to customise existing design for national conditions.
TI2	Component Integration - IP licensed: Ability to integrate licensed components into a system.
TI1	Turnkey assembly: Ability to assemble turnkey solution.

5

THE DIVIDE



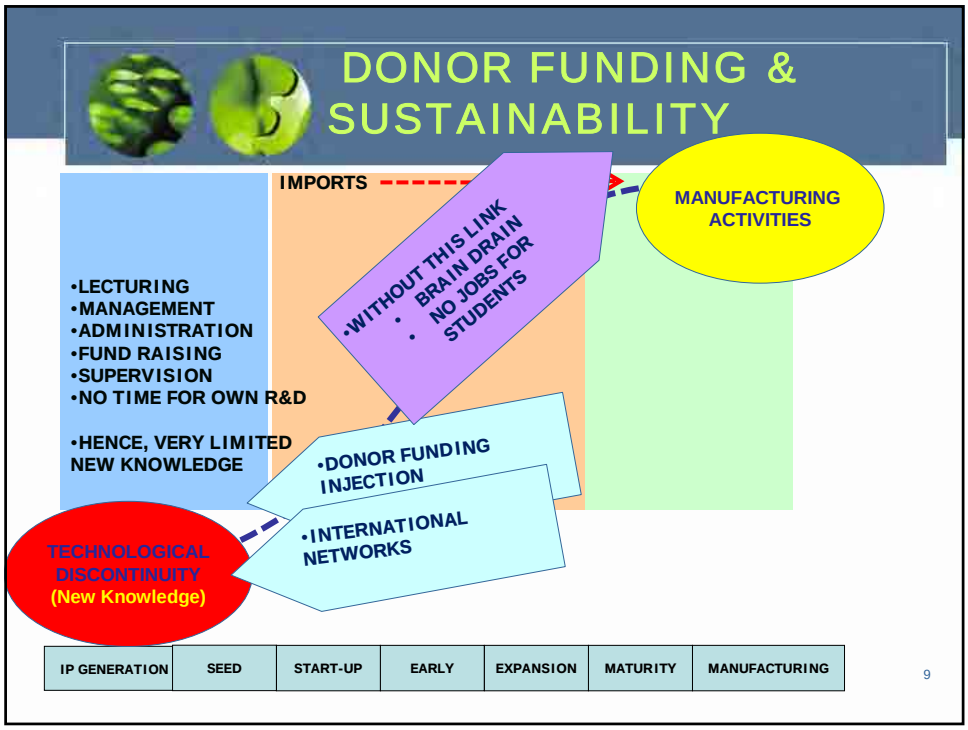
Growth in Per Capita Income for Korea and Ghana, (1960-2000)

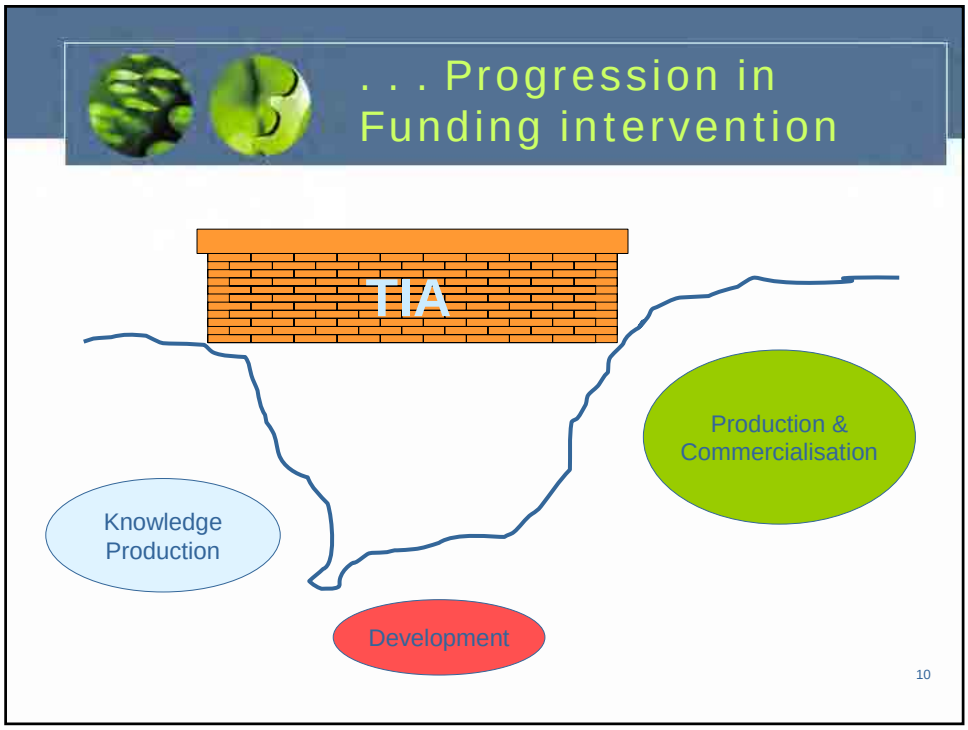


CHALLENGES WITH STI NETWORKS IN AFRICA

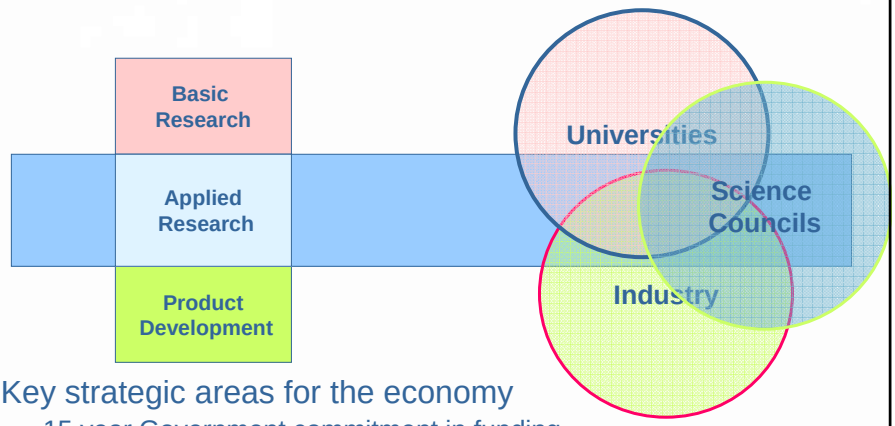
- Governments' commitment
- Purposeful linkage to industry
- Time to focus on R&D, new knowledge
- Post-Doctoral fellows to supervise & operate equipments
- IPR Regulations & funding mechanisms along the value chain
- Reward systems that encourages patenting

8


DONOR FUNDING & SUSTAINABILITY
IMPORTS
MANUFACTURING ACTIVITIES
•LECTURING
•MANAGEMENT
•ADMINISTRATION
•FUND RAISING
•SUPERVISION
•NO TIME FOR OWN R&D
•HENCE, VERY LIMITED NEW KNOWLEDGE
•WITHOUT THIS LINK
• BRAIN DRAIN
• NO JOBS FOR STUDENTS
•DONOR FUNDING INJECTION
•INTERNATIONAL NETWORKS
TECHNOLOGICAL DISCONTINUITY (New Knowledge)
IP GENERATION
SEED
START-UP
EARLY
EXPANSION
MATURITY
MANUFACTURING
9


. . . Progression in Funding intervention
TIA
Production & Commercialisation
Knowledge Production
Development
10

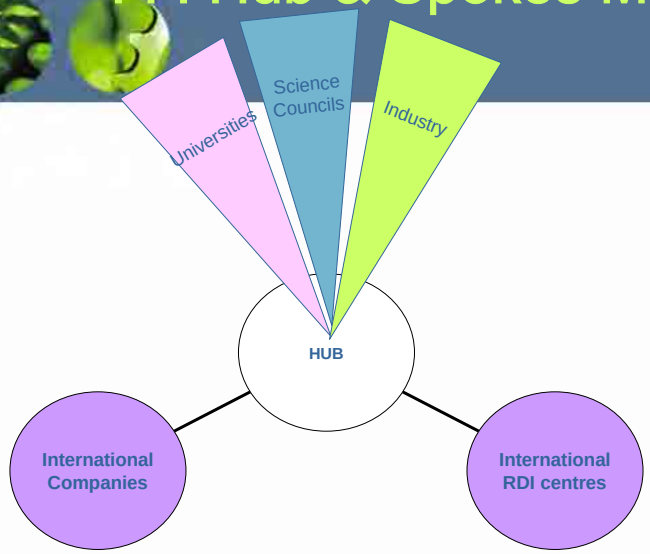
. . . Forstering Networked Competencies



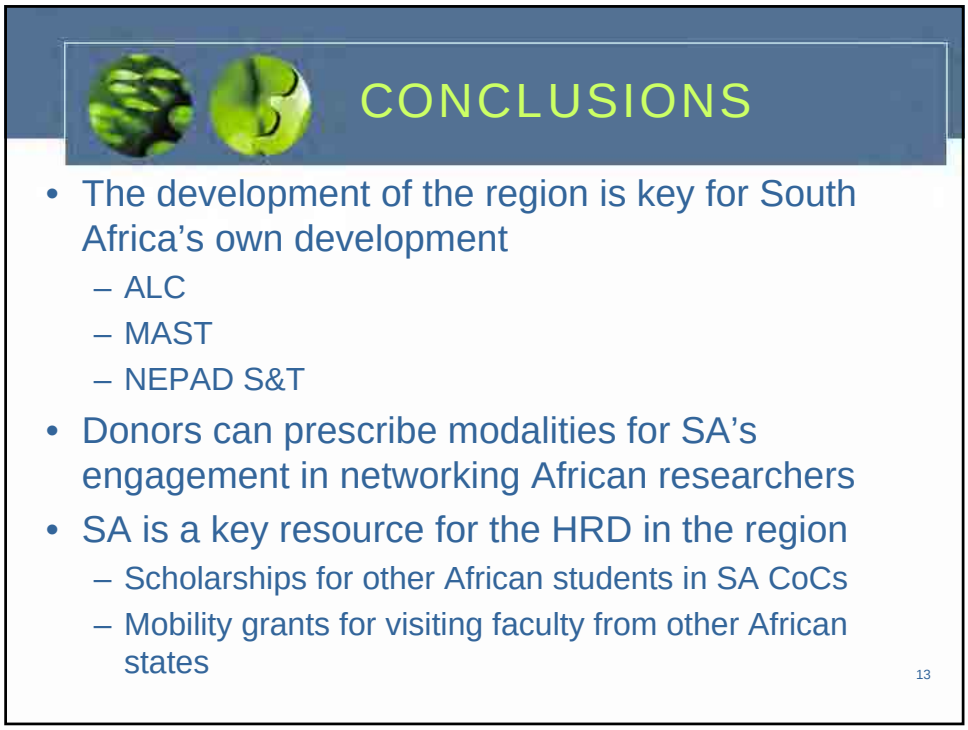
- Key strategic areas for the economy
  - 15 year Government commitment in funding
  - Industry participation – not requiring immediate funding
  - Minerals beneficiation, Energy & Social impact

11

. . . Hub & Spokes Model



12


CONCLUSIONS
• The development of the region is key for South Africa's own development
– ALC
– MAST
– NEPAD S&T
• Donors can prescribe modalities for SA's engagement in networking African researchers
• SA is a key resource for the HRD in the region
– Scholarships for other African students in SA CoCs
– Mobility grants for visiting faculty from other African states
13

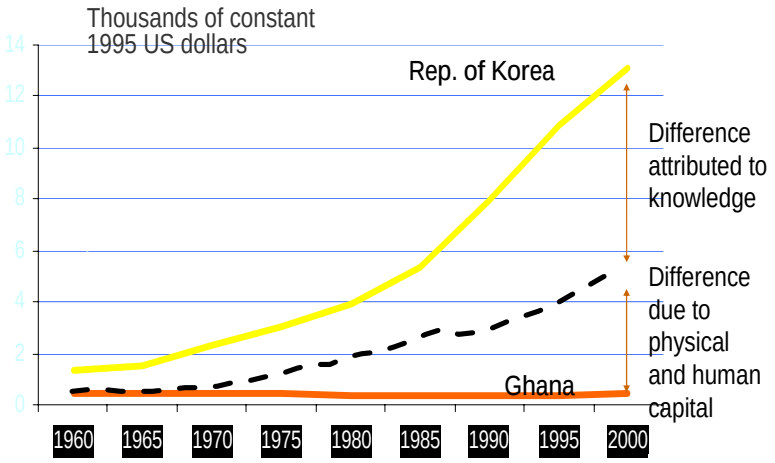
Networking for Change: STI and Higher Education in the Global Society

Alfred Watkins
World Bank S&T Program Coordinator

February 1, 2008
Tokyo, Japan

Why Worry About All This?

Knowledge makes the Difference between Poverty and Wealth...

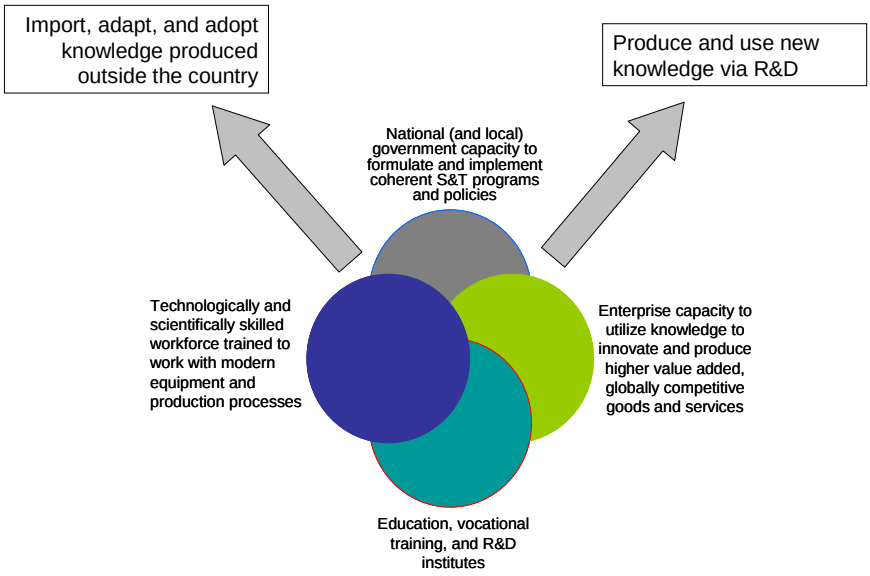


Difference Attributable to Knowledge

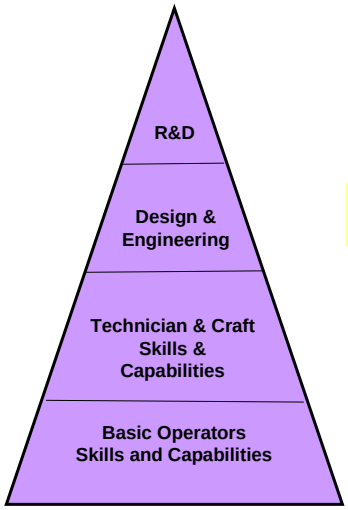
- What kind of knowledge?
- Where do you get it?
- How do you find it?
- How do you learn to use it?

3

Dimensions of STI Capacity



Capacity building is needed at all skill levels

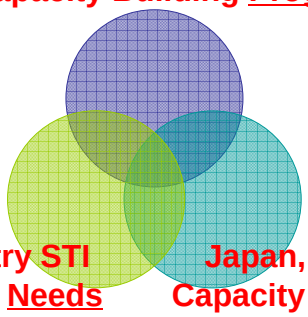


Required Tasks	Required Skills
Hydrological Analysis of Surface and Underground Water	Hydrology, Geology, Limnology, Geochemistry, GIS and Remote Sensin
Watershed Conservation and Pollution Control	Environmental Engineering, Chemistry, Soil Science, Geology
Well Boring and Pumping Underground Water	groundwater engineering, Construction, Masonry, Pump operation, maintenance
Harvesting Rainwater Run-offs from Roofs and Fields	Geology and Hydrology Construction and Masonry
Water Storage & Distribution Infrastructure	Civil Engineering; Construction, masonry (for tanks, reservoirs, pipes)
Water Purification and Water Quality Control	Chemistry, Microbiology, Public Health, Environmental Science, Laboratory Assistance

5

Network Programs, Needs, and Resources

JICA – World Bank
STI Capacity Building Programs



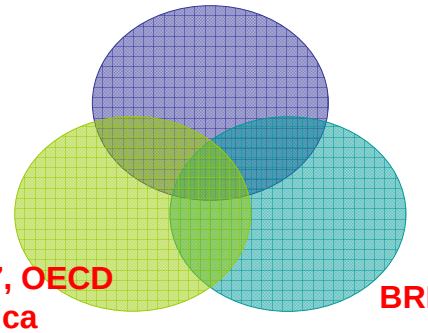
Developing country STI Capacity Building Needs

Japan, Other G-7, OECD Capacity Building Resources

6

Network Types

Intra-Regional



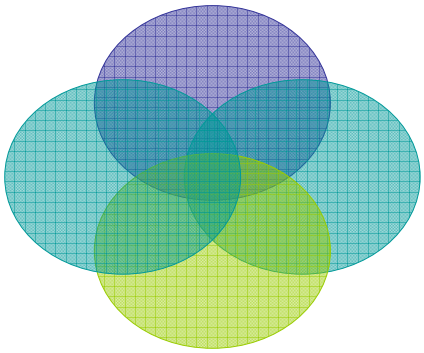
Japan, Other G-7, OECD
vis. a vis Africa

BRICS --- Africa

7

Network Objectives

Training Africans (In Africa?
In network partner institutions?)

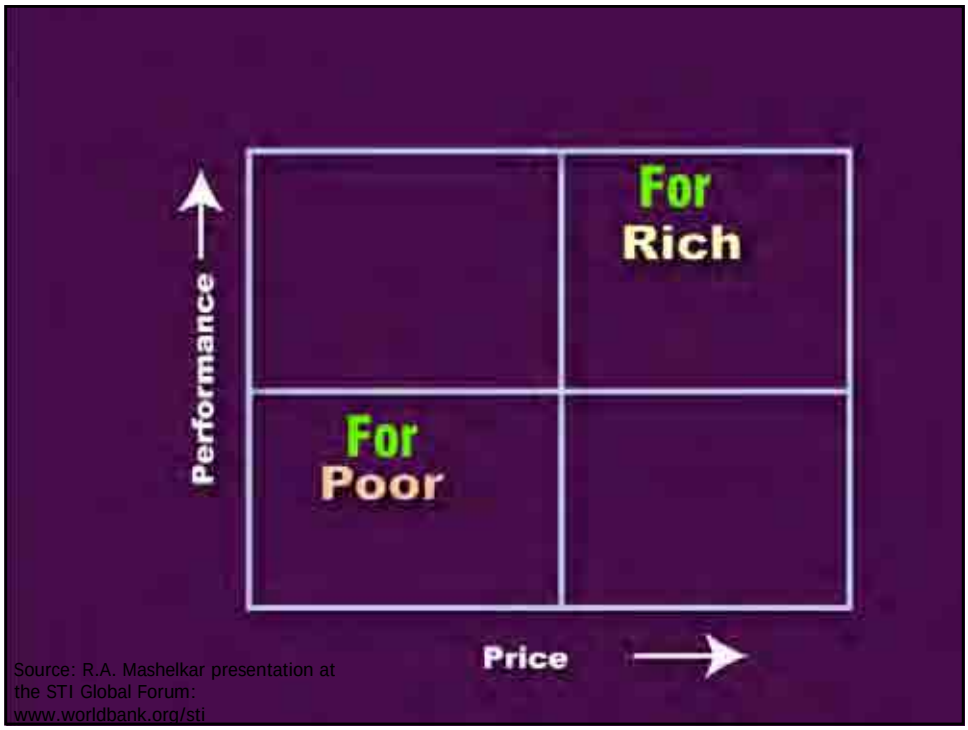


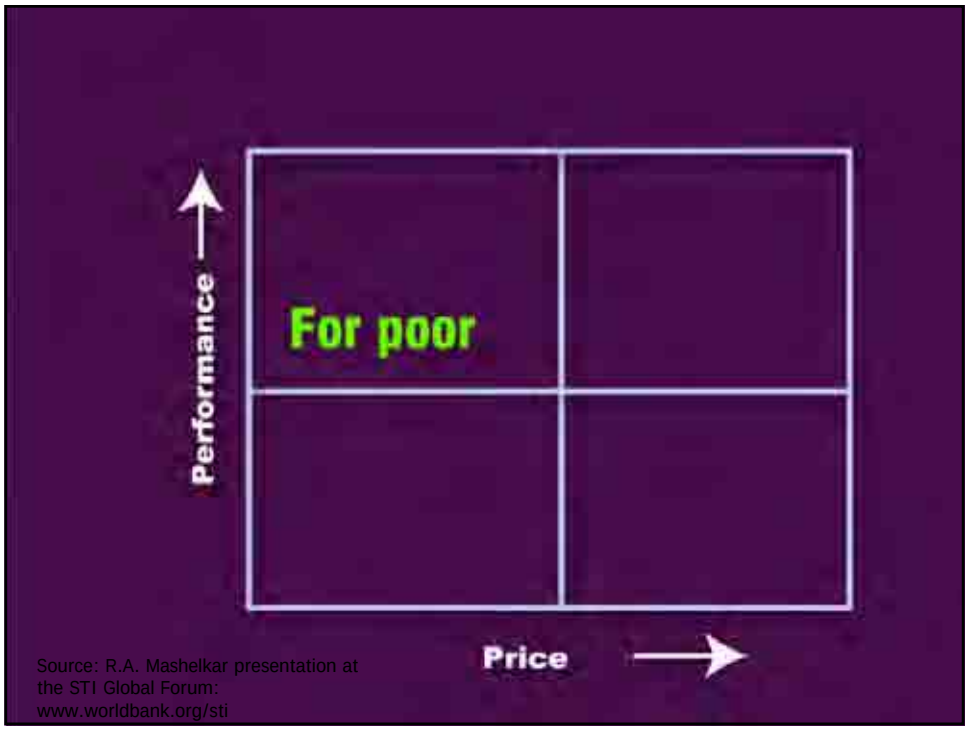
Joint R&D
Programs

Technology
Diffusion

Building Faculty Capacity
at African Universities

8


For
Rich
For
Poor
Performance
Price
Source: R.A. Mashelkar presentation at
the STI Global Forum:
www.worldbank.org/sti


For poor
Performance
Price
Source: R.A. Mashelkar presentation at
the STI Global Forum:
www.worldbank.org/sti

THANK YOU

Alfred Watkins
Science and Technology Program Coordinator

Awatkins@worldbank.org
www.worldbank.org/stiglobalforum

11

科学技術に関するＪＩＣＡの取り組みは如何にあるべきか？

「科学技術」と国際協力

■ 国際協力における「科学技術」を如何に理解するか？

- 作業用定義：経済社会の発展および貧困削減に資する実用的な技術
- 重点：
  - 個々の開発課題の解決に資する新技術（新技術と在来技術の融合を含む。）
  - 国際協力のツールとして汎用性の高い新技術（特にＩＣＴ）
- 非重点：
  - 既に広範に普及、定着している技術
  - 近未来における実用化の可能性が低い基礎的研究や高度な研究
  - その他（軍事関連技術は対象外）

■ なぜ今「科学技術」か？

- 開発パラダイムのシフト？
  - 在来技術によるＢＨＮの充足、あるいは、資本と低廉な労働力のみでは、成長も貧困削減も十分に実現できない。
- 急速なグローバル化と技術革新の進展
  - 「科学技術」を梃子とする「後発の利益」享受（＝「蛙跳び」）の機会が生じている。
- 国際協力の進展と要請の高度化
  - 積年の国際協力を通じＢＨＮ充足が一部実現しつつある。（特に基礎教育）

■ 「科学技術」に関する国際協力とは？

- 協力のアプローチ
  - 人材育成：「科学技術」を担う人造りを支援する。
  - 研究開発：「科学技術」の創造を支援する。
  - 活用・普及：「科学技術」の活用・普及を支援する。
  - 基盤整備：これらに資するインフラ等の基盤整備を支援する。
  - 政策・制度：これらを司る政策策定・制度整備を支援する。
- 主な対象
  - コミュニティ（解決すべき開発課題の同定および「科学技術」の活用・普及の場）
  - 民間企業、ＮＰＯ
  - 研究・高等教育機関
  - 技術教育・職業訓練機関、中等教育機関（理数科）
  - 政策策定機関、行政機関

「科学技術」とＪＩＣＡ

■ ＪＩＣＡを取り巻く状況：「科学技術」に対する認識の高まり

- 途上国
  - ＡＵ総会（2007）、ＴＩＣＡＤ閣僚会議、ＡＰＥＣ・ＩＳＴＷＧ
  - ルワンダ、エジプト等からの「科学技術立国」に関する支援要請
  - 「国家中長期科学技術発展計画」（中国）、「国家科学技術戦略計画」（タイ）
- 先進国、ドナー
  - 世銀ＳＴＩグローバルフォーラム（2007）、Ｇ８サミット（2007、2008）
  - ＤＦＩＤによる科学技術戦略、米国科学研究アカデミーの調査
- 民間、ＮＰＯ
  - 感染症新薬研究開発（GAVI）、ゲイツ財団
- 我が国
  - 第三期科学技術基本計画、総合科学技術会議、アジア科学技術協力戦略
  - ＯＤＡ中期政策（環境、防災分野における科学技術の活用）

■ ＪＩＣＡのアプローチ（「たたき台」）

- 人材育成：
  - 中核となる教育・訓練機関、人材の支援（ＴＯＴを含む。）を重視。
  - 多層にわたる人材育成ニーズにも対応。（中堅技術者、中等理数科等）
- 研究開発：
  - 実用性の高い研究開発を重視。（産学地連携、感染症対策研究等）
  - 国別アプローチよりも、域内、地域間の連携を重視。（AUN/SEED-Net、国際農業研究グループとの連携等）
  - 民間との共同開発（⇒今後の課題？）
- 活用・普及：
  - 最貧国・地域では、新技術開発よりも、既往技術の活用・普及を重視。（NERICA米、サブサハラにおけるＩＴ）
- 基盤整備：
  - 民間との連携を重視。（ＩＣＴパーク整備等）
  - 島嶼国、内陸国、遠隔農村地帯等における通信インフラの整備等を重視。
- 政策・制度：
  - 「科学技術立国」に向けての途上国各国自身のコミットメントと我が国への期待に応じ対応（ルワンダ、エジプト等）

■ 協力推進に際しての留意点

- **我が国の政策枠組みにおける整合性とシナジーの確保**
  - **ＪＩＣＡ以外のＯＤＡ事業との連携（国費留学生、マルチ協力等）**
  - **非ＯＤＡを含む科学技術振興事業との連携（アジア科学技術協力戦略、感染症研究拠点プログラム、国際標準化戦略（？）等）**
- **世界に通じる「日本の強み」の活用**
  - **日本の経験・教訓に基づく協力の重視（環境、防災分野での協力）**
  - **日本の大学・産業界との連携（⇒特に産業界との連携は今後の課題？）**
- **国際アジェンダへの積極的参画・貢献**
  - **Ｇ８東京サミット**（2008）、TICAD-4（2008）
  - **世銀** STI **グローバルフォーラム・フォローアップ会合等**
- **「科学技術」活用に伴うリスク等への対応**
  - **安全管理（Ｐ３施設の整備等）**
  - **「陳腐化」リスクの最小化**
  - **知的財産権保護その他法的制度の整備**

当面の課題

■ 「新ＪＩＣＡ設立」を視野に入れた平成 19 年度における取り組み

- **「科学技術」に関する優先分野、課題、アプローチの選定**
- **「科学技術」に関する協力を促進する「新規事業」開発の検討**
  - **「研究開発」の推進（ＪＩＣＡ調査研究のあり方と併せ検討？）**
  - **民間連携の推進**
  - **旧「研究協力」の見直し、再評価？**
  - **マルチ連携、広域事業展開**
- **「科学技術」に関する取り組み強化を目指した体制の検討**
  - **総合的戦略策定機能の強化**
  - **「科学技術」に関する「アンテナ機能」（感度＋発信力）の強化**
    - DFID **の** Chief Scientist**、外部有識者委員会？**
  - **「科学技術」に関する事業の効率的展開**
    - **専門部署の設置？ｖｓ各技術部門における対応**

以　上

JICA の科学技術分野における主要な事例

【経済開発部】

項目	説明
1. プロジェクト名	マレーシア・クリムテクノセンター経営企画調査（開発調査）
2. 協力期間	1995 年
3. 協力概要	世界的な産業ネットワーク化の中で、人材育成と技術移転、ハイテク経営の教育訓練を進め、マレーシア経済を先進地域の産業ネットワークに組み込ませていくための方策の検討・提言を行った。具体的には、半導体産業を対象とし、製品の試験・分析・計測、産業ネットワーク化推進、IT 開発促進、新規企業創出・育成等を担う各サブセンター新設に係る提言を行った。
4. 案件の特徴	・ベトナム・ホアラックハイテクパーク計画（1999 年）、チュニジア・ボルジュ・セドリア・テクノパーク運営管理プロジェクト（2005-2009 年）等、ハイテクセンター構築による中進国の開発推進の先駆け的案件。 ・サブセンターの構成を工夫することにより生産技術支援・情報支援・創業支援など民間セクターのニーズに多面的に対応。 ・生産技術・情報技術等、日本が優位性を持つ科学技術を活用した支援。

【社会開発部】

項目	説明
1. プロジェクト名	ハノイ工科大学 ITSS 機能強化
2. 協力期間	2006.10.28～2008.10.27
3. 協力概要	ハノイ工科大学（HUT）に日本語及び ITSS（IT スキル・スタンダード）教育を含む ITSS 学科を新設した上で、学生の日本留学などを併せ行うことでベトナムの IT 高等教育人材の育成を図るというもの。いずれはプロジェクトで育成された人材が両国の経済活性化（ブリッジエンジニア）に繋がっていくことが期待されており、プログラムのうち JBIC が設備改修/機材供与・日本語教育・本邦留学を受け持ち、JICA は、ITSS 学科創設/運営および ITSS 教育を行う。
4. 案件の特徴	・日本語能力と ITSS の 2 つの能力をもった人材育成を行うことにより、日本企業と連携したベトナムの IT 産業の発展の支援を行う、産官学連携の好モデル。 ・科学技術振興における JICA・JBIC 連携のモデル。

【人間開発部】

項目	説明
1. プロジェクト名	「エジプト日本科学技術大学」設立構想
2. 協力期間	（日・エ双方で検討中。）
3. 協力概要	質の高い高等教育を提供する国立大学を設立し、マスプロ化の進行するエジプトの高等教育を改善するとともに、中長期的かつ公共的な経済社会ニーズに応えることを目的としている。

4. 案件の特徴	・ 中東･北アフリカに共通する開発課題（環境保全、産業育成等）に取り組む人材の育成、技術革新を担う「科学技術センター」としての大学を設立し、中東・北アフリカの経済社会の発展と域内統合に貢献。 ・ 中東・北アフリカと日本の科学技術分野での交流拠点としての大学となり、同地域での日本のプレゼンス強化、日本の科学技術の普及・国際基準化、優秀な教員・学生の確保や国際的な地位の確立を目指す日本の大学の国際化にも貢献。

【農村開発部】

項目	説明
1. プロジェクト名	ネリカ米普及支援
2. 協力期間	2003 年～
3. 協力概要	我が国が 1972 年から支援してきた西アフリカ稲開発協会（WARDA）において、1994 年、耐乾性・耐病性にすぐれたアフリカ稲と収量の高いアジア稲の特徴を合わせもった交配種（「ネリカ」）が開発された。本協力プログラムでは、アフリカ諸国におけるネリカ種の普及を図るため、ウガンダ、ベニン等に対する専門家の派遣及び機材供与や、アフリカ諸国を対象とした技術セミナー等を実施している。
4. 案件の特徴	・ アフリカ地域に適した新品種の開発と、開発された技術の各国への適用のため実証試験、生産現場への実適用のための体制整備（種子増殖）を支援。 ・ 新開発された「ネリカ種」の普及により、アフリカ諸国において、人間の安全保障を進めるうえで課題となる食糧問題を改善するとともに、水稲作の適地が限られたこれら国々に適した稲を開発することにより、増大する米輸入を抑制し、貴重な外貨の節約、経済の安定・成長に貢献。

【地球環境部】

項目	説明
1. プロジェクト名	日中友好環境保全センタープロジェクトフェーズIII（延長）
2. 協力期間	2002/4/1 - 2006/3/31、2006/4/1-2007/3/31（延長）
3. 協力概要	本案件は、センターが中国の環境保全上の重要課題の解決に指導的な役割を発揮し、また、その成果を中国国内に展開することにより、中国各地方の環境問題の改善に寄与することを目標としている。本体期間では①政策・制度支援、②技術移転支援（ダイオキシンや POPs の分析技術、黄砂を含む都市大気中粒子状物質発生源の解析研究等）、③センターの日中環境協力プラットホーム機能の強化、の 3 つの活動領域での協力を、延長期間では、①分析技術の強化によるセンターのレファランスラボラトリー化、②企業環境監督員制度の推進を活動の二本柱として実施している。
4. 案件の特徴	・ 日本が優位性をもつ、環境保全に係る科学技術を活用し、環境保全に係る政策・制度、分析技術、プラットホーム機能の強化を支援する、科学技術支援における Capacity Development アプローチのモデルケース。 ・ 高度な知識を備えた専門家（コンサルタントチーム）の派遣と、国立環境研究所等の研究者の参加による日本側支援体制を整え協力を行ってきた結果、センターは、全国の研究機関の人材育成や先端的な研究実施を担う、中国のダイオキシ

	ン・POPs 分析の最先端研究基地として成長しており、全国の実験室の基準およびレファレンスラボラトリー指定にむけ着実な成果を挙げてきている。

【国内事業部】

項目	説明
１．研修コース名	集団研修：バイオマス有効利用技術
２．所管国内機関	JICA 筑波
３．主な実施機関	独立行政法人　産業技術総合研究所
４．協力期間	2006 年～2010 年　2006 年 10 月 12 日～2007 年 9 月 1 日
５．協力概要	OJT 方式の研究活動を通じ、当該分野での技術を習得すると共に科学技術的見地からバイオマス有効利用法について提言することをコース目標とする。 研修成果としては、①自立的に研究活動を遂行するための標準技術の習得、②バイオマス利用分野での最新の技術・情報の習得、③日本人研究者とのネットワーク構築、④関連学会での研究成果の発表、⑤自国でのバイオマス有効利用に係る提案書案の作成、を目指す。受入分野は、生分解性プラスチック関連分野、バイオマスエネルギー関連分野、エタノール製造技術関連分野、バイオ燃料の自動車への適用技術分野等。
6. 案件の特徴	・ 本邦研修による技術取得のみならず、来日前～帰国後の一環したプロセスにより、取得技術の現地適用・実現を推進している研修のモデルケース。 来日前には、自国の現状を踏まえたリサーチプロポーザル作成、来日後には、研究内容確定と担当研究室でのマンツーマン方式による約 10 ヶ月の研究活動の実施、帰国後は、本邦研修中に作成したバイオマス有効利用法に関する提案書の所属組織内での共有、6 ヶ月後と 12 ヶ月後の提案書の取り組み状況についての報告提出と担当研究者と意見交換、を行っている。

ドナーの科学技術分野における支援の概要

１．ドナー全体の支援傾向

基本方針 ドナーの中で全体的に、科学技術の分野での支援の重要性に対する認識が高まっている。しかし、科学技術分野の支援についての定義が援助機関によって異なり、また協力の経験からの教訓が共有されておらず戦略が不足しており、基本的なガイドラインの設定が終わっていない場合が多い。さらにドナー間の協調も未だ少ないことが指摘されている。

国連開発計画、英国国際開発省などでは、方針の検討が進んでおり、また、アジア開発銀行（ADB)、米州開発銀行（IDB)、米国国際開発庁（USAID）などでは重要性の認識が高まっており、具体的な方針の設定については、現在取り組んでいるところである。

2007 年 2 月 13 日～15 日に世界銀行主催、IDB、UNESCO、UNCTAD、DFID、CIDA などの共催で開催された「持続的開発と貧困削減を目的とした科学技術（STI）のキャパシティー・ビルディングのためのグローバル・フォーラム」には、ドナー、途上国政府、民間セクター、大学・研究機関などが参集し、本イシューに係る経験・教訓の共有が行われた。

科学技術の分野での民間とのパートナーシップによる協力（PPP）の重要性を強調するドナーが多い。（世界銀行、USAID、DFID）

重点分野 途上国では保健、農業（バイオを含む)、エネルギー、環境の分野が多い。DFID と CIDA では、HIV/AIDS 関連の保健分野が多い。二国間援助機関、国際機関に係わらず ICT 分野は比較的多い。先進国では、ナノテク、宇宙など多様である。また先進国では、基礎科学の分野で積極的な研究支援が行われている。

重点地域 農業技術と教育（高等教育及び技術教育訓練を含む）の分野では、広い地域で、中所得国と低所得国の双方で、実施されているのに対して、それ以外の研究開発タイプの協力は、限られた数の中所得国に集中する傾向がある。（世界銀行の場合）しかし最近では、低所得の途上国に対しても積極的に、実用的な科学技術の開発と普及を進めるべきであるという議論が増加している。

２．各ドナーの支援傾向

(1) 世界銀行（IBRD）

基本方針 世界銀行は科学技術の分野のキャパシティー・ビルディングは、途上国が貧困から脱出するために必要であるとして重視している。

世界銀行は、科学技術に係る能力を、①教育（知識経済のための教育）、②研究開発（R&D：経済活動に関連した新たな知識の生産）、③技術導入・普及（技術の習得と普及：産業競争力を高めるために既存の知識を利用）、④科学技術政策の立案能力の４つに分類し、取り組みを行っている。[1]

科学技術振興には、教育水準が高く技術を有する労働力と、民間企業の経営能力が必要であることから、特に、人的資源開発と民間とのパートナーシップを重要視している。また、必ずしも高度な技術ではなく、実用的な技術の活用に重点を置いている。

組織体制としては、組織横断的に科学技術全般を総括している部署はない。Sustainable Development Network に Chief Scientist and Director が、また Human Development Network の教育局に Science and Technology Coordinator が設置され、各 Network 内で科学技術政策を担っている。

重点分野 教育タイプでは、職業訓練、技術教育訓練、高等教育、教育センターとネットワーク、生涯教育、遠隔教育など新しい学習技術のプロジェクトがある。また研究開発タイプには、ミレニアム科学イニシアティブによる研究センタープロジェクトや研究能力向上プロジェクトを含む。さらに、技術導入・普及タイプには、農業技術プロジェクトと民間セクター工業技術プロジェクトがみられる。[2] 世界銀行による科学技術関連のプロジェクトのレビューによれば、過去に多かった農業技術プロジェクトは減少傾向にある。なお保健や環境プロジェクトは未だ比較的少ない。[3]

重点地域 教育と技術導入・普及のタイプの協力は、低所得国・中所得国にかかわらず多くの地域で広く実施されている。他方で、研究開発タイプの協力はメキシコ、ブラジル、チリ、ベネズエラ、韓国、トルコ、などの少数の中所得国に集中している。[4]

---

[1] 世界銀行、科学・技術・イノベーションに係るウェブサイト。
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20457091~menuPK:2458448~pagePK:210058~piPK:210062~theSitePK:282386,00.html
[2] 同上
[3] Crawford and others, [2006] *Review of World Bank Lending for Science and Technology 1980-2004*, World Bank
[4]世界銀行、上記教育分野のホームページ。

(2) アジア開発銀行（ADB）

基本方針 ICT 分野を除けば、特に科学技術分野の協力として方針を策定していない。[5] 科学技術分野とし整理はしていないものの、研究開発に携わる人材の育成をコンポーネントとして含むプロジェクトへの融資は、これまで実施している。またアジア工科大学院のような研究施設への協力も行ってきている。さらに、大学院教育への奨学金や博士号取得への支援などの協力も実施している。

重点分野 科学技術に関連する分野の協力としては、教育、ICT、エネルギー技術、農業技術などへの支援のための融資を行っているが、ICT 分野への協力の他は、科学技術分野として特定しにくい。なお、技術協力として、科学技術政策の立案への協力も行っている。

重点地域 科学技術分野の協力として分類はしておらず、その統計は存在していない。[6] そのため、重点地域は確認できない。

(3) 経済協力開発機構（OECD）

基本方針 OECD には従来から、加盟国の代表によって構成される委員会として科学技術政策委員会（CSTP）が存在する。また常勤の職員がいる事務局としては科学・技術・産業局（STI）があり、科学・技術・イノベーションのための政策について、主に加盟国間の情報交換と協力が続けられている。ただし、DAC（開発援助委員会）事務局、開発センター、サヘルクラブをのぞき、基本的には先進国・OECD 加盟国を対象としており、開発途上国に関連した活動を行うことは稀である。

DAC については、2005 年 12 月に「開発のための ICT」担当官ポストが廃止された後は、科学技術に特化した部署･役職は設けられていない。この背景には、2005 年 11 月にチュニスで開催された世界情報サミット（WSIS）以降、国際通信連合(ITU)がデジタル・ディバイド関係行動計画のフォローアップを行うことになり、同事項に係る OECD の役割がほぼ収束したことによる。

重点分野 科学・技術・産業局によれば同局では、科学・技術関連については、科学・イノベーション全般に関する政策の他、情報通信政策、バイオテクノロジー、科学・技術に携わる高度な人材の問題について調査を行っている。[7] この他、農水産業、環境、教育につ

[5] Asian Development Bank, [1998] *Toward E-Development in Asia and the Pacific, A Strategic Approach to Information and Communication Technology*
[6] Farley, Sara, [2005] Support to Science, Technology, and Knowledge for Development: A Snapshot of the Global Landscape p.18 ADB からのアンケート調査に対する回答。
[7] OECD,Science & Innovation 2005-2006,https://www.oecd.org/dataoecd/45/31/35554259.pdf

いて事務局が、それぞれの分野での専門的な調査を行っている。DAC では、これまで持続的な開発のための環境関連の科学・技術の問題が、比較的とりあげてきたが、一般にセクターに特化した科学・技術テーマについての調査は少ない。

重点地域 OECD は、まず先進国である加盟国間の情報共有と協力を目指すもので、科学・技術分野でも、主に加盟国について研究・調査が行われている。科学・技術・産業局でも一部 OECD 加盟国以外の途上国に対して、情報通信、知的所有権、イノベーションのための官民協力などのテーマの理解を得る目的で、途上国と会議を開催しているが、活動は小さい。[8]

(4) 欧州連合（EU）

基本方針 EU 加盟各国の行動では目的を十分達成できず EU によって十分に達成できる科学技術活動を行うことを原則としている。今年から 7 ヵ年計画で研究プログラムを作成しており、現在は第 7 次欧州研究フレームワーク（2007－2013 年）が開始された。また基礎研究推進のためのグラントとして欧州研究委員会（ERC）が本年発足した。同委員会は自律的な運営をまかされた科学者・研究者によって構成され、資金は研究者の自主的な研究に対して与えられる。

重点分野 第 7 次欧州研究フレームワークによれば、予算は総額 505 億ユーロで、そのうち 324 億ユーロが産学連携研究（情報通信 91 億、保健衛生 61 億、運輸 42 億、ナノテク・材料・新生産技術 35 億、エネルギー24 億、食品・農漁業・バイオ 19 億、環境 19 億、宇宙 14 億、安全保障 14 億、社会経済科学人文科学 6 億）である。この他に、基礎研究（ERC）75 億、人材育成 48 億、基盤整備 41 億、共同研究センター18 億が割り当てられる。

重点地域 研究技術開発は欧州の経済成長、競争力強化、雇用創出に貢献するためのものであり、欧州域内に研究資金を提供するための仕組みである。途上国は対象とされていない。

(5) 国連科学技術委員会(CSTD)／国連貿易開発会議(UNCTAD)

基本方針 国連の科学技術に関する活動は、主に経済社会理事会（ECOSOC）の専門委員会のひとつである、開発のための科学技術委員会(CSTD)の総括の下で、（FAO、UNIDO、IAEA などの）専門機関や（ESCAP など）地域委員会などが実施することになっている。国連貿

[8] 同上

易開発会議(UNCTAD)の事務局が科学技術委員会の事務局の役目も果たしている。UNCTADの CSTD の事務局によれば、科学技術委員会は時機に合うと判断された、国連組織に広く共通する中心的な課題を提案する。

重点分野 最近は、ICT 分野にさらに重点が移る傾向がある。2005-2006 年会期の課題として取り上げられた技術ギャップでは、デジタル・ディバイドが重視されており、また CSTD によれば、2007 年 5 月に提案される新たな中心的な課題は、「人間を中心とした、開発志向で、参加を促進する情報社会の建設の振興」と題して、ICT 分野を重点にあげ、世界情報サミット（WSIS）のフォローアップを強調することを予定している。

過去 3 年間に科学技術委員会が提案した中心的な課題は、「国内及び国際的な技術ギャップを埋める」（2005-2006 年会期）、「ミレニアム開発目標達成のための科学技術の振興、助言および応用」（2004-2005 年会期）、「ミレニアム開発目標に適合した科学技術の応用の促進」（2003-2004 年会期）であった。[9]

重点地域 重点地域は決めていないが、ミレニアム開発目標が中心課題として取り上げられてきており、途上国に重点がおかれている。

(6) 国際連合教育科学文化機関（UNESCO）

基本方針 UNESCOの2002－2007年の中期計画では、科学技術の分野の活動の方針として、１）科学技術の進歩と社会の変革を導く原理と倫理的規範を促進する、２）環境と社会変化のより良い管理による人間の安全保障の改善、３）科学的技術的人間的な能力を向上させて、出現しつつある知識社会に参加する、の三点をあげている。[10]

なお UNESCO は、国際科学会議（ICSU）の共催で、1999 年に加盟国の政府と学術団体、NGO の代表を招いて、「世界科学会議」を開催し、重要な科学の話題、科学と社会の関係（「科学と開発」を含む）、科学の振興についての意見交換を行った。この会議では「科学と科学的知識の利用に関する世界宣言」及び「科学アジェンダ-行動のためのフレームワーク」を採択し、そのフォローアップが UNESCO の科学技術分野における活動の重要な優先事項のひとつとなった。[11]（なおこれ以後、UNESCO は科学技術についての大規模な国際会議を行っておらず、2007 年にも計画していない。）

[9] United Nations, Economic and Social Council, Commission on Science and Technology for Development, Report on the Session, 2004, 2005, 2006
[10] UNESCO[2001] *Medium-Term Strategy 2002-2007*, UNESCO
[11] UNESCO[1999] *Science Agenda: Framework for Action*, UNESCO

重点分野 科学技術の分野で UNESCO は、淡水、海洋、工学生物多様性とエコシステム、海洋、地球科学、基礎科学、工学、海岸と小島嶼、科学政策と持続的開発、自然災害、復元可能なエネルギー資源など幅広いテーマを扱っている。科学技術分野の 2004－2005 年および 2005-2006 年の予算でみると、淡水とエコシステム関連、基礎及び工学のキャパシティー・ビルディング、海洋関連が大きな割合を占めている。[12]

重点地域 途上国に重点を置き、後発発展途上国を重視している。2004－2005 年の予算でみると、アフリカ、アジア太平洋、欧米、中南米、アラブ地域の順で、2005－2006 年の予算では、アフリカ、アジア太平洋、中南米、アラブ地域で、アフリカとアジア地域が大きい。なお UNESCO は 2005 年にアフリカ開発のための新パートナーシップ（NEPAD）及びアフリカ連合（AU）と協力して、アフリカ科学技術総合活動計画を作成している。[13]

(7) 国際電気通信連合（ITU）

基本方針 国際電気通信連合（ITU）は、電気通信技術の標準を目指す各国首脳による世界情報サミット（WSIS）を開催し、情報社会についての共通ビジョンを確立し、デジタル・ディバイドの解消をめざし、2003 年にジュネーブで WSIS 一回目の会合を主催し、基本宣言と行動計画を採択した。[14]しかしインターネット管理の問題で、先進国と（米国及び民間主導に反発する）途上国が合意できず、2005 年にチュニスの会合で同問題と行動計画の実施方法についての討議を行い合意した。途上国から提案のあった、デジタル・ディバイド解消のための基金は、義務的でなく、既存のメカニズムを補完するものとされた。[15]

行動計画の実施の調整及び促進には、ITU、UNDP、UNESCO、UNCTAD、ILO などの国連機関があたる。現在、WSIS の行動計画のフォローアップが実施されている。（上記サミットではインターネット管理の問題で紛糾し、デジタル・ディバイド解消のための議題が相対的に低くなったという批判もある。）[16]

重点分野 チュニス会合で合意されたアジェンダでは下記の課題が取り上げられた。開発のためのＩＣＴ利活用における公的政府当局及び全ての関係者の役割、情報通信インフラ、情報・知識へのアクセス、人材開発、ＩＣＴの利用における信頼性とセキュリティの確立、環境の整備、ICT の適用（電子政府、e ビジネス、e ラーニング、e ヘルス、e 雇用、e 環境、

[12] UNESCO, *Approved Programme and Budget 2004-2005 及び 2005-2006,* UNESCO
[13] UNESCO[2005] *Africa's Science and Technology, Consolidated Plan of Action,,* UNESCO
[14] ITU,[2003] *Plan of Action, World Summit on the Information Society*, ITU
[15] ITU「情報社会に関するチュニス・アジェンダ、世界情報サミット（WSIS）」、2005 年
[16] WSIS の問題については、http://www.atmarkit.co.jp/news/200401/30/wsis.html などを参照。

e 農業、e サイエンス)。

重点地域 チュニス・アジェンダでは、「小島嶼開発途上国、内陸開発途上国を含む、農村地域及び不利な条件におかれた人々に対し ICT アクセス及びサービスを提供する際に、公的資金援助が重要な役割を果たすことを認識する。」としている。

(8) 国連開発計画（UNDP）

基本方針 国連開発計画（UNDP）の科学技術分野での重要な役割は、開発課題の整理や活動の調整である。UNDP の活動分野は大きい順に、民主的ガバナンス（47%）、貧困削減（25%）、危機予防と復興（12%）、エネルギーと環境（11%）、HIV／エイズ（5%）の順であり、科学技術の関係する分野は小さい。（2005 年の支出）[17] 科学技術に関しては、UNCTAD 及び他の分野の国連の専門機関が担当する。

重点分野 ミレニアム開発目標８のターゲット 18.「民間セクターと協力し、特に情報・通信分野の新技術による利益が得られるようにする。」に関連した課題の整理や人間開発報告書 2001「新技術と人間開発」で、科学技術の開発課題を取り上げている。また 2005 年には、ミレニアム開発目標の実施戦略の参考となる、実施例、政策改革、政策実施の枠組み、などについての報告書「イノベーション・開発における知識の適用」をまとめた。[18]なお世界情報サミット（WSIS）のフォローアップでは、キャパシティー・ビルディングと環境整備を担当している。

重点地域 科学技術分野における重点地域については統計がなく、確認ができない。

(9) 米国国際開発庁（USAID）

基本方針 米国科学研究評議会（アカデミー）の調査によれば、USAID は数十年前には科学技術の分野での協力を行ってきたが、現在では大きく減少している。しかしこの傾向を逆転させようとする動きが最近出ている。その主な要因は、a.USAID による最新および既存の技術の有用性についての認識、b.世界銀行および民間（米国科学アカデミー、RAND コーポレーション、ゲイツ財団など）などによる科学技術分野の支援への関心の高まり、c.USAID 以外の米国の他の省による途上国への科学技術分野での協力の拡大、などである。

[17] 国連開発計画「国連開発計画（UNDP）年次報告書 2006」2006 年、国連開発計画
[18] Juma, Calestous and Yee-Cheong, Lee, UN Millennium Project Task Force on Science, Technology, and Innovation [2005] *Innovation: Applying Knowledge in Development*, UNDP

[19] USAID は 2003 年ぐらいから科学技術分野の協力の重要性を公式に強調するようになった。[20]

組織体制面では、組織横断的に科学技術を総括している部署はない。（過去に設置されていたことがあり、今後、再設置することが検討されている。）USAID の組織は地域局と課題曲に大別されるが、課題局(Bureau)の課(Office)の中に、科学技術を担当する係（Division）が設置されている部署もある（例：世界保健局の HIV/AIDS Office に設置されている Technology and Research Division や、経済成長・農業・貿易局の Office of Environment and Science Policy など）

重点分野 USAID による科学技術分野の協力は技術協力である。科学技術分野が関連する USAID のこれまでの主な協力の分野は、保健（人口・保健サーベイ、微量栄養素の亜鉛補給、オンコセルカ症、安全な水システム、一回使用のシリンジ)、農業（農業技術普及、さび病に耐性のある麦の種子、牧草の状況の予測制度、害虫抵抗性ジャガイモ)、エネルギー（電力のプールシステム、送電線システム、配電ロスの低減)、環境（大気モニタリングネットワーク、旱魃予測）などである。[21]

重点地域 科学技術分野の協力の額と対象国は不明であるが少ないとみられている。米国の援助は 10 カ国ほどの戦略的に重要な国々に集中しているが、USAID はどの途上国事務所も、制度上は科学技術分野の協力を要請することは可能だとしている。[22]

(10) 英国国際開発省（DFID）

基本方針 「DFID 研究資金の計画 2005～2007 年」によれば、ナレッジと資源は貧困に対処するための二つの重要な武器であるとして、研究のための資金への予算措置を増加させている。

DIFID の事業は分権化されており、研究のための資金も、50%近くが途上国にある事務所の決める国別戦略によって決められ、残りが本部の予算となる。（2001～02 年の実績）[23]

DFID の科学分野の協力は、英国及び途上国における研究員や研究プログラムの実施、訓練や研究人材の育成などの技術支援、研究施設や器材の供与、国際的な研究ネットワーク

[19] National Research Council [2006] *The Fundamental Role of Science and Technology in International Development,* The National Academies Press
[20] Farley, Sara, [2005] Support to Science, Technology, and Knowledge for Development: A Snapshot of the Global Landscape p.17 USAID からのアンケート調査に対する回答。
[21] 上記 National Research Council [2006] Appendix H
[22] 上記 Farley, Sara, [2005] p.17
[23] House of Commons, Science and Technology Committee, [2004] *The Use of Science in UK International Development Policy Volume I, Thirteen Report of Session 2003-2004*, House of Commons

や組織への支援が含まれる。 DFID は、科学分野で公的部門と民間とのパートナーシップによる協力を重視している。

組織体制面では、次官アドバイザーとして Chief Scientist が設置されている[24]。同ポストは事業予算こそ持たないものの、科学技術の観点から DFID 全般に対して幅広くアドバイスする立場にあり、DFID の政策佐策定過程への影響力は大きい。現在は、元ロックフェラー財団会長、サセックス大学副学長を歴任した農業学者の Gordon Conway 氏が任に当たっている。

重点分野 上記の DFID 研究資金の計画によれば、重点分野は農業と保健であり、その他に社会科学、工学、教育が対象となっている。2005 2007 年の期間の、本部による研究資金の 3 分の 2 は、「アフリカを中心とした地域での持続的農業」、「HIV/AIDS、結核などの致命的な病気」、「貧困層のために機能しない国家」、「気候変動の貧困層への影響」の４つの課題に対する研究が占める。

重点地域 重点地域は特に定めていない。プログラムの内容から低所得国をより対象としていると推定される。

(11) カナダ国際開発庁（CIDA）、カナダ国際開発研究センター（IDRC）

基本方針 カナダ政府による研究分野の協力は、途上国の研究能力の育成を目的に主に IDRC が行っており、IDRC は 2003 04 年、444 のプロジェクトを含む、828 の研究を実施した。[25] IDRC は特別法に基づき設置された民間研究機関で、ODA 予算の約 3%が直接計上されている。なお ODA 予算全体について議会に対する責任は CIDA が負う。[26]

重点分野 CIDA は、HIV/AIDS 対策、政策立案や開発に役立つキャパシティー・デベロップメント、教育のための情報通信技術（ICT）を重視し、戦略文書を 2001 年にまとめた。また、IDRC の協力分野は広く、（1）環境天然資源管理、（2）社会・経済政策、（3）開発のための ICT に分けられている。この他に複数のセクターにまたがる研究協力がある。[27]

重点地域 IDRC の協力は、54%がアフリカ及び中東地域、20%が中南米カリブ地域、26%

[24] 英国政府では 9 つの省庁に Chief Scientist が配置されている。Chief Scientist は人事院より選定されるが、政府とは独立しており、政府に対して批判を行うことができる。
[25] Farley, Sara, [2005] Support to Science, Technology, and Knowledge for Development: A Snapshot of the Global Landscape p.12 IDRC からのアンケート調査に対する回答。
[26] 外務省「政府開発援助（ODA）白書 2006 年版資料編」p.416
[27] Farley, Sara, [2005]

がアジア地域であった。（2003 04 年）[28]

[28] Farley, Sara, [2005]

３．科学技術の協力に係る今後の大規模な国際会議

１．アフリカ開発会議（TICAD）

第 4 回のアフリカ開発会議（TICAD IV）は、2008 年に開催することが決められているが、具体的な議題は未だ公表されていない。TICAD で支援対象として重視されるアフリカ開発のための新パートナーシップ（NEPAD）は、2007 年 1 月のアディス・アベバでのアフリカ連合（AU）の総会で、AU の仕組みに統合されることが決定された。[29]

また上記の 2007 年 1 月の AU 総会で採択された宣言では、科学・技術・工学分野の教育を促進し、研究とイノベーションための活動と人的・制度的なキャパシティーの強化・支援を強調し、さらに気候変動に対処するための戦略を開発計画に含めるよう加盟国やドナーに要請している。[30] また同時に開催された科学技術担当大臣会議でも、研究開発とイノベーション促進戦略の推進が確認された。[31]

なお外務省によれば、2007 年 3 月には TICAD IV の準備会合として、ケニアで「持続可能な開発のための環境・エネルギー」のテーマで閣僚会議が開催される予定である。

２．主要国首脳会議（G８サミット）

2007 年の G8 サミットは、６月にドイツで開催される予定である。議長国となるドイツ政府は科学技術に関連して、下記の議題を提案している。[32]

- 知識基盤社会（knowledge-based societies）におけるイノベーションの重要性及び製品・商標権の侵害からの革新の保護を強化する必要性についての対話
- 資源の持続的な使用の必要に対する挑戦－エネルギーの効率的な使用を重要なテーマとする。気候変動を防ぐための世界的な協力－京都プロセスが重要な役割を果たす。

外務省によれば G8 ではほぼ毎年、科学技術に関する議題が取り上げられている。最近の科学技術関連の議題は、2006 年が「21 世紀における革新を生み出すための教育」、2005 年が「気候変動、クリーンエネルギー、持続可能な開発」と「知財海賊行為・模倣行為の削減」、2004 年が「持続可能な開発のための科学技術（３R 行動計画と実施の進捗）」、2003

[29] Assembly of the African Union [2007] Decisions and Declarations, African Union
[30] 同上
[31] Executive Council of the African Union [2007] Decisions, African Union
[32] The Federal Government of Germany, Growth and Responsibility-Leitmotif for Germany's G8 Presidency, http://www.g-8.de/Content/EN/Artikel/2007/03/Anlagen/2007-03-01-g8-schlaglichter-en,property=publicationFile.pdf

年が「持続可能な開発のための科学技術、G８行動計画」であった。

３.アジア・太平洋経済協力（APEC）

APEC はアジア太平洋地域の国々の協力のために、科学技術担当大臣会議を開催しており、最近では 2004 年（第 4 回）と 1998 年（第 3 回）に実施した。第 4 回担当大臣会議は、ニュージーランドにおいて「持続可能な成長をもたらす科学技術、イノベーションの能力促進」をテーマに開かれた。第 5 回の開催時期は未定である。

また、APEC には加盟各国の専門家から構成されるワーキンググループがあり、科学に関連するワーキンググループとしては、産業科学技術の他に、人材開発、エネルギー、海洋資源保全、電気通信、農業技術がある。産業科学技術ワーキンググループ（ISTWG）では研究施設の相互利用、科学技術情報流通の促進などの協力が進められている。[33] APEC 事務局によればISTWGの次回の会議は2007年5月にウラジオストックで開催の予定である。(詳細は未公表)

[33] 文部科学省「科学技術白書平成 18 年版」、文部科学省

科学技術　参考文献リスト

I. ガイドライン的な資料

(1) 政府機関

１．Committee on Science and Technology in Foreign Assistance of National Research Council of the National Academies, [2006] ***The Fundamental Role of Science and Technology in International Development, An Imperative for the U.S. Agency for International Development,*** **the National Academies Press(** **頁ごとのダウンロードは可能** **)**
http://books.nap.edu/openbook.php?record_id=11583&page=1
－米国研究評議会の海外援助における科学技術委員会による USAID **の科学技術分野の援助に対する改革の提言**

２．IDRC, Innovation, Policy and Science, Program Area
http://www.idrc.ca/uploads/user-S/11616319321IPSe_web.pdf
－カナダ IDRC **による研究協力プログラムの紹介パンフレット**

３．CIDA, CIDA's Strategy on Knowledge for Development through Information
http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUImages/pdf/$file/ICT.pdf
－CIDA **による** ICT **協力の戦略**

４．DFID, [2004] ***Research Funding Framework 2005-2007,*** **DFID**
http://www.dfid.gov.uk/pubs/files/researchframework/research-framework-2005.pdf
－英国国際開発省の研究協力のためのガイドライン

５．　House of Commons, Science and Technology Committee, [2004] ***The Use of Science in UK International Development Policy, Thirteen Report of Session 2003-04, Volume I,*** **House of Commons**
http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/133/13302.htm
－英国下院の科学技術委員会による援助政策についての報告書

(2) 国連

１．CSTD, [2006] ***Commission on Science and Technology for Development, Report on the ninth session,*** **United Nations**

http://stdev.unctad.org/docs/report9.doc
－国連科学技術委員会(CSTD)による科学技術分野での中心的課題の提言（毎年実施）

２．**UNESCO, [2001],** ***Medium-Term Strategy 2002-2007,*** **UNESCO**
http://unesdoc.unesco.org/images/0012/001223/122379e.pdf
－UNESCO の中期計画 2002-2007 年

３．**UNESCO, [2005],** ***Africa's Science and Technology, Consolidated Plan of Action,*** **UNESCO,**
http://www.nepadst.org/doclibrary/pdfs/ast_plan_of_action.pdf
－UNESCO のアフリカ科学技術支援の行動計画

４．**UNESCO, [1999],** ***Science Agenda: Framework for Action, UNESCO*** 、
http://www.unesco.org/science/wcs/eng/framework.htm#knowledge
－世界科学会議で採択された科学アジェンダ-行動のためのフレームワーク

５．**ITU, [2003]** ***Plan of Action, World Summit on the Information Society,*** **ITU**
http://www.itu.int/wsis/docs/geneva/official/poa.html
－ITU の主催した世界情報サミット（WSIS）の行動計画

６．ITU、情報社会に関するチュニス・アジェンダ、世界情報サミット（WSIS)、2005 年、総務省仮訳、http://www.soumu.go.jp/s-news/2005/pdf/051119_1_2.pdf
－ITU の主催した世界情報サミット（WSIS）のアジェンダ

(3) 開発銀行

１．**Asian Development Bank, [1998]** ***Toward E-Development in Asia and the Pacific, A Strategic Approach to Information and Communication Technology,*** **Asian Development Bank**
http://www.adb.org/Documents/Policies/ICT/ICT-policy.pdf
－アジア開発銀行による ICT 協力の戦略

(4) OECD

１．OECD 科学技術政策委員会（CSTP）閣僚級会合最終コミュニケ 2004 年、
http://www.oecdtokyo2.org/pdf/theme_pdf/science_pdf/20040130communique.pdf
－OECD 加盟国が取り組むべき科学技術政策の課題に方向性について（科学技術政策委員会閣僚級会合は 1963 年以来 11 回目、前回は 1999 年）

II. ドナーの科学技術に関する主要なペーパー

(1) 援助実績についての資料

１．Farley, Sara E., [2005] ***Support to Science, Technology and Knowledge for Development: A Snapshot of the Global Landscape (Summary Report),*** **The Africa-Canada-UK Exploration: Building Science and Technology Capacity with African Partners**
http://www.idrc.ca/uploads/user-S/11084964061SFarley_London.pdf
－世界銀行、ADB、IDB、UNESCO、USAID、DFID、IDRC、NORAD、SIDA、EU **などによる科学技術分野での開発のためのアプローチの比較分析**

２．World Bank, [2006] ***Review of World Bank Lending for Science and Technology 1980-2004,*** **World Bank**
http://siteresources.worldbank.org/EDUCATION/Resources/278200-1099079877269/547664-1099079975330/Review_WB_lending_ST_80-04.pdf
－世界銀行のこれまでの科学技術協力

３．Holm-Nielsen, Lauritz B., [2001] "The World Bank's Role in Science and Technology", ***International Science and Technology Co-operation: Towards Sustainable Development,*** **OECD**
－世界銀行の役割（2000 **年の「持続的開発のための科学技術での国際協力」**OECD‐**ソウル会議の論文のひとつ）**

４．UNESCO, [2002], ***Harnessing Science to Society, Analytical report to governments and international partners on the follow-up to the World Conference on Science,*** **UNESCO**
http://www.unesco.org/science/wcs/report_wcs.pdf
－世界科学会議で採択した行動計画に対するフォローアップ

(2) 世界銀行関連

１．World Bank [2006] Building Science, Technology and innovation Capacity for Sustainable Growth and Poverty Reduction, Background Discussion Paper for STI Global Forum
http://siteresources.worldbank.org/INTSTIGLOFOR/Resources/discussion_paper.pdf
－世界銀行の科学技術イノベーションフォーラムのためのバックグラウンド・ペーパー

２．Soubbotina, Tatyana, P., [2006] ***Generic Models of Technological Learning by Developing Countries,*** **World Bank**

http://siteresources.worldbank.org/EDUCATION/Resources/278200-1099079877269/547664-1099079975330/Challenge_Tech_Learning_Oct05.pdf
－科学技術のキャパシティーによる途上国の分類についての論文（世界銀行）

３．Agapitova, Natalia [2005] ***The Role of Social Networks for National Innovation Systems' Dynamics*****, World Bank**
http://globelics.org/downloads/BRICS+workshop06/Agapitova_paper.pdf
－イノベーションのための制度を促進する社会のネットワークについて論文（世界銀行）

４．Kumar, Vinod, Goel (ed.) [2004] ***Innovation Systems: World Bank Support of Science and Technology Development,*** **World Bank Working Papers**
－イノベーションのための制度を支援する世界銀行の協力について論文（世界銀行）

５．De Ferranti, David and Others [2003] ***Closing the Gap in Education and Technology,*** **World Bank**
－世界銀行による、途上国の技術教育訓練とイノベーション、技術政策についての報告書

６．Watson, Robert, Crawford, Michael and Farley, Sara, [2003], ***Strategic Approaches to Science and Technology in Development, World Bank Policy Research Working Paper 3026,*** **World Bank**
http://siteresources.worldbank.org/EDUCATION/Resources/278200-1089743700155/StrategicApproachesS&T.pdf
－開発における科学技術の重要性と世界銀行のアプローチの検討（世界銀行）

(3) 国連関係

１．Juma, Calestous and Yee-Cheong, Lee,UN Millennium Project Task Force on Science, Technology, and Innovation [2005] ***Innovation: Applying Knowledge in Development,*** **UNDP**
http://www.unmillenniumproject.org/documents/Science-complete.pdf
－国連ミレニアム・プロジェクトの科学技術イノベーション・タスクフォースによる報告

２．UNDP、[2001]、人間開発報告書、新技術と人間開発、UNDP
－人間開発報告書の科学技術特集

３．UNESCO, [2005] ***UNESCO Science Report 2005*****, UNESCO**

－中南米、カリブ、アラブ、アフリカ、東および東南アジア、南アジア、米国、EU、南東ヨーロッパ、ロシアの地域に分けて、それぞれの研究開発の状況と科学技術政策についてまとめた資料、2005 年版のユネスコ科学報告書（１９９８年版以来の報告書）

４． **UNESCO, [2005],** ***UNESCO World Report, Towards Knowledge Societies,*** **UNESCO** Publishing、http://unesdoc.unesco.org/images/0014/001418/141843e.pdf
－科学技術と教育・研究（UNESCO 初の World Report）

５．**UNESCO, [2000],** ***World Conference on Science: Science for the Twenty-First Century A New Commitment,*** **UNESCO、**http://unesdoc.unesco.org/images/0012/001207/120706e.pdf
－科学のトピックスと社会との関係

６． **UNCTAD [2003],** ***Science and Technology Diplomacy, Concepts and Elements of a Work Programme,*** **United Nations**
http://www.unctad.org/en/docs//itetebmisc5_en.pdf
－科学技術に関する課題と国連の活動についての解説

(4) 途上国一般

１． **OECD and Asian Development Bank, [2002]** ***Technology and Poverty Reduction in Asia and the Pacific: Development Centre Seminars,*** **OECD**
－技術の貧困削減への貢献と貧困削減に役立つ技術政策の二つにテーマについての論文集（OEDC 開発センターとアジア開発銀行の共同主催のセミナーで発表、アジア諸国が中心）

２． **OECD, [2001]** ***International Science and Technology Co-operation: Towards Sustainable Development,*** **OECD**
－2000 年の「持続的開発のための科学技術での国際協力 OECD‐ソウル会議の論文集、（途上国と先進国における環境問題のための科学技術協力でエネルギー、運輸、交通、製造技術を含む）

３． **Wagner, Caroline S., Brahmakulam, Irene, Jackson, Brian, and Yoda, Tatsuyo [2001]** ***Science and Technology Collaboration: Building Capacity in Developing Countries?,*** **RAND Science and Technology**
http://rand.org/pubs/monograph_reports/MR1357.0/MR1357.0.pdf
－米国のシンクタンク RAND による途上国の科学能力の向上のための協力についての論文

(5) 欧州連合

１．European Communities, Tomorrow's Answers Start Today, 7th Frame Work
http://ec.europa.eu/research/fp7/pdf/fp7-factsheets_en.pdf 日本語による解説は、
http://crds.jst.go.jp/watcher/data/171-002.html
－EU の共同研究 第 7 次研究フレームワーク（FP７）の解説

(6) OECD 諸国

１．OECD, [2006] ***Science, Technology and Industry: Outlook 2006,*** **OECD、和文要約は**
http://www.oecd.org/dataoecd/40/3/37685863.pdf
－OECD 諸国の科学技術の現状（１年おきに発行）

２．OECD, [2005] ***Science, Technology and Industry Scoreboard 2005,*** **OECD、和文要約**
http://www.oecdtokyo2.org/pdf/theme_pdf/st_pdf/20051011scoreboard.pdf
－OECD 諸国の科学技術の現状をデータで紹介したもの、科学・技術・産業スコアボード、研究開発費、人材、特許、ICT、国際的知識フローなどを扱った（１年おきに発行）

(7) ICT 関連

１．World Bank, [2006] ***2006 Information and Communications for Development, Global Trends and Policies,*** **World Bank**
－世界銀行による途上国の ICT の政策と状況、開発に関連したテーマの報告書

２．OECD, [2006] ***Information, Technology Outlook 2006,*** **OECD、和文要約は**
http://www.oecd.org/dataoecd/25/7/37823085.pdf
－OECD 諸国の ICT の現状（１年おきに発行されている）

３．ITU、チュニスコミットメント、世界情報サミット（WSIS）、2005 年、総務省仮訳、
http://www.soumu.go.jp/s-news/2005/pdf/051119_1_1.pdf
－ITU の主催した世界情報サミット（WSIS）

JICA's Assistance Strategy on Science and Technology[1]

～ An Idea for Further Discussion ～

I. "Science & Technology" and Development Assistance

■ How to understand "Science and Technology" in the context of Development Assistance?

- Working Definition: "practical technologies which contribute to socio-economic development and poverty reduction"
- High Priority Technologies:
  - ✧ New technologies which lead to solve development issues (technologies including fusion of new ones and existing ones)
  - ✧ New technologies which are widely applicable as a tool for development assistance (especially ICT)
- Low Priority Technologies:
  - ✧ Technologies which are already wide-spread and well utilized
  - ✧ Basic or advanced research with low possibility of becoming practical use in the near future
  - ✧ Military related technologies: excluded

■ Why "Science and Technology" now?

- Paradigm Shift of Development?
  - ✧ Difficulty of achieving sufficient growth or poverty reduction, just by fulfillment of BHN with existing technologies, or with capital and unskilled labor.
- Rapid Globalization and Progress of Technological Innovation
  - ✧ Opportunity for "Late comers' advantage" (="leap frogging") with a leverage of "Science and Technology"
- Progress of Development and Sophistication of Developing Countries' Needs
  - ✧ Partial achievement of Basic Human Needs(BHN) through years of development assistance effort (especially in basic education)

■ What is Development Assistance on "Science and Technology"?

- Approaches of Cooperation
  - ✧ Human development: assisting development of human resources who take lead in Science and Technology
  - ✧ Research and development: assisting innovation of Science and Technology
  - ✧ Dissemination and Utilization: assisting dissemination and utilization of Science and Technology
  - ✧ Infrastructure Development: assisting development and upgrading of physical

[1] This discussion paper is prepared for the purpose of internal discussion within JICA, therefore, does not necessarily represent official views of JICA.

infrastructure conducive to those development mentioned above

- ✧ Policy and Institution: assisting policy making and institution building which define and influence development of Science and Technology

➢ Major Targets

- ✧ Communities (locus for identifying development issues to be solved, and locus for disseminating and utilizing Science and Technology)
- ✧ Private enterprises, NPOs
- ✧ Research institutions and Higher education institutions
- ✧ Technical and vocational training institutions
- ✧ Secondary education (Science and Mathematics)
- ✧ Policy Making Institutions and Administrative institutions

II. "Science and Technology" and JICA

■ Surrounding Environment：Higher Recognition on the Importance of Science and Technology

➢ Developing Countries

- ✧ AU's General Assembly(2007), TICAD[2] Ministerial Meeting, APEC[3], ISTWG[4]
- ✧ Request for assistance to become "Science Based Country" from countries such as Rwanda, Egypt, etc.
- ✧ "National Mid-Long term Science and Technology Development Plan" (China), "National Science and Technology Strategic Plan" (Thailand), etc.

➢ Developed Countries & Donors

- ✧ World Bank Global Forum on STI (2007), G8 Summit Meeting (2007, 2008)
- ✧ DFID's Strategy on Science and Technology, Research by US National Research Council

➢ Private Enterprises, NPOs

- ✧ Development of new drug on infectious diseases（GAVI[5]）、Bill and Melinda Gates Foundation

➢ Japan

- ✧ The 3rd Science and Technology Basic Plan, The Council for Science and Technology Policy, Program for Promoting Strategic Cooperation on Science and Technology in Asia
- ✧ Medium term Policy on ODA (Utilization of Science and Technology in environment and disaster management)

[2] Tokyo International Conference for African Development
[3] Asia-Pacific Economic Cooperation
[4] The Industrial Science and Technology Working Group
[5] Global Alliance for Vaccines and Immunization

■ JICA's Approach on Science and Technology (rough idea)

- ➢ Human Resource Development:
  - ✧ Strengthening core education & training institutions, and human resource development (including Training of Trainers)
  - ✧ Responding to diverse needs/levels for human resource development (Technicians, science and mathematics at secondary education level, etc.)
- ➢ Research and Development:
  - ✧ Research and development with high practicality (university-industry-community linkage, research on infectious diseases, etc.)
  - ✧ Regional/inter-region partnership and linkage, rather than country focused appoarch (AUN/SEED-Net[6], Collaboration with CGIAR[7], etc.)
  - ✧ Collaborative development with private sector (⇒future challenge)
- ➢ Dissemination and Utilization：
  - ✧ At poverty stricken countries/areas, priority given on dissemination and utilization of existing technologies, rather than developing new technologies（NERICA[8] Rice、ICT at Sub-Saharan Africa）
- ➢ Infrastructure Development:
  - ✧ Public Private Partnership (ex. development of ICT Park, etc.)
  - ✧ Building ICT infrastructures at Island countries, landlocked countries, remote rural areas etc.
- ➢ Policy and Institutions:
  - ✧ Depending on developing countries' commitment for becoming "Science based Country" and their expectation for Japan (ex. Rwanda, Egypt etc.)

■ Important Points in Promoting Assistance on "Science and Technology"

- ➢ Securing consistency and synergy effect with policies of Japanese government
  - ✧ Linkage with other ODA activities (Monbukagakusho[9] scholarship, multilateral cooperation, etc.)
  - ✧ Linkage with various programs to promote Science and Technology, including non-ODA programs (Program for Promoting Strategic Cooperation on Science and Technology in Asia, Program for COE on Infectious Diseases, International Standardization Strategy)
- ➢ Utilization of "Advantages and Strengths of Japan"
  - ✧ Emphasis on assistance based on Japan's experience and lessons (assistance on environment and disaster management)
  - ✧ Collaboration with Japanese universities and industries（⇒collaboration with the industries as a future challenge）

[6] ASEAN University Network / South East Asia Engineering Development Network
[7] The Consultative Group on International Agricultural Research
[8] New Rice for Africa
[9] Ministry of Education, Culture, Sports, Science and Technology, Japan

- Active Participation and Contribution to International Forums and Agendas
  - G8 Summit in Tokyo (2008), TICAD-IV (2008)
  - Follow-up meetings on World Bank's Global Forum on STI, etc.
- Preparedness and Response to Risks for Utilizing "Science and Technology"
  - Security management (ex. building facilities of bio safety level-3, etc.)
  - Minimization of risks of technological obsolescence
  - Protection of intellectual property rights, and development of legal framework

III. Pressing Issues

Actions within JFY 2007 in view of integration with JBIC (Yen loan division)

- Identification of priority areas, issues and approaches on Science and Technology
- Consideration of developing new programs to promote assistance on Science and Technology
  - Promotion of research and development (in connection with currently undertaken deliberation to shape new-JICA's research activities)
  - Promotion of Public Private Partnership
  - Reconsideration and re-evaluation of JICA's "Research Cooperation"
  - Collaboration with multilateral cooperation, Promotion of region-wide assistance
- Consideration of Organizational Structure to Strengthen Engagement on Science and Technology
  - Strengthening of function to make comprehensive strategy
  - Strengthening of "Antenna" function (information gathering and dissemination) on Science and Technology
    - Chief Scientist (ex. DFID), External experts committee
  - Efficient Implementation of Programs and Activities on Science and Technology
    - Establishment of a new specialized division? Vs. Utilization of existing divisions?

Establishment of Framework to Consider the Above Mentioned Issues

- Organizing internal and/or external resource persons on Science and Technology to consider issues in promoting assistance with a viewpoint of Science and Technology in JICA

(END)

Science, Technology and Innovation
Background Information

I. Guidelines

(1) Governmental Organizations

1. Committee on Science and Technology in Foreign Assistance of National Research Council of the National Academies, [2006] ***The Fundamental Role of Science and Technology in International Development, An Imperative for the U.S. Agency for International Development,*** **the National Academies Press** http://books.nap.edu/openbook.php?record_id=11583&page=1

2. IDRC, Innovation, Policy and Science, Program Area
http://www.idrc.ca/uploads/user-S/11616319321IPSe_web.pdf

3. CIDA, CIDA's Strategy on Knowledge for Development through Information
http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUImages/pdf/$file/ICT.pdf

4. DFID, [2004] ***Research Funding Framework 2005-2007,*** **DFID**
http://www.dfid.gov.uk/pubs/files/researchframework/research-framework-2005.pdf

5. House of Commons, Science and Technology Committee, [2004] ***The Use of Science in UK International Development Policy, Thirteen Report of Session 2003-04, Volume I,*** **House of Commons**
http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/133/13302.htm

(2) UN

1. CSTD, [2006] ***Commission on Science and Technology for Development, Report on the ninth session,*** **United Nations**
http://stdev.unctad.org/docs/report9.doc

2. UNESCO, [2001], ***Medium-Term Strategy 2002-2007,*** **UNESCO**
http://unesdoc.unesco.org/images/0012/001223/122379e.pdf

３．**UNESCO, [2005],** ***Africa's Science and Technology, Consolidated Plan of Action,*** **UNESCO,** http://www.nepadst.org/doclibrary/pdfs/ast_plan_of_action.pdf

４．**UNESCO, [1999],** ***Science Agenda: Framework for Action, UNESCO*** 、http://www.unesco.org/science/wcs/eng/framework.htm#knowledge

５．**ITU, [2003]** ***Plan of Action, World Summit on the Information Society,*** **ITU** http://www.itu.int/wsis/docs/geneva/official/poa.html

(3) Development Bank

１．**Asian Development Bank, [1998]** ***Toward E-Development in Asia and the Pacific, A Strategic Approach to Information and Communication Technology,*** **Asian Development Bank** http://www.adb.org/Documents/Policies/ICT/ICT-policy.pdf

II. Papers on STI by Donors

(1) Past Assistance on STI

１．**Farley, Sara E., [2005]** ***Support to Science, Technology and Knowledge for Development: A Snapshot of the Global Landscape (Summary Report),*** **The Africa-Canada-UK Exploration: Building Science and Technology Capacity with African Partners** http://www.idrc.ca/uploads/user-S/11084964061SFarley_London.pdf

２．**World Bank, [2006]** ***Review of World Bank Lending for Science and Technology 1980-2004,*** **World Bank** http://siteresources.worldbank.org/EDUCATION/Resources/278200-1099079877269/547664-1099079975330/Review_WB_lending_ST_80-04.pdf

３．**Holm-Nielsen, Lauritz B., [2001] "The World Bank's Role in Science and Technology",** ***International Science and Technology Co-operation: Towards Sustainable Development,*** **OECD** http://www1.worldbank.org/education/tertiary/documents/OECD%20KOREA%20final.pdf

４．UNESCO, [2002], ***Harnessing Science to Society, Analytical report to governments and international partners on the follow-up to the World Conference on Science,*** **UNESCO**
http://www.unesco.org/science/wcs/report_wcs.pdf

(2) World Bank Reports

１．World Bank [2006] Building Science, Technology and innovation Capacity for Sustainable Growth and Poverty Reduction, Background Discussion Paper for STI Global Forum
http://siteresources.worldbank.org/INTSTIGLOFOR/Resources/discussion_paper.pdf

２．Soubbotina, Tatyana, P., [2006] ***Generic Models of Technological Learning by Developing Countries,*** **World Bank**
http://siteresources.worldbank.org/EDUCATION/Resources/278200-1099079877269/547664-1099079975330/Challenge_Tech_Learning_Oct05.pdf

３．Agapitova, Natalia [2005] ***The Role of Social Networks for National Innovation Systems' Dynamics,*** **World Bank**
http://globelics.org/downloads/BRICS+workshop06/Agapitova_paper.pdf

４．Kumar, Vinod, Goel (ed.) [2004] ***Innovation Systems: World Bank Support of Science and Technology Development,*** **World Bank Working Papers**

５．De Ferranti, David and Others [2003] ***Closing the Gap in Education and Technology,*** **The World Bank**

６．Watson, Robert, Crawford, Michael and Farley, Sara, [2003], ***Strategic Approaches to Science and Technology in Development, World Bank Policy Research Working Paper 3026,*** **World Bank**
http://siteresources.worldbank.org/EDUCATION/Resources/278200-1089743700155/StrategicApproachesS&T.pdf

(3) UN Reports

１．Juma, Calestous and Yee-Cheong, Lee,UN Millennium Project Task Force on Science, Technology, and Innovation [2005] ***Innovation: Applying Knowledge in Development,*** **UNDP**
http://www.unmillenniumproject.org/documents/Science-complete.pdf

２．UNDP、[2001]、Human Development Report: Making New Technologies Work for Human Development

３．UNESCO, [2005] ***UNESCO Science Report 2005*****, UNESCO**

－ Report on R&D status and STI policies by regions

４．UNESCO, [2005], ***UNESCO World Report, Towards Knowledge Societies*****, UNESCO** Publishing、http://unesdoc.unesco.org/images/0014/001418/141843e.pdf

５．UNESCO, [2000], ***World Conference on Science: Science for the Twenty-First Century A New Commitment*****, UNESCO**、http://unesdoc.unesco.org/images/0012/001207/120706e.pdf

６．UNCTAD [2003], ***Science and Technology Diplomacy, Concepts and Elements of a Work Programme*****, United Nations**
http://www.unctad.org/en/docs//itetebmisc5_en.pdf

(4) Reports on Developing Countries

１．OECD and Asian Development Bank, [2002] ***Technology and Poverty Reduction in Asia and the Pacific: Development Centre Seminars*****, OECD**

２．OECD, [2001] ***International Science and Technology Co-operation: Towards Sustainable Development*****, OECD**

３．Wagner, Caroline S., Brahmakulam, Irene, Jackson, Brian, and Yoda, Tatsuyo [2001] ***Science and Technology Collaboration: Building Capacity in Developing Countries?*****, RAND Science and Technology**
http://rand.org/pubs/monograph_reports/MR1357.0/MR1357.0.pdf

(5) EU

１．European Communities, Tomorrow's Answers Start Today, 7th Frame Work
http://ec.europa.eu/research/fp7/pdf/fp7-factsheets_en.pdf

(6) OECD

1. OECD, [2006] *Science, Technology and Industry: Outlook 2006*, OECD

2. OECD, [2005] *Science, Technology and Industry Scoreboard 2005*, OECD

(7) Reports on ICT

1. World Bank, [2006] *2006 Information and Communications for Development, Global Trends and Policies,* World Bank

2. OECD, [2006] *Information, Technology Outlook 2006*, OECD

3. ITU Tunis Commitment, World Summit on the Information Society (WSIS), 2005

Annex

Naoko Toriumi
International Development Center of Japan
*"The Study on Higher Education Networks
For Promoting Science, Technology and Innovation
Final Report"*

Annex

The Study on Higher Education Networks For Promoting Science, Technology and Innovation Final Report

Abstract

This study looks at higher education networks for the purpose of promoting science, technology and innovation (STI), and appropriate cooperation among donors in the future. Various types of higher education networks for STI have grown because of advanced technology such as ICT under the globalization. An analytical framework for understanding such various networks with particular emphasis on "operation and management (O&M)" is adopted because of its importance as an area for future cooperation among donors.

Comparative analysis of case studies was undertaken in order to draw out lessons for such cooperation. In the concluding part, four issues are proposed for further consideration about cooperation, namely: appropriate approaches to capacity building; assistance for long incubation of networks; the catalyst role of networks and South –South cooperation.

Naoko Toriumi

International Development Center of Japan

March 2008

Annex

Special thanks to:

Jeffrey C. Fine, Consultant, Alfred Watkins, Science and Technology Program Coordinator, the World Bank, Tatyana Soubbotina, Consultant of the World Bank STI Program, Presentations at the seminar, "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society" and Group II (Technical and Higher Education/Social Security) of Human Development Department, Japan International Cooperation Agency.

Annex

Contents

		Page
1.	Background and objectives of the study	1
1-1	Objectives of the study	1
1-2	Science and technology and innovation is an essential piece of the development process	1
1-3	Higher education institutions for science and technology and innovation in the context of “globalization”	3
1-4	Rationale for and objectives of building higher education networks for science, technology and innovation	4
2.	Case studies	8
2-1	Analytical framework of higher education networks for science, technology and innovation	8
2-2	AUN/SEED Net	11
2-3	Embrapa and CGIAR Cooperation	16
2-4	EU-INCO water research	21
2-5	Biosciences eastern and central Africa	27
2-6	Comparative analyses of the two cases	32
3.	Key Issues for sustainable networks	38
3-1	Present situation of higher education networks for STI	38
3-2	Lessons learned from existing experiences	40
3-3	Future cooperation to higher education networks for STI	44
3-4	Further considerations	48
Reference		50

Annex

1. Background and objectives of the study

1-1 Objectives of the study

It is widely recognized that technological progress is important for economic and social development in the sense that it increases the productivity of land, labor and capital, reduces costs of production and improves the quality of outputs, thereby improving the lives of people. In particular, globalization, which has helped human, financial and physical resources transcend national boundaries through advantages in ICT, promotes the formulation of networks of higher education institution for science, technology and innovation (hereinafter STI). Taking these factors into account, the study is aimed at understanding higher education networks engaged in STI and drawing lessons for future cooperation.

1-2 Science, technology and Innovation is an essential piece of the development process

STI is increasingly viewed within the context of globalization, as central to poverty reduction as well as economic and social development. Science and technology knowledge is ultimately the basement of development.[1] Energy, medicine and health, clean air and water, transportation, sanitation, management use and conservation of natural resources, all of which have science and technology elements in them and without which lives of people would not be improved.

According to UNDP's Human Development Report (2001), technology affects human development through two major paths. Through innovation, it can (a) directly affect human well being by increasing functionality of existing means to reduce poverty and increase human capabilities. This is most evident through technological innovations in human health, agriculture, and energy use and information and communication technologies. (b) It can also indirectly affect human well being by enhancing productivity and thus economic growth and incomes. This productivity enhancement may be seen through increased output of workers, higher agricultural yields and heightened efficiency of services, while the higher incomes can again help to meet basic needs. [2]

The scientific perspectives about the interdependence of society and environment contributed to generating the idea of sustainable development emerged in the early 1980s as well.[3] The role of STI in

[1] Dr. Norman Neureiter, "Science and Technology for Sustainable Development, Science and Technology", U.S. briefing to NGOs at World Summit on Sustainable Development (WSSD) PrepCom II, New York, New, February 5, 2002. (http://www.state.gov/g/oes/rls/rm/2002/8496.htm).
[2] Smita Srinivas, "Task Force on Science, Technology and Innovation Background Paper", United Nations Millennium Project, April 18, 2003.(http://www.unmillenniumproject.org/documents/tf10apr18.pdf).
[3] Dr. Norman Neureiter, ibid.

meeting sustainable development goals was recognized during the World Summit on Sustainable Development (WSSD) in 2002. In the Plan of Implementation, it was recommended that "science and technology be mobilized to solve problems associated with energy deficiency, food insecurity, environmental degradation, diseases, water insecurity and many other sustainable development challenges".[4]

Roles of STI for economic and social development of developing countries, hence for reducing poverty have thus been recognized under the rapidly expanding global economy.[5] As highlighted by neoclassical, new endogenous growth, and evolutionary growth theories all emphasize, there is widespread agreement on the importance of technological progress for economic growth. The development of physical, human and institutional productive capacities is a prerequisite for sustainable economic development and poverty reduction. The ability to be internationally competitive also depends on having up to date and appropriate technology. As most LDCs have undertaken fast and deep trade liberalization since the early 1990s, technological progress has become vital for their competitiveness and economic viability.[6] In open economies it is not only necessary for export development but is also vital for production that serves local markets.

STI could contribute substantially to social development as well, both at the regional and national levels. Among the areas affected by STI[7] are democracy and human rights; provision of basic needs such as water, food-nutrition, sanitation, energy, environment, health-health care; economic empowerment and poverty reduction; employment generation; gender; scientific education; and information technology and connectivity. STI promotes the active involvement of all citizens in making and monitoring decisions that affect the public welfare through training and literacy in basic scientific principles, which enhanced "democracy and human rights". In particular, the provision of access to information such as internet information and literacy programs, and fostering a scientific mindset and philosophy with an evidence-based rather than a subjectivity-based orientation toward solving problems and making decisions are expected to open up opportunities for democratic participation to societal groups which are

[4] Sanbio Draft Business Plan– Not For Circulation, Southern African Network For Biosciences (Sanbio) Business Plan 2006 – 2011, April 2006, P.1).

[5] Graeme Wheeler, Managing Director of the World Bank states, "Rapid technological progress in developing countries has been central to the reduction of poverty in recent decades. While the integration of global markets has played and will continue to play a key role in this, future success will increasingly depend on strengthening technical competencies and the business environment for innovative firms in developing countries".

[6] UNDP and UNCTAD, "Globalization and the Least Developed Countries: Issues in Technology", United Nations Ministerial Conference of the Least Developed Countries Making Globalization Work for the LDCs, 9-11 July 2007.

[7] Science, technology, engineering and innovation for development: a vision for the Americas in the twenty first century (http://www.science.oas.org/Ministerial/ingles/documentos/Document_001.pdf)

traditionally underrepresented. It also enhanced voices of the poor by including the poor in research (such as agro-industrial research) and in other science.[8]

1-3 Higher education institutions for science, technology and innovation in the context of "globalization"

As we saw in the previous section, STI has greatly contributed to the economic and social development of developing countries. However, the level of STI capacities of developing countries is weak. Most workers in LDCs have to earn their living using only their labor, with rudimentary tools and equipment, little education and training, weak access to financial services, and poor infrastructure.

There are two aspects of STI capacity[9] in developing countries to be considered: (a) the capacity to acquire and use existing knowledge; and (b) the capacity to produce and use new knowledge. In most developing countries where even existing science and technology knowledge is not effectively utilized, it is probable that improvements in capacities to absorb and apply existing technologies is most relevant by developing engineering, technical, and vocational skills, rather than conducting frontier-level R&D.

Higher education institutions play significant roles to develop and improve STI capacities of human resources in developing countries. While cutting-edge technology could be promoted by private sectors including foreign investors, basic science and technology knowledge such as the engineering, technical and vocational skills are less attractive for the private sectors. Such knowledge is disseminated well where technological capacities of recipient countries are adequate such as a case of the Green Revolution shows. The Green Revolution is said to be more successful in Asia than in Africa due to the greater domestic technological capacities in the former.[10] Higher education institutions such as universities and research institutions in Asia could adapt the new green revolution technologies developed by the system of CGIAR to local conditions. It is therefore important to strengthen higher education institutions in developing countries in order to develop local human resources, to meet local demand for technologies precisely and to respect for traditional technologies, which are to be taken into account when introducing new technologies from outside.

---

[8] Sanbio ibid.
[9] Alfred Watkins and Michael Ehst ed., "Science, Technology, and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction", World Bank, 2008.
[10] Devesh Kapur and Megan Crowley, "Beyond the ABCs: Higher Education and Developing Countries", Working Paper Number 139, February 2008, Center for Global Development.

For developing countries, higher education for STI is important not only for increasing the numbers of highly educated people, but also increasing the middle class people who are neither part of the land-tied peasantry nor part of the aristocracy that drew its privileges from feudalism".[11] People from the middle-class built the very institutions that are regarded as an indispensable factor of development. According to a managing director of a private automobile parts company in Pakistan, the critical constraint for development of Pakistani automobile industry is a lack of middle class managers who can understand production lines as well as management issues and connect blue workers with top-level management. It becomes serious problems that most developing countries cannot provide graduates from secondary schools with adequate corresponding seats at higher education institutions, reflecting the fact that both donors and developing countries governments have tended to allocate more budgets to primary and secondary education as cost performance of higher education (unit per education costs) is considered to be higher for higher education institutions than those of primary and secondary schools.

1-4 Rationale for and objectives of building higher education networks for science, technology and innovation

Higher education has been less paid attention to in the international development community, as it is believed to yield lower social returns compared with those of other investments such as primary and secondary education.[12] However, donors pay more attention to higher education because of improved access to primary and secondary educations in developing countries. Owing to the huge investments in primary and secondary education, the enrollment rates have improved rapidly in many developing countries. The increase inevitability causes a problem of generating not accepted graduates from secondary schools even though they want to continue studying.

In many developing countries, governments intend to promote "high-tech" industries and pay less attention to "low-tech" industries. However, unlike developed industrialized countries, "low-tech" but knowledge-intensive sectors such as horticulture and food processing greatly contribute to making developing countries competitive and innovative, compared with a few high-tech niche products and industries. In other words, developing countries should encourage not only "high-tech" development, but

[11] Devesh Kapur and Megan Crowley, "Beyond the ABCs: Higher Education and Developing Countries", Working Paper Number 139, February 2008, Center for Global Development.
[12] Devesh Kapur and Megan Crowley, "Beyond the ABCs: Higher Education and Developing Countries", Working Paper Number 139, February 2008, Center for Global Development.

also non-high-tech development, which may generate the greatest social and economic returns to STI capacity building.[13] In this way, it is likely that technological change in LDCs occurs primarily by learning the technologies that already exist in more advanced economies.[14] Without appropriate absorptive capacities technology will not be transferred easily even though trade and foreign investment is liberalized

Donors' perception of higher education has gradually changed as well. Srinivas explains about the changes in a following manner. [15] "Mature and down to earth technologies like mechanisation of small farm, small-scale irrigation and potable water installation, small energy system, rural road to market and basic communications and computer facilities would be most telling…The reorientation to appropriate technology would not only require increased funding from developed countries, but also a paradigm shift from political leaders and intelligentsia including S&T elites in developing countries from investing prematurely and wastefully in high and cutting edge technologies and related R&D".

In this way, various demand for higher education for STI grew, and many donors and developing countries have selected a method of formulating higher education networks for STI in many parts of the world. Rapid advances in ICT promote distance learning, communication among researchers and collaboration among higher education institutions, often in the form of a network.

There are several advantages for higher education institutions in participating in higher education networks for STI compared with working alone, which were pointed out based on practical experiences at the seminar, "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society", which was held by JICA and the World Bank on 1 February 2008 in Tokyo. Personal and institutional advantages are observed in the presented existing networks. Personal advantages such as obtaining degrees of MA and PhD become a strong motivation, which encourages members of the network to participate in network activities actively. Members of a network can share relevant information with others, which is also a benefit obtained from participating in the network. Institutional advantages are recognized when member institutions can complement the contents or facilities by cooperating with other institutions. For instance, in the case of engineering, it is rather difficult for a university to cope with various disciplines and therefore, collaborating with other universities covering different disciplines

[13] Alfred Watkins and Michael Ehst ed., "Science, Technology, and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction", World Bank, 2008.
[14] This paragraph is based on UNDP and UNCTAD, Globalization and the Least Developed Countries: Issues in Technology: Issues Paper, United Nations Ministerial conference of the least developed countries Making Globalization Work for the LDCs, Istanbul, 9-11 July 2007.
[15] Smita Srinivas, ibid.

generate synergy effect.[16] Networks can provide opportunities for participants, in particular those in developed countries, to save on the costs of performing relatively simple but labor-intensive R&D tasks due to lower costs in developing countries, to increase the scale and scope of their research, to gain access to unique natural resources and geographical locations, and to recruit some of the best foreign professionals.[17]

Activities and the associated social arrangements of member institutions working in higher education networks for STI have started to transcend national and institutional boundaries.[18] It becomes easier for member institutions to send / receive STI-related human, physical and financial resources to and from institutions in other countries. During the processes of interacting with other institutions in another countries, arrangements within and around an institution become disembedded from their national context due to the intensification of transnational flows of people, information and resources.

Based upon this recognition, this study considers "higher education network" from the point of view of resource exchange. We define "higher education networks for STI in the context of globalization" as shown in Box 1.

[16] Dr. Krisada Visavateeranon, Dean of Thai-Nichi Institute of Technology pointed the advantage by quoting automobile industry as a case at "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society" on 1 February 2008.
[17] Tatyana Soubbotina, Consultant of the World Bank STI Program.
[18] The processes of globalization have various interpretations. As Beerkens discusses in his paper[18], notions of globalization could be classified either based on a geographical concept or on an authority-related, cultural and institutional concept. Globalization processes involve not only the geographical expansion of economic activity across national boundaries, but also the functional integration of such internationally dispersed activities. (H.J.J.G.Beerkens, "Global Opportunities and Institutional Embeddedness", 2004, p.17.(Beerkens (2004))

Box 1 Definition of "higher education networks for science, technology and innovation"

"A linkage between research institutions* beyond each member institutions' and country's boundaries for collaborative work in order to promote science, technology and innovation, within which each member's resources are complemented and / or are compatible, and hence competitive advantages of the member institutions can be enhanced"

Note*: In practice, a network for STI involves not only research institutions but other stakeholders such as private firms and civil societies according to types of products the network is dealing with. However, since this study primarily focuses on "higher education networks", research institutions are mainly taken into account.

Objectives of Networks

Many kinds of basic knowledge and some relatively older technologies could be widely disseminated under the globalization.[19] Higher education networks for STI have contributed to organizing global collective action in order to disseminate such technologies. In addition, networks do not only help strengthen supply capacities of host institutions which provide science and technology knowledge, but also helps stimulate demand of beneficiaries who learn the knowledge from the host institutions through stronger contracting relationships.

Networks have been utilized for several objectives. The following four objectives are considered for collaborative activities:[20]

- Training of students/researchers;
- Conducting joint research and development (R&D);
- Building faculty capacity at universities; and
- Technical diffusion.

[19] It is quite difficult to expect that "new and sophisticated technologies are disseminated globally, as they play the role of major tools of modern economic competition and thus tend to be strictly protected by patents or even commercial secrets" (Author notes referring to comments made by Tatyana Soubbotina, Consultant of the World Bank STI Program).

[20] Quoted from "World Bank Science, Technology and Innovation Capacity Building Programs", prepared by Alfred Watkins of World Bank S & T program coordinator, for the presentation at "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society" on 1 February 2008.

2. Case studies

2-1 Analytical framework of higher education networks for science, technology and Innovation

In order to achieve the objective of this study, which is to consider appropriate donors' cooperation to higher education networks for STI, it is worth obtaining ideas from experiences of existing networks. In particular, it is helpful for donors to understand what happens in network operation and management in reality. Case studies of different types of networks around the world will help donors grasp some ideas. Analytical framework therefore needs to be the one, which help understand "operation and management issues of networks".

To formulate the analytical framework, we refer to the above-mentioned definition of "higher education networks for STI in the context of globalization" and objectives (rationales) of building networks. The definition is further elaborated for the case studies with strong emphasis on "operation and management aspects". We incorporate Beerkens" (2004) idea of grasping network from both "integration aspects" and "member institutions' desembeddness from national contexts aspects". "Integration" implies a structure of operation and management of a network. For example, whether a network management is centralized or decentralized. Several viewpoints are considered to judge the structure such as delegation of authority to members, equality of members, network drivers and coping and problem solving mechanism. "Desembeddness" refers to the extent to which a member institutions' behavior is constrained or limited by the other member country's national contexts such as rules, regulations, norms, culture and regional contexts (if any), or the extent to which the institution's behavior being exerted an influence on by the network's contexts. Table 1 summarizes the possible indices associated with "integration" and "desembeddness".

Table 1 Possible indices for the analysis

	Possible Indices
Profiles	
Objective	・ Training of students/researchers ・ Conducting joint research and development (R&D) ・ Building faculty capacity at universities ・ Technical diffusion
Dimension of time frame	・ Limited ・ Indefinite
Distribution/allocation of benefits of networks=Who is getting what?	・ Think about the allocation from various stakeholders' points of views. Researchers in sponsored and partner countries. Institutions in sponsored and partner countries. End users. etc.
Integration of network	
Delegation of authority to each member	・ Budgeting

institution	・ Appointment of academic and non academic staff ・ Determination of research themes and activities
Equality of the members	・ Decision making on network activities
Network, driven by whom?	・ Academics or professionals in specific fields ・ Leaders of member institutions
Coping mechanism of multiple activities, problems, administrative issues, etc. employed by the network	・ A sole unit which is responsible for coping with various issues and activities ・ Member institutions cope with each other
Desembeddness / Embeddness from institutional and national contexts	
Extent of decentralized institutional forms	・ Decision making process. ・ Day to day management systems. ・ Responding time. ・ Diversity at operational levels. ・ Individual leadership ・ Freedom of operation.
Extent to which national contexts exert an influence on other member institutions' behavior	・ Does centralized institutional forms such as national laws and organizational rules have a negative impact on network activities?
Extent to which relationships among the individuals of the member institutions play an important role.	・ Do relationships among the individuals of the member institutions play important roles?
Exchanges of resources	・ Complementarity in the network ・ Compatibility in the network
Management of network	・ Are institutions and staff capable of handling obstacles that arise due to incompatibility? ・ Joint accreditation ・ Joint credit transfer systems ・ Do regional contexts influence on member institution's behavior?

Source: Author made referring to a concept explained in Chapter 13 of Beerkes (2004).

Taking into account of analytical points shown in Table 1, we then classify considerable types of networks into 4 as presented in Table 2. Figure 1 elaborates the above-explained concepts in a diagram.

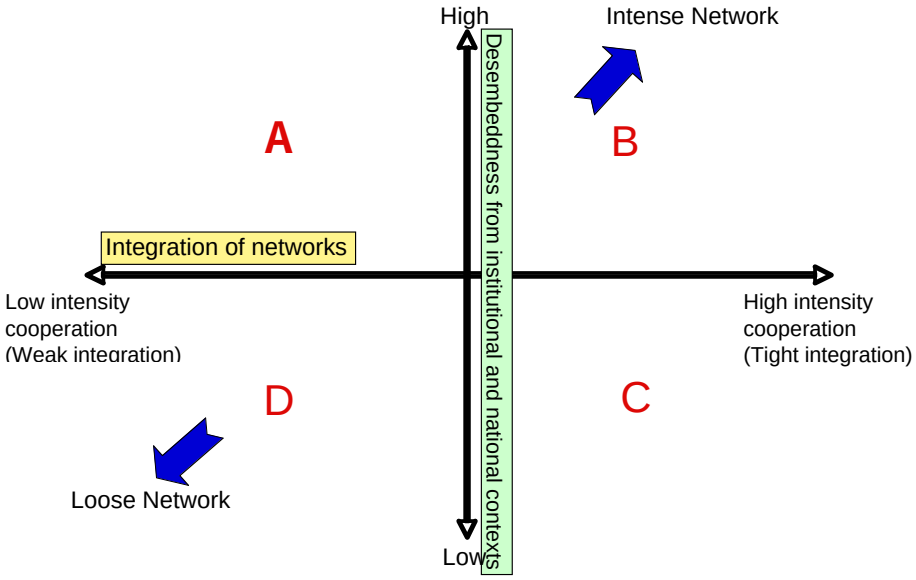
Table 2 Characteristics of networks

	A	B	C	D
Characteristics of network	Weak integration with strong desembeddness	Intense network	Strong integration with low desembeddness	Loose network
Delegation of authority to each member institution*	low	high	high	low
Extent of decentralized institutional forms like culture, norms and beliefs	high	high	low	low
Extent to which regional contexts exert an influence on member institutions' behavior	high	high	low	low
Extent to which relationships among the individuals of the member institutions play an important role.	high	low	low	high
Whether member institutions less tied to the national institutional contexts.	yes	yes	no	no

Source: Author made referring to a concept explained in Chapter 13 of Beerkes (2004).

Note*: Both advantages and disadvantages of "Delegation of authority to each member institution" are considered. Advantages and disadvantages are as follows (Source: Ros Tennyson, "Institutionalizing partnerships: Lessons from the front line", International Business Leaders Forum, p.14)

Advantages	Disadvantages
Maximum diversity at operational levels	Greater risks of conflicts of interests
Opportunities for individual leadership	High levels of personal isolation
Shared sense of “ownership” based on co-created working principles	Cumbersome decision making process
Moving away from conventional “power bases”	Tendency for power to be exercised in hidden ways
Freedom of operation	Lack of coherence



Source: Author made referring to a concept explained in Chapter 13 of Beerkes (2004).

Figure 1 Preliminary typology of network (preliminary analysis)

Based on the analytical framework of a network, four cases are explained from the viewpoints of (1) features of higher education networks for STI, (2) effectiveness of the network in achieving objectives of network and (3) lessons learned from the network. All the cases are summarized based on data and information obtained domestically without conducting field studies. The followings are criteria to select 4 cases.

- Working in different regions (Asia, South America, Europe and Africa).
- Networks engaged STI.
- Different arrangements for operation and management in terms of funding sources, duration of working period, background of establishment, etc.
- Information obtainable without conducting field studies.

Based upon these criteria, we selected the following 4 cases.

AUN/SEED Net	(Asia)
Embrapa and CGIAR Cooperation	(South America)

EU-INCO water research	(Europe)
Biosciences eastern and central Africa	(Africa)

Following a review of each case, we conduct a comparative analysis of three cases (AUN/SEED Net, Embrapa and CGIAR Cooperation and EU-INCO water research). [21]

2-2 AUN/SEED Net[22]

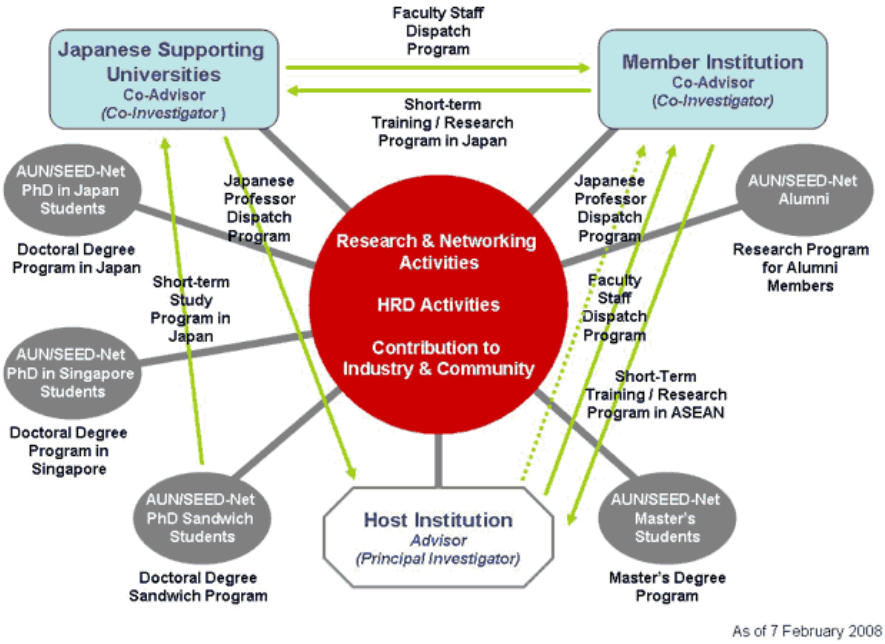
This is a case of developing human resources in engineering field by increasing MA and PhD holders of leading universities in ASEAN countries through close linkages among the ASEAN universities with support from Japanese universities. As opposed to a bilateral cooperation between developed and developing countries, instead, the project intends to build an autonomous network within which developing countries help each other over the long run by diversifying funding sources.

(1) Features of the network

The purpose of the AUN/SEED Net is to build a system, which can develop human resources in engineering field. It aims at improving educational and research capability through the active exchange of resources among the Member Institutions (MIs) a collaborative relationship with Japanese Universities. The expected output of the project is graduates with master's and doctoral degrees of international standard within the region through a consortium of graduate school of engineering in 19 Member Institutions (MIs) from 10ASEAN countries and 11 Japanese Supporting Universities (JSUs)[23].

Figure 2 shows Conceptual Diagram of AUN/SEED NET Project and Table 3 shows a list of MIs and JSUs, which participate in the project.

[21] BecA was not be able to be included due to inadequate available operation and management information.
[22] ASEAN University Network/Southeast Asia Engineering Education Development Network (AUN/SEED-Net) Project, Joint Final Evaluation Report, May 2007.
[23] Kiyohiko Kuroda, "Japanese Higher Education and Japanese Higher Education and International Engineering Development".



Source: AUN/SEED Net home page. http://www.seed-net.org/info_concept.php

Figure 2 Conceptual Diagram of AUN/SEED Net Project

Table 3 A List of Member Institutions and Japanese Supporting Universities

Member Institutions/Host Institutions	Japanese Supporting Universities
<Brunei> Institut Teknologi Brunei Universiti Brunei Darussalam <Cambodia> Institute of Technology of Cambodia <Indonesia> Gadjah Mada Universi Institute Teknologi Bandung <Lao PDR> National University of Laos <Malaysia> Universiti Sains Malaysia University of Malaya <Myanmar> University of Yangon Yangon Technological University <Philippines> De La Salle University University of the Philippines-Diliman <Singapore> Nanyang Technological University National University of Singapore <Thailand> Burapha University Chulalongkorn University King Mongkut's Institute of Technology Ladkrabang <Vietnam> Hanoi University of Technology Ho Chi Minh City University of Technology	Hokkaido University Keio University Kyoto University Kyushu University National Graduate Institute for Policy Science Shibaura Institute of Technology Tokai University Tokyo Institute of Technology Toyohashi University of Technology University of Tokyo Waseda University

Source: AUN/SEED Net home page. http://www.seed-net.org/info_concept.php

As Figure 2 shows, it combines a scholarship program among ASEAN countries and Japan with (1) collaborative research, (2) field seminars and (3) short term visits among universities in ASEAN and Japanese universities.

(2) Effectiveness of the network

Effectiveness of AUN/SEED Net is considered from the point of view of achieving the objective of developing human resources in engineering field in 10 ASEAN countries. As of July 2007, project had awarded 427 scholarships for Master and PhD levels and had produced 140 graduates, about 60% of whom are currently faculty members of the MIs while most of the rest continue their studies at a higher level. These graduates can become a driving force for the sustainable development of ASEAN.[24]

1) Concrete collaboration activities are observed among MIs themselves as well as with JSUs.

AUN/SEED-Net Project has stimulated and enhanced internationalization of graduate programs in ASEAN universities. With assistance of JSU's, the Network provides a new corridor to graduate degree studies for ASEAN students, promising self-reliance in human resource development and enlarging its capacities for research and teaching through AUN/SEED-Net alumni and local graduates.

During the project implementation process, interactions between MIs and JSUs increased and the number of collaborative research activities conducted by MIs, JSUs and private firms increased as well. Those graduates, though the number is still limited, have already started to work at their Alma Mater.

Phase 1 of the project will terminate in March 2008 and additional funding is needed even if Japan should provide funds for the phase 2. Some host institutions already have made provision for scholarships for graduates to extend their studies. The Thailand and Indonesian governments allocate funds to invite academic staff from non-member universities to member universities in order to improve their capacities through the AUN/SEED Net.[25] Two universities in Singapore provide full scholarships for PhD students of the AUN/SEED project.

2) Mutual collaboration among Mis are strengthened

Some cases are observed in the project that improved engineering technology contributed to solve common problems beyond each country's national and institutional boundaries. The followings are

[24] http://engg.upd.edu.ph/news/engg070907.html.
[25] Joint Final Evaluation Report, May 2007.

examples of ongoing collaborative research.

- Elimination of Vehicle exhaust emission.
- Development of environmentally friendly biotechnology fuel.
- Natural resource development (material engineering).
- Disaster management (Tsunami, earthquake, floods, etc.).
- The ground improvement industrial method.
- Transport planning under the rapidly expanding urbanization.
- Road pavement study.
- Information process analysis for the different languages of ASEAN countries.
- Comprehensive environmental protection measures.
- Contribution to solving electric power problems,

3) Information dissemination system, activity management system and communication network are established

Information dissemination and communication network is confirmed in terms of numbers of publications, a Newsletter, access to a website and the number of mailing list members. Regarding activity management, organizational structure around the AUN/SEED Net Secretariat was established and regular monitoring visits to member institutions are being conducted.

(3) Lessons learned from the network

1) Utilizing gaps and similarities among ASEAN countries effectively

Even though ASEAN countries are regarded as developing countries except for Singapore and Brunei, gaps between more advanced countries such as Malaysia, Thailand, the Philippines and Indonesia, and less developed countries such as Cambodia, Laos, Myanmar and Vietnam are still large. AUN/SEED Net project seems to be designed to consider the gaps and to make appropriate division of labor among MIs. Regarding academic issues, advanced countries supply host institutions and receive students from sending institutions, which belong to mainly less advanced countries[26]. On the other hand, administrative issues are managed mainly by AUN/SEED Net Secretariat, which substitutes for inadequate administrative capacities of MIs.

The Network addresses shared concerns. When MIs seek for scientific and technological solutions to similar problems like natural disasters such as earthquakes and Tsunami, collaborative research started

[26] Indonesia is an exception as it is a big country in terms of population and similar demand exists as less developed countries.

smoothly by sharing each country's experiences. Overseas students are relatively easy accommodated by host countries, which have similar natural conditions, culture, and in some countries, similar language.

2) Reflecting voices of all MIs

Research themes are to be determined by accommodating all stakeholders' (host institutions, sending institutions and JSU) interests. However, in practice, host institutions' interests are well reflected even though host and sending institutions have different interests. In order to reflect non-host institutions' needs and interests more and to make non host institutions actively involve in the collaborative research activities, further interactions between these institutions through Field Wise Seminars, Short Term Visit among member institutions, and trips to Japan are recommended in the Joint Final Evaluation Report (May 2007).

3) Project's financial and institutional sustainability

As is always the case with STI development projects, this project has required a significant amount of funding which member countries themselves cannot provide. In particular, as the Joint Final Evaluation Report points out, funds supporting AUN/SEED Net Secretariat activities are vital. In order to make the AUN/SEED Net function financially even after the termination of the project, it has to seek for alternative funding sources such as ASEAN Solidarity Funds.

Regarding institutional sustainability, the strong capacity of AUN/SEED Net Secretariat is a key to success.[27] However, heavily dependence on AUN/SEED Net Secretariat is by no means sustainable, therefore, it is pocessary to gradually transfer AUN/SEED Net's role to each member institutions.

4) Clear project rationale in AUN Secretariat

This project is clearly positioned in AUN's overall diversifying strategy of funding sources to help promote MIs participation.[28] With the establishment of a permanent office and with its own financial resources, AUN Secretariat has become more pro-active and functions as a matchmaker between foreign universities or governments and ASEAN universities and the ASEAN Secretariat.[29] Although substantial funding of

[27] Final Evaluation Report said, "AUN/SEED Net project secretariat is well functioning and contributes to the effective management.
[28] H.J.J.G.Beerkens, "10.3 ASEAN University Network" from "Global Opportunities and Institutional Embeddedness", 2004 (pp.111-117).
[29] Beerkens (2004), p.157.

ASEAN comes from ASEAN Secretariat or the ASEAN Foundation, AUN has acquired funds through "Dialogue Partners". AUN/SEED Net project is recognized as one of such external funding projects.

2-3 Embrapa[30] and CGIAR Cooperation[31]

This is a case study involving Embrapa, a research institution in Brazil, which has a long history of coordinating a Brazilian National Agricultural Research System, and at the same time, building a network with international agricultural research institutions, namely, CGIAR[32].

(1) Features of the network

Embrapa is a Brazilian Agricultural Research Corporation created in 1972 as a private- law public institution with administrative and financial autonomy linked to the Brazilian Ministry of Agriculture. The purpose of the establishment was to develop the Brazilian agricultural sector through the enhancement of plant and animal productivity in order to respond to increasing demand for food. Embrapa aims to: (a) develop competitive agribusiness in a global economy; (b) promote sustainability of economic activities by ensuring environmental balance; (c) reduce social imbalances; and (d) supply food that promotes health and improves the nutritional status and the quality of life of the population.

Coordinating a national network of agricultural research institutions

Embrapa's headquarter is located in Brasília and has 40 decentralized units strategically located in all regions and ecosystems of Brazil. Embrapa's decentralized units are classified in three types, namely 15 product centers, addressing key crops and animals; 9 thematic centers, addressing specific areas of knowledge; and 13 agroforestry or ecoregional centers, which cover the different ecosystems in the Brazilian territory. Three special services are also available, addressing key areas that cut across products, themes, and regions. Embrapa coordinates the National Agricultural Research System consisting of 7,000 researchers and technicians, with the participation of State research agencies, universities, foundations, technical support, and rural extension groups, cooperatives, farmers associations and private companies.

Embrapa has been financed mainly[33] by the federal government and devotes its efforts to strengthening

[30] Empresa Brasileira de Pesquisa Agropecuária =The Brazilian Agricultural Research Corporation.

[31] This case study mainly refers to Jamil Macedo, Marcio C.M. Porto, Elisio Contini, and Antonio F.D. Avila, "The CGIAR at 31:An Independent Meta-Evaluation of the Consultative Group on International Agricultural Research: Brazil Country Paper for the CGIAR Meta-Evaluation", The World Bank Operations Evaluation Department, 2003.

[32] CGIAR (Consultative Group on International Agricultural Research) is a strategic alliance of members, partners and 15 international agricultural centers that mobilizes science to benefit the poor.

[33] Annual financial resources are around U.S. $ 300 million, which comes from the federal government (91 percent),

human resources.

Collaboration with CGIAR

Human resource development

In collaboration with CGIAR, Embrapa has trained researchers, extension workers and farmers, and strengthened institutional capacity. Researchers participated in several training events useful for developing joint research projects that were carried out by EMBRAPA and the CGIAR centers. In the last 30 years, a total of 875 Brazilian nationals participated in training events organized by CIAT, CIP and CIMMYT, the three CGIAR centers that have developed closer collaboration with Embrapa in the period. In the case of CIAT, a total of 684 Brazilian nationals benefited from several modalities of training, ranging from short-term courses to post-graduate thesis work. Of this total, 521 were Embrapa researchers. A total of 101 Brazilians attended courses organized exclusively by CIP or jointly with Embrapa. The information provided by CIMMYT shows that 90 Brazilian researchers participated in training events organized by that Center.

Joint research

Collaboration between Embrapa and research centers belonging to CGIAR started informally, most on personal basis in the 1970s after its establishment and the creation of the first group of CGIAR, namely CIAT, CIMMYT, IRRI, and IITA. Brazilian researchers were trained at CGIAR centers in germplasm exchange and testing. Brazilian researchers participated in meetings organized by the CGIAR. In the 1980s, the cooperation became intense with the placement of several CGIAR scientists at Embrapa research centers. Joint research projects were started with funding from the third parties and coordinated by CGIAR centers. After 1996, Brazil held a seat on the Executive Council of the CGIAR and was represented in several of its committees and task forces, especially those dealing with changes in the System's structure and governance. Several Embrapa scientists have been acting as board members of international centers and in the CGIAR Secretariat. Figure 3 shows the network of research units and institutions making up the Brazilian NARS, with linkages to the CGIAR Centers.

---

self-financing (6 percent), and external resources (3 percent).

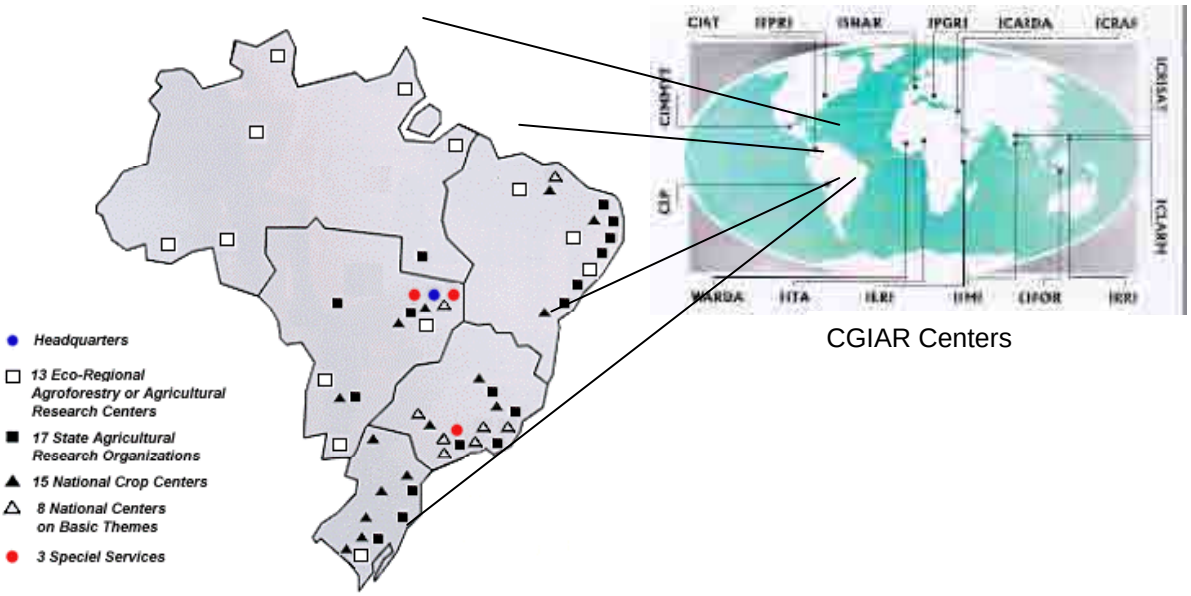


Figure 3 Brazilian National Agricultural Research System and CGIAR Centers

Source: Jamil Macedo, Marcio C.M. Porto, Elisio Contini, and Antonio F.D. Avila, "The CGIAR at 31:An Independent Meta-Evaluation of the Consultative Group on International Agricultural Research: Brazil Country Paper for the CGIAR Meta-Evaluation", The World Bank Operations Evaluation Department, 2003, p.2.

(2) Effectiveness of the network

Embrapa/CGIAR started by cooperating with each other informally and did not set specific. Instead, various cooperation results were generated as a result of the spontaneous collaboration. Therefore, it is appropriate to consider effectiveness of Embrapa/CGIAR Cooperation from the point of view of achieving the objectives of Embrapa such as developing a competitive agribusiness in a global economy, promoting sustainability of the economic activities while ensuring environmental balance, reducing social imbalances and supplying food that promotes health and improves the nutritional status and the quality of life of the population.

Research products

In collaboration with research centers belonging to CGIAR acting in America, Africa, Asia, and Europe, Embrapa has been developed a vast program of technical and scientific cooperation focusing on research. The following are examples of such partnerships: soil management projects at Embrapa Cerrados; forage breeding projects at Embrapa Beef Cattle; projects covering cassava IPM and cassava breeding at Embrapa Cassava and Fruits; beans breeding at Embrapa Rice and Beans; and potato breeding at

Embrapa Vegetables. These attempts are likely to contribute to developing a competitive agribusiness in a global economy

Contribution to domestic market

The share of CGIAR genetic material in the Brazilian seed market was on average 25 percent in the 1990s. Among the commodities analyzed, wheat was the product that benefited through CGIAR genetic resources, followed by irrigated rice. However, since the beginning of the second half of the 1990s, use of genetic material originated from CGIAR centers has declined. This trend coincides with the overall slow down of collaboration between Embrapa and CGIAR centers.

Contribution to other developing countries

Embrapa and CGIAR conducted joint research in various agro-ecological locations throughout Brazil. The research output generated variety of products, which respond to various needs not only of Brazilian farmers, but also those of other developing countries. For example, in the field of maize, millet, and sorghum, which are staple foods in Sub Saharan African countries, eight experimental varieties with resistance to specific stresses have been generated and transferred. These entries, along with those generated using data from other locations, have been included in acid soils trials and delivered to interested collaborators in many countries. Regarding cassava, Embrapa in collaboration with CIAT and IITA, implemented an extensive research program involving transfer of medium and large-scale cassava production and processing technologies to sub-Saharan Africa. The introduction of germplasm from Latin America to Sub Saharan African countries through CIAT in collaboration with IITA started in the early 1980s, and has provided unique sources of variability not currently available in Africa. Genes from Latin American materials, especially those related to drought resistance and tolerance, are incorporated into the breeding populations with resistance to the African cassava mosaic virus and distributed to national programs for testing and selection under local environmental conditions. Embrapa played a key role when IITA strengthened African research institutions' capacities through a series of training, workshops, exchange visits, and information exchange with Embrapa. The Embrapa's development assistance is considered to be as one of the strategies for developing a competitive agribusiness in a global economy, promoting sustainability of the economic activities while ensuring environmental balance,

Capacity building of Embrapa

This could be considered as a by-product of the Embrapa 's collaboration with CGIAR. Embrapa 's collaboration with CGIAR centers is recognized as particularly successful in the area of capacity building

and institutional strengthening, more specifically in training Brazilian researchers, extension workers, and farmers. Through the Brazilian government's strong support to human resource development, Embrapa researchers participated in several training events useful for developing joint research projects carried out by Embrapa and the CGIAR centers.

(3) Lessons learned from the network

1) Government investment in human resource development is crucial to collaborate with domestic as well as international research institutions in a good manner.

The Brazilian government has placed strong emphasis on investing in human resource development and has funded about 90 percent of Embrapa's budget. It is estimated that about U.S. $ 16 billion were invested since the creation. This enabled Embrapa to heavily invest in strengthening its human resources. It now has 8,619 employees, of whom 2,221 are researchers, 45% with master's degrees and 53% with doctoral degrees. These rich human resources have been an important attraction to CGIAR research centers.

2) Utilizing endowments of natural resources will contribute to generating good results of joint research

Due to the peculiarities typical of a country with continental dimensions, with a broad diversity in climate, soil, cultural values and the heterogeneity of its agricultural sector, Brazil is considered by the CGIAR as a unique partner. The dynamic character of the economy and its productive structure, and the existence of several agricultural frontiers in the country are factors that justify the existence of a flexible and multifaceted approach of cooperation.

3) Joint research activities, which depend on personal relationship is not sustainable and would decease once the key person(s) left.

The collaboration between Embrapa and CGIAR centers started in the 1970s based on informal mechanisms, including training of Brazilian researchers at CGIAR centers; germplasm exchange and testing; and participation of Brazilian researchers in meetings organized by the CGIAR. However, these joint research activities considerably reduced in the 1990s, after key scientists returned to their research centers and declined budget allocated to CGIAR. Additionally, the number of visits of researchers from both Embrapa and CGIAR centers has declined.

4) Applying "participatory approach" in conducting joint research

The definition of what technologies to produce in order to address the real problems faced by farmers in developing countries should also be an important step when planning a better mode of collaboration between the CGIAR centers and the Brazilian agricultural research system. Utilizing its own networks with national agriculture research institutions, Embrapa tried to involve direct beneficiaries, the small-scale farmers and their organizations of forest project in order to validate process of selected management options for secondary forests in farmers' lands. Comparative advantages of both sides must be taken into consideration when planning joint research and development activities, which could benefit users in Brazil and other tropical countries.

2-4 EU-INCO water research[34]

This is a case study of EU sponsored international scientific research cooperation projects related to integrated water resources management (IWRM). It is a consortium that has mobilized 530 research teams and other relevant partners from Europe and associated states (252 teams) and partner countries in Africa, Asia, Eastern Europe and Central Asia, Mediterranean and Latin America (318 teams) from 1994 to 2006. EU-INCO water research is carried out interdisciplinary with a team of experts from various disciplines both of scientific and socio-economic fields. EU-INCO staff manage the research program which is given expression via its sponsored research projects, coordinated activities and specific support actions in order to promote high quality applied research.

(1) Features of the network

EU-INCO facilitates and supports research and related cooperative activities in partner countries[35] outside the EU. Water issues have been one of three main environmental research priorities throughout the period from 1994 to 2006. EU-INCO water research is a component of the EU Water Initiative, which is a platform for strategic partnerships to implement the programs of actions for the World Summit on Sustainable Development (WSSD) and to contribute to meeting the Millennium Development Goals on water. The mission of EU-INCO is to increase the capacity of associated state and third country

[34] This section is primarily based on EUROPEAN COMMISSION, EU Water Initiative – Research Component, "EU-INCO water research from FP4 to FP6 (1994-2006): A Critical Review", 2006. The reviewed projects came from three successive funding cycles: 20 projects from FP4 (1994-1998 –completed projects); 34 from FP5 (1998-2002 – completed or in their final stages); 13 from FP6 (2002-2006 – just started). EU-INCO is the **EU**'s **In**ternational S&T **Co**operation Programme that has formed an integral part of successive EU Research Framework Programs (FPs).

[35] The INCO partner countries include – those in the Eastern and Southern Mediterranean, in the Western Balkans, in Russia, Eastern Europe and Central Asia (formerly New Independent States - NIS), the ACP (Africa, Caribbean and Pacific) countries, Latin America and most countries of Asia.

universities and research bodies to research the management of water according to the principles of IWRM.[36] The intent is to reach as large a number as possible of active water scientists and stakeholders and involve them in research projects, coordination activities and specific support actions. The EU-INCO budget is 2.5 % of the total of EU Research Directorate General from 1998-2002 (FP5).

Memberships

EU partners (115 university and 115 non-university), 22 Associated state (13 university and 9 non-university) and 318 Third Country partners (106 university and 212 nonuniversity) have been involved in EU-INCO funded water research from 1994-2006. Most of the research projects have (or had) coordinators from departments in EU universities. However, it is required that scientists from partner countries will be closely involved in managing the research. The participation of Small and Medium Enterprises and non-governmental actors is also encouraged. There were also 22 partners from countries associated with the framework programs (13 from universities and 9 from non-university partners).

Implementing the EU-INCO water research

EU-INCO water research has been conducted through (i) EU-INCO funded projects, coordinated activities and the development of science networks (EU), (ii) EU and Associated Countries water science institutions and their staff and (iii) Third Country water science institutions and their staff. Regarding EU-INCO funded projects; EU-INCO staffs manage the research programs aiming at promoting high quality applied research via these modes. EU-INCO promotes its mission to diffuse advanced concepts and involve large numbers of scientists in partner countries through the coordinated activities and the specific support actions. Through the research, EU and Associated Countries water science institutions such as universities and their staff stress the importance of de-emphasizing hydraulic engineering, which supply manages water, and of paying more attention to researching and teaching about the technologies that contribute to demand management of water resources. Third Country water science institutions and their staff have gained experience in conducting international level research and in managing integrated interdisciplinary research through coordinating a proportion of the work packages in most projects

Interested parties

While universities of member countries have conducted majority of water research, there was stronger

[36] IWRM (Integrated Water Resource Management) is a concept of water management proposed by EC.

participation in EU-INCO network from outside universities in INCO partner countries - ranging from government departments to farmer associations. The followings are such interested parties in additional to universities.

(A) Agenda shaping

Intra-EU

- EU-INCO staff and their 'advisers' in other DGs and EU Member States
- The EU water science epistemic groups
- Review processes

Extra-EU

- Policy dialogue between Europe and other regions of the World, including in UN fora
- Partner country water science epistemic groups
- The international water research discourse on IWRM

(B) Research and networking activities

- EU water science institutions and their staff
- Associated States and Third Country water science institutions and their staff.

Quality control of commissioned research

EU-INCO water research has a very thorough and transparent process for such quality evaluation. First, the bids are vetted by a comprehensive peer-review process. The coordinators of the successful individual projects, which receive EU funding also provide reports on progress and on final outcomes. Contributions to the peer-reviewed literature are also fully recorded. Nor has the review focused on the efficiency of managing the research. Logistical problems encountered by some research groups are, however, noted where they seem relevant to this review.

Evolving approaches taken by EU-INCO network

Policy-related research – as increasingly required by EU-INCO – is unavoidably interdisciplinary. The IWRM approach, adopted by EU-INCO, has evolved during the decade. EU-INCO has progressively encouraged water management research to be policy aware and increasingly policy focused. This trend has influenced the technical, allocative and socioeconomic shape of EU-INCO funded studies. In taking this approach EU-INCO has been moving against the main preferences of discipline-based science in higher education and research within the EU. However, policy-related science is not the first choice for

most water scientists in Europe. Nor do their national science programs reinforce such researchers and related funding processes to pursue policy-oriented research. Therefore, the evolving approaches still need time to be fully adopted and implemented.

Communication gaps between researchers in EU and partner countries

There are differences in approaches to water resources between EU and partner countries. The EU-INCO country researchers are for the most part reflexive in their understanding of the environmental and economic value of water in addition to traditional water science. Water scientists in partner countries are aware of the concerns about managing water resources based only on traditional water science. However, for them incorporating these new concepts into the research designs is challenging, as it requires certain time for them to convince stakeholders to adopt the concept.

(2) Effectiveness of the network

The objective of EU-INCO is capacity building of associated state and third country universities and research bodies in order to research the management of water according to the principles of IWRM. Taking this goal into account, we look at the effectiveness of the network.

1) Longer-term institutional cooperation building

It takes time and effort to build longer-term institutional cooperation based on mutual trust. Project coordinators of the Euro-Mediterranean network, which was established in 1998 and still cooperating in more and more ambitious projects, feel that they can trust in each other and cooperate after carrying out several research projects. In the first project – MECO[37] - the flow of information was mainly internal within the network of ecological scientists. 'Integration' between socio-economists and biologists, and between researchers and managers was not fluent. The next project called MEDCORE[38] gave attention to the flow of interdisciplinary information including that outside the project. The third project, which is WADI[39], aims at establishing an exchange of information with local stakeholders, and possibly with stakeholders at higher - national and international - levels. Political difficulties is said to impede the communication.

[37] MECO: Mediterranean co-ordination and dissemination of land conservation management to combat desertification.
[38] From river catchment areas to the sea: a comparative and integrated approach to the ecology of the Mediterranean coastal zone for sustainable management.
[39] Water supply watershed planning and management: an integrated approach.

2) Experience in conducting international level research and in managing integrated interdisciplinary research

EU-INCO has actively involved water scientists and stakeholders of partner countries in research projects, coordination activities and specific support actions. Through these tasks, scientists and stakeholders have gained experience in conducting international level research and in managing integrated interdisciplinary research through coordinating a proportion of the work packages in most projects. Without these initiatives exposure to international research would be less rich. Universities of partner countries have gained experience in conducting international level research and in managing integrated interdisciplinary research through coordinating a proportion of the work in most projects as well.

(3) Lessons learned from the network

1) Experience in collaboration strengthens mutual trust among stakeholders

Mutual collaboration helps strengthen trust among stakeholders and becomes a basis for functioning and sustainable networks. Some cases are reported by EU-INCO water research observe that research projects conducted over a short period of time face difficulties in materializing tangible “end-user results”.

2) Need to provide for a strategy for communicating research outputs.

Research results are expected to be addressed to five target communities: namely; (i) relevant policy-making institutions, including those in the water sector; (ii) the technical domain of water resource management and in the delivery of water supply and sanitation; (iii) local water users; (iv) scientists and students in higher education and secondary education and (v) those working in the private sector to provide water services as well as those using private water services.

In the case of EU-INCO water research, the most consistent communication effort was directed toward the technical scientific community. On the other hand, less attention was devoted to addressing the political although a strong upward trend is observed more recently as compared to the period from 1994 to 1998. The political and policy domain and the private sector are particularly important if secure and sustainable water managing outcomes are to be achieved.

3) Different perspectives on local contents between project coordinators, researchers and educators

Reflecting the interdisciplinary characteristics, EU-INCO water research envisages several inadequate 'Integration' between stakeholders such as socio-economists and biologists, and between researchers and managers. There is a tendency that managers and policy makers do not care much of local populations, insofar as these are demographically limited. Their needs, rights and skills are generally ignored, which sometimes causes serious problems such as depriving houses and moving people to the periphery of a town, irrespective of their rural origin, as a consequence of the construction of a dam. On the other hand, local researchers and educators, who interact directly with the local population, are interested in information about the locality, the environment and the cultural traditions.

4) Difficulty for policy makers to utilize research output

A major difficulty is that policy makers often have their own scientific and technical informants (scientists and technicians who have authority at the national level) EU-INCO water research itself has affected by the political influence. EU-INCO adopted the IWRM paradigm in the late 1990s, which was embedded in very complex political processes. IWRM has tangible structuring effects on the way the science was done by achieving better integration across different disciplinary boundaries than in most national research programs. EU-INCO water research, during FP4 (1994-1998) was not explicitly policy oriented, though emphasis was placed on systems approaches with environmental orientation. In FP5 (1998-2002) policy priorities were identified by EU-INCO. Those applying for FP6 (2002- 2006) water projects were asked explicitly to address policy issues.

5) Advantages and disadvantages of the participatory approach

Interdisciplinary research requires the participation of not only scientists and researchers but also end users of water resources, government officials, NGOs and the private sector. There is little discussion in the sustainable development literature of the limits and dangers of participation. Participatory exercises were conducted in several research projects. On the positive side, participation yielded many useful and interesting insights and invoked a sense of 'involvement' in sustainable development. On the negative side, outcomes depend upon representativeness. It is rather difficult for outsiders of community to understand the process of "selecting representatives". Sometimes only one interest was reflected even though participatory approach is adopted. The critical review found that simplified assumptions about a 'community' made to facilitate convening a stakeholder meeting could bias the process in favor of some stakeholder groups at the expense of others.

6) The importance of information

The information infrastructure can facilitate the integration of local knowledge with science. These databases are vital for effective communication about water resources and their management, for negotiating rational use of water resources and evidence-based policy.

2-5 Biosciences eastern and central Africa (BecA)

This case study involves one of the four regional biosciences networks initiatives established under the auspices of NEPAD (New Partnership for Africa's Development). BECA, despite being in its infancy, is regarded as potentially as a potential model for scientific centers of excellence in Africa.

(1) Features of the network

Well-coordinated research, teaching, and extension can help developing countries improve capacity to utilize the existing knowledge embedded in the thousands of patents that expire every month around the world. However, it is unfortunate that many African countries have a dysfunctional separation among research, teaching, and extension.[40]

Donors have invested considerably in African agricultural research over the past several decades. Assistance has mainly been provided to national research institutions and universities. Taking into account the constraints associated with the traditional "center type" assistance, BecA has put strong emphasis on capacity building of researchers as well as research institutions *per se* within a regional collaboration framework. BecA focuses on bioscience research by providing a platform for the African scientific community to conduct cutting-edge research and human resource capacity building on IPR (Intellectual Property Rights), biosafety and regulatory issues. BecA also serves as a platform for forging partnerships with other bioscience initiatives elsewhere in Africa and worldwide.[41] BecA works with universities to train young scientists to MSc and PhD levels and to provide opportunities for post-doctoral fellows. It will not become a degree-awarding institution but will enhance the work of university laboratories. It is expected that the close association of these facilities with universities will enable academic staff in Africa to further their professional development and careers through fellowships and secondment that allow them to undertake high-priority research for the poor within first-rate facilities [of BECA? Since the universities themselves are unlikely to have comparable facilities for some time] and with direct access to international as well as African resources and scientific skills.

[40] Alfred Watkins and Michael Ehst ed., "Science, Technology, and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction", World Bank, 2008.
[41] http://www.trade-environment.org/page/ictsd/projects/biotech_eastern_africa.pdf.

Bearing this situation in mind, the vision of networked centers of excellence was developed in 2002, through collaboration among the New Partnership for African Development (NEPAD), the International Livestock Research Institute (ILRI), and the Doyle Foundation, who facilitated consultations within Africa and with potential partners internationally.[42] BecA started operation in 2002 with support from the Canadian government, as one of the new Centers of Excellences to advance science in Africa whose establishment was agreed upon at the G8 summit in June 2003 in France.[43]

The aim of BecA is to support eastern and central African countries to develop and apply bioscience research expertise to produce technologies that help poor farmers to secure their assets, improve their productivity and income and increase their market opportunities.[44] BecA set a hub at International Livestock Research Institute's (ILRI) Nairobi campus, which has an well equipped laboratory facility upgraded through financial support from CIDA it can become a shared research platform with state-of-the-art research facilities for the biosciences, including genomics, proteomics, gene technology, immunology and new containment facilities for safe genetic manipulation of plants and micro-organisms (e.g., for vaccine development), and safe handling of pathogens used in research programmes. The facility is available for use by the African scientific community, advanced research institutes, other CGIAR centers and so on.[45] The biosciences facility is expected to serve Burundi, Democratic Republic of Congo, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Somalia, Sudan, Tanzania and Uganda.

Key partners are expected to be regional universities; national, regional and international agricultural research institutions; universities and other advanced research institutions worldwide; non-governmental organizations; the private sector; and the wider international scientific and development communities.[46]

Output[47]

[42] Andy Hall and Jeroen Dijkman, Capacity development for agricultural biotechnology in developing countries: Concepts, contexts, case studies and operational challenges of a systems perspective, January 2006) (http://www.merit.unu.edu/publications/wppdf/2006/wp2006-003.pdf).
[43] Four networks were established by the agreement. (1) Canada committed $30 million to BECA (Biosciences for Eastern and Central Africa facility) headquartered in Nairobi. (2) The French have agreed to build a bioinformatics center in Senegal, (3) the British are committed to building labs (largely – but not exclusively – related to human genomics) in South Africa; and (4) the US has plans to build another research center in Egypt. (quoted from ETC group, Communiqué , Green Revolution 2.0 for Africa? This time the "silver bullet" has a gun", March/April 2007).
[44] Jeffrey C.Fine and Peter Szyszlo, "The Partnership for higher education in Africa: Network Study", Appendix B.
[45] ILRI, ILRI Medium Term Plan 2008 – 2010 Executive Summary Livestock: a pathway out of poverty, June 2007.
[46] http://www.africabiosciences.org/background.php#newarr.
[47] ILRI, ILRI Medium Term Plan 2008 – 2010 Executive Summary Livestock: a pathway out of poverty, June 2007.

Since 2003 to date, over 100 scientists have been hosted at the BecA hub for periods ranging from 3 months to 4 years. These have included research fellows on student attachments (a total of 45), MSc and PhD graduate fellows (53) undertaking projects with ILRI and other CG centers based at the hub, and NARS (National Agricultural Research System) scientists using the facilities to undertake their own research projects (11), many in collaboration with, or backstopped by ILRI scientists. The expanded genomics capacity, including sequencing/genotyping and additional bioinformatics infrastructure is expected to facilitate ILRI's involvement as a key user/partner and also strengthen capacity through interactions with other users. A dedicated management of research infrastructure of the shared platform is expected to allow ILRI scientists to concentrate more on project execution, and less on logistics for technology acquisition and maintenance.

An intense two-year phase (until March 2009) has now commenced for the construction and development of the platform at the ILRI campus in Nairobi as well as the development of a research and capacity building program with partners in the region.

(2) Effectiveness of the network

An analysis of operation and management of BecA is not covered in this study due to inadequate relevant obtained information. Chataway et al. summarized BecA as follows. [48]

BecA (original expression is "BECA") is very much a work in progress, but it does mark a shift away both from bilateral donors continuing to fund research and design at NARS in the face of a lack of results, and away from the idea that only the CGIAR centers can undertake cutting edge agricultural research in Africa. BecA is conceived as an institution that can work in partnership with NARS and the CG system to make better use of R&D comparative advantages in Africa. The extent to which BecA will become a new model for research and innovation in Africa is unclear, but significant resources have been earmarked to shape the initiative.

Experience with the CGIAR centers in East Africa shows that although some partnership activities occur with NARS, a certain amount of capacity is drawn from the periphery to the core and efforts must be made to support the building of sustainable R&D capacity within national research systems. BecA will have to

[48] Joanna Chataway, James Smith, and David Wield, "Partnerships for Building Science and Technology Capacity in Africa: Canadian and UK Experience", Paper prepared for the Africa–Canada–UK Exploration: Building Science and Technology Capacity with African Partners 30 January – 1 February 2005 Canada House, London, UK).

develop a reputation of excellence, and seek to centrifuge that reputation and allied mechanisms of capacity and capability building across 11 East African countries. This is a challenge that, if overcome, will truly create an institutional blueprint for research excellence in Africa.

However, focusing on long-term support for institutions such as BecA in no way guarantees that immediate development goals will be met. Networks that stretch beyond the traditional research centre are just one of the prerequisites necessary for that to occur.

(3) Lessons learned from the network

1) Knowledge and communication gaps in sub-regional institutions hinder network activities

According to a stakeholder consultation workshop[49], knowledge and communication gaps in the sub-regional institutions exist due to insufficient funding for sources of knowledge such as journals and Internet access, as well as poor knowledge management and communication skills. Bioscientists cannot access information because there is insufficient literature, e.g. missing or outdated journals in biosciences, expensive and poor internet access due to cost as well as the unavailability of hardware and software. Even where internet access is available it is slow and inefficient. Poor management of information as well as lack of communication manifest themselves in poor documentation of results to peer, partners and end users, inadequate access to different communication outlets, limited awareness of sources of information, and poor production and distribution of local journals.

In terms of strengthening relationship between the hub and subregional research institutions, it is recommended advice on such areas as outreach/advocacy, communications etc. and services in biotechnology training and related areas should be provided. To strengthen the capacity of national institutions, the workshop proposed that the hub should assist/support the establishment of minimum functioning laboratories in key institutions in the sub-region. Stakeholders of the workshop consider that this could be done through the development and implementation of collaborative projects and mobilizing additional support for partner laboratories from national and international sources.

2) The management and governance of the hub

An essential component in establishing centers of excellence in science and technology knowledge is strong linkages with other such centers in Africa and other parts of the world. Biosciences is a rapidly

[49] NEPAD and ILRI, "Summary Report Of Stakeholder Consultation Workshop On The Biosciences Facility For Eastern And Central Africa 28-30 January 2004, Nairobi, Kenya.

evolving field and establishing linkages with individuals and institutions working at the cutting edge is critical in establishing and maintaining the reputation of *BecA* as a center of excellence for biosciences in Africa. In this context, partnerships are being sought with a variety of research, education and training institutions in Africa who are currently using biosciences, and with the international scientific community. Early partnerships are also being sought with those responsible for: defining needs in rural communities, understanding the role of women in African societies, identifying consumer preferences and trends, and/or for developing and delivering new innovations and technologies.[50]

The hub located at ILRI is considered to be a key to successful operation of the network. Participants of the stakeholder consultation workshop [51] recognized the following three aspects regarding the management of the hub. First, the ILRI Management and that of the hub need to avoid conflicts of interest and establish strong and effective financial, human resources and administrative support/management structures/systems. A Steering Committee (SC) was established to be responsible for the governance of the hub. Membership of the SC should take into account balance in representation across the sub-region, a track record in leadership and management of science and the ability to mobilise resources. Gender representation on the committee is also considered as important. A second concern is the relationship of network members to the hub. The workshop participants felt it was important to develop formal procedures for prioritizing projects and activities both in terms of timing as well as resource allocation. It is recommended that the hub should establish a web-portal to facilitate information management and that some kind of editorial board/group be put in place for this purpose. Third, the governance and management of science should be the responsibility of a scientific advisory body composed of persons with international reputation with a strong track record in the conduct of research and innovation. It is requested to be drawn, in a gender-sensitive manner, from a combination of local (sub-regional), continental, and international scientific communities. Members should have fixed terms. Workshop participants consider the role of the scientific advisory body should be to: oversee peer-review and selection of proposals; to undertake monitoring and evaluation of on-going projects; and work with the steering committee in developing fund-raising strategies.

[50] BCEA, Business Plan 2005 – 2009 April 2005 Biosciences eastern and central Africa is part of a network of centres of excellence, mobilizing biosciences for Africa's development, and sponsored by the New Partnership for Africa's Development (NEPAD).

[51] NEPAD & ILRI, Summary Report of Stakeholder Consultation Workshop on The Biosciences Facility for Eastern and Central Africa, 28-30 January 2004, Nairobi, Kenya).

2-6 Comparative analyses of the cases

Based on the above analyses of AUN/SEED Net, Embrapa and CGIAR cooperation and EU-INCO water research, we compare the three cases using the “analytical framework of higher education networks for STI” explained in 2-1. Table 4 summarizes their comparative features.

Table 4 Comparative analyses of case studies

	AUN/SEED	Embrapa/CGIAR	EU-INCO
Profile			
Objectives	● Developing engineering human capital.	● Developing and disseminating new and improved agricultural technology.	● Increasing partner countries’/institutions’ research and management capacities of water according to the principles of IWRM.
Stakeholders	● Researchers (ASEAN, Japan) ● Students ● Project coordinators (ASEAN, Japan) ● Universities (ASEAN, Japan)	● Researchers ● Extension workers ● Farmers ● The Brazilian government ● CGIAR research centers	● Water scientists (EU, partner countries) ● EU project coordinators ● Local government, civil societies, end users of water resources, private sectors, international organization. ● Diversified partner countries belonging to middle to low income countries. ● Individual scientists and laboratories are substantially in advance of the EUINCO position on IWRM.
Dimension of time frame - How has the network been evolved in the time frame?	2003-2008 (Phase 1) 2008-2013 (Phase 2)	Since the 1970s	1994~2006 (Studied periods) Indefinite as far as EU provides budget within its framework of EU-INCO
Distribution/allocation of benefits of networks=Who is getting what?	● Student and faculties of the Network obtain degrees. ● Japanese universities obtain talented researchers and students. ● Host and sending institutions obtain relevant facilities. ● AUN/SEED Secretariat obtains recurrent costs.	● Researchers of Embrapa obtain advanced / relevant agricultural technology. ● Centers of CGIAR obtained field data. ● People in Lusophone African countries obtain relevant agricultural technology.	● People in developing (partner) countries obtain knowledge on water resource management. ● Researchers and institutions of partner countries improve research and management capacity on water resource. ● Policy makers of EU and partner countries mutually benefit each other (eg, South Africa)

			• EU research institutions obtain field data.
Integration of network			
Delegation of authority to each member institution	• Centralized budget. • Member institution has authority. • Sending institutions in 4 member countries cannot reflect their interest in research themes occasionally.	• Independent budget. • Member institution has authority. • Research themes are determined independently.	• Centralized budget. • Member institutions obtain research budget based primarily on bit. • Field study is conducted under the discretion of institutions/researchers of partner countries.
Equality of the members	• Inequality between host institutions and sending institutions exist in terms of setting research themes.	• After capacity of staff is enhanced, Embrapa has become equal partners to CGIAR research centers in terms of supplying development cooperation.	• Significant participation from partner countries has been attempted but not been successful. • Some projects are carried out multidisciplinary and interdisciplinary interactions • At research field, local partners, and international and multidisciplinary teams work together.
Network, driven by whom?	• AUN/SEED Net Secretariat with support from JICA and JSU leads the network effectively.	• Both Embrapa and related centers of CGIAR has led the network.	• EU project coordinators
Coping mechanism of multiple activities, problems, administrative issues, etc. employed by the network	• AUN/SEED Secretariat with support from JICA and JSU is responsible for the whole management of the project.	• Member institutions are cooping and coordinating with each other.	• The coordinators and research teams have attended to the norms of science communication – with technical reports, refereed publications, workshops and conferences.
Desembeddness / Embeddness from institutional and national contexts			
Extent of decentralized institutional forms	• Further research is needed.	• Further research is needed.	• Various attempts have been made in order to incorporate local contexts in developing appropriate water resource management technology.
Extent to which regional contexts exert an influence on member institutions' behavior	• Gradual standardization and internationalization of graduate programs based on international standard in host universities countries.	• Member's institutional forms are being kept.	• Efforts have been made to connect traditionally and culturally embedded knowledge with technological research findings. • The presence of women researchers facilitated the contacts with local women (s).
Extent to which relationships among the individuals of the	• Personal relationships have played an import role in terms of continuity	• Personal relationships have played important roles in conducting joint	• Collaborative researches including field studies are carried

member institutions play an important role.	of research themes of students at host institutions and JSU, and of organizing seminar on common research themes. ● Collaborative research has been conducted in a systematic manner.	research informally. ● It sometimes happened that the joint research did not continue once researchers in charge left from the project.	out by researchers belong to EU and partner countries.
Exchanges of resources	● Utilizing gaps and similarities among ASEAN countries effectively.	● Utilizing comparative advantages of both institutions resulted in effective international cooperation in other countries.	● Within various types of partnerships such as (i) between EU member institutions and middle-income countries, (ii) between EU member institutions and low-income countries in Africa, Asia and Latin America, various exchanges of resources are observed according to the types of partnerships.
Management of network	● Joint accreditation ● Joint credit transfer systems ● Cost sharing systems are expected to be introduced in the phase 2 so that the Japanese government can withdraw and AUN/SEED Net can be independent / autonomous.	● CGIAR budgets have decreased and the Brazilian government seeks for other donors in addition to the World Bank.	● EU coordinators play key roles in managing projects. ● Political will of European Commission cannot be ignored to consider direction of EU-INCO. ● Further interaction between EU and partner countries is expected to be enhanced. ● Research contents will be designed interdisciplinary based on mutual collaboration of stakeholders in EU and partner countries.

Note: In the case of EU-INCO, author extracted relevant examples from “Project Coordinators comments relevant to communication” based on 67 reviewed projects.

(a) Euro-Mediterranean network was established in 1998. The purpose of MECO was to analyze the elements and the links among elements as well as the services of coastal ecosystems and to enhance the competence for integrated management of coastal areas across the Mediterranean. The sites were in Italy, Spain, Malta , Egypt, Tunisia and Morocco.

(b) RURBIFARM - Sustainable farming at the rural-urban interface an integrated knowledge-based approach for nutrient and water recycling in small-scale farming systems in peri-urban areas of China and Vietnam. The collaboration has proven very fruitful with synergy within the research teams across the Asian and the European partners. RURBIFARM in late 2005 was in the last year of the 4-year project period. Prospects for longer-term institutional cooperation are favorable. Further funding is being sought. Many other research studies have been initiated as a result of this EU-INCO project.

(c) REAL – Systems research on small groundwater retaining structures under local management in arid an semi-arid areas of East Africa

Source: Author made referring to a concept explained in Chapter 13 of Beerkes (2004).

AUN/SEED Net

AUN/SEED Net is considered to be a network type B, which is “intense network”. Looking at “integration” aspect, the network seems to be centrally managed by the AUN/SEED Net Secretariat. It has yet to delegate authority to member institutions, since the demands of the sending institutions’ intentions are not easily reflected in the process of determining research themes. Regarding “disembeddness” from national contexts aspects, AUN/SEED Net shows some desembeddness. From the beginning, AUN/SEED Net tries to promote mutual collaboration among member institutions located in ASEAN 10 countries, which are endowed with diverse resources, instead of strengthening only linkages between member institutions of ASEAN countries and those of Japan. This approach inevitably requires certain level of desembeddness among member institutions. As a result, AUN/SEED Net has promoted gradual standardization and internationalization of graduate programs based on international standards in host universities’ countries.

The “intense network” supported by strong initiatives of AUN (ASEAN University Network) and Japan seems to be reasonable for AUN/SEED Net under the condition that the project has to achieve determined objectives of “improving the quality of human resource in the higher engineering areas” within the limited time frame of five years. A tighter institutional integration might have played a significant role in order to respond to each student’s/faculty’s demands.

Embrapa/CGIAR

Embrapa/CGIAR cooperation is considered to be a network type “A”, which is “weak integration with high desembeddness”. It was not designed to build a network from the beginning under a sole project within the limited timeframe by particular financiers. Rather the network emerged between researchers of the Brazilian national agriculture research network and those of CGIAR centers as a result of a series of collaborative activities funded by the Brazilian government and various donors for more than 30 years. I facilitating creative exchange of ideas and informal flows of information among individual researchers and teams of researchers, a less formal and more flexible type of network with stronger accent on personal contacts of staff seems to have been preferred.with research being undertaken at the researchers’ own discretion. Therefore, operation and management of the network was not systematically facilitated as in the cases of AUN/SEED and EU-INCO Therefore, joint research sometimes did not continue once researchers in charge left from the project.

In terms of “desembeddness”, it is difficult to say the network is desembeded from national context, since Embrapa has its own nationwide network, which can be used to disseminate the results of collaborative

works with CGIAR. However, the CGIAR centers are likely to be desembedded from the country in which they are located, and, the network *per se* has been based on individual relationships, Hall et al describe characteristics of an earlier CGIAR, as being aimed at increasing agricultural productivity,[52] as "network of international centres of scientific excellence linked to national agricultural centres of excellence". It is also said that little integration with clients or other actors in the agricultural/ rural sector is observed. Taking these into consideration, desembeddness of the network is likely to be high. As the network started expanding the activities across national boundaries in order to disseminate the research results to other developing countries such as Lusophone African countries, it might have been necessary to pay more attention to "embeddness" of recipient countries.

EU-INCO

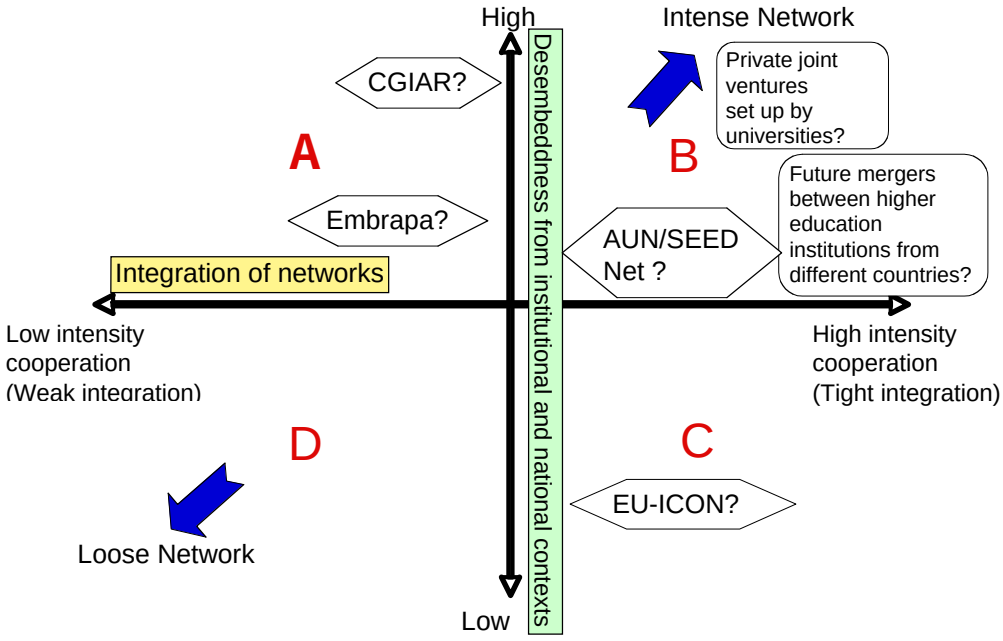
EU-INCO water research is considered to be type "C" which is "strong integration with low desembeddness". It was centrally managed by EU in terms of funding and logistical issues such as bidding on the budget allocated by EU. EU coordinators play key roles in managing research projects. In addition, the political will of European Commission could not be ignored in setting the direction of EU-INCO. These point to high integration of the network.

On the other hand, once EU approves a research proposal and a field study is started, inclusion of local context becomes crucial since the research is directed toward developing and disseminating appropriate water resource management technology appropriate for local people's needs. While conducting field research, local partners, and international and multidisciplinary teams work together. There are some projects featuring multidisciplinary and interdisciplinary interactions. Various attempts have been made to incorporate local contexts in developing appropriate water resource management technology. In this way, respecting the contexts has become important as EU-INCO shifted its focus on water resource management from the supply management approach[53] to demand management approach.[54] Here, end users of research output need to be taken into consideration when implementing the research. Stressing embeddness becomes strong as EU-INCO has progressively encouraged water resource management

[52] Andy Hall and Jeroen Dijkman, Capacity development for agricultural biotechnology in developing countries: Concepts, contexts, case studies and operational challenges of a systems perspective, January 2006.
[53] The supply management approach responds to water shortages by finding and mobilizing more water. Building more storage, conveyance structures and installing pumps to lift groundwater are supply management measures (EUROPEAN COMMISSION, EU Water Initiative – Research Component, "EU-INCO water research from FP4 to FP6 (1994-2006): A Critical Review", 2006).
[54] Demand management is where technologies to monitor and regulate water use are installed. But much more important are institutional reforms that provide incentives to use water less wastefully and especially to use it in activities which bring a better return to water. Ibid

research to be policy aware and increasingly policy focused in order to increase partner countries'/institutions' research and management capacities of water according to the principles of IWRM.

Figure 4 shows preliminary application of analytical framework to the 3 case studies in order to help readers grasp the idea of understanding networks taking into account of "operation and management aspects", and for further discussion.[55] Since it is not possible to show the extents of "integration" and "disembeddness" of the 3 selected networks numerically, we roughly show a simplified image in Figure 4. Although we classify the types into four from A to D for convenience' sake, we also recognize that there are many other types of networks which will be put on a border between the four types. For instance, networks, which conduct various researches, within which some show high desembeddness while others, show low desembeddness. We do not intend to stress which type is superior to others. We recognize that an appropriate type of network will be determined according to objectives of collaborating activities, stakeholders who actually operate and manage day to day network activities, profiles of related research institutions, length of the collaborative period, and whether the network is built based on North-South or South-South collaboration,



Source: Author made referring to a concept explained in Chapter 13 of Beerkes (2004).

Figure 4 Preliminary application of analytical framework to case studies

[55] The author greatly appreciates constructive comments and suggestions made by Tatyana Soubbotina, Consultant of the World Bank STI Program, for improving the hypothesis shown in the first draft. Further analysis is needed by obtaining the latest information and raw data.

3. Key Issues for sustainable networks

In this section, we summarize present situation of higher education networks for STI, draw lessons learned from existing experiences and consider appropriate future cooperation with particular reference to Japan and other prospective donor partners.

3-1 Present situation of higher education networks for STI

(1) Sharing of resources through networks

The most important role networks can play is to generate and disseminate science and technology knowledge suitable for improving living standard and increasing income of the people in poor countries beyond institutional and national boundaries, through exchanging relevant resources. Endowments of the resources of member institutions could be classified into three categories as follows.[56]

a. Physical capital resources: the used technology such as ICT infrastructure and its digital learning environments, teaching and research facilities, laboratories, real estate, geographical location.
b. Human capital resources: training, experience and knowledge, professional network of academics and non-academics
c. Organizational capital resources: formal operating structures, budgeting systems, quality assurance systems, relationship with industry, government and others.

These three types of resources are recognized in the case studies. AUN/SEED Net utilizes such physical capital resources, which are facilitated by the project. The importance of ICT and its digital learning environments are recognized in all the cases. Regarding human capital resources, it was confirmed that government investment in human resource development does attract foreign researchers in the case of Embrapa/CGIAR. It is confirmed from the three cases (AUN/SEED, Embrapa/CGIAR and EU-INCO) that professional networks of academics play a very important role in keeping the quality of research high, ensuring the continuity of research when a researcher/faculty moves from an institution to another in another country, and ensuring appropriate field research together with local stakeholders.

Organizational capital resources vary from a network to another, as we learned in the case studies. In this study, we tried to analyze such organizational capital resources from the viewpoints of “integration” and “desembeddness” aspects. Each network has its own organizational capital resources:

[56] Beerkens (2004), p.65.

AUN/SEED Net:	strong integration with high desembeddness (intense network);
Embrapa/CGIAR cooperation:	weak integration with high desembeddness; and
EU-INCO water research:	strong integration with low desembeddness.

The “integration” aspect is related to “formal operating structures, budgeting systems, and quality assurance systems”. In the cases of AUN/SEED and EU-INCO, since the networks were established within network-building projects, these systems are facilitated. On the other hand, the systems of Embrapa/CGIAR are not well facilitated, as it was a spontaneously emerged network from the beginning.

The “desembeddness” implies to what extent the network takes into account of local contexts, and therefore, is related to “relationship with industry, government and others”. Both high and low desembeddness are observed in the selected networks. In the case of Embrapa/CGIAR, the international character of CGIAR centers makes the network being desembeded from local context. [Point not clear] AUN/SEED needs a certain level of desembedness or standardizations of post-graduate programs in order to develop engineering human resources at 19 different research institutions located in 10 ASEAN countries. EU-INCO gradually shifted its approach from only focusing on water-scientific issues to incorporating not only water-science but also local variations in water resource management research, which is likely to enhance embeddness.

(2) Different access to resources between South-South networks and North-South networks

We have to consider about differences of member institutions’ access to resources between South-South networks and North-South networks. It is likely that available resources are limited in the case of South-South networks, while North-South networks could exchange human and natural resources for foreign funding.

(3) Operational Issues

Following issues are obtained from case studies and literature surveys. These will be of reference to consider about operation and management of a network.

- **Founders or foundations should play a short-term role by the time a network truly flourishes**

It is important for founders of foundations to help a network by the time the network truly flourishes. However, donors typically underestimate the time required until a network “flourishes” in terms of its

internal management, strengthened capacities, strong links and trust among members, and the production of useful concrete results. There are also several other key considerations:

- The role donors can play in attracting support from host governments as well as the private sector during the network's more formative stages; and
- Whether donors should continue to play a residual role, e.g. in financing common core costs that neither the private sector nor a host government may be prepared to pay for.

After the termination of the Phase1 of AUN/SEED Net, the Japanese government, which was a major funding agency for Phase 1, is considering an appropriate exit strategy for the Phase 2 in order to make the network autonomous/independent/sustainable without donor funding. It should also consider helping the networks diversify raising funds methods.

- **Clear decision-making protocols/procedures**

This is clearly observed in the case of EU-INCO, where decision-making protocols/procedures are clearly determined by EU. Especially participating in a decision making process of conducing a research enhances ownerships of members/member institutions, by keeping the accountability of the research.

- **Most day-to-day decisions are carried by individuals or small groups on behalf of the networks. Only major decisions are brought to the members as a whole group.**

This attempt has been made by AUN/SEED and EU-INCO. Related to day to day management, two approaches are observed: (a) researchers are in charge of day-to day management activities in addition to their own research work and (b) persons who are in charge of operation and management are assigned by the project while researchers conduct research. There are many cases that a network becomes disfunctioning when network drivers, mostly scientists, become a network manager as well. Consequently, networks should separate the roles of network driver and network manager.

- **Regular, easily accessible and succinct information sharing systems between members**

Networks are using various tools such as ICT and publications in order to share information among members

3-2 Lessons learned from existing experiences

Followings lessons are obtained from case studies and literature surveys.

(1) Encouraging factors of collaborative activities through networks

Since it would make it impossible to generalize about critical success factors[57], we will point out some factors, which are considered to be related to functioning higher education networks for STI.

- **Win-Win relationship**

What factors encourage higher education institutions to collaborate with other institutions within a network? Case studies show that functioning networks provide researchers as well as research institutions with significant benefits, which promote collaborative works. In the case of "training of students/researchers"-focused network such as AUN/SEED Net, both stakeholders of developing and developed countries can benefit from the activities, which becomes an important factor for successful implementation. Students of ASEAN can pursue higher education career in the networked countries and recognize advantages associated with international and cross-cultural experiences within their regular curriculum. The academic staff members of host institutions as well as supporting universities in Japan have benefited from obtaining talented students from ASEAN countries and providing international lectures and having international research projects in ASEAN countries. Furthermore mutually relevant research can sometime be conducted in developing countries at a lower cost.

It was also pointed out by panelists of the seminar, "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society" that both individual and institutional advantages associated with participating in the network will become a strong motivation to be a member of a network. Moreover, it is recognized that concept, vision and mission of a network need to be attractive for participants and to be shared by all members of a network. This will further lead to mutual trust among members of the network.[58] It is noted as an important factor for successful networks that advantages or benefits should be allocated to relevant members in a fair and transparent manner.[59]

Nature of such benefits will evolve over time. With growth in capacity, there will increasing evidence of PEER relationships between former students and their professors, now mentors, and a desire to undertaken collaborative research. Also recipient institutions will begin to develop their own graduate programs.

---

[57] Beerkens (2004), p.236.
[58] Tsunoda Manabu, Dr. Eng., Senior Advisor, Institute for International Cooperation, Japan International Cooperation Agency.
[59] Jeffrey C. Fine, consultant, Jeffrey C. Fine Consulting.

- **Shared Research Concerns**

Networks are appropriate instruments for dealing with research concerns that transcend national boundaries. A good example is the natural disaster management of AUN/SEED Net project. Member countries' common problems associated with natural disasters such as earthquakes and Tsunami became a strong incentive for related member institutions to conduct collaborative research.

- **"Complementarity" of resources**

If members of a network possess resources, which are strategically valuable for the other members, they can benefit from participating in and acting for the network. In the case of Embrapa and research centers of CGIAR, both benefited from resources the other has. Embrapa was able to improve human resources by being trained at CGIAR centers, exchanging researchers, etc., while CGIAR obtained useful information and empirical evidence from conducting joint research with the national agricultural research systems under Embrapa, which were located in different agro-ecological zones throughout the country.

- **Public Policy**

Government's strong commitment in human resource development is critical to attract other institutions including foreign ones, as the case of Embrapa shows. A few countries in two regions, East Asia (Korea, China, India, Indonesia) and Latin America (Brazil, Mexico, Chile), have maintained science and technology knowledge as a constant national priority. With the exceptions of Korea and Chile, these have tended to be large countries with low to middle incomes.[60] Networks can help reduce brain drain by providing attractive career opportunities in research and teaching in the host countries.

- **Leadership**

Both intellectual and supporting leaderships of member institutions are crucial to a networks' success. "Leadership driven nature of networks" is observed as one of factors to make network function. Network is established at the level of the institution as a whole and it is likely that successful networks do not stick only to specific disciplines or themes. This could be confirmed by AUN/SEED Net case to a certain extent.

[60] Michael F. Crawford, C. Cesar Yammal, Hongyu Yang, Rebecca L. Brezenoff, "Review of World Bank Lending for Science and Technology 1980–2004", Science, Technology And Innovation: Discussion Paper Series, Education Department Human Development Network, The World Bank, Jan.2006.

- **Addressing institutional and regulatory constraints.**

Incompatibility in national regulatory systems will affect international cooperation in higher education in several ways: student and staff mobilization; legal position of students and staff; faculty appointment; government restrictions on establishment of new programs; and regulations on funding. AUN/SEED Net Secretariat more or less has played a key role in tackling with these issues.[61] EU-INCO water research recognized the difficulties of conducting research interdisciplinary.

(2) Evolving vision of networks

It is worth recognizing that vision(s) / mission of a network evolve as the network is utilized by members. The vision of partnership is considered to evolve from within the partner group rather than be predetermined by individuals.[62] Expectations of a network gradually change as members achieve set objectives or responding to external environmental changes. For example, responding to European Commission's request, EU-INCO changed its mission to Integrated Water Resource Management, which deals with scientific as well as socio-economic issues in the field of water management interdisciplinary.

It is equally important to note that interests and capacities of those individuals who actually conduct the research and teaching, as well as the participating universities and research centers evolve as well.

(3) System, financial and human resources[63]

There are two key aspects associated with system, financial and human resources:

1) Networking is administratively and managerial intensive, requiring significant financing as well as appropriate personnel – and infrastructure; and
2) There are two forms of financial support. One is for the core (recurrent) costs of a network, and the other is for specific programs and projects. Donors tend to provide for the second even though a network can only be sustained and grow through adequate core funding.

Both logistics and contents of a network should be well developed and facilitated. In terms of logistics, a system, which makes all participants obtain something from the network, needs to be considered. In the system, it is necessary to have a coordinator(s) who has good management skills and experiences of

[61] Further research such as interviewing to stakeholders is needed in order to confirm this.
[62] Ros Teneyson, Institutionalizing partnership: Lessons from the front line", International Business Leaders Forum.
[63] This paragraph is based on the panel discussion of "Science, Technology And Innovation: Discussion Paper Series, Education Department Human Development Network".

managing networks, coordinates various interests and makes responsibilities of participants clear. Whether a network develops depends on to the extent to which introduced-technology is disseminated to beneficiaries. Dissemination of technology requires timely, flexible and long-term commitment by donors. Regarding financial resource, it is crucial for network to be sustainable to have independent fund raising/income generating mechanism within the network.

3-3 Future cooperation to higher education networks for STI

Based on the previously mentioned observations and lessons, we consider donors' future cooperation to higher education networks for STI in a following manner.

(1) Appropriate cooperation to capacity building

It is very important to strengthen capacities of research institutions and stakeholders in charge of network operation (both academic and management staff members) in order to make higher education networks for STI autonomous and sustainable in the long run. Donors have to pay more attention to enhance local ownerships whilst providing for accountability to key stakeholders including the founders; the beneficiaries of the research; and the individual and institutional participants.

As we showed in Figure 4, higher education networks for STI have different characteristics and the extent to which local contexts are taken into consideration differs according to set objectives. However, when it comes to capacity building of research institutions and stakeholders in charge of network operation in developing countries, it might be able to say that donors need to pay more attention to incorporate "local contexts" in designing STI research.

Without understanding local contexts, generating appropriate solutions would be difficult. Local contexts imply not only local needs, but also how the local contexts shape the ability of local scientists and researchers to find solutions. In addition, without understanding local capabilities, local scientists will be bypassed by particular activities and funding, and effectively removed from systemic local innovation.

Embrapa/CGIAR cooperation and some of EU-INCO water research show that STI capacity is developed through the spectrum of activities such as projects, programs, networks, and institutions in the long run. At the same time, problem-solving types of projects within a limited time frame contributed to improving specific capacities as well. Capacity building can thus be based both on short-term and long-term support. Chataway, et al. even point out, **"**inter-institutional capacity can be built almost as a by-product of the research and design process… Therefore, understanding the local context enables research and design networks to be effectively extended and stretched over whatever distance and skill sets that are

necessary to achieve the aim. From this perspective, understanding both local needs and local capacities allows a fuller, broader and more appropriate innovation system to be developed".[64] An example of supporting the short-term capacity building within the context of the longer-term quoted by Chataway, et al is Sida-SAREC in supporting African universities as hybrid research and learning institutions. It provides short-term project support and also longer-term infrastructural program support, including library and ICTs, support for research management, laboratory development, and technician training.

(2) Assistance for long incubation period

Network building is expected to provide all participants with opportunities to benefit from the associated activities in the long run. However, network building, especially in its start-up period, requires significant human, financial and physical inputs, which become heavy burden especially for supporting participants. As we saw in the case of AUN/SEED Net, the burden for participants from Japanese member institutions is heavy at least in the short period of time. It is therefore important to help supporting stakeholders recognize the benefit even in the short term.

The impacts of investments into research and technology capacity building for solving problems in any given society tend to arise only after long incubation periods. In the incubation period, various actions need to be taken, which require time and money. The followings are major arguments, which need to be considered for incubation period.[65]

1) Proof of concept
2) Risk management: Investing a small sum at the beginning; Selecting participants and activities in the absence of vetted information concerning researchers and institutions
3) Developing cohesion and trust among the different network partners
4) Evolving appropriate governance arrangements
5) Overcoming legal and regulatory constraints
6) Resource mobilization: Laying the groundwork for attracting other funders, e.g. host governments and the private sector, further downstream
7) Evolving appropriate modalities for research and training

[64] Joanna Chataway, James Smith, and David Wield, "Partnerships for Building Science and Technology Capacity in Africa: Canadian and UK Experience", Paper prepared for the Africa–Canada–UK Exploration: Building Science and Technology Capacity with African Partners 30 January – 1 February 2005 Canada House, London, UK.
[65] Quoted from Jeffrey C. Fine's comments on the draft paper.

8) Developing a more informed longer term strategic and business plan

In reality, as project coordinators of EU-INCO water research point out, most of the time, the project duration is too short to produce highly visible impacts, except if there is a succession of several projects. Donors tend to prefer to fund the tangible rather than intangible as well.[66] Experiences of Embra/CGIAR cooperation and EU-INCO water research show that long incubation period surely contribute to well functioning of networks. As Jeffrey.C.Fine proposes the idea of incubation grant for the initial setting up of networks at the seminar "Network for Change: Science, Technology & Innovation and Higher Education in the Globalized Society", it is worth considering effective ways of cooperation in the initial stage of networks building. It is practical for donors to share the relevant information on the above-mentioned issues during the incubation period of building networks. From the point of view of financial intervention, AUN/SEED Net provides a useful idea. The first phase of AUN/SEED Net was fully financed by the Japanese government through JICA for the incubation period. Cost sharing methods have already been proposed by member countries that recognize the value of the network for the second phase, which would start from 2008

(3) Catalyst role

From sustainable development point of view, donors are expected to play "catalyst role" instead of intervening directly, so that research institutions/network of developing countries are enhanced technically, financially and administratively. Embrapa is one of such examples. It is already working together with lusophone African countries through bilateral agreements and tripartite actions funded by the Brazilian government and foreign agencies, such as JICA. The most important area being emphasized is the training of lusophone Africans by Embrapa scientists in specific areas of agricultural research and development. Within the project, donors helped strengthen absorptive capacities of recipient institution(s): namely, IITA, continues to strengthen the capability of African research institutes to undertake cassava research and development through a series of training, workshops, exchange visits, so that Embrapa proceeds with the cooperation effectively.

Assistance for removing barriers is considered. Private companies are reluctant to collaborate with firms in developing countries due to problems associated with intellectual property right, copyright, confidentiality of information, etc. in developing countries. Therefore, removing such barriers will pave a

[66] Ros Tenneson, "Institutionalization of partnerships", p.17.

way for future public private partnership.

It is necessary to consider making networks independent or autonomous even after donors withdraw. However, it is quite difficult or debatable to think about financially viable higher education networks for STI. Even in developed countries, many research institutions are not fully financially independent as most of them are financed by the national budget taking into account of networks' "public goods" characteristics. Many developing countries lack the necessary resources and higher education networks for STI are facing with severe budget constraints and need to diversify their funding sources. There are two ways for donors to cooperate with such networks in developing countries: either financing directly with national capacity building e.g. universities and research centers through bilateral assistance, or providing support through multi-country networks as we saw in the case studies.

Whether donors' support is successfully utilized for making networks for STI sustainable depends on the extent of developing countries' involvement in the network activities. In particular, facilitating recurrent costs of operating a network is crucial for network operation, which is expected to be born by developing countries. Matching grant is one of approaches in order to make developing countries governments actively involve in the network operation.

(4) South-South Cooperation

Network has a potential to implement South-South cooperation in a way that introducing technology with appropriate modification based on an interaction between providing and recipient institutions/countries. The network of agricultural research institutions such as Embrapa could apply developed technology such as improved varieties of seed which have high productivity such as the ones developed under the Green Revolution and measures to reduce harmful insects, to another countries where natural conditions are similar to those of Brazil, belong to same agro-ecological zones and have same staple food, through a network of researchers and research institutions located in different countries.

As the Embrapa case shows that research institutions will start considering about utilizing their knowledge, experiences and technology for other developing countries, which have similar problems to be solved. Donors have vast experiences in STI and can utilize their knowledge, experiences, and human resource network to be a catalyst among developing countries.

3-4 Further considerations

There are some issues, which need to be further studied and analyzed following this study.

(1) Influences / impacts of existing networks

It is worth considering about influences / impacts of existing networks which joined a newly established network. In the case of AUN/SEED Net, ASEAN University Network (AUN) had already implemented various cooperation projects with other donors when the project started and therefore was able to utilize the experiences. In the case of Embrapa/CGIAR cooperation, Embrapa's long standing networks of national agriculture research institutions greatly contributed to disseminate newly developed agriculture technology, which resulted in benefiting end users such as extension workers and farmers. Both advantages and disadvantages of working with "existing networks" need to be considered in the future study.

(2) Brain Circulation: Turning "brain drain" into 'brain gain' through regional agreements on skill sharing

As case studies show, higher education networks for STI have developed human resources in developing countries. On the other hand, the severe brain drain problem, which is the extensive emigration of skilled professionals who are trained through the networks, is recognized as well. Most of the time, those skilled professionals are reluctant to work in their own countries where research conditions are likely to be worse compared with those of host countries.

Many donors have strategies for making professionals return to developing countries (brain gain) so that learned science and technology knowledge is widely utilized for people in developing countries. Although it is in an infant stage, AUN/SEED Net has so far succeeded in the "brain gain". Students and faculties who studied in host countries and Japanese supporting universities returned their countries and started to work. EU-INCO recognized the brain drain from less developed countries to developed EU member countries and has strategies for turning brain drain into brain gain through regional agreements on skill sharing. INCO offers possibilities to carry out high quality research of interest to Europe's partner regions, while breaking isolation of third country researchers, a prerequisite for halting brain drain.[67] In area where regional integration proceeds with such as EU, even brain drain from one member country can

[67] http://knowledge.cta.int/en/content/view/full/1690.

become brain gain for the other member country. It is important to consider about “brain drain” and ‘brain gain’ associated with higher education networks for STI in the future study.

References

H.J.J.G.Beerkens, “Global Opportunities and Institutional Embeddedness”, 2004.

Joanna Chataway, James Smith, and David Wield, “Partnerships for Building Science and Technology Capacity in Africa: Canadian and UK Experience”, Paper prepared for the Africa–Canada–UK Exploration: Building Science and Technology Capacity with African Partners 30 January – 1 February 2005 Canada House, London, UK

Michael F. Crawford, C. Cesar Yammal, Hongyu Yang, Rebecca L. Brezenoff, “Review of World Bank Lending for Science and Technology 1980–2004“, Science, Technology And Innovation: Discussion Paper Series, Education Department Human Development Network, The World Bank, Jan.2006.

ETC group, Communiqué , Green Revolution 2.0 for Africa? This time the “silver bullet” has a gun”, March/April 2007

EUROPEAN COMMISSION, EU Water Initiative – Research Component, “EU-INCO water research from FP4 to FP6 (1994-2006): A Critical Review”, 2006.

Andy Hall and Jeroen Dijkman, Capacity development for agricultural biotechnology in developing countries: Concepts, contexts, case studies and operational challenges of a systems perspective, January 2006

Devesh Kapur and Megan Crowley, “Beyond the ABCs: Higher Education and Developing Countries”, Working Paper Number 139, February 2008, Center for Global Development.

ILRI, ILRI Medium Term Plan 2008 – 2010 Executive Summary Livestock: a pathway out of poverty, June 2007.

Jeffrey C.Fine and Peter Szyszlo, “The Partnership for higher education in Africa: Network Study”,

JICA, “ASEAN University Network/Southeast Asia Engineering Education Development Network (AUN/SEED-Net) Project, Joint Final Evaluation Report”, May 2007.

Kiyohiko Kuroda, “Japanese Higher Education and Japanese Higher Education and International Engineering Development”, pdf.

NEPAD and ILRI, “Summary Report Of Stakeholder Consultation Workshop On The Biosciences Facility For Eastern And Central Africa 28-30 January 2004, Nairobi, Kenya.

Ros Tennyson, “Institutionalising partnerships: Lessons from the front line”, International Business Leaders Forum,

UNDP and UNCTAD, “Globalization and the Least Developed Countries: Issues in Technology”, United Nations Ministerial Conference of the Least Developed Countries Making Globalization Work for the LDCs, 9-11 July 2007.

Jamil Macedo, Marcio C.M. Porto, Elisio Contini, and Antonio F.D. Avila, “The CGIAR at 31:An Independent Meta-Evaluation of the Consultative Group on International Agricultural Research: Brazil Country Paper for the CGIAR Meta-Evaluation”, The World Bank Operations Evaluation Department, 2003.

The World Bank Operations Evaluation Department, The CGIAR at 31: A Meta-Evaluation of the Consultative Group on International Agriculture Research Volume 2: Technical Report, The World Bank, May 2003,

Alfred Watkins and Michael Ehst ed., “Science, Technology, and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction”, World Bank, 2008.

A.Watkins, “Building Science, Technology and Innovation Capacity for Sustainable Growth and Poverty World Bank Operations Evaluation Department, “Addressing the Challenges of Globalization. An Independent Evaluation”, 2004.

Home pages of related institutions.