APEC Center for Technology Foresight 2014 International Advisory Board Meeting





12th of November 2014 Bangkok, Thailand

APEC Center for Technology Foresight National Science Technology and Innovation Policy Office

Agenda

APEC CTF International Advisory Board (IAB) Meeting 2014 APEC Center for Technology Foresight

Date: 12th of November 2014

Time: 9.30 – 21.00 hrs

Venue: Kamolporn room, Ground floor, the Sukosol Bangkok

Hosted by: National Science Technology and Innovation Policy Office, Thailand

Dress code: Business

Agenda:

1. Introduction (0930-1030 hrs)

- 1.1 Greetings by Chair and executives
- 1.2 Adoption of agenda
- 1.3 Brief introduction of APEC CTF
- 1.4 Roles and renewal of IAB members and election of new members
- 1.5 Introducing staffs of the Center
- 2. Adoption of the last IAB meeting minute (1030-1045 hrs)
- 3. Report of activities, October 2013 October 2014 (1045-1200 hrs)
 - 3.1 Foresight projects (20 minutes)
 - 3.1.1 Integrated Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries report – Dr. Warong
 - 3.1.2 Innovation Future in APEC: Competitiveness and Grand Challenges – Dr. Apichat
 - 3.1.3 Thailand's National Materials Technology Policy Framework Dr. Jakapong
 - 3.1.4 Thailand's National STI Reform Dr. Charnwit
 - 3.2 Networking (20 minutes)
 - 3.2.1 NISTPASS visit for Thailand's experience in science and technology integration with ASEAN member countries – Dr. Apichat

- 3.2.2 UK-Thailand Workshop: Science and Foresight for Strategic Flood Risk Management Dr. Surachai
- 3.2.3 UN ESCAP Nexus Dr. Surachai
- 3.2.4 International Foresight Conference, Japan Dr. Surachai
- 3.2.5 Collaboration with Foresight and S&T Research Institutes in Chinese Taipei (Taiwan) Dr. Angkarn
- 3.3 Trainings (10 minutes)
 - 3.3.1 The 2nd Science Technology and Innovation Policy Management Program (STI-PMP) – Dr. Jakapong
 - 3.3.2 Foresight lecture, Siam University Dr. Surachai
 - 3.3.3 Foresight course, Thammasat University Dr. Surachai
- 3.4 Consultancies in APEC Economy (10 minutes)
 SEAMEO Regional Study and Development of Post-2015 Education
 Agenda in Southeast Asia Dr. Angkarn
- 3.5 Recent development in APEC PPSTI Dr. Surachai (10 minutes)
- 3.6 Publication (5 minutes)Horizon Magazine, Key Technology article Dr. Apichat

4. Policy for 2015 and Beyond (1330-1630 hrs)

- 4.1 APEC PPSTI project
- 4.2 National Designated Entity for Technology Development and Transfer for Climate Change under Technology Mechanism of the United Nations Framework on Climate Change (UNFCCC)
- 4.3 Global Resilience Partnership project

5. Other matters (1630-1700 hrs)

- 5.1 Date of the next IAB meeting
- 5.2 Other matters
- 6. Networking dinner (1800-1930 hrs)

1. Introduction

1. Introduction

1.1 Greetings by Chair and Executives

1.2 Adoption of Agenda (see 1st page)

1.3 Brief Introduction of APEC CTF

The APEC Center for Technology Foresight (APEC CTF) was established as a project of the Industrial Science and Technology Working Group (ISTWG) of APEC and has been transformed to the APEC Policy Partnership on Science Technology and Innovation (PPSTI) Working Group since 2012. The Center was set up as a unit in the National Science and Technology Development Agency (NSTDA) until 2009 through support from the Royal Thai Government. From that year onwards, the National Science Technology and Innovation Policy Office (STI) has become the new host of the Center.

The Center has been chartered with a mission to promote foresight knowledge and capability throughout the APEC region. The Center fully participated in the biannual APEC ISTWG Meeting and holds a side meeting in order to keep the ISTWG members informed of its ongoing activities and to seek opinions, suggestions, and supports from all ISTWG members.

APEC CTF regularly submitted proposals to APEC ISTWG to compete with other projects for funds from APEC. Yet it is important to note that STI Office provides the core funding and employs the staffs. The Center also relies on supports and in kind contributions of member economies, to whom it is bound by mutual interest and trust rather than formal relationship.

1.4 Roles and Renewal of IAB Members and Election of New Members

All ten IAB members from 9 APEC economies are invited to attend the IAB Meeting 2014:

1.	Dr. Richard Silberglitt	USA (Chair)
2.	Prof. Dr. Masuo Aizawa	Japan
3.	Prof. Dr. S.K. Chou	Singapore
4.	Dr. Kerstin Cuhls	Germany
5.	Prof. Dr. Ron Johnston	Australia
6.	Prof. Terutaka Kuwahara	Japan
7.	Prof. Dr. Jung Won Lee	Korea
8.	Adj. Prof. John Edward Smith	Canada
9.	Dr. Chatri Sripaipan	Thailand
10	.Prof. Dr. Lan Xue	China

The roles of IAB are:

- To provide guidance to the Center by establishing broad strategies, identifying opportunities, and ensuring relevancy.
- To act as an extension of the Center by promoting the roles of the Center, providing outreach and advocacy.
- To monitor progress of the Center against work plans, and provide advices.
- To provide insights into technology foresight activities for member economies.
- To promote participation of APEC members in activities of the Center.

The Executive Director of the Center acts as the Secretary of the Board. The term of membership is 3 years, renewable once. Every 3 years, 5 new candidates will be proposed to replace 5 members of the existing board. The Chair is to be elected by the members every 2 years. The Center proposes that the Board considers election of new members.

1.5 Introducing Staffs of the Center

- 1. Dr. Surachai Sathitkunarat
- 2. Dr. Angkarn Wongdeethai
- 3. Dr. Charnwit Udomsakdigool
- 4. Dr. Jakapong Pongthanaisawan
- 5. Dr. Warong Sukchotrat
- 6. Ms. Sopida Tongsopit
- 7. Ms. Supak Virunhakarun
- 8. Dr. Srichattra Chaivongvilan
- 9. Ms. Nisara Jantarapatin
- 10.Ms. Sirinya Lim
- 11.Dr. Apichat Aphaiwong
- 12.Ms. Siriporn NamDang

- Executive Director, APEC CTF
- Policy Specialist
- Policy Specialist
- Senior Policy Researcher
 - Policy Researcher
 - Policy Researcher
 - Policy Researcher
- **Project Coordinator**

2. Adoption of the Last IAB Meeting Minute

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Date:	30 th of September	2013
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Time: 9.30 – 16.00 hrs

Venue: Banyan Tree Bangkok Hotel

Hosted by: National Science Technology and Innovation Policy Office, Thailand

Attendance:

International Advisory Board Members:

1.	Dr. Richard Silberglitt	USA (Chair)
2.	Prof. Dr. Masuo Aizawa	Japan
3.	Dr. Kerstin Cuhls	Germany
4.	Prof. Dr. Ron Johnston	Australia
5.	Prof. Dr. Jung Won Lee	Korea
6.	Adj. Prof. John Edward Smith	Canada
7.	Dr. Chatri Sripaipan	Thailand
	Secretary:	
	Dr. Surachai Sathitkunarat	Executive Director APEC CTE
	APEC CTF Staff:	
1.	Dr. Angkarn Wongdeethai	Policy Specialist
1. 2.	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan	Policy Specialist Senior Policy Researcher
1. 2. 3.	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit	Policy Specialist Senior Policy Researcher Senior Policy Researcher
1. 2. 3. 4.	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit Ms. Supak Virunhakarun	Policy Specialist Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher
1. 2. 3. 4. 5.	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit Ms. Supak Virunhakarun Dr. Srichattra Chaivongvilan	Policy Specialist Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher
1. 2. 3. 4. 5. 6.	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit Ms. Supak Virunhakarun Dr. Srichattra Chaivongvilan Ms. Salinthip Thipayang	Policy Specialist Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Policy Researcher
1. 2. 3. 4. 5. 6. 7.	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit Ms. Supak Virunhakarun Dr. Srichattra Chaivongvilan Ms. Salinthip Thipayang Ms. Nisara Jantarapatin	Policy Specialist Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Policy Researcher Policy Researcher
 1. 2. 3. 4. 5. 6. 7. 8. 	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit Ms. Supak Virunhakarun Dr. Srichattra Chaivongvilan Ms. Salinthip Thipayang Ms. Nisara Jantarapatin Mr. Natthaphol Lichaikul	Policy Specialist Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Policy Researcher Policy Researcher Policy Researcher
 1. 2. 3. 4. 5. 6. 7. 8. 9. 	Dr. Angkarn Wongdeethai Dr. Jakapong Pongthanaisawan Ms. Sopida Tongsopit Ms. Supak Virunhakarun Dr. Srichattra Chaivongvilan Ms. Salinthip Thipayang Ms. Nisara Jantarapatin Mr. Natthaphol Lichaikul Mr. Manoch Polpanich	Policy Specialist Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Senior Policy Researcher Policy Researcher Policy Researcher Policy Researcher Project Coordinator

10.Ms. Sinan Chamnanchol	Project Coordinator	
Apologies:		
1. Prof. Dr. S.K. Chou	Singapore	
2. Prof. Terutaka Kuwahara	Japan	
3. Prof. Dr. Sandy Thomas	England	
4. Prof. Dr. Lan Xue	China	
Observers:		
1. Dr. Pichet Durongkaveroj	STI Policy Office's Secretary General	
2. Dr. Nares Damrongchai	Chief Executive Officer of Thailand Center of Excellence for Life Science	

2.1 Introduction

2.1.1 Greetings by Chair and Executives

Dr. Richard Silberglitt, Chair of the Board, welcomed the board members and Dr. Kerstin Cuhls, who joined the meeting via skype, to the 14th IAB Meeting.

2.1.2 Adoption of Agenda

The Chair asked for an adoption of agenda. The agenda was adopted with no objections.

2.1.3 Brief Introduction of APEC CTF and Roles of IAB

Dr. Surachai described rules for renewal of IAB members and election of Chair. There are 10 IAB members including the Chair. The term of membership is 3 years, renewable once. Every 3 years, 5 new candidates will be proposed to replace 5 members of the existing board. The Chair is to be elected by the members every 2 years. APEC-CTF would elect the Chair and 5 new members in the next IAB meeting.

2.1.4 Introducing Staffs of the Center

All 8 current staffs and supporting staffs presented their background information, current position, and recent project involvement to the board members. This year APEC CTF has one new staff - Mr. Natthaphol Lichaikul.

1.	Dr. Angkarn Wongdeethai	Policy Specialist
2.	Dr. Jakapong Pongthanaisawan	Senior Policy Researcher
3.	Ms. Sopida Tongsopit	Senior Policy Researcher
4.	Ms. Supak Virunhakarun	Senior Policy Researcher
5.	Dr. Srichattra Chaivongvilan	Senior Policy Researcher
6.	Ms. Salinthip Thipayang	Policy Researcher
7.	Ms. Nisara Jantarapatin	Policy Researcher
8.	Mr. Natthaphol Lichaikul	Policy Researcher
9.	Mr. Manoch Polpanich	Project Coordinator
10	.Ms. Sinan Chamnanchol	Project Coordinator

2.2 Adoption of the Last IAB Meeting Minute (2012)

The Chair asked for an adoption of the last IAB meeting minute. The minute was adopted with no objection.

IAB members asked APEC-CTF to check grammar of the report.

2.3 Report of Activities (June 2012 – September 2013)

2.3.1 Foresight Projects

2.3.1.1 National Science Technology and Innovation Roadmap for Thailand's Industries

Ms. Supak reported the National Science Technology and Innovation Roadmap for Thailand's Industries project by National Science Technology and Innovation Policy Office (STI) in cooperation with Thailand Management Association (TMA) and the College of Management, Mahidol University (CMMU). The objective was to prepare the national roadmaps for science, technology, and innovation development of six leading industrial and service areas, namely, automotive industry, rubber industry, food industry, business-related-to-travel industry, health-and-wellness industry, and logistic industry. These roadmaps will guide the development of domestic industries, encourage integration of research between public and private sectors, and subsequently move Thailand away from labor-intensive economy.

Idea sharing and suggestions:

• Dr. Pichet mentioned that as TMA is a private association with linkages to the government, this helps STI Office to work with both public and private sectoral groups through TMA as an implemental platform.

2.3.1.2 Nanotechnology R&D Roadmap

Dr. Angkarn reported the formulation of the second Thailand's Nanotechnology R&D Roadmap: NanoTRM (2013-2016). This roadmap was obtained from analysis of global Nanoscience and Nanotechnology trends by literature review, and assessment for Thailand's Nanotechnology resource and capacity. Six workshops were also conducted to engage of R&D experts in examination agenda, key achievement/product/application, key technology, and resource of the roadmap. This NanoTRM will assist in identification of strengths and opportunities, and will be used to develop policy plan, strategy, and implementation plan for driving Nanotechnology development in the midterm future.

Idea sharing and suggestions:

• Dr. Pichet responded to Prof. Dr. Aizawa's question on "what is the mechanism to drive this R&D roadmap?" that STI Office does not have a mechanism to fully engage public and private sectors to drive the roadmap but STI Office gives recommendations to the government.

STI Office also cannot propose the budgets of other R&D granting agencies, nonetheless, this issue is currently being addressed.

 Dr. Angkarn answered Prof. Dr. Aizawa's question on the timescale of this NanoTRM that STI Office updates and revises the roadmap on a yearly basis to accommodate rapid developments of Nanotechnology around the world.

2.3.1.3 Thailand's National Materials Technology Development Framework

Dr. Jakapong reported a project plan by the National Science Technology and Innovation Policy Office (STI) in cooperation with the National Metal and Materials Technology Center (MTEC), a member of the National Science and Technology Development Agency (NSTDA), to formulate Thailand's National Materials Technology Development Framework for nine industrial sectors, namely, rice, rubber, bio-fuels, processed food, plastics and petrochemicals, electronics, automotive, fashion, and creative and digital. Foresight workshops and tools such as scenario building technique and stakeholder analysis would be applied to implement the project.

Idea sharing and suggestions:

- Prof. Dr. Aizawa mentioned that Materials technology and Nanotechnology in Japan are under the same category, and perhaps this Material framework is the manufacturing technology.
- Dr. Silberglitt suggested that there should be clear differentiation and separation of this Materials roadmap and the previous Nanotechnology roadmap so there will be no overlap of work areas.

2.3.1.4 Thailand's Vocational System Scenarios and the Development Strategy

Ms. Sopida reported the Thailand's Vocational System Scenarios and the Development Strategy project by National Science Technology and Innovation Policy Office (STI) in collaboration with the Office of Vocational Education Commission (VEC) and King Mongkut's University of Technology Thonburi (KMUTT). The aim was to explore what could affect the vocational system in Thailand in the next 10 years, and to explore possible strategies to develop the vocational system as a whole to cope with Thailand's competitiveness and sustainable development. From a two-day workshop with participants from organizations related to the vocational system, comprising mainly private sectors (manufacturing, agriculture, and service) as well as vocational schools, three scenarios of vocational system were built up: the Vocational Professionalism Scenario as the best case, the Labor-intensive Vocation Scenario as the worst case, and the Bridge to the Future Scenario as the business-as-usual scenario. It was suggested that country's technology capability plays as a game changer in the scenario that could lead Thailand's vocational system to the global professional level, and the strategy to develop the vocational system are re-organization, external reinforcement, and re-branding.

Idea sharing and suggestions:

- It was suggested by Prof. Dr. Lee to identify clearly what industries would be in need of that special skills/knowledge so that the plan will serve real needs.
- Dr. Cuhls also suggested that there should be more linkage with the private sector.

2.3.1.5 Issues for Strategic Planning for Thailand Research Fund (TRF)

Dr. Surachai on behalf of Dr. Suchat reported attendance of APEC CTF staffs as facilitators in group discussions among the Thailand Research Fund (TRF)'s staffs and key stakeholders in issues for strategic planning of TRF for the next 4 years (2014-2017). The participants discussed on six topics: challenges that Thailand will face in the next 10 years, research areas at a national level, TRF's research program, research management of TRF, development of researchers, and roles of TRF in the next 4 years. Prior to the discussion, there were presentations of invited speakers from the National Economic and Social Development Board, the National Science Technology and Innovation Policy Office (STI), and the Federation of Thai Industries, providing the participants the direction of country development.

Idea sharing and suggestions:

• This is an activity-collaboration of STI Office with TRF, which is the largest R&D funding in Thailand.

2.3.1.6 Foresight on Thailand Health Systems

Ms. Chalisa on behalf of Dr. Suchat reported the Analysis and Scenario Planning of Thai Health Systems project. It was conducted by APEC CTF, Health Systems Research Institute (HSRI), and National Health Commission Office (NHCO), prior to an amendment of National Health Act B.E. 2550 (A.D. 2007). The project consisted of three stages: stakeholder analysis based on 138 stakeholders of health systems, Real-Time Delphi survey with 29 statements, and Scenarios Planning. Three scenarios were built using the information obtained from the survey: summary of likelihood and impact of factors related to Thailand health systems, the prioritized factors, and relationship among them.

2.3.1.7 Bioenergy Science Technology and Innovation Policy for Thailand in the context of AEC

Dr. Srichattra reported an agreement between the National Science Technology and Innovation Policy Office (STI) and the Joint Graduate School of Energy and Environment (JGSEE) as an MOU on the implementation of Energy and Environment Science and Technology (S&T) Strategies. The MOU brings into the collaboration between STI and JGSEE on the project entitled "Bioenergy Science Technology and Innovation Policy for Thailand in the context of AEC". The "ASEAN Bioenergy Workshop" was organized to learn from ASEAN experts that have challenges and opportunities in renewable energy policies, particularly biomass, by employing scenario building of techniques. The outcome the workshop of was а set challenges/barriers/solutions classified in science, technology, and innovation system.

Idea sharing and suggestions:

• Dr. Srichattra explained to Dr. Silberglitt on the number of ASEAN members participating in the workshop that representatives from Singapore and Brunei Darussalam were missing because they have no agricultural waste for biomass energy, those from Myanmar couldn't attend as they needed clearance from their government, and those from Cambodia couldn't join the workshop due to political situation.

2.3.1.8 Integrated Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries

Ms. Nisara reported the progress of a project entitled "Integrated Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries" by APEC CTF, the National Science Technology and Innovation Policy Office (STI), in partnership with the Rockefeller Foundation. The aim was to develop policies, strategies, and actions that advance science, technology, and innovation for inclusive development of ASEAN countries, in agreement with the ASEAN Krabi Initiative's vision of the ASEAN leaders in promoting "Science Technology and Innovation for a Competitive, Sustainable and Inclusive ASEAN". Three workshops and one symposium were organized to develop a science, technology, and innovation foresight policy-orientated scenario report by incorporating knowledge and expertise from key stakeholders, partners, experts, and ASEAN representatives from the governments, policy makers, academia, and private sectors, though Real-time Delphi survey and Scenario Building technique. The resulting Food-Energy-Water nexus policy recommendations would include issues of security, production, resource usage and management, relevant and appropriate technology foresight, inclusive STI with focus on the bottom of the pyramid, relations and impacts to the environment, local communities, and ecological and economic development of ASEAN countries.

Idea sharing and suggestions:

• Dr. Surachai mentioned that there were 80 respondents of the Real-Time Delphi survey from 400 invites i.e. 20% respondent rate.

- Dr. Silberglitt noted that different ASEAN countries have prepared at different levels of the Food-Energy-Water nexus. It turns out that Vietnam and the Philippines are having the worst situations regarding these issues. Indonesia has good policies but the issue lies with the government and implementation bodies. Dr. Silberglitt also mentioned that there was work done a few years back by a Japanese company for the EU Ministry of Energy, looking into energy scenarios of ASEAN countries.
- Prof. Dr. Johnston referred to an international seminar organized by the Foresight International Group in Zurich, where Dr. Silberglitt, Adj. Prof. Smith, and Prof. Dr. Johnson presented a paper on this project. There were many presentations about foresight scenarios of energy with discussions and references to the ASEAN Krabi Initiative. A lot of audiences were also interested in the inclusive innovation and STI enculturation under the Krabi Initiative.
- Dr. Cuhls shared information that in Europe, water is not such a big problem, however, it is more complicated to manage than energy.
- Adj. Dr. Smith suggested that the bottom of the pyramid and inclusive innovation should be focused as they are interest areas of the Rockefeller Foundation.

2.3.2 Networking

Research and Development of Thai Rice

Dr. Angkarn reported that APEC CTF supported Thailand Development Research Institute (TDRI) to conduct research project entitled "Research and Development of Thai Rice: Looking Forward", by facilitating Scenario Planning. Three scenarios were built by participants based on the following topics: socio-economic factors, policy and politics, technology and environment, and barrier and tuning point at policy level.

2.3.3 Trainings

2.3.3.1 Foresight for ASEAN

Dr. Angkarn reported a training for ASEAN Executive Management Program held by Sasin Graduate Institute of Business Administration of Chulalongkorn University (SIGA) on the 19th of April 2013. Participants, consisting of Deputy Secretary-General of Office of the Public Sector Development Commission (OPDC), permanent secretaries from various ministries, large enterprise CEOs, experts, and executives of media, were given an overview of foresight concept, methodology, and key importance issues, and were demonstrated with a concise foresight workshop. APEC CTF also facilitated the workshop by using Scenario Building process to foresee ASEAN in the next 10 years, generating 12 scenarios in total: 4 from each expertise area, namely, Inclusive, Competitiveness, and Green Growth.

2.3.3.2 The 1st Science Technology and Innovation Policy Management Program (STI-PMP)

Dr. Surachai reported the 1st Science Technology and Innovation Policy Management Program (STI-PMP). The objective was to support STI policy directions corresponding to Thailand's National Science Technology and Innovation Policy and Plan (2012-2021), by aiming at providing STI knowledge-based to executive directors and high-level policy makers from different organizations for further integration on STI with other sectoralpolicies. The program contained a workshop employing foresight tools namely, Scenario Building, Future Wheels, and Delphi survey in order to pull insights into two major areas of STI development – society and economy. The outcome of the workshop was the precise view of challenges and opportunities in science, technology, and innovation system.

Idea sharing and suggestions:

• Dr. Pichet mentioned that STI Office has a major task to involve 20 ministries to be aware of STI policies and have STI policies in their strategies. The aim of this project was also to create networking

among high executives of different ministries. This project would be running annually at the beginning, and biannually later on. STI analyzed participants' projects, helped them benchmark and analyze their strategies.

2.3.4 Consultancies in APEC Economy

Rubber Foresight

Dr. Angkarn reported a consultancy service provided by APEC CTF to Bank for Agriculture and Agricultural Co-operatives (BAAC) for the Rubber Foresight (2013-2018) workshop. The aim of this workshop was to examine future scenarios and adaptation pathways for rubber farmers and BAAC in the next 5 years, by bringing together 15 creative minds with diverse expertise, roles, ages, and genders from industries, universities, experts, practitioners, government agencies, policy makers, and farmers. The obtained four scenarios - Fight for Wealth, Green Development, Living by former merits, and Misery-Poor - would be used as a media to communicate with regional farmers to request their insight viewpoints and feedbacks, and to pursue the preferred scenario by preparing for alternative solutions, appropriated policies, action plans, and further implementation.

Idea sharing and suggestions:

 Dr. Pichet responded to Dr. Chatri's question on how to sustain the involvement with people and networks that STI proposed the Public-Private-Partnership arrangement so the private sector could help them manage and sustain the program.

2.3.5 Recent Development in APEC ISTWG and APEC PPSTI

Dr. Surachai Reported that in 2012, APEC Senior Officials agreed to broaden the mandate of Industrial Science and Technology Working Group (ISTWG) to include issues of innovation policy development by transforming ISTWG into a Policy Partnership on Science Technology and Innovation (PPSTI) Working Group to intensify cooperation among the relevant stakeholders – government, private sector and academia. PPSTI should be the APEC community's primary forum to engage actors involved in joint scientific research and in technology inception, dissemination, and commercialization cycle, with both its competitive commercial sectors and non-profit elements.

Idea sharing and suggestions:

- Dr. Nares mentioned that APEC CTF could play active roles in networking and human resources through trainings on foresights for the public, and in Enhanced Policy Dialogue and Review. The funding for APEC CTF projects came from the central office of APEC. There are funding reviews about 3-4 times a year.
- Dr. Cuhls suggested that a strong successor is needed to lead the network of APEC CTF.
- Dr. Silberglitt asked Dr. Nares to recommend a list of 5 IAB candidates who are also in PPSTI Working Group, and perhaps invite these potential members to attend the IAB Meeting.
- Dr. Chatri also suggested that APEC CTF should look into both possibilities of people in permanent positions and people who were appointed to participate in PPSTI meetings.
- Dr. Pichet advised APEC CTF to be pro-active on this regard during the transformation of ISTWG to PPSTI. The funding of APEC CTF should come from within the APEC group i.e. from member countries and partners.
- Dr. Nares mentioned that there are PPSTI meetings twice a year at the venue of the APEC host. It is hosted by China in 2014. Representatives from Australia, China, Japan, and Korea will also attend the meetings. Delegates from Thailand will include representatives from the Ministry of Science and Technology (MOST) and APEC CTF, STI Office.

2.3.6 Publications

Dr. Srichattra reported publications of Horizon Magazine which were edited by APEC CTF, National Science Technology and Innovation Policy Office (STI), and a publication of Biomass Technology Status Report 2013 which was edited by the working group for Bioenergy Science Technology and Innovation Policy for Thailand in the context of AEC, STI Office, and the Joint Graduate School of Energy and Environment (JGSEE).

3. Report of Activities

(October 2013 – October 2014)

3 Report of Activities (October 2013 – October 2014)

3.1 Foresight Projects

3.1.1 Integrated Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries: Food - Energy - Water Nexus

The APEC Center for Technology Foresight (APEC CTF) of the National Science Technology and Innovation Policy Office (STI) of Thailand, in partnership with the Rockefeller Foundation, organized a project conducted from August 2011 to October 2012 with a series of workshops to apply an integrated foresight approach coupled with sustainable economic and ecological choices to develop strategies and actions that advance science, technology, and innovation for inclusive development of ASEAN countries. This project was conceived in agreement with the ASEAN Krabi Initiative's vision of the ASEAN leaders in promoting "Science, Technology and Innovation for a Competitive, Sustainable, and Inclusive ASEAN".

A wide range of data and reports held by APEC CTF and researchers was first examined to build a strong knowledge base about approaches and barriers to food, energy, and water security in the ASEAN region. Then, three twoday participative scenario workshops were held in Bangkok, Jakarta, and Hanoi between January and April 2013. A final Symposium on the 1st-2nd of October was held in Bangkok, in which the findings of the project were presented, and the nexus between food, energy, and water and its implications for policy in the context of ASEAN 2015 were explored in details, with senior representatives from the great majority of ASEAN nations, and with experts in food, energy, and water policy and management. On the basis of these findings of the workshops, a Real-Time Delphi survey of participants across the ASEAN region was constructed, largely by the staffs of APEC CTF, and distributed to a wide range of respondents across the ASEAN region. Finally, an impact evaluation exercise which captured perspectives and experiences of the participants at each meeting about the foresight processes used and their potential applications was performed.

The results of the project are intended for use to formulate a new set of insights about what may be possible by 2020 after the completion of the ASEAN Economic Community (AEC) in 2015 in terms of stable, productive, and innovative employment prospects in the emerging ASEAN economies.

3.1.2 Innovation Futures in APEC: Competitiveness and Grand Challenges

The foresight exercise considers a large area of new technologies and innovation efforts which may influence the direction and growth. It also considers unexploited opportunities, technologies, and innovation of all industrial sectors and key enabling technologies that bring technological convergence and provide a broad range of current and near future innovations, which will transform the industry to a certain extent. To explore the horizon and scan future patterns of innovation in practice, it is thus necessary to contextualize these developments and determine ahead for uncertainties and major changes which will happen corresponding to innovation system and scenarios.

Foresight approach is very important since it looks beyond time horizons that can be addressed by current trends and, moreover, into qualitative trend breaks that can make major changes on development pathways of the industry. This foresight exercise looks not only for qualitative trend breaks to occur, so that major changes in both innovative and markets can happen, but also stays close to decision-making at the present time to highlight key policies to cope with challenges for the next couple of years. Materialization of this foresight exercise would facilitate and accelerate innovation-driven development and collaboration among APEC economies.

This project aims to integrate foresight tools such as Horizon Scanning, Real-Time Delphi survey, Expert Panels, and Key Technology, to understand the dynamics of innovation system. The scope involves not only a specific knowledge base, technologies, inputs and demands, but also trends and trend-breaking developments which are key drivers. A future-oriented innovation policy is a key to leap into leading positions in trade and investment. This policy can be developed by industrial innovation foresight as a systematic process of anticipating and managing changes, by identifying emerging markets, key drivers, technology trends, technology readiness level, key technology, and requirements. Another objective is to encourage capacity building and to strengthen collaboration among private sectors, governmental organizations, and academia through participation in training and exercises on foresight methodology as well as international workshops and online surveys.

The final outputs of the project i.e. policy recommendations will be delivered to both academia, private sectors, and governmental agencies, especially to policy makers. This will raise awareness of investment in key technologies and their readiness, resulting in a change in directions of science, technology, and innovation at a national level. Upon reprioritization of R&D funding scheme, both fundamental and frontier issues will be adjusted to align with important and feasible actions suggested by the published policy recommendations. Moreover, comparison of one's own readiness with international findings will simultaneously promote technology transfers across APEC, particularly among partners as identification of technology's host and home economies will already be verified by foresight activities.

The expected outcome is maintaining long term development by stimulating immediate actions needed to be taken today, and guiding future collaboration in the region towards the next decade in science, technology, and innovation advances to enhance competitiveness and sustainable development.

3.1.3 Thailand's National Materials Technology Development Framework

In 2012, the cabinet approved the National Science Technology and Innovation Policy and Plan 2012 - 2021, a ten-year policy and plan of science, technology, and innovation development to enhance economic competitiveness, people's quality of life, and sustainable development through "Green Innovation". According to target industrial sectors in the national plan, Materials technology is one of important technologies which play crucial roles to green evolution.

In collaboration with the National Metal and Materials Technology Center (MTEC), a member of the National Science and Technology Development Agency (NSTDA), and the National Science Technology and Innovation Policy Office (STI), APEC CTF organized three foresight workshops during November 2013 and January 2014. By using Scenario Building technique and Technology Roadmapping, future views presenting the role and needs of Materials technology for industry development of Thailand in the next decade were explored. Stakeholder analysis was applied to analyze power and interest of all stakeholders in Materials technology for selecting participants for the workshops. The target industrial sectors include automotive and auto part, machinery, rail transport infrastructure, food and agriculture, energy, garment, construction, electronics, medicine and health care, packaging, etc. The expected outcomes of the workshops are vision and strategic plan of national Materials technology development framework for Thailand's industrial sectors.

3.1.4 Thailand National STI Reform Forum

The National Science Technology and Innovation Policy Office (STI), Ministry of Science and Technology (MOST) has been assigned by the National Council for Peace and Order (NCPO) to prepare the Science Technology and Innovation Reform Proposal. This proposal will be a national policy for moving beyond the Middle-Income Trap, and consequently, Thailand will become a developed country within the next ten years, by a joint venture between the government and private sectors for development of science, technology, and innovation at 1% of Gross Domestic Product (GDP) by the end of the eleventh National Economic and Social Development Plan (2012 – 2016), and at 2% of GDP by the end of the twelfth National Economic and Social Development Plan (2017-2021).

In support of this STI reform proposal, STI Office organized the "Science Technology and Innovation Reform Forum for Thailand" in four major regions during July and August 2014 - Bangkok (Central), Chiang Mai (Northern), Khonkhan (Northeastern), and Songkla (Southern). In Bangkok, the workshop provided three STI policy issues: STI and national development plan, system of budget allocation, and regulation and management system for STI. The regional workshops provided two issues: STI for industrial development, and STI for social and environmental development. In addition, the STI reform forum contained a brainstorming process by using card technique with representatives from public sectors and other relevant stakeholders. The results were important for foresight of science, technology, and innovation policy for Thailand in the next ten years.

3.2 Networking

3.2.1 NISTPASS visit for Thailand's experience in science and technology integration with ASEAN member countries

The APEC Center for Technology Foresight (APEC CTF) welcomed delegates from the National Institute for Science and Technology Policy and Strategy Studies (NISTPASS) Vietnam to visit the Center in November 2013. The purpose was to share experiences in integrating science and technology with ASEAN countries, and to discuss development, monitoring, and evaluation of science, technology, and innovation policy, establishment and management of Center of Excellence, and STI consultancy service for SMEs. APEC CTF also arranged meetings for delegations with the National Science and Technology Development Agency (NSTDA), Thailand Center of Excellence for Life Sciences (TCELS), Stockholm Environment Institute (SEI) Asian Office, Fiscal Policy Research Institute Foundation, the College of Management, Mahidol University (CMMU), Noviscape Consulting Group Company Limited, and Siam Intelligence Unit (SIU).

3.2.2 UK-Thailand Workshop: Science and Foresight for Strategic Flood Risk Management

The British Embassy organized a one-day workshop on foresight and science for flood risk and climate change in Bangkok on the 8th of November 2013. Dr. Surachai Sathitkunarat, Executive Director of APEC CTF, was invited to give a presentation on "Foresight and Science to inform public policy". The contents covered foresight concept, foresight tools, and the results of "the Integrated Foresight for Sustainable Economic Development and Ecoresilience in ASEAN Countries" project, and "Thailand Technology Needs Assessments for Climate Change" project. The topic was arranged in the foresight and strategy session with experts from Environmental Change Institute (ECI) University of Oxford, and UK Environment Agency.

3.2.3 UN ESCAP Nexus

The World Water Day 2014 (WWD2014) was celebrated around the world on Friday the 21st of March 2014 with the theme of Water and Energy. Globally, the WWD2014 was facilitated jointly by United Nations University (UNU) and United Nations Industrial Development Organization (UNIDO). In Thailand, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and United Nations Educational Scientific and Cultural Organization (UNESCO) together with the host country, the Thai Government, organized the WWD2014 Celebration at the UN Conference Centre (UNCC), Bangkok. The Asia nexus dialogue on "Water Infrastructure Solutions for the Food-Energy-Water Nexus" was organized prior to the celebration. Dr. Surachai Sathitkunarat, Executive Director of APEC CTF, was invited to give a presentation on the topic "Integrated Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries" in the nexus case study in Asia session, in order to share the APEC CTF's initiative in ASEAN foresight on Food-Energy-Water nexus.

3.2.4 International Foresight Conference, Japan

The National Institute of Science and Technology Policy (NISTEP), Japan organized an international conference entitled "the 5th international conference on foresight: foresight activities for solving societal issues" on 12th-14th of February 2014 in Tokyo. The conference aimed to discuss the future direction of the foresight activities from both international and domestic viewpoints, and shared experiences around the world, including emerging trends of society, science, and technology to elicit implications towards desirable society. Dr. Surachai Sathitkunarat, APEC CTF Executive Director, was invited to speak on the topic "Integrated Foresight for Sustainable Economic Development and Eco-Resilience in ASEAN Countries" in the international activities session. Furthermore, Dr. Surachai participated in a workshop on future scanning entitled "Futures with water: Too much and too little (2034)", organized by NISTEP. The conclusion of the workshop described three futures with water from the perspective of cities, the food chain, and industry.

3.2.5 Collaboration with Foresight and S&T Research Institutes in Chinese Taipei

In June 2014, a researcher and an expert from Industrial Technology Research Institute (ITRI) and Taiwan Institute of Economic Research (TIER) visited STI research institutes in ASEAN countries such as Thailand, Singapore, Indonesia, and the Philippines in order to gather ideas and discussion on future directions of Taiwan research institutes to overcome current challenges for sustainable development. The APEC Center for Technology Foresight (APEC CTF) organized a visit of Taiwanese researchers and facilitated high-level meetings with leading S&T research institutes in Thailand such as King Mongkut's University of Technology Thonburi (KMUTT), the National Science and Technology Development Agency (NSTDA), the Ministry of Science and Technology (MOST), and the National Science Technology and Innovation Policy Office (STI). In July 2014, under APEC Policy Partnership on Science Technology and Innovation (PPSTI) Working Group, APEC CTF proposed a concept note to carry out foresight activities in particular for future benefit of S&T development in APEC economies. This concept note obtained co-sponsors from many APEC economies including Chinese Taipei. In September 2014, ITRI and TIER organized an innovation foresight workshop called "InnoSight Workshop 2014: A New Vision for Industry Technology" with around 10 distinguished guests from ASEAN countries, including the Deputy Secretary General of STI Office, Dr. Kitipong Promwong, whom was invited for a roundtable meeting together with other 30 key participants from relevant organizations from Taiwan government agencies, academia, and industries. Dr. Angkarn Wongdeethai, as an APEC CTF representative, requested for closed meetings with key stakeholders who are responsible for Taiwanese national foresight projects in order to exchange ideas, learn from best practices, expand network, obtain suggestions, and seek further collaboration for the APEC PPSTI Innovation Futures foresight project.

Taiwan national S&T and foresight activities are funded and supported mainly by two ministries: Ministry of Economic Affairs (MOEA) which is responsible for funding applied researches to support industrial technological development, and Ministry of Science and Technology (MOST) which is responsible for funding basic researches and frontier researches to support and strengthen the fundamental of S&T development. There are several types of organizational funding under these ministries such as full funding by the government, and partly funding by industrial sectors and private companies, whereby most of them have long-term government projects. In August 2014, APEC CTF visited key foresight stakeholders under MOEA, including Market Intelligence and Consulting Institute (MIC), Institute for the Information Industry (III) in Taipei, Industrial Economics and

Knowledge Center (IEK) ITRI in Hsinchu, Development Center for Biotechnology (DCB) in Taipei, and Metal Industries Research and Development Centre (MIRDC) in Kaohsiung. The aforementioned organizations are the key stakeholders who were the designers, planners, and actors for the series of the long-term Taiwanese Foresight 2015/2020/2025. Four Scenarios were generated with visions and strategic directions. Several key technologies and action plans to achieve goals were identified. Last but not least, APEC CTF had a meeting with the Department of Foresight and Innovation Policies - a foresight unit under MOST in Taipei. This department was newly established and is currently under restructuring to become a think tank for analyzing, foresight, and planning for the S&T development in Taiwan. MOST has been assigned to increase and strengthen the roles of this foresight unit by creating a platform to link and share database and statistics from other relevant think tanks and key stakeholders to create robust and strategic foresights for Taiwan national STI plan and policies.

3.3 Trainings

3.3.1 The 2nd Science Technology and Innovation Policy Management Program (STI-PMP)

Thailand's National Science Technology and Innovation (STI) Policy and Plan (2012-2021) is the new beginning of STI policy directions. The plan provides mechanisms to enrich Thailand's innovation system at all levels. The plan was designed to address four major driving forces shaping the balance of sustainable economic growth and quality society, namely, ASEAN integration and regionalism, social and demographic changes, energy and environmental security, and technology and innovation trends. There are five development strategies to achieve these driving forces: empowering society and local communities, enhancing economic competitiveness and flexibility, ensuring energy, resource, and environment security, developing

and enhancing STI human capital, and promoting and supporting the development of STI infrastructure and enabling factors.

In support of these policy directions, STI Office organized the "Science Technology and Innovation Policy Management Program (STI-PMP)" with an aim to provide STI knowledge base to executive directors and high-level policy makers from different organizations for further integration on STI with other sectoral policies.

The program contained a workshop employing foresight tools, namely, Scenario Building, Future Wheels, Delphi survey, and SWOT analysis in order to pull insights into two major areas of STI development – society and economy. The outcome of the workshop was precise view of challenges and opportunities in science, technology, and innovation system, and development of strategic policies and measures to enhance well-being and competitiveness of the country by using science, technology, and innovation.

3.3.2 Foresight lecture, Siam University

Dr. Surachai Sathitkunarat, APEC CTF Executive Director, was invited to give special lectures on the topic "Foresight" for undergraduates of Siam University. The lectures aimed to educate 4,000 university students on foresight thinking, foresight tools, and case studies and lesson learn of APEC CTF.

3.3.3 Foresight course, Thammasat University

Dr. Surachai Sathitkunarat, APEC CTF Executive Director, has been invited to formulate a university course entitled "Technology Foresight and Roadmapping" and teach graduate students of Innovation College, Thammasat University. The lectures aimed to teach graduate students on technology foresight, foresight tools, both theory and practice, in particular Technology Roadmapping.

3.4 Consultancies in APEC Economy

SEAMEO Regional Study and Development of Post-2015 Education Agenda in Southeast Asia

The Southeast Asian Ministers of Education Organization (SEAMEO) in partnership with the National Institute of Science and Technology Policy (NISTEP), Ministry of Education, Culture, Sports, Science, and Technology (MEXT) Japan, and the APEC Center for Technology Foresight (APEC CTF), the National Science Technology and Innovation Policy Office (STI) Thailand conducted a foresight study applying futuristic methodology to build preferable depiction of the Post-2015 Education in Southeast Asia. This seven-month project: "Survey on Education Scenario and Education Agenda in Southeast Asia beyond 2015" involved SEAMEO's key partners including the Institute for the Promotion of Teaching Science and Technology (IPST) Thailand, Burapha University Thailand, and the Thailand-United States Education Foundation (Fulbright Thailand). The United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Children's Fund (UNICEF) also actively involved in the discussion.

In June 2014, the APEC CTF team, Dr.Surachai Dr.Angkarn and Dr.Apichat, facilitated a brainstorming workshop for the SEAMEO survey project with around 50 participants from ASEAN members. Suggestions for Real-Time Delphi Lime-survey questions, and technical supports for launching the Delphi survey across ASEAN countries were coordinated and worked hand-in-hand between the APEC CTF team and SEAMEO team, led under close supervision of the Executive Director of APEC CTF, Dr. Surachai Sathitkunarat. The full result of the Delphi survey was analyzed, summarized, and used as preparation materials for the SEAMEO Executive Committee Meeting in August 2014. The result was also disseminated to member countries as part of the Strategic Dialogue for Education Ministers

(SDEM), as well as to the 8th ASEAN Education Ministers Meeting (ASED) in September 2014 and other ASEAN-related meeting in Lao PDR.

3.5 Recent Development in APEC PPSTI

APEC Policy Partnership on Science Technology and Innovation (PPSTI) Working Group

The APEC Center for Technology Foresight was a project under the APEC Industrial Science and Technology Working Group (ISTWG) since 1998. Originally, the ISTWG was known as the Working Group on Expansion of Investment and Technology Transfer, which was initiated at the APEC Ministerial Meeting in Singapore in 1990.

In 2012, APEC agreed to broaden the mandate of the former APEC ISTWG to include issues of innovation policy development and intensify cooperation among governments, businesses, and academia, thereby transforming the ISTWG into the Policy Partnership on Science Technology and Innovation (PPSTI) Working Group. A new terms of reference outlining the PPSTI's mandate and goals was endorsed.

APEC PPSTI supports the development of science and technology cooperation and effective innovation policy in APEC economies. It serves as APEC's primary forum to engage government, private sector, and academia in joint scientific research.

Its strategic aim is to enhance economic growth, trade and investment opportunities, as well as social progress, in harmony with sustainability. PSSTI will seek to develop an enabling environment for market-based innovation policy that supports commercialization, promotes innovation capacity, and facilitates cooperation among APEC members.

Among other activities, PPSTI works to:

• Strengthen collaboration and enhance member economies innovative capacity;

- Develop science, research, and technology cooperation;
- Build human capacity;
- Support infrastructure for commercialization of ideas;
- Develop innovation policy frameworks; and
- Foster an enabling environment for innovation.

PPSTI Strategic Plan- Final Draft

The PPSTI strategic plan was considered in the 4th PPSTI Meeting held in Beijing China. The Priority Areas have been approved as followed;

- A. Building Science Capacity Sub Group (SG) Chair: China, SG Vice Chair: USA
- B. Promoting Enabling Environment for Innovation Sub Group (SG) Chair: Philippines, SG Vice Chair: Indonesia
- C. Enhancing Regional Science and Technology Connectivity Sub Group (SG) Chair: Chinese Taipei, SG Vice Chair: USA

APEC CTF has been approved as a mechanism in the Priority Area B. Its objective is to promote Public-Private-Partnerships (PPP) for science and technological innovation with KPIs as followed: develop an inventory of model public-private partnerships and best practices to support science and technological innovation, strengthen links between the public and private sectors to support research and development commercialization including financing mechanism, develop frameworks and policy recommendations to increase public-private partnerships in support of commercialization.

Toward Innovation-Driven Development (Final Draft)

China proposed a document entitled "Toward Innovation-Driven Development" in order to formulate the APEC leaders' statement for the APEC Leaders Meeting in 2014 in China as followed: **Recognizing** that innovation represents an important pathway to improve the quality of growth, promote economic and social development, address the global challenges, and achieve common prosperity of the Asia-Pacific;

Recalling the "2011 Honolulu Declaration" highlighting the importance of open and non-discriminatory trade and investment policies to the implementation of innovative growth strategy, the "2012 Vladivostok Declaration" expressing the resolve to give full scope to the role of all APEC mechanisms in driving innovative growth through closer regional cooperation, and the "2013 Bali Declaration" underscoring the commitment to achieving innovative growth through human resource exchange, infrastructure development and enhanced financing;

Considering the 2014 APEC theme "Shaping the Future through Asia-Pacific Partnership" and its three priority areas: (I) Advancing regional economic integration; (II) Promoting innovative development, economic reform and growth; and (III) Strengthening comprehensive connectivity and infrastructure development.

We, member economies of the APEC, agree to:

1. **Foster** a pragmatic, efficient, and vigorous partnership on science, technology, and innovation (STI) to enhance economic growth and social progress, in harmony with sustainability, through the development of an enabling environment for market-based innovation policy in support of commercialization, the promotion of innovation capacity, and the facilitation of innovation cooperation among member economies, with the APEC's goal to achieve innovative growth by 2023.

2. **Strengthen** the policy dialogues among government, academia, and business through existing mechanisms such as Policy Partnership on Science, Technology and Innovation (PPSTI) and its associated Innovation Policy Dialogues (IPD), Innovation Technology Dialogue (ITD), and APEC Research and Technology Program (ART) workshops.

3. **Create** a favorable innovation ecosystem, strengthen the role of market in allocating innovation resources, enhance the creation, use, protection and management of IPRs, and improve technology commercialization and risk investment mechanisms.

4. **Improve** the innovation capacity of member economies, especially for developing economies through the development of human capital, scientific research and infrastructure.

5. **Promote** science popularization programs (i.e. ASPIRE, APEC Youth Science Festival), to bring science and innovation closer to the public and foster a culture that encourages innovation and entrepreneurship.

6. **Strengthen** the role of innovation in the global production and value chains, enhance collaborative innovation in various fields including science, technology, industry, finance, management, and business model.

7. **Engage** industrial and commercial sectors especially ABAC members in STI collaboration.

8. **Set** cooperative priorities on STI policy and strategy, smart city technologies, science park, technology incubation and commercialization, climate change etc.

9. **Give** full play to the existing APEC mechanisms such as: Asia Pacific Center for Theoretical Physics, APEC Cooperation for Earthquake Simulation, APEC Climate Center, APEC Research Center for Typhoon & Society and <u>APEC</u> <u>Center for Technology Foresight (APEC CTF)</u>.

10. **Intensify** cross-fora cooperation and coordination on innovation within APEC framework and beyond.

2.3.6 Publications

Horizon 15th issue, Foresight Society, Key Technologies.

