ASIA-PACIFIC ECONOMIC COOPERATION
FOURTH MEETING OF THE APEC ECONOMIES' CHIEF SCIENCE ADVISORS AND EQUIVALENTS
LIMA, PERU, 18-19 AUGUST 2016

Executive Summary

Highlights

The Fourth Meeting of the APEC Economies' Chief Science Advisors and Equivalents met in Lima, Peru on 18 and 19 August 2016. Seventeen member economies (Australia, Canada, Chile, China, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, The Philippines, Russia, Chinese Taipei, The United States of America and Viet Nam), and EPWG attended the meeting.

The Fourth Meeting of the APEC Economies' Chief Science Advisors and Equivalents was chaired by Sir Peter Gluckman, Prime Minister's Chief Science Advisor from New Zealand and Co-Chaired by Dr. Gisella Orjeda, Peru, President of the National Council of Science, Technology and Technological Innovation of Peru (CONCYTEC), and with Ms. Karin Fassbender from Peru as Vice-Chair.

1. Opening remarks from Co-Chair Peru

Day 1 commenced with opening remarks from Co-Chair Peru Ms. Karin Fassbender, who welcomed all participants and highlighted the importance of a council advisory system when facing environmental disasters as an economy and as an integrated region. Sir Peter Gluckman was introduced and took the floor. He pointed out that the leaders had recognized the significance of APEC Economies' Chief Science Advisors and Equivalents and had sought their recommendations. He added that on the one hand, the group needed to differentiate itself from PPSTI and that on the other hand it would be positive to coordinate the group's agenda with PPSTI's on themes that are related. This was followed by a Tour de Table with the participation of all attending economies.

2. Tour de Table

Australia mentioned they were in process of implementing a national innovation science agenda.

Canada introduced its science and innovation agenda, the creation of the Minister of Science position, the importance of coordinated efforts among its different states and the fact that scientists were actually consulted for policy-making purposes.

Chile followed by discussing the need to develop productivity, the creation of the Ministry of Science, and six strategic areas requiring science and technology: 1. Mining 2. Tourism 3. Food 4. Construction (Smart Cities) 5. Agriculture and Fishery, and 6. Health services.

China presented some facts regarding its substantial improvement on international collaboration for research and publications and also mentioned that China had undergone factor-driven and efficiency-driven stages and was now in the transition stage towards becoming an innovation-driven economy. Indonesia requested the international forum to focus on discussing measures of prevention against El Niño's disastrous consequences. Japan introduced its science and innovation plan as a key driver to transform society and with a special focus on enhancing preparedness.

The Republic of Korea continued, presenting its primary priority for science, technology and innovation as being a creative economic center, it also commented that it had seen an increase on young start-up companies and international entrepreneurship collaboration and that it was particularly promoting a green climate technology roadmap.

Malaysia expressed that its aim was for science advice to be the center of policy-making, and a specific goal that had already been achieved was the establishment of the National Science Council, chaired by the Prime Minister, industries and academia, which also complemented the National Disaster Agency that had recently been set up.

Mexico highlighted their goal to increase national productivity through five major strategies since 2015: 1. The growth of national investment in science, technology and innovation 2. The formation and strengthening of human capital 3. The strengthening of regional development based on local capacities 4. The fostering of the participation of the private sector, and 5. The work on the capacities of science and technology in the country; all with the cross-cutting pillar of international collaboration, mainly via APEC.

New Zealand commented that it had massively increased its investment in Research and Development, and that the science advisor to the government met every two to three weeks with the Minister of Justice to discuss environmental and conservation issues and, finally, that two roadmaps had been establish for the next 20 years: 1. The role of science in emergencies' management, and 2. Public understanding of the impact of digitalization on society.

Papua New Guinea highlighted its diversity and multi-cultural background and the difficulty this posed, as well as the fact that 89% of the population lived in rural areas; it also mentioned that it had undertaken a national research agenda with key areas such as the creation of new knowledge to address the problems in society, the building of human capital and capacity, the ownership of science by citizens and public understanding of the impact of science in livelihoods and ended saying that it would largely rely on collaboration with APEC economies.

Peru commented that the new government in office has highlighted the importance of STI for social and economic development and clarified that although Peru did not have a Ministry of Science and Technology, CONCYTEC was its governing body for STI.

3. PPSTI Update

- Then, followed an update from PPSTI where Chair reminded participants that the previous year in Malaysia, a discussion had been held regarding the relationship between the Chief Science Advisor and Equivalents group and PPSTI; regarding a possible duplication of work. However, it was agreed that these two groups were complementary to each other.

4. Science Advice in and around Emergencies: Introduction to EPWG, Reports from Auckland Secretariat

- Then followed the session on Science Advice in and around emergencies: Introduction to EPWG, Reports from Auckland Secretariat. The Chair recognized the EPWG Chair, with whom he spent a lot of time discussing related processes at the meeting in Malaysia. The United States commented that the range of disasters were often economy-specific. Russia highlighted the importance of disaster risk reduction and that APEC should consider making earthquakes' risk a priority; many of its economies being exposed to them. Peru pointed out that much work needed to be done between economies in order to better prepare themselves for the effects of El Nino. China affirmed that they suffered great damage, both in the economic and lives sense, from natural disasters.

5. Developing Human Capital – Investment in Scientists related to Risk Management and Climate Change

Following that session, the economies continued with Developing Human Capital – Investment in Scientists related to Risk Management and Climate Change, all economies reached consensus stated that APEC economies were particularly prone to natural disasters with catastrophic results, and that cross-fora sharing of information was an essential part for the preparation of more scientists with updated technologies.

6. Science Advice and Sustainable Development Goals

- The economies then moved to discuss Science Advice and Sustainable Development Goals, where Sir Peter Gluckman stressed the fact that there needed to be a good link between scientists within the country and policy makers.

7. Social License – Indigenous and Local Knowledge

- Day 2 commenced with Social License – Indigenous and Local Knowledge, discussion led by Sir Peter Gluckman who pointed out that the issue of particular interest to APEC was the region's most diverse cultures in the world and the necessity of improving communication with local communities regarding the application of technologies.

8. Science Advice and Foreign Ministers – Update of Development and Capacity

- The topic which followed was Science Advice and Foreign Ministries – Update of Development and Capacity and the important role of science advisors and governments in policy making and sharing of experiences.

9. Science Advice and Small Developing States – Role of APEC Economies

- Science Advice and Small Island Developing States – Role of APEC Economies was the next item in question considering that the APEC region contained a significant proportion of Small Island Developing States (SIDS). The economies discussed the large number of scientific challenges they faced and the interface between local knowledge and western science.

10. Role of National Academies in CSAE, Terms of Reference of CSAE, Report to PPSTI and other APEC Fora

- Next on the agenda was the Role of National Academies in CSAE, Terms of Reference of CSAE, Report to PPSTI and other APEC Fora which referred to the group's Terms of Reference, carrying out discussions and taking certain amendments into consideration.

11. Next Meeting's Agenda

The last item to be discussed was the Next Meeting's Agenda where Viet Nam gladly invited all participants to the next CSAE meeting which would be held in May in Hanoi. Malaysia continued saying that they would be interested in discussing the 4th industrial revolution; that could possibly be included in the last priority of Viet Nam.

12. Fourth CSAE Meeting Endorsements and Agreements:

1. CSAE discussed and carried out amendments on its Terms of Reference; pending review by the SOM group.

13. Fourth CSAE Meeting Intersessional Actions:

1. CSAE members shall form a constructive relationship with PPSTI; these two groups having different but complementary functions.
2. CSAE Chair noted he would try to be an observer in the first PPSTI meeting the following year.

14. Fourth CSAE Meeting Notation

1. CSAE welcomed the participation of EPWG and noted its concern with the topics related to Science Advisors.

15. Closing Remarks

The Chair noted that discussions had been very fruitful, with positive feedback by all participating economies. There remained many solutions to be found regarding several topics: such as improving warning systems, increasing collaboration and communication among economies. Regarding the meeting for the following year, he invited all members to participate in the elaboration of the agenda.

The Chair thanked the host, the Peruvian government, CONCYTEC and the entire team for all the arrangements. In addition, the Chair expressed his thanks to the Secretariat and the support staff.

Fourth APEC Chief Science Advisors and Equivalents (CSAE) Meeting

18-19 August 2016
Lima, Peru

Meeting Report

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GLOSSARY

ABAC	APEC Business Advisory Council
APCC	APEC Climate Center
APCTP	Asia Pacific Center for Theoretical Physics
APRU	Association of Pacific Rim Universities
ART	APEC Research and Technology Program
CBN	Capacity Building Network
CTCN	Climate Technology Center and Network
CSAE	Chief Science Advisors and Equivalents
EDNET	Education Network
EPWG	Emergency Preparedness Working Group
HLPD	High-Level Policy Dialogue
HRDWG	Human Resources Development Working Group
IASP	International Association of Science Parks and Areas of Innovation
ILK	Indigenous and Local Knowledge System
INDCs	Intended Nationally Determined Contributions
IoT	The Internet of Things
IoV	The Internet of Vehicles
IPP	Innovation Policy Platform
KPIs	Key Performance Indicators
PPFS	Policy Partnership on Food Security
SCE	Steering Committee on Economic and Technical Cooperation
SDGs	Sustainable Development Goals
SOM	Senior Officials' Meeting
STEM	Science, technology, engineering and mathematics
STEPI	Science and Technology Policy Institute
STHE	Science and Technology in Higher Education
STI	Science, technology and innovation
ToR	Terms of Reference
WE	Women and the Economy Statement
YST	Young Scientists' Training

Fourth meeting of the APEC Economies' Chief Science Advisors and Equivalents

18-19 August 2016
Lima, Peru

Co-Chairs: Sir Peter Gluckman, Prime Minister's Chief Science Advisor, New Zealand

Dr. Gisella Orjeda, Peru, President of the National Council of Science, Technology and Technological Innovation of Peru

Day 1 – August 18, 2016

MORNING SESSION

ITEM 1: *Welcoming remarks from the co-chairs*

After welcoming all participating economies, Co-chair Peru opened the session by stating that environmental disasters were not limited to boundaries; they required joint response from more than one economy. As Economies suffering disasters such as tsunamis, volcano eruptions, dengue, etc., some economies did not have a council advisor system; there being a need for strong research institutions. The well-being of their people needed to be consolidated. For that reason, Peru was now proud to introduce the programs of popularization of sciences, technology and innovation; they were strategic tools. With the formulation of such programs, the aim would be to achieve a strong national innovation system, improving collaboration between academia and the public and private sectors.

During the meeting, the economies would cover important aspects, related to risk management, indigenous and local knowledge; the important relationship between traditional knowledge and science. They should explore how traditional and scientific knowledge should benefit from each other, regarding warning systems for risk management; disaster risks such as El Nino, employing scientific and technological development. As the participants knew, not all APEC economies had access to this technology. There had been an implementation of a national science technology and innovation plan during the last few years and now the national science technology and innovation policy promoted by CONCYTEC.

In conclusion, they were already willing to stretch ties with fellow economies to achieve their common goals. Peru welcomed Sir Peter Gluckman to take the floor.

After thanking Co-chair Peru for the introductory comments, Sir Peter Gluckman stated that last year; economies spent a lot of time reflecting on the role of that

group. It had been a fruitful discussion, which most importantly had been to recognize that it was an important group to APEC; they influenced prime ministers, presidents who in turn reflected on their actions on the APEC region. The group was not just an excuse to meet with friends once a year; they had to please the customer, that being their governments. It led to recommendations that ended up in the Declaration of Manila; scientific advice in and around emergencies. The leaders recognized the importance of the group and sought their advice. That was reflected on the current agenda as it was a response to the leaders on how their economies could improve the use of science in and around emergencies. He thanked EPWG for being present; that being another group of APEC concerned with the topic.

Potential ToR, they discussed with other groups in APEC. They needed to coordinate their agenda with PPSTI, but there were parts that were not related. The point of their discussions should be recommendations or advice through the APEC system to their leaders. He thanked all for attending, in particular Peru for hosting the meeting.

Sir Peter then suggested a tour de table for economies to introduce themselves in 3 to 4 minutes on significant changes/improvements from the previous year.

ITEM 2: ***Tour de Table – Update from Member Economies on Developments in Science/Policy Interactions***

The tour de table began with the introduction of Australia who gave a very brief update on events in their economy, stating they were in the process of

implementing a national innovation science agenda; a 1.1 billion dollar package. The government was reelected and continued with implementation; focusing on innovation, culture, capital, collaboration (research, industry and international engagement), talents, skills and government; all given as examples. It was also necessary to be innovative. Recently, it began a global innovation linkages program; they really saw national engagement to drive joint initiatives in economies.

Canada followed by introducing its science and innovation agenda. A new government began its term at the end of the previous year. They were working on an innovation agenda for new directions; very strong engagement on a wide front; messages from government were very clear. Such being that fundamental research was of great importance, to focus on applied research; better coordination of the federal sciences from different states was necessary, considering each was autonomous and independent. The new government appointed a minister of Science with full authority; this being a significant change to increase coordination and support of science; to create a chief science advisor in Canada. The economy had such position, but was abolished; it went through a transformation and did not have the standard it currently held. Scientists could speak freely about their work; being consulted when policies were made.

Then came the turn of Chile; thanked the Chair, stating it was its first time there and very glad for the invitation. The economy began saying that there was an absolute necessity to develop productivity; they lost it some ten years ago. In order to recover it, they needed to transform their structural platform for development, particularly focused on intensive export production; now they needed to diversify. For that, more knowledge, technology and science were necessary. They had organized a new ministry of Science and a foreign minister to collaborate with that office. Additionally, strategies areas were put in place; these required developing. 1. Mining: knowledge was required in order to have a structure; 2. Tourism: They had natural observatories, on climate, wind, sea astronomy and the sub Antarctic area; they had invited scientists to work with them. 3. Food: had developed an engine to design food; with biotechnology there was that possibility. 4. Productivity and construction (smart cities); very important in the northern part of Chile because mining and lights could destroy their skies. 5. Agriculture and fishery. 6. Technology and services in health.

The economy had to orient this ministry and solve problems: the capital market strengthened; formation of their human capital; a finance system to carry out research. He stated that Chile's investment in science was very low and hoped to be able to extend talks on the topic.

The following economy, China, presented some facts to the effect that since 2008, China had increasingly co-authored papers. Due to the quality of the paper, in the total citations, they were ranked number 4. If they looked at individual fields, most of them ranked 10 or more. After a decade, most fields improved dramatically. China made substantial improvements in research quality. It had the first or second largest IP5 statistics report (patents). Huawei had the number

1 patent application in businesses. China had the third place of patent applications, after US and Japan. Mainland China have undergone factor-driven and efficiency-driven and was now in the transition stage towards innovation-driven.

In recent years, China released many policies to boost innovation and to promote massive entrepreneurship. This year: the blueprint for turning the economy into an innovative nation by 2020. In August, China issued a national scientific and technological innovation 5-year plan. The main tasks being: to enhance the ability of original innovation; to focus on the national strategies and improvement of peoples' livelihoods; to strengthen the leading role of enterprises in technological innovation.

The main indicators of the 13th 5-year plan for science and technology: Ranking of national comprehensive innovation capability (currently they were number 18, by 2020 aimed to reach 15); contribution of science and technology progress to economy's growth; high/new technological enterprises operating income, among others. On that note, China concluded its presentation.

The floor was then turned over to Indonesia, who thanked the Chair and began speaking about El Nino and how its scientists were focusing more seriously on the effects; these contributed to massive flooding and drought which were a main contribution factor causing large scale degradation from uncontrolled fires. China concluded stating that the international forum was important to discuss measures of prevention against El Nino's disastrous consequences.

The representative from Japan began by introducing their science and innovation plan. Their context was dramatically changing, making it more difficult to make a 5-year plan. The key was to enhance preparedness, not to just promote innovation and new technologies; but using that as a key driver to transform their society. They wanted to propose the new idea of science societal 5.0; they were not competing with Germany, but they placed society at the center. Why name it 5.0? ; Because they wanted to review why society had evolved from gregarious, agricultural masters of nature to industrialization; with a dominance of power in production. They were not satisfied with just promoting information technology. They needed to use IT to have a vision of the next society; a need to better consolidate that concept. The economy needed to invest in fundamentals: people and strengths (skills and others). The key message being everybody on board, they were taking some action on that. The current year, G7 was hosted in Japan and topics of common interest were tried to be found: 1. Global health, tropical diseases; 2. Innovation, making place for women as next leaders; 3. Future of the sea and discussions of renewable energy: cutting edge technologies, sharing the fruits of innovation with everybody. The way of doing science had changed; there had to be a common standard for data sharing. On concluding, Japan stated it would be happy to continue discussions on more collaboration.

Korea continued, presenting its primary priority for STI as being a creative economic center. There had been a large performance by young start-up companies. There were changes in the trend; they went overseas, to Latin

America and Asia, trying to form creative economic centers. There was more collaboration abroad in entrepreneurship.

There was a safer and better life for all; trying to use these technological innovations in partnership with in developing countries, in order to incorporate this STI component. Other changes were the climate technology roadmap; with a sustainable development goal of reduction of carbon in climate technology. They would build up a new team for such technology; and climate adaptation, with big changes in promoting climate technology, with a roadmap for the next ten years.

Next to continue was Malaysia, who presented their primary point as being science advice to be the center of policy in their economy; taking a lead in global challenges. The mega conferences in 2015 were very constructive as to how to proceed. In the Disaster Risk Reduction summit COP21, science was not just part of the ministry of Science, but there were 7 or 8 other ministries with science related issues. One of the challenges was to streamline science governance in the economies. One streamlining was to establish the National Science Council, chaired by the Prime Minister, industries and academia. The representative considered that very good progress; not only looking at science at governance level but how it could interact with society at large. Science has influenced the setup of the national disaster agency; a national body that took care of natural disasters. Malaysia commented that the Prime Minister had endorsed the scientific expert panel as complement to the agency, thus ending its introduction.

Next the representative of CONACYT, Mexico, took the floor, stating it was the first time they participated in the meeting. Their mandate was to increase national productivity; policies oriented towards more balance based on competitiveness advantages. The current administration began working on 5 major strategies in 2015. These included: increase national investment in STI; formation and strengthening of human capital; strengthening of regional development based on local capacities; fostering the participation of private sectors; and, working on the capacities of science and technology in the country. They were very focused on international collaboration; APEC being the main mechanism.

New Zealand began its introduction stating that it had massively increased investment in R&D and not medical and health research. Government required the science advisor to produce input; that being a very major part of their role in health, education, social development, justice. The representative stated that he met every 2 or 3 weeks with the ministry of Justice to discuss environmental matters and conservation. There were 2 roadmaps on what the government needed during the next 20 years. They had major progress with a report related to the role of science in emergency management and public understanding of the impact of digitalization on society. There was a strong commitment to science diplomacy. New Zealand was a small economy, which led a group of 7 countries; they worked together on the STI for policies.

Following New Zealand’s introduction, Papua New Guinea thanked the secretariat responsible for Science and Technology. It went on to say the

economy recognized the importance of S&T; commenting on the progress made during the last couple of years in science and technology, as well as the challenges presented to define the context where it could leverage S&T in their development and economic plans. For Papua New Guinea, it was about their resources and people; being a very diverse country, multi-cultured, very hard to govern, with over 850 languages. Its plan was on how to best develop national endowment; its people and environment. Papua New Guinea's economy was largely dependent on extractive industries; the focus being on the people and promotion of excellence in governance. To focus on research discoveries and inventions, they would largely rely on collaboration with APEC economies; on how to translate and also for commercialization, considering that 89% of the population was in rural areas. They undertook a national research agenda with key areas: create new knowledge to address the problems in society and force translation into business, industries that rely on business from outside. Sustainable use of their endowment, how to do that with a platform; building up human capital and capacity. Science was also about creating responsibility around citizens. They needed to ensure that the community understood science to impact their livelihoods. Promote a fair and equal partnership in collaboration. The current year, they were able to discuss a science and technology program with Australia, their closest neighbor.

Peru then took the floor with Dr. Tania Peña from CONCYTEC; firstly mentioning that the economy had a new government in office, with President Pedro Pablo Kuczynski who has expressed the importance of STI. Some economies knew that Peru did not have a ministry of Science and Technology, but the government body of STI was CONCYTEC. Dr. Ojeda was an equivalent of Chief Science Advisor.

Peru expressed its willingness to continue working with CONYTEC, which was good news for them. Dr. Peña stressed that new STI programs had been formulated the previous year with wording from public and business sectors; such programs had been approved the current year. These included: valorization of biodiversity, information in communication technology, biotechnology and a new program to popularize science at school level with help from universities and the museum. The goal was to strengthen and improve the national innovation system. The president expressed interest on being part of OECD. The current year, the national STI policy was approved; conveying the commitment of the public sector in STI.

The Philippines was the next economy to present itself, stating that on behalf of the new president, it was happy to participate in the meeting. The new president took office on June 30, mandated to regionalizing all their efforts, including STI. Philippines had 17 regions, but most of the budget went to the capital. As from the previous year, there was a new position: Assistant secretary for international collaboration to enhance science diplomacy. Having completed their hazard assessment program, they were now moving towards risk assessment, with a new budget. The national academy was to have a bigger role, increasing investment in basic R&D and technological transfer. Companies that were

adopting R&D results and innovations from their department appeared in priority plans.

Following that presentation, Russia, on behalf of the ministry of Education and Science, commented they were continuing modernization with an enlargement of science careers. Updating the current status of science, he pointed out that the strategy of STI held the same place of national security, social and economic development defined the national development goal. They finalized the preparation of strategy for national approval. The transition from science and technology to science, technology and innovation. The current year was focused on national technology initiative. There were four road maps for the future; build from foresight vision of the world's future.

The following introduction came from Chinese Taipei. It presented an update of its flagship S&T program, green energy, smart machinery, biotech and medicine, security and education. Such program would strengthen their value in agriculture, machinery and circulation. In coming December, they would have an S&T meeting to discuss policy framework for the next 4 years. Lastly, the economy remarked that they would like more international cooperation; through this platform more discussion could be held.

United States followed, thanking Peru for organizing the meeting. The office of science and technological policy worked jointly with the chief adviser. It provided the president and senior staff with technical advice, and played an important part in the role of science branches. There were critical issues for administration. Over the past year, PCAST produced a report on the future of cities, adaptation to climate change.

Regarding US policy advice and integration with policies, there were many mechanisms available, to enhance the capacity of the State Department. These included an increase in the number of technical training personnel; more than 200 working full time in the executive. The innovation forum was new to bring together scientists and businesses.

The host for the following year's forum, Viet Nam then took the floor, beginning by putting forward some updates. Science and technology were considered key driving forces of the economy. Investment for S&T was still limited; expenditure being of over US$ 800 million, 0.4% of GDP. Half of such expenditure came from state budget and 40% came from the private sector. There were 2 important tasks: 1. Develop science and technology markets, commercialization, technical transfer; 2. Improve science and technological tasks from the STI system. They implemented the project for the support of the national innovation system for 2025. Through fora like APEC, they wanted to promote more international collaboration to be the driving force of the economy.

On concluding the tour de table, Sir Peter remarked they were seeing greater coherence among economies.

ITEM 3: *Update from PPSTI*

The Chair reminded the participants that last year in Malaysia there was a discussion regarding the relationship of this Chief Science Advisor and Equivalents group and PPSTI, as some economies were concerned that work could be duplicated. However, the economies reached the agreement that these two groups have different but complementary functions, and thus have to cooperate through a constructive relationship.

PPSTI Vice Chair (USA) informed that PPSTI exists in its current form since 2012 and serves as one of the primary fora of STI within the APEC framework. PPSTI's vision is that by 2025, innovative economic growth is achieved due to its efforts.

Its governing board is comprised of one chair (currently from the People's Republic of China), for a 2-year turn and two vice chairs: one for 2-year turn and the other one is the host economy. The next PPSTI meeting will have a new chair.

This year, PPSTI has covered three main topics: Building science capacity, enhancing regional science, and technology connectivity.

PPSTI's highlights of 2016 are: Innovation Policy Sharing Seminar on Mass Entrepreneurship and Innovation, the ASPIRE prize, the 1st Conference on Centers and Long-term Mechanisms in Korea (a common operating mechanism will be launched, the ToR to guide PPSTI's APEC Centers are currently being discussed), APEC Research and Technology Program (ART) (currently working towards SDGs), and Cooperation with ABAC and HRDWG (joint session).

Some of the most important undergoing projects are:

- the Internet of Vehicles: Capitalizing on the Internet economy to create an integrated network using advanced technology for supporting intelligent traffic management and vehicle control and improving road safety and transportation efficiency,
- SME Cluster Development: Creation of higher value added clusters through supply chain connectivity and by sharing successful models of acceleration and technology transfer,
- Smart City Application Forum: Promotion of energy efficiency through development of energy smart and low carbon model communities and cities utilizing new information technologies
- Dialogue on Sustainable urbanization: Integrating smart/innovative technologies and business solutions into city planning and management and building sustainable, resilient communities.

There are three main pillars for CSAE and PPSTI to work together in coordination and PPSTI mechanisms behind them that could be of use to CSAE are: 1. Emergency preparedness, resilience, and response, with PPSTI's APEC Center for Typhoon and Society and PPSTI project: Building earth and marine observation systems; 2. Developing human capital risk management and climate change, with PPSTI's APEC Climate Center, PPSTI's APEC Mentoring Center for Gifted in Science, PPSTI's collaboration with human resource development

WG; 3. Sustainable Development Goals, with PPSTI's APEC Research and technology (ART) program.

PPSTI work is highly complementary with the Chief Science Advisors and Equivalents group and should pursue closer collaboration.

The chair mentioned that he and the PPSTI chair had met to discuss collaboration between PPSTI and the Chief Science Advisors and Equivalents group and that they agreed that one area to strengthen both groups' relationship should be identified in order to focus on that. He proceeded to share one idea they discussed regarding the social license for new technologies within the APEC region. APEC economies have the most diverse cultural background in the world, they guard indigenous and local knowledge. When the latest technology is discussed, a big part of the population does not accept it, and this may be a barrier or an opportunity for innovation. The political understanding of science, as well as the public understanding of science, is the responsibility of CSAE.

Japan expressed that although the economies agree that the mobilization of innovation is a platform for growth, it also has an impact on transforming society itself and that these changes should be addressed together. Not everything is beautiful with technology and society should have the opportunity to judge what they would like to have in their everyday life. The right balance of advancement of technology and advancement of society itself needs to be achieved. For example, if there are not barriers worldwide between countries, how do you create your taxation system? There is a need for consensus.

The Chair mentioned that the science community did not engage early with society and it did not create a language that was easy to understand. There are many reasons for people not to work with genepools, for example and society needs to understand the risks. Or regarding the advanced digital society and machine learning that could affect people's lives, there needs to be an understandable basis.

Malaysia commented that the acceptance of technology is the very rule of the CSAE. Thus, there is a synergy relationship with PPSTI. There is a need to consider how the acceptance of technology can be achieved and to explore how indigenous and local knowledge can participate.

The PPSTI Vice Chair highlighted that this was a science communication system: Preventing the resistance, adopting new technologies by our societies, choosing technologies that are sustainable for society and taking advantage of indigenous and local knowledge. This needs to be done for already existing policies that we already have, such as vaccines, where there has been declining use. The complimentary link that exists between PPSTI and CSAE should not only be evidence-based policy making but also access to this, data that is defensible and that can stand scrutiny. APEC centers can better standardize data procedures. Collaboration between both groups is very important. He also commented that considering the coming change in leadership in PPSTI, this would be a good time to inject important issues to the agenda.

The Chair replied that he would try to be an observer on the first PPSTI meeting of next year.

ITEM 4: *Science Advice in and around Emergencies: Introduction to EPWG, Reports from Auckland Secretariat followed by Discussion and Recommendations*

Led by Sir Peter Gluckman

The Chair began by acknowledging the EPWG Chair, with whom he spent a lot of time discussing related processes at the meeting in Malaysia. He went on to say that he made some recommendations from this group.

The Leaders' Declaration of 2015 noted that "the provision of science advice before, during and after emergencies can contribute to risk reduction and effective disaster response" and that the Chief Advisors and Equivalents (CSAE) group is well positioned to provide effective science advice in an APEC context, acting as a collective resource with the region, in a manner similar to the roles played in their respective economies".

He pointed out that the EPWG was the other relevant APEC group that focused on this issue, and invited the EPWG Co Chair to take the floor.

EPWG Co-Chair said that last autumn, APEC endorsed the reduction framework, seeking opportunities for cross-fora collaboration. Science and technology is indispensable for our colleagues.

The Chair presented a personal story regarding the New Zealand crisis group being called for a major water contamination in one of their cities. A massive bout of infection, resulting in many ill people, some fatally. He shared how he spent an hour explaining the limitations of PCR and how to communicate this to the public and not generate panic.

The point was in a sense to identify the source of contamination until it was removed; something that was not so simple. Their concern was no so much for the public; rather, what would the reactions be at a political level. His role was not to help them do the obvious thing that water engineers and other experts know what to do; it was to help the science communicate uncertainty to a panicked public, decision making of how to use the science to cope with crisis events. He thought it highlighted the complexity of how the science acted in a complex situation. The anecdote seemed relevant to the following conversation.

How can science help governments cope with crisis events?

He continued saying that he had been very impressed in New Zealand in risk assessment and crisis management; in identifying hazards and risks. Some risks and hazards were very easy to identify. New Zealand has done a lot of work on earth-related risks. The economy also knew that the estimates from other economies placed risks occurring every decade and that there was no preparation for such risks.

He also told about a bio diversity risk that turned out to be important. He mentioned that seaweed was extinct in every harbor but one. If it became extinct in all, they would lose their fishery. So there was a need to look at this more closely. A structured assessment of hazard and risk across government and the private sector is important.

The Philippines mentioned that they had to do a lot of mapping and gather a lot of risk assessment, but that they realized that every time there is a change of government, all previous assessment has to be carried out again; there has to be training of first responders to disasters.

Japan mentioned that their weakness is when there are combined risks. Regarding Fukushima, for example, they were well-prepared for an earthquake, but not for what followed. The economy recommended to bring some additional structure for combined risks.

The Chair mentioned that the European Union has required that all European Union countries have risk registers in place and ask whether the present economies had any structured risk register or similar.

Malaysia added that a national risk register is an essential component of grappling with risk assessment and should probably be considered a national priority.

EPWG Co Chair drew attention to the fact that basically responsibility needs to be shared with local governments. Daily disasters, such as small inundations should be managed by them. The need to decide when to issue an evacuation order or when to cancel it was essential; when to move people to safer places, in case of risk of floods or landslides; or in the case of a volcano eruption, when to advise that it would be safe to return. She also recommended introducing an early warning system, which would provide all the scientific information.

The USA commented that the range of disasters are often economy-specific. Some are to maintain risk registers, some are linked to dealing with policy making, to insurance. One of the things to think about is the cost to aggregate to a registry. One of the constant discussions is not what happens during the crisis; there is need for better accuracy on how to work with scientist in events that can be forecasted.

Russia highlighted the importance of disaster risk reduction and that APEC should consider making earthquakes' risk reduction a priority, as many of its economies are exposed to it, there is no accurate prediction system yet, and thus a communication chain for monitoring data within APEC would be a great step. The economy proposed the creation of an APEC Scientific Task Force as a project and invited everyone to participate as partners.

The Chair commented that in the last six years, New Zealand has had diverse emergencies, whether man made or natural. Examples where response was fragmented were found. The result was the government stablished a Strategic Group and a Resilience Panel. Identifying gaps and duplications helped the

government think about greater prioritization. The register is far from completed, but has promoted a discussion based on “what would happen if”. There is a consideration of two versions of the registry: one that is simple, maintained by the government and that includes civil emergencies and more sensitive potential emergencies, like terrorism; and a public version of the register for what EPWG mentioned, so that a local government or the private sector could respond not the central government level. The latter should be as public as possible for transparency and for the public to be better prepared. The first role of the government is to protect the citizens and they need to see that they are prepared and the more you can show that you can do so, it is better for the citizens. He also asked the economies where their efforts were going.

Peru mentioned an example of how scientific and government institutions work together: the national study of El Niño Phenomenon. Scientific institutions carried out analysis that submitted to the government to consider how big the impact was going to be at different regions, so that information is provided to regional and local governments for decision-making. There is a lot to do in order to understand what the impact will to be. This last El Niño was strong for the northern hemisphere and it was supposed to be as strong for Peru but it was not, so the analysis needs to be improved. Collaboration with other economies is necessary.

Chile commented that they have had many disasters in the last five years. In all of these, the government has reacted correctly but to what extent the scientific adviser can be sufficiently coherent and effective? In Chile’s experience, the scientific recommendation in volcano disaster was to move a town and people did not want to move; with tsunami disaster, there is a mistake in coherence as there was an agency that said “you have to react immediately” and another one that said “it is a long shot for the tsunami to happen”, and at the end, it did happen. It is difficult for the scientific advisor to do what it is right for the government and in the right moment.

The Chair pointed out that a science advisor is part of a team of something that could be called the National Disaster Advisory, which should be called in emergencies. Technical experts have a different responsibility; they need to ask questions differently. When the first are in charge of political decisions, such as evacuations, the latter should be asking “have you thought about this?” or “how are you going to communicate this?” or maybe they could provide an environmental response. They need to be people that do not have a responsibility to the public.

China commented that they have suffered severe damage from natural disaster, in lives and the economy. There is not a Chief Science Advisory in China, but there is a National Commission for National Disaster. The Expert Committee has a very important goal in this regard among the government bodies: to use science and technology for the advance of risk reduction. There is a proposal to implement a country framework. There are many mechanisms implemented in China, like the Assessment of Natural Disasters, the Center of Space Technology for Disaster Prevention or the China Academy of Sciences. In March of this year,

the 4th meeting of the ICSEG was held with the participation of representatives from all regions of China. The meeting formally adopted China's working plan for the tsunami warning center. The next meeting will be in October and hopefully it will improve tsunami warning.

The Chair mentioned that as that was a very systematic approach, it would probably be the equivalent of a national risk register.

(Lunch)

AFTERNOON SESSION

ITEM 4: ***Science Advice in and around Emergencies: Introduction to EPWG, Reports from Auckland Secretariat followed by Discussion and Recommendations (cont.)***

The Chair commented that most emergencies have a small specific area to respond to them, for example, maritime. If the emergency expands, it is from that moment that it involves the rest of the government. In the case of a shipwreck, it could also involve environmental issues, for example. He shared that from his observations, these specific emergency-responsive areas are very good at solving their own part of the emergency but not at integrating it when working among other groups. For example, in 2011, an earthquake occurred in a full moon in the UK and, days later, an astrologer and popular weather forecaster said on air that the earthquake was caused by a full moon and in 28 days there would be an even greater earthquake. The consequence was that 50 thousand people panicked and left Christchurch, which caused major destruction because the city needed to be built again. There are earthquakes every day after a major one so saying that there was not going to be another one after 28 days was not a possibility. To relieve the panic, I trusted a scientist to restore the trust of the public and to explain how shock after shock happens and that there is no greater danger on one day or another. Behavioral and communication science are essential in the response of an emergency. The paper that has been circulated picks up on much of the UK experience on this area, and some other experiences around the world. On the second part, there is a discussion of what the CSAE has discussed and the OECD report on science advice during emergencies.

Japan shared some background regarding the OECD report. The idea is that Japan used to have sound advisers but when disaster happened, the economy was not prepared because the information needs to be translated to political implications and to the public. It is important to have the science advisory implemented in a proper way. The Japanese Council for Disaster Management includes scientists from the natural sciences and social sciences (specialized in communication). These sciences are essential. Regarding the UK reports, they are very systematized. Japan had scenarios of different disasters but the next step would be to consider what could happened on mixed scenarios. It takes time to establish social trust and it quickly falls down. There needs to be preparation

and a dialogue between society and scientists saying that science is not 100% accurate, that it is based on theories. It is of the utmost important not only to help society achieve scientific literacy but also to help scientists to achieve social literacy, in order to bring about mutual learning.

The Chair commented that experts can help with disaster's consequences but if they have not been prepared on how to give information to officials, they could actually make the problem worse. Scientists have a lot of data, but politicians want to have it digested, summarized. The British prepare scientists on how to show data to decision-makers. They have about 2000 scientists on different areas prepared on how to provide information. Otherwise, they can confuse the policy-maker. New Zealand is learning from what Britain has done in this aspect and the importance of searching for the proper capacities to train. What are other economies doing? What are their approaches in these areas?

The USA mentioned that there is a need to understand how to train communicators and how to communicate science in case of a disaster. The input of science advice and training, and constant practice builds a robust system, so that not every problem has to go to the highest level; other levels can determine the actionable part. People know who are the policy makers. But what is a policy implementer or policy effecter? They are the people responsible for or the spokesperson of a department or agency. There is a difference. They communicate a complex idea. We are advising senior levels, we are also in constant communication with people in charge of public affairs. In an emergency, all the other levels should be involved.

The Philippines commented that they have a pre-disaster assessment team. They are in charge of deciding to where emergency food would go, and practice emergency situations 22 times per year. They learn how to learn from each other, how to listen to the scientist and how to communicate to them. After the typhoon they asked the public if they were correct on the assessment and whether they actually helped. Before, people had problems choosing property over life (when an evacuation was required, they did not want to leave their houses), but people are more aware now; the choice is now going towards life. The government reports to the people what happened before, during and after a disaster and thus, it creates trust between scientists and the public.

The Chair pointed out that the last part of the document was the most provocative part. Through the Manila Declaration, the leaders requested CSAE to come up with recommendations. It became clear today that all economies have different structures, so all recommendations have to allow for diversity. Science is an important part of environmental disaster responses and there needs to be a systemic approach.

Japan commented that a jurisdictional crisis management system is necessary because a good response depends on the structure itself.

The USA added that economies need to make sure that these recommendations are part of a continuous operation not an *ad hoc* activity. A fire station should not be built when there is a fire, it should be built before the fire.

The Chair commented that it is difficult to know who to go to for data sharing about disasters within or between countries. For example, New Zealand trusts experts in Ireland, because they are similar islands, but there should be a connection with other APEC economies. Economies are more likely to share information on natural disasters than on sensitive information within governments.

The EPWG representative pointed out that she had just received the document, and that she would like to share it intersessionally to make sure it is correct and to provide feedback.

The Chair replied that once the final form has been agreed upon, the document would be available for other groups.

ITEM 5: *Developing Human Capital – Investment in Scientists related to Risk Management and Climate Change*
Led by Peru

The topic was led by Peru, stating that APEC economies were particularly prone to natural disasters with catastrophic results. There was a discussion paper, beginning with Tania Peña, speaking about investment in science.

They formulated the national program called CINTyA in CONCYTEC; identifying two most important areas: climate variability and climate change, as well as risk management. Peru had a very complex geography and did not have many scientists specialized in these topics; who could give solutions to these problems. The economy had some research institutes, as well as immediate report institutions; both enabled government to give immediate response facing disaster. During the previous year and the current one, there were scientists working on El Nino, trying to forecast and predict what was going to happen, and what actions government would take. There was a great deal of investment in prevention and mitigation, but in reality most of it was not used. The theme was introduced because more scientists were needed, in addition to more collaboration with other economies. Most APEC economies were affected by El Nino and climate change. Dr. Peña went on to say that fortunately, the relationship between science and policy was improving, although there continued to be a large gap. There were already collaborations with other APEC economies; giving the example of Japan, through the Japan International Cooperation Agency. Likewise, with the US and with China; for the construction of the new emergency collaboration center. What was required was going a step beyond the scientific point of view; it was known that data sharing was necessary and more training required for their scientists.

She mentioned that one of the main issues were the early warning systems that some economies had; such technologies were necessary for other economies as well. It should be shared, but also required the scientists and technicians that were going to be able to use them.

Dr. Peña concluded by saying that Peru was very vulnerable to disasters and the advice from the scientists had not reached the public; advice was not accepted or listened to. There was a need to empower scientists and the national STI.

Following her presentation, the floor was opened to other economies.

Sir Peter Gluckman commented on the issues of climate science. Volcanology, seismological sciences; they thought that even scientists trained in those disciplines had very weak knowledge of risk itself; which was not just hazard but also exposure. One of the fundamentals was how were they going to be more involved in helping economies? There was a need to train scientists on how to assess risk. Other programs were currently being explored; to teach them how they were perceived by other people. The point of Peru was quite core. The issue of how risk was communicated to a post-trust society; understanding the science of risk communication was as important as the other sciences.

Following the comments by New Zealand, Philippines pointed out that disaster risk reduction and climate change were multidisciplinary. The economy had a general education subject called disaster science and most undergraduates took it. When they reached PhD or Masters Level, they joined research groups; which could be a way to develop human capital. That way, they could multiply because they could come from other fields, such as engineering.

Indonesia noted Peru's statement in the second paragraph, on the effects El Nino had; that was why Indonesia proposed an international seminar on El Nino, since there was nothing similar on that topic. They hoped that would be a means to create networking and data sharing among scientists.

After thanking the Co-chair, Malaysia wondered that perhaps the proposal of human capital should be taken up by the PPSTI. There were issues that were more relevant to PPSTI.

Peru Vice-chair commented that they would take that to PPSTI and another group; human development capital which they met with a previous day. The proposals would be passed to them.

United States agreed with Malaysia that some proposals could go to PPSTI. The economies should identify models that had worked in this hemisphere; the inter-American institute of global change. It looked at multidisciplinary, climate change and decision-making, among others. Created in 1992, it promoted capacity building for students and others, transboundary and internationally.

One of those models could help with decision-making policies; they could be interesting for another body to look at.

Australia pointed out that from September 26-30, it would be hosting a workshop on earth and marine observation. The economy would forward the paper to contacts.

Co-chair suggested that the program of that seminar could be circulated.

Japan stated that the forum could be a space for sharing information and best practices about partnership for sustainable development. It was trying to team Japanese scientists with their international counterparts to identify global issues and look for solutions. This would enhance human capital in Japan and other economies and this multilateral collaboration could be extended.

Vietnam commented on its awareness of the importance of improving capacity on warning and disaster. It had disaster reduction in universities; institutes in disaster reduction, national programs focusing on climate change and disasters. They also had researchers on disaster reduction with Asian economies and others. They would like to have more cooperation in the APEC framework.

China began its introduction stating it had a few points to share. The economy had a large R&D team, over 3 million participants; however, the scientific quality of the public was not so high. According to the next 5-year plan, they would increase that indicator; many activities were necessary to reach the human capital investment goal. These programs could be used to train people who worked in that field, e.g. climate change or other research areas. The ministry of Science and Technology had a young talent mobility program; working in key laboratories, trainees, etc.

Although China contributed many research papers on that topic, the majority of scientists carried out research in traditional ways. This fact limited opportunity and there is great potential in big data. As an example, for earth science; however, those scientists did not know how to deal with big data. Therefore, training was necessary.

The participant from Canada commented that their economy would provide grants, scholarships; there was a wide variety of programs. That was one way to attract talent; working with many researchers was very interesting to students, in areas such as climate change. Canada would be happy to share more information.

Russia briefly mentioned it would like to highlight the PPSTI project of virtual mobility map, to capture and share information for improving mobility in APEC countries.

Mexico said that they had high vulnerability to earthquakes and volcanic events. A thematic research network had resources like enhancing capacities, related to risks from natural disasters. Mexico had no specific project to prepare scientists as such, but that network enhanced capacities related to risk management activities in the economy.

Chile commented that it had been working very hard in programs dealing with the construction of buildings against seismic events; with interesting results to show.

Different programs could be developed; e.g., some were prepared with the EU- with Italy- for volcanology. There could possibly be more cooperation with APEC members. Chile had a lot of contact with the EU concerning risk reduction. It would be interesting to think of developing more programs like that in APEC.

Co-chair Peru thanked all economies for sharing experiences. They proposed to add an additional recommendation in the discussion paper of science advice in and around emergencies.

Peru took the floor, stating that now that they all knew what each economy was doing for the development of human talent and some also shared that they had programs in universities; it could be a good idea to share all those graduate level programs where their scientists could know what was available in those other economies. Perhaps they could share more about them to add to their discussion paper.

Chair was of the opinion that it should be separate document. He thought SOM would refer it to the human resources groups instead of the leaders, while primary recommendations would go to the leaders directly.

The US agreed with that motion. That would keep it in the context it had been discussed and would go to the right group.

Peru was in agreement with the proposal and concluded the session.

ITEM 6: *Science Advice and Sustainable Development Goals*
Led by Sir Peter Gluckman

There needs to be a good link between scientists within the country and policy makers. Global agencies are important, particularly the UN agencies for achieving the goals. Ultimately these decisions are made by diplomats, not scientists but effective science-based decision-making at a global level is also necessary.

We have the challenge and opportunity to build bridges from old science as we know it but include indigenous knowledge as well.

The terminology “post-normal” refers to science that is complex, much is unknowing and it does not matter how much is done, there will always be unknown aspects, but there is also an immediate need for response.

Most SDGs involve science of the post-normal type and values and beliefs have to intercede. In order to achieve them, the private sector should be more engaged. When we consider the next 20 years, it would be hard to imagine an area not involved with SDGs.

The USA commented that they take SDGs very seriously and that they intend to achieve every goal, as they involve the whole society. Every single one of them gains from the involvement of science, although some relationships are not that evident.

The Chair highlighted the importance of more engagement from the community and of bringing in local knowledge and local innovation from different sectors. The key issue for CSAE is related to science advisory mechanisms to help the economies reach their goals.

Japan shared that they have drafted guidelines for the implementation of SDGs and specific priorities in particular human health, women participation and disaster prevention. They take advantage of existing mechanisms, like G7 to promote these ideas. STI is a key tool for implementation and Japan is moving in this direction. Regarding science advisories, all economies will set up something domestically but there can be international coordination on specific areas, such as disaster management.

Australia commented that PPSTI is looking at what their eight centers are doing in relation to SDGs and that a task force may be set up specifically to face SDGs.

Brad Fenwick mentioned that he had given a brief presentation about it to PPSTI. Sustainability science was growing at twice the rate of the other sciences. That meant there was much information coming and that was well received by the scientific community. The question was being able to translate that new science into policy; if the scientific community was not settled, there would be conflicting information. Using caution would be a good measure. Good policy made good science and science made good policy; that applied when science was more mature, it was not the case at the moment. It was important to work as a community with different sectors.

Chair pointed out that the biggest challenge for scientists was the span across what activities the SDGs represented. Was that what worked? 3 million papers were produced, many of reputable quality. How did one establish what was useful for decision making? There was no way a scientist could keep abreast with their own field, let alone others. Were there tools emerging that would make possible, particularly for economies with low scientific capacity, to access what might work?

Brad Fenwick replied that the tools were emerging through biometrics, which helped focus on consensus issues. The validation was changing from paper review to public process. People tended not to read what was not credible. Their (science advisors) role was influencing how governments distributed priorities; integrating them, becoming more part of society.

Chair asked if any economy cared to suggest how to frame a consideration. Remembering conversations from Malaysia the previous year, there should always be an action point.

US queried if it was known whether additional issues were coming up in other discussions.

Secretariat replied that to their knowledge, there was no focal discussion in APEC at that moment. The discussion at the ART event in PPSTI had been the first of its nature to really discuss that.

US replied that one of the gestures was to be responsive to the institutions of APEC. It would be helpful to have more analytical work on the issue. The demand side would be helpful in that sense.

Chair commented that perhaps noting the importance of it in the region for the following year, they could also create demand as well as respond to demand.

Korea commented on a conference it held with PPSTI and ART program. They discussed SDG, climate change and STI role for SDG in the context of APEC. They realized that APEC did not address that issue very much. Many of Korea's centers were already dealing with disaster issues; thus related to SDG. Perhaps there could be some sort of task force established for SDG. What kind of methodology could be used to address this issue? Perhaps some sort of platform. Some economies wanted to share data they already had related to observation or climate information. There was an APEC climate center building some sort of platform. 17 SDGs were too broad; some were related to science and technology, each specific area had very different situations.

Chair replied he was trying to reflect on Korea's and United States' comments; perhaps they should recommend that APEC needed to be more integrated with the SDGs. Whether there was enough of an issue in that region, Small Island developing states, etc. and whether APEC needed to have an integrated response on SDGs.

United States directed its comment to the PPSTI Vice-chair; the task force looked to potential recommendation for the next time that group convened. Evidently, that would have to circulate across PPSTI representatives.

Secretariat put forth the suggestion that it be up for some SDG leaders to look into any specific areas. For SDGs it considered safe for chief advisors to look into that topic as science advice. There were other areas like peace and justice, for APEC preview and mandate. Concerning the paper, it was generally alright; being scientific advice that went with that group's mandate.

Chair responded they should focus on items 1, 2 and 3; on their roles of science advisor. There might be some reflection needed on the proper apparatus of SDG as an objective.

The United States commented that when looking at the issues possibly being faced across the policy landscape they did rely strongly on STI inputs. The academy had a main recommendation: creating an innovation forum between global innovators and policy makers. In early July, the national academy of science and its office (United States) made good science advance on emerging technology. In February prior to that, they convened a group that brought together people whose work it was to give science advice to ministries; they held the same job title. Additionally, they reached out to other economies whether through science advisory or other mechanisms taking science to governments. The sharing of experiences; some were full-time, others part-time.

Japan shared that its minister of Foreign Affairs queried whether its office was properly advised by scientists. Based on that idea, he decided to experiment with the roles of S&T advisor to the foreign minister and reinforce networking around S&T advisors, scientists and academia.

New Zealand stated that they were isolated. For many countries in Africa, the only way for progress was through science; that being largely because they had those relations with many countries through science. The New Zealand government recognized the importance of science for a small country; being more important than having an embassy. Seven years ago they decided on the need of a science advisor; science diplomacy could be used for development.

China intervened by stating that its assumption was that there would be a discussion before changing the agenda. The economy had a brief concern; the foundation of APEC was to discuss topics not related to diplomatic affairs. A question to the Secretariat was if that was aligned with APEC.

Secretariat replied that most senior officials were ambassadors or ministers. As long as they remained on scientific advice and economic development, they were not distancing themselves from the focal issues.

New Zealand gave the opinion of what had been previously spoken about being of informational character; considering the questioning of the science advisors' roles.

China then responded that what was being discussed was beneficial to all matters.

Day 2 – August 19, 2016

MORNING SESSION

ITEM 7: *Social License – Indigenous and Local Knowledge*
Led by Sir Peter Gluckman

Chair commenced by referring to the paper that built on the discussion held in Malaysia the previous year; in an economic sense, e.g. Papua New Guinea's plan for the development of indigenous plants.

Giving it further thought, the issue of particular interest to APEC was that the region had the most diverse cultures in the world.

The challenge for the APEC innovation system was how society perceived those modifications. North America tended to generally accept genetically modified crops; receiving great resistance from Europe and New Zealand and less from Australia. If they thought ahead, innovations were coming at a great pace.

One could see that different societies were going to have diverse responses: enthusiasm, anger, adoption; then a reflection of what was occurring there. Some

technologies would be reasonably easy for economies to manage, others more difficult.

They saw all sorts of things happen, restrictions put in place; showing how these technologies could emerge very quickly. APEC's original purpose was to promote economic development in the region. CSAEs needed to talk about where such technologies should be limited on their economies. A broader conversation was necessary; reflection on how social license was to be achieved across their diverse economies. He would use the term indigenous and local knowledge in a general sense; it seemed a complicated subject to him. Was that a way a conversation should proceed? He knew Canada had been reflecting on several issues, as was Malaysia. He opened it up for discussion. They had a challenge; if it was not addressed, they did not know what other countries in the region would do. That was work to be developed for further discussion.

Malaysia expressed the relevance of discussing that, considering the advances mentioned; the issue of ILK had been formally recognized by the scientific community. How would they frame it within APEC economies? Malaysia did not necessarily have an answer to that.

Papua New Guinea stated there was no doubt, given the value of input of indigenous groupings that development provided a space for them to contribute. The capacity to accept, continue expansion and incorporate local knowledge into modern technology. If one looked at the market, even with drugs; a high content of these came from local knowledge. Perhaps many products had an element of local knowledge in them; it remained embedded in the market.

Chair went on to say that his office had engaged in a hypothetical mind program, if the ZIKA fever was as bad as they believed and vaccine development seemed impossible. There being failure in mosquito control in most of the APEC region, they considered what would happen and how did they obtain social license. The answer probably being to conceive a genetically modified mosquito to deal with the ZIKA virus; realizing that it was very complicated. Within a country of different attitudes, communities would take diverse stands; that would also be the case internationally. What sort of conversation would they hold? How would they have such conversation, and with whom? The more they thought about it, the more doubt there was on how to proceed. The whole area was growing in importance; how as a scientific community, might they explore those issues? He was trying to think about how their society would respond; welcoming any advice as to how the scientific community might explore such issues.

Canada mentioned that it carried out some research; looking at traditional and formal science, factors influencing food security. They were currently considering an additional assessment. What was traditional knowledge? Could registry help? What about the political barriers of engaging indigenous people? How could those two sides be integrated? They had done some assessment; would be open to sharing information or collaboration as to the type of knowledge to be conducted.

Chair recognized that it was a potential barrier to innovation; it was a very hard, complex topic.

The United States mentioned that it had a very strong relationship with the indigenous population, particularly in the Arctic region to integrate local knowledge to the Arctic council. It enhanced their understanding, given they did not usually have much information. Fishery management used local knowledge; the economy worked with tribes as it was important to understand traditional knowledge. How did they provide the right data?

Chair went on to reflect on something he learnt from Australia when that economy accepted GMCs and New Zealand did not. Australia had a social science unit- although it was not called that- which identified different groups in the community that needed to be the leaders; with which the conversations were held early on. Different sectors, i.e. farmers and teachers required other forms of conversation.

New Zealand could not have these crops, due to conversations not having been held correctly; with subsequent resistance from communities. The lesson for him was that they needed to become more able as science advisors because early conversations with the public were important. They needed to be doing this with regard to big data. The issue with this data was how to get social license to use it; this could possibly receive much resistance. There was no guaranteed security of a big database.

Peoples' privacy could not be protected unless there were conversations with the population. They were going to have to learn how to have them prior to the application of technologies.

ITEM 8: *Science Advice and Foreign Ministries – Update of Development of Network and Capacity*
By New Zealand, the USA, and Japan

The USA commented that when looking across the policy landscape, they do rely strongly on STI inputs to solve the issues that they may face. The Academy had a main recommendation: creating an innovation forum between global innovators and policy makers. In early July, the National Academy of Science and other government agencies met to discuss science advances on emerging technologies. Last February, a group that brings together the people whose work is to give science advice to the ministries convened, people that have the same job title. The economy intends to reach out to other economies whether through their science advisory or other mechanisms that take science to the government in order to share experiences.

Japan expressed that their Ministry of Foreign Affairs was properly advised by scientists, but that they still need to reinforce networking among science and technology advisors, scientists and academics.

New Zealand is isolated and sometimes the connection of the economy with other countries, for example in Africa, was only through science. The New Zealand

government has recognized the importance of science for a small economy, it is even more important than having an embassy.

ITEM 9: ***Science Advice and Small Island Developing States – Role of APEC Economies***

Led by Sir Peter Gluckman

The APEC region contained a significant proportion of Small Island Developing States (SIDS). These were characterized by small populations and inherently limited indigenous scientific and scientific institutional capacities. As a group, they faced a large number of scientific challenges including environmental, resource management, societal, public health and economic challenges, as well as the interface between indigenous and local knowledge and western science.

For New Zealand and Australia in particular, a number of complicated scientific challenges were raised. Sir Peter stated he was sure that was also the case for the north western Pacific; they had major issues of environmental, resource management; as well as managing their fish stocks, environmental pollution; their societal and public health; having high rates of obesity, non-communicable diseases. The issues of infectious diseases were very high. All of these countries had economic challenges of sustainability; also exposure to large amounts of natural hazards, including typhoons, tsunamis, etc.

In addition, they were states still having a strong sense of cultural tradition; engagement with their traditional and local knowledge systems; education system tended to be very weak. While the digital world should better link these states to the rest of the world, it had not yet defined a pathway to economic progress.

The challenges for these small economies were enormous. How could science help with progress? Ways needed to be found to provide scientific support on complex issues without interfering in their autonomy. Small island states relied on whatever advice came through ODA; some looked to larger nations for advice, others did their best on their own.

The UNESCO also saw that as an issue of globally rising importance. No one proposed an immediate solution right now. Sir Peter said he would appreciate if any of the member economies had ideas on how to have progressive dialogue, considering many of the affected nations were APEC economies. He also talked to the representative of Papua New Guinea, who suggested that in 2018, when his economy was the host, it might invite representatives of the smaller island states to discussions; perhaps along with the South Pacific Commission. It might be possible to have some form of dialogue with those vulnerable economies. That was something for Papua New Guinea to reflect upon; if that were the case, he would take back to the New Zealand ministry of Foreign Aid – Australia would do likewise with their counterpart- the idea to provide support for those countries to send the representative to those meetings. He would put it on the agenda as an information item. It could be a matter for further discussions.

He asked if there were any comments.

Australia requested, just to confirm, that if Papua New Guinea should like to proceed with a meeting, Australia would be happy to take it back to its economy for consideration.

Malaysia stated that it was very noble of their CSAE to take it into account; it also gained a special place having a special representative, implying that it would be good if that platform could be used for those countries. One aspect that was incumbent was to do something in a careful way, there being many sensitivities.

Sir Peter expressed the importance of raising the issue of recognition, autonomy and that their status was important. Interaction needed to be done in a sensitive way. For Japan, Australia, New Zealand, China, United States and other donor economies in this region, when things went wrong, science became important in addressing issues. Interaction had to be done in the sensitive way; it could help those island economies quite significantly. It was a matter for Papua New Guinea, as a host, to think about an invitation to dialogue.

This issue was discussed in Papua New Guinea; he considered important the issues that impacted the economy, health and the environment. All had certainly been raised in the discussion. He asked the Papua New Guinea representative for any comments he might have.

Papua New Guinea recognized the area of the small island states; thought the issues that impacted on their economy were important; his economy had discussed them.

Sir Peter asked if there were any comments on this information item. If anyone had any novel suggestions on solutions on how to help; it being a very complicated issue and one of growing importance. These economies were not able to enter the digital world as other societies had done.

United States stated that it knew they would appreciate Papua New Guinea considering bringing in some of the small and regional states during their host year for dialogue. It could be also useful, between now and then, to know what different economies were actually doing in the science policy arena. Possibly sending science envoys specialized in specific topics; like oceans and marine conservation.

Sir Peter commented that it was a very useful suggestion and that he would get his office to work through its connections to collect further information, including talking to the South Pacific Commission and South Pacific Forum about the possibility of preparing a note of such issues from their perspective.

He thanked the participants and moved to the next item.

ITEM 10: *Role of National Academies in CSAE, Terms of Reference of CSAE, Report to PPSTI and other APEC Fora*

Led by Sir Peter Gluckman

During the break, Secretariat discussed with EPWG and SOM and now they (CSAE) had a process to communicate their recommendations and feedback.

In the Malaysia meeting, they saw the need to work in a more formal manner, so they decided to draft the Terms of Reference. Chair hoped all commentaries were included in said document. He proposed to go through the Terms of Reference, line by line, so hopefully they could adopt it.

China suggested making it more focused to their forum, referring to Number 2.

The United States replied they could add “economic issues” to bring it closer to APEC, which was an economic cooperation. The “issues” because APEC focused on economic cooperation and covered all related issues.

Chair asked if they could say “economic and other related issues”.

The United States replied that it focused primarily on APEC priority issues. That kept it bounded to the economic part.

Chair pointed out that sometimes the leaders’ declaration added something.

Malaysia asked if maybe Chair was talking about sustainable development.

The United States said to make sure CSAE was focused on issues that leaders had determined; that were not all the science issues of the Asia Pacific region. It was a very specific forum within APEC.

Chair stated that CSAE focused primarily on APEC’s priority issues.

The United States replied that it primarily focused on APEC priority issues; that it was a forum of APEC, not separated. It was not an academy panel for anyone who brought broader science advice. If they went broader, a future group would begin to bring things that were not within the APEC forum. The blunt part was: it gave people something to think about.

Chair commented that APEC was so broad; he thought it was alright to include the United States’ suggestion. Chair wanted to hear from PPSTI; if that was a fair distinction of labor.

Canada confirmed its acceptance. The main function of PPSTI was to provide policy recommendations.

Malaysia expressed its satisfaction with that. Concerning the last two lines, it thought that “innovation” should be at the same level as “science and technology” and Malaysia would rather have it as “policy formulation” instead of “policy formation”.

China specified that they were discussing to include the PPSTI mandate as it was a good idea and it was their Terms of Reference.

Chair agreed that China’s point was wise, but perhaps they should say that that was distinct to PPSTI. It could be possible that PPSTI covered some issues from their group; perhaps they were limiting PPSTI in their ToR.

The United States understood both points; wondered if there was a way to word it in the background text. “PPSTI, which had a mandate, that (…),” thus placing

a description, and if they did that, the United States suggested removing the PPSTI part of those recommendations.

Chair then summarized: they inserted some acknowledgement of the existence of PPSTI in the background and that theirs was somewhat different.

China was in agreement with the United States, but if there was a mention of PPSTI, they would probably need PPSTI endorsement. The idea was that this different approach is recognized by both.

Chair wondered if they quoted the mission statement of PPSTI in the background, any issues could be avoided.

Japan suggested: instead of using “distinct from PPSTI”, to put “complementary with PPSTI” in the background. It agreed with the United States proposal.

Chair specified that No. 3 was not debatable. “CSAE was open to all economies”.

Malaysia asked if that was necessary; it was understood.

Chair agreed with Malaysia; they could remove that part.

China asked if they could remove the word “senior roles”, because it would be practical to also have young science advisors; as it currently stood, it literally excluded young or future science advisors.

Chair agreed that it was an interesting question. He thought one of the things of concern on APEC as a group, was the decline in senior representatives. Chair thought that group did attract people who had major influence on senior political apparatus; would like to see them commit to people with senior roles, otherwise it would decline to the point. If the meeting were to be held in a difficult place, young representatives would not necessarily be prepared for delicate situations.

The United States understood what China was saying; the wording looked like it was excluding younger participants.

Malaysia replied that it had to disagree with the United States; agreeing with Chair that senior did not refer to age, rather to senior position.

The United States agreed that the main representative be of a senior position; it could be included that they be the leaders.

China was in agreement; so they could have bigger teams.

Chair then asked: When did the term of the Chair begin? Since he thought it should be after the leaders’ meeting. They still needed to work with the host economy, so that should coincide with the APEC calendar. Chair mentioned that he had put in a 3-year term arbitrarily, because it took time to understand APEC’s mechanisms; it was a lot of work. Was there any feedback?

The United States considered it was a good period of time as terms of reference were assessed every three years; therefore, it should be someone who took them to the following term, to analyze whether they should maintain or change chair.

Chair remarked that the standing Co-chair did all the hard work regarding meeting with the secretariat and the host Co-chair dealt with logistics of the meeting.

The United States asked how was the co-chair elected? There would be a time when the standing Co-chair and host Co-chair would be the same person. Would that be alright? Or should there be somebody additional? How did other bodies do that?

Chair replied that some had vice Co-chair; had not thought about such possibility, but it was very feasible. Perhaps a vice-chair should be included for that case.

Referring to the 3-year turn, Philippines said that an assumption was being made that the individual was going to remain at such position in their economy for 3 years and asked what if the person were replaced before.

Chair responded that supposedly the economy was the chair, not the individual; uncertain as to what happened in other meetings; or in case the individual passed away.

The United States pointed out that perhaps they should consider the vice-chair position; there could be a gap in the economies' position.

Chair suggested having a vice-chair elected every 3 years.

The United States said the vice-chair could be the representative of the host economy two years out.

Chair agreed with that idea; they could also be thinking of the agenda they wanted the following year.

China said it saw the point where the Chair was a person, did not represent an economy; they needed the nominee's CV and make certain they were endorsed.

Chair replied that Secretariat would take care of that.

The United States wanted to make certain that they had an agreement with Papua New Guinea.

Papua New Guinea expressed it had no problem with that.

Chair thought that all committees, including the mandate, had a timeline when they should be revised.

Australia wondered about the role of the committee; who they should flag, there might be other senior representatives.

Chair was of the opinion it could involve technology experts; include a range of people.

The United States agreed on the highlighting of potential to bring in others; although, according to its view, it was as yet too soon.

Canada expressed doubt as to the relevance of the next sentence.

Chair explained there was no mechanism for electing a chair for that group. China had already raised the issue of it being an individual, instead of an economy. It had certainly been easier for him to play that role when he did not have to also represent his economy; he thought it was the right way. The chair would not speak for his/her country at the CSAE meeting. He did not know if he could continue for one more year; if the committee so wanted, but no longer. He put it to the floor; more time needed to determine and establish a mechanism.

The United States agreed, in principle, with the minimum of 1 year, based on that structure; that did not become operative until all agreed on the ToR and that, in turn, blessed by SOM. Nothing would be determined until the next SOM.

Chair went on to talk about how to appoint the chair and opened the question as for the appropriate process to follow and if it should be six months prior to his/her term end in order to request CVs and recommendations from their economies.

APEC representative commented that most groups did not go into much detail; basically, the Secretariat provided information for the election of a chair. Nominations would be submitted for their consensus and approval. Members would be asked to express their preference.

Australia commented it was going to read how the PPSTI chair was elected.

Chair came to the conclusion that the position of chair should be a consensus process conducted by the Secretariat.

Australia pointed out that it was supported rather than conducted.

The United States expressed its support if it worked for other APEC committees.

Chair suggested that the Secretariat worked with their team to make sure everything was correct and it needed to get to SOM.

The United States pointed out that one of the things they were not seeing in the Terms of Reference was any description of mechanisms. Nothing that explained how that actually fed into the process; helpful for future participants. Something that said how results were produced and sent in.

The United States queried if they wanted to be more involved, what were they doing throughout the process? That might be in the Terms of Reference or something the economies discussed there. It would be valuable on what they were doing throughout the APEC meeting; have more specific information for the body going forward. Make sure that economies were engaged in the process.

For the Chair, the current challenge was that without the Terms of Reference, other bodies did not know what they were doing as much; coordination of a joint agenda was necessary.

The United States asked how were they sure of going forward not only at the end of the process but throughout the same? PPSTI was easier because they had a shared secretariat. It was a better way to inform that group before the meeting.

Chair replied that the practical way of doing it was having a direct conversation with Alan or his equivalent in APEC. They could add to ToR that they might make recommendations to economic leaders and senior officials and share them with other APEC groups. He could see the potential of more intermediate activity when the host economic sets its priority. If there were no more comments; by Monday, Secretariat and himself would have it arranged again. They would wait until Friday for feedback, to get it to the SOM group. He particularly thanked Alex, who was not there, for all his work helping create that.

With those closing remarks, Chair passed to the final session.

ITEM 11: *Next Meeting's Agenda and Closing Remarks*

Viet Nam highlighted how happy they are to welcome the participants next year. PPSTI 9 will be held in February and the CSAE meeting after PPSTI 10, will be organized in May in Hanoi. The details will be coordinated with the Secretariat.

- Theme: Creating New Dynamism, Fostering Shared Future
- Four priorities were announced:
  - Deepening Regional Economic Integration;
  - Advancing Structural Reform for Sustainable, Innovative and Inclusive Growth;
  - Enhancing MSME's Competitiveness and Innovation in the globalized world;
  - Enhancing Food Security and Sustainable and Climate-Smart Agriculture.

The activities include:

- ISOM
- SOM 1 and related meetings
- SOM 2 and related meetings
- SOM 3 and related meetings
- 2017 APEC Economic Leaders' Week.

Malaysia asked whether topics can be proposed.

The Chair replied that the overall project of APEC is already decided but that topics can be proposed for the CSAE meeting.

Malaysia continued that they would be interested in discussing the 4th industrial revolution (the convergence of IT, biological and physical sciences), which may be included in the last priority of Viet Nam.

The Chair added that before the end of the year, ideas for the meeting are welcomed and invited everyone to participate in the elaboration of the agenda. He also commented that he agrees with the topic proposed by Malaysia.

The meeting was concluded.