ASEAN PLAN OF ACTION ON SCIENCE, TECHNOLOGY AND INNOVATION (APASTI) 2016-2025

one vision
one identity
one community

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The ASEAN Secretariat
Jakarta

The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967. The Member States are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.
The ASEAN Secretariat is based in Jakarta, Indonesia.

For inquiries, contact:
The ASEAN Secretariat
Community Relations Division (CRD)
70A Jalan Sisingamangaraja
Jakarta 12110, Indonesia
Phone : (62 21) 724-3372, 726-2991
Fax : (62 21) 739-8234, 724-3504
E-mail : public@asean.org

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PREFACE

Science, technology and innovation have been considered as an important key element in driving economic growth, enhancing community well-being and promoting integration in ASEAN region. In realising the goals of ASEAN Community 2025, the Committee on Science and Technology (COST) considered developing the new action plan titled ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025.

The transformation from past ASEAN Plan of Action on Science and Technology (APAST) 2007-2015 to APASTI 2016-2025 will provide strategic direction of COST in implementing the programmes/activities focusing on public-private collaboration, talent mobility, people-to-people connectivity and inclusiveness, enterprise support, and public awareness and STI enculturation.

The ASEAN Ministers for Science and Technology at the 16th ASEAN Ministerial Meeting on Science and Technology (AMMST) held on 6 November 2015 in Vientiane, Lao PDR have endorsed the ASEAN Plan of Action on Science, Technology and Innovation 2016-2025. The Plan of Action consists of 4 strategic thrusts and 15 actions that will serve as a guide in developing the appropriate policy and mechanism in science, technology and innovation cooperation.

I believe the accomplishment of the plan of action development will help the ASEAN Member States to explore ways in developing relevant programmes/activities align with the goals and objective of APASTI 2016-2025 and ASEAN Economic Community (AEC) Blueprint 2025.

Towards this end, allow me to express my deep gratitude and appreciation to All ASEAN Member States for their efforts in contributing and finalising the plan of action.

H.E. Mr. Houmphanh INTHARATH
ASEAN COST Chair (2015-2016)

ACRONYMS AND ABBREVIATIONS

ABAPAST	Advisory Body on the ASEAN Plan of Action on Science and Technology
ABASF	Advisory Body of the ASEAN Science Fund
ACGS	ASEAN Plus Three Centre for the Gifted in Science
ACJSTC	ASEAN-China Joint Science and Technology Committee
ADF	ASEAN Development Fund
AEC	ASEAN Economic Community
AEUDST	ASEAN-European Union Dialogue on Science and Technology
AFC	ASEAN Food Conference
AIWGST	ASEAN-India Working Group on Science and Technology
AJSTD	ASEAN Journal on Science and Technology for Development
AKJSTC	ASEAN-Republic of Korea Joint Science and Technology Committee
AMMST	ASEAN Ministerial Meeting on Science and Technology
AMS	ASEAN Member States
AMST	ASEAN Ministers on Science and Technology
APAST	ASEAN Plan of Action on Science, and Technology
APASTI	ASEAN Plan of Action on Science, Technology and Innovation
APCoMS	ASEAN-Pakistan Conference on Materials Science
APSC	ASEAN Political Security Community
APT JSO	ASEAN Plus Three Junior Science Odyssey
ASCC	ASEAN Socio-Cultural Community
ASEAN	Association of Southeast Asian Nations
ASF	ASEAN Science Fund
ASTCRM	ASEAN-Republic of Korea S&T Roadmap Program
ASTIF	ASEAN Science, Technology and Innovation Fund
ASTNET	ASEAN Science and Technology Network
ASTRENA	ASEAN Science and Technology Research and Education Network Alliance
ASTIW	ASEAN Science, Technology and Innovation Week
ASTW	ASEAN Science and Technology Week

ATM	ASEAN Talent Mobility
AUN/SEED-NET	ASEAN University Network/Southeast Asia Engineering Education Network
AUSCST	ASEAN-United States Consultation on Science and Technology
AVIST	ASEAN Virtual institute of Science and Technology
BAC	Boards of Advisers to Committee on Science and Technology
CATTC	China-ASEAN Technology Transfer Centre
COST	Committee on Science and Technology
CPR	Committee of Permanent Representatives to ASEAN
C-WET	Centre for Wind Energy Technology
EABN	East Asia Bioinformatics Network
EC	European Commission
EGM	Expert Group on Metrology
ENSO	El Nino Southern Oscillation
ETV	Environmental Technology Verification
EU	European Union
FP7	Seventh Framework Programme for Research and Technological Development
GC-AISTDF	Governing Council of the ASEAN-India S&T Development Fund
GCI	Global Competitiveness Index
GHG	Green House Gases
HLTF	High-Level Task Force
HPA	Ha Noi Plan of Action
IAMMST	Informal ASEAN Ministerial Meeting on Science and Technology
ICT	Information and Communications Technology
JENESYS	Japan-East Asia Network of Exchange for Students and Youths
KI	Krabi Initiative
MOA	Memorandum of Agreement
NABL	ASEAN-India Program on Quality Systems in Manufacturing
NEFSE	ASEAN-Japan New Energy Forum for the Sustainable Environment

NZ	New Zealand
PCOST	Permanent Committee on Science and Technology
POA	Plan of Action
R&D	Research and Development
READI	Regional European Union-ASEAN Dialogue Instrument
ROK	Republic of Korea
S&T	Science and Technology
SCB	Sub-Committee on Biotechnology
SCFST	Sub-Committee on Food Science and Technology
SCIRD	Sub-Committee on Science and Technology Infrastructure & Resources Development
SCMG	Sub-Committee on Meteorology and Geophysics
SCMIT	Sub-Committee on Microelectronics and Information Technology
SCMSAT	Sub-Committee on Marine Science and Technology
SCMST	Sub-Committee on Materials Science and Technology
SCOSA	Sub-Committee on Space Technology and Applications
SCSER	Sub-Committee on Sustainable Energy Research
SEACOOP	Southeast Cooperation on ICT Research
SEA-EU-NET	Southeast Asia-European Union Network
SEC	Solar Energy Centre
SEOM	Senior Economic Officials Meeting
SG	Secretary-General
SOC-COM	Coordinating Conference on the ASEAN Socio-Cultural Community
TICC	Technology Information and Commercialisation
TTF-TW	Technical Task Force on Tsunami Warning
TWG-NPP	Technical Working Group on Nuclear Power Plant
VAP	Vientiane Action Program
VCO	Virgin Coconut Oil
VIIP	Virtual Institute for Intellectual Property
WEF	World Economic Forum
YoSTI	Year of Science, Technology and Innovation

ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025

I. Introduction

The Bangkok declaration[1] that set the basis for the establishment of ASEAN on 8 August 1967 recognised the urgency for the then five member states (i.e., Indonesia, Malaysia, Philippines, Singapore and Thailand) to engage in joint efforts to accelerate the economic growth, social progress and cultural development in the region. Recognising further that science and technology are necessary and indispensable tools towards this end, an Ad hoc Committee on Science and Technology was established. Its first meeting was convened in Jakarta, Indonesia on 27-29 April 1970 to discuss ways to promote and intensify cooperation in science and technology. Specifically, said meeting agreed that ASEAN cooperation in science and technology should be guided by the following objectives:

- To initiate and intensify regional cooperation in scientific and technological activities; to generate and promote development of scientific and technological expertise and manpower in the ASEAN region;
- To facilitate and accelerate the transfer of scientific developments and technologies among ASEAN countries and from the more advanced industrialised countries to the ASEAN region;
- To provide support and assistance in the application of the results of research and development, and in the more effective use of natural resources in the ASEAN region; and
- To provide support towards the implementation of present and future ASEAN programmes.

In 1971, the Ad hoc Committee on Science and Technology was elevated into the ASEAN Permanent Committee on Science and Technology (PCOST) to ensure continuity in promoting and intensifying cooperation in science and technology activities that can contribute to addressing common problems in the ASEAN region as well as raising the level of scientific and technological advancement in member states. PCOST was among the first eleven (11) Permanent Committees (e.g., food and agriculture; shipping; civil air transportation; finance; commerce and industry; transportation; tourism; science and technology; socio-cultural activities; and mass media) that were set up by ASEAN. Among the major initiatives of PCOST include, among others, the development of low-cost protein-rich foods for infants and lactating mothers; compilation of climatic Atlas and compendium of climatic

statistics in ASEAN; management of the environment; and management and utilisation of food waste materials. The idea of formulating a plan of action that will serve as a guiding framework for cooperation in science and technology was also raised in 1977.

Following the rationalisation of ASEAN operations in 1978, PCOST was rebranded as the ASEAN Committee on Science and Technology (COST). COST met for the first time in June 1978. One of the first major milestones achieved by COST since its first meeting in June 1978 was the development of the first ASEAN Plan of Action on Science and Technology (APAST). The final draft of the 1st APAST was essentially completed in 1981 but was adopted by COST in 1985 through the joint efforts of an Experts group established by COST and the ASEAN Secretariat. Given the continuing progress in S&T cooperation in ASEAN, including the entry of Brunei Darussalam as a new member country on 7 January 1984; and new directives from the 3rd ASEAN Summit in Manila, Philippines in 1987, the 1st APAST was updated and adopted at the 4th Meeting of the ASEAN Ministers on Science and Technology (AMST-4) in Manila, Philippines on 30-31 January 1989. The Ministers also established the ASEAN Trust Fund for Science and Technology to promote regional cooperation in science and technology. Said Trust Fund, later on referred to as the ASEAN Science Fund (ASF), started with an initial contribution of US$50,000.00 from each ASEAN Member country, and a contribution of NZ$100,000 (approx. US$58,218.65) from the New Zealand government. The 21st Meeting of COST in Yogyakarta on 4-8 September 1989 adopted the guidelines for the Management of the ASF. The Terms of Reference of the Advisory Body of the ASF (ABASF) was also adopted by COST-21. The augmentation of the ASF was first raised at the 1st ABASF Meeting in Chiang Mai, Thailand on 27 February 1991.

The 2nd APAST was adopted at the 6th Meeting of ASEAN Ministers on Science and Technology (AMMST) in February 1994 in Manila, Philippines. A separate ASEAN Operational Plan of Action on Science and Technology (1995-1999) to accompany the 2nd APAST was also proposed to be published. The said operational plan was amended and later renamed Medium Term Programme for Science and Technology Development (1996-2000). The said Medium Term Programme, which was adopted at the 7th AMMST, held on 28-29 August 1995 in Bangkok, Thailand, aimed to achieve the following goals:

- A high level of intra-ASEAN Cooperation in Science and Technology that is synergistic and self-sustaining and having the active participation of the private sector;
- A network of S&T infrastructure and programmes for public and private sector human resource development;

- An active economically-beneficial institution-industry technology transfer;
- An enhanced state of public awareness of the importance of science and technology to ASEAN's economic development; and
- An expanded S&T cooperation with the international community.

The ASEAN Leaders at their 2nd Informal Summit held on 15 December 1997 in Kuala Lumpur, Malaysia, adopted the ASEAN Vision 2020[2] where ASEAN is envisioned to be a concert of Southeast Asian Nations, outward looking, living in peace, stability and prosperity, bonded together in partnership in dynamic development and in a community of caring societies. The ASEAN Vision 2020 also provides for the following statements that served as the vision for S&T cooperation in ASEAN:

"A technologically competitive ASEAN competent in strategic and enabling technologies, with an adequate pool of technologically qualified and trained man power, and strong networks of scientific and technological institutions and centers of excellence."

A year later, the Ha Noi Plan of Action (HPA)[3] 1999-2004 was adopted by the ASEAN Leaders at the 6th ASEAN Summit in Ha Noi, Viet Nam on 16 December 1998. The HPA 1999-2004 was the first in a series of plans of action that ASEAN would formulate to realise the goals of ASEAN Vision 2020.

By mid-1999, ASEAN has expanded its membership with Viet Nam joining the organisation on 28 July 1995; Lao PDR and Myanmar on 23 July 1997; and Cambodia on 20 April 1999. The 38th Meeting of COST on 27-29 October 1999 in Singapore was an historic event as it marked the first time that COST met with all ten ASEAN Member States represented in the meeting.

Recognising the varied levels of scientific and technological developments in all ten ASEAN Member States, it was imperative for ASEAN COST to devise mechanisms that would allow the newer Member States to accelerate the development of the capacities of their human resources including their S&T policy infrastructure. The ASEAN S&T Ministers, at their First Informal Ministerial Meeting on 8 April 2000 in Genting Highlands, Pahang, Malaysia, signed the Agreement on the Augmentation of the ASEAN Science Fund. The Agreement states that the ASEAN Member States (AMS) shall augment the ASEAN Science Fund to reach a target contribution of US$1 million each. The AMS shall complete their contributions to the ASF in annual payments over a period of 10 years.

To address the S&T aspirations stipulated in the ASEAN Vision 2020, the new millennium plan of action on science and technology (3rd APAST) was developed to include the S&T actions outlined in the HPA. Noting further the continuing rapid development in S&T, the implementation framework of the 3rd APAST covered a shorter 2001-2004 period with a view to making adjustments as necessary to ensure that the objectives and strategic thrusts remain relevant and continue to be supportive of the ASEAN Vision 2020. The APAST implementation framework for 2001-2004 was adopted at the 9th ASEAN Ministerial Meeting on Science and Technology on 17-18 September 2001 in Bandar Seri Begawan, Brunei Darussalam. The 2001-2004 Implementation Framework, later extended to 2006, called for the institutionalisation of an ASEAN-Help-ASEAN scheme whereby the more advanced ASEAN Member States would mentor and provide technical assistance in developing human resources and strengthening the relevant institutions of the new ASEAN Member States.

The new millennium APAST attempted to elevate the goals of the previous APASTs to include aspirations that would result in the development of innovative systems that can contribute to facilitating technology transfer and commercialisation, revenue generation, entrepreneurship including the establishment of start-up companies that can mature into future industries. The goals of the new millennium APAST include:

- An intensified cooperation on science and technology development and R&D between public and private sector that has a strong thematic focus, and is interdisciplinary and cross-sectorial;
- An expanded scope of regional programmes leveraging on national experiences and resources and ASEAN-Help-ASEAN initiatives that will enable the newer ASEAN members to move up the learning curve and become economically competitive;
- A highly mobile and intelligent S&T community that thrives on knowledge creation and application, and is creative;
- A system of rewards and incentives to encourage innovation and technology commercialisation and attract talents to a life-long career in science and technology;
- A means of seeding and sustaining science and technology programmes through innovative ways of investing in S&T endeavours and generating revenue; and
- An enhanced system of management of the future S&T enterprise that is innovative, bold and entrepreneurial.

The ASEAN Leaders at their 9th Summit in Bali, Indonesia on 7 October 2003 signed the ASEAN Concord II (Bali Concord II)[4] declaring that the ASEAN Community shall comprise three pillars: political and security cooperation; economic cooperation; and socio-cultural cooperation that are closely intertwined and mutually reinforcing for the purpose of ensuring durable peace, stability and shared prosperity in the region. These pillars would later be known as the ASEAN Political-Security Community (APSC); ASEAN Economic Community (AEC) and ASEAN Socio-Cultural Community (ASCC), respectively.

The Vientiane Action Program (VAP)[5] 2004-2010 was adopted at the 10th ASEAN Summit on 26 November 2004 in Vientiane, Lao PDR as the successor of the HPA1999-2004. The VAP was designed to unify the strategies and goals of the three pillars of the ASEAN Community. Given the dynamic nature of ASEAN Community building, the VAP was perceived to be an evolving document. The VAP recognised the potential contribution of S&T towards enhancing competitiveness of ASEAN to sustain economic growth and integration. As such, science and technology was placed under the ASEAN Economic Community pillar of the VAP with the following objectives:

- Foster Science and Technology (S&T) as a key factor in sustaining economic growth, enhancing community well-being and promoting integration in ASEAN, through human resource, research and technology development and provision of technical services to meet the needs of economic integration;
- Apply S&T tools and methodologies to enhance economic and industrial planning;
- Formulate a systematic approach in the implementation of the ASEAN-Help-ASEAN programmes to address the S&T needs and strengthen the S&T infrastructure of less developed member states; and
- Use S&T as major tool for ASEAN to move forward in a unified and cohesive manner. The 4th APAST covering the period 2007-2011 was adopted at the 4th informal ASEAN Ministerial Meeting on Science and Technology held on 29 August 2006 in Kuantan, Malaysia. The objectives of APAST 2007-2011 are basically extracted from the above S&T section of the VAP and to build on the accomplishment of the immediate past APAST 2001-2004 extended to 2006.

ASEAN Leaders at their 12th Summit in Cebu, Philippines on 13 January 2007 agreed to accelerate the establishment of the ASEAN Community from 2020 to 2015[6]. Following this bold decision, the relevant Ministers were tasked to facilitate the development of respective Blueprints for the APSC, AEC and ASCC. The AEC Blueprint was first to be completed in 2007; the Blueprints for APSC and ASCC

and the 2nd Work Plan of the Initiative for ASEAN Integration (IAI) were adopted at the 15th ASEAN Summit in Cha Am, Hua Hin, Thailand on 1 March 2009. The three (3) Blueprints and the 2nd IAI Work Plan constituted the Roadmap for an ASEAN Community (2009-2015).

Science and technology interventions towards building the ASEAN Community were placed under the human development characteristic of the ASCC Blueprint. Referencing on the past APAST, the strategic objective stipulated in the ASCC Blueprint include the development of policies and mechanisms to support active cooperation in research, science and technology development, technology transfers and commercialisation and establishment of strong networks of scientific and technological institutions with the active participation of private sector and other relevant organisations. The following actions were identified to address such objectives:

- Establish a network of S&T centres of excellence to promote cooperation, sharing of research facilities, technology transfer and commercialisation, and joint research and technology development by 2011;
- Strengthen collaborative research and development in applied S&T to enhance community well-being;
- Facilitate the exchange and mobility of scientists and researchers from both public S&T institutions and private sector according to the respective laws, rules, regulation, and national policies;
- Establish strategic alliances with private sector to promote R&D collaboration and technology transfer and commercialisation;
- Establish ASEAN scholarship and fellowship opportunities to support the ASEAN Virtual Institute of Science and Technology (AVIST) and other related science activities;
- Heighten the awareness on applied S&T for sustainable development;
- Develop a core set of S&T indicators that can serve as input in the development of human resource strategies by economic and industry planners;
- Enhance and sustain the utilisation of the ASEAN Science and Technology Network (ASTNET) and other S&T networks; and
- Promote the strengthen collaborative research and development in applied S&T to development, use and sharing of digital content among ASEAN Member States.

Looking back, it can be noted that the strategic thrusts and their associated actions in the series of APASTs developed to address the S&T vision basically aim to achieve common aspirations. These include intensifying collaboration with all relevant stakeholders and institutions in capacity building, R&D, technology diffusion and commercialisation; strengthening S&T infrastructure, governance and support system; raising the visibility of the benefits that can be derived from developing and utilising S&T products and services; and strengthening cooperation with the private sector, dialogue and other partners. Figure 1 shows the timeline of the key roadmap events of ASEAN and ASEAN Science and Technology Cooperation. Table 1 shows a comparison of the thrusts and actions of the past three (3) APASTs.

Figure 1.
Timeline of events on ASEAN roadmaps and ASEAN Science and Technology Action Plans

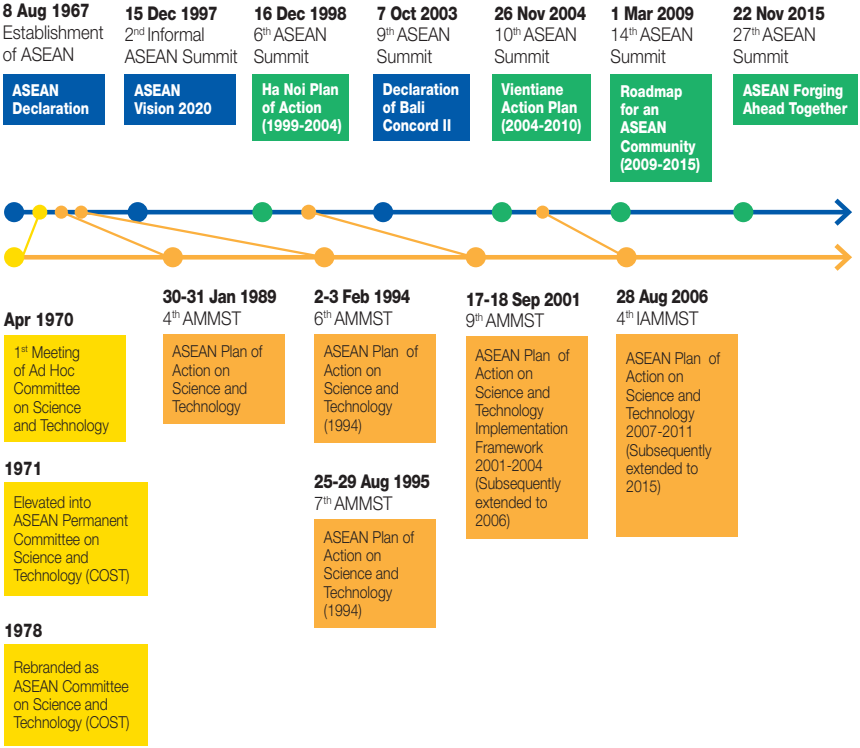


Table 1.
Comparison of the past three (3) APASTs

	APAST 1996-2000	APAST 2001-2004 (extended to 2006)	APAST 2007-2011 (extended to 2015)
VISION	**A technologically competitive ASEAN, competent in strategic and enabling technologies, with adequate pool of technologically qualified and trained manpower, and strong networks of scientific and technological institutions and centers of excellence.**		
Goals/ Objectives:	To intensify intra-ASEAN cooperation in science and technology with the active participation of the private sector that is synergistic and self-sustaining; To establish a network of S&T infrastructure and programmes for public and private sector human resource development; To promote an active and economically beneficial institution-industry technology transfer; To enhance the state of public awareness on the importance of science and technology to ASEAN's economic development; and To expand S&T cooperation with the international community.	An intensified cooperation on science and technology development and R&D between the public and private sector, that has a strong thematic focus, and is interdisciplinary and cross-sectoral; An expanded scope of regional programmes leveraging on national experiences and resources and ASEAN-Help-ASEAN initiatives that will enable the newer ASEAN Members to move up the learning curve and become economically competitive; A highly mobile, intelligent and creative S&T Community that thrives on knowledge creation and application; A system of rewards and incentives to encourage innovation and technology commercialisation and attract talent to a lifelong career in science and technology; A means of seeding and sustaining science and technology programmes through innovative ways of investing in S&T endeavours and generating revenue; and An enhanced system of management of the future enterprise that is innovative, bold and entrepreneurial.	To foster Science and Technology (S&T) as a key factor in sustaining economic growth, enhancing community well-being and promoting integration in ASEAN through human resource, research and technology development and provision of technical servicesto meet the needs of economic integration; To apply S&T tools and methodologies to enhance economic and industrial planning; To formulate a systematic approach in the implementation of the ASEAN-Help-ASEAN programmes to address the S&T needs and strengthen the S&T infrastructure of less developed Member countries; To use S&T as a major tool for ASEAN to move forward in a unified and cohesive manner; and To build on the accomplishments of ASEAN Plan of Action on Science and Technology (APAST) 2001-2004 extended until 2006.

Strategic Thrusts and Actions	**Strategy 1:** **Supporting regional S&T programmes that are economically and socially beneficial to ASEAN** **Actions:** Identify private sector end-users of research results and seek active participation of the private sector in R&D; Support improvement of standards, testing and quality assurance activities of the private sector; Select and prioritise programme areas and projects that ofter the greatest impact and the most benefits to ASEAN as a whole; Establish a set of criteria for prioritizing programme areas and projects based on technical and economic factors; and Identify centers of excellence for S&T development.	**Thrust 1:** **Networking of S&T centres of excellence and programmes so as to optimise resources and achieve maximum results** **Actions:** Hasten the development of the ASEAN S&T Network (ASTNET) & create a hub of activities to promote & sustain it; Identify centres of excellence on S&T and develop a resource database and network to facilitate information sharing human resource development and technical cooperation between the public and private sector; Develop a network of national and regional projects and databases to support integration and achieve optimisation for regional implementation taking into account the diverse economies, stage of development, and readiness of member countries; and Promote a modern and competitive Small and Medium Enterprise (SME) sector in ASEAN by leveraging on astnet and the related S&T networks and resources.	**Thrust 1:** **Intensifying R&D collaboration and promoting technology commercialisation** **Actions:** Identify and develop cost-shared projects through the subcommittees of cost; Develop a policy framework for strategic partnership in R&D and technology development with the private sector; Identify and seek appropriate commercial spin-offs with the private sector; and Transfer and apply technological know-how for the community's welfare.
	Strategy 2: **Providing close coordination and management of S&T activities** **Actions:** Set up a programme/ project planning, monitoring and reporting system;	**Thrust 2:** **Developing policy for programme selection, design, and management in a new S&T enterprise, taking into consideration sectoral needs and the needs of newer member states**	**Thrust 2:** **Developing S&T human resources** **Actions:** Enhance the promotion of the ASEAN-Help-ASEAN programme focusing on human resource development and capacity building;

	Establish a set of key targets to drive the regional S&T development effort; Establish guidelines on the acquisition and management of programme/project funding; Promote strategic linkages with industry; Establish guidelines on commercialisation of results including the sharing of intellectual property right and royalties.	**Actions:** Develop policy to guide programme selection, funding, execution and management; Develop policy and a framework for collaboration with the private sector on R&D and technology venture development; Develop policy and mechanisms for cost and benefit sharing and equity participation in S&T spin-off companies; Develop a framework for intra-ASEAN intellectual property protection and technology transfer; Develop a mechanism for identification, design and execution of ASEAN-help-ASEAN projects;	Design and implement training programmes to address the needs of high value-added industries that enhance ASEAN global competitiveness; Design training programmes and utilise the ASEAN Virtual Institute of Science and Technology (AVIST) whenever appropriate; and Establish the ASEAN Scholarship and fellowship Programme to support e-ASEAN and the implementation of the ASEAN information infrastructure.
	Strategy 2: **Providing close coordination and management of S&T activities** **Actions:** Set up a programme/project planning, monitoring and reporting system; Establish a set of key targets to drive the regional S&T development effort; Establish guidelines on the acquisition and management of programme/project funding; Promote strategic linkages with industry;	**Thrust 2:** **Developing policy for programme selection, design, and management in a new S&T enterprise, taking into consideration sectoral needs and the needs of newer member states** **Actions:** Develop policy to guide programme selection, funding, execution and management; Develop policy and a framework for collaboration with the private sector on R&D and technology venture development; Develop policy and mechanisms for cost and benefit sharing and equity participation in S&T spin-off companies;	**Thrust 2:** **Developing S&T human resources** **Actions:** Enhance the promotion of the ASEAN-Help-ASEAN programme focusing on human resource development and capacity building; Design and implement training programmes to address the needs of high value-added industries that enhance ASEAN global competitiveness; Design training programmes and utilise the ASEAN Virtual Institute of Science and Technology (AVIST) whenever appropriate; and

	Establish guidelines on commercialisation of results including the sharing of intellectual property right and royalties.	Develop a framework for intra-ASEAN intellectual property protection and technology transfer; Develop a mechanism for identification, design and execution of ASEAN-Help-ASEAN projects; Establish an ASEAN-know-ASEAN platform to promote close interactions among S&T professionals and policy and decision makers in the public and private sectors; and Establish a mechanism to promote public awareness on the achievements of ASEAN Science and Technology Cooperation.	Establish the ASEAN Scholarship and Fellowship Programme to support e-ASEAN and the implementation of the ASEAN information infrastructure.
	Strategy 3: **Developing S&T human resources** **Actions:** Develop R&D human resources to meet sectoral needs; and Establish an ASEAN S&T fellowship programme.	**Thrust 3.** **Intensifying R&D collaboration in strategic and enabling technologies and promoting technology commercialisation** **Actions:** Employ a Project Steering Group (PSG) for each programme area to engage dialogue partners and the private sector for discussion on collaboration and funding; Adopt a sectoral and thematic approach to defining priority areas for research collaboration through a process of technology scanning and foresighting; Intensify intra-ASEAN research collaboration to develop core competency and enabling technology; Identify and seek appropriate commercial spin-offs through partnership with the private sector; and	**Thrust 3:** **Networking of S&T centres of excellence and programmes** **Actions:** Establish an ASEAN network of technology foresight practitioners and sustain technology foresight exercises for selected priority sectors; Develop a resource database and network to facilitate information sharing and technical cooperation among agencies in the public and private sector; and Enhance and sustain the utilisation of the ASEAN Science and Technology Network (ASTNET) and other S&T networks.

		contribute to the e-ASEAN infrastructure and projects by being an active end-user and content developer leveraging on resources of COST's subsidiary groups and networks.	
	Strategy 4: **Information networking of centers of excellence** **Actions:** Develop an ASEAN technology information network; Establish a technology database of ASEAN business groups; Establish a database of ASEAN S&T expertise and facilities; and Establish a technology scan mechanism.	**Thrust 4.** **Developing human resources to meet the needs of e-ASEAN, newer members and the knowledge economy** **Actions:** Mobilise S&T resources and networks to create an environment for life-long learning and innovation and to support the training of young entrepreneurs; Design HR development programmes to meet sectoral needs and the needs of newer ASEAN members, especially the training of trainers and updating of professionals; Establish an ASEAN Scholarship and fellowship programme to support e-ASEAN and the imple mentation of the ASEAN information infrastructure; and Establish an intra ASEAN exchange programme for talented ASEAN decision makers to be attached to key resource centres and government agencies or take part in an executive fellowship programme focusing on S&T policy and management.	**Thrust 5:** **Strengthening S&T infrastructure and support systems** **Actions:** Increase awareness of S&T projects and accomplishments through the implementation of appropriate programmes, leveraging on the ASEAN Science, Technology and Innovation Week (ASTIW), ASEAN Food Conference (AFC), the ASEAN Journal on Science and Technology for Development (AJSTD), and the various ASEAN COST supported events; Establish linkages with other ASEAN bodies and committees for joint under-takings, utilizing S&T as a major tool in addressing priority projects in ASEAN; Improve the competitiveness of the Small and Medium (SME) sector in ASEAN through the application of S&T tools and methodologies; and Promote the wider utilisation of services provided by the ASEAN Seismological and Meteorological Centre (ASMC) and the ASEAN Earthquake Information Centre (AEIC).

	Strategy 5: **Promoting institution-industry technology transfer** **Actions:** Establish mechanisms for technology transfer; and Establish a set of incentives to encourage technology commercialisation and mobility of S&T human resources.	**Thrust 5.** **Developing S&T infrastructure and content for e-enabling research, human resource development, technology foresighting and intelligence gathering, technology commercialisation, and venture development** **Actions:** Establish an S&T Research and Education Network Alliance (ASTRENA) taking advantage of the current and future multi-lateral and bi-lateral new generation internet links; Further develop ASTMIS databases for easy data management, updating and search, and develop new indicators to measure technology content in products and services and impact on the national and regional economy; Create content for the ASEAN information infrastructure leveraging on ASTNET, ASTMIS and the networks of COST Subcommittees; Develop an e-learning network for continuing education and professional updating courses; Develop e-links between COST and schools and the business community; and Undertake ASEAN-Help-ASEAN e-conversion projects in newer ASEAN members focusing first on the S&T and education sector.	**Thrust 5:** **Strengthening S&T infrastructure and support systems** **Actions:** Complete the current augmentation plan of the ASEAN Science Fund and other ways to augment the fund; Develop a core set of ASEAN S&T indicators that can serve as input in the development of human resource strategies by economic and industry planners; Operationalise the ASTNET as a hub of S&T information exchange technology transaction; Strengthen the ASEAN information infrastructure by creating and utilizing the contents of ASTNET, ITTIN, ASTMIS, ASTRENA and other cost resources; Develop the policy and the system to promote and manage regional S&T enterprise, including intellectual property protection, for commercial spin-offs and joint ventures; and Develop the framework for the establishment of the ASEAN and Technology Enterprise for Research, Innovation, Service and Knowledge (ASTERISK) to create a fast-moving, adaptive and forward-looking S&T enterprise.

	Strategy 6: **Promoting S&T awareness** **Actions:** Recognise the contributions of individuals and corporations to ASEAN's scientific and technological endeavours; and Publish an ASEAN S&T newsletter/ magazine.	**Thrust 6.** **Generating revenue through innovative management systems and enterprise formation** **Actions:** Spin off the commercial portion of ASTNET & develop it into an income generating enterprise and test bed for future projects; Develop business plans to spin-off COST projects having the potential to become viable commercial ventures; Create a system of governance of COST spin-off enterprises; Develop a system for revenue sharing among researchers, institutions and ASEAN COST; and Augment the ASEAN Science Fund (ASF) from revenue obtained from fees and royalties, equity holdings in COST enterprises.	**Thrust 6:** **Forging closer cooperation with dialogue partners and other relevant organisations on regional projects** **Actions** Develop new strategies for partnership with dialogue partners & other relevant organisations on mutually beneficial projects; Facilitate access to dialogue partners' resources for implementation of regional projects with a focus on newer ASEAN members; and Forge closer relationships with relevant+3 S&T agencies for mutually beneficial development in East Asia.
		Thrust 7. **Engaging dialogue partners in a focused manner in major programme areas and flagship projects** **Actions:** Seek appropriate representation in discussions with dialogue partners on S&T cooperation; Develop strategies for engagement of dialogue partners beyond project design and monitoring taking into consideration differentiated approaches based on mutually beneficial common interests;	

		Invite dialogue counterparts and private sector for joint venture development; Facilitate access to dialogue partners' resources for implementation of regional projects with a focus towards newer ASEAN members; and Manage COST+3 relations with the view to forging closer partnership for mutually beneficial development in EAST ASIA.	
		Thrust 8. **Managing the S&T enterprise in the new millennium** **Actions:** Develop innovative systems to manage a regional S&T technology enterprise having diverse interests in R&D, spin-offs, and venture development; Develop innovative mechanisms for COST to hold equity in its spin-offs and joint ventures; Strengthen the administrative support to COST; and Establish an ASEAN Science and Technology Enterprise for Research, innovation, Service and Knowledge (ASTERISK) as a twin body of COST to create a fast-moving, adaptive and forward-looking S&T enterprise.	

II. Review of ASEAN Cooperation on Science and Technology: Milestones, Challenges and Opportunities

Milestones and Accomplishments

The implementation of the APAST 2007-2011 saw the completion of 134 projects and related activities while 23 projects are in various stages of implementation (see Table 2). China, India, Japan, and the ROK continue to engage and support COST and its subsidiary bodies in implementing S&T projects/programmes. The amount of funding mobilised from ASEAN and its Dialogue Partners to support the projects is estimated to be more than USD 12 million with Japan as a major benefactor. This sum remains conservative in the absence of complete information on how much was spent by ASEAN Member States for cost-shared projects.

Among the milestones reached and major initiatives implemented since 2007, the following can be rightfully cited as significant or can be categorised as success stories on the basis of being sustained over the years:

i. The Krabi Initiative (KI)

The Krabi Initiative was adopted at the 6th Informal ASEAN Ministerial Meeting on Science and Technology on 17 December 2010 in Krabi, Thailand. Guided by the theme "Science, Technology and Innovation (STI) for a competitive, Sustainable and inclusive ASEAN", the KI set the framework on how ASEAN should prepare for the future of Science, Technology, and Innovation (STI) from year 2015 and beyond.

Following the adoption of the Krabi Initiative, COST agreed to embark on a transformational revolution and paradigm shift as defined in the Krabi Initiative and that while still anchored on science and technology, COST shall ensure that innovation benefitting the ASEAN peoples will be the ultimate goal of S&T collaboration in ASEAN.

ii. Study on the State of Science and Technology Development in ASEAN[7]

The study aimed to assess the S&T capacities (both human and infrastructure) of ASEAN Member States (AMS); to identify possible technology niches (strengths) in each AMS; and to develop a set of strategies on how ASEAN could synergise each other's strengths to ensure rapid, consistent, and

harmonious S&T developments in each Member State without duplicating but complementing these developments and how S&T development in ASEAN, both at national and regional levels, could be relevant to the realisation of the ASEAN Community by 2015.

The study provided an insight on varied levels of S&T development in all AMS based on internationally accepted indicators related to human resources involved in Research and Development (R&D); funding such as the Gross Expenditure on Research and Development (GERD); S&T policy, development strategies and S&T infrastructure.

The general findings of the study appear to be consistent with those reported by the World Economic Forum on Global Competitiveness Index (GCI)[8]. The GCI is composed of 12 pillars, which contribute to setting the necessary conditions for competitiveness. These pillars include, among others, institutions; infrastructure; technological readiness; higher education and training; innovation, etc. Table 3 shows the global competitiveness ranking of ASEAN Member States and Dialogue Partners. Table 4 also indicates a steady improvement in the global competitiveness ranking of AMS. In fact, 7 of the 10 AMS rank in the top 50% of the 140 countries surveyed and with Singapore consistently maintaining its no. 2 position over the years.

iii. The ASEAN Plus Three Centre for the Gifted in Science (ACGS)[9]

The ACGS initiative is championed by the ROK and aimed to inspire and provide opportunities for young students in ASEAN, China, Japan, and the ROK who are gifted in science to pursue careers in science and technology and become future innovators and contributors to sustainable growth in their respective countries. Since the first ACGS Consultative Meeting that was convened on 11-12 April 2007 in Gyeongnam, ROK, the conduct of annual events such as Teachers' Workshop and Student Camp; ASEAN Plus Three Junior Science Odyssey; and ACGS consultative meetings have been sustained and supported by the ROK. The various events were conducted on cost-sharing basis but ROK has provided more than USD 1 million to cover event expenses.

iv. The ASEAN Food Conference (AFC)

This event is one of the flagship projects of ASEAN COST that endeavours to bring together scientists, technologists, researchers, academicians, industrialists, entrepreneurs, policy planners, students, international and regional agencies as well as government and non-government organisations

related to the food industry to enhance scientific knowledge by sharing new findings, establishing strategic alliances to further develop the food industry to contribute to accelerating trade and growth of the economies of the ASEAN.

Since the first AFC that was held in Singapore in 1982 (see Table 5), the AFC has continued to serve as a platform to showcase the new developments in food science and technology and their impact on food security, environment, health and nutrition as well as enhancing harmonisation of food standards and regulations while fostering communication and networking. The following five AFC events were held during the period 2007-2015:

- The 10th AFC, 21-23 August 2007, Kuala Lumpur, Malaysia;
- The 11th AFC, 21-23 October 2009, Bandar Seri Begawan, Brunei Darussalam;
- The 12th AFC, 16-18 June 2011, Bangkok, Thailand;
- The 13th AFC, 9-11 September 2013, Singapore; and
- The 14th AFC, 24-26 June 2015, Pasay City, Manila, Philippines.

v. The ASEAN Science, Technology and Innovation Week (ASTIW)

The ASEAN Science, Technology and Innovation Week (ASTIW) (originally named as ASTW) is an important undertaking of the ASEAN COST. The event is held triennially on a rotational basis among ASEAN Member States. The main purpose of conducting ASTIW events is to promote and raise awareness of scientific and technological development in ASEAN. The ASTIW has also served as a forum for scientists, technologists, researchers, academicians, government officials, those who are from the industry practitioners and private sectors to interact and to promote networking, as well as to expand cooperation in science, technology and innovation. Since the 1st ASTW that was hosted by Malaysia in Kuala Lumpur on 24-29 April 1986 (see Table 5), nine ASTW events have been held. The 8th and 9th ASTW events were held during the implementation of APAST 2007-2011.

- The 8th ASTW, 1-11 July 2008, Manila, Philippines; and
- The 9th ASTW, 18-27 August 2014, Bogor, West Java, Indonesia.

Challenges

The 58th Meeting of COST in Singapore on 3-5 November 2009 noted the report of the ASEAN Secretariat on its general assessment of the projects implemented by COST's Sub-Committees since 1978 until 2008. The general observation was that project implemented could be categorised to be mostly on capacity building activities such as conduct of workshops, conference, and study visits. Sub-Committees faced difficulties in engaging relevant partners to undertake joint R&D works. The observations remain valid to this date. This could be attributed to the following:

- Sub-Committees continue to rely nearly totally on external funding support from Dialogue Partners or other donors. Unfortunately, these external funding sources have shifted their priorities in areas outside of R&D;
- Some ASEAN Member States remain to have limited R&D facilities, skilled scientists or national funds to allow them to participate fully in R&D activities;
- The holding of S&T popularisation events at the regional level posed significant financial load to the hosts of the events;
- The quality of project proposals emanating from the Sub-Committees may need to be improved to attract potential donors towards providing support;
- Sub-Committees tend to develop and implement one-off projects instead of programmes that are well planned and designed; and
- Sub-Committee members have specialisation in specific technical areas but may lack the skills and tools in strategic planning, technology foresighting, programme/project design and development, monitoring and evaluation.

COST-58 and the COST retreat on the "Future of Science, Technology, and Innovation (STI): 2015 and Beyond" was held on 11-12 December 2010 in Krabi, Thailand noted the lessons learned and the need to work on following measures to bring about more meaningful S&T interventions:

- ASEAN Member States need to improve its strategy to properly mobilise and manage its resources. Commitments and efforts to internalise the programmes and strategic thrusts of APAST into its national agenda should be secured and sustained. This would entail adjustments and reforms of national mechanisms, programmes and activities, and internalisation into the national budget.
- An effective coordination mechanism needs to be put in place that would allow the Sub-Committees to engage among themselves or with other relevant sectors outside of COST in joint undertakings particularly on cross-cutting issues such as addressing food or energy security; disaster management; and climate change.

- Outreach programmes and engaging the private sector in the conduct of various S&T activities, including those that promote appreciation of S&T interventions need to be aggressively pursued.
- Trainings for the Sub-Committee members may need to be undertaken on a regular basis.
- The support system for the ASEAN COST should be enhanced by strengthening the ASEAN Secretariat.

Table 2.
List of ASEAN Science, Technology and Innovation (STI) Projects Implemented since 2007

COMPLETED PROJECTS/ACTIVITIES/PROGRAMMES

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
1.	The 2nd ASEAN-India Workshop in Bioinformatics	2007	SCMIT
2.	ASEAN-India Workshop in Renewable Energy	2007	SCSER
3.	RANET Training (formerly Training Course on the Understanding of Earthquake and Tsunami and Mitigating Their Effect)	2007	SCMG
4.	Training on Digital Forecast	2007	SCMG
5.	ASEAN-Help-ASEAN Scheme: Field Course on Local Scale (district) Climate Forecast Application	2007	SCMG
6.	ASEAN-ROK Cooperation on Climate Information and Service	2007	SCMG
7.	ASEAN-Help-ASEAN Scheme: The International Training Course in Tsunami and Earthquake Vulnerability Reduction	2007	SCMG
8.	ASEAN-China Training Workshop on Utilisation of Biomass Gasification Technology	2007	SCSER
9.	ASEAN-China Workshop on Functional Materials	2007	SCMST
10.	Spatial Data Infrastructure Project	2007	SCOSA
11.	ASEAN-Pakistan Geoinformatics Workshop	2007	SCOSA
12.	Training Workshop on Application of Satellite Altimetry Data	2007	SCOSA
13.	The 10th ASEAN Food Conference (AFC-10)	2007	SCFST
14.	Regional Workshop on Food Traceability and Food Safety under the Thai French Trilateral Cooperation	2007	SCFST

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
15.	The 2nd East-Asia Bioinformatics Network (EABN)	2007	SCMIT
16.	The 2nd ASEAN-China International Bioinformatics Workshop	2007	SCMIT
17.	ASEAN Life Science Grid Panel	2007	SCB
18.	Training Course on Intellectual Property Protection (IPP) Management	2007	SCIRD
19.	ASEAN-Japan Experiences on S&T Governance: Framework of incentives for Scientists and Scientific Organisations	2007	SCIRD
20.	The 3rd East Asia Bioinformatics Network (EABN) Workshop	2007	SCMIT
21.	ASEAN-ROK Project on Ubiquitous Computing	2007	SCMIT
22.	Southeast Cooperation on ICT Research (SEACOOP) Phase I	2007	SCMIT
23.	The 2nd Workshop on Validation of Climate Model	2007	SCMG
24.	ASEAN Workshop on Avian Flu Reverse Genetic Vaccine and the International Symposium on Avian Influenza: Integration from Knowledge to Control	2007	SCB
25.	The 8th ASEAN Science and Technology Week (ASTW-8)	2008	COST
26.	ASEAN-ROK Workshop on Technology Transfer and Joint Technology Development	2008	SCIRD
27.	ASEAN-ROK S&T Roadmap Program (ASTCRM)	2008	SCMG
28.	ASEAN-China Training Course on Application of Satellite Remote-Sensing and Satellite Communication Technologies in Disaster Reduction	2008	SCMG
29.	Flagship Project in Disaster Management: Workshop Training on Earthquake Hazard Reduction Strategy	2008	SCNCER
30.	ASEAN-Japan New Energy Forum for the Sustainable Environment	2008	SCIRD
31.	APTCP-ASEAN Workshop for Nanophysics & Nanotechnology	2008	SCMST
32.	ASEAN-ROK Cooperation on Industrial Uses of Marine Biological Resources: Assessment of the State of the Art of Marine Biotechnology in the ASEAN Region	2008	SCMSAT
33.	ASEAN+3 Workshop on Life Science	2008	SCIRD
34.	An ASEAN Collaborating Network for Potential Surveillance and Monitoring for Zoonotic Emerging Infectious Disease from Wildlife	2008	SCB

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
35.	ASEAN-Russia Workshop on Vaccines	2008	SCB
36.	The 2nd Training Workshop on Earthquake Hazard Reduction Strategy	2008	SCMG
37.	ASEAN-ROK Project on Aviation Meteorology	2008	SCMG
38.	ASEAN-Japan Project on Development of Tsunami Propagation and Run-up/inundation Model Capability	2008	SCMG
39.	ASEAN-Japan Very Large Scale integration (VLSI) Project	2008	SCMIT
40.	Technology transfer and commercialisation of heat pump dryer for CIMV	2008	SCSER
41.	ASEAN-Russia Workshop on Renewable Energy	2008	SCSER
42.	ASEAN-Japan Training Course on Cleaner Production Technology for Virgin Coconut Oil (VCO) of Food Industry for ASEAN Countries	2008	SCFST
43.	ASEAN-Pakistan Materials Science conference	2008	SCMST
44.	ASEAN-China Workshop on Test Automation	2008	SCMIT
45.	ASEAN-India Training Workshop on R&D and Innovative Management	2008	SCIRD
46.	China-ASEAN Training Course on Technologies and Products of Building integrated with Solar Energy System	2009	SCSER
47.	ASEAN-India Training Course on Analysis of Chemical and Biological Contaminants in Raw and Processed Products for ASEAN countries	2009	SCFST
48.	Mapping of the Product R&D Landscape for Infectious Tropical Diseases in ASEAN Member States	2009	SCB
49.	The 17th National Children Science Congress (NCSC-17)	2009	SCIRD
50.	ASEAN-Japan Workshop on Climate Applications in ASEAN	2009	SCMG
51.	ASEAN-Pakistan International Workshop on Advanced Materials for New and Renewable Energy (AMNRE)	2009	SCSER
52.	The 11th ASEAN Food Conference (AFC-11)	2009	SCFST
53.	ASEAN-US Next-generation Cook Stoves Workshop	2009	SCSER
54.	China-ASEAN Solar Energy Development and Utilisation Forum	2009	SCSER
55.	FP7 SEALING Project - Southeast Asia Cooperation on ICT Research (SEACOOP) Phase II	2010	SCMIT

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
56.	The 1st ASEAN Environmental Technology Verification (ETV) Workshop	2010	SCFST
57.	ASEAN-Japan Cooperation on Application of Crop Growth Simulation Model with Satellite Remote Sensing and Geographic information System Techniques for Agricultural Crop Potential Yield Monitoring and Estimating	2010	SCOSA
58.	ASEAN-Japan Cooperation on Meteorological Early Warning System for Prevention and Mitigation of Agricultural Disasters	2010	SCMG
59.	ASEAN-Japan Utilisation of Satellite Images on Disaster Management Project	2010	SCOSA
60.	ASEAN-ROK Training on Numerical Weather Prediction (NWP)	2010	SCMG
61.	ASEAN-Russia Workshop on Application of Modern Biotechnology in Food Industry	2010	SCFST/SCB
62.	The 12th ASEAN Food Conference (AFC-12)	2011	SCFST
63.	Study on the State of S&T Development in ASEAN (supported by Japan)	2011	COST
64.	ASEAN-Japan Capacity Building in Landfill Gas Utilisation	2011	SCSER
65.	The 2nd ASEAN-Pakistan Conference on Materials Science (APCOMS)	2011	SCMST
66.	ASEAN-ROK Multi-Model Ensemble Seasonal Prediction Over South East Asia	2011	SCMG
67.	ASEAN-China International Workshop on Renewable Energy Application Technology	2011	SCSER
68.	ASEAN-China Seminar on Science and Technology Policy and Management for ASEAN countries	2012	SCIRD
69.	ASEAN-EU Year of Science, Technology and Innovation (YoSTI): ■ ASEAN-EU Media Awareness and Science Communication, Singapore, 2-3 March 2012; ■ Participation of academes, industries and governments in the triple helix conference, Bandung on 8-10 August 2012; ■ Participation on business and industries at International Techmart, Ha Noi, 20-23 September 2012; and ■ S&T Policy Visit of the National COST chairmen to Brussels, Brussels, 11-13 December 2012.	2012	SCIRD
70.	ASEAN-India Technology Mission on Functional Food	2012	SCFST

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
71.	The 5th ASEAN-India Science Conclave	2012	SCIRD
72.	The 20th National Children Science Congress (NCSC-20)	2012	SCIRD
73.	China-ASEAN Workshop on New Technologies of Agricultural Engineering & Agro-Processing for ASEAN Member States	2013	SCFST
74.	ASEAN-India Cooperation Project on Marine Biotechnology	2013	SCMSAT
75.	The 13th ASEAN Food Conference (AFC-13)	2013	SCFST
76.	The 21st National Children Science Congress (NCSC-21)	2013	SCIRD
77.	India-ASEAN Program on Quality Systems in Manufacturing (NABL)	2013	SCIRD
78.	ASEAN-China Training Workshop on Small Hydropower and Solar Energy System for Rural Electrification	2014	SCSER
79.	International Training Workshop on New and Renewable Energy (Biogas)	2014	SCSER
80.	ASEAN-India Special Training Programme on Wind Turbine Technology and Applications for ASEAN	2014	SCSER
81.	ASEAN-India Special Training Programme on Solar Energy Technologies and Applications	2014	SCSER
82.	ASEAN-Japan Regional Training Workshop on Weather Radar Basis & Routine Maintenance and Real-Time Radar Rainfall Estimation & Forecasting	2014	SCMG
83.	The 9th ASEAN Science and Technology Week	2014	COST
84.	The 3rd ASEAN-Pakistan Conference on Materials Science (APCOMS)	2014	SCMST
85.	ASEAN-India Development of Thermally Sprayed Ceramic-Based Coatings	2008-2014	SCMST
86.	ASEAN-GIZ Project on Promoting Innovation & Technology in ASEAN Countries (PIT) [year 1]	2013-2014	SCIRD
87.	ASEAN-India S&T Digital Library	2009-2014	SCMIT
88.	ASEAN-India Technology Information and Commercialisation Centre (TICC)	2012-2015	SCIRD
89.	ASEAN-India Virtual Institute for Intellectual Property (VIIP)	2012-2015	SCIRD
90.	ASEAN-US S&T Policy Fellowship Programme (Pilot Program)	2014-2015	SCIRD

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
91.	Japan-East Asia Network of Exchange for Students and Youths II (JENESYS 2.0): S&T Component of JENESYS 2	2015	SCIRD
92.	ASEAN-EU establishment of Networks of Excellence: ■ ASEAN Pilot Network of Excellence in Green Energy Research (ANEGER); and ■ ASEAN Pilot Network of Excellence in Food Security Research (COMMOD).	2015	SCIRD
93.	The 14th ASEAN Food Conference (AFC-14)	2015	SCFST
94.	ASEAN-Russia Workshop on the Practical Application of the Earth Remote Sensing Technologies to Solve Social and Economic Challenges	2015	SCOSA
95.	ASEAN-Russia Seminar on the Common Use of the GLONASS/GPS Satellite Navigation Technologies	2015	SCOSA
96.	ASEAN-Russia Workshop on Nano-Biotechnology: Achievements and Application	2015	SCB
97.	ASEAN-ROK STI Forum	2015	COST
98.	ASEAN Plus Three Center for the Gifted in Science (ACGS) initiatives: ■ 8 meetings of the ACGS Board of Directors; ■ 6 Teachers Workshop and Student Camp for the Gifted in Science; and ■ 4 ASEAN Plus Three Junior Science Odyssey Events.	2007-2015	SCIRD

ON-GOING PROJECTS/ACTIVITIES/PROGRAMMES

1.	HRD Program in Biotechnology	2006 - present	SCB and SCFST
2.	China-ASEAN Science and Technology Partnership Program (China-ASEAN STEP Program): ■ China-ASEAN Technology Transfer Center (CATTC); ■ Talented Young Scientist Visiting Program; ■ Joint Laboratory Program; and ■ Remote Sensing Satellite Data Sharing and Service Platform.	2013 - present	SCIRD and SCOSA
3.	ASEAN Centre for the Gifted in Science (ACGS)	2007 - present	SCIRD
4.	ASEAN-India Extent of Transfer of Nuisance Organisms between South and Southeast Asia by Shipping	2011-2016	SCMSAT

5.	ASEAN-Japan Project on Extension of the Rainfall Estimation for Monitoring of High Risk Fire Areas in Southeast Asia	To be implemented in 2016	SCMG
6.	ASEAN-India Program on Quality Systems in Manufacturing (NABL)	2013-2016	SCIRD
7.	ASEAN-Japan Capacity Building on Climate Change - Green-House Gases Emission (GHG) Reduction for Energy Intensive Industry in ASEAN	To be implemented in 2016	SCSER
8.	ASEAN-Japan Developing of Highly Skilled Science and Technology Engineering Professionals and Researchers from ASEAN Member States	2015-2018	SCIRD
9.	ASEAN-US S&T Policy Fellowship Programme (Year 2)	2015-2016	SCIRD
10.	Southeast Asia-European Union Network (SEA-EU-NET Phase II)	2013-2016	SCIRD
11.	ASEAN-EU EURAXESS (a joint initiative of the European Commission and the countries participating in the European Union's Framework Programme for Research)	2013-present	SCIRD
12.	ASEAN-India Space Programme	2015-2020	SCIRD
13.	ASEAN-Russia Dialogue on Renewable Energy and Clean Energy Technologies. Creation of an Expert-Analytical and Consulting Network on Renewable Energy	2015-2016	SCSER
14.	ASEAN-GIZ Project on Promoting Innovation & Technology in ASEAN Countries (PIT) [Year 2]	2014-2015	SCIRD

List of ASEAN COST Projects/Activities funded by the ASEAN Science Fund (ASF)

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
Completed			
1.	Publication of the ASEAN Plan of Action on Science and Technology (APAST)	2007	COST
2.	Brainstorming Session on Inter-Subcommittees Cooperation	2009	SCMSAT
3.	Publication of Coastal Resources & Environment profile	2009	COST/ ABAPAST

NO.	PROJECT TITLE	YEAR	IMPLEMENTING BODY
4.	Workshop on Developing Roadmaps for APAST Flagship Programmes	2009	SCMIT
5.	ICT-Based Real Time Monitoring and Management System for Dam Safety	2010	SCIRD
6.	ASEAN Collaboration in Metrology Training	2010	COST/ ABAPAST
7.	Workshop on Development of Implementation Plans of COST Flagship Programmes	2011	COST-Malaysia
8.	ASEAN Biofuel Workshop	2012	COST
9.	Krabi Initiative Workshop	2012	COST
10.	ASEAN Training-of-Trainers Workshop on Life Cycle Assessment (LCA) and Greenhouse Gas Profiling	2013	SCSER
11.	Meeting on ASEAN STI Grand Challenges	2013	SCIRD
12.	ASEAN Talent Mobility (ATM) Workshop	2014	SCIRD
13.	ABAPAST Retreat and Expert Group Meeting (EGM) on the ASEAN Science Fund	2014	ABAPAST/ ABASF
14.	The 9th ASEAN Science & Technology Week (ASTW-9) Awards	2014	COST
15.	ASEAN-NDI Meetings/Workshops	2014-2015	SCB
ON-GOING			
1.	Publication of the ASEAN Journal on Science and Technology for Development (AJSTD)	1997 - present	SCIRD
2.	The ASEAN S&T Network (ASTNET)	1997 - present	SCIRD
3.	Network-based ASEAN Languages Translation Public Service	2013 - present	SCMIT
4.	ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2015-2020	2013 - present	ABAPAST
5.	ASEAN Talent Mobility (ATM)	2014 - present	SCIRD/ ABAPAST
6.	Harmonising the LCA Methodology for ASEAN Biofuel - Carbon Footprint	2015-2016	SCSER

Table 3.
Global Competitiveness Ranking of ASEAN Member States and Dialogue Partners (World Economic Forum)

ASEAN Member States	2007-2008[1]	2008-2009[2]	2009-2010[3]	2010-2011[4]	2011-2012[5]	2012-2013[6]	2013-2014[7]	2014-2015[8]	2015-2016[9]
Brunei Darussalam	-	39	32	28	28	26	26	-*	-*
Cambodia	110	109	110	109	97	88	86	95	90
Indonesia	54	55	54	44	46	38	38	34	37
Lao PDR	-	-	-	-	-	-	81	93	83
Malaysia	21	21	24	26	21	24	24	20	18
Myanmar	-	-	-	-	-	-	139	134	131
Philippines	71	71	87	85	75	59	59	52	47
Singapore	7	5	3	3	2	2	2	2	2
Thailand	28	34	36	38	39	37	37	31	32
Viet Nam	68	70	75	59	65	70	70	68	56

ASEAN Dialogue Partners	2007-2008[1]	2008-2009[2]	2009-2010[3]	2010-2011[4]	2011-2012[5]	2012-2013[6]	2013-2014[7]	2014-2015[8]	2015-2016[9]
Australia	19	18	15	16	20	20	21	22	21
Canada	13	10	9	10	12	14	14	15	13
China	34	30	29	27	26	29	29	28	28
India	48	50	49	51	56	59	60	71	55
Japan	8	99	88	6	9	10	9	6	6
ROK	11	13	19	22	24	19	25	26	26
New Zealand	24	24	20	23	25	23	18	17	16
Russia	58	51	63	63	66	67	64	53	45
US	1	1	2	4	5	7	5	3	3
No. of Countries surveyed	**131**	**134**	**133**	**139**	**142**	**144**	**148**	**144**	**140**

[1] WEF Global Competitiveness Report 2007-08
[2] WEF Global Competitiveness Report 2008-09
[3] WEF Global Competitiveness Report 2009-10
[4] WEF Global Competitiveness Report 2010-11
[5] WEF Global Competitiveness Report 2011-12
[6] WEF Global Competitiveness Report 2012-13
[7] WEF Global Competitiveness Report 2013-14
[8] WEF Global Competitiveness Report 2014-15
[9] WEF Global Competitiveness Report 2015-16

* The Survey minimum requirements were not met in Brunei Darussalam and therefore, Brunei Darussalam could not be included in the list.

III. Key Consideration and Conceptual Framework for the Development of APASTI 2016-2025

The development and implementation of past APASTs have always been guided by the directives of ASEAN Leaders on the basic principles of ASEAN cooperation, the ASEAN Vision 2020 and the series of plans of actions [i.e., the HPA 1999-2004; the VAP 2004-2010; the Roadmap for an ASEAN Community (2009-2015)]; and the various declarations to realise the goals and aspirations towards building an ASEAN Community.

Guidance and directives from COST and AMMST, including success stories and lessons learnt from the implementation of past APASTs have determined how the latter were developed. Except for the inclusion of "innovation", the development of the new ASEAN Plan of Action on Science, Technological and Innovation (APASTI) 2016-2025 does not significantly deviate from what have been assessed to work best in the past. While the strategic thrusts and their associated actions of past APASTs (see table 1) remain valid, new approaches and strategies and how to raise the level and efficiency in the implementation of specific actions may need to be determined.

The development of APASTI 2016-2025, thus, is guided by the following:

i. Decision of the 6th IAMMST on 17 December 2010 in Krabi, Thailand

The Krabi Initiative which was adopted at the 6th IAMMST is guided by the theme of "Science, Technology and Innovation (STI) for a competitive, sustainable and inclusive ASEAN", the KI set the framework on how ASEAN should prepare for the future of Science, Technology, and Innovation (STI) from year 2015 and beyond. To realise this intent, the KI identified the following:

Eight thematic tracks[10] of the Krabi Initiative:

1. ASEAN Innovation for Global Market

ASEAN innovation through science and technology can benefit both ASEAN and global markets. Locally, ASEAN indigenous capabilities in products and services can benefit common people, raising quality of life both in the form of appropriate and emerging technologies. Utilizing our locally available resources and innovation can also extend to the global markets and contribute to ASEAN competitiveness.

2. Digital Economy, New Media and Social Networking

The revolution of Information and Communications Technology (ICT) paves the way for a more pervasive and knowledge-based society. In this regard, ASEAN in the digital age must make sure the accessibility and affordability of ICT and useful applications covering, amongst others, social networking, mobile communication, disaster management, healthcare improvement and gender equality.

3. Green Technology

Climate change is starting to show visible impact globally. In response to the increasing demand for industrial production to be more environmental friendly, STI should play a pivotal role in upgrading the industry by making use of low-carbon and cleaner technology. STI for mitigation and adaptation to climate change will be crucial for ASEAN sustainable development.

4. Food Security

STI plays a vital role in ensuring food security for ASEAN's more than 600 million population. Its role ranges from productivity improvement and optimisation, appropriate mechanisation of farms, appropriate food safety standards and access to adequate nutritional requirement to modern biotechnology that cater for both food and energy security.

5. Energy Security

The fluctuation in oil price and the increasing global demand for energy for economic development make it necessary for ASEAN to ensure energy security in the region. STI is vital in increasing energy efficiency and developing next-generation alternative energy resources.

6. Water Management

Realising that water is critical to both living and production, ASEAN should utilise STI in effective water management. In order to ensure stable access to clean water, innovations should be extensively promoted to facilitate water utilisation and waste water treatment, to mitigate disaster from flood and to prevent water scarcity.

7. Biodiversity for Health and Wealth

ASEAN is one of the most biodiverse regions in the world. Efforts should be made in preservation and appropriate use of this resource for the improvement of health and value creation. In this regard, STI is viewed as instrumental in

the collective discovery of new species, development of effective preservation methods and creation of values from biodiversity including its applications in food, health and energy areas.

8. Science and Innovation for Life

The future of ASEAN is in the hands of our youth today. ASEAN youth who are well equipped with science literacy and technology competency are the hope for ASEAN prosperity. Creativity and passion in STI, which are instilled in our youth, will pave the way for the capacity building and life-long learning of future ASEAN population. This entails innovative ecosystem in schools, vocational and higher education institutions as well as mechanism to bridge learning system with professions and career path.

Paradigm Shift[10] Advocated by the Krabi Initiative:

Recognizing the past practices of the ASEAN scientific community where S&T activities were mostly confined to academic domains, the Krabi Initiative advocated the urgency for COST and its subsidiary bodies to consider a paradigm shift to bring about the benefits of science, technology and innovation to the ASEAN citizens. These include:

1. STI Enculturation

There is a need to mainstream Science, Technology and Innovation (STI) into ASEAN citizens' ways of lives. Innovative eco-systems are to be created in ASEAN community at all levels. Due recognitions are given to citizens with outstanding STI achievements as role models.

2. Bottom-of-the-Pyramid Focus

In order for the ASEAN Socio-Cultural Community Blueprint to focus on human development, it necessitates the improvement of quality of life of ASEAN population. Special attention should be given to the majority of the ASEAN population especially those at the bottom-of-the-pyramid. In this regard, consideration must be accorded to the outcomes of STI addressing on human basic needs such as foods, habitat, health, and access to information and knowledge.

3. Youth-Focused Innovation

Recognizing the vibrancy and dynamism of ASEAN young generation, particular emphasis must be given to the ASEAN youths by enriching their living and

learning environment with STI as an important foundation. Opportunities for young people to enhance their STI potentials and entrepreneurship are to be enlarged. Examples of measures to be taken include young ASEAN STI Awards, cross-country attachment program and seed funding to support youth-focused innovations.

4. STI for Green Society

To be well prepared for the challenges of climate changes, ASEAN community needs green STI integration platform in its transformation towards low-carbon society. Science-based public awareness on environmental-friendly life style is to be instilled. Appropriate technologies and green innovations are to be promoted among ASEAN Member States in order to become competitive and yet remain sustainable.

5. Public-Private Partnership Platform

The ASEAN private sector which previously assumed limited role in scientific and technological activities should be mobilised to the forefront of the novel STI era. Public-Private Partnership should be strengthened through proactive dialogues and establishments of engaging platforms such as government-linked companies and corporate social responsibility activities..

To operationalise the implementation of the Krabi Initiative, the following courses of action shall be considered:

1. The ASEAN Committee on Science and Technology (COST) may need to undertake organisational restructuring for a meaningful delivery of STI agenda in ASEAN, taking into account, among others, the following:
    - Enhancing the roles, responsibilities, and selection of the chair of COST, Sub-Committees, advisory bodies, and other groups under the purview of COST;
    - Appropriate measures such as clustering approach to enhance coordination not only within COST but also inter-sectoral coordination across many ASEAN bodies that may have similar interventions in order to achieve efficiency and effectiveness in the implementation of prioritised activities and to avoid duplication; and
    - Identification of gaps and challenges in the implementation of science, technology and innovation interventions, including measures to address the gaps and challenges.

2. Develop a mechanism to effectively pursue partnerships and cooperation with the public and private sectors in promoting science, technology and innovation.

3. Enhance the ASEAN Plan of Action on Science and Technology for 2012-2015 and leverage the recommendations of the Krabi Retreat for development of APAST beyond 2015.

4. Implement a result-based monitoring and evaluation mechanism for the implementation of STI thematic tracks, enhanced ASEAN Plan of Action on Science and Technology, and relevant actions in the ASEAN Socio-Cultural Community Blueprint.

ii. Decisions of the 14th AMMST on 28 November 2011 in Ho Chi Minh City, Viet Nam

Following the adoption of the Krabi Initiative, the 14th AMMST noted that COST shall embark on a transformational revolution and paradigm shift as defined in the Krabi Initiative and that, while still anchored on science and technology, COST shall ensure that innovation benefitting the ASEAN people will be the ultimate goal of S&T collaboration in ASEAN.

The 14th AMMST noted the key findings and recommendations of the "Study on the State of S&T Development in ASEAN". The Ministers were of the view that the study could be a useful reference for COST and its subsidiary bodies in the planning and implementation of APAST and the Krabi Initiative.

The Ministers noted the interest of China to renew cooperation with COST through the signing of an ASEAN-China Memorandum of Agreement (MoA) on Science and Technology. The Ministers noted that COST also affirms its interest to continue engaging in S&T cooperation with China with or without any formal instruments. In this regard, Viet Nam, as a country coordinator for China, shall work closely with the ASEAN Secretariat and the Sub-Committee on S&T Infrastructure and Resource Development (SCIRD) to study the proposal for further consideration of COST and the AMMST.

The Ministers welcomed the offer of the Republic of Korea to formalise its cooperation with COST through the setting up of an ASEAN-ROK Joint Science and Technology Committee (JSTC). The Ministers noted that the proposed ASEAN-ROK JSTC follows on the similar platform that COST has established with some Dialogue Partners such as China, The EC, Japan, India, Russia, and the Plus Three Countries. The draft Terms of Reference (TOR) of the ASEAN-

ROK JSTC is patterned with the said Dialogue Partners in the aftermath of the TOR of COST and will be discussed and/or finalised at the forthcoming consultation with ROK in December 2011 in Jeju, ROK.

The Ministers requested COST, through its Advisory Body of the ASF (ABASF) to report to the next Ministerial Meeting the outcome of the ABASF's study in finding innovative and creative ways so that the ASF could generate higher interest returns and to review the guidelines on the use of the ASF to determine the feasibility of using not only the earnings but also a portion of the ASF principal amount to support major S&T initiatives.

iii. Decisions of the 7th IAMMST on 2 December 2012 in Jerudong, Brunei Darussalam

The 7th IAMMST noted the proposal to restructure COST through the establishment of clusters according to the thematic tracks of the Krabi Initiative (KI). Some AMS have expressed interest to host or co-host the clusters. The Ministers agreed, however, that the eight (8) KI thematic thrusts and the six (6) flagship programmes of COST must first be harmonised before appropriate clusters could be established. In this regard, the Ministers endorsed the proposal for a holistic study to be done by experts or a group of experts to determine how the restructuring could be effectively implemented. The ABAPAST was tasked to develop the terms of reference for the study and expedite the completion of the study before the next Ministerial Meeting in 2013. The Ministers further agreed that the pending result of the study, the functions and reporting system of the COST's Sub-Committees will remain unchanged.

The Ministers noted that the utilisation of 80% of the earnings from the ASEAN Science Fund (ASF) placements as provided for in the ASF guidelines will not be enough to support Science, Technology and Innovation (STI) activities. Thus, the Ministers welcomed the proposal for the establishment of an ASEAN Innovation Fund (AIF) to support the implementation of STI-driven projects. A certain amount could be transferred from the ASF to seed the AIF. Unlike the ASF, the principal sum and the interest earned by the AIF can be invested in projects for a rate of return (e.g. technology spin-off companies, revenue generating training programmes, etc.). Mechanisms shall be developed to encourage and enable the participation of private sectors, dialogue partners and international agencies to contribute to AIF. Such contributions will leverage resources in COST and collaborative activities and projects with the potential for revenue generation.

While expressing support to the proposal, the Ministers noted that establishing the new fund would require careful study and analysis, especially on how to sustain the fund. Thus, the Ministers requested the ABAPAST and ABASF to jointly develop the concept paper on the establishment of the AIF. Once the concept paper is developed, the ABASF shall take the lead in implementing the proposed actions in determining the feasibility of establishing the AIF.

The Ministers agreed to expand the mandate of the ABAPAST to cover the review of the performance of the various COST Sub-Committees and other relevant subsidiary bodies. In this regard, the ABAPAST was tasked to establish the appropriate performance review mechanism. Meanwhile, the Ministers also tasked the Sub-Committees to effect better coordination among themselves, with other ASEAN bodies outside of COST and with selected centres of excellence so as to address the implementation of the new APAST.

iv. Decision of the 65th COST Meeting on 23-24 May 2013 in Tagaytay City, Philippines

COST-65 noted that under the ASEAN Roadmap for Community Building 2009-2015, science and technology measures that could contribute to build the ASEAN Community were placed under the ASCC Blueprint. While recognizing the need for COST to continue supporting relevant initiatives of the ASCC, COST-65 agreed that the APASTI should be designed in a manner that its goals, strategic thrusts and actions will be aligned with those of the AEC post 2015.

v. Decision of the 15th AMMST on 12 November 2013 in Kuala Lumpur, Malaysia

The Ministers noted the recommendations of the Meeting of the High-Level Task Force (HLTF) on Strengthening ASEAN Secretariat and Review of ASEAN organs and further tasked the consultant who developed the ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2015-2020 to review the mechanism to make more efficient and more effective the work processes of ASEAN COST.

The Ministers also noted the proposal of the High-Level Task Force on Economic Integration (HLTF-EI) on the AEC Post 2015's vision "AEC 2025: Consolidation and Going Beyond" comprising pillars namely:

- Integrated and Highly Cohesive Economy;
- Competitive, Innovative and Dynamic ASEAN;
- Inclusive, People-Centred and Resilient ASEAN;

- Enhanced Sectoral Integration and Cooperation; and
- Global ASEAN.

The Ministers approved the following proposed vision and goals on STI that could be placed under pillar no. 4 of AEC Post 2015:

Vision

A Science, Technology and Innovation-enabled ASEAN which is innovative, competitive, vibrant, sustainable and economically integrated.

Goals

- Economically integrated ASEAN involving active collaboration between the public and private sectors, and talent mobility;
- Deep awareness of STI and the beneficial impacts of STI on the Bottom of the Pyramid;
- Innovation-driven economy leveraging on ICT and with a strong engagement of our youth in STI;
- ASEAN innovation reaching global markets;
- ASEAN innovation addressing the grand challenges of the new millennium; and
- Active R&D collaboration, technology commercialisation, entrepreneurship and network of Centres of Excellence.

The Meeting endorsed the proposed amendments to the ASF guidelines and agreed on the rebranding of ASEAN Science Fund (ASF) to ASEAN Science, Technology and Innovation Fund (ASTIF). The Ministers noted that the scope of utilisation of the ASF has been expanded to support innovation-related initiatives. The Ministers agreed for ABAPAST and ABASF with the representation from the private sector to jointly study and define the appropriate criteria for selection of innovation-related projects submitted for funding by ASTIF.

The Ministers supported the decisions of COST that the signing of draft MOUs with China and India shall be deferred until the new APASTI is approved and adopted by the Ministers. The Minister tasked the ABAPAST to further review the said MOUs.

vi. Decision of the 69th Meeting of COST on 28 May 2015 in Phuket, Thailand

COST-69 agreed to amend the APASTI implementation period from 2015-2020 to 2016-2025 to be consistent with the implementation period of the AEC Post 2015 Attendant Document. COST-69 further agreed that the APASTI goals shall be amended as follows:

APASTI 2016-2025 Amended Goals

- ASEAN Science, Technology and Innovation (STI) addressing the grand challenges of the new millennium;
- Economically integrated ASEAN involving active collaboration between the public & private sectors especially SMEs and enhanced mobility of talents;
- Deep awareness of STI & the beneficial impacts of STI on the bottom of the pyramid;
- An innovation-driven economy with a deep STI enculturation and a system of seeding and sustaining STI by leveraging ICT and the resources of our talented young, women and private sectors;
- Active R&D collaboration, technology commercialisation and entrepreneurship and network of centres of excellence; and
- An enhanced STI management system in the new AEC so as to support ASEAN innovation reaching global markets and that promotes innovation, integration and narrowing of development gaps across AMS.

COST-69 also adopted the following proposed STI measures in the AEC Post-2015 Attendant document:

Element D. Productivity-Driven Growth, Innovation, Research and Development and Technology Commercialisation (under Pillar 2: Competitive, Innovative and Dynamic ASEAN).

- Promote strategic partnerships among the academia, research institutions and the private sector towards developing capabilities and creating an effective channel for technology transfer and commercialisation;
- Strengthen the competitiveness of the small, medium and large enterprise in ASEAN through the application of S&T tools and methodologies; and
- Enhance the support system and enabling environment to nurture a highly mobile, intelligent and creative human resource that thrives on knowledge creation and application.

Element F. Science and Technology (under Pillar 4: Enhanced Sectoral Integration)

- Strengthen existing networks of S&T centres of excellence to promote cooperation, sharing of research facilities and manpower towards joint research and technology development, technology transfer and commercialisation; Enhance mobility of scientists and researchers from both public S&T institutions and private sector through exchange programmes and other appropriate arrangements according to the respective laws, rules, regulation, and national policies;
- Establish systems and mechanisms that will increase the engagement of women and youth in STI to promote entrepreneurship;
- Raise public awareness of the various achievements derived from ASEAN cooperation in STI;
- Establish innovative support systems to promote and manage regional STI enterprise arising from spin-offs and joint ventures; and
- Establish new strategies for partnership with dialogue partners & other relevant organisations on mutually beneficial projects.

COST-69 also adopted the proposed STI measures in the ASCC Post-2015 Attendant Document under the Characteristic: Dynamic ASEAN.

COST-69 further agreed that a detailed implementation plan for APASTI 2016-2025 shall be developed as soon as the APASTI is adopted by the Ministers.

Continuing efforts have been intensified towards the finalisation of the AEC Post-2015 Agenda and Action. One of the expected findings is that the overall vision articulated in the AEC Blueprint 2015 will remain relevant. The new framework[11] covering a 10-year period (AEC 2025) will be built on the existing AEC Blueprint consisting of five interrelated and mutually reinforcing characteristics, namely: (i) A Highly Integrated and Cohesive Economy; (ii) A Competitive, Innovative, and Dynamic ASEAN; (iii) An Enhanced Connectivity and Sectoral Cooperation; (iv) A Resilient, Inclusive, People-Oriented, and People-Centred ASEAN; and (v) A Global ASEAN.

It is envisioned that in the next decade, ASEAN will provide, among others, a new emphasis on the development and promotion of Micro, Small and Medium Enterprises (MSMEs) in its economic integration efforts. At the same time, ASEAN will likewise embrace the evolving digital technology as leverage

to enhance trade and investments, provide an e-based business platform, promote good governance, and facilitate the use of green technology.

vii. Decision of the 70th Meeting of COST on 6 November 2015 in Vientiane Capital, Lao PDR

COST-70 endorsed the recommendations of the ABAPAST that the final draft of APASTI will be submitted for adoption of the 16th AMMST.

COST-70 agreed that the Advisory Body on the ASEAN Plan of Action on Science and Technology (ABAPAST) and the Advisory Body on ASEAN Science Fund (ABASF) shall be merged to form the Board of Advisers to COST (BAC).

COST-70 also agreed that the Technical Task Force on Tsunami Early Warning System (TTF-TW) and Technical Working Group on Nuclear Power Plant (TWG-NPP) shall be dissolved, noting that the mandate and function of these two subsidiary bodies shall be assumed by the Sub-Committee on Meteorology and Geophysics (SCMG) and Sub-Committee on Sustainable Energy Research (SCSER) respectively.

COST-70 agreed that the APASTI 2016-2025 shall be accompanied by a separate implementation plan. The plan shall include the priorities, targets/ deliverables; specific actions; timelines; indicators, to be derived from the work plans of COST subsidiary bodies.

COST-70 endorsed the setting up of an ATM Platform recommended by ABAPAST which aims to facilitate mobility of scientists and researchers in ASEAN and with partner countries.

viii. Decision of the 16th AMMST on 6 November 2015 in Vientiane Capital, Lao PDR

The Ministers adopted the ASEAN Plan of Action on Science, Technology and Innovation (APASTI 2016-2025). The Ministers highlighted the necessity and urgency for COST activities and programmes to be visible enough to get the attention and appreciation of the ASEAN Leaders.

The Ministers supported the recommendations of the APASTI in restructuring the Committee on Science and Technology through the merger of the Advisory Body on the ASEAN Plan of Action on Science and Technology (ABAPAST) and the Advisory Body of ASEAN Science Fund (ABASF) to form the Board

of Advisers to COST (BAC). The Meeting tasked the ASEAN Secretariat to formulate the Terms of Reference (TOR) of the BAC and ensure that the BAC shall be a more dynamic and proactive body.

The Ministers agreed that the APASTI should be accompanied by an implementation plan that will include the priorities, targets/deliverables; specific actions; timelines; indicators, to be derived from the work plans of COST subsidiary bodies.

The Ministers welcomed and adopted the setting up of an ASEAN Talent Mobility (ATM) Platform that would facilitate mobility of scientists and researchers in ASEAN and with partner countries.

IV. APASTI 2016-2025 Vision, Goals, Strategic Thrusts and Actions

Building on the milestones, significant achievements, lessons and best practices learnt from the implementation of the past APASTs, the APASTI 2016-2025, while is still anchored on science and technology, highlights the role and benefits that innovation can provide to the ASEAN peoples. Guided by the relevant declarations of ASEAN Leaders, directives from COST and AMMST, and new developments in ASEAN and beyond its borders, the salient features of the APASTI 2016-2025 shall be as follows:

i. APASTI 2016-2025 Vision

A Science, Technology and Innovation-enabled ASEAN, which is innovative, competitive, vibrant, sustainable and economically integrated.

ii. APASTI 2016-2025 Goals

- ASEAN Science, Technology and Innovation (STI) addressing the grand challenges of the new millennium;
- Economically integrated ASEAN involving active collaboration between the public & private sectors especially SMEs and enhanced mobility of talents;
- Deep awareness of STI & the beneficial impacts of STI on the bottom of the pyramid;
- An innovation-driven economy with a deep STI enculturation and a system of seeding and sustaining STI by leveraging ICT and the resources of our talented young, women and private sectors;
- Active R&D collaboration, technology commercialisation and entrepreneurship and network of centres of excellence; and
- An enhanced STI management system in the new AEC so as to support ASEAN innovation reaching global markets and that promotes innovation, integration and narrowing of development gaps across AMS.

iii. APASTI 2016-2025 Strategic Thrust and Actions

Recognising that the strategic thrusts and actions of the past APASTS remain valid (Table 1), the following strategic thrusts are reinforced with key considerations, strategies, analysis, recommendations and/or rationales that will set the tone for their implementation. The thrusts and actions are general enough such that during their implementation, the AMMST, COST and its subsidiary bodies, Dialogue Partners and other relevant stakeholders may propose amendments or enhancements to achieve the APASTI goals:

Thrust 1:

Strengthen strategic collaboration among academia, research institutions, networks of centres of excellence, and the private sector to create an effective ecosystem for capability development, technology transfer and commercialisation.

Action 1.1 *Intensify the engagement of academe, private sector and relevant partners in the planning, implementation and assessment of joint undertakings in human resource development, and research and development;*

Action 1.2 *Enhance and sustain the utilisation of the ASEAN Science and Technology Network (ASTNET) and strengthen other S&T networks to facilitate information sharing;*

Action 1.3 *Establish policy frameworks including IPR protection, risk and benefit sharing mechanisms for joint collaboration and technology transfer among centres of excellence; and*

Action 1.4 *Strengthen existing regional STI initiatives in priority areas including Sustainable Development Goals.*

Thrust 2:

Enhance mobility of scientists and researchers, people-to-people connectivity and strengthen engagement of women and youth in STI.

Action 2.1 *Establish a policy framework for exchange of scientists, researchers and students including women and youth;*

Action 2.2 *Establish scholarship, fellowship and/or attachment programmes for students, researchers and other STI personnel;*

Action 2.3 *Intensify efforts towards standardisation of certification and accreditation in education and technical competency; and*

Action 2.4 *Expand opportunities for women, youth and the disadvantaged group to contribute in STI through incentives and support mechanisms.*

Thrust 3:

Establish innovative system and smart partnership with dialogue and other partners to nurture STI enterprises to support MSMEs, nurture knowledge creation and STI applications to raise competitiveness.

Action 3.1 *Establish support mechanism such as mentorship and incentive programme to support and nurture STI enterprises from start-up to the next competitive level of development; and*

Action 3.2 Engage dialogue and other strategic partners in joint undertakings on appropriate and commercially viable STI initiatives.

Thrust 4:

Raise public awareness and strengthen STI enculturation to enhance ASEAN science and technology cooperation.

Action 4.1 Encourage the participation of scientists, researchers and industries in the ASEAN S&T events such as ASEAN Food Conference (AFC) and ASEAN Science, Technology and Innovation Week (ASTIW);

Action 4.2 Enhance the contents of the articles published in the ASEAN Journal of Science and Technology for Development and other journals;

Action 4.3 Leverage on the ASTNET in publicizing ASEAN initiatives in STI;

Action 4.4 Develop a resource database and network to facilitate information sharing and technical cooperation among agencies in the public and private sector; and

Action 4.5 Engage relevant stakeholders in developing and implementing an effective communication and STI enculturation plan.

V. APASTI 2016-2025 Programme Areas and Implementation Strategy

New Priorities of COST Sub-Committees

Following the adoption of the Krabi Initiative (KI) in December 2010, various Sub-Committees of COST conducted special meeting on 21 November 2011 in Ho Chi Minh City, Viet Nam, to brainstorm on possible enhancement of the APAST 2007-2011 taking into account the KI recommendations. The Sub-Committees also reviewed and amended their respective terms of reference and priority areas as necessary to maintain their relevance in contributing to ASEAN Community building as shown in table 4.

Table 4.
Objectives of COST Sub-Committees and their priority areas

SUB-COMMITTEE TERMS OF REFERENCE/OBJECTIVES	PRIORITIES AREAS (2016-2025)
Sub-Committee on Biotechnology (SCB)	
Goals 2016-2025: The Sub-Committee on Biotechnology seeks to promote regional cooperation in biotechnology for improvement and production of selected bio-materials for agriculture and industry; application of biotechnology for improving quality and production of crops and animals and their product; pilot scale design and computer controls of biological reactor; medical biotechnology, bioremediation and bioprospecting; and, to further develop human resources along these areas. The Sub-Committee on Biotechnology also seeks to develop network on biotechnology. In addition, the Sub-Committee will promote technology transfer and licensing of its technologies. The possibility of joint ventures with the private sector will also be explored. **General Objective (2016-2025):** Strengthen institutional capacity for the development, management, and safe use 'of all modern biotechnologies and their products for the benefit of ASEAN people'. **Specific Objectives (2016-2025):** 1. To develop and maintain projects and programs that will serve as a platform to facilitate collaboration in the field of biotechnology; and 2. To develop human resources with emphasis (but not exclusively) in the Priority Areas given below.	1. Agricultural biotechnology; 2. Medical biotechnology; 3. Environmental biotechnology; and 4. Industrial Biotechnology (enzyme technology; food manufacture); and 5. Bio-resource management and utilisation.

Sub-Committee on Food Science and Technology (SCFST)	
General Objectives (2016-2025): 1. The SCFST shall promote ASEAN cooperation in food science and technology areas relevant to country programmes and needs in order to improve the quality of scientific institutions and increase competent man power; and 2. The SCFST shall utilise strategic approaches for building solid foundation for regional cooperation in R&D and other activities in food science and technology. **Specific Objectives (2016-2025):** 1. Implement cooperation activities in scientific projects that maximise mechanisms for enabling country participation in accordance with current and potential capabilities; 2. Establish increased interactions between food scientists and private sectors in order to strengthen the outcome of scientific cooperation, and promote higher level of intra-ASEAN collaboration; 3. Develop cooperation with international dialogue partner(s) in priority areas of food science and technology; and 4. Establish database for exchange of information and enhance technology transfer.	1. Functional food; 2. Food safety and quality; 3. Application of emerging technologies; and 4. Post-harvest technology.
Sub-Committee on S&T Infrastructure and Resources Development (SCIRD)	
Objectives (2016-2025): 1. To develop policies that set a conducive environment to strengthen the capabilities and relevant infrastructure of ASEAN in STI development, utilisation and commercialisation; 2. To develop programs to facilitate, monitor and assess the implementation of agreed STI initiatives; and 3. To establish mechanisms to promote collaboration, networking and coordination among the relevant stakeholders in STI.	1. Policy studies on STI development, utilisation and commercialisation; 2. STI Management information dissemination; 3. STI Enculturation; 4. STI support to MSMEs, start-ups and the bottom of the pyramid 5. Youth and women-focused innovation; 6. Public-Private Partnership Platform; and 7. Capacity building and talent mobility.

Sub-Committee on Meteorology and Geophysics (SCMG)	
General Objectives (2016-2025): 1. To enhance the capabilities of services in meteorology and geophysics to safeguard lives and properties of the people; and 2. To improve forecasting services and early warning system; and to establish appropriate Support Centre. **Specific Objectives (2016-2025):** 1. Strengthen capacity building in climate information and prediction services; 2. Strengthen near real time exchange of data from weather observations, radar, seismological, volcanological and tsunami monitoring network; 3. Enhance monitoring and modelling of transboundary marine and air pollution in particular haze episode; satellite meteorology and atmospheric acidification measurement; 4. Increase the use of IT for rapid exchanges of data products and dissemination of weather forecast and warning, and seismological information and in the development of client-oriented services; and 5. Promote studies and coordination of exchange of knowledge.	1. Climate variability and change; 2. Forecast, warning and dissemination system; 3. Capacity building on meteorological and geophysical services; 4. Aviation and marine meteorological services; and 5. Exchange of meteorological and geophysical data including tsunami information.
Sub-Committee on Microelectronics and Information Technology (SCMIT)	
Goals 2016-2025: The SCMIT seeks to develop and enhance the capabilities of ASEAN member countries on microelectronics and ICT, and its related areas from down-stream to up-stream technologies. The sub-committee aims to undertake research, development, capacity building, and prototype projects in microelectronics and ICT and related areas according to the strategic thrusts of APASTI 2016-2025. **Specific Objectives (2016-2025):** 1. To strengthen the capacity of less developed AMS; 2. To promote and undertake R&D technology transfer in microelectronics, ICT, and other related areas; 3. To foster and strengthen intra-ASEAN activities in the priority areas; 4. To strengthen information network/database for exchange and dissemination within and outside ASEAN; and 5. To strengthen institutions and centres of excellence.	1. Microelectronics; 2. Multimedia and Mobile Communication Applications; 3. Internet of Things; 4. Big Data Processing and Analytics; 5. Cyber Security; 6. Embedded Systems and Sensors; 7. Robotics and Automation; 8. Open Platforms; 9. Cloud Computing; and 10. Artificial Intelligence.

Sub-Committee on Marine Science and Technology (SCMSAT)	
Goals 2016-2025: The Sub-Committee on Marine Science and Technology (SCMSAT) seeks to promote sustainable development of marine living and non-living resources while increasing the potential of these resources to meet the requirements of ASEAN. It also seeks to increase the number of qualified personnel in marine science and technology. **General Objectives (2016-2025):** 1. Implement cooperation activities in scientific projects that maximise mechanisms for enabling country participation in accordance with current and potential capabilities; 2. Establish increased interactions between marine scientists and private sector in order to strengthen the outcome of scientific cooperation, and promote higher level of intra-ASEAN collaboration; 3. Develop cooperation with international dialogue partner(s) in priority areas of marine science and climate change; and 4. Facilitate data sharing and publications for exchange of information and enhance technology transfer.	1. Trans-boundary aquatic pollution / Marine debris; 2. Risk management and mitigation from climate change; and 3. Renewable energy and Marine Biodiversity.
Sub-Committee on Materials Science and Technology (SCMST)	
Goals 2016-2025: The Sub-Committee on Materials Science and Technology (SCMST) seeks to develop new materials for a sustainable environment, to utilise both indigenous and waste materials, and to develop a strong base for future technology innovation through networking and human resources development. The Sub-Committee aims to undertake R&D collaboration which are generic in nature to ASEAN member countries in the areas of materials for management of the environment, environment friendly materials from resources in ASEAN, materials for high technology applications utilizing indigenous sources, and biodegradable and recyclable materials. The Sub-Committee also intends to develop a technology information network as well as mechanisms for technical consultations for industrial concerns, technology transfer and exchange of human resources for R&D work. **Specific Objectives:** 1. To undertake inter-ASEAN collaborative R&D on new and innovative materials for high technology applications; 2. To develop environmental friendly materials; 3. To establish network for the exchange of information; 4. To enhance human resources development programme through training, seminar and workshop; and 5. To promote optimum utilisation of facilities through scientist and student exchange.	1. Nanomaterials; 2. Functional materials; and 3. Biomaterials to biomedical materials.

Sub-Committee on Sustainable Energy Research (SCSER)	
Goals (2016-2025): The Sub-Committee on Sustainable Energy Research (SCSER) seeks to contribute in developing and enhancing the Science, Technology and Innovation (STI) capabilities of ASEAN Member States in accessing and utilizing sustainable and renewable energy resulting in reduce carbon emissions, increasing the share of renewable energy to 23% by 2025 and reducing energy intensity by 20% in 2020 based on 2005 level. **Specific Objectives (2016-2025):** 1. To intensify joint R&D, technology demonstration/transfer and commercialisation with the relevant stakeholders in sustainable and renewable energy; 2. To enhance and sustain the accessibility and utilisation of sustainable and renewable energy in remote communities and MSMEs; 3. To strengthen intra-ASEAN cooperation and to heighten Dialogue Partners engagements in enhancing the capacities of ASEAN Member States in sustainable and renewable energy research; 4. To strengthen information network/database for exchange and dissemination within and outside ASEAN; and 5. To strengthen institutions and centres of excellence.	1. New and renewable/ alternative energy such as biomass/biofuels, solar and energy storage systems; 2. Clean energy and environment technology such as clean coal technology, nuclear technology and natural gas; 3. Energy efficient technologies such as cogeneration and energy management systems; and 4. Energy technology applications/solutions for remote areas.
Sub-Committee on Space Technology and Application (SCOSA)	
New Objectives (2016-2025): 1. Serve as platform to formulate and coordinate collaborative and cooperative programmes and projects on space science and technology, in such areas as, remote sensing, satellite meteorology, space education and research, communication, environmental and natural resource management, and development planning; 2. Review the status and capability on space technology in the region and promote this technology for natural resource and environment management and sustainable development; 3. Recommend mechanisms to involve government agencies, industries and academe in promoting and sustaining regional cooperation in space technology, applications, education, research and development; 4. Exchange and sharing of information, best practices and expertise on national policies, programmes and planning in all areas of space technology and its applications among AMS; 5. Facilitate and accelerate the transfer of space technology and its applications to the ASEAN region;	1. Geoinformatics: Remote Sensing (RS), Global Navigation Satellite System (GNSS), Geographic Information System (GIS); 2. Space technology applications, including space-based communication, Disaster Risk Reduction (DRR), agriculture, environment and resource monitoring, Surveying and Mapping (SM), and space astronomy and space exploration; and 3. Satellites, such as nano, micro and small satellites, payloads such as sensors, and ground facilities.

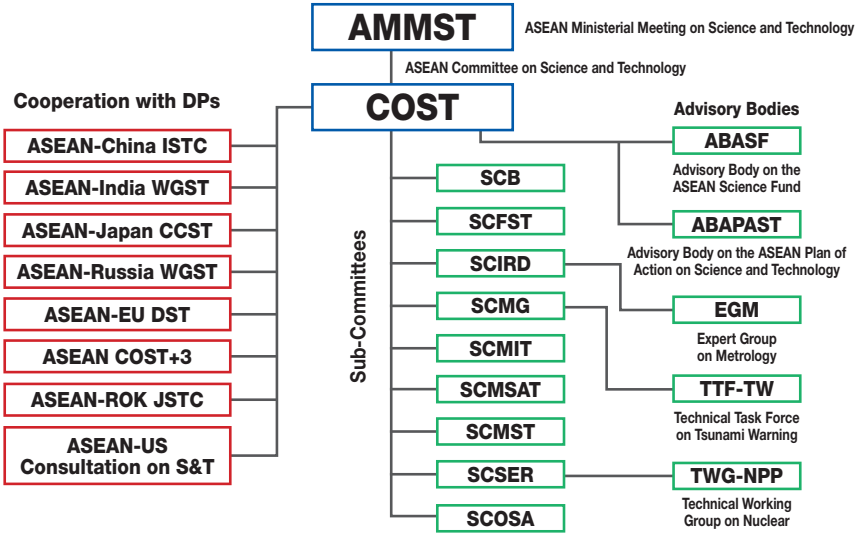
6. Promote and facilitate collaborative and cooperative activities on space technology and its applications with relevant international organisations; 7. Advise COST on matters relating to space technology and its applications; and 8. Assist in securing financial support and funding sources for ASEAN activities and projects relating to space technology and its applications. **To achieve the above objective, the SCOSA shall endeavour to:** 1. Promote collaborative STA activities with relevant international organisations; 2. Advise COST on any matters relating to STA activities especially regarding future applications, education, research and development; 3. Seek funding from within and outside ASEAN for the SCOSA activities; 4. Promote STA capacity building in ASEAN region; 5. Recommend STA projects promoting regional cooperation; and 6. Promote the transfer of technology from more advanced countries to ASEAN region.	

The six flagship programmes of the APAST 2007-2011 (extended to 2015) shall be subsumed under the eight thematic tracks of the Krabi Initiative. The respective Sub-Committees accept the fact that the above priority areas will continue to evolve according to new developments and requirements of ASEAN and the international community. The Sub-Committees are expected to formulate their own work programme in support of the APASTI 2016-2025. The individual Sub-Committee work programmes shall be consolidated and shall constitute the APASTI implementation plan.

COST Governance Framework

The policies for ASEAN cooperation in science and technology are set by the annual ASEAN Ministerial Meeting on Science and Technology (AMMST)[12]. The ASEAN Committee on Science and Technology (COST) is responsible in i) setting directions, coordinating activities of its subsidiary bodies; ii) creating public awareness of regional S&T activities and their contribution to economic development; and iii) reviewing overall progress of collaboration, including the progress of its relations with the ASEAN's Dialogue Partners as well as other external collaborators. The existing structure of S&T cooperation in ASEAN is shown in Figure 2.

Figure 2.
Existing structure of ASEAN Cooperation in S&T



Individual Sub-Committees were established to oversee the management, coordination, evaluation and implementation of regional programmes and projects. The Sub-Committees are expected to assess the effectiveness and impact of their projects in strengthening the regional S&T capabilities. Advisory bodies were also set up to make policy recommendations to COST on matters related to the implementation of the APAST as well as the management of the ASEAN Science Fund. Thus, the subsidiary bodies of COST include the following:

- SCB : Sub-Committee on Biotechnology
- SCFST : Sub-Committee on Food Science and Technology
- SCIRD : Sub-Committee on S&T Infrastructure and Resources Development
- SCMG : Sub-Committee on Meteorology and Geophysics
- SCMIT : Sub-Committee on Microelectronics and Information Technology
- SCMSAT : Sub-Committee on Marine Science and Technology
- SCMST : Sub-Committee on Materials Science and Technology
- SCSER : Sub-Committee on Sustainable Energy Research

- SCOSA : Sub-Committee on Space technology and Applications
- ABASF : Advisory Body of the ASEAN Science Fund
- ABAPAST : Advisory Body on the ASEAN Plan of Action on Science and Technology

Further, some of the Sub-Committees have established task force, working and experts groups to work on specific areas of concern. Cooperation with ASEAN dialogue Partners has also been formalised through the establishment of joint committees, working groups and related platforms.

- TTF-TW : Technical Task Force on Tsunami Warning Under SCMG
- TWG-NPP : Technical Working Group on Nuclear Power Plant Under SCSER
- EGM : Experts Group on Metrology Under SCIRD
- ASEAN-China JSTC : JSTC - Joint Science and Technology Committee
- ASEAN-EU DST : DST - Dialogue on Science and Technology
- ASEAN-India WGST : WGST - Working Group on Science and Technology
- ASEAN-Japan CCST : CCST - Cooperation Committee on Science and Technology
- ASEAN-ROKJSTC : JSTC - Joint Science and Technology Committee
- ASEAN-Russia WGST : WGST - Working Group on Science and Technology
- ASEAN-US CST : CST - Consultation on Science and Technology
- ASEAN COST+3 : ASEAN COST Plus China, Japan and ROK

The possible restructuring of COST and its subsidiary bodies has been an issue that was consistently raised in meetings of COST and the AMMST. The 8th IAMMST held 25 August 2014 in Bogor, Indonesia supported the recommendations of the High-Level Task Force (HLTF) established recently to determine how the ASEAN Secretariat can be strengthened and to review the work processes of various ASEAN organs. The Ministers agreed that the appropriate mechanism in restructuring of COST and its subsidiary bodies should be clearly defined in the APASTI. The restructuring of COST may entail dissolution, and/or merger of subsidiary bodies, including redefining the terms of reference and selection process of the chairs of COST and its subsidiary bodies. To streamline and make efficient the work processes of COST, the following actions are proposed.

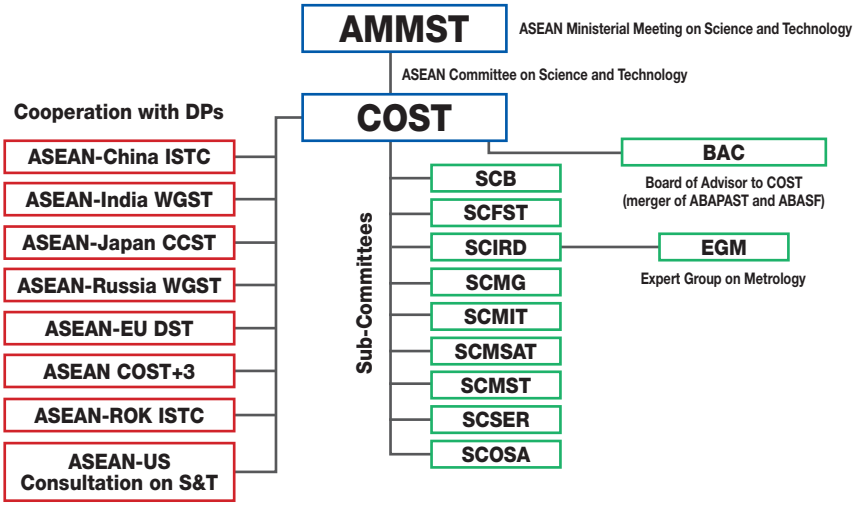
i. Merger of the ABAPAST and ABASF to form the Board of Advisers to COST (BAC)

There is a need to synergise efforts to facilitate the implementation of agreed programmess and activities of the APASTI including the funding support that can be provided by the ASEAN Science, Technology and Innovation Fund (ASTIF). The individual Terms of Reference of the ABAPAST and ABASF can be consolidated to and applied to the Board of Advisers to COST (BAC) (see Figure 3).

ii. Dissolution of the TTF-TW and TWG-NPP

The functions of the two Ad-hoc bodies can be taken up by SCMG and SCSER, respectively.

Figure 3.
Propose structure of ASEAN Cooperation in S&T



iii. Establishing Clusters as a Mechanism for Coordination

The individual Sub-Committees of COST have reviewed and redefined their priority areas and objectives consistent with the goals of the APASTI. Considering that APASTI will have programmes to address the thematic tracks of the Krabi Initiative where the flagship programmes of COST will be subsumed,

it is imperative that the relevant Sub-Committees join hands in coordinating their efforts towards achieving the desired outcomes. The ABAPAST workshop on how to operationalise the Krabi Initiative conducted on 27-28 November 2012 in Jerudong, Brunei Darussalam recommended that relevant Sub-Committees might be clustered according to the KI thematic tracks as follows:

- Cluster 1: Green Technology, Water Technology, and Food Security
- Cluster 2: STIF or Life and The Global Market
- Cluster 3: Digital Economy
- Cluster 4: Energy And Biodiversity

iv. Selection of Chairs of COST and its Subsidiary Bodies

The performance of COST and its subsidiary bodies depends, to a large extent, on the leadership of the chairs of the concerned bodies as well as on the amount of support that the respective members and the ASEAN Secretariat provide. While the APAST 2007-2011 has clearly spelt out their expected roles and responsibilities, the chair's role has mostly been limited to presiding over the meetings. The more challenging tasks of providing leadership, initiating, directing, and overseeing the implementation of the agreed plans of action for the duration of the chair's term were, thus, not fully met. The respective terms of Reference of the chairs of ASEAN COST, National COST, Sub-Committees and the ASEAN Secretariat in support of COST and AMMST are indicated in ANNEXES 1-4, respectively. Thus, the following options might be considered with regard to selection of chairs of COST and its subsidiary bodies:

Option 1

The system provided in APAST 2007-2011 whereby the chairmanship of COST and its subsidiary is rotated alphabetically among ASEAN Member States based on the principle of equal sharing of opportunities and responsibilities shall be retained; or

Option 2

The chairmanship of COST and its subsidiary bodies shall be determined according to the demonstrated competencies and qualifications, including firm commitments from the concerned ASEAN Member State to provide technical and other logistic support to its nominee to the post.

Cooperation with Dialogue and other Partners

The implementation of various initiatives in the past APASTS over four decades has been supported, to a large extent, by ASEAN Dialogue and other Partners. As such , COST has formalised cooperation with them through the establishment of platforms such as joint committees, working groups and/or dialogues and consultation. It can be noted from Table 5 that the formalising cooperation with Dialogue Partners (e.g., China, the EU, India, ROK, Russia and the US) was a strategic move as it resulted to the implementation of significant number of joint undertakings. Countries such as Australia, Canada and New Zealand, which used to be strong partners of COST had been practically inactive during the implementation of APAST 2007-2011. There is, therefore, a need to rekindle cooperation with said countries as the APASTI would require support and cooperation from all possible partners.

Table 5.
Priority Areas of Dialogue Partners Related to STI

DIALOGUE PARTNERS	RELEVANT S&T MATTERS IN THE PLAN OF ACTION (POA) OF DIALOGUE PARTNERS
ASEAN - AUSTRALIA	**Plan of Action to Implement the ASEAN-Australia Comprehensive Partnership (2015-2019)**
	■ Encourage cooperation and cross-sectoral collaboration in science and technology, including on joint research and development (R&D) projects, thereby supporting the implementation of the ASEAN Plan of Action on Science and Technology and the Krabi Initiative;
	■ Encourage the exchange and mobility of scientists and researchers and encourage conducting joint research projects in ASEAN and Australia;
	■ Encourage cooperation among research centres of both parties to address shared challenges, including disaster management, climate change adaptation, food security and safety, tropical and communicable diseases, marine sciences, and natural resources management; and
	■ Support the development of the ASEAN research activities by contributing, where possible, to the establishment of stronger ties between ASEAN and Australian research institutions through strategies, networks and researchers' exchanges to be developed around shared regional priorities.
	Projects/Activities currently supported by Australia since 2007:
	- None

ASEAN - CANADA	**Plan of Action to Implement the Joint Declaration on ASEAN-Canada Enhanced Partnership (2016-2020)**
	■ Support the implementation of the ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2015-2020 and encourage cooperation in Science Technology and Innovation (STI), through capacity building, talent mobility, joint research and development, technology transfer, commercialisation and entrepreneurship, networking of Centres of Excellence and policy dialogues in mutually agreed STI areas including the initiatives under the Grand Challenges Canada;
	■ Encourage collaboration and cooperation among research centres as well as exchange of experts and mobility of scientists and researchers in conducting joint research programmes, including, where possible, through the support of Grand Challenges Canada;
	■ Support the application of science, technology, and innovation for green growth and sustainable development, including through the implementation of collaborative projects to support green growth; and
	■ Support science, technology and innovation capacity building programmes through the provision of canadian scholarships, expertise exchange programmes and specialised training programmes.
	Projects/Activities currently supported by Canada:
	- None
ASEAN - CHINA	**Plan of Action to Implement the Joint Declaration on ASEAN-China Strategic Partnership for Peace and Prosperity (2016-2020)**
	■ Build closer cooperation in science, technology and innovation through mechanisms such as the ASEAN-China Joint Science and Technology Committee and ASEAN Plus Three Science and Technology Senior Officials' Meeting, as well as the ASEAN-China Science and Technology Ministers Meeting;
	■ Vigorously implement the ASEAN-China Science and Technology Partnership Programme (STEP), which includes conduct of joint research and development, including through the building of joint laboratories, technology demonstration, promotion and transfer, including through the ASEAN-China Technology Transfer Centre and networking of centres of excellence, capacity building and personnel exchange, including through the talented young Scientists Visiting China Programme;
	■ Strengthen the cooperation, academic exchange and scientific research in the field of agriculture between ASEAN and China;
	■ Strengthen exchange and cooperation in new and renewable energy technologies and discuss the formulation of an action plan on new and renewable energy; and

	■ Encourage the peaceful uses of outer space and cooperation in areas such as the transfer of technologies, joint technological research and development, capacity building efforts in space technology and its applications in accordance with international laws, national law and regulations of the participating states.
	Projects/Activities currently supported by China:
	- Training Workshop on Utilisation of Biomass Gasification Technology; - ASEAN-China Workshop on Functional Materials; - 10th ASEAN Food Conference; - 2nd ASEAN-China International Bioinformatics Workshop; - 3rd East Asia Bioinformatics Network (EABN) Workshop; - ASEAN-China Training Course on Application of Satellite Remote-Sensing and Satellite Communication Technologies in Disaster Reduction; - ASEAN+3 Workshop on Life Science; - ASEAN-China Workshop on Test Automation; - China-ASEAN Training Course on Technologies and Products of Building Integrated with Solar Energy System; - China-ASEAN Solar Energy Development and Utilisation Forum; - The International Workshop on Renewable Energy Application Technology; - ASEAN-China Training Workshop on Small Hydropower and Solar Energy System for Rural Electrification; - International Training Workshop on New and Renewable Energy (Biogas); - China-ASEAN Science and Technology Partnership Program a. China-ASEAN Technology Transfer Center (CATTC); b. Talented Young Scientist Visiting Program; c. Joint Laboratory Programme; and d. Remote Sensing Satellite Data Sharing and Service Platform. - ASEAN-China Seminar on Science and Technology Policy and Management for ASEAN Countries; and - China-ASEAN Workshop on New Technologies of Agricultural Engineering & Agro-Processing for ASEAN Member States.
ASEAN - EUROPEAN UNION (EU)	**Bandar Seri Begawan Plan of Action to Strengthen the ASEAN-EU Enhanced Partnership (2013-2017)**
	■ Continue dialogue between Committee of Science and Technology (COST) and the EU to promote cooperation in research and technology and innovation under the Framework Programme 7 (FP7) and its successor programme “HORIZON 2020”;
	■ Strengthen ASEAN-EU dialogue in the field of R&D including in applied S&T, as well as to reinforce the policy dialogue;

	■ Support ASEAN to establish a network of S&T centres of excellence to promote closer cooperation, sharing of research facilities, technology transfer and commercialisation, and technology development, including joint programmes to promote science technology and innovation in vocational education through work-integrated learning;
	■ Facilitate the exchange and mobility of scientists and researchers in accordance to the respective laws, rules, regulation, and national policies; and
	■ Promote the implementation of the eight thematic tracks of the Krabi Initiative 2010 as a strategic platform for ASEAN-EU Science, Technology and Innovation (STI) cooperation.
	Projects/Activities currently supported by EU:
	- Southeast Cooperation on ICT Research (SEACOOP) Phase I; - EU-ASEAN READI Facility; - FP7 SEALING Project - Southeast Asia Cooperation on ICT Research (SEACOOP) Phase II; - Southeast Asia - European Union Network (SEA-EU-NET Phase II); and - EURAXESS (a joint initiative of the European commission and the countries participating in the European Union's Framework Programme for Research).
ASEAN - INDIA	**Plan of Action to Implement the ASEAN-India Partnership for Peace, Progress and Shared Prosperity (2016-2020)**
	■ Encourage and promote cooperation in science, technology and innovation, including through joint research activity, and development on cross-sectoral areas such as health, communicable and emerging infectious diseases, environmental management, climate change adaptation and mitigation measures, agricultural technologies, alternative energy, biodiversity, food processing, advanced materials for development of value-added products, and space technology and applications;
	■ Encourage and promote cooperation in biotechnology including through capacity building and joint research and development for mutual benefit; and
	■ Undertake activities and develop programmes/projects under the ASEAN-India Science and Technology Development Fund.

	Projects/Activities currently supported by India:
	- The 2nd ASEAN-India Workshop in Bioinformatics; - The ASEAN-India Workshop in Renewable Energy; - ASEAN-India Training Workshop on R&D and Innovative Management; - Training Course on Analysis of Chemical and Biological; Contaminants in Raw and Processed Products for ASEAN countries - 17th National Children Science Congress (NCSC); - Participation of Delegates from ASEAN Member States and the Dialogue Partner in the 12th ASEAN Food Conference 2011 in Bangkok, Thailand; - ASEAN-India Technology Mission on Functional Food; - 5th Science Conclave; - ASEAN Food Conference 2013; - Establishment of ASEAN-India S&T Digital Library; - Extent of Transfer of Nuisance Organisms between South and Southeast Asia by Shipping; - ASEAN-India Development of Thermally Sprayed Ceramic-Based Coatings; - The Indian Ocean Dipole Mode, El Nino Southern Oscillation (ENSO) and Monsoon Interactions and their Socio-Economic Impacts on India-ASEAN Nations; - Participation of AMS at the 20th National Children Science Congress (NCSC); - Participation of AMS at the 21th National Children Science Congress (NCSC); - ASEAN-India Meeting of Head of Space Agencies; - ASEAN-India Cooperation Project on Marine Biotechnology; - Special Training Programme on Wind Turbine Technology and Applications for ASEAN Participants at Center for Wind Energy Technology (C-WET); - Special Training Programme on Solar Energy Technologies and Applications for Participants of ASEAN Countries at Solar Energy Center (SEC); - 9th ASEAN Science and Technology Week: Participation of India Scientists in the 4th ASEAN Science Congress & Sub-Committee Conferences; - Establishment of Technology Information and Commercialisation Centre (TICC); - ASEAN-India Virtual Institute for Intellectual Property (VIIP); and - ASEAN-India Program on Quality Systems in Manufacturing (NABL).
ASEAN - JAPAN	**Implementation Plan of the Vision Statement on ASEAN-Japan Friendship and Cooperation: Shared Vision, Shared Identity, Shared Future (Adopted 2013)**
	■ Promote cooperation on science, technology, and innovation through continuing human resource development; intensifying R&D collaboration in strategic and innovative areas; and promoting technology transfer and commercialisation between Japan and ASEAN Member States.

	Projects/Activities currently supported by Japan:
	- 10th ASEAN Food Conference; - ASEAN's Experiences on S&T Governance: Framework of Incentives for Scientists and Scientific Organisations; - Development of Tsunami Propagation and Run-up/Inundation Model Capability; - Very Large Scale Integration (VLSI); - Training Course on Cleaner Production Technology for Virgin Coconut Oil (VCO) of Food Industry for ASEAN Countries; - Workshop on Climate Applications in ASEAN; - 1st ASEAN Environmental Technology Verification (ETV) Workshop; - Co-operation on Application of Crop Growth Simulation Model with Satellite Remote Sensing and Geographic Information System Techniques for Agricultural Crop Potential Yield Monitoring and Estimating; - Co-operation on Meteorological Early Warning System for Prevention and Mitigation of Agricultural Disasters; - Study on the State of S&T Development in ASEAN; - Participation of Delegates from ASEAN Member States and the Dialogue Partner in the 12th ASEAN Food Conference 2011 in Bangkok, Thailand; - Utilisation of Satellite Images on Disaster Management Project; - Capacity Building in Landfill Gas Utilisation; - Regional Training Workshop on Weather Radar Basis & Routine Maintenance and Real-Time Radar Rainfall Estimation & forecasting; - Japan-East Asia Network of Exchange for Students and Youths II (JENESYS 2.0); - Extension of the Rainfall Estimation for Monitoring of High Risk Fire Areas in Southeast Asia; - ASEAN-Japan Cooperation: Joint Activities on Climate Change and Disaster Prevention and Mitigation; - Numerical Model Products for Marine Meteorology and Oceanography; - Capacity Building on Climate Change - Greenhouse Gases Emission (GHG) Reduction for Energy Intensive Industry in ASEAN; - Regional Training Workshop on Weather Radar Basis & Routine Maintenance and Real-Time Radar Rainfall Estimation & Forecasting; and - 9th ASEAN Science and Technology Week: Participation of ASEAN and Japan in the 4th ASEAN Science Congress & Sub-Committee Conferences, and ASEAN Science, Technology and Innovation Exhibition.

ASEAN - REPUBLIC OF KOREA (ROK)	**ASEAN-Republic of Korea Plan of Action to Implement the Joint Declaration on Strategic Partnership for Peace and Prosperity (2016-2020)**
	■ Exchange of information to strengthen scientific technology and innovation competitiveness, and developing technology management and innovation to build the capabilities of Science & Technology experts and officials in ASEAN;
	■ Continue to support human resource development, sharing of knowledge and enhancing cooperation in the field of science, technology and innovation for green growth and sustainable development to promote technical cooperation among private sectors of both sides;
	■ Explore joint efforts to enhance economic growth by intensifying cooperation activities, promoting R&D collaboration and technology transfer and development in the areas of food technology, food processing, human nutrition, new materials, information technology, medical technology, micro-electronics, renewable and alternative energy, meteorology, environmental management, advanced materials technology, environment technology, biotechnology, green growth, nanotechnology, space technology and applications and other high value-added industries, especially latest technology of marine biology or genetic engineering; and
	■ Encourage joint research activities and exchanges of youth experts, and scientists, including the Gifted in Science; as well as promote technical cooperation among public-private entities of both sides.
	Projects/Activities currently supported by ROK:
	- ASEAN-ROK cooperation on climate information and Service; - 2nd East-Asia Bioinformatics Network (EABN); - ASEAN Cooperation Project for Programming, ITM, Ubiquitous Computing; - ASEAN-ROK Cooperation on Industrial Uses of Marine Biological Resources: Assessment of the State of the Art of Marine Biotechnology in the ASEAN Region; - ASEAN-ROK Project on Aviation Meteorology; - Multi-Model Ensemble Seasonal Prediction Over South East Asia; - Training on Mesoscale (NWP) by the KMA; and - ASEAN Food Conference 2013.

ASEAN - NEW ZEALAND	**Plan of Action to Implement the Joint Statement for ASEAN-New Zealand Strategic Partnership (2016-2020)**
	There's no specific cooperation on science and technology. However, cross-cutting issues could be found in the following areas:
	Agriculture:
	■ Promote closer cooperation in agriculture in key areas of mutual interest to encourage economic growth, sustainable agricultural productivity, food security and accessibility of ASEAN and New Zealand products to regional and global markets. The focus of cooperation and initiatives will include capacity-building, technology transfer, education and training, food safety and standards, agribusiness, and agriculture innovation.
	Environment and Climate Change:
	■ Promote cooperation in areas of mutual interest including global environmental issues, transboundary environmental pollution, environmental education, environmentally-sound technology, urban environmental governance, urban planning, green cities, coastal and marine environment, nature conservation, water resources management, fisheries management, and sustainable production, consumption, and development, through relevant regional and international mechanisms such as the ASEAN Declaration on Environmental Sustainability.
	Projects/Activities currently supported by New Zealand:
	- None
ASEAN - PAKISTAN	**ASEAN and Pakistan have undertaken cooperation in trade, industry and investment, science and technology, drugs an narcotics, environment, tourism, and human resources development**
	Projects/Activities funded by Pakistan:
	■ ASEAN-Pakistan Geoinformatics Workshop;
	■ International Workshop on Advanced Materials for New and Renewable Energy (AMNRE); and
	■ ASEAN-Pakistan Materials Science Conference (3 Conferences).

ASEAN - RUSSIA FEDERATION	**ASEAN-Russian Federation Plan of Action on Science, Technology and Innovation (2016-2025)**
	■ Strengthen and develop joint R&D activities in the following areas as identified in the ASEAN-Russia Concept Paper: - Biotechnology; - Food security and sustainable agriculture; - Water resources and water treatment technology; - Clean and nuclear technologies and power generation; - Oil and gas technologies; - Microelectronics and information technology; - Meteorology and geophysics; - Nanotechnology; - Geoinformatics; - Environmental management; - Energy technology and renewal energy; - Material science; and - Space technology and application.
	■ Enhancing regional STI connectivity;
	■ Commercialisation of Science and Technology;
	■ Create STI ecosystem & STI networks that strengthen regional STI linkages; and
	■ Strengthen strategic collaboration between ASEAN and Russia to create an effective system for capability development, technology transfer and commercialisation.
	Comprehensive Plan of Action to Promote Cooperation Between the ASEAN and the Russian Federation (2016-2020)
	■ Hold regular meetings of the ASEAN-Russia Working Group on Science and Technology (ARWGST), and implement and update if necessary the ASEAN-Russia Plan of Action on Science, Technology and Innovation to promote scientific and technological cooperation for mutual benefit;
	■ Promote scientific and technological research development and exchanges between ASEAN Member States and the Russian Federation for mutual benefit and sharing of scientific and technological information, including but not limited to high potential areas, such as development of advanced materials and life science for development of value-added products;
	■ Foster mutual participation in scientific and technology exhibitions, conferences, seminars and other international scientific and technology meeting, in particular, of the young scientists and experts; and
	■ Explore cooperation and capacity-building in the field of space technologies application.

	Projects/Activities currently supported by Russia Federation:
	- ASEAN-Russia Workshop on Vaccines; - ASEAN-Russia Workshop on Renewable Energy; - ASEAN-Russia Workshop on Application of Modern Biotechnology in Food Industry; - Energy Dialogue between Russia and ASEAN on Renewable Energy and Clean Energy Technologies Creation of an Expert-Analytical and Consulting Network on Renewable energy; - Seminar on the Common Use of the GLONASS/GPS Satellite Navigation Technologies; - Workshop on the Practical Application of the Earth Remote Sensing technologies to Solve Social and Economic Challenges; and - Workshop on Nano-Biotechnology: Achievements and Application.
ASEAN - UNITED STATES (U.S.)	**Plan of Action to Implement the ASEAN-U.S. Strategic Partnership (2016-2020)**
	■ Continue ASEAN-U.S. Consultations on Science and Technology to further explore cooperation in areas of mutual interest;
	■ Encourage science and technology exchanges and knowledge transfers, where appropriate, through capacity building for ASEAN's science and technology authorities;
	■ Encourage collaboration and cooperation among research centres, as well as exchanges of experts and the mobility of scientists and researchers, in conducting joint research programmes, including through the ASEAN-U.S. Science & Technology Fellows Programme; and
	■ Continue to promote women in science through the ASEAN-U.S. Science Prize for Women.
	Projects/Activities currently supported by the U.S.:
	- ASEAN-US Next-Generation Cook Stoves Workshop; - ASEAN-US S&T Policy Fellowship Pilot Programme Year 1; and - ASEAN-US S&T Policy Fellowship Programme Year 2.

ASEAN - PLUS THREE	ASEAN PLUS THREE COOPERATION WORK PLAN 2013 - 2017
	■ Broaden cooperation between and among the scientific and technological communities, including on human resource development and networking on science, technology, and innovation, and promoting public-private partnership in APT countries;
	■ Promote and engage in joint capacity building activities, exchange of information, and sharing of best practices in areas such as science, technology and innovation policies, technology transfer, commercialisation, products and scientific standards, investment and IPR management;
	■ Promote research and technology development in areas of having potential for commercial applications such as biotechnology, food technology, new materials, microelectronics and information technology, marine resources,new and renewable energy, life science, medical devices and technology,and space technology;
	■ Strengthen cooperation in meteorology addressing climate information and prediction services, weather observations and climate change; and
	■ Raise the visibility of APT cooperation in science, technology and innovation through sustained efforts in promoting and participating in various initiatives of the APT Centre for the Gifted in Science (ACGS), the ASEAN Food Conference, ASEAN Science and Technology Week, and other relevant events such as science, technology, and innovation youth camp.
	Projects/Activities currently supported by ASEAN Plus Three:
	- ASEAN Centre for the Gifted in Science: a. ASEAN Plus Three Student Camp and Teacher Workshop for the Gifted in Science (ACGS); and b. ASEAN Plus Three Junior Science Odyssey (APT JSO).

Where necessary, the existing platforms that formalised cooperation with Dialogue Partners might need to be elevated to Ministerial levels. While COST has expressed the intention to cooperate with Dialogue Partners with or without formal instruments such as Memorandum of Understanding or Agreement, it appears that such instruments would be useful to secure firm commitments from both sides to engage in meaningful joint undertakings.

VI. Resource Mobilisation to Implement APASTI 2016-2025

The ASEAN Science Fund (ASF) *[now known as ASTIF]*

The ASEAN Trust Fund for Science and Technology to promote Regional Cooperation in Science and Technology. Said Trust Fund (later on referred to as the ASF) was established by the ASEAN Ministers for Science and Technology in January 1989 with initial contribution of US$50,000.00 from each ASEAN Member country, and a contribution of NZ$100,000 (US$58,218.65) from New Zealand Government. (*Note: in 1989, ASEAN Member States include Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand*).

To strengthen the ASF, the ASEAN S&T Ministers, at the First Informal Ministerial Meeting on S&T on 8 April 2000, Genting Highlands, Pahang, Malaysia, signed the Agreement on the Augmentation of the ASEAN Science Fund by the ASEAN S&T Ministers. The Agreement states that the ASEAN Member States (AMS) shall augment the ASF to reach a target contribution of US$1 million each. The AMS shall complete their contributions to the ASFF in annual payments over a period of 10 years.

The Agreement on the Augmentation of the ASF prescribed the guidelines and general Principles for the operation of the ASEAN Science Fund. The Advisory Body of the ASEAN Science Fund was also established to advise the committee on Science and Technology on matters relating to the management of the ASEAN Science Fund in accordance with its Terms of Reference.

The original ASF Guidelines stipulate that 80% of the earnings of the Capital Account can be used to support cost-approved activities while the remaining 20% of earnings shall be retained in the Capital Account. Given that the initial quantum of the ASF is not large enough to support a wide range of activities, the guidelines also stipulated that the ASF can only be used to support the following activities:

- Science and Technology policy studies, including convening and hiring experts for this purpose; and
- S&T information exchange and dissemination.

As the ASF begins to accumulate through the regular contributions from ASEAN Member States and from the income generated by the ASF placements in fixed deposit instrument, the various COST Sub-Committees proposed that the ASF

be used to also support activities outside those prescribed in the original ASF Guidelines. As such, the ABASF reviewed the guidelines and proposed to COST some amendments to the ASF Guidelines.

The 56th Meeting of COST on 3-5 November 2008 in Kuching, Malaysia approved the proposed amendments to the ASF guidelines. The amended guidelines allow the use of the ASF to support the following activities:

- The creation and/or strengthening of the policy making capacity for science and technology matters;
- The exchange of experience and information on science and technology;
- The setting up and strengthening of the appropriate machinery and the services required to carry out the process of scientific and technological development;
- The establishment and strengthening of national capacities for the assessment, selection, acquisition and adaptation of foreign technology and expertise and the facilitation of the transfer of technology within ASEAN and from developed countries;
- The development of techniques to monitor scientific and technological activities and to assess their impact, including negative impact, on the development process;
- The establishment and improvement of regional information centres, networks and system to meet the needs of the ASEAN countries;
- The application, pilot-testing and the diffusion of innovative technology;
- The promotion and the further use of natural resources for national and regional development;
- The undertaking of a limited number of high-risk, research and development projects with high potential of Return of Investment (ROI); and
- Human resources development programme in scientific establishment of advanced countries.

Aside from the above expansion of activities now covered by the ASF, the revised ASF Guidelines no longer stipulated that only 80% of the income can be used to support COST activities. While the ABASF and COST could always exercise prudence, the removal of this restriction would mean that the ASF capital account could now be used to fund COST activities.

The establishment of a new ASEAN Innovation Fund (AIF) to support the implementation of STI-driven initiatives of the Krabi Initiative was proposed at the 7th IAMMST on 2 December 2012 in Jerudong, Brunei Darussalam. The proposal called

for the transfer of some ASF amount to seed the AIF that can be invested in projects (e.g. technology spin-off companies, revenue generating training programmes, etc.). Mechanisms shall be developed to encourage and enable the participation of the private sector, dialogue partners and international agencies to contribute to AIF. Such contributions will leverage resources in COST and collaborative activities and projects with the potential for revenue generation.

While expressing support to the proposal, the Ministers noted that establishing new fund would require careful study and analysis, especially on how to sustain the fund. Thus, the Ministers tasked the ABAPAST and ABASF to jointly study the feasibility of establishing the AIF.

The 8th IAMMST held on 25 August 2014 in Bogor, Indonesia adopted new amendments to the ASF guidelines that further expanded the coverage of the ASF to include STI-driven initiatives. As such, the Ministers agreed that instead of establishing a separate AIF, the ASF shall, instead, be rebranded as ASEAN Science, Technology and Innovation Fund (ASTIF). The amended guidelines (see ANNEX 5) now allows the ASTIF to be used for support the following:

- The creation and/or strengthening of the policy making capacity for science, technology and innovation matters;
- The exchange of experience and information on science, technology and innovation;
- The setting up and strengthening of the appropriate machinery and the services required to carry out the process of scientific and technological development;
- The establishment and strengthening of national capacities for the assessment, selection, acquisition and adaptation of foreign technology and expertise and the facilitation of the transfer of technology within ASEAN and from developed countries;
- The development of techniques to monitor scientific and technological activities and to assess their impact, including negative impact, on the development process;
- The establishment and improvement of regional information centres, networks and system to meet the needs of the ASEAN countries;
- The application, pilot-testing and the diffusion of innovative technology;
- The protection and sustainable use of natural resources for national and regional development;
- The undertaking of high-risk research and development projects with high potential of Return on Investment (ROI); and

- Human resources development programme in scientific establishment of advanced countries.

The new ASTIF guidelines as well as the completion of the augmentation of the fund in June 2015, may be deemed sufficient at this time to support APASTI initiatives that would require substantial funding. COST may also consider calling for a new round of contribution should the ASTIF balance reaches a certain threshold (e.g. USD 5M). The proposed Board of Advisers to COST may need to formulate the criteria that would define the eligibility of STI programmes and projects seeking ASTIF support.

The ASEAN Development Fund (ADF)

The Agreement to establish the ASEAN Development Fund (ADF)[13] was signed by the ASEAN leaders on 26 July 2005 in Vientiane, Lao PDR. The Terms of Reference[14] of the ADF was set up to support eligible initiatives of the Vientiane Action Programme (VAP). ASEAN Member States agreed to contribute one million US Dollars (USD 1,000,000) to the ADF. The ADF basically replaced the ASEAN Fund (AF)[15] that was established on 17 December 1969. The existing contributions of AMS to the AF were credited to the ADF.

The Terms of Reference of the ADF was later amended and adopted by the Committee of Permanent Representatives (CPR) to ASEAN on 22 October 2013. The amended TOR (see ANNEX 6) states that the ADF shall be used for any of the following purposes:

- To leverage funding of regional cooperation programmes and projects from dialogue Partners and other external parties. When used for counterpart funding, the amount shall not exceed 20% of the total funding raised regardless of whether the co-funding source is an ASEAN Member State or an external party;
- To provide seed funding for initial activities of large-scale projects, requiring major financial support from a Dialogue Partner or other external party; and
- To provide full funding support to small and short-term projects of a confidential or strategic nature.

COST Sharing

The principle of cost-sharing the implementation of projects and activities originally developed for the Medium-Term Programme 1996-2000 and agreed at the 10th ASEAN S&T Ministerial Meeting in October 2003 remains applicable. Pertinent terminologies in the cost-sharing principle (ANNEX 7) were amended to be consistent with new terminologies used in ASEAN.

VII. APASTI 2016-2025 Implementation and Review Arrangements

Implementation

The ASEAN Ministerial Meeting on Science and Technology (AMMST) shall be responsible for overseeing the overall implementation of the APASTI 2016-2025. The ASEAN Committee on Science and Technology (COST) shall be responsible in operationalising and translating the APASTI strategic thrusts into specific actions.

The Board of Advisers to COST shall take the lead in developing a more detailed implementation plan for the APASTI 2016-2025, including the formulation of criteria for the selection of STI projects to be supported by the ASTIF.

The Sub-Committees shall each develop their respective work programmes that would clearly describe the targets, milestones and strategies in implementing specific activities consistent with their new thematic priorities and the APASTI goals and strategic thrusts, in general.

Review

The implementation of the APASTI 2016-2025 shall be reviewed and assessed regularly according to guidelines and criteria to be set up by the BAC. The implementation-focused monitoring system developed by the ASEAN Secretariat to review the ASCC Blueprint implementation may be considered as a useful mechanism. The Sub-Committees shall also undertake assessments of the efficiency and effectiveness of their work programme implementation. Formal reviews of the APASTI implementation can be conducted in 2020 and in 2025 respectively.

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ANNEX 1

Terms of Reference of the ASEAN COST Chair

The ASEAN COST Chair shall:

1. Provide leadership and guidance towards fulfilling the objective, mission, and strategies of the ASEAN Committee on Science and Technology (COST), pursuant to the larger goals, aims, objectives and mission of ASEAN.

2. Initiate, direct and oversee the development, monitoring and implementation of programmes and activities of COST and its subsidiary bodies in support of the ASEAN Plan of Action on Science, Technology and Innovation (APASTI), relevant ASEAN Blueprint and roadmaps and other directives from the ASEAN Leaders, science and technology and related Ministers.

3. Plan and coordinate all activities required for convening of meetings, in coordination with the host country and ASEAN Secretariat. These include the following:
   - Preparations of tentative agenda and its annotation, information papers, policy issues and other documents for discussion in the meeting;
   - Issuance of meeting announcement and invitation letters; and
   - Preparations of draft report of the meeting for adoption, and its subsequent reproduction.

4. Present reports, policy papers, and provide recommendations of the ASEAN COST to the S&T Ministers for their considerations;

5. Preside over regular ASEAN COST meetings, preparatory meetings for the ASEAN Ministerial Meeting on Science and Technology (AMMST) and other relevant meetings and exert efforts in achieving consensus over the issues discussed and decisions made.

6. Chair and/or Co-Chair Meetings and represent the ASEAN COST in meetings under the purview of ASEAN-Dialogue Relations and other relevant platforms. These include, but not limited to:
   - ASEAN-China Joint Science and Technology Committee (ACJSTC);
   - ASEAN-EU Dialogue on Science and Technology (AEU DST);
   - ASEAN-Japan Coopertion Committee on Science and Technology (AJCCST);

- ASEAN-India Working Group on S&T (AIWGST);
- ASEAN-ROK Joint Science and Technology Committee (AK JSTC);
- ASEAN-Russia Working Group on S&T (ARWGST);
- ASEAN-US Consultation on Science and Technology (AUS CST);
- ASEAN COST Plus Three Meeting;
- Governing Council of the ASEAN-India S&T Development Fund (GC-AISTDF); and
- Forums and related meetings convened by the Senior Economic Officials Meeting (SEOM); ASEAN Secretariat, committee of Permanent Representatives to ASEAN (CPR); Committee of the Whole; SOC-COM; AMMST, etc.

7. Facilitate and coordinate the execution and follow-up the decisions of the ASEAN Summit, AMMST, COST and other relevant meetings under ASEAN Dialogue Relations.

8. To maintain an archive of Meeting's minutes, notes, and relevant documents of AMMST, COST and its subsidiary bodies, in close cooperation with the ASEAN Secretariat.

9. To establish regular communications and links with all National COST chairmen, ASEAN Secretariat, chairmen of other COST-Sub-Committees, BAC, proponents of projects implemented by COST, project consultants/experts engaged under COST, and counterparts in dialogue countries.

10. To prepare Handover Notes at the end of chairman's term to ensure continuity and that proper succession planning takes place according to the usual rotation.

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ANNEX 2:

Terms of Reference of National COST Chair

1. To assist the S&T Minister in providing leadership and guidance to the National efforts towards fulfilling the charter (objective, mission, strategies) of the ASEAN Committee on Science and Technology (COST), pursuant to the larger goals, aims, objectives and mission of ASEAN.

2. To assist the S&T Minister in initiating, directing and overseeing the development, monitoring and implementation of the COST and the Sub-Committee programmes and activities, at the national level, in support of the ASEAN Plan of Action on Science, Technology and Innovation (APASTI), relevant ASEAN Blueprint and roadmaps and other directives from the ASEAN Leaders and science and technology and related Ministers.

3. To preside over National COST Meetings, prepare reports and recommendations to the S&T Minister in preparation for the regular ASEAN Ministerial Meeting on S&T (AMMST) and other relevant meetings and exert efforts in achieving consensus over the issues discussed and decisions made.

4. To represent his/her country in the Meetings of the ASEAN COST and in other Meetings under the purview of ASEAN-Dialogue Relations and other relevant forums. These include, but not limited to:
   - ASEAN-China Joint Science and Technology Committee (ACJSTC);
   - ASEAN-EU Dialogue on Science and Technology (AEU DST);
   - ASEAN-Japan Coopertion Committee on Science and Technology (AJCCST);
   - ASEAN-India Working Group on S&T (AIWGST);
   - ASEAN-ROK Joint Science and Technology Committee (AK JSTC);
   - ASEAN-Russia Working Group on S&T (ARWGST);
   - ASEAN-US Consultation on Science and Technology (AUS CST);
   - ASEAN COST Plus Three Meeting;
   - Governing Council of the ASEAN-India S&T Development Fund (GC-AISTDF); and
   - Forums and related meetings convened by the Senior Economic Officials Meeting (SEOM); ASEAN Secretariat, Committee of Permanent Representatives to ASEAN (CPR); committee of the Whole; SOC-COM; AMMST, etc.

5. To facilitate and coordinate at the national level the execution and follow-up of the decisions of the ASEAN Summit, AMMST, COST and other relevant Meetings under ASEAN Dialogue Relations.

6. To facilitate, coordinate and organise all activities, as host country, in the smooth conduct of activities not limited to meetings and workshops of the ASEAN COST, it's Sub-Committees, and other relevant bodies established with Dialogue Partners.

7. To Co-Chair the ASEAN COST Meeting should the Meeting be held in his/her country;

8. To maintain, in coordination with the National COST Secretariat, an archive of Meeting's minutes, notes, and relevant documents of AMMST, COST and its subsidiary bodies, in close cooperation with the ASEAN Secretariat.

9. To establish regular communications and links with all focal points,particularly the chairs, if any, of the various National COST Sub-Committees, proponents of projects implemented by COST, project consultants/experts engaged under COST, and counterparts in dialogue countries.

10. To prepare Handover Notes at the end of his/her term as National COST chair to ensure continuity and that proper succession planning takes place should such event takes place.

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ANNEX 3:

Terms of Reference of COST Sub-Committee Chair

1. To provide leadership and guidance to the Sub-Committee towards fulfilling the charter (objective, mission, strategies) of the Sub-Committee, pursuant to the larger goals, aims, objectives and mission of Committee on Science and Technology (COST), ASEAN Ministerial Meeting on S&T (AMMST) and ASEAN.

2. To initiate, direct and oversee the development, monitoring and implementation of Sub-Committee programmes and activities in support of the ASEAN Plan of Action on Science, Technology and Innovation (APASTI), relevant ASEAN Blueprint and roadmaps and other directives from the ASEAN Leaders, science and technology and related Ministers.

3. In coordination with the host country and ASEAN Secretariat, to plan, execute and coordinate all activities required for convening meetings under the purview of the Sub-Committees. These include the following:

   - Preparations of tentative agenda and its annotation, information papers, project reports, project briefs/concept paper/proposals and other documents for discussion in the meeting;
   - Issuance of meeting announcement and invitation letters;
   - Preparations of draft report of the meeting for adoption, and its subsequent reproduction; and
   - Preparations of report and documents for presentations to COST and other COST subsidiary bodies for their consideration.

4. To preside over meetings, project meetings, discussion forums under the purview of the Sub-Committee so as to achieve consensus over issues discussed and decisions made.

5. To present the outcomes of the Sub-Committee Meetings and relevant issues, recommendations, policies, comments, new initiatives to COST, and other subsidiary bodies of COST (e.g. other Sub-Committees and BAC) for their consideration.

6. To participate in BAC Meetings and its other activities as *ex-officio* member.

7. Upon invitation of COST, to represent the Sub-Committee in relevant Meetings held under the purview of ASEAN-Dialogue Relations and other relevant platforms. These include, but not limited to:
    - ASEAN-China Joint Science and Technology Committee (ACJSTC);
    - ASEAN-EU Dialogue on Science and Technology (AEU DST);
    - ASEAN-Japan Cooperation Committee on Science and Technology (AJ CCST);
    - ASEAN-India Working Group on S&T (AIWGST);
    - ASEAN-ROK Joint Science and Technology Committee (AK JSTC);
    - ASEAN-Russia Working Group on S&T (ARWGST);
    - ASEAN-US Consultation on Science and Technology (AUS CST);
    - ASEAN COST Plus Three Meeting;
    - Governing Council of the ASEAN-India S&T Development Fund (GC-AISTDF); and
    - Forums and related meetings convened by the Senior Economic Officials Meeting (SEOM); ASEAN Secretariat, committee of Permanent Representatives to ASEAN (CPR); committee of the Whole; SOC-COM; AMMST, etc.

8. To facilitate and coordinate the execution and follow-up of the decisions of the Sub-Committee COST and other subsidiary bodies of COST.

9. To maintain an archive of the Sub-Committee Meeting's minutes, notes, and relevant documents in close cooperation with the ASEAN Secretariat.

10. To establish regular communications and links with Sub-Committee Members, the ASEAN Secretariat, chairmen of other COST Sub-Committees. National COST chairman, the BAC, proponents of projects, project consultants/experts engaged under the Sub-Committee, and designated focal points in dialogue countries.

11. To prepare Handover Notes at the end of chairman's term to ensure continuity and that proper succession planning takes place accordingly.

12. The Sub-Committee Vice-Chairmen shall be ready to assume the tasks of the Sub-Committee chair, in the event that the Sub-Committee chair is unable to perform the mandated tasks due to reasons beyond his/her control or when assigned specific duties by the Sub-Committee chair.

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ANNEX 4:

Terms of Reference of the ASEAN Secretariat

1. The ASEAN Secretariat's basic function is to provide for greater efficiency in the coordination of ASEAN organs and for more effective implementation of ASEAN projects and activities. The ASEAN Secretariat's mission is to initiate, facilitate and coordinate ASEAN stakeholder collaboration in realising the purposes and principles of ASEAN as reflected in the ASEAN charter (*http://www.asean.org/asean/asean-secretariat/about-asean-secretariat*).

2. The ASEAN Secretariat, in particular, shall provide the following technical and administrative support to the activities of the AMMST, ASEAN COST and its subsidiary bodies (e.g., Sub-Committees, advisory bodies; experts groups; task forces, etc.), including those established with Dialogue Partners in the area of Science, Technology and Innovation (STI):

i. General Support

- Advise, coordinate and assist in the initiation, implementation, and review of ASEAN COST activities;
- Assist in the preparation and development of the plans of action on STI; The work plans of COST's subsidiary bodies and relevant work plans with COST's dialogue and other partners; and
- Monitor the implementation of Agreements entered into between and among the ASEAN COST, Dialogue Partners, other legal entities and the private sector.

ii. Conduct of Meetings

- Serve as resource persons in the Meetings of relevant ASEAN committees and other international bodies;
- Assist the host country in planning and coordinating all activities required forconvening the ASEAN COST and other relevant meetings. The assistance may include the following:
  - Provide advice on the preparations of annotated agenda, information papers, project reports, project briefs/concept paper/ proposals and other documents for discussion in the Meeting;
  - Assist in protocol and logistical arrangements including media conference; and
  - Assist the local secretariat or the assigned committee in the preparations of draft report of the meeting for adoption.

iii. Project conceptualisation, implementation and monitoring

- Assist in the conceptualisation, development and appraisal of project and programme proposals;
- Monitor the progress of implementation and assist in the impact assessment of programmes and projects of the ASEAN COST;
- Coordinate the implementation of the projects of the ASEAN COST; and
- Implement COST projects of which the ASEAN Secretariat is the proponent.

iv. Information dissemination

- Inform the ASEAN COST and its subsidiary bodies of the directives of the ASEAN Summits; Relevant Ministerial and/or high-level task force Meetings; Maintain regular communications and links with the ASEAN COST and its subsidiary bodies, proponents of projects, project consultants/experts, designated focal points in Dialogue Partner countries and international bodies; and
- Present reports and updates on ASEAN STI cooperation and related activities to the Committee of Permanent Representatives (CPR) to ASEAN and other ASEAN bodies, as necessary.

v. Management of the ASEAN Science, Technology and Innovation Fund (ASTIF)

- Manage the ASTIF, as instructed by the ASEAN S&T Ministers and ASEAN COST; and
- Administer the disbursement of funds from ASTIF to support ASEAN COST approved activities and projects.

3. Perform such other duties as directed by the ASEAN Secretary General, the S&T Ministers and the COST.

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ANNEX 5:

Guidelines for the Management and Operation of the ASEAN Science, Technology and Innovation Fund

(Adopted at the 8th IAMMST, Bogor, Indonesia, 25 August 2014)

Measures to Solicit Contributions to the Fund

The Advisory Body should consider the following measures in their effort to solicit further contributions:

- Income from COST projects, such as seminar fees, publications, royalties, etc.;
- Contribution from international organisations, private sector and individuals; and
- Contributions from Dialogue Partners and third countries.

Guidelines and General Principles for the Operation of the ASEAN Science, Technology and Innovation Fund

1. There is hereby established a trust fund to be known as the "ASEAN TRUST FUND FOR SCIENCE, TECHNOLOGY AND INNOVATION" hereinafter referred to as "the ASEAN Science, Technology and Innovation Fund or ASTIF".

2. The ASTIF is established for the purpose of financing the various activities relating to science, technology and innovation as identified, reviewed and recommended by the Expert group Meeting on the fund for the consideration and approval of ASEAN Committee on Science and Technology (hereinafter referred to as 'Approved Projects').

3. The ASTIF shall be credited with:
   - Contributions from Dialogue Partners and third countries;
   - Contributions from United Nations Agencies and other international organisations or bodies; and
   - Contributions from other sources as approved by the COST.

4. The ASTIF shall be sought from those parties by the ASEAN Member States through the present contact points.

5. Contribution paid into the ASTIF shall belong to ASEAN and shall be held in the custody of the ASEAN Secretariat.

6. The ASTIF shall be administered solely by ASEAN.

7. Payments from the ASTIF may only be made for the following purposes:
   - The creation and/or strengthening of the policy making capacity for science, technology and innovation matters;
   - The exchange of experience and information on science, technology and innovation;
   - The setting up and strengthening of the appropriate machinery and the services required to carry out the process of scientific and technological development;
   - The establishment and strengthening of national capacities for the assessment, selection, acquisition and adaptation of foreign technology and expertise and the facilitation of the transfer of technology within ASEAN and from developed countries;
   - The development of techniques to monitor scientific and technological activities and to assess their impact, including negative impact, on the development process;
   - The establishment and improvement of regional information centres, networks and system to meet the needs of the ASEAN countries;
   - The application, pilot-testing and the diffusion of innovative technology;
   - The protection and sustainable use of natural resources for national and regional development;
   - The undertaking of high-risk research and development projects with high potential of Return on Investment (ROI); and
   - Human Resources Development programme in scientific establishment of advanced countries.

8. The ASTIF shall only be used for the purpose stated in paragraph 7 above. Unless otherwise provided for by the Advisory Body, it shall not be used to cover Routine expenditure for work undertaken by the ASEAN Secretariat, national COST Secretariat and Committee Meetings of ASEAN.

9. An approved project shall include a budget showing full and detailed itemisation of expenditures, as well as schedule of payments, if applicable. The budget of Approved Projects shall be divided as follows:

   a. Administrative and Capital COSTs

   These costs will include all administrative costs such as rents, utilities, equipment, office requisites, salaries of the locally engaged general service personnel and insurance and will include certain expenditures of a capital nature such as expenditure on lands and buildings.

b. Operational COST

These costs comprise all other costs of the Approved Projects including programme costs, recruitment costs, service fees and allowances of professional staff engaged in the Approved Projects.

10. The ASTIF shall be used only to fund the operational costs of approved projects except for innovation-related project where capital costs may be considered.

11. For approved projects of one time nature the amounts equivalent to the approved budgets shall be remitted to the ASEAN-COST National Secretariat or a designated national institution of the host government concerned, hereinafter referred to as "the project proponent" thirty (30) days before the date of commencement of implementation.

12. For approved projects other than those mentioned in Rule 11, remittance shall be made in accordance with the schedule of payments. Each remittance shall be made sixty (60) days before the date of commencement of implementation of a particular phase. In the event that the fund for the projects is not fully utilised, it shall be the responsibility of the project proponent to inform the ASEAN Secretariat to withhold the whole or part of subsequent remittances.

13. The project proponent shall send to the ASEAN Secretariat a letter of acknowledgement of the remittances.

14. All remittances from the ASTIF shall be on a certification duly certified by the ASEAN Secretary-General (SG), or by an officer or officers duly appointed by SG in writing for this purpose. Such certification shall be supported by all relevant documents.

15. a. The unexpended balance from any projects shall be reverted to the ASEAN Secretariat by the project proponent within sixty (60) days after the completion of the projects.
    b. The ASEAN Secretariat shall revert to the ASTIF the unexpended balance mentioned in Rule 15(a), as soon as possible.

16. The ASTIF shall at all times be kept in credit and not be overdrawn.

17. a. The ASTIF shall have two accounts, namely the Administrative and Capital Account and the Operational Account. These two accounts shall be

expressed in United States dollars and shall be operated and accounted for in accordance with the agreed Financial Regulation and accounting system of the ASEAN Secretariat.

b. The Capital Account would be used to generate income. The Operational Account would be replenished by the earnings from the Capital Account.

c. The fund shall be deposited in a bank or banks to be determined by the ASEAN Secretariat with the approval of COST.

18. The financial year for the fund shall commence on the 1st of January and end on the 31st of December.

19. The project proponent concerned shall forward to the ASEAN Secretariat a statement of accounts of the funds disbursed, not later than thirty (30) days from the date of completion of the projects or at the end of the financial year or on-going projects.

20. For a project with a duration of more than six months, the project proponent shall submit a six monthly progress report including the Financial Statement to the ASEAN COST through the Advisory Body on 31st of July or 31st of January. At the end of the project, the proponent shall submit a Project Completion Report to the ASEAN COST through the Advisory Body not later than thirty (30) days after its completion. The Project Completion Report shall include the Financial Statement, which shall be audited by the Auditor of the Government Concerned to the ASEAN COST through the Advisory Body.

21. The ASEAN Secretariat shall submit to the ASEAN Audit Committee an Annual Financial Statement summarizing the financial transaction of the ASTIF within ninety (90) days after the end of the financial year.

22. Any proceeds accruing from the approved project shall be credited back to the ASTIF. Where applicable and with the approval of COST through the Advisory Body, the proceeds may be retained in the ASEAN COST National Secretariat concerned to be offset against subsequent remittances by the ASEAN Secretariat.

23. The Audit Committee of ASEAN shall audit the Account of the ASTIF.

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ANNEX 6:

Terms of Reference of the ASEAN Development Fund (ADF)

Objectives

1. The ASEAN Development Fund (ADF) shall serve as ASEAN's common pool of financial resources to support the implementation of the Vientiane Action Programme (VAP), the Roadmap for ASEAN Community (2009-2015), the Master Plan on ASEAN Connectivity (2010), the Bali Concord III, and their successor documents.

Guiding Principles

2. The ADF shall be established and managed according to the following guiding principles:
   - The basic element of the ADF shall be equal contributions by ASEAN Member States. The initial contribution of each ASEAN Member State to the ADF shall be one million US dollars (US$1,000,000). This initial contribution shall comprise the existing contributions of each ASEAN Member State to the ASEAN Fund;[1]
   - ASEAN Member States, at any time, are encouraged to make additional voluntary contribution(s) in any amount in addition to their initial contributions;
   - The ADF shall be open to contributions from other public and private sources. However, the ADF shall not accept contributions where restrictions or conditions are sought to be imposed with regard to the use of such contributions;
   - Contributions by the ASEAN Member States to the ADF shall be distinct and separate from their contributions to the operating budget of the ASEAN Secretariat, and to other ASEAN Funds of a sectoral nature; and
   - The annual fund available for approved projects is determined based on the availability of the fund, subject to the decision of the Committee of Permanent Representatives (CPR) upon recommendation of the ASEAN Secretariat, subject to periodic review.

[1] Pursuant to the Entry Into Force (EIF) of the Agreement for the Establishment of an ASEAN Development Fund on 26 July 2005, the previous contributions of each ASEAN Member State to the ASEAN Fund have therefore been transferred to the ADF.

Arrangements for Managing and Utilising the ADF

Custody and Management of the Fund

3. The ADF shall be held in trust at the ASEAN Secretariat, subject to the same rules and conditions that are applied to other existing trust funds in regard to investment, disbursement, accounting and auditing procedures.

4. The ADF shall be maintained in two accounts, an Endowment Fund account, where the fund is invested through an Investment Manager aiming for preservation of capital and optimizing income, and an Operational Account, where the fund is available for approved projects. Investment of the Endowment Fund is guided by the investment guidelines recommended by the Fund Advisory Group.

5. The annual income from the investment of the Endowment Fund shall be distributed 80% for projects, and 20% for capital development. Accordingly, 80% of the income from the investment shall be transferred to the Operational Account.

Programming and Appraisal of Proposed Projects

6. The use of the ADF shall be programmed on a regular basis every two years to realise each of the three pillars of the ASEAN Community and to narrow the development gap among ASEAN Member States. Selection of regional cooperation measures to be included in the ADF programme shall take explicit account of the need for: (a) priority measures in realising each of the three pillars of the community; (b) striking a parallel and balanced development and implementation of the three pillars of the community; and (c) narrowing the development gap among ASEAN Member States so that they could move forward in a unified manner.

7. The two-yearly ADF Indicative Work Programme shall be approved by the CPR as basis for preparation of specific project proposals for ADF funding support.

8. Projects seeking ADF support shall be appraised based on criteria including regionality, appropriateness and relevance in the context of the VAP, the Roadmap for ASEAN Community (2009-2015), the Master Plan on ASEAN Connectivity (2010), the Bali Concord III, and their successor documents, quality of design, cost-effectiveness, and sustainability. Appraisal of projects shall be made by the ASEAN Secretariat Project Appraisal Committee (PAC) based on those criteria. The standard format for ASEAN project proposals shall be used.

Eligible Utilisation of the ADF

9. Unless otherwise agreed by the CPR, the ADF shall be used for any of the following purposes:
   - To leverage funding of regional cooperation programmes and projects from Dialogue Partners and other external parties. When used for counterpart funding; the amount shall not exceed 20% of the total funding raised regardless of whether the co-funding source is an ASEAN Member State or an external party;
   - To provide seed funding for initial activities of large-scale projects, requiring major financial support from a Dialogue Partner or other external party; and
   - To provide full funding support to small and short-term projects of a confidential or strategic nature.

10. The ADF shall support projects and activities with clearly defined set o objectives and targets within a set timeframe for implementation.

11. The items of expenditure in a project budget shall be classified into three (3) general categories as follows:
   - Administrative costs: rent, utilities, office space, salaries of locally engaged personnel, insurance and taxes; and
   - Operational costs: project overhead costs, recruitment costs, compensation of professional staff engaged in the project, its related expenditure (e.g. travel, accommodation, per diem) equipment and supplies; and
   - Capital costs: land and building, and equipment costing more than US$10,000.

12. Only the operational costs of the project shall be eligible for support under the ADF.

13. The capital and administrative costs shall be borne by the host government of the project.

14. Travelling, accommodation and other expenses of delegations attending regular meetings of duly established ASEAN bodies are not eligible expenditures under the ADF.

Funding Approval

15. Approval for use of the fund for a project shall be obtained from the CPR taking into account the recommendations of the PAC of the ASEAN Secretariat submitted through the Secretary-General of ASEAN, in consideration of the nature of activities eligible for support under the ADF.

Ownership of Property

16. The ownership of property acquired, including intellectual property generated, as a result of the implementation of projects/programmes financed by the ADF shall be vested in the name of ASEAN. The use and/or disposition of such property shall be in accordance with rules and procedures to be determined by the CPR.

Reporting

17. All project implementing agencies receiving ADF support for projects of duration longer than six months are required to submit six-monthly financial reports to the ASEAN Secretariat, for consolidation into a regular six-monthly financial statement for review by the CPR.

18. At the end of a project, a project completion report including a full accounting of all funds received from the ADF shall be submitted by the project implementing agency within 60 days of project completion. Any excess funds unutilised by the project shall be returned by the project implementing agency to the ASEAN Secretariat within 90 days of project completion.

19. The ASEAN Secretariat shall provide a six-monthly financial statement to the CPR to update ASEAN Member States on the status of the ADF.

Amendments

20. ASEAN Member States or the ASEAN Secretariat may propose amendments at any time to the Terms of Reference and submit them for consideration and approval by the CPR.

Utilisation of Remaining Funds

21. At the end of the period of the implementation of the VAP, the Roadmap for ASEAN Community (2009-2015), the Master Plan on ASEAN Connectivity (2010), the Bali Concord III and their successor documents, any funds remaining in the ADF shall be carried over for the implementation of the successor ASEAN action programmes or for any other related purposes approved by the CPR.

Final Provisions

22. These Terms of Reference are further amended and approved by the ASEAN Member States as represented by the CPR on 22 October 2013[2] and shall replace the Terms of Reference referred to in Article I of the Agreement on the Establishment of the ASEAN Development Fund signed on 26 July 2005.

23. Paragraphs 15-18 of the 2005 Terms of Reference of the ADF adopted on 26 July 2005 shall continue to apply to ownership of property, which is the subject of projects completed prior to the adoption of these Terms of Reference.

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[2] The first amendment was approved by the ASEAN Member States as represented by the CPR on 5 November 2012.

ANNEX 7:

COST SHARING

Principles of Cost-sharing

1. When three or more ASEAN Member States decide to jointly undertake an STI project, the cost of the project will be shared among the participating Member States.

2. In return for the shares of participating Member States in the project, the sharing of potential benefit among them will be agreed prior the beginning of the project. The share of benefit will correspond with the share of the project cost. An agreement on terms and conditions for the cost-sharing and intellectual property rights, the latter whenever deemed appropriate by the participating countries, will be drafted.

3. Within each Member State, the government may invite the private sector, a company or group of companies, to provide funding as part of the country's share. In turn, the private sector contributor will have a share over the country's benefit.

4. When the project is approved for funding by the ASEAN Science, Technology and Innovation Fund or the ASEAN Development Fund, the financial support from the ASTIF and/or the ADF will be considered as the share from the ASTIF and/or the ADF. The ASTIF and/or the ADF will be given their corresponding benefit arising from the project.

Contribution from a Dialogue Partner or a third country to the project cost will be translated into the corresponding share of benefit of the Dialogue Partner or the third country.

Procedure to Establish COST-sharing Project

1. A subcommittee or an ASEAN Member State(s) will propose to COST a cost-shared STI project. The proponent must make a prior identification of other participating ASEAN Member States.

2. Dialogue Partners and/or third countries may be invited to join the project and consider the possibilities of sharing the cost as well as the benefits.

3. The proponent will then draw up a draft agreement on the sharing of the cost and of the benefits, including intellectual property rights whenever deemed

appropriate, among the potential participating countries. A subcommittee or COST, through the ASEAN Secretariat, may assist in relation to the signing of the agreement.

4. When COST and other appropriate ASEAN bodies have approved the project and the agreement of cost-and-benefit sharing among the participating countries, the project will commence.

5. Where appropriate, a participating country may enter into agreement with the national institute or agency and the private company or companies which contribute to the country's share of the project cost.

6. When it is considered that additional fund is required, COST will take the necessary steps to seek the support from the ASTIF or the ADF before the project is authorised to start. In addition, the benefits from the project will be included in the agreement. Any share of the revenue which may accumulate from the project will be returned to the ASF or the ADF.

Management of COST-shared Project

COST, a sub-committee of COST, or COST, through the ASEAN Secretariat, will oversee and monitor the activities and ensure that the outputs are achieved. Cost-sharing funds may include an allocation for project management. This allocation may come from the cost-sharing contributions of participating ASEAN Member States, Dialogue Partner or third country, or the ASEAN Development Fund. If necessary, a Project Coordinator may be hired. Progress and financial reports will be made to COST during regular COST meetings.

Any of the following schemes on the handling of cost-sharing funds will be adopted and incorporated in the agreement prior to the beginning of a cost-shared project.

1. Cost-sharing contributions will be retained in separate member country's accounts and managed by the respective countries.

2. Cost-sharing contributions will be centralised into a common account and managed by the ASEAN Secretariat. The disbursement will be made to support the project activities in the participating Member States.

3. A combination of (1) and (2). A ratio of (1) to (2) will be agreed upon by each participating country.

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