

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

Implementation Plan



one vision
one identity
one community



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

Implementation Plan

The ASEAN Secretariat
Jakarta

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TABLE OF CONTENTS

PREFACE	v
A. INTRODUCTION	1
B. VISION	2
C. GOALS	2
D. STRATEGIC THRUSTS	3
E. STRATEGIC COMPONENTS	4
E.1. Public-Private Collaboration	4
E.2. Talent Mobility, People-to-People Connectivity, and Inclusiveness	11
E.3. Enterprises Support.....	16
E.4. Public Awareness and STI Enculturation	22
F. KEY PERFORMANCE INDICATORS	29
F.1. Output Indicators.....	29
F.2. Outcome Indicators	32
F.2.1. R&D Expenditure.....	32
F.2.2. Human Resource Involved in R&D	32
F.2.3. S&T Output	32
F.2.4. Talent Mobility	33
F.2.5. Knowledge Impact	33
F.2.6. Knowledge Diffusion.....	33
F.2.7. STI Culture	33
References	33
G. IMPLEMENTATION ARRANGEMENT	34
G.1. Implementation Mechanism	34
G.2. Resource Mobilisation.....	34
G.3. Monitoring and Evaluation.....	35
ANNEXES	36
ANNEX 1: Work Plan of Sub-Committee on Biotechnology (SCB).....	37
ANNEX 2: Work Plan of Sub-Committee on Food Science and Technology (SCFST)	44

ANNEX 3: Work Plan of Sub-Committee on S&T Infrastructure and Resources Development (SCIRD)	57
ANNEX 4: Work Plan of Meteorology and Geophysics (SCMG).....	74
ANNEX 5: Work Plan of Sub-Committee on Microelectronics and Information Technology (SCMIT).....	86
ANNEX 6: Work Plan of Sub-Committee on Marine Science and Technology (SCMSAT).....	89
ANNEX 7: Work Plan of Sub-Committee on Material Science and Technology (SCMST).....	103
ANNEX 8: Work Plan of Sustainable Energy Research (SCSER).....	120
ANNEX 9: Work Plan of Sub-Committee on Space Technology and Application (SCOSA).....	132

PREFACE

The APASTI 2016-2025 Implementation Plan (AIP) was adopted by the ASEAN Ministers for Science and Technology at the 9th Informal ASEAN Ministerial Meeting on Science and Technology (IAMMST) held on 29 October 2016 in Siem Reap, Cambodia.

The detailed AIP provides a comprehensive plan for the next ten years implementation of the APASTI 2016-2025 that outline key strategic actions and components comprising of the priorities; targets/deliverables; specific activities; timelines; indicators derived from the work plans of nine ASEAN Sub-Committees under the purview of the ASEAN Committee on Science and Technology (COST).

The AIP will also help various Sub-Committees of COST to improve the monitoring and evaluating mechanisms of programmes/activities, enhance cooperation with Dialogue Partners through resource mobilisation, engage private sectors through public-private partnership in supporting the strategic thrusts, actions and the goals of APASTI 2016-2025.

Through this comprehensive plan, I deeply appreciate the great efforts made by all those involved in the development of AIP and look forward for the excellent deliverables of the implementation APASTI 2016-2025.



H.E. Dr. TUNG Ciny
ASEAN COST Chair (2016-2017)

A. INTRODUCTION

Following the adoption of the ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025 at the 16th ASEAN Ministerial Meeting on Science, and Technology (AMMST-16) in Vientiane, Lao PDR on 6 November 2015, the S&T Ministers agreed that the APASTI shall 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 various Sub-Committees under the purview of the ASEAN Committee on Science and Technology (COST).

As Science, Technology and Innovation (STI) are necessary contributors to socio-economic development and in accordance with the S&T Ministers' directive, this APASTI implementation plan includes activities that are supportive of both social and economic developments and consistent with the relevant characteristics of the ASEAN Economic Community (AEC) 2025 as well as the ASEAN-Socio-Cultural Community (ASCC) Blueprints 2025.

B. VISION

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

C. GOALS

1. ASEAN Science, Technology and Innovation (STI) addressing the Grand Challenges of the new millennium.
2. Economically integrated ASEAN involving active collaboration between the public & private sectors especially SMEs and enhanced mobility of talents.
3. Deep awareness of STI & the beneficial impacts of STI on the bottom of the pyramid.
4. 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.
5. Active R&D collaboration, technology commercialisation and entrepreneurship and network of centres of excellence.
6. 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.

D. STRATEGIC THRUSTS

1. Public-Private Collaboration

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.

2. Talent Mobility, People-to-People Connectivity, and Inclusiveness

Thrust 2:

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

3. Enterprises Support

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.

4. Public Awareness and STI Enculturation

Thrust 4:

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

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25			
	Conduct consultative workshop on talent mobility mechanism.		SCIRD	x	x											
	Conduct consultative workshop on self-regulatory principles for R&D.		COST SCs	x	x											
1.1.3 Recommended guidelines on: <ul style="list-style-type: none"> Foresighted technologies. Assessing impact of potential STI initiatives. 	Conduct technology foresight analysis studies.	Number of Recommended guidelines developed.	COST SCs		x	x	x	x							Recommended guidelines on foresighted technologies and assessing impact of potential STI initiatives developed.	
	Conduct benchmarking studies on assessing impact of potential STI initiatives.		SCIRD		x	x	x	x								
1.1.4 Assessment report on impact of potential joint STI initiatives.	Conduct impact assessment of potential joint STI initiatives.	Number of Assessment report produced.	COST SCs		x	x									Assessment report produced.	
1.1.5 Agreed relevant collaboration instruments.	Conduct exploratory meetings with potential collaborators.	Number of collaboration projects identified.	COST SCs	x	x	x	x	x	x	x	x	x	x		Relevant collaboration instruments agreed.	New partnerships established.

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25				
1.1.6 Identified collaboration projects.																Collaboration projects identified.	
1.1.7 Human resource developed in specialised skills.	Conduct joint undertakings in human resource development (HRD) in specialised skills.	Number of training conducted. Number of participants involved in training.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	x	Joint undertakings in HRD in specialised skills conducted.	Strengthened public-private engagement in implementation joint undertakings in HRD and R&D.
1.1.8 Resultant product or services of R&D.	Conduct joint undertakings in R&D.	Number of product developed. Number of services developed.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	Joint undertakings in R&D conducted.		
1.1.9 Status report on: <ul style="list-style-type: none"> STI Development and Technology Readiness in ASEAN. Governmental, academe and private sectors involvement in STI. 	Conduct consultation and other related activities under the triple/ quadruple helix platform.	Number of report produced.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	Status reports produced.	Strengthened public-private engagement in assessment of joint undertakings in HRD and R&D.	
	Conduct relevant activities to determine the status of STI development in ASEAN.		COST SCs		x	x	x					x	x	x			

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																
Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25			
1.2.1 Enhanced and improved ASTNET.	Conduct activities to enhance and improved the salient features of ASTNET.	Number of features improved/ developed.	SCIRD	x	x	x	x	x	x	x	x	x	x	x	ASTNET enhanced and improved.	Enhanced and improved ASTNET.
1.2.2 Relevant databases on STI on ASTNET.	Identify and coordinate with relevant focal points/ institutions in AMS on sharing relevant information to be included in the database on STI of ASTNET.	Number of Databases identified.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	Relevant databases on STI shared on ASTNET.	Sustained utilisation of ASTNET.
		Number of focal points & institutions contribution information.														
		Number of updates performed.														
1.2.3 Sub-Committees content on ASTNET.	Develop content on Sub-Committees to be uploaded to ASTNET.	Number of users accessing ASTNET.	COST SCs	x	x	x	x	x	x	x	x	x	x	Sub-Committees content shared on ASTNET.		
1.2.4 Additional content on existing web-portals of S&T networks.	Develop content for existing web-portals of S&T networks.	Number of users accessing other S&T networks.	COST SCs	x	x	x	x	x	x	x	x	x	x	Content shared on existing web-portals of S&T networks.	Strengthened S&T networks.	

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

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25		
1.3.1 Recommended guidelines on joint collaboration including: <ul style="list-style-type: none"> • funding scheme and/or sponsorship. • policy framework on IPR among the private sectors, centres of excellence, government and other relevant partners in technology development and commercialisation. 	Consultation with relevant stakeholders and cooperation with ASEAN Working Group on Intellectual Property Cooperation (AWGIPC) to develop guidelines on joint collaboration.	Number of recommended guidelines developed.	SCIRD	x	x	x	x	x	x	x	x	x	x	Recommended guidelines developed.	Improved engagements of centres of excellence and other relevant partners in technology development and commercialisation.
1.3.2 STI data sharing protocol.	Establishing STI data sharing protocol among ASEAN Member States.	Number of STI data sharing protocol established.	COST SCs	x	x	x	x	x	x	x	x	x	x	STI data sharing protocol developed.	Increased quantity and improved quality of STI data, outcome and benefit exchange among ASEAN Member States.

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25			
1.3.3 Policy framework to foster STI outcome and benefit sharing among ASEAN Member States.	Consultation with relevant stakeholders including dialogue and other partners in the development of policy framework to foster STI outcome and benefit sharing among ASEAN Member States.	Number of policies for policy framework identified/ developed.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	Policy framework on STI outcome and benefit sharing developed.	
1.3.4 Guidelines on utilisation of ASTIF to provide incentives to foster joint R&D collaboration and adaptation of transfer technology.	Consultation with BAC and all Sub-Committees on the formulation of the suitable guidelines on the utilisation of ASTIF.	Number of Guidelines on the utilisation ASTIF produced.	BAC SCIRD	x	x			x	x				x	x	Guidelines on utilisation of ASTIF developed.	Increased joint R&D collaboration and adaptation of transfer technology.

Action 1.4. Strengthen existing regional STI initiatives in priority areas including Sustainable Development Goals.																
Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25			
1.4.1 COST Priority Areas.	Conduct study to identify COST priority areas supportive of the ASEAN STI initiatives addressing the ASEAN Grand Challenges including the Sustainable Development Goals (SDGs).	Number of priority areas identified.	BAC, COST SCs	x	x			x	x				x	x	COST Priority Areas identified.	Strengthened existing regional STI initiatives in priority areas.
1.4.2 Sub-Committees programmes supportive of COST Priority Areas.	Formulate relevant programmes/projects/activities to support the COST Priority Areas identified.	Number of programmes/projects/activities established.	COST SCs	x	x	x	x	x	x	x	x	x	x	Sub-Committees programmes established to support COST Priority Areas.		

E.2. Talent Mobility, People-to-People Connectivity, and Inclusiveness

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 scientist, researchers and students including women and youth.																
Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25			
2.1.1 Recommended guidelines for exchange of scientists, researchers and students.	Conduct relevant activities towards formulation of guidelines.	Number of Recommended guidelines developed.	COST SCs	x	x	x	x	x							Recommended guidelines developed.	Increased participation of the public and private sector in exchange programmes.

Action 2.2. Establish scholarship, fellowship and/or attachment programs for students, researchers and other STI personnel.															
Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25		
2.2.1 Funding mechanisms, including the use of ASTIF and the AUN to support scholarships/ fellowship/ attachment programme.	Conduct relevant activities towards the development of mechanisms to support scholarship/ fellowship/ attachment programme.	Number of ASEAN Dialogue and other partners established exchange programme. Number of exchange programmes established.	COST SCs	x	x	x	x	x	x	x	x	x	x	Scholarship/ fellowships/ attachment programmes with ASEAN Dialogue Partners and other partners established and implemented.	Increased in the number of grants for scholarships, fellowships, internship and/or attachment programmes.

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25				
2.2.3 Talent mobility platform established.	Develop talent database website and ATM portals.	Website/ ATM portals developed. Number of users accessing the website/ATM portals.	SCIRD	x	x	x										Talent database website and ATM portals developed.	
	Gather current policies, rules and guidelines supporting and enhancing talent mobility.	Number of policies, rules, and guidelines gathered as framework.	COST SCs			x	x	x	x	x	x	x	x		Set of policies, rules and guidelines supportive of talent mobility gathered.		
	Initiate pilot ATM programmes on priority areas.	Number of talent mobilised through programmes. Number of programmes initiated.	SCIRD			x	x	x	x	x	x	x	x		Pilot ATM programmes initiated.		

Action 2.4 Expand opportunities for women, youth and the disadvantaged group to contribute in STI through incentives and support mechanisms.																
Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25			
2.4.1 Inclusive funding mechanisms, including the use of ASTIF and the AUN to support scholarships/ fellowship/ attachment programme for women, youth and the disadvantaged group.	Conduct relevant activities towards the development of inclusive funding mechanisms to support scholarships/ fellowship/ attachment programme for women, youth and the disadvantaged group.	Number of Mechanisms established.	SCIRD	x	x	x	x	x	x	x	x	x	x	x	Inclusive funding mechanisms developed.	Increased number and level of participation of women, youth and the disadvantaged group in STI activities.
2.4.2 Inclusive incentive programmes.	Conduct relevant activities towards the development and implementation of inclusive incentive programmes such as granting of awards and recognition for women, youth and the disadvantaged group.	Number of incentives programmes and awards established. Number of participants (women, youth and disadvantaged group).	COST SCs	x	x	x	x	x	x	x	x	x	x	x	Inclusive incentive programmes developed.	

E.3. Enterprises Support

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 program to support and nurture STI enterprises from start-up to the next competitive level of development.

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25		
3.1.1 Compliance report of national measurement standards in ASEAN according to international practice.	Conduct consultations among national metrology institutes in setting national measurement traceability that complies to international practices.	Number of Report on needs of national metrology institutes in setting national measurement traceability produced.	SCIRD, EGM	x	x	x	x	x	x	x	x	x	x	Compliance report of national measurement standards in ASEAN according to international practice developed.	Increased confidence of accuracy of measurements and credibility of STI enterprises.
	Conduct survey to determine the measurement capability of national metrology institutes in ASEAN.	Number of Survey report on measurement capability of national metrology institutes in ASEAN produced.	SCIRD, EGM		x	x					x	x			

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25			
	Mapping of capability and needs of national metrology institutes in setting national measurement traceability.	Number of Mapping report of capability and needs of national metrology institutes in setting national measurement traceability produced.	SCIRD, EGM				x	x					x	x		
3.1.2 Joint funding and cross-border technology transfer mechanisms.	Cooperate and discuss with the dialogue and other relevant partners on joint funding and cross-border technology transfer mechanisms.	Number of joint funding and cross-border technology transfer mechanisms established.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	Joint funding and cross-border technology transfer mechanisms established.	Increased cross-border technology transfer.
	Disseminate information through the ASETNET and other technology data sharing centers.	Number of publicity avenues established.	SCIRD	x	x	x	x	x	x	x	x	x	x			

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25			
3.1.3 Policy framework to promote technopreneurship and access to market.	Conduct consultation and relevant activities towards the development of policy framework to promote technopreneurship.	Number of policies for policy framework identified/ developed. Number of Policy framework developed.	SCIRD		x	x	x	x	x	x	x	x	x	x	Policy framework to promote technopreneurship and access to market developed.	Increased number of technopreneurs.
	Cooperate with the Small and Medium Enterprises Working Group (SMEWG) on access to market.		SCIRD	x	x	x	x	x	x	x	x	x	x			
	Conduct exhibition and other relevant trade and/or technology fairs to showcase products and services of ASEAN Member States.	Number of exhibition and other relevant trade and/or technology fairs conducted.	COST SCs		x			x				x				

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

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25				
3.2.1 Relevant instruments (such as MOU, MOA, MOC and LOI) on joint STI collaboration with Dialogue and other partners.	Continue to cooperate with dialogue and other relevant partners in developing the relevant instruments.	Number of relevant instruments developed.	COST SCs		x	x	x	x								Relevant instruments (such as MOU, MOA, MOC and LOI) on joint STI collaboration with Dialogue and other partners formally established.	Increased joint undertakings with dialogue and strategic partners on STI initiatives.
3.2.2 Joint funding mechanism to facilitate joint undertakings in STI.	Draft the rules of procedures (ROP) to develop and implement joint funding mechanism.	Number of ROP and joint funding mechanism developed.	COST SCs		x	x	x	x								Joint funding mechanism to facilitate joint undertakings in STI established.	
	Evaluate/ assess existing joint funding mechanism that can be adapted for possible application to facilitate joint STI undertaking in ASEAN.	Number of Evaluation/ assessment report produced.	COST SCs					x									

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25			
3.2.3 List of areas of mutual interest and possible commercially viable STI initiatives.	Conduct mapping exercise with dialogue and other partners to identify areas of mutual interest and possible commercially viable STI initiatives.	<p>Number of Mapping exercise report produced.</p> <p>Number of mutual interest identified.</p> <p>Number of possible commercially viable STI initiatives identified.</p>	COST SCs		x	x	x	x	x	x	x	x	x	x	List of areas of mutual interest and possible commercially viable STI initiatives compiled.	

E.4. Public Awareness and STI Enculturation

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).															
Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25		
4.1.1 Information materials to raise awareness of ASEAN S&T events.	Coordinate with National COST including COST Subsidiary bodies	Number of ASEAN S&T events where information materials were shared and developed.	COST SCs	x	x	x	x	x	x	x	x	x	x	Information materials to raise awareness of ASEAN S&T events developed.	Increased participation of scientists, researchers and industries in ASEAN S&T events.
4.1.2 Linkages to websites and social media accounts of the relevant S&T Ministries in ASEAN.	Focal Points to access and share information on ASEAN S&T events and S&T Ministries in ASEAN.	Number of linkages to websites and social media accounts.	COST SCs	x	x	x	x	x	x	x	x	x	Linkages to websites and social media accounts of the relevant S&T Ministries in ASEAN established.		

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25				
4.2.2 The AJSTD listed in the Scopus bibliographic database or International Scientific Indexing (ISI) journal and/or other related peer-reviewed of scientific journals.	Identify potential International Scientific Journal Indexing system.	Number of potential International Scientific Journal Indexing system identified.	SCIRD		x											The AJSTD listed in the Scopus bibliographic database or International Scientific Indexing (ISI) journal and/or other related peer-reviewed of scientific journals.	Increase prestige and accessibility to Call For Papers of AJSTD.
	Call for papers using various media such as SCIRD focal points, ASTNET, website of relevant ministries of ASEAN Member States.	Number of papers submission received.	SCIRD		x	x	x	x	x	x	x	x	x	x			

Action 4.3. Leverage on the ASTNET in publicising ASEAN initiatives in STI.																
Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome	
				16	17	18	19	20	21	22	23	24	25			
4.3.1 STI events, initiatives and information materials (posters/proceedings/ compilation of research papers from various COST events) published in ASTNET.	Coordinate with National COST including COST Subsidiary bodies Focal Points to access and share information on ASEAN S&T events and upload to ASTNET.	Number of ASEAN S&T events where information materials were shared and developed.	COST SCs	x	x	x	x	x	x	x	x	x	x	x	STI events, initiatives and information materials published in ASTNET.	Increased public awareness of STI events, initiatives, S&T Ministries and/ or other related bodies in ASEAN.
4.3.2 Established linkage of ASTNET to websites and social media accounts of the relevant S&T Ministries and/or other related bodies in ASEAN.	Continue the development and enhancement of ASTNET.	Number of linkages to websites and social media accounts.	SCIRD	x	x	x	x	x	x	x	x	x	x	Linkage of ASTNET to websites and social media accounts of the relevant S&T Ministries and/or other related bodies in ASEAN established.		

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25		
	Focal points of COST and its Subsidiary bodies to provide the links to relevant sources of information including website and social media accounts, and for the information to be uploaded to ASTNET.		COST SCs	x	x	x	x	x	x	x	x	x	x		

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

Expected Output	Activities	Indicators	Responsible Bodies	Timeline										Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25		
4.4.1 Develop a resource database and network to facilitate information sharing and technical cooperation among agencies in the public and private sector.	National COST Chairs to identify and nominate the responsible organisation to provide necessary information to the ASEAN STI resource database.	Number of organisation to provide information to ASEAN STI resource database nominated.	COST SCs		x	x	x	x	x	x	x	x	x	STI resource database in ASEAN established in ASTNET.	Increased information flow and cooperation among agencies in the public and private sector.

Expected Output	Activities	Indicators	Responsible Bodies	Timeline											Milestones	Outcome
				16	17	18	19	20	21	22	23	24	25			
	The identified responsible organisation to update necessary information to be included in the ASEAN STI resource database on regular basis.	Number of updates performed.	COST SCs		x	x	x	x	x	x	x	x	x	x		
4.4.2 Incentive and other appropriate mechanisms to facilitate sharing of information in the STI database.	Conduct activities among the responsible organisations including SCIRD and other relevant stakeholders to discuss and formulate the appropriate mechanism including the development of the roadmap to facilitate sharing of information in the ASEAN STI resource database.	Number of incentive and mechanisms to facilitate sharing of information in the STI database established.	COST SCs		x	x	x	x	x	x	x	x	x	x	Incentive and other appropriate mechanisms to facilitate sharing of information in the STI database established.	

F. KEY PERFORMANCE INDICATORS

F.1. Output Indicators

1. Public-Private Collaboration	
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	<p>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.</p> <ul style="list-style-type: none"> • Number of joint collaboration projects identified and implemented : <ol style="list-style-type: none"> a. Number of scientific papers and articles published; b. Number of initiatives implemented with the academe, private sector and relevant partners; c. Amount of resources mobilised from various partners; and d. Number of prototypes, products and services developed. • Number of HRD and R&D programmes established and implemented : <ol style="list-style-type: none"> a. Number of personnel trained; and b. Number of training workshops and conference conducted.
	<p>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.</p> <ul style="list-style-type: none"> • Number of users accessing ASTNET and other S&T networks. • Number of focal points & institutions contributing information to ASTNET. • Amount of quality information provided : <ol style="list-style-type: none"> a. Information on available technologies and expertise (e.g. researchers in specific fields, academician, eminent persons, etc.) in ASEAN; and b. Available STI Infrastructure (e.g. centres of excellence, science parks, funding institutions, etc.) in ASEAN.
	<p>Action 1.3 Establish policy frameworks including IPR protection, risk and benefit sharing mechanisms for joint collaboration and technology transfer among centres of excellence.</p> <ul style="list-style-type: none"> • Number of MOU/MOA established for ASEAN joint collaboration. • Number of policy recommendations, guidelines and standards on IPR and technology transfer among centre of excellence and other relevant partners.
	<p>Action 1.4 Strengthen existing regional STI initiatives in priority areas including Sustainable Development Goals.</p> <ul style="list-style-type: none"> • Number of programmes / projects / activities on the priority areas identified and implemented.

2. Talent Mobility, People-to-People Connectivity, and Inclusiveness

**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 scientist, researchers and students including women and youth.

- Number of MOUs or other relevant instruments established among ASEAN and other partners on exchange programmes.

Action 2.2 Establish scholarship, fellowship and/or attachment programs for students, researchers and other STI personnel.

- Number of ASEAN mechanisms (e.g. B2B, G2G, G2B, etc.) to support the implementation of scholarships/fellowships/attachment programme.
- Number of Scholarship, fellowship, attachment programmes among ASEAN and with other partners established and implemented.
- Number of STI personnel mobilised in ASEAN and non-ASEAN countries.
- Number of users accessing the ASTNET and its talent mobility database (applicable to Action 1.2).

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

- Number of certification and Mutual Recognition Arrangement (MRA) facilitated/ coordinated with other relevant ASEAN bodies (e.g. ACCSQ).
- Number of collaborations (e.g. trainings, advocacy, consultations, etc.) among other relevant ASEAN bodies institutions on standards and certification.

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

- Number of funding and other support mechanisms established and implemented.
- Number of incentives, programmes and awards established and implemented.
- Number of women, youth and disadvantaged group participating in the programmes.

3. Enterprises Support

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 program to support and nurture STI enterprises from start-up to the next competitive level of development. <ul style="list-style-type: none"> • Number of initiatives implemented to support STI enterprises including MSMEs under the joint funding arrangements. • Number of mechanism and related instrument to facilitate technology transfer and link various STI enterprises in ASEAN value chain. • Number of publicity (e.g. through social media, incubator companies, links to investors, trade and technology fairs) conducted.
	Action 3.2 Engage dialogue and other strategic partners in joint undertakings on appropriate and commercially viable STI initiatives. <ul style="list-style-type: none"> • Number of instruments (ROP, joint funding mechanism, etc.) developed and implemented. • Amount of resource mobilised. • Number of joint initiatives implemented.

4. Public Awareness and STI Enculturation

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). <ul style="list-style-type: none"> • Number of ASEAN STI events where information materials were shared and developed. • Number of ASEAN and non-ASEAN participants especially the private sectors in the events. • Number of new initiatives to be implemented arising from the events that will promote public awareness. • Number of new events conducted and recognition and awards granted to showcase and promote ASEAN STI to various stakeholders especially the youth, women and disadvantaged group.
	Action 4.2 Enhance the contents of the articles published in the ASEAN Journal of S&T for Development and other journals. <ul style="list-style-type: none"> • Number of manuscripts accepted by AJSTD. • Number of countries submitting articles to AJSTD. • Number of citation by international scientific indexing system and other peer-reviewed journals. • Ratio of the accepted per submitted papers to AJSTD.

	<p>Action 4.3 Leverage on the ASTNET in publicising ASEAN initiatives in STI.</p> <ul style="list-style-type: none"> • Number of ASEAN STI events where information materials were shared on the ASTNET. • Amount of quality information provided : <ul style="list-style-type: none"> a. Information on available technologies and expertise (e.g. researchers in specific fields, academicians, eminent persons, etc.) in ASEAN; and b. Available STI Infrastructure (e.g. centres of excellence, science parks, funding institutions, etc.) in ASEAN.
	<p>Action 4.4 Develop a resource database and network to facilitate information sharing and technical cooperation among agencies in the public and private sector.</p> <ul style="list-style-type: none"> • Number of ASEAN STI resource databases uploaded and/or updated in ASTNET. • Number of networks established to facilitate information sharing and technical cooperation.
	<p>Action 4.5 Engage relevant stakeholders in developing and implementing an effective communication and STI enculturation plan.</p> <ul style="list-style-type: none"> • Number of stakeholders participating in the development of STI communication/enculturation plan. • Number of awareness programmes conducted. • Number of joint undertakings with relevant stakeholders to raise awareness on STI.

F.2. Outcome Indicators

F.2.1. R&D Expenditure

- Gross Expenditure on R&D (GERD) ¹
- Percentage of GERD financed by industry ¹
- Percentage of GERD financed by government ¹

F.2.2. Human Resource Involved in R&D

- Number of R&D Personnel (Head count per million inhabitants) ¹
- Number of Researchers (Head count per million inhabitants) ¹

F.2.3. S&T Output

- Number of Patent Applications in one year ¹
- Number of Patents Granted in one year ²
- Number of Scientific and Technical Publications ³
- Citable Documents H Index ³

F.2.4. Talent Mobility

- Exchange programs, scholarships, internships established
- Number of foreign researchers (Inward mobility) ⁴
- Number of local researchers leaving (Outward mobility) ⁴

F.2.5. Knowledge Impact

- High-tech and medium-tech output (% of total manufactures output) ³
- Number of commercial spin-offs ²

F.2.6. Knowledge Diffusion

- Total royalties and licence fees receipts (% service exports) ³
- High-tech exports (in USD) ³
- Communications, computer and information services exports (in USD) ³

F.2.7. STI Culture

- Number of STI fairs ⁵
- Rate of technology diffusion ⁵
- Percentage of individual interested in S&T careers in population ⁵
- Percentage of scientists, engineers and researchers in population ⁵

REFERENCES

- ¹ OECD. (2016), *Main Science and Technology Indicators*, Vol. 2015/2, OECD Publishing, Paris.
- ² Seppo, Marge, and Alo Lilles, *Indicators measuring university-industry cooperation*, Discussions on Estonian Economic Policy 20.1 (2012): 204.
- ³ Cornell University, INSEAD, and WIPO (2015): *The Global Innovation Index 2015: Effective Innovation Policies for Development*, Fontainebleau, Ithaca, and Geneva.
- ⁴ European Commission, Deliverable 7 - Researcher Indicators Report, Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. http://ec.europa.eu/euraxess/pdf/research_policies/more2/Indicators%20report.pdf
- ⁵ Benoit Godin and Yves Gingras, What is scientific and technological culture and how is it measured? A multidimensional model, *Public Understanding of Science*, January 2000 vol.9 no.1, Page 45-58.

G. IMPLEMENTATION ARRANGEMENT

G.1. Implementation Mechanism

The ASEAN Ministerial Meeting on Science and Technology (AMMST) shall provide overall guidance and advice on the implementation of APASTI 2016-2025. The AMMST shall also provide further direction and guidance on future programmes/activities to address key issues, challenges and common interest identified in APASTI 2016-25 and ASEAN Community 2025 Blueprint.

The Committee on Science and Technology (COST) shall Initiate, direct and oversee the development, monitoring and implementation of programmes and activities of COST and its subsidiary bodies.

The Board of Advisers to COST (BAC) shall establish appropriate performance review mechanisms and assess the progress of implementation of the various initiatives of ASEAN COST Sub-Committees according to their respective work plans and facilitate the development, monitoring, review and assessment of the APASTI 2016-2025.

COST Sub-Committees shall undertake assessments of specific programmes and activities under their respective work plans in support the Sub-Committees thematic priorities of the APASTI 2016-2025.

The ASEAN Secretariat shall assist COST, BAC and Sub-Committees in facilitating the implementation of the APASTI Implementation Plan.

G.2. Resource Mobilisation

To implement STI programmes/activities under the priority areas of APASTI 2016-2025, COST shall consider the following:

- a. Direct contributions from all or some ASEAN Member States (cost-sharing arrangements);
- b. ASEAN pooled sources (i.e. ASTIF and ADF); and
- c. External funding (i.e. the ASEAN Dialogue Partners, relevant regional and international organisations and the private sector, among others).

G.3. Monitoring and Evaluation

BAC assisted by the ASEAN Secretariat, shall carry out regular monitoring and evaluation of the progress of the APASTI 2016-2025 for submission to COST/AMMST meetings. A guidelines/mechanism framework for regular monitoring and evaluation of the APASTI Implementation Plan shall be developed by BAC.

ANNEXES

- ANNEX 1 : Work Plan of Sub-Committee on Biotechnology (SCB)
- ANNEX 2 : Work Plan of Sub-Committee on Food Science and Technology (SCFST)
- ANNEX 3 : Work Plan of Sub-Committee on S&T Infrastructure and Resources Development (SCIRD)
- ANNEX 4 : Work Plan of Meteorology and Geophysics (SCMG)
- ANNEX 5 : Work Plan of Sub-Committee on Microelectronics and Information Technology (SCMIT)
- ANNEX 6 : Work Plan of Sub-Committee on Marine Science and Technology (SCMSAT)
- ANNEX 7 : Work Plan of Sub-Committee on Material Science and Technology (SCMST)
- ANNEX 8 : Work Plan of Sustainable Energy Research (SCSER)
- ANNEX 9 : Work Plan of Sub-Committee on Space Technology and Application (SCOSA)

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
		can work together to expand clinical network to accelerate production of diagnostics technologies, particularly in the area of infectious diseases with high burden in ASEAN countries (e.g. tuberculosis (TB) and malaria).													
7.	Developed national strategy for biotech research and development.	Mobilise resources to support biotechnology research and development.	<ul style="list-style-type: none"> National biotech R&D strategy. 	Selected SCB member states (Cambodia)			x	x	x	x					
8.	Research and biotechnology demonstration facilities.	Establish national center of excellence for biotechnology research and demonstrations.	<ul style="list-style-type: none"> National center of excellence for biotechnology. 	Selected SCB members states (Cambodia and Lao PDR)				x	x	x	x	x	x	x	x
9.	Capacity building through sharing of experience in the implementation of biosafety regulations in ASEAN countries, leading to the harmonisation of biosafety research protocols on genetically modified organisms.	International Conference on Harmonisation of Biosafety Guidelines and Biosafety Research Protocols in the ASEAN region (2017 in the Philippines).	<ul style="list-style-type: none"> Increased awareness on Biosafety regulations in the ASEAN region. 	Philippines, SCB members, Biosafety organisations			x	x	x	x					

Action 1.3. Establish policy frameworks including IPR protection, risk and benefit sharing mechanisms for joint collaboration and technology transfer among centres of excellence.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
12.	Developed policy for biotech application and information management in agriculture.	Conduct need assessment and policy formulation.	<ul style="list-style-type: none"> Survey report on need assessment. 	Selected SCB member states (Cambodia, Indonesia and Malaysia)		x	x							
			<ul style="list-style-type: none"> Policy paper on biotech application. Establishing a committee for conducting evaluation of Biotech policy in ASEAN member countries. 					x	x	x	x			
13.	Developed guidelines that support biotech policy implementation in agriculture.	Establish inter-ministerial biotech technical working group to develop guideline for biotech application and information management.	<ul style="list-style-type: none"> Establishing collaboration between/ among scientists from ASEAN member countries. Increased awareness in term ISO and Codex alimentari, Cartagena protocols on Biosafety. Guidelines for biotech application and information management. 	Selected SCB member states (Cambodia)				x	x	x	x	x	x	x

Thrust 4:

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

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
16.	ASEAN Network on Microbial Utilisation (AnMicro).	Organise network meeting regularly for members to discuss work plan and initiate activities.	<ul style="list-style-type: none"> Number of network members. 	BIOTEC, Thailand who serves as Secretariat of AnMicro	x	x	x	x	x						
		Organise capacity building activities such as regional courses, workshops.	<ul style="list-style-type: none"> Number of activities. Number of researchers/students participating in each activity. 		x	x	x	x	x						
17.	ASEAN-NDI Capacity building on Health and Environment.	Organise capacity building activities such as regional courses, workshops.	<ul style="list-style-type: none"> Number of researchers/students participating in each activity. 	ASEAN-NDI		x	x								

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
	Outcome: <ul style="list-style-type: none"> Increased collaborations of AMS human talents in food science and technology through training and R&D on the following priority areas: Functional Food, Food Safety and Quality, Post-Harvest Technology and Application of Emerging Technologies. Increased number of trained personnel in various relevant aspects of the priority areas. 	Conduct R&D on: <ul style="list-style-type: none"> intelligent packaging. Functional food. 	<ul style="list-style-type: none"> Number of IPs. Publications. Technology transfer. 		x	x	x	x	x	x	x	x	x	x	x

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
	<ul style="list-style-type: none"> Science and Technology towards creating an effective ecosystem for capability development, technology transfer and commercialisation. 														

NOTES:

In summary, the above outputs, specific activities/projects, indicators are consistent with the following strategic thrusts and actions of the APASTI 16-25:

- a. Strategic 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.
- b. Strategic Thrust 2:** Enhance mobility of scientists and researchers, people-to-people connectivity and strengthen engagement of women and youth in STI.
Action 2.3: Intensify efforts towards standardisation of certification and accreditation in education and technical competency.
- c. Strategic 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 program to support and nurture STI enterprises from start-up to the next competitive level of development.
- d. Strategic 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).

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
	<p>Outcomes :</p> <p>i. Providing an effective, low cost, simple technology for identified AMS to reduce postharvest losses of fresh fruits and vegetable by using surface coatings; and</p> <p>ii. Enhancing the use of ASEAN natural resource as materials instead of synthetic and imported ones to produce the coatings.</p>														
5.	Trained Researchers in Nanotechnology Application.	Workshop and Training on Nanotechnology Application for ASEAN Member States.	<ul style="list-style-type: none"> 20 trained scientists. 	Indonesia Focal Point, LIPI, SCFST Focal Points, ASEAN Member States, dialogue partners, industry					x						

Thrust 3:

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

Action 3.1. Establish support mechanism such as mentorship and incentive program to support and nurture STI enterprises from start-up to the next competitive level of development.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
7.	20 trained participants on design and fabrication of appropriate equipment for ASEAN countries.	Project on strengthening the regional capabilities on process engineering: design and fabrication of appropriate equipment for ASEAN countries.	<ul style="list-style-type: none"> A new research network formed. 20 trained scientists. 	Collaboration among DOST-ITDI, Thailand and Singapore Participants: AMS			x	x						
8.	20 participants from AMS – info sharing on innovative technology adoption towards improved productivity and competitiveness.	Sharing of Best Practices on Establishment and Operation of FIC for Development of AMS.	<ul style="list-style-type: none"> Number of MSMEs trained. 	DOST-ITDI		x								

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline											
					16	17	18	19	20	21	22	23	24	25		
10.	(i) Knowledge sharing on 7 core technologies of functional food development and high value added food products; (ii) Best practice or guidelines of functional food development based on antioxidant and high value added food products; and (iii) Network among ASEAN researchers	Activities include: (i) Workshop/training workshop on functional food development based on antioxidant; (ii) High value added food products; and (iii) Advance food packaging.	<ul style="list-style-type: none"> 20 participants from AMS attend each workshop. ASEAN collaboration training workshop. 	Thailand/AMS		x	x			x						
11.	(i) Manuals on methodologies for screening, identifying and analysis of cancer chemoprevention properties in selected fruit/vegetable/food materials; and	Workshop and Training on "Development of Functional Foods as Cancer Chemoprevention" for ASEAN Member States	<ul style="list-style-type: none"> At least 4 methodologies for screening and identifying chemoprevention, properties implemented in each AMS. 	Indonesia focal point, LIPI, SCFST focal points, ASEAN Member States, dialogue partners, industry		x	x			x						

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
	(ii) Develop network and collaboration among AMS and Asia Plus Three in the identified areas.		<ul style="list-style-type: none"> At least 1 R&D collaboration initiated among institutions in AMS and/or Plus Three in the field of functional foods on chemoprevention. At least 1 selected natural resource (vegetables, fruits, spices, edible plants) is being developed as functional food for cancer chemoprevention. 																	

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
		Collaboration projects for proficiency testing and accreditation.	<ul style="list-style-type: none"> Collaboration projects conducted. 		x	x	x	x	x	x	x	x	x	x	x
		Propose – Designated ASEAN Measurement Standards Lab – to support accreditation, testing and calibration to strengthen the Quality Infrastructure in the region.	<ul style="list-style-type: none"> ASEAN Measurement Standards Lab established. 			x	x	x							

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.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
7.	Enhanced and improved ASTNET.	Conduct activities to enhance and improved the salient features of ASTNET.	<ul style="list-style-type: none"> Number of features improved/developed. 	SCIRD COST SCs	x	x	x	x	x	x	x	x	x	x	x
8.	Relevant databases on STI.	Identify and coordinate with relevant focal points/ institutions in AMS on sharing relevant information to be included in the database on STI.	<ul style="list-style-type: none"> Databases identified. Number of focal points & institutions contributing info. Number of updates performed. Number of users accessing ASTNET. 	SCIRD COST SCs	x	x	x	x	x	x	x	x	x	x	x

Action 1.4. Strengthen existing regional STI initiatives in priority areas including Sustainable Development Goals.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
11.	Guidelines on the utilisation of ASTIF to provide incentives to foster joint R&D collaboration and adaptation of transfer technology.	Consultation with BAC and all Sub-Committees on the formulation of the suitable guidelines on the utilisation of ASTIF.	<ul style="list-style-type: none"> Guidelines on the utilisation of ASTIF produced. 	BAC SCIRD All SCs	x	x	x	x	x	x	x	x	x	x

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 scientist, researchers and students including women and youth.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
12.	Guidebook/ Guidelines/Set of Recommendations for exchange of scientists, researchers and students.	Conduct relevant activities towards formulation of the guidelines/guidebook.	<ul style="list-style-type: none"> Guidebook/ Guidelines/Set of Recommendations developed. 	SCIRD/ COST SCs, Dialogue and other relevant Partners	x	x	x	x	x					

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
		Conduct exhibition and other relevant trade and/or technology fairs to showcase products and services of ASEAN Member States.	<ul style="list-style-type: none"> Number of exhibition and other relevant trade and/or technology fairs conducted. 			x				x			x		
23.	Guidelines and policies on business incubation and mentorship/coaching programme to support MSMEs formulated.	Conduct consultation and relevant activities towards the development of guidelines and policies on business incubation and mentorship/coaching programme to support MSMEs.	<ul style="list-style-type: none"> Guidelines and policies developed. 	SCIRD SMEWG	x	x	x	x	x	x	x	x	x	x	x
		Conduct activities to raise awareness and build capacity of MSMEs such as technopreneur competition.	<ul style="list-style-type: none"> Number of awareness and capacity building activities conducted. 		x	x	x	x	x	x	x	x	x		

Action 4.3. Leverage on the ASTNET in publicising ASEAN initiatives in STI.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
30.	STI Events, Initiatives and information materials (Posters/ Proceedings/ Compilation of Research Papers in various COST events) published in ASTNET.	Coordinate with National COST including COST Subsidiary bodies Focal Points to access and share information on ASEAN S&T events and upload to ASTNET.	<ul style="list-style-type: none"> Number of ASEAN S&T events where information materials were shared and developed. 	SCIRD/ COST SCs, Dialogue and other relevant Partners	x	x	x	x	x	x	x	x	x	x
31.	Established linkage of ASTNET to websites and social media accounts of the relevant S&T Ministries and/or other related bodies in ASEAN.	Continue the development and enhancement of ASTNET.	<ul style="list-style-type: none"> Number of linkages to websites and social media accounts. 	SCIRD/ COST SCs, Dialogue and other relevant Partners	x	x	x	x	x	x	x	x	x	x
		Focal points of COST and its Subsidiary bodies to provide the links to relevant sources of information including website and social media accounts, and for the information to be uploaded in ASTNET.			x	x	x	x	x	x	x	x	x	

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
34.	STI communication/enculturation plan developed.	Engage all Sub-Committees, experts from ASEAN and Dialogue Partner countries in the discussion about the contents of the plan.	<ul style="list-style-type: none"> STI communication/enculturation plan developed. 	SCIRD/ COST SCs, Dialogue and other relevant Partners		x	x					x	x		

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
	<ul style="list-style-type: none"> Monthly integrated IODM, ENSO and Monsoon long-lead forecast. Scientific and popular-science publications. <p>[Lead: Indonesia]</p>		<ul style="list-style-type: none"> Number of citation index of the results publication. 																	
2.	<ul style="list-style-type: none"> Training materials products. Trained personnel. <p>[Lead: Malaysia]</p>	ASEAN-ROK Co-training Workshop for Weather/ Climate Data Processing and Restoration: An Initiative to Implement ASEAN GCOS Action Plan.	<ul style="list-style-type: none"> Number of staff trained. 	NMHs and KMA		x	x													
3.	<ul style="list-style-type: none"> Regional Climate Change projection and Climate Change potential impact to different sectors. <p>[Lead: Philippines]</p>	Conduct of training/ workshop on downscaling of Global Climate Change Projection and Impact Assessment.	<ul style="list-style-type: none"> Number of staff trained. 	NMHs and Dialogue Partners			x													
4.	<ul style="list-style-type: none"> Flash Flood Warning System. <p>[Lead: Philippines]</p>	Conduct of training/ workshop on the development of flash flood warning system.	<ul style="list-style-type: none"> Number of staff trained. 	NMHs and Dialogue Partners			x													

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
9.	Guide on cloud seeding techniques. (Lead: Malaysia/ Thailand/ Philippines)	Conduct workshop on Cloud seeding and artificial rain making techniques. [Workshop]	<ul style="list-style-type: none"> Number of Personnel trained. 	NMHSs and Dialogue Partners			x								
		Conduct training/ attachment on cloud seeding techniques such as the ground-based cloud seeding. [Training]													
10.	ASEAN framework on weather radar quality control (QC) and radar data exchange. (Lead: Thailand)	Conduct workshop to formulate ASEAN framework on weather radar quality control (QC) and radar data exchange. [Workshop]	<ul style="list-style-type: none"> ASEAN Framework on Weather Radar Quality Control (QC) and Radar Data Exchange developed. 	WMO/JMA/ KMA/CMA and NMHSs of ASEAN counties		x	x	x							
11.	ASEAN weather radar data exchange format. (Lead: Thailand)	Conduct workshop on weather radar data format to be established as data exchange format for ASEAN. [Workshop]	<ul style="list-style-type: none"> ASEAN weather radar data exchange format established. 	WMO/JMA/ KMA/CMA and NMHSs of ASEAN counties		x	x	x							
12.	Guide on atmospheric dispersion modeling. (Lead: Indonesia)	Conduct training on development of atmospheric dispersion modeling. [Training]	<ul style="list-style-type: none"> Number of ASEAN countries conducting atmospheric dispersion modeling Number of staff trained. 	WMO/JMA/ KMA/CMA and NMHSs of ASEAN counties		x	x	x							

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
		Develop long-range forecasts for the region based on available models from GPCs. [Product]	<ul style="list-style-type: none"> Number of long-range forecasts for the region developed. 																	
		Conduct training on Sub-Seasonal-to-Seasonal (S2S) skill assessment and development of products on S2S time scale (sub-seasonal to seasonal range, i.e. between 2 weeks and 2 months lead time). [Training]	<ul style="list-style-type: none"> Number of seasonal prediction products developed. Number of staff trained. 																	
		Develop website to host the long-range forecasts and other products. [Product]	<ul style="list-style-type: none"> Operational website for access by ASEAN NMHSs developed. 																	
16.	<ul style="list-style-type: none"> Learning materials. E-learning training methodologies. (Lead: Indonesia)	Conduct workshop on training needs assessment. [Training]	<ul style="list-style-type: none"> Number of trained staffs. 	NMHSs of ASEAN countries and Dialogue Partners			x	x	x	x										

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
17.	Assessment report on the readiness of ASEAN to implement Global Aeronautical Navigation Plan (GANP) regionally.	Conduct study on the readiness of ASEAN to implement GANP regionally. [Study]	<ul style="list-style-type: none"> Assessment report developed. 	WMO, ICAO, and NMHSs of ASEAN countries							x	x	x		
18.	Roadmap on improving aeronautical meteorology to address integration of Meteorology with Air Traffic Management (MET-ATM).	Conduct workshop to develop roadmap on improving aeronautical meteorology capacity to address integration MET-ATM. [Workshop]	<ul style="list-style-type: none"> Roadmap developed. 	WMO, ICAO, and NMHSs of ASEAN countries							x	x	x		
19.	Report on meteorology and geophysics consideration on the implementation of regional one sky policy.	Conduct workshop to meteorology and geophysics consideration on the implementing of regional one sky policy. [Workshop]	<ul style="list-style-type: none"> Roadmap developed. 	WMO, IMO and NMHSs of ASEAN countries							x	x	x		
20.	Mechanism for sharing of data above the sea required by Atmospheric Model Evaluation Tool. (AMET)	Conduct workshop to develop mechanism for sharing of data above the sea required by AMET. [Workshop]	<ul style="list-style-type: none"> Mechanism developed. 	WMO/JMA/ KMA/CMA and NMHSs of ASEAN countries							x	x	x		

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
26.	Probabilistic seismic hazard maps. (Lead: Indonesia)	Conduct training on probabilistic seismic hazard analysis (PSHA) for the development of PSHA Map for each ASEAN countries based on active seismicity situation and historical earthquakes. [Training]	<ul style="list-style-type: none"> Number of ASEAN countries with PSHA maps developed. Number of trained staff. 	USGS/RIMES/GFZ and NMHSs of ASEAN countries							x	x	x	x	x
27.	Study report on ASEAN-wide meteorological/geophysics information to be shared and the dissemination mechanism. ASEAN meteorological/geophysics information mobile application. (Lead: Singapore/ Thailand)	<p>Conduct study to identify the ASEAN-wide meteorological/geophysics information to be shared and the dissemination mechanism. [Study]</p> <p>Engage vendor to design and develop the ASEAN meteorological/geophysics information mobile application. [Product]</p>	<ul style="list-style-type: none"> Report on study produced. ASEAN meteorological/geophysics information mobile application developed. 	NMHSs of ASEAN countries		x	x	x							

Action 4.5. Engage relevant stakeholders in developing and implementing an effective communication and STI enculturation plan.															
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
28.	An enhanced AEIC web portal to: <ul style="list-style-type: none"> mirror information from BMKG on tsunami advisories and warnings for Indian Ocean. enable exchange of sea level and seismic data. (Lead: Indonesia)	Engage vendor to develop the feature of mirroring information from BMKG on tsunami advisories and warnings for Indian Ocean onto the AEIC web portal. [Product]	<ul style="list-style-type: none"> Feature of mirroring information from BMKG on tsunami advisories and warnings for Indian Ocean onto the AEIC web portal developed. 	USGS/RIMES/ GFZ and NMHSs of ASEAN countries, RTSP member countries			x	x	x	x	x	x	x	x	x
	Conduct workshop to develop mechanism for ASEAN to exchange real-time sea level data and seismic data via AEIC web portal. [Workshop]	<ul style="list-style-type: none"> Feature of real-time sea level data and seismic data exchange on AEIC web portal developed. 													
	Engage vendor to develop the feature of sea level and seismic data exchange via AEIC web portal. [Product]	<ul style="list-style-type: none"> Feature of sea level and seismic data exchange via AEIC web portal developed. 													

ANNEX 5: Work Plan of Sub-Committee on Microelectronics and Information Technology (SCMIT)

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.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
1.	Building application tools for human resource development, telecommunication networking, and prototyping focusing on start-ups.	A Multilingual Online and Mobile Dictionary for ASEAN Community Service Project (proposed by Thailand).	• ASEAN multilingual lexicon platform.	AMS China/ Japan/Korea/ Microsoft		x	x	x	x						
			• A website of online multilingual dictionary.				x	x	x						
			• A prototype of mobile dictionary application.					x	x						
2.		Disaster Warning System: Landslide Detection Project (proposed by Thailand).	• A report of site survey in AMS.	AMS		x	x								
			• Training 20 engineers for understanding and reproducing the system for their countries.				x	x							
			• Prototype of disaster warning system used for landslide detection.			x	x	x							

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
3.		ASEAN Network Platform for Internet of Things Project (proposed by Thailand).	• Building a cloud-based IoT platform-as-a-service.	AMS/Japan		x	x	x							
			• A formation of regional IoT's website.			x	x	x							
			• Setting training curriculum for basic IoT development over the IoT platform.			x	x	x							
			• Receiving more than 100 applications or devices running on the IoT Platform.			x	x	x							
4.		Integrated Green Energy Profiler (Hydrokinetic-Solar-Wind) Project (proposed by Malaysia).	• A set of energy profile of various rivers in ASEAN countries.	AMS		x	x	x	x	x	x	x	x	x	x
			• Technology Transfer of the profilers.												
5.		Training and Research Facility for IoT Additive Manufacturing and Drone Storage System Project (proposed by Malaysia).	• R&D output for innovation and improvement of IoT Technology for manufacturing industry.	AMS		x	x	x	x	x	x	x	x	x	x

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
		3. Carbon sink and sequestration in aquatic ecosystems - Indonesia.		Indonesia			x								
		4. Ocean Acidification and its ecological Impacts - Philippines.		Philippines			x								
		5. Conservation of migratory marine mammals and other endangered marine organisms - Malaysia.		Malaysia			x								
		6. Response to cross border oil spill incidents - Viet Nam.		Viet Nam			x								
		7. Capacity Building and Networking on Biofuels from Aquatic Algae.		Malaysia			x								
		8. Extent of transfer of alien invasive organisms in South/SE Asia by shipping. Phase II. Towards an ASEAN-India ballast water management exemption zone.		Singapore			x	x	x						
		9. Joint ASEAN-India Oceanographic Cruise.		Singapore			x	x							

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
		10. ASEAN-Russia project on Advancing Sustainable Development and Protection of Marine Environment in ASEAN Member States.		TBC											

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.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
2.	Integrated and strengthened ASTNET	Promote mutual exchange of information, experiences and knowledge of ASTNET and member countries' S&T networks. Links of useful and relevant websites are shared in ASTNET.	<ul style="list-style-type: none"> Number of hits/statistic. 												

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
		Project: i. ASEAN Tropical Marine Ecosystem Network (Philippines); and ii. Climate change impacts and coastal adaptation of coastal community within The South China Sea (Malaysia).					x													
								x												

Action 2.2. Establish scholarship, fellowship and/or attachment programs for students, researchers and other STI personnel.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
7.	Improvement of marine science education through better access to scholarship and attachment program.	<ul style="list-style-type: none"> Seek sponsorship from large private sector organisations/dialogue partners/ASEAN member countries in establishing scholarship program. Establish scholarship criteria and ensuring projects under SCMSAT incorporates scholarship and attachment program for students, researchers and other STI personnel. 	<ul style="list-style-type: none"> Scholarship and attachment program established. Scholarship criteria established. Attachment program implemented. 																	

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline																
					16	17	18	19	20	21	22	23	24	25							
13.	Engagement with dialogue and other strategic partners in SCMSAT projects to identify potential joint undertakings.	Conduct workshop to identify potential joint undertakings with dialogue and strategic partners.	<ul style="list-style-type: none"> Number of identified potential joint undertakings. 																		

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).

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline																
					16	17	18	19	20	21	22	23	24	25							
14.	<ul style="list-style-type: none"> Increased participation by marine scientists, researchers, students and industries in ASEAN STI events. 	<ul style="list-style-type: none"> Invite prominent keynote speakers or country leaders and industry players to participate in any ASEAN events related to marine science. 	<ul style="list-style-type: none"> Numbers of participants. Numbers of uploads. 	Malaysia		x															

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
		<ul style="list-style-type: none"> Suggest to ASEAN COST to introduce the Best Published Article Award in Marine S&T. 	<ul style="list-style-type: none"> Guidelines and criteria for the Best Published Article Award proposed. 																	

Action 4.3. Leverage on the ASTNET in publicising ASEAN initiatives in STI.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
16.	Sub Committee activities uploaded on ASTNET website for promotion.	Regular update of Sub Committee's progress/ activities in ASTNET portal.	<ul style="list-style-type: none"> Number of data entries. 																	

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
17.	Shared resource database developed in ASTNET portal.	<ul style="list-style-type: none"> Identify specific resource database(s). Define data format following IODE standards. 	<ul style="list-style-type: none"> Completed resource database. 																	

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
18.	Engagement of stakeholders in developing an effective communication and STI enculturation plan.	<ul style="list-style-type: none"> • Production of publicity materials for SCMSAT projects. • Identify relevant stakeholders. • Conduct active engagement with identified relevant stakeholders to develop communication and STI enculturation plan. • Organise awareness program to promote the implementation of communication and STI enculturation plan. • Implementation of communication and STI enculturation plan with participation from identified relevant stakeholders. 	<ul style="list-style-type: none"> • Communication and STI enculturation plan developed and implemented with the participation of relevant stakeholders. • Number of awareness program. 												

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
6.	Guidebook/ Guidelines/Set of Recommendations on:	Dissemination information and campaign on IP protection and utilisation (Obj. no. 3 & PA no. 2).	<ul style="list-style-type: none"> Number of information dissemination and campaign conducted. 	SCMST/ AWGIPC	x	x					x	x			
	a. Joint collaboration and funding scheme and/ or Sponsorship including inclusive of policy framework on IPR among the private sectors, centres of excellence, government and other relevant partners in technology development and commer- cialisation.	Cooperate with the ASEAN Working Group Intellectual Property Cooperation (AWGIPC) (Obj. no. 3 & PA no. 1, 2).	<ul style="list-style-type: none"> Number of Guidebook/ Guidelines/Set of Recommendations developed. 												

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline											
					16	17	18	19	20	21	22	23	24	25		
7.	Policy framework to foster STI outcome and benefit sharing among ASEAN Member States.	Consultation with relevant stakeholders including dialogue and other partners in the development of policy framework to foster STI Outcome and benefit sharing among ASEAN Member States (Obj. no. 1 & PA no. 1).	<ul style="list-style-type: none"> Number of policies for policy framework identified/developed. Policy framework developed. 	SCMST and COST SCs, Dialogue and other relevant Partners	x	x					x	x				
8.	Guidelines on the utilisation of ASTIF to provide incentives to foster joint R&D collaboration and adaptation of transfer technology.	Consultation with BAC and all Sub-Committees on the formulation of the suitable guidelines on the utilisation of ASTIF (Obj. no. 1, 2 & PA no. 1, 2).	<ul style="list-style-type: none"> Guidelines on the utilisation of ASTIF produced. 	BAC, All SCs												

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline											
					16	17	18	19	20	21	22	23	24	25		
9.	COST Priority Areas identified	Conduct study to identify COST priority areas supportive of the ASEAN STI Initiatives addressing the ASEAN Grand Challenges including the Sustainable Development Goals (SDGs) (Obj. no. 1 & PA no. 1).	<ul style="list-style-type: none"> Number of policies for policy framework identified. 	BAC	x	x				x	x					

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline											
					16	17	18	19	20	21	22	23	24	25		
10.	SCMST programmes established to support the COST Priority Areas.	Formulate relevant programmes/projects/ activities to support the COST Priority Areas identified (Obj. no. 2 & PA no. 5, 6, 7).	<ul style="list-style-type: none"> Number of SCMST programmes or projects/activities established. 	SCMST and Dialogue and other relevant Partners	x	x				x	x					

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 scientist, researchers and students including women and youth.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline											
					16	17	18	19	20	21	22	23	24	25		
11.	Guidelines of Recommendations for exchange of scientists, researchers and students in materials science and technology.	Formulation of the guidelines, recommendations for exchange of scientists, researchers and students (Obj. no. 1 & PA no. 1, 7).	<ul style="list-style-type: none"> Guidelines/Set of Recommendations. 	COST SCs, Dialogue and other relevant Partners	x	x	x				x	x				
		Conduct relevant activities towards the mobility and strengthen engagement of women and young scientists and researchers (Obj. no. 3 & PA no. 5, 7).	<ul style="list-style-type: none"> Number of women and young scientists/ researcher mobilised. 	COST SCs, Dialogue and other relevant Partners	x	x	x				x	x				

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
19.	Joint funding and cross-border technology transfer mechanisms established.	conduct seminar/workshop (Obj. no. 3 & PA no. 1, 4, 6).	<ul style="list-style-type: none"> Number of seminars/workshops. 	COST SCs, Dialogue and other relevant Partners	x	x	x				x	x			
		Cooperate and discuss with the dialogue and other relevant partners on joint funding and cross-border technology transfer mechanisms (Obj. no. 3 & PA no. 1, 4, 6).	<ul style="list-style-type: none"> Number of joint funding and cross-border technology transfer mechanisms. 												
		Disseminate information through the ASTNET and other technology data sharing centers (Obj. no. 3 & PA no. 1, 2).	<ul style="list-style-type: none"> Number of publicity avenues. 												
20.	Policy framework to promote technopreneurship and access to market developed.	Conduct consultation and relevant activities towards the development of policy framework to promote technopreneurship and access to market (Obj. no. 1, 3 & PA no. 1, 4, 6, 7).	<ul style="list-style-type: none"> Policy framework. 	COST SCs, Dialogue and other relevant Partners	x	x	x				x	x			

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
		Conduct exhibition and other relevant trade and/or technology fairs to showcase products and services of ASEAN Member States (Obj. no. 3 & PA no. 3).	<ul style="list-style-type: none"> Number of exhibition and other relevant trade and/or technology fairs. 																	

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
21.	Relevant instruments (such as MOU, MOA, MOC and LOI) on joint STI collaboration with Dialogue and other partners formally established.	Continue to cooperate with dialogue and other relevant partners in developing the relevant materials (Obj. no. 3 & PA no. 1, 2).	<ul style="list-style-type: none"> Relevant instruments developed. 	SCMST/ COST SCs, Dialogue and other relevant Partners	x	x	x				x	x								
22.	Joint funding mechanism established to facilitate joint undertakings in STI.	Draft the rules of procedures (ROP) to develop and implement Joint funding mechanism (Obj. no. 1 & PA no. 1, 2).	<ul style="list-style-type: none"> ROP and joint funding mechanism developed. 	SCMST/ COST SCs, Dialogue and other relevant Partners	x	x	x				x	x								

Action 4.3. Leverage on the ASTNET in publicising ASEAN initiatives in STI.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
27.	STI Events, Initiatives and information materials (Posters/ Proceedings/ Compilation of Research Papers in various COST events) published in ASTNET.	Coordinate with National COST including COST Subsidiary bodies Focal Points to access and share information on ASEAN S&T events and upload to ASTNET (Obj. no. 3 & PA no. 2).	<ul style="list-style-type: none"> Number of ASEAN S&T events where information materials were shared and developed. 	SCMST/ COST SCs, Dialogue and other relevant Partners	x	x	x	x	x	x	x	x	x	x
28.	Established linkage of ASTNET to websites and social media accounts of the relevant S&T Ministries and/or other related bodies in ASEAN.	<p>Continue the development and enhancement of ASTNET (Obj. no. 3 & PA no. 2).</p> <p>Focal points of COST and its Subsidiary bodies to provide the links to relevant sources of information including website and social media accounts, and for the information to be uploaded in ASTNET (Obj. no. 3 & PA no. 2).</p>	<ul style="list-style-type: none"> Number of linkages to websites and social media accounts. 											

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
31.	STI communication/enculturation plan developed.	Engage all Sub-Committees, experts from ASEAN and Dialogue Partner countries in the discussion about the contents of the plan (Obj. no. 3 & PA no. 2, 3).	<ul style="list-style-type: none"> STI communication/enculturation plan. 	COST SCs, Dialogue and other relevant Partners	x	x	x	x	x	x	x	x	x	x	x

ANNEX 8: Work Plan of Sustainable Energy Research (SCSER)

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.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline											
					16	17	18	19	20	21	22	23	24	25		
1.	Reports on the state of development (technology readiness) on the following: a. New and renewable/ alternative energy such as biomass/ biofuels, solar and energy storage systems; b. Clean energy and environment technology such as clean coal technology, nuclear technology and natural gas;	Undertake situation analysis on the state of development and technology readiness of AMSs in agreed priority areas. Conduct regular consultations with the relevant experts.	<ul style="list-style-type: none"> The situation analysis is comprehensive and is well reviewed by experts. The reports published on time. The number of experts participating in consultations. The number of consultations conducted. 	SCSER ASEAN Centre for Energy (ACE) RE-SSN/SOME Dialogue Partners Academe Private sectors	x	x					x					

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.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
5.	Database of: a. Experts related on energy; b. Renewable energy research; and c. Energy testing facilities and laboratories.	Collecting, grouping, providing and validating data.	<ul style="list-style-type: none"> The database set up on time. Number of accessibility from AMSs. 	SCSER Relevant COST Sub-Committees ASEAN Centre for Energy (ACE) Dialogue Partners Academe Private sectors Other relevant institutions/ organisations	x	(grouping/database structure)									
		Establish system for the maintenance and administration for the databases.	<ul style="list-style-type: none"> The system for maintenance and administration for the databases established. 		x	x	x	x	x	x	x	x	x	x	
6.	Platform in ASTNET for technology transfer and commercialisation.	Modify and enhance the features of ASTNET to allow the establishment of the platform for technology transfer and commercialisation.	<ul style="list-style-type: none"> The platform for technology transfer and commercialisation in ASTNET established. Number of visitors who accessed the platform. 	ASEAN Secretariat SCSER All COST Sub-Committees ASEAN Centre for Energy (ACE) Dialogue Partners Academe Private sectors Other relevant institutions/ organisations					x						

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
10.	Awards for Innovation in Renewable Energy and Energy Efficiency particularly for women, youth and the disadvantage group.	<p>Define the rules of procedures for granting of the awards.</p> <p>Seek partnership with private sector, Dialogue and other partners.</p>	<ul style="list-style-type: none"> The rules of procedure (ROP) for the granting the awards developed. The partnership with DPs and private sectors identified. Number of applications received. 	SCSER Relevant COST Sub-Committees ASEAN Centre for Energy (ACE) Dialogue Partners Academe Private sectors Other relevant institutions/ organisations		x		x		x		x			x

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 program to support and nurture STI enterprises from start-up to the next competitive level of development.															
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
11.	Support and incentive mechanisms on sustainable energy for MSMEs, start-up companies.	Undertake needs assessment of MSMEs and other stakeholders in the area of sustainable energy.	<ul style="list-style-type: none"> Needs assessment of MSMEs and other stakeholders implemented on time. 	SCSER Relevant COST Sub-Committees Dialogue Partners Academe, private sectors, MSMEs and other relevant institutions/ organisations				x	x	x					
		Study existing mechanisms and best practices.	<ul style="list-style-type: none"> Study on existing mechanisms implemented on time. 					x	x	x					
		Engage dialogue and other partners in identifying appropriate support and incentive mechanisms to promote new enterprise and support MSMEs.	<ul style="list-style-type: none"> Number of dialogue and other partners participated. Appropriate support and incentive mechanisms to promote programme identified. 				x	x	x	x	x	x	x	x	
		Encourage/invite MSMEs to participate in ASEAN Science, Technology and Innovation Week (ASTIW) and other technology fairs.	<ul style="list-style-type: none"> Number of invitation disseminated. Number of MSMEs participating in ASTIW. 				x	x	x	x	x	x	x	x	

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
12.	Sustainable energy technology adopted and commercialised.	Identify technology needs for sustainable energy improvement in MSMEs.	<ul style="list-style-type: none"> Technology needs of MSMEs for sustainable energy identified. 	SCSER Relevant COST Sub-Committees Dialogue Partners Academe, private sectors, MSMEs and other relevant institutions/ organisations			x	x							
		Leverage the existing cooperation with Dialogue Partners.	<ul style="list-style-type: none"> Number of Dialogue Partners participating in the demonstration platform. 				x	x							
		Organise Seminar/ Workshop/Conference with the experts from Dialogue Partners.	<ul style="list-style-type: none"> Number of Seminar/ Workshop/ Conference conducted. 					x	x	x	x	x	x	x	
		Commercialise the sustainable energy STI initiative.	<ul style="list-style-type: none"> Number of pilot/ demonstration plants Number of appropriate technologies commercialised. 					x	x	x	x	x	x	x	

Action 4.5. Engage relevant stakeholders in developing and implementing an effective communication and STI enculturation plan.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
17.	Note: under the purview of SCIRD.	Note: <ul style="list-style-type: none"> • SCSEER to provide comments/suggestion to improve the STI communication/enculturation plan. • SCSEER Focal Points can take part in the development of STI communication/enculturation plan. 	<ul style="list-style-type: none"> • Refer to SCIRD Work Plan 											

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline												
					16	17	18	19	20	21	22	23	24	25			
3.	ASEAN Research and Training Center for Space Technology and Applications (ARTSA).	ASEAN Research and Training Center for Space Technology and Applications (ARTSA).	For ARTSA <ul style="list-style-type: none"> Physical facility (provided by Thailand). Manpower. Resources (support for the first four years to be provided by Thailand). 		x	x	x	x									
4.	Agreement with Southeast Asia Astronomy Network (SEAN) on joint space collaboration with space agencies/centers.	Collaboration/agreement with other centers in ASEAN.	<ul style="list-style-type: none"> Adopted TOR. 	SCOSA SEAN	x	x	x	x	x	x	x	x	x	x	x	x	x
			<ul style="list-style-type: none"> Number of activities identified and implemented. 		x	x											
5.	Partnership between space agencies in the region and outside of ASEAN.	Collaboration project and consultation between space – related agencies/ institutions in the region.	<ul style="list-style-type: none"> Collaboration projects identified. 	SCOSA COST SCs Dialogue and other relevant Partners	x	x	x	x	x	x	x	x	x	x	x	x	x
6.	Prioritised list of proposals for possible cooperation.	Monitor the submission and endorse STA project proposals on research and development.	No. of R&D proposals: <ul style="list-style-type: none"> Submitted. Endorsed. Implemented. Completed. 	SCOSA ASEAN COST	x	x	x	x	x	x	x	x	x	x	x	x	x
7.	Recommendation on ASEAN Science, Technology and Innovation Fund (ASTIF).	Recommend mechanism for funding R&D projects under ASTIF.	<ul style="list-style-type: none"> No. of recommendations forwarded. 	SCOSA COST	x	x	x	x	x								

Action 1.4. Strengthen existing regional STI initiatives in priority areas including Sustainable Development Goals.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
12.	Updated STA priority areas. Formation of task force/technical working group.	Conduct of consultations to identify STA priority areas.	<ul style="list-style-type: none"> No. of priority areas served through Action 1.1. ASEAN STA priority area report. 	SCOSA Dialogue Partners	x	x							x	x
13.	ASEAN Connectivity Map.	Develop ASEAN Base Map.	<ul style="list-style-type: none"> Number of country's area appear on digital Base Map. 	SCOSA	x	x	x	x						
		Develop ASEAN Spatial Data Infrastructure (SDI).	<ul style="list-style-type: none"> No. of Pilot platform developed. 	SCOSA		x	x	x	x	x	x	x	x	x
		Develop applications on top.	<ul style="list-style-type: none"> Number of applications on base map. 	SCOSA				x	x	x	x	x	x	x

Action 2.2. Establish scholarship, fellowship and/or attachment programs for students, researchers and other STI personnel.

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
17.	Recognition and incentives established.	<ul style="list-style-type: none"> Support/expand the conduct of STA competitions, including pitching competitions, for the women, youth and disadvantaged groups. Tracking of activities involving women, youth and disadvantaged groups (persons with disabilities, ethnic minorities, etc). Conduct of space related activities for women, youth and disadvantaged group. 	<ul style="list-style-type: none"> No. of competitions conducted. No. of participants. No. of activities conducted. 	SCOSA Other relevant organisations	x	x	x	x	x	x	x	x	x	x	x

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
		<ul style="list-style-type: none"> Encourage participation in trade fairs and showcase completed research projects as mentioned in Action 1.1. 		Relevant stakeholders																

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).																				
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline															
					16	17	18	19	20	21	22	23	24	25						
20.	Participation in ASTIW/AFC.	Encourage participation of STA companies and professionals in ASTIW/ AFC.	<ul style="list-style-type: none"> No. of invitations disseminated. No. of exhibitors. Estimated no. of participants. 	SCOSA ASEAN COST STA stakeholders	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Participation in other STA events.	Encourage participation of STA companies and professionals in other STA events organised in ASEAN Member States.		SCOSA AMS STA stakeholders																

Action 4.4. Develop a resource database and network to facilitate information sharing and technical cooperation among agencies in the public and private sector.														
No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline									
					16	17	18	19	20	21	22	23	24	25
23.	STA Database.	Develop SCOSA IP database.	<ul style="list-style-type: none"> No. of databases developed. 	SCOSA		x	x	x	x	x	x	x	x	x
24.	<ul style="list-style-type: none"> Satellite image given to members. Sharing of satellite images among members. 	Subject to the SCOSA data sharing policy, establish and sustain the utilisation of satellite data and facilitate data sharing and technical cooperation.	<ul style="list-style-type: none"> Number of images provided to AMS. Number of countries sharing data. 	SCOSA	x	x	x	x	x	x	x	x	x	x
25.	Satellite images provided for disaster.	Continue cooperation in STA with relevant initiatives such as Sentinel Asia, UN-SPIDER, UN-RESAP, etc.	<ul style="list-style-type: none"> Number of images provided. 	SCOSA Relevant partners and organisations	x	x	x	x	x	x	x	x	x	x
26.	ASEAN satellite constellation (starting with a virtual constellation).	Encourage the creation of an ASEAN satellite constellation.	<ul style="list-style-type: none"> Number of country performing technical cooperation. 	SCOSA ASEAN Member States		x	x	x	x	x	x	x	x	x

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

No.	Expected Outputs	Specific activities/projects	Indicators	Implementing/ Cooperating Bodies	Timeline										
					16	17	18	19	20	21	22	23	24	25	
27.	Education and outreach programs.	Conduct education and outreach program on STA for students and general public.	No. of promotional materials developed: <ul style="list-style-type: none"> • Video. 	SCOSA	x	x	x	x	x	x	x	x	x	x	x
			<ul style="list-style-type: none"> • Education materials for communication and enculturation. 			x	x								

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