

Session X

STI roadmaps for the SDGs – Joint Guideline and Global Pilot Programme

UN-MoST Joint Capacity Building Workshop on STI for SDGs

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Guilin, China



RIS

Research and Information System
for Developing Countries

विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

SDGs and STI

- STI/SDG Agenda is as much endogenous as influenced by exogenous factors
- In most of the developing countries GERD is largely government dependent and government is influenced by several external factors which are driven by linkages, resources, priorities determinants.

The Context: Challenges

- The 3rd Conference for Financing for Development (FfD3) prioritising STI delivery signals collective willingness to address issues of resource availability and financing of a global mechanism
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- **Addis Ababa Action Agenda (AAAA)**
- **BAPA + 40**

SDGs and STI

- Significance of STI and **availability of innovation driven solutions**, to address sustainability challenges.
- **Best practices** adopted for technology cooperation, stressing on building technological as well as financial capacities
- **Restructuring intellectual property regimes** and fostering STI partnerships in the larger global context.

The Strategy

- **Key Challenges**

- Human Resources
- National STI Roadmaps: Sectoral Strategies
- Social Innovations and non-commercial markets like for clean water, primary health and responsible consumption
- Enabling mechanisms for SMEs
- G-20 to sensitise the International Agencies for STI/SDG Connect

The Context: Challenges

- How to have sectoral frameworks supporting legal provisions promoting adoption and diffusion of STI.
- Countries that have tried to do so have varied experiences, ranging from Human Centric Society 5.0 of Japan, to Green Growth Mission with STI as a key in Colombia

Agenda 2030 and TFM

- The 2030 Agenda, prima facie, has only produced a rough skeleton of the proposed TFM.
- The structure proposed is the following:
 - *UN Inter-Agency Task Team (UN IATT);*
 - *Multi-stakeholder Forum on Science, Technology and Innovation for Sustainable Development Goals (SDGs) (STI Forum); and*
 - *Online Platform*

TFM for Systemic Deficiencies

- Identify systemic deficiencies that might be relevant for TFM:
 - Capacities for technology assessment,
 - Domains of development and sustainability
 - Ecosystem be such that individual countries can come up with specific (cost effective!) technology solutions in these domains and contribute to the global repository.
 - Relevant capacities to absorb and use technologies that are being transferred.

TFM for Systemic Deficiencies

- Financing instruments supporting the TFM should have adequate provisions to predict and fulfill those needs.
- Capacity building to address institutional and resource constraints
- Inspired by the already established Technology Bank for the least developed countries (LDCs), a key outcome of the IPoA (2011-2020),
- Universal technology bank be created as the core institution of the TFM.

STI Co-operation and Development Assistance

“Japan-ASEAN STI for SDGs Bridging Initiative” is a newly launched initiative toward SDGs by Japan and ASEAN countries in 2018,

- Facilitate social implementation from research outputs into practical applications by proper stakeholders.
- Support for business model brushups by using R&D outputs of SATREPS

FfD, STI and SDGs

- Since Monterrey Consensus, advances in the realm of STI have enhanced the potential for development.
- STI strategies as part of national development strategies
- Scaling up capacity, closing the gaps and harnessing of STI Potential
- How various actors may mobilise knowledge/Expertise/technology and finance
- Appropriate New Technology
- MSMEs/GVCs/FDI/Technology spill-overs
- Enhance International Cooperation for access to clean energy research and technology

Technology Facilitation Mechanism

- Collaborative multi-stakeholder forum
- Supported through inter-agency cooperation
- On-line forum for mapping
- Technology Bank for LDCs

Setting the Context

- STI an essential ingredient of economic growth.
- Augmented 'Solow Swan' Model, Endogenous growth models
- Fatas and Mihov (INSEAD 2009), in 'The 4 I's of Economic Growth' cover Innovations, Initial conditions, Investment and Institutions.
- Data - also Fundamental for development, meeting societal needs, good governance, crime detection/ prevention, internal security, defence.
- All the four main global agreement documents, namely, 2030 Agenda, AAAA, Paris agreement, Sendai Framework, recognize the importance of STI and data.
- GoI process- -set up legal, policy, institutional architecture.
- Technological frontier - Cost, climate and environmental sensitiveness of STI initiatives to be analysed for adoption.

Some New Technological Frontiers

- Nano
- Bio
- Digital
- Information and Communication-Mobile Smart Phone, 5G, web apps.
- Blockchain
- Green
- AI
- Robotics
- IoT
- Big data Science and Analytics
- Cloud computing

Goal 1 : End poverty in all its forms everywhere

STI- Interconnects

Natio nal 1.4.5	Proportion of population having bank accounts	JAM Big data analytics and advanced algorithms
1.4.6	Number of mobile telephones as percentage of total population	
RIS 2	Proportion of population below the national Poverty Line	PMJDY PMJJBY PMSBY APY MGNREGA Auyshman – PMJAY NSAP
RIS 3	Proportion of people at risk of poverty	
RIS 4	Percentage of population having access within 2 km from the place of residence to facilities of PDS Fair Price Shop, health-care facilities, primary education, and banking service facilities	

Goal 2 : End hunger, achieve food security and improved nutrition and promote sustainable agriculture		STI Interconnects
National 2.5.1	Number of accessions conserved in the base collection (-18 degree Celsius) at National Gene Bank	
2.5.2	Conservation of germplasm (in number)	
2.5.3	Conservation of fish genetic resource (in number)	
2.a.1	Percentage share of expenditure in R&D in agriculture to GVA in agriculture.	

Goal 2 : (contd.)

STI Interconnects

RIS 5 Prevalence of malnutrition among children under 5 years of age (stunting, wasting, underweight, overweight)

RIS 6 Prevalence of micronutrient deficiency among children under 5 years of age (Vitamin A and Iron)

RIS 7 Proportion of gross cropped area under organic farming

RIS 8 Proportion of net cropped agricultural area with proper NPK balance

Satellite Imagery
Bio-Technology
Block-chain
Technology

NNM,
Indradhanush,
(Real time data-
Nutritive meals,
undernutrition,
overweight,
Vaccination
e-NAM
SHCs
NFSM
PMFBY
PMKSY

Goal 3 : Ensure healthy lives and promote well-being for all at all ages

STI Interconnects

3.2.3	Percentage of children aged 12-23 months fully immunized (BCG, Measles and three doses of Pentavalent vaccine)	<p>Tele-medicine etc.</p> <p>Drones</p> <p>Real-time monitoring</p> <p>Big Data</p> <p>Indradhanush, NHM</p> <p>PMMVY</p> <p>NCBs</p> <p>Vector borne diseases</p> <p>Medical-aids</p> <p>Ambulances</p>
3.8.2	Percentage of TB cases successfully treated (cured plus treatment completed) among TB cases notified to the national health authorities during a specified period	
3.b.1	Total net official development assistance to medical research and basic health sectors	
RIS 16	Out-of-Pocket Spending (OoPS) as percentage of the total health expenditure	
RIS 17	Death rate due to road traffic accidents	

Goal 4 : Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

STI Interconnects

4.4.1	Proportion of computer literate adults	
4.a.1	Proportion of schools with access to: (a) electricity; (b) computers for pedagogical purposes; (c) adapted infrastructure and materials for students with disabilities/ disabled friendly ramp and toilets; (d) basic drinking water; (e) single-sex basic sanitation facilities; and (f) basic hand washing facilities (as per the WASH indicator definitions)	<p>AIM Skilling IMPRINT- Impacting Research Innovation & Technology SWAYAM</p> <p>Samagra Shiksha MDM Teachers' Training Technical Education Quality Improvement Programme</p>
RIS 18	School Education Quality Index (SEQI)	
RIS 19	Per cent of people aged 15-49 years having formal skill training	

Goal 5 : Achieve gender equality and empower all women and girls

STI Interconnects

5.a.5 Exclusive women SHGs in Bank linked SHGs

5.a.6 Percentage of adult having an account at a formal financial institution

5.a.7 Percentage of women having an account at a formal financial institution

5.a.8 Number of borrowers per 1,00,000 adults (Male & Female – wise)

RIS 21 Child sex ratio

RIS 22 Female Labour Force Participation Rate

Safety apps
Women Helpline
POCSO e-Box
e-Samvad Portal
e-dropbox for kids
Big Data

BBBP
JAM
PMMVY
Mahila e-Haat

Goal 6 : Ensure availability and sustainable management of water and sanitation for all

STI Interconnects

6.6.2	Percentage sewage load treated in major rivers
6.6.3	Biological assessment information of surface water bodies.
6.a.1	Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan
6.a.2	Number of MoU/Co-operation agreements for capacity building and technology transfer

Goal 6 : (contd.)

STI Interconnects

RIS 23	Proportion of population using toilets having proper hand-washing facility	Satellite Imagery Desalination
RIS 24	Change in water-use efficiency over time	SBM National Water Quality Sub-Mission
RIS 25	Change in Water Productivity	Third Party Quality Assurance Policy Namami Gange PMKSY

Goal 7 : Ensure access to affordable, reliable, sustainable and modern energy for all

STI Interconnects

7.1.1	Percentage of households electrified	ISA Non-renewable energy
7.1.2	Percentage of household using clean cooking fuel	Electric Vehicles
7.2.1	Renewable energy share in the total final energy mix	Smart-metering Nuclear energy
7.3.1	Energy intensity measured in terms of primary energy and GDP	DBTL- Ujjawala UJALA Scheme PM-Saubhagya

Goal 8 : Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

STI Interconnects

8.2.2	Total number of patents issued	Big Data Satellite Imagery
8.3.5	Number of start-ups recognized under Start-up India	
8.4.1	Renewable energy share in the total final energy mix	
RIS 30	Proportion of youth (15-24 years) not in education or employment or training (NEET)	
		Skill India Mission Make in India Atal Innovation Mission MUDRA PMJDY NIDHI

Goal 9 : Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (1/3)

**STI
Interconnects**

9.2.1	Annual mean levels of fine particulate matter (e.g. PM _{2.5} and PM ₁₀) in cities (population weighted)
9.4.1	CO ₂ equivalent emission per unit of value added
9.5.1	Percentage share of expenditure in R&D to total GDP
9.5.2	Researchers (in full time equivalent) per million inhabitants
9.5.3	Total number of Patents issued
9.b.1	Share of Intellectual Property Products in total Gross Fixed Capital Formation

Goal 9 : contd. (2/3)

STI Interconnects

9.b.2 Share of GVA of companies with research & development as main activity in total GVA from Private Corporate Sector

Industrialization
4.0

9.b.3 Share of GVA of Information and Computer related activities in total GVA

Internet of Things
AI

9.c.1 Proportion of population covered by a mobile network, by technology

Robotics
3-D printing

9.c.2 No. of broadband subscribers per 10000 person

Cloud computing

(contd.)

Goal 9 : Contd. (3/3)

STI Interconnects

RIS 31	Proportion of rural population who live within 2 km of an all-weather road	Satellite Imagery PMGSY e-toll Start up Mission Atal Innovation Mission Bharat Net Technology and quality up- gradation (TEQUP) support to MSMEs Scheme of promotion of ICT in Manufacturing Sector
RIS 32	Industry sector employment as a proportion of total employment	
RIS 33	Share of R&D expenditure to GDP	
RIS 34	Energy Productivity	

Goal 10 : Reduce inequality within and among countries

STI Interconnects

10.c.1 10.c.1 : Remittance costs as a proportion of the amount remitted

On-line
Banking
Big data

RIS 35 Growth rate of per capita household expenditure among the bottom 40 per cent of the population and the total population

NSAP

MGNREGA

International
Co-operation

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

STI Interconnects

11.2.1	Proportion of cities with efficient urban mobility and public transport	Satellite Imagery Building Technology Green Technologies Air Quality Improving Technologies
11.3.1	Proportion of cities with integrated development plans.	
11.3.3	Net Density	
11.6.1	Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities	
11.6.2	Annual mean levels of fine particulate matter (e.g. PM _{2.5} and PM ₁₀) in cities (population weighted)	
		Smart Cities Mission PMAY

Goal 12: Ensure sustainable consumption and production patterns

STI Interconnects

12.1.1	Formulation of national SCP framework and integration of SCP with national/State planning process	Satellite Imagery Waste Management Smart Cities Mission
12.2.1	Percentage variation in per capita use of natural resources	Reduce, Recycle, Reuse, Restore
12.5.1	Number of waste recycling plants installed	National Mission on Food Processing Hazardous and Other Wastes Management

Goal 13: Take urgent action to combat climate change and its impacts

STI Interconnects

13.2.1	13.2.1 : Pre 2020 action achievements of pre 2020 Goals as per country priority.	National Mission for Sustaining the Himalayan Ecosystem National Action Plan on Climate Change
13.2.2	13.2.2 : Achievement of Nationally Determined Contribution(NDC) Goals in post 2020 period.	
13.3.1	13.3.1 : Number of States that have integrated climate mitigation and adaptation in education curricula and outreach programs	
RIS 41	Green House Gas emission per unit of GDP	

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

STI
Interconnects

14.1.1	Health index of area of coastal water (percentage change)
14.1.2	Number of sewage treatment plants installed along the coast and construction of toilets under Swachh Bharat Mission
14.1.3	Percentage change in use of nitrogen fertilizers in the coastal States
14.3.1	Coral health index of Exclusive Economic Zone (EEZ)
14.4.1	Maximum Sustainable Yield (MSY) in fishing.

Goal 14: (Contd.)

STI Interconnects

14.a.1 Allocation of budget resources for research as per the EEZ or coastal line.

14.b.1 Assistance to the traditional / artisanal fishers for procurement of FRP boats and other associated fishing implements.

14.c.1 Percentage compliance of international laws.

RIS 42 Protected Terrestrial and marine area to total terrestrial area

Deep Sea
Technologies
Mangroves
restoration
Technologies

National Plan for
Conservation of
Aquatic Eco-
system
Coastal
Environment
Impact
Assessment
Neel Kranti
Mission (Blue
Revolution)

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

STI Interconnects

15.1.1	Forest area as a proportion of total land area
15.1.2	Percentage of Tree Outside Forest (TOF) in total forest cover.
15.2.1	Percentage change in Forest Area coverage
15.2.2	Total area covered under different afforestation schemes
15.2.3	Total tree cover achieved outside forest area

Goal 15: (contd.)

STI Interconnects

15.4.1	Increase in forest / vegetative cover in mountain areas	Drones for planting trees
15.4.2	Restoration of water bodies / stream in mountain areas	
15.9.1	15.9.1 : Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategies Plan for Biodiversity 2011-2020	Compensatory and Afforestation Fund
15.a.1	15.a.1 : Official development assistance and public expenditure on conservation and sustainable use of biodiversity and eco system.	National Mission for Sustaining the Himalayan Ecosystem
RIS 43	Forest area as a proportion of total land area	
RIS 44	Red list index	

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

STI Interconnects

16.6.1	Number of Government services provided online to citizens.	Forensic sciences
16.9.1	Percentage of births registered	Modernization of courts
16.9.2	Proportion of population covered under Aadhaar	Modernization of Police
RIS 46	Number of court cases pending per 100,000 population	Aadhaar - Identification

Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

STI
Interco
nnects

Technology
Targets
17.6 to 17.8

17.6 : Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

Target

17.7 : Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

Global
Indicator

17.7.1 Total amount of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies

Goal 17: (contd.) (2/3)

STI
Int.

Target	17.8 : Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology
Capacity Building Target 17.9	17.9: Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation
Multi-Stakeholder partnerships Targets 17.16 and 17.17	17.16 : Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries
Target 17.7	17.17 : Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Goal 17: (contd.) (3/3)

STI Interconnects

Data,
monitoring
and
accountabilit
y
Targets 17.18
and 17.19

17.18 : By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

Target 17.19

17.19 : By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

RIS 48

Total financial and technical assistance received from rest of the world as percentage of total revenue receipts

Big data
TFM
ToT

GST
FDI
Global
Environment
Facility (GEF)
Trust Fund

SDGs and STI mapping

- SDG 1- Blockchain, Biometrics, Drone, Fintech
- SDG 2- Bio-technology, Drone, Satellite imagery, Smart Phone, 5G, web based apps
- SDG 3- Bio-Technology, Diagnostic AI, Radiology, Telemedicine, Nano
- SDG 4- e-education, ICT
- SDG 5- ICT
- SDG 6- Nano, 3-D printing
- SDG 7- Renewable Energy (Wind, solar etc.), Nano
- SDG 8- AI, Robots, 3-D printing

SDG and STI mapping (contd.)

- SDG 9- AI, Robots, Fintech, 3D printing
- SDG 10-Blockchain Technology
- SDG 11- 3D printing, Big-data in combination with cloud computing
- SDG 12- Big-data in combination with cloud computing
- SDG 13-Sattelite imagery, Scanner, Big-data in combination with cloud computing
- SDG 14- Marine Science and technology in combination with electronic navigation devices, data devices
- SDG 15- AI, ARSEC, CI, Satellite imagery, Scanner, Big-data in combination with cloud computing

SDG and STI mapping (contd.)

- SDG 16- Big-data in combination with cloud computing, Scanner
- SDG 17- Fintech, e-commerce, Big-data in combination with cloud computing

Key Challenges

- Proposed framework and modalities of the TFM as yet, can best be described as nascent.
- TFM might fail to attract the interest of major technology owners, such as transnational corporations.
- Opportunity to enhance TDC/SSC to expand the exchange of technologies developed by SMEs.

Key Challenges

- Quality and effectiveness of technologies eventually offered through the TFM
- Building upon the initiatives within the UN for implementation of the TFM
- Approaches around issues like IP ownership and technology commercialization
- Inventor's right and social obligation
- Institutionalizing robust evaluation and reporting mechanism

Skeleton proposed by the UN

- UN Inter Agency Task Team

(To begin with 29 UN Agencies as members; 10 member Eminent Person Group; 70 STI Initiatives)

- Multi-stakeholder STI Forum

(First STI Forum held in June 2016)

- Online Platform

Key Challenges

- Poor financial capacities of governments and private firms in developing countries
- Global regimes including IPR
- Systemic issues including capacity