Addressing the Human and Technical Capacity Challenges Through Digital Skills

U4SSC-United For Smart Sustainable Cities

-An initiative of ITU & UNECE

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About

United for Smart Sustainable Cities (U4SSC)

United 4 Smart Sustainable Cities (U4SSC)

U4SSC is a United Nations Initiative

coordinated by ITU and UNECE

and supported by other 14 UN agencies to respond to the

Sustainable Development Goal 11:

"Make cities and human settlements inclusive, safe, resilient and sustainable"

It advocates for public policy to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities.

Supported by:

Convention on Biological Diversity

United Nations ECLAC

FAO

ITU

United Nations Economic Commission for Africa

UNDP Empowered lives. Resilient nations.

UNECE

United Nations Educational, Scientific and Cultural Organization Montevideo Office Regional Bureau for Sciences in Latin America and the Caribbean

UN environment United Nations Environment Programme

UNEP FINANCE INITIATIVE

United Nations Framework Convention on Climate Change

UN HABITAT FOR A BETTER URBAN FUTURE

UNIDO

UNITED NATIONS UNIVERSITY UNU-EGOV Operating Unit on Policy-Driven Electronic Governance

UN WOMEN

World Meteorological Organisation

What is a Smart Sustainable City?

"A smart sustainable city is an innovative city that uses **information and communication technologies** (ICTs) and **other means** to improve **quality of life**, **efficiency of urban operation and services**, and **competitiveness**, while ensuring that it meets the **needs of present and future generations** with respect to **economic**, **social**, **environmental** as well as **cultural aspects**".

-UNECE and ITU, October 2015

What is Sustainability?

In plain words , Sustainability is the process of living in harmony with our ecosystem

- Environmental protection
  - Flora/ Fauna
  - Environment – Air/water
- Development of people of all walks of life
  - Social
  - Culture
  - Traditions
- Economic development
  - Inclusive
    - Kashmir – Japanese delegation

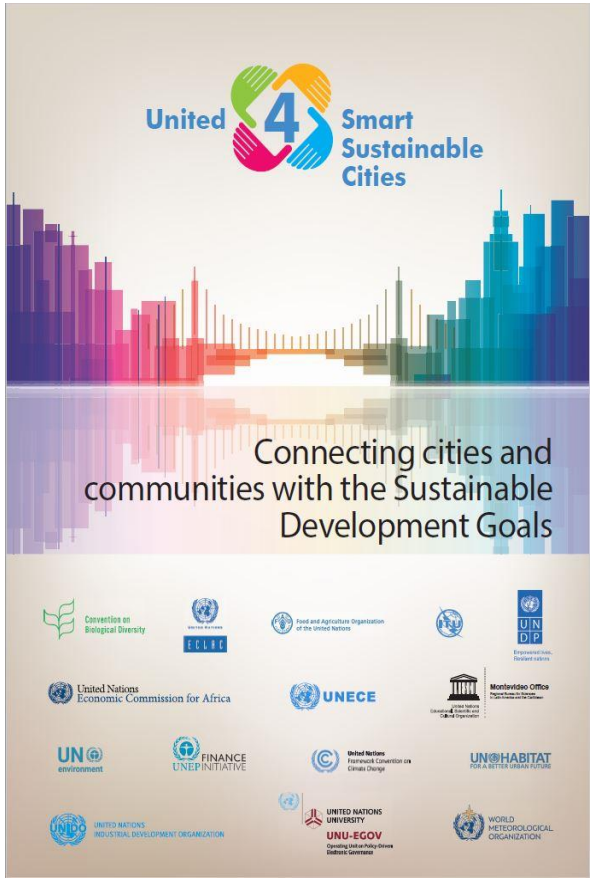
Why is Sustainability important ?

- Whatever we do today should work for tomorrow as well !
- If we undertake a **project/program** without considering tomorrow, then that project program can not be sustained
- Many civilisations have perished as at some point of time they drifted from their sustainability pledge
  - Indus Valley civilisation
  - Civilisation on the banks of Saraswati river
- In case we do not wake up still, nature is going to terminate us too !

Sustainable Development Goals (SDGs)

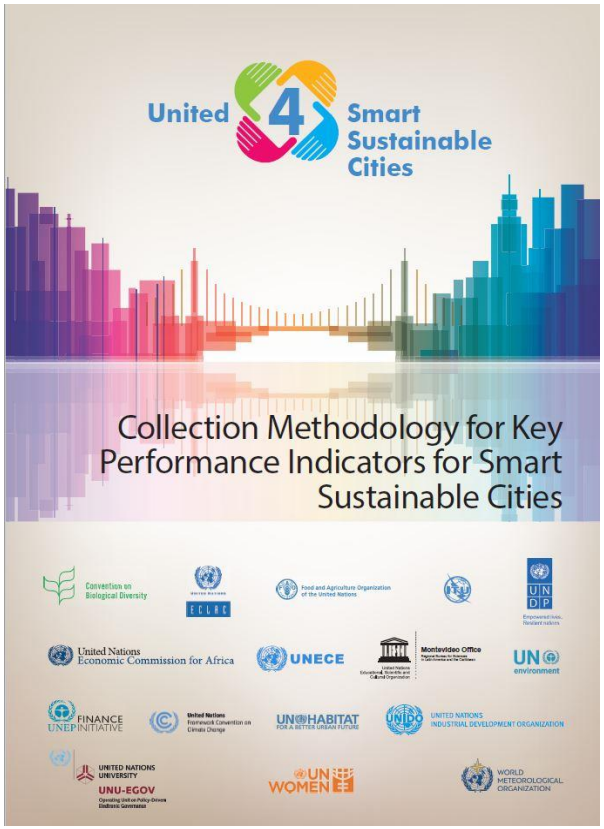
U4SSC

U4SSC - Publications



Available for free on the U4SSC website:
http://itu.int/go/U4SSC

U4SSC – Publications -KPIs for Smart Sustainable Cities



Over 50 cities worldwide have since started implementing these KPIs

Mapping U4SSC Products to Sustainable Development Goals (SDGs)

Product/ Case study title	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Green bonds for cities	√								√				√				
Aquaponics as innovative urban agriculture: The case of the GrowUp Box		√	√			√			√			√					
Managing HIV in children: The case of Kenya			√						√	√						√	√
Mohammed Bin Rashid Smart Learning Program				√					√								√
Digital Literacy Campaign	√				√				√	√	√						√
Smart water management: SmartH2O project						√					√						√
Smart grid solutions: The case of PowerMatching City							√		√		√						√
E-banking services: The case of Pakistan								√	√	√						√	√
Smart mobility: The case of Ahmedabad							√		√		√	√					√
Pan-African e-Network Programme			√						√	√	√						√
Smart Dubai Platform and Dubai Data initiative					√				√	√	√					√	√
Smart tourism								√	√		√	√	√	√	√	√	√
Creating climate smart cities: The case of Scotland			√						√		√		√		√		√
Protecting life below water: The Global Fishing Watch platform									√			√		√		√	√
Monitoring of animals using ICTs									√		√				√	√	√
Improving participation and accountability: MyGov Portal									√		√					√	√
United for Smart Sustainable Cities	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

U4SSC – Published Case Studies from India

- Pan African e-Network
- MyGov portal - India
- Skill Development & Entrepreneurship- India
  (Page 55-61 –Enhancing Innovation & Participation in SSCs)
- Kochi International Airport –The first fully renewable energy airport of the world

U4SSC – Submitted Case Studies from India

- IoT- Monitoring Water bodies in Cities
- Circular Economy-Use of Waste Plastics in Road Construction
- Circular Economy-Food Bank
- Circular Economy -Worn out discarded textiles to premium ware

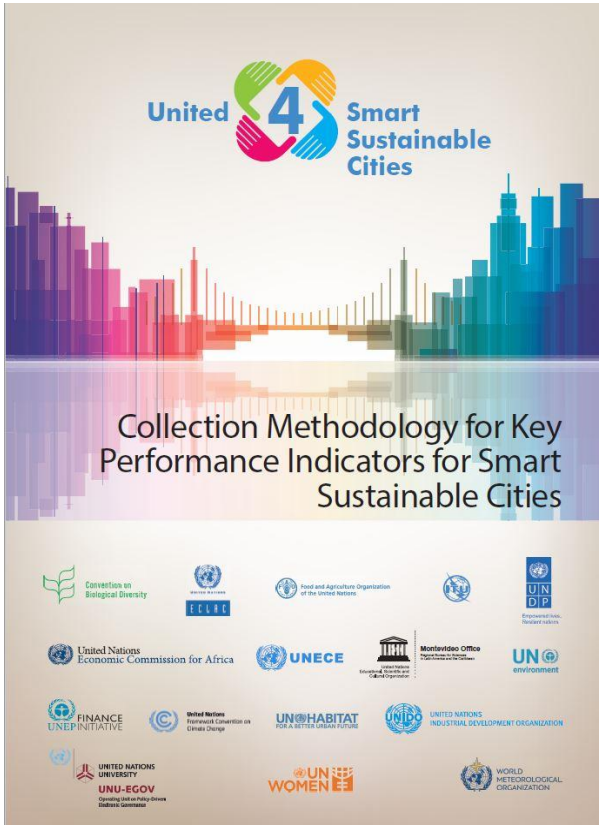
U4SSC - Current engagements

U4SSC is currently working on the following deliverables

- Guidelines on Tools and Mechanisms to Finance SSC projects
- Guidelines on strategies for Circular Cities
- City Science Application Framework
- Blockchain 4 Cities
- Guiding principles for Artificial Intelligence in cities
- The impact of Artificial Intelligence and Cognitive Computing in Cities
- The impact of Data processing and Computation in Cities
- The impact of Sensing Technologies and IoT in cities

KPIs- Key Performance Indicators

U4SSC – KPIs -Key Performance Indicators for Smart Sustainable Cities



The U4SSC Initiative has developed a set of **International Key Performance Indicators (KPIs) for Smart sustainable cities (SSC)** to establish the criteria to evaluate ICT´s contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessment.

Over 50 cities worldwide have since started implementing these KPIs

U4SSC – KPIs for Smart Sustainable Cities

Objectives of KPIs

- Achieving Sustainable Development Goals (SDGs)
- Becoming a Smart City
- Becoming a more Sustainable City

Structure of KPIs

- KPIs- Economy Dimension
- KPIs- Environmental Dimension
- KPIs- Society & Culture Dimension

Types of KPIs

- Core
- Advanced

U4SSC – KPIs for Smart Sustainable Cities

KPIs- Economy Dimension

- Household Internet Access
- Fixed Broadband Subscriptions
- Wireless Broadband Subscriptions
- Availability of Public WiFi
- Smart Water Meters
- Water Supply ICT Monitoring
- Drainage/ Storm water Monitoring
- Smart Electricity Meters
- Dynamic Public Transport Information System
- Traffic Monitoring
- Open Data
- e-Procurement

U4SSC – KPIs Smart Sustainable Cities

KPIs- Environmental Dimension

- Air Pollution
- Drinking Water Quality
- Water Consumption
- Energy Consumption
- Renewable Energy Consumption
- Public building Energy Consumption
- Waste Water Treatment
- Solid waste Treatment
- EMF Exposure
- Noise pollution exposure
- Green Areas
- Protected Green Areas

U4SSC – KPIs for Smart Sustainable Cities

KPIs- Society & Culture Dimension

- Student ICT Access
- School Enrollment
- Higher Education Degrees
- Adult Literacy
- Electronic Health Records
- Life Expectancy
- Maternal Mortality Rate
- Police Services
- Fire Services
- Traffic Fatalities
- Poverty

U4SSC – KPIs for Smart Sustainable Cities
-Economy Dimension

Dimension	Sub - Dimension	Category	KPI	Type	Type
Economy	ICT	ICT Infrastructure	Household Internet Access	Core	SMART
			Fixed Broadband Subscriptions	Core	SMART
			Wireless Broadband Subscriptions	Core	SMART
			Wireless Broadband Coverage	Core	SMART
			Availability of WIFI in Public Areas	Advanced	SMART
		Water and Sanitation	Smart Water Meters	Core	SMART
			Water Supply ICT Monitoring	Advanced	SMART
		Drainage	Drainage / Storm Water System ICT Monitoring	Advanced	SMART
		Electricity Supply	Smart Electricity Meters	Core	SMART
			Electricity Supply ICT Monitoring	Advanced	SMART
			Demand Response Penetration	Advanced	SMART
		Transport	Dynamic Public Transport Information	Core	SMART
			Traffic Monitoring	Core	SMART
			Intersection Control	Advanced	SMART
		Public Sector	Open data	Advanced	SMART
			e-Government	Advanced	SMART
			Public Sector e-procurement	Advanced	SMART
	Productivity	Innovation	R&D Expenditure	Core	STRUCTURAL
			Patents	Core	STRUCTURAL
			Small and Medium-Sized Enterprises	Advanced	STRUCTURAL
		Employment	Unemployment Rate	Core	STRUCTURAL
			Youth Unemployment Rate	Core	STRUCTURAL
			Tourism Sector Employment	Advanced	STRUCTURAL
			ICT Sector Employment	Advanced	STRUCTURAL

U4SSC – KPIs for Smart Sustainable Cities
-Economy Dimension (contd.)

Dimension	Sub - Dimension	Category	KPI	Type	Type
Economy	Infrastructure	Water and Sanitation	Basic Water Supply	Core	SUSTAINABLE
			Potable Water Supply	Core	SUSTAINABLE
			Water Supply Loss	Core	SUSTAINABLE
			Wastewater Collection	Core	SUSTAINABLE
			Household Sanitation	Core	SUSTAINABLE
		Waste	Solid Waste Collection	Core	SUSTAINABLE
		Electricity Supply	Electricity System Outage Frequency	Core	STRUCTURAL
			Electricity System Outage Time	Core	STRUCTURAL
			Access to Electricity	Core	STRUCTURAL
		Transport	Public Transport Network	Core	SUSTAINABLE
			Public Transport Network Convenience	Advanced	SUSTAINABLE
			Bicycle Network	Core	SUSTAINABLE
			Transportation Mode Share	Advanced	SUSTAINABLE
			Travel Time Index	Advanced	SUSTAINABLE
			Shared Bicycles	Advanced	SUSTAINABLE
			Shared Vehicles	Advanced	SUSTAINABLE
			Low-Carbon Emission Passenger Vehicles	Advanced	SUSTAINABLE
		Buildings	Public Building Sustainability	Advanced	SUSTAINABLE
			Integrated Building Management Systems in Public Buildings	Advanced	SMART
		Urban Planning	Pedestrian infrastructure	Advanced	SUSTAINABLE
			Urban Development and Spatial Planning	Advanced	SUSTAINABLE

U4SSC – KPIs for Smart Sustainable Cities
-Environmental Dimension

Dimension	Sub - Dimension	Category	KPI	Type	Type
Environment	Environment	Air quality	Air pollution	Core	SUSTAINABLE
			GHG Emissions	Core	SUSTAINABLE
		Water and Sanitation	Drinking Water Quality	Core	SUSTAINABLE
			Water Consumption	Core	SUSTAINABLE
			Freshwater Consumption	Core	SUSTAINABLE
			Wastewater Treatment	Core	SUSTAINABLE
		Waste	Solid Waste Treatment	Core	SUSTAINABLE
		Environmental Quality	EMF Exposure	Core	SUSTAINABLE
			Noise Exposure	Advanced	SUSTAINABLE
		Public Space and Nature	Green Areas	Core	SUSTAINABLE
			Green Area Accessibility	Advanced	SUSTAINABLE
			Protected Natural Areas	Advanced	SUSTAINABLE
			Recreational Facilities	Advanced	SUSTAINABLE
	Energy	Energy	Renewable Energy Consumption	Core	SUSTAINABLE
			Electricity Consumption	Core	SUSTAINABLE
			Residential Thermal Energy Consumption	Core	SUSTAINABLE
			Public Building Energy Consumption	Core	SUSTAINABLE

U4SSC – KPIs for Smart Sustainable Cities
-Social & Cultural Dimension

Dimension	Sub - Dimension	Category	KPI	Type	Type
Society and Culture	Education, Health and Culture	Education	Student ICT Access	Core	SMART
			School Enrollment	Core	STRUCTURAL
			Higher Education Degrees	Core	STRUCTURAL
			Adult Literacy	Core	STRUCTURAL
		Health	Electronic Health Records	Advanced	SMART
			Life Expectancy	Core	STRUCTURAL
			Maternal Mortality Rate	Core	STRUCTURAL
			Physicians	Core	STRUCTURAL
			In-Patient Hospital Beds	Advanced	STRUCTURAL
			Health Insurance / Public Health Coverage	Advanced	STRUCTURAL
		Culture	Cultural Expenditure	Core	STRUCTURAL
			Cultural Infrastructure	Advanced	STRUCTURAL
	Safety, Housing and Social Inclusion	Housing	Informal Settlements	Core	STRUCTURAL
			Housing Expenditure	Advanced	STRUCTURAL
		Social inclusion	Gender Income Equity	Core	STRUCTURAL
			Gini Coefficient	Core	STRUCTURAL
			Poverty	Core	STRUCTURAL
			Voter Participation	Core	STRUCTURAL
			Child Care Availability	Advanced	STRUCTURAL
		Safety	Natural Disaster Related Deaths	Core	SUSTAINABLE

U4SSC – KPIs for Smart Sustainable Cities
-Social & Cultural Dimension (contd.)

Dimension	Sub - Dimension	Category	KPI	Type	Type
			Disaster Related Economic Losses	Core	SUSTAINABLE
			Resilience Plans	Advanced	SUSTAINABLE
			Population Living in Disaster Prone Areas	Advanced	SUSTAINABLE
			Emergency Service Response Time	Advanced	STRUCTURAL
			Police Service	Core	STRUCTURAL
			Fire Service	Core	STRUCTURAL
			Violent Crime Rate	Core	STRUCTURAL
			Traffic Fatalities	Core	STRUCTURAL
		Food Security	Local Food Production	Advanced	SUSTAINABLE

U4SSC – KPIs for Smart Sustainable Cities -Numbering Convention

Table 4 — KPI numbering convention

XX -		X(XX):		X(XX):		Number	C or A
Dimension		Sub-Dimension		Category		1, 2, 3, etc.	C: Core A: Advanced
EC	Economy	E	Energy	AQ	Air Quality		
EN	Environment	EH	Education, Health and Culture	B	Buildings		
SC	Society and Culture	EN	Environment	C	Culture		
		I	Infrastructure	D	Drainage		
		ICT	ICT	E	Energy		
		P	Productivity	ED	Education		
		SH	Safety, Housing and Social Inclusion	EM	Employment		
				EQ	Environmental Quality		
				ES	Electricity Supply		
				FS	Food Security		
				H	Health		
				HO	Housing		
				IN	Innovation		
				ICT	ICT Infrastructure		
				PS	Public Sector		
				PSN	Public Spaces and Nature		
				SA	Safety		
				SI	Social Inclusion		
				T	Transport		
				UP	Urban Planning		
				WA	Waste		
				WS	Water and Sanitation		

U4SSC – KPIs for Smart Sustainable Cities
-Collection methodology

Dimension	Economy				
Sub-Dimension	**ICT**				
Category	**ICT Infrastructure**				
KPI Name	**Household Internet Access**				
KPI No.	**EC: ICT: ICT: 1C**	**Type:**	**Core**	**Type:**	**Smart**
Definition / Description	Percentage of households with Internet access				
Rationale / Interpretation / Benchmarking	This indicator demonstrates the access to information and technology connectivity given that connectivity across regions and between countries is correlated to economic prosperity, development and growth. This in turn underscores a city inhabitant's access to knowledge, data, news and communication to use for economic productivity, i.e. training, education, research, business management, ideas exchange, etc. Data that includes any household's access via a fixed or mobile network at any given time should be collected. An increasing trend and higher values are considered positive.				
Methodology	Calculate as: Numerator: Number of households with internet access. Denominator: Total number of households. Multiply by 100				
Unit	Percentage				
Data Sources / Relevant Databases	The data may be collected from the local statistics department, or may need to be extrapolated from national data. Annual surveys of households may be another method for data collection to obtain the percentage of households with internet access. This percentage will then be applied to the in-scope population. The data may also be collected from local internet service providers and telecommunications companies.				
SDG Reference(s)	SDG Indicator 17.8.1: Proportion of individuals using the Internet.				

Smart Cities initiative in India

Indian Scenario – Smart Cities

- Started in 2015
- 100 cities have been identified
- Some cites have started working on ICT related solutions
- Challenges
  - KPIs-Key performance Indicators not being followed
  - Efforts at replicating the advanced cities
  - The consultant plays a key role in deciding what all the city should have
  - Stakeholders are driven on a predetermined path , while under an illusion that it is they are the decision makers
- Sustainability has taken a back seat.

Smart Cities -Issues

- Water Management
- Waste Management
- Air Management
- Traffic Management
- Mobility
- Housing
- Food/ Agriculture
- Energy Management
- Health
- Education
- Safety and Security
- Governance
- Financial Inclusion
- Communication

Water Management

- Recycling/Green patches – Drip Irrigation – IoT based
- Drinking water/ Water ATMs
- Water Harvesting
  - Rain Water
  - Sewage treatment
  - Saline Water utilization
- Monitoring Pollution- IoT based, Centralised
  - Effluents
  - Industries

- **SDG – 6/ SDG 11**

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Waste Management

- General Waste Management – Is Indore the role Model?
- Decentralized Units
- Garbage Segregation
- Effluent Treatment plants
  - Centralized Monitoring – IoT based
- Generation of Fertilizers (organic)
- Aerobic/Anaerobic Toilets
- Reduction in Hardware requirements
- Processing Plants for proper disposal
- e-Waste Management

Air Management

- Individual vehicle Exhaust Monitoring – IoT based
  - Electric Vehicles
- No polluting Industries around
- Non Conventional Sources of Energy
  - Solar
  - Wind
  - Fuel Cell based

SDG 11 / **SDG 13**

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Mobility Management

- Huge transportation implications
  - Pollution of the environment
- Solutions-
  - Public Transport
    - Broad Metro Network
  - Agricultural Products
    - Clusters around Smart Cities
    - Livelihood generation
  - Finished Goods
    - Local products

SDG – 1 / SDG – 8

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Housing

- Vaastu Shastra
  - Ecofriendly
  - Low heating / cooling requirements
- Bhutan Example
  - Natural light 12 hours a day
  - Heating/cooling solar and wind
- Others
  - Hollow bricks
  - Local Materials – Prashank
- Inclusive – UN Habitat 2030
  - Houses for the domestic and industrial help within each of these housing complexes (**Dharavis to be prevented**)

SDG – 1 / SDG 11

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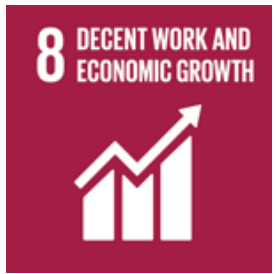
Agriculture

- Clusters around cities
  - Chandigarh city– Le Corbusier
- Food/ Vegetables (Local produce best for the area)
- Animal Farms
- Controlled Irrigation – IoTs based
- PURA(Providing Urban amenities in Rural Areas) important to ensu inclusive development
  - Dr. Abdul Kalam's vision
  - Financial Inclusion
  - Prevention of Infrastructure overload in cities
- Farmer in India, Pakistan, Africa would be like his counterpart in Australia

SDG – 1

SDG – 2

SDG – 8



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Health

- Citizen Health Record
- People with special needs – IoT monitoring
  - People with Epilepsy
- Promotion of Local medicines
  - Learn from tribals
- Mother and child care – mHealth

SDG – 3

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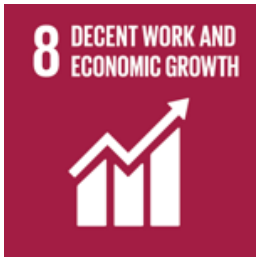
Education

- e-Networks
  - Maintain quality throughout (No long distance schooling)
- Digital Libraries
- Objective of education
  - Inclusive
  - Equitable
  - Equal Opportunity

- **SDG – 4/ SDG – 5/ SDG – 8**



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Governance

- Land records
  - GIS mapping
- Infrastructure
  - GIS mapping
- Citizen Centre- Online
  - With SLA conditions

SDG 11

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Safety & Security

- Women/Children – Safety
  - Panic button in mobile
  - CCTV cameras in the city
- Terrorist threats
  - Non-Clonable ID
  - Facial Recognition System
- Crime and Criminal Tracking System
- Big Data Analytics
  - Preventive measures for controlling crime
- No slums like Dharavi – biggest slum in Asia
  - Dharavi – Hub of organized crime

SDG 10/ 16

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Communications

- LTE/4G Networks/ 5G Networks
  - Less peak energy consumption
  - Use of Solar energy
- FMC –Fixed Mobile Convergence
  - Less no. of Mobile Towers
  - Less energy consumption
  - Lower Non Ionizing Radiation
- Continuous monitoring of EMF radiation in the town

Growth of Flora / Fauna

- Local Trees/Plants
  - IoT monitoring
  - Monitoring by drones
- Regular planting of trees
  - Special Monsoon drive in Delhi
- Maintenance of the ecosystem for the Fauna
  - Monitoring by drones

SDG 11 / SDG 13

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Energy

- Natural Lighting
- Smart Lighting
  - Human presence based
- Smart cooling/heating
- Smart metering
- Smart Grids
  - Net Metering

SDG 7

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Financial Inclusion

- Separate Bank A/Cs for all
  - Jan Dhan Yojana in India
- Accessibility to Finances
  - Financial Transactions using Bhim/PayTM/mPaise
- Equal work equal pay
  - Payments only into individual accounts
  - Monitoring by enforcement agencies

- **SDG – 1/ SDG – 5 / SDG – 8**

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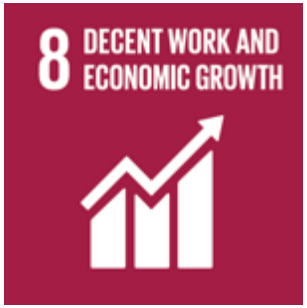
Economic Growth

- Generation of employment opportunities
  - Through intense economic activity
- Increased Employability of young population
- Policy measures

- SDG – 8



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Infrastructure and industrialization

- Resilient Infra
  - Transportation/Roads/Railways/ Cycle lanes
  - Bus services
  - City Centres
- Industrialization
  - Support localized industries
  - Incentives for local products
- Innovation
  - Create Centers of excellence linking Educational Institutions with the Industry
  - Ancient knowledge dissemination to be encouraged
    - Egyptian Pyramids
    - Concept of Time – Indian literature
    - No need to reinvent the wheel.

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Wholesome World

- Spiritual Knowledge Dissemination
  - Sharing of Knowledge
  - Sharing of best practices
  - Sharing resources
- Antithesis of Protectionism
- *Vasudeva Kutumbakam*
  - Not only humans, but the whole environment included
- Reduce inequality within and among countries
- More people like
  - Wilhelm Rontgen (X Ray)
  - Jonas Salk (patent free polio vaccine).
- Innovations for the welfare of the world

SDG – 10

Potential Domains for Digital Skilling in India

Challenges faced by the Developing Nations

- Food
- Health
- Environment
- Education
- Water Management
- Energy
- Financial Inclusion
- Governance deficit
- Disaster preparedness
- Communications
- Security
- Corruption

Technologies of Today and Tomorrow

- e- Networks
- M2M/ IoT
- GIS Mapping
- Artificial Intelligence
- Virtual Reality/ Augmented Reality
- 3 D Printing
- 5 G Networks for Communication
- Solar Energy
- Non Clonable ID
- Block Chain
- Big Data / Analytics

Potential Domains for Digital Skilling in India

e- Networks

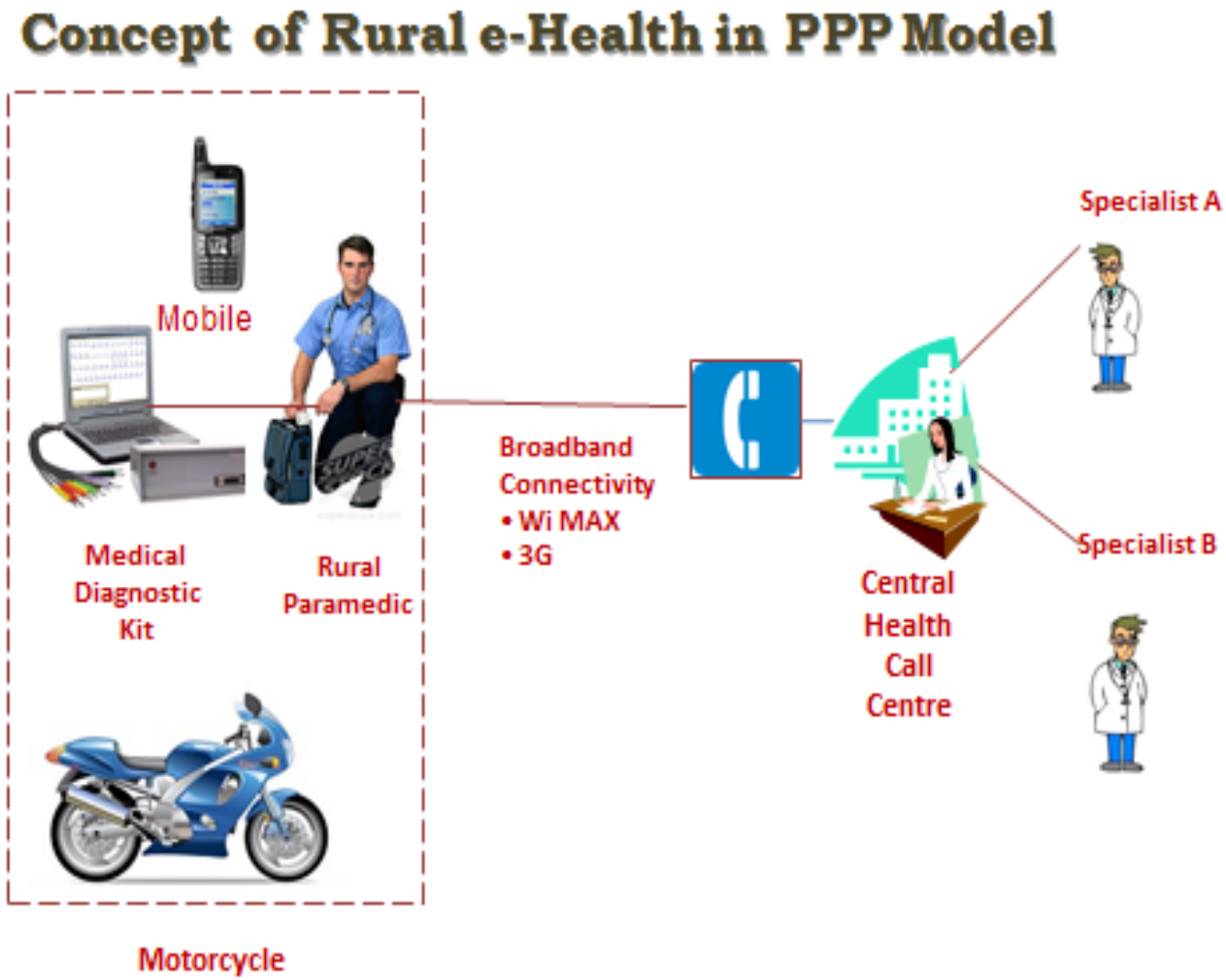
Health

- Rural Tele Medicine
- Continued Medical Education
  - Live Demo of Surgeries
- Teleconsultation
- Mother & Child Care
- m-Health
- Chronic Patients management
- Maintenance of patient records

Potential Domains for Digital Skilling in India

Health

e- Networks



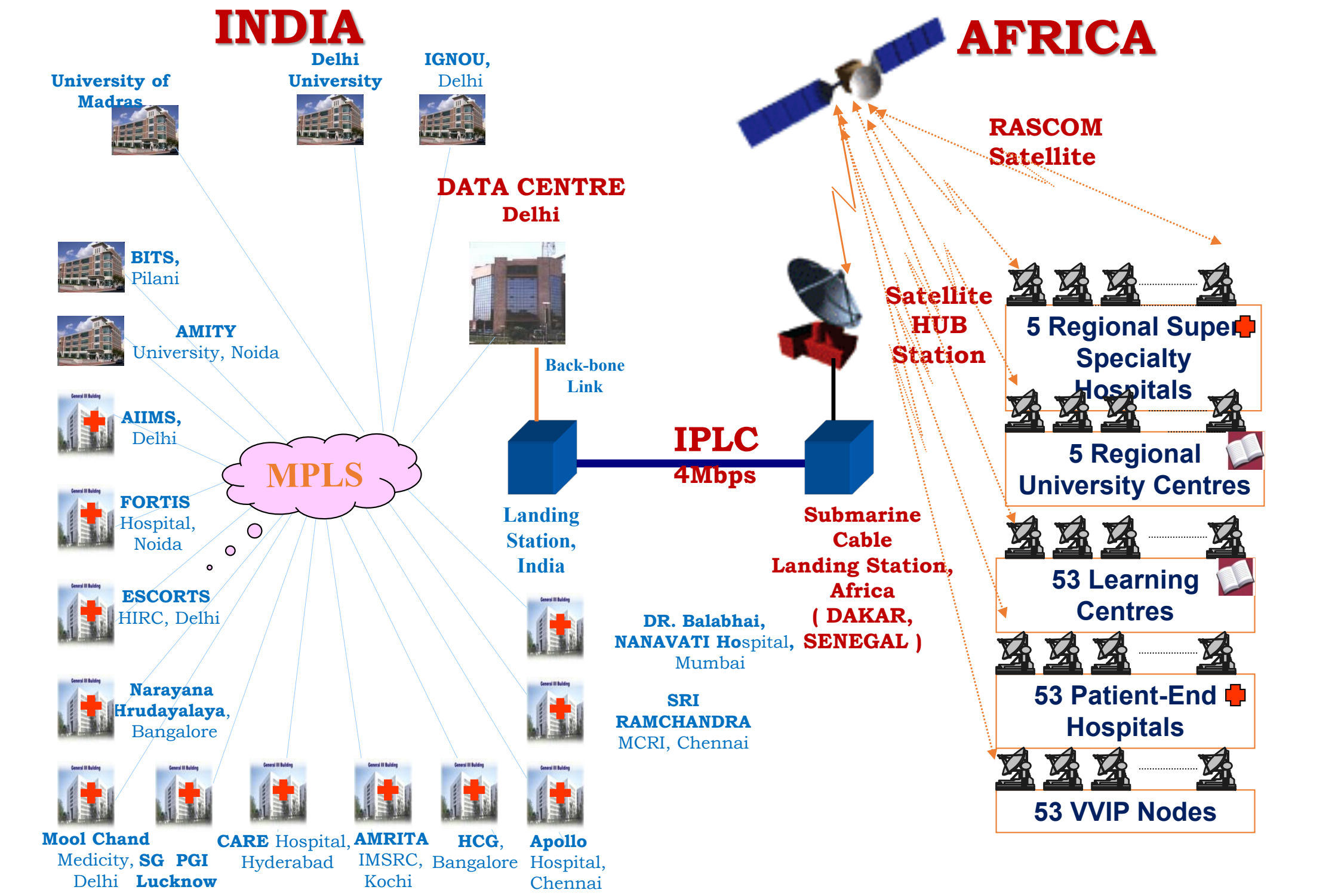
Pathological Kit

Potential Domains for Digital Skilling in India

e- Networks

Education

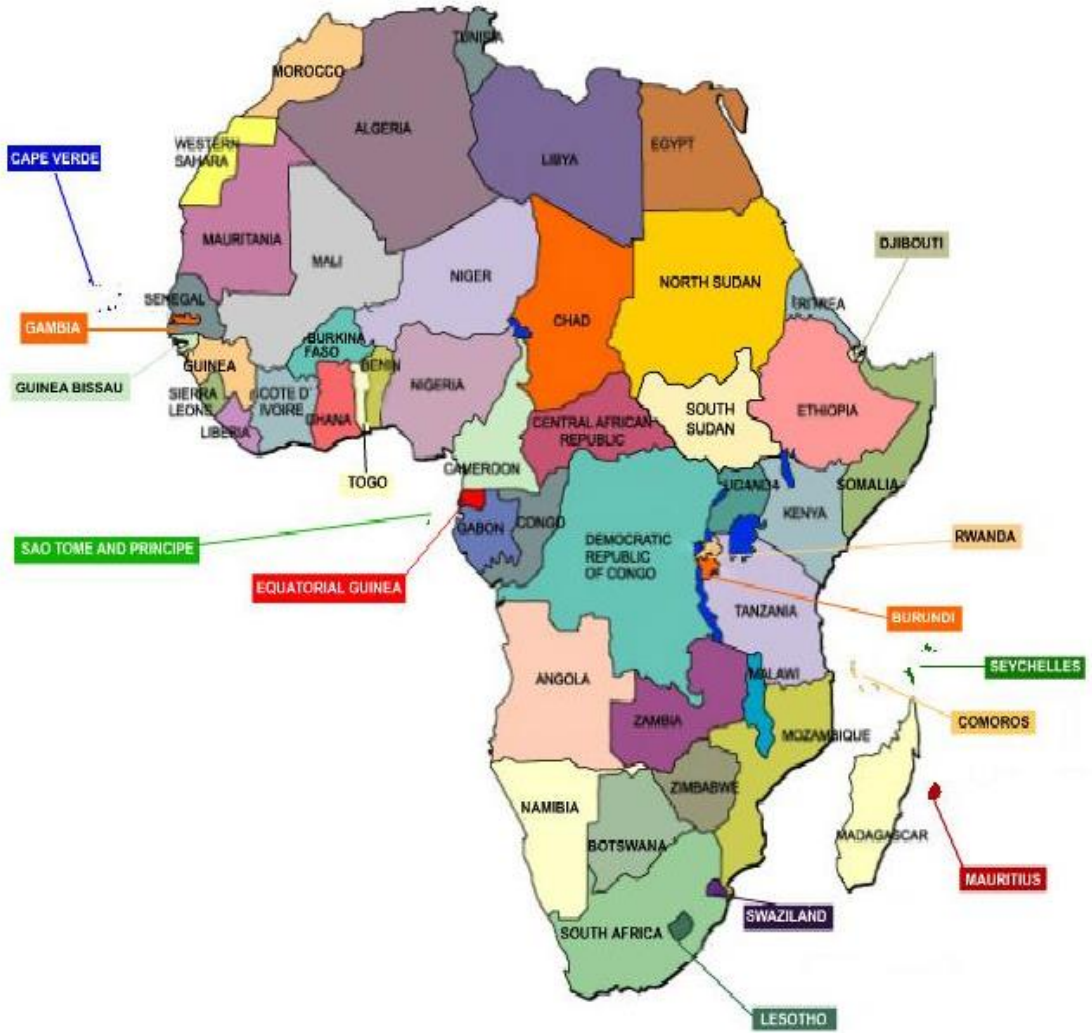
- Virtual Classrooms
  - Pan Africa
  - UNOM
  - SAARC
- Collaborative research/ 'Centers of Excellence' replication
- Digital content /Digital Libraries
- Skill Development – 'Learn as you Earn'
- Employability enabling courses



ARCHITECTURE OF PAN-AFRICAN e-NETWORK

48 Countries of African Union are a part of the Project

1. Benin
2. Botswana
3. Burkina Faso
4. Burundi
5. Cameroon
6. Cape Verde
7. CAR
8. Chad
9. Comoros
10. Congo
11. Cote d'Ivoire
12. D.R. of Congo
13. Djibouti
14. Guinea-Bissau
15. Egypt
16. Eritrea
17. Ethiopia
18. Gabon
19. The Gambia
20. Ghana
21. Guinea
22. Kenya
23. Lesotho
24. Liberia
25. Libya



26. Madagascar
27. Malawi
28. Mali
29. Mauritania
30. Mauritius
31. Mozambique
32. Namibia
33. Niger
34. Nigeria
35. Rwanda
36. Sao Tome and Principe
37. Senegal
38. Seychelles
39. Sierra Leone
40. Somalia
41. South Sudan
42. Sudan
43. Swaziland
44. Tanzania
45. Togo
46. Uganda
47. Zambia
48. Zimbabwe

Dr. A.P.J Abdul Kalam delivering inaugural special lecture to African Nations from Studio of Pan Africa e Network project, TCIL HQ

Potential Domains for Digital Skilling in India

M2M/ IoT (Machine to Machine/ Internet of Things)

- Air Pollution
- Water Pollution
  - Cleaning of the Ganga – Centralised monitoring
- Water Management
  - Equitable/ Transparent Distribution
  - Sardar Sarovar Project –automated gate control
- Agriculture
  - Effective weather forecasting
  - Controlled irrigation
    - based on moisture and temperature

Potential Domains for Digital Skilling in India

M2M/ IoT (Machine to Machine/ Internet of Things)

- Infrastructure Monitoring
  - Flyovers
  - Bridges – Australian Experience
- Financial Inclusion
  - Bank to Mobile direct transaction- m Banking
  - Postal Rural ICT devices
    - Not at the mercy of postmen !
- Mandatory PoS devices for all
  - MSME segment
  - Prevention of Tax evasion

Potential Domains for Digital Skilling in India

M2M/IoT(Machine to Machine/ Internet of Things)

- Smart Ambulances
  - Monitoring of critical patients enroute to hospitals
- Road Safety
  - Smart vehicles
    - Prevention of accidents
- Energy Sector
  - Smart Metering
    - No Power pilferages
  - Smart Grids
    - Smart Power- Peak period pricing

Potential Domains for Digital Skilling in India

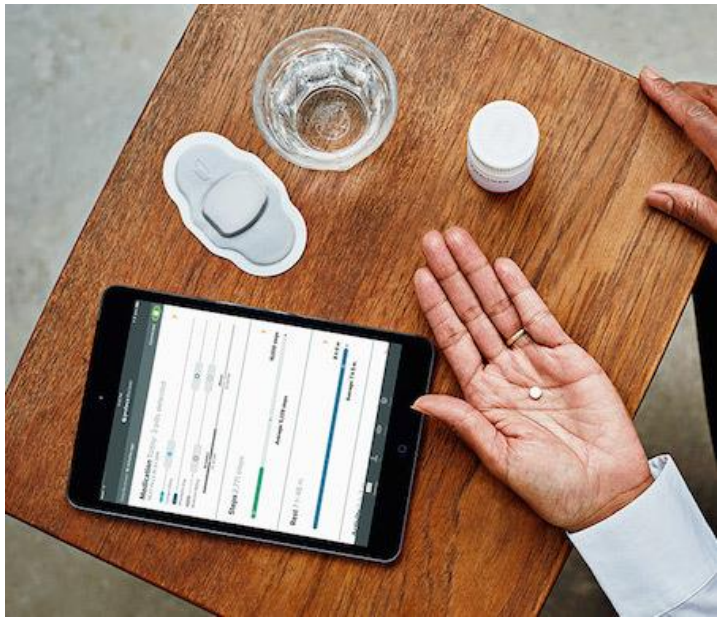
M2M/ IoT (Machine to Machine/ Internet of Things)

- Homeland Security
  - CCTNS – Crime & Criminal Tracking System
- Defense
  - Smart fences
  - Borders
    - Use of Intrusion Detection OFC system
- Smart Cities –challenges
  - Social
  - Economic
  - Environmental

Potential Domains for Digital Skilling in India

Health

- Ingestible sensors
- Remote monitoring of patients
- Implantable Continuous Glucose monitoring system
- Open **artificial pancreas** system
  - Controlling diabetes
- Managing **Parkinson's disease**



Potential Domains for Digital Skilling in India

GIS Mapping

- Satellite Imagery
- Agriculture
  - Identification of Arable lands
- Water sources identification
- Digitization of land records
  - Transparency in the system
    - A challenge in the Developing Nations
  - Ease of transfer
- Mapping of Resources
  - Gas pipe lines
  - Water supply
  - Electric cables
  - Communication cables

Potential Domains for Digital Skilling in India

Artificial Intelligence

- Traffic Management
  - Air
  - Road
- Management of Resources within a city
- Machine learning
- Modern Call Centres
- Health Sector
  - People with Physical Challenges
  - **Microsoft – Seeing AI** https://youtu.be/R2mC-NUAmMk
- Robotics

Potential Domains for Digital Skilling in India

Virtual Reality (VR)/ Augmented Reality(AR)

- Huge application in Medical Education
  - Capacity building
- Surgeries become more effective
  - No last minute surprises -prove fatal for the patient whose organ has been opened
- Curing Phobias in Patients
- Curing Post Traumatic Stress Disorder
- Rehabilitation of patients having suffered Stroke
- Parkinson's disease management
- Pain reduction

Potential Domains for Digital Skilling in India

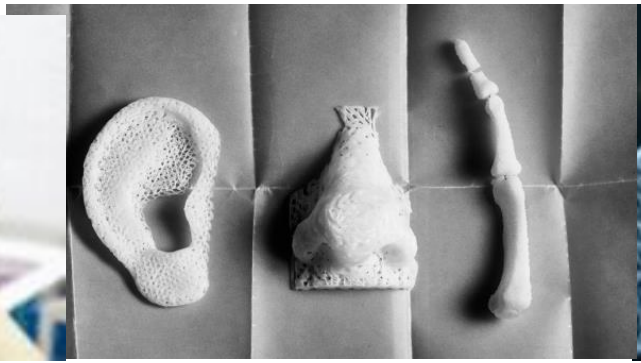
3D Printing

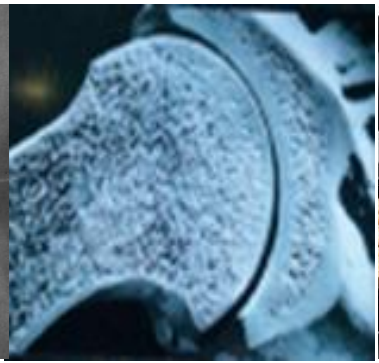
- Cost effective solution for **Prototype development**
  - Jet Engine optimization
  - Space – tool development
- MSME Sector in India
  - Jugaad
  - Fastract- prototype to final production
- **Cost effective housing**
- Big boost to **Make in India** program
  - Innovation Hub
  - Manufacturing Power House of the world

Potential Domains for Digital Skilling in India

3D printing -Healthcare

- Bone structure featuring porous bone structure
- Dentistry
- Prosthetics
- Bio printing of live tissues using cells as ink
  - Cartilages – Ear / Nose
  - Fingers
  - Heart - latest
- Customised Drug printing





Potential Domains for Digital Skilling in India

Solar Energy

- Reduced emphasis on Grid supply
- Grid connected Solar Power units with Net-metering
- Savings on precious foreign exchange on imports
  - Diesel for Mobile communication towers
- Stand alone Micro units for Rural areas - Solar based
  - Just US$ 50
  - Meets requirements of
    - Lighting
    - Fans
    - Charging Mobiles
    - Terminal devices

Potential Domains for Digital Skilling in India

Communications

- 5G Networks / WiFi
  - Roll out of the Network
  - Network optimization
  - Infrastructure Management
  - Operation and Maintenance of Network
  - Development of Applications
- Fixed Mobile Convergence (FMC)
  - Network optimization

Potential Domains for Digital Skilling in India

Block Chain

- Hyper ledger
- Transparency
- Supply chain Management
- Quality Assurance
- Security of Transactions

- Dubai Smart City- Mandatory

Potential Domains for Digital Skilling in India

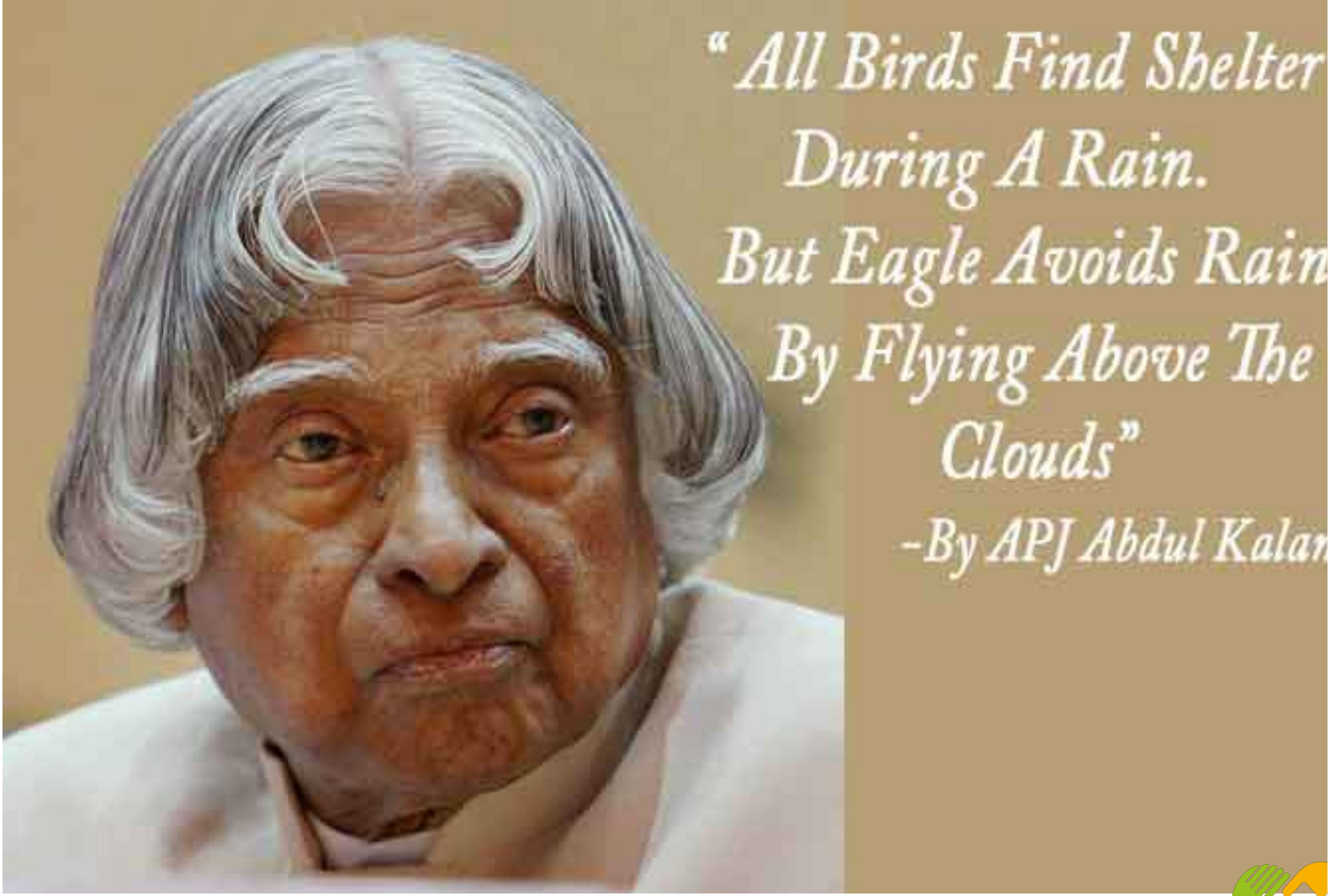
Big Data / Analytics

Big data and Data Analytics for-

- Safety and Security
  - Terrorism
  - Lynchings
- Analysing the citizen's **requirements**
- Checking the **impact** of various schemes of the government
  - Mid-course correction
- **Planning resources** in various sectors **optimally**
- Ensuring that the benefits of various schemes reach the **intended beneficiaries**
- Ensuring that **Mega schemes** do not get **usurped** by mafias that are hand in glove with some politicians.

Conclusions

- Developing Nations face huge challenges
- These challenges in various domains can be mitigated leveraging Technology
- There is tremendous potential for capacity building
- These Human and Technical challenges can be addressed through Digital Skilling
- e-Networks , Augmented Reality (AR) , Virtual Reality (VR) can play a major role in this



Skill people to become Eagles !

U4SSC-United For Smart Sustainable Cities

-An initiative of ITU & UNECE

Thank You!