Science, technology and innovation for sustainable urbanisation, urban planning and local governance

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The dynamic urban context

- Cities of the developing world are growing rapidly (high-speed/dynamic growth)
- Densification, infill, renewal being advocated to prevent urban sprawl and build compact cities
- Concern about quality of open/public spaces, as well as public services, infrastructure and mobility
- Increasing concern about climate change, natural and man-made disasters

A few illustrations

How science, technology and innovation can contribute to:

- More effective urban/regional planning
- Better service delivery
- Improved mobility
- Enhanced city resilience

Environmental management through a **Planning Information System in Oman**

- **Oman National Spatial Strategy** (ONSS) information system grouped into three main systems:
  - Oman Planning Information System (OPIS)
  - Map Atlas
  - Monitoring System

- **OPIS main elements:**
  - Data requirements defined
  - Data collected from different sources and institutions (data providers)
  - Data evaluated and quality checked according to defined criteria (accuracy, completeness, timeliness, metadata etc.)
  - Data processed, compiled and integrated in one geodatabase

Environmental management through a **Planning Information System in Oman**

- **OPIS is the hub** for every spatial data interaction between all parties
- **Managed by a central institution** and several data stewards responsible for the data content and associated business rules
- **Data-integration processes** include compliance to the data quality requirements
- OPIS linked to a **Map Atlas** and a comprehensive **GIS capacity-building programme**

Source: Schrenk et al 2012

Use of spatial data and information in urban development and planning

Issue	Use of Spatial Information	Examples
Access to serviced land	Current location of serviced land	Cadastral maps overlaid with aerial phots and utility networks
Utility services	Location and attributes of water, sewerage, storm water, electricity and telephone networks	Cadastral maps and database showing utility services
Impact of climate change	Vulnerability to rising sea level, tidal surges, flash floods	Flood prone land mapping and real time weather mapping
Secure property rights	Spatial extent and type of property rights	Land titles register
Community participation	Public access to cadastral, planning and environmental information affecting individuals and the community	Public display of proposed developments
Transport	Location and status of public roads and traffic	In-car navigation using up-to-date road network and GPS

Source: Adapted from Mueller 2010

Innovative ways of waste management: **Waste Concern, Dhaka**

- In Bangladesh, the urban population generates on an average 14,000 tons of waste per day, which increases by 46% in the monsoon.
- Average per capita urban waste generation - 0.41 kg/day
- 12 million people citizens of Dhaka produce about 4,700 tons of solid waste per day.
- Dhaka City Corporation responsible for waste management.
- Less than 40% of total waste collected by DCC; disposed off in unmanaged landfill sites.
- Waste Concern founded as an NGO in 1995
- Enabled reduction of greenhouse gas emissions by 17,000 tons between 2001 and 2006, and saved 33 acres of landfill area.

Innovative ways of waste management: **Waste Concern, Dhaka**

- Promoted the principles of Reduce, Reuse, Recycle and Recover waste
- Offered a community-based composting model with multiple benefits
- Has reduced uncollected waste in Dhaka by 52%
- Three types of composting methods developed - Aerobic Composting, Box Type Composting and Barrel Type Composting.
- Four types of financial models developed – partnership between municipality, community and private sector
- Waste Concern has now initiated the world's first carbon trading-based composting project at a cost of Euro 12 million.
- The project has a capacity of composting 700 tons of waste per day along with a landfill gas extraction and utilization through its three planned recycling plants.

Source: Rahman 2011

Enhanced mobility with lower pollution: **Public transport in New Delhi and Ahmedabad**

- Mobility is a serious challenge in most Indian cities
- Key issues - inadequate transport infrastructure, an unbalanced modal split heavily favouring private transport, and little integration between land use and transport planning.
- A range of public transport options being tried, e.g. improved and environment-friendly bus services, bus rapid transit, and metro rail systems.

Source: Narang Suri 2010

Enhanced mobility with lower pollution: **Metro and CNG in New Delhi**

- **Delhi Metro** - the most extensive metro-rail network in the country developed over the past fifteen years.
- Delhi Metro ferries upto 2.3 million commuters every day on seven lines.
- **Use of CNG** - All public service vehicles in Delhi run on CNG since 2001-02. By 2008, 3,500 CNG buses, 12,000 taxis, 65,000 auto rickshaws and 5,000 mini buses ran on CNG.
- Between 2000-2008 carbon emissions had plummeted by 72% while SO2 emissions decreased by 57%.

Enhanced mobility with lower pollution: **Bus Rapid Transit System in Ahmedabad**

- **Vision** of Ahmedabad BRTS:
  - Greater accessibility
  - Efficient mobility
  - A lower carbon future
- Extensive **technological applications such** as:
  - Automatic Vehicle Tracking and passenger information systems
  - use of smart cards
  - surveillance and security systems, and Area Traffic Control Systems at junctions

- **Other features:**
  - Dedicated right-of-way for the buses
  - Median bus stations with barrier-free access and at-level boarding to enhance accessibility and save time.
  - Innovative public-private partnership arrangements to provide footbridges, landscaping and maintenance of the corridor, as well as operation and maintenance of a pay and park system.
  - The BRTS today carries an average of 125,000 passengers per day using 70 buses.

Building city resilience through infrastructure: **SMART Tunnel, Kuala Lumpur**

- **SMART** - Stormwater Management and Road Tunnel
- Initiated to **alleviate the flooding problem** in the city centre of Kuala Lumpur. Implemented as a PPP.
- The SMART system will be able to divert large volumes of flood water from entering the city centre via a holding pond, bypass tunnel & storage reservoir.
- **Integrated motorway tunnel** provides an alternative route that reduces traffic congestion and travel time significantly.

Building city resilience through infrastructure: **SMART Tunnel, Kuala Lumpur**

Modes of operation

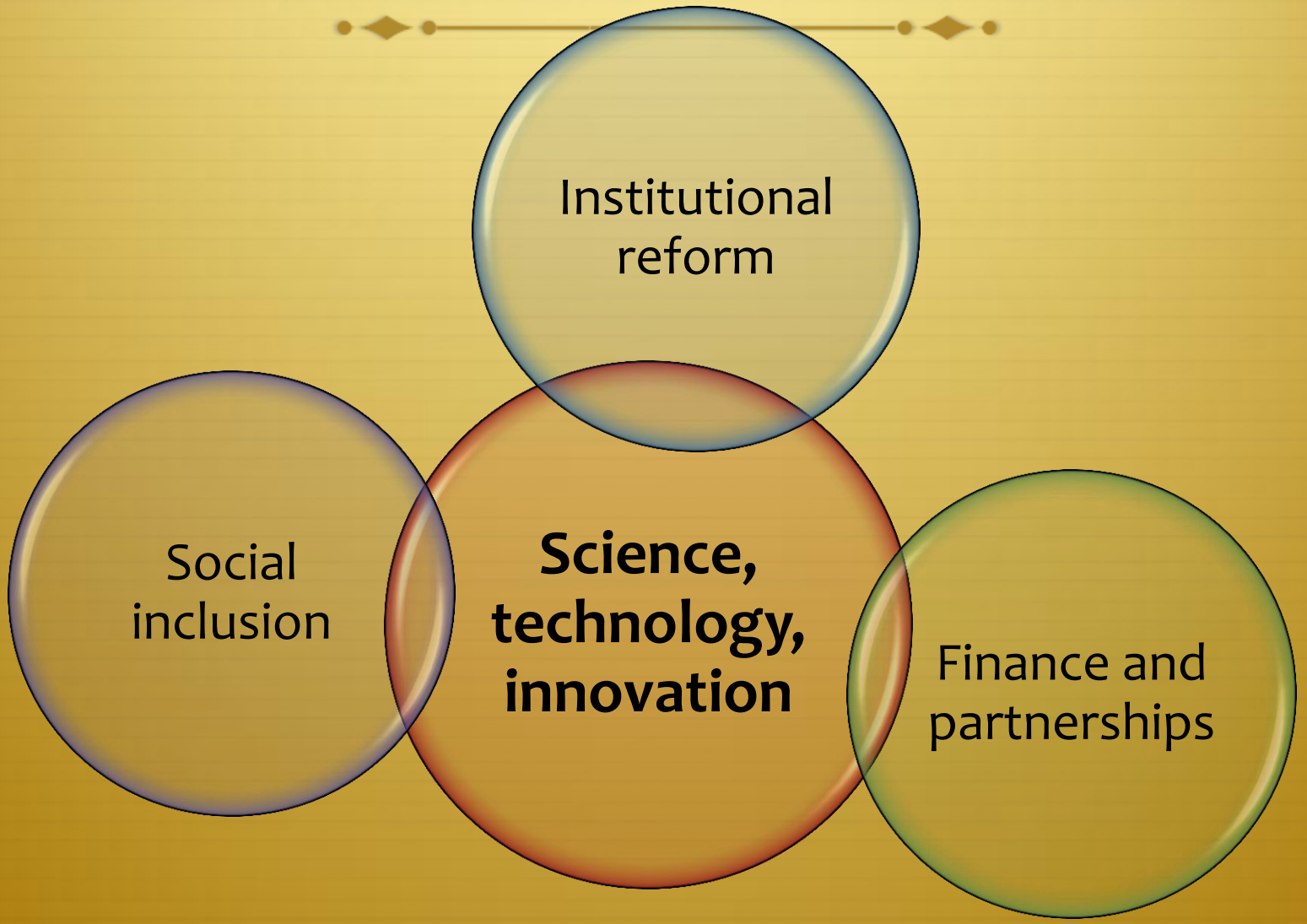
- **Mode One** - normal conditions, no water needs to be diverted into the tunnel.
- **Mode Two** - Moderate storms, floodwater diverted into a bypass tunnel in the lower section of the motorway tunnel, which remains open to traffic.
- **Mode Three/Four** - Once or twice a year, heavy storms, tunnel closed to road traffic and the full tunnel section available to divert the dramatically increased flows.

Unique features

- Automated Flood Control Gates
- Cross Passage
- Ventilation/Escape Shafts
- Radio Re-Broadcasting Services
- Air Quality Monitoring Equipment (AQME)
- Other Emergency Equipments
- First Responder Vehicle (FRV)
- Medical Response Vehicle
- Road Sweeper

Source: www.smarttunnel.my

Is Innovation enough?



Institutional reform

- Reforming policy, legislation, regulations
- Making local governments and service providers more responsive
- Building capacity within local institutions
- Enhancing transparency and accountability
- Building political will

Social inclusion

- Engagement with the community
- Responsiveness to needs of different groups
- Community education and awareness-building
- Ensuring that the rights of traditionally excluded groups are upheld

Financing and partnerships

- Making the financial case for interventions and projects
- Building public-private-community partnerships
- Clear and well-developed, bankable projects

In conclusion…

- Innovation is central to achieving sustainable urban development
- Innovation needs some pre-requisites to succeed
- Institutional reform, social inclusion, finance and partnerships are key
- Finding solutions that work on all these counts takes time

"When you first start off trying to solve a problem, the first solutions you come up with are very complex, and most people stop there. But if you keep going, and live with the problem and peel more layers of the onion off, you can often times arrive at some very elegant and simple solutions. Most people just don't put in the time or energy to get there."

– Steve Jobs

Thank you for your attention!