



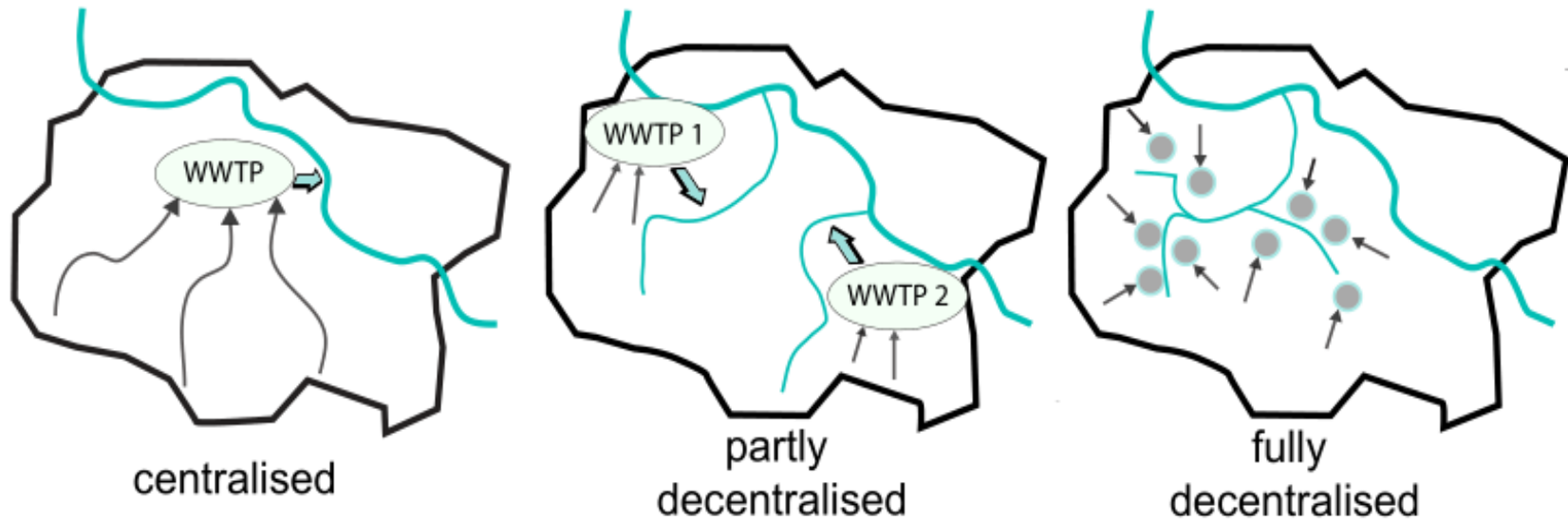
# Workshop 1: The Key Role of FSM in Modern Urban Sanitation Systems

Chennai, India 23 February 2017

# Cities are characterized by diversity of settlement types



## Range of models for sanitation provision exists





# Conundrum: Sanitation approaches - institutional systems - city size / growth

## Individual System Pit Latrines

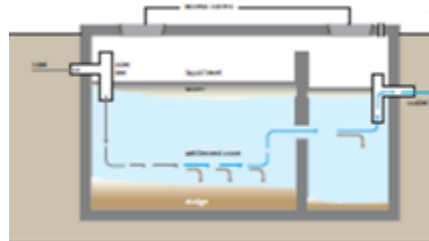


**Upgrade**

### Managed by Households

- Mason

## Septage Management System Septic Tank



**Upgrade**

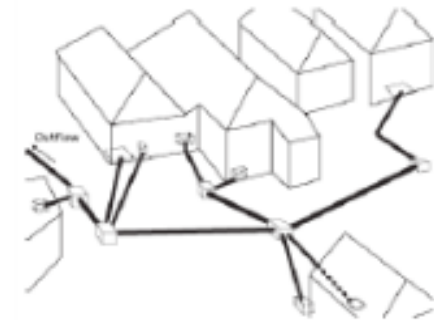
### Managed by Households

- Mason
- Plumber

### Managed by City / ULB

- Vacuum truck operators
- Treatment plant operators

## Centralized Sewerage system



### Managed by Households

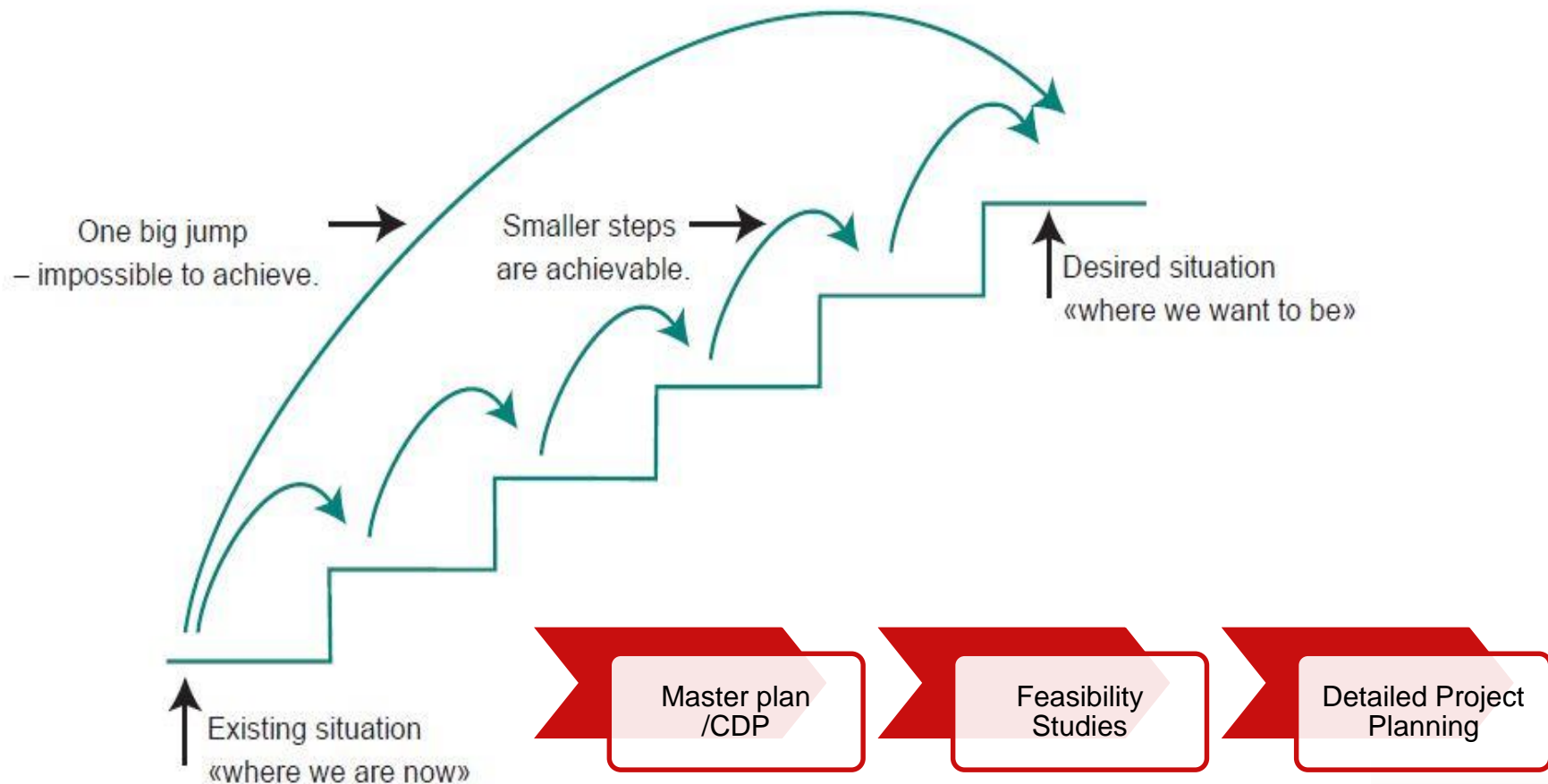
- Plumbers for Household connectivity

### Managed by City / ULB

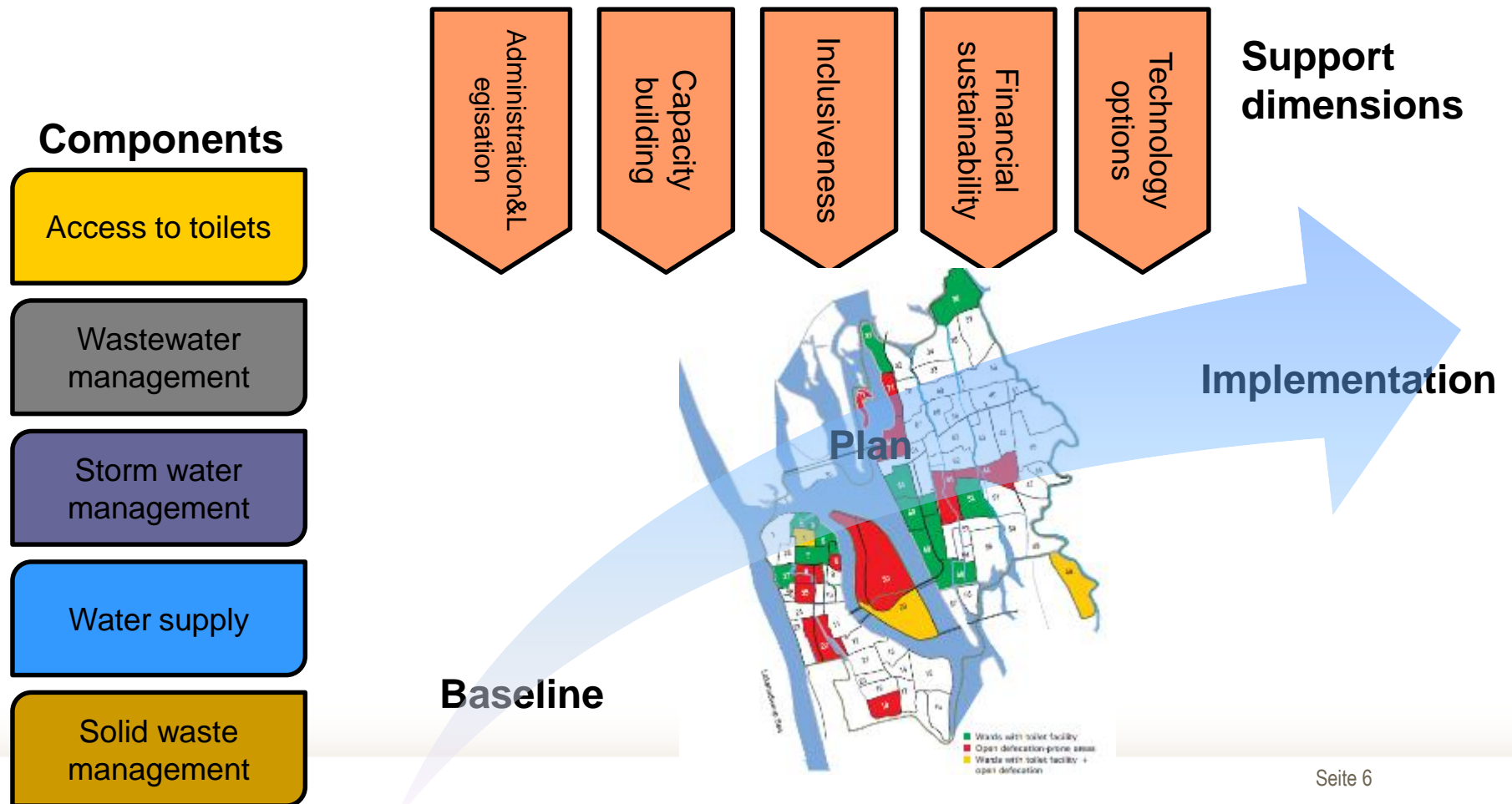
Requires dedicated institution (WS, sanitation + various depts. viz.

- Management
- Engineering & Technical
- Accounts & Finance
- Administration
- Data management
- Customer service etc...

# Incremental Planning for city-wide sanitation



# City-wide Sanitation Planning as a framework to formulate solutions





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# Hence the need for non-conventional approaches

german

System definition

DEUTSCHE ZUSAMMENARBEIT

## CONVENTIONAL SYSTEM

Wastewater type

Faecal sludge, black water, grey water

Point of generation inside building

All uses inside the house

WW character @ outlet to building

Combined waste source type

Infrastructure for Collection on plot

Sewer connection / interceptor

Infrastructure for Collection on street

Manhole, laterals

Infrastructure used for WW transport

Large dia. Sewers – interceptors, outfalls, incl. intermediate pumping / energised

Primary treatment (physical)

None

Secondary treatment (physical + biological)

Common treatment for combined WW - for ex.

Tertiary treatment (physical + biological + chemical +/- special resource recovery options)

Extended facility / process at secondary treatment

Reuse & disposal

Direct / indirect potable / non-potable (treatment unit design)

## NON-CONVENTIONAL SYSTEM

BLACK WATER

GREY WATER (liquid)

Faecal sludge (solid)

Effluent (liquid)

Toilet

Bathrooms, kitchen, wash basins, other floor cleaning, rain water, etc.

**A choice of solutions and combinations, amenable for customization to city vision and local conditions**

Waste source independent

Sedimentation tank

Small dia. Sewers / storm drains

Small dia. Sewers / storm drains

Soak pit / no treatment if channelled to storm drains

Septic tank (conventional / prefabricated)

Composting / land application, etc.

Constructed wetlands / combination etc.

Kitchen garden / Soak away channel / Root Zone Treatment / stabilization pond / combination etc..

Independent septicage treatment facility / co-treatment at existing WWTP, etc.

Settling Contact Aeration System / SBR etc.

None

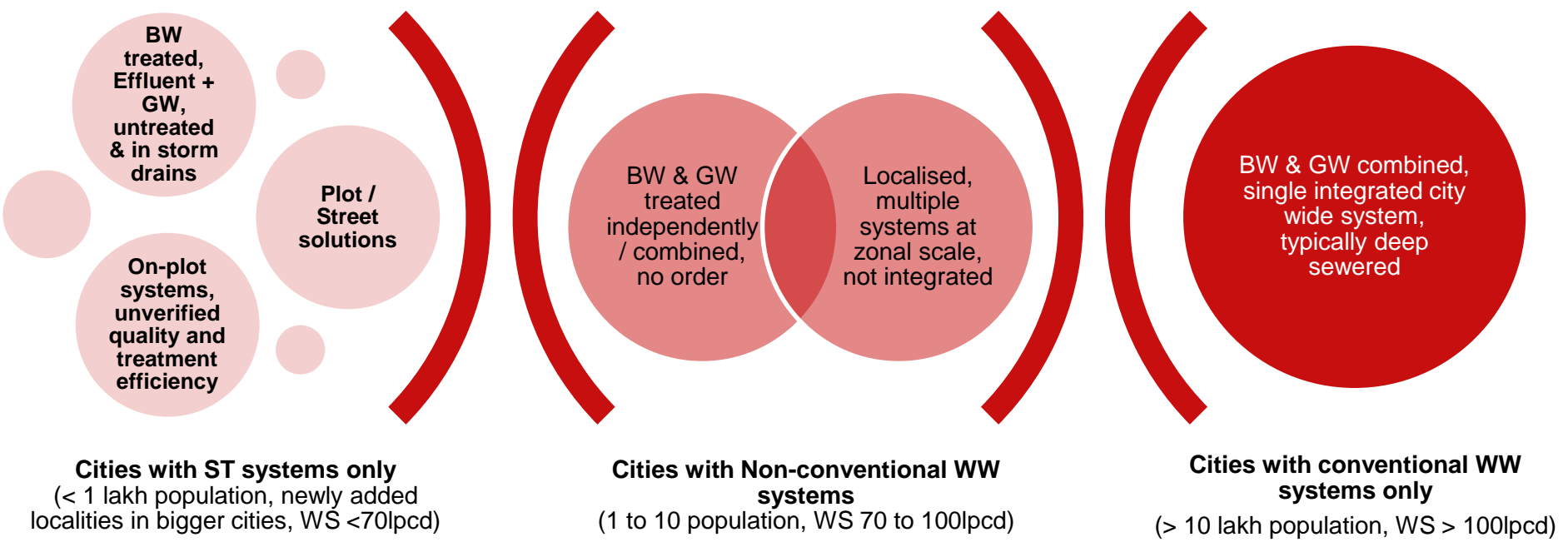
Agriculture / Energy generation, etc.

Water body rejuvenation / agriculture / landscaping, etc.





# Typical Indian city size, mixed sanitation needs

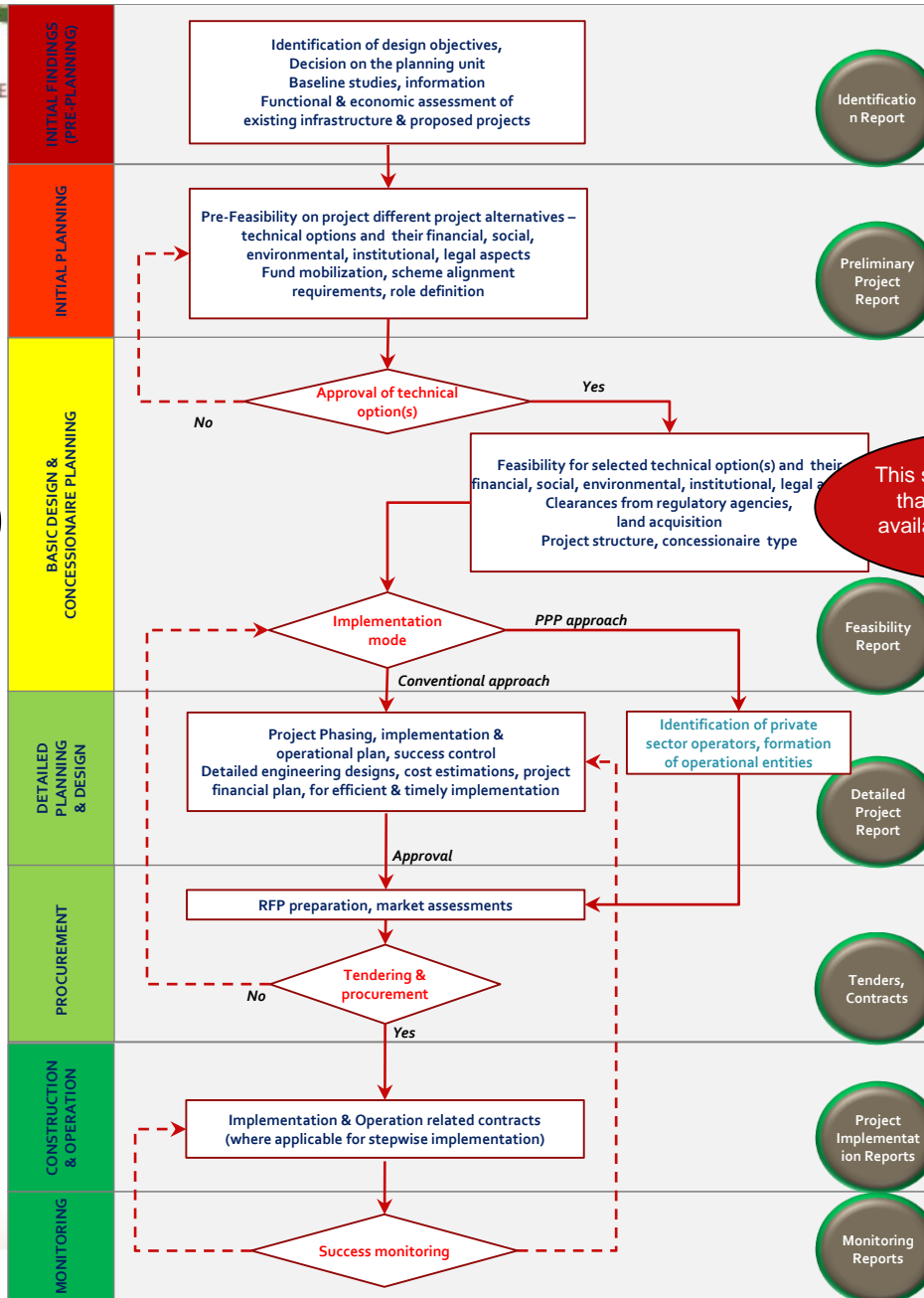


*First order preference in the absence of a sewer network (legally required at 30m) would be a septic tank in developing area / newly developed area / peri-urban area before migration to deep sewer based systems.*

**So Septic tanks are a reality and needs integration in sanitation planning**



# The catch is... Planning process in Indian conditions



This steps is being strengthened to ensure cost-effective spending of financial resources

This step is delayed so much that detailed designs are available and projects fail on most occasions

**Irrespective of any solution attempted wastewater / faecal sludge / septage management / combination**

**The planning process is the same and is generic to access funds under any scheme**