ITU Regional Workshop on "Prospects of Smart Water Management (SWM) in Arab Region"
Khartoum-Sudan, 12 December 2017

Best practices on Smart Water Management policies and projects

Mayamiko Nkoloma

Outline and goal

Why Smart Water Management – problem definition

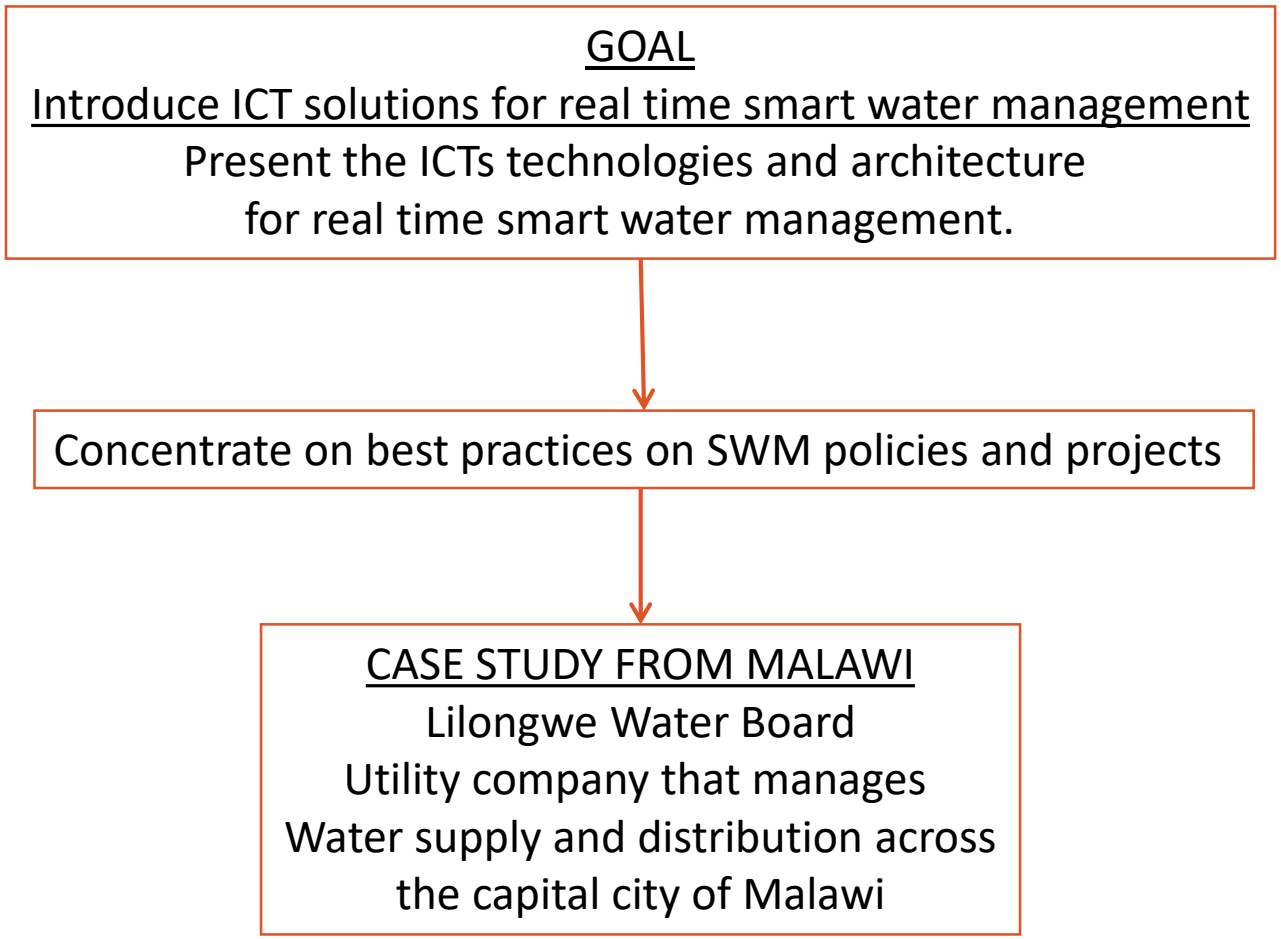
ICT growth enabling opportunities for managing water resources

Water Management Challenges Met in developing countries

System architecture of Smart Water Management system

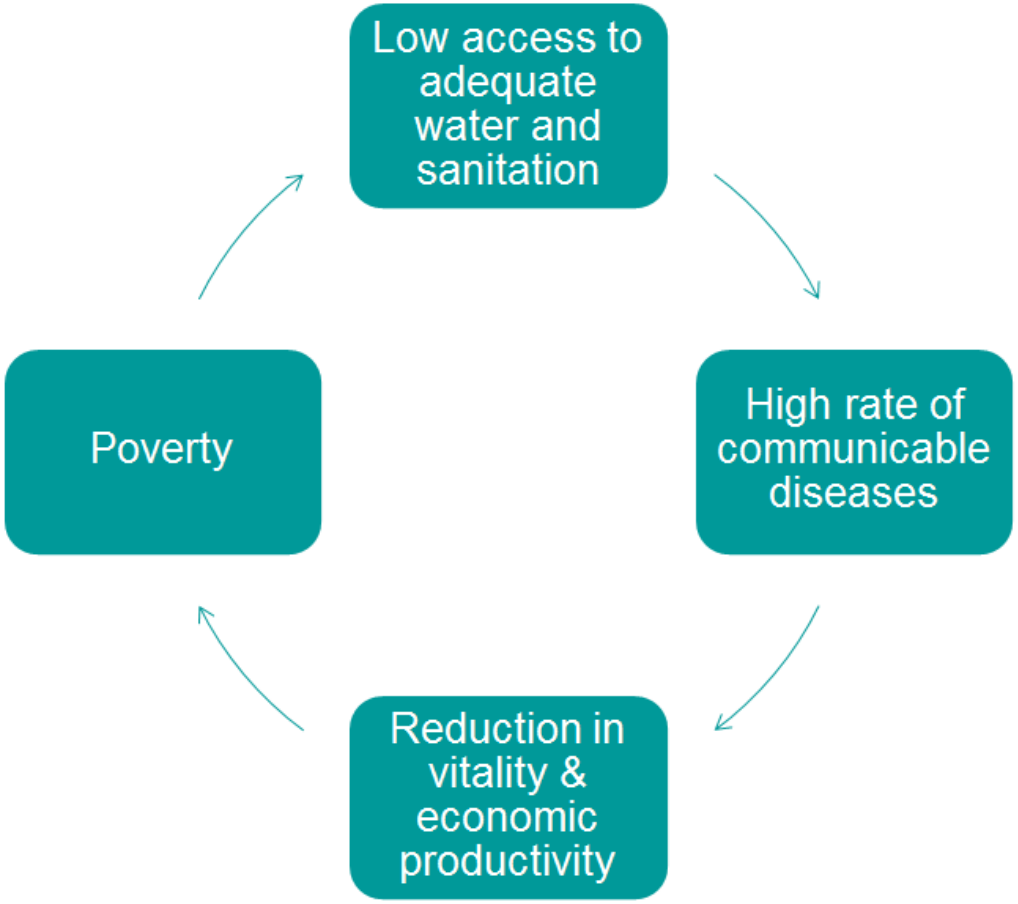
Key elements to consider for such projects
Conclusions

Goal


GOAL
Introduce ICT solutions for real time smart water management
Present the ICTs technologies and architecture
for real time smart water management.
Concentrate on best practices on SWM policies and projects
CASE STUDY FROM MALAWI
Lilongwe Water Board
Utility company that manages
Water supply and distribution across
the capital city of Malawi

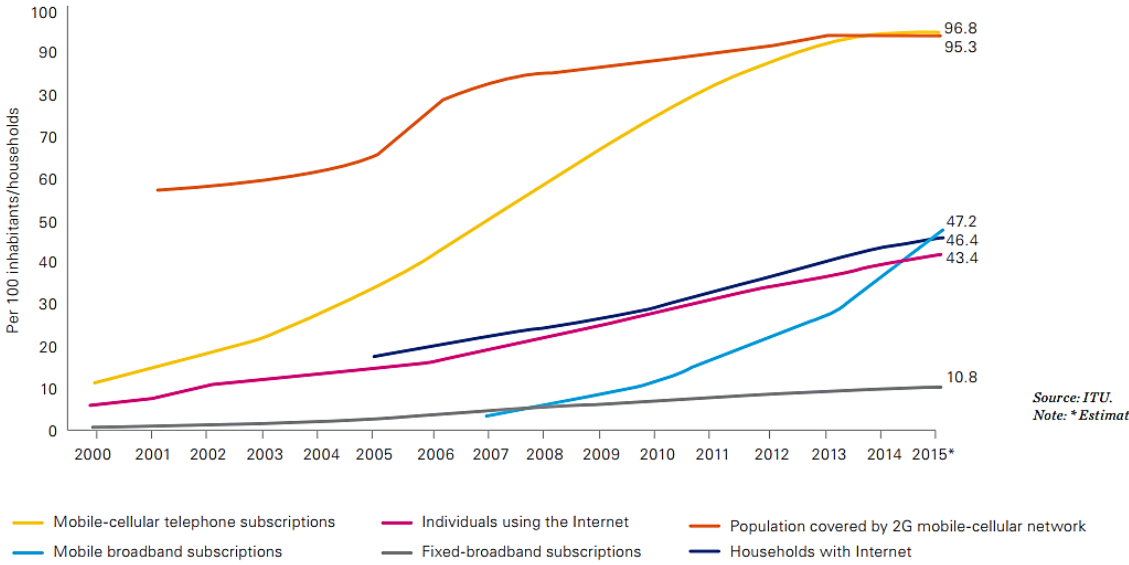
Why Smart Water Management – problem definition

- Access to basic water services, including clean drinking water and sanitation, is still unavailable to much of the world's population.
  - According to United Nations estimates, 783 million people do not have access to clean water. Almost 2.5 billion people do not have access to adequate sanitation, while six to eight million people die annually from the consequences of water-related disasters and diseases
- Safe, adequate and efficiently managed freshwater resources are essential to the sustenance of basic livelihoods, and to the economic and political stability of countries.



Why Smart Water Management – ICT Growth

- Over the years there has been rapid growth of ICTs its services
- More devices are connected to the internet
- This boom has opened opportunities for developing ICT based service innovations that propel towards development and solving of typical day-to-day challenges encountered in many sectors including the water sector
- ICTs have the potential to enhance water sustainability, efficiency and accessibility
- Smart Water Management projects/ services take advantage of ICT advancements in tackling global water challenges



Water Management Challenges Met in developing countries

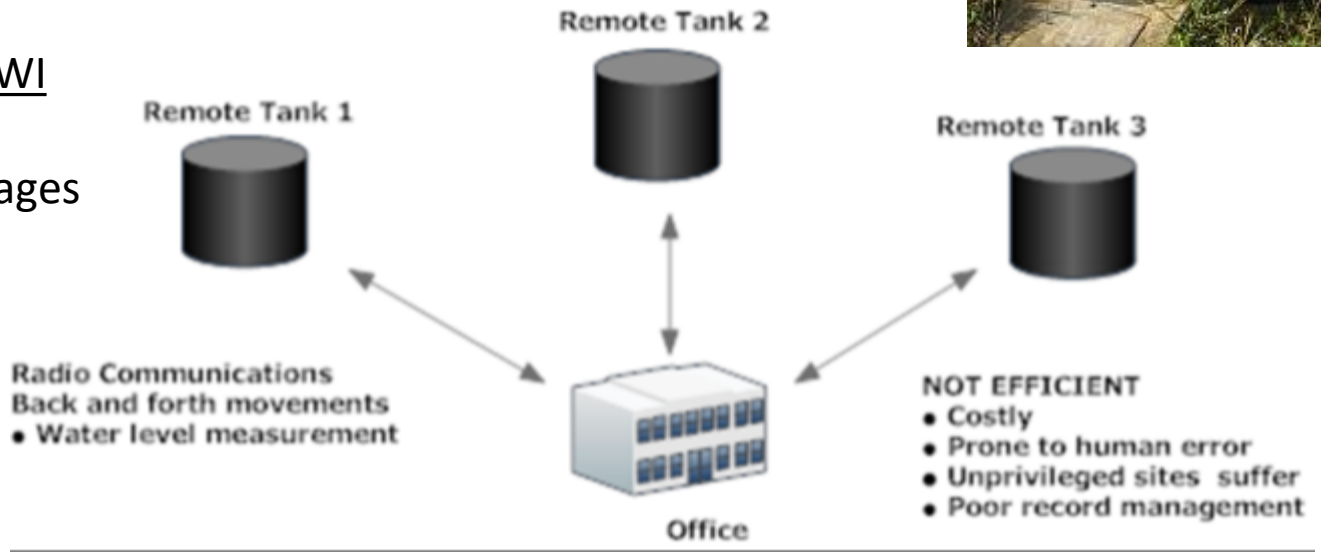
- Different countries have different water challenges
- Different countries also use different techniques in finding solutions towards water problems
  - But we can learn and build stronger systems by sharing experiences and similarities
- We shall build this discussion from challenges and solutions from Malawi

Water Management Challenges Met in developing countries

- Traditional ways of water level measurements present challenges in managing the resource for distribution
  - Inaccurate measurements
  - Long distance and poor road network between sites
  - Time consuming

- Need to develop a low cost solution through remote monitoring

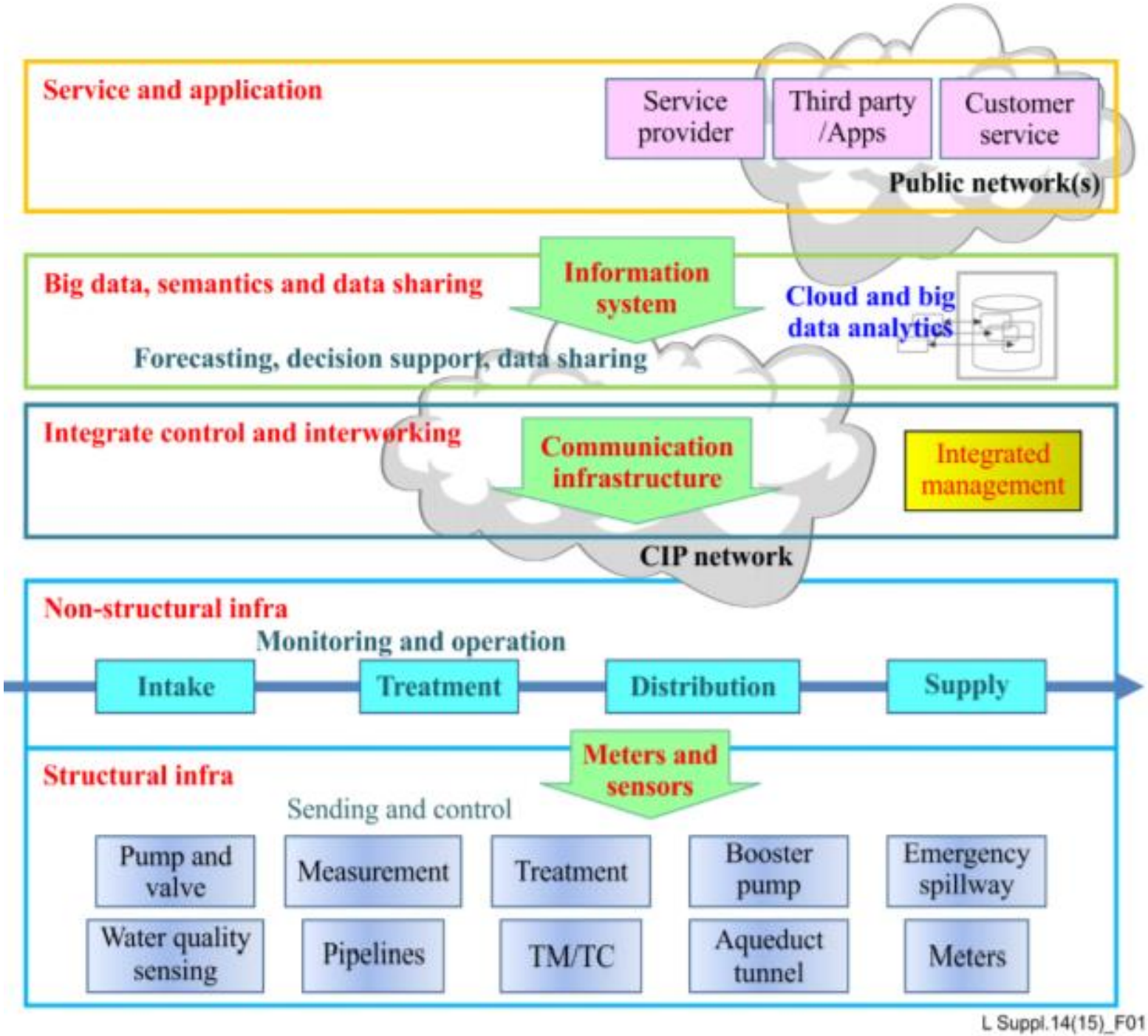
<u>CASE STUDY FROM MALAWI</u>
Lilongwe Water Board
Utility company that manages
Water distribution across
The capital city of Malawi



Water Management Challenges Met in developing countries

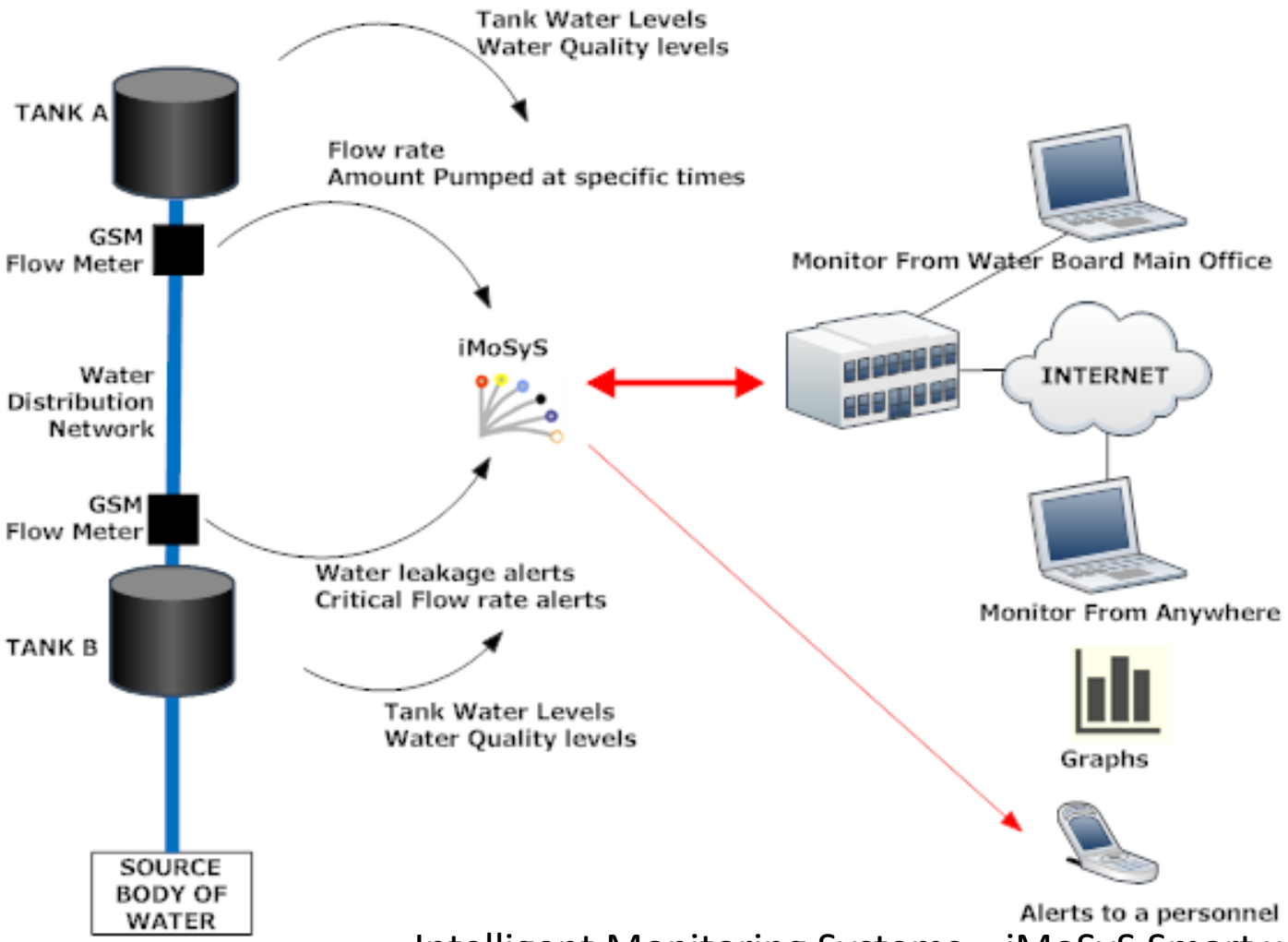
- Challenges in monitoring water quality issues across the distribution system
  - Samples taken 3 times a week on selected points in the distribution system
  - But real time monitoring is ideal on all strategic points
- Unable to distribute the water to different locations according demand

- Challenges in reducing non revenue water
  - Difficulties in identifying points where a pipe is broken
  - Illegal connections



Conceptual model of water management system with ICT

System architecture of Smart Water Management system



- Water level monitoring
  - To avoid overflows
  - To manage demand
- Water flow rate monitoring in pipe systems
  - Scheme for detecting pipe bursts
  - Scheme for detecting illegal connections
- Water quality monitoring

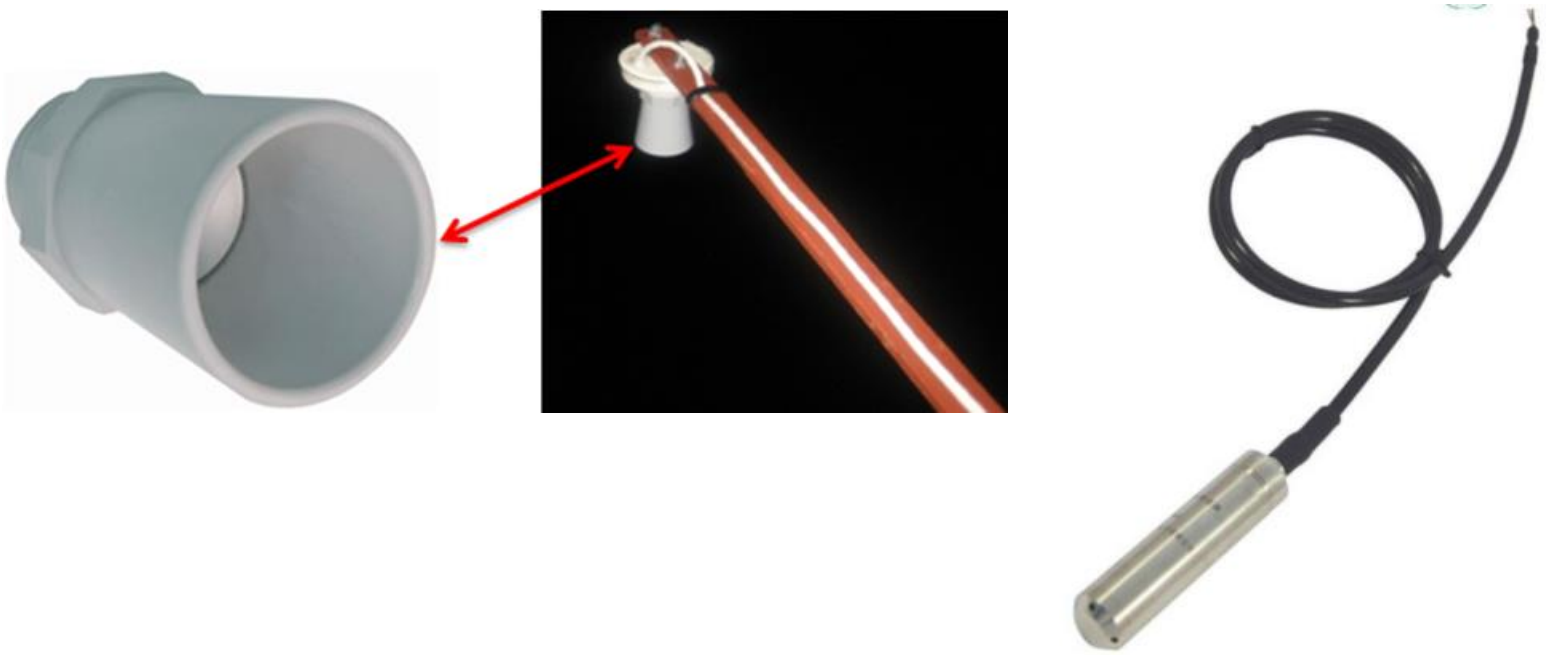
Intelligent Monitoring Systems – iMoSyS Smart water Management model

Key elements to consider for such projects

- What type of sensors to use
- How to power remote units that capture data
- How will the data be transmitted from remote sites to engineers/ operators/ decision makers
- How is the data presented to users to enable quick and accurate strategic decisions
- Management issues
  - Project capital
  - Mind set of operators

Key elements to consider for such projects

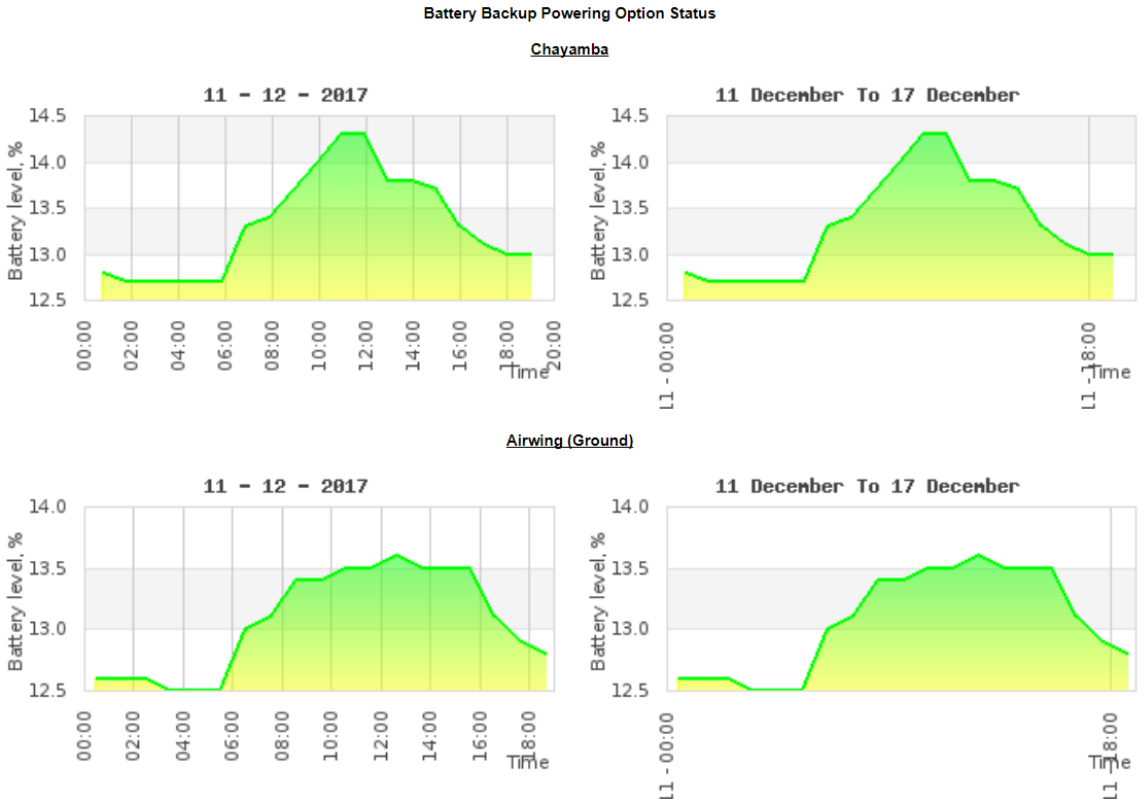
- What type of sensors to use
  - Should be able to survive in harsh environmental conditions
    - Chronine can make metal items to degrade – eaten – corrode



Ultrasonic vs Pressure Sensors for water level monitoring

Key elements to consider for such projects

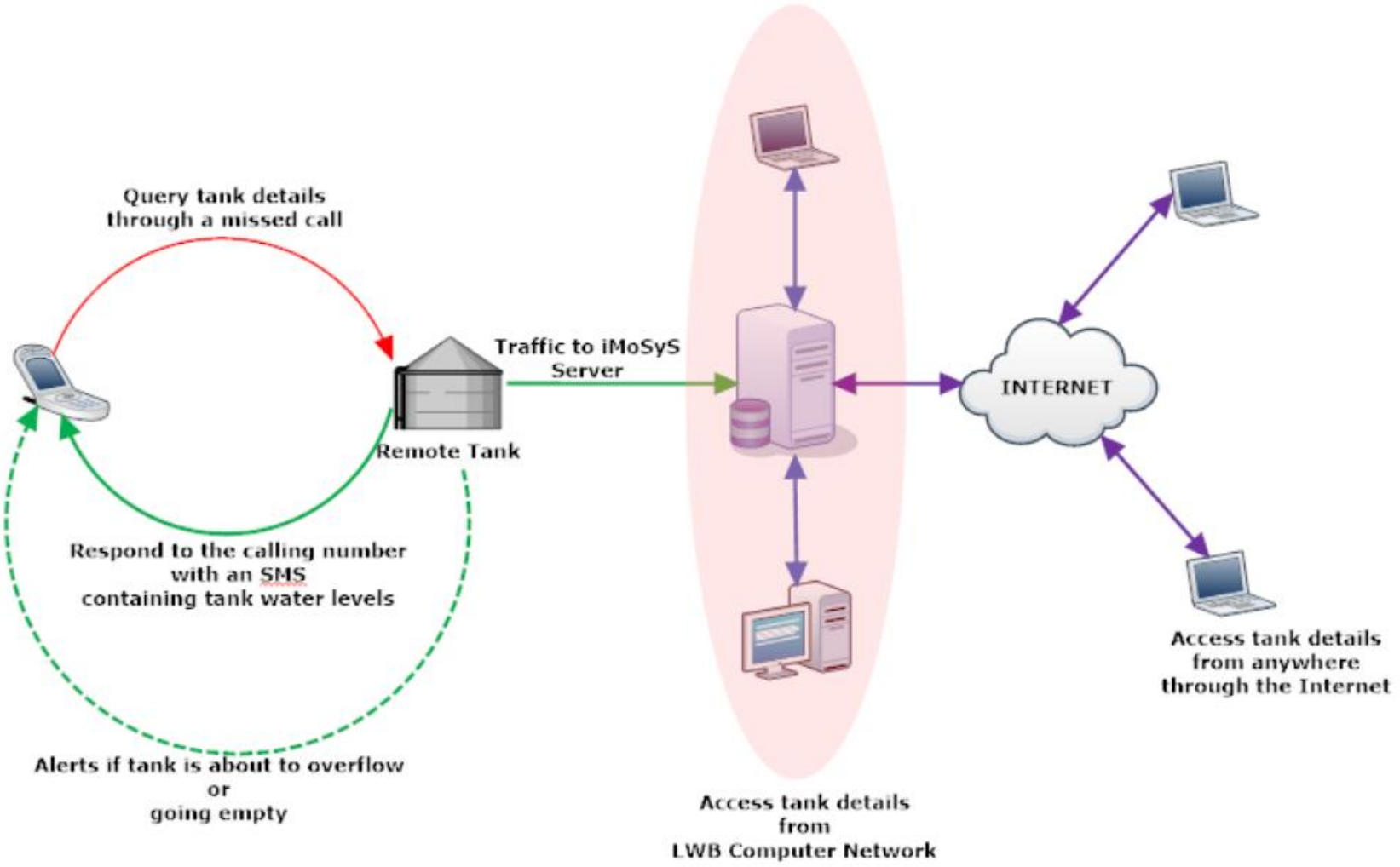
- Many cases the distribution system is in far remote areas with no electricity
  - Solar energy is an option



Key elements to consider for such projects

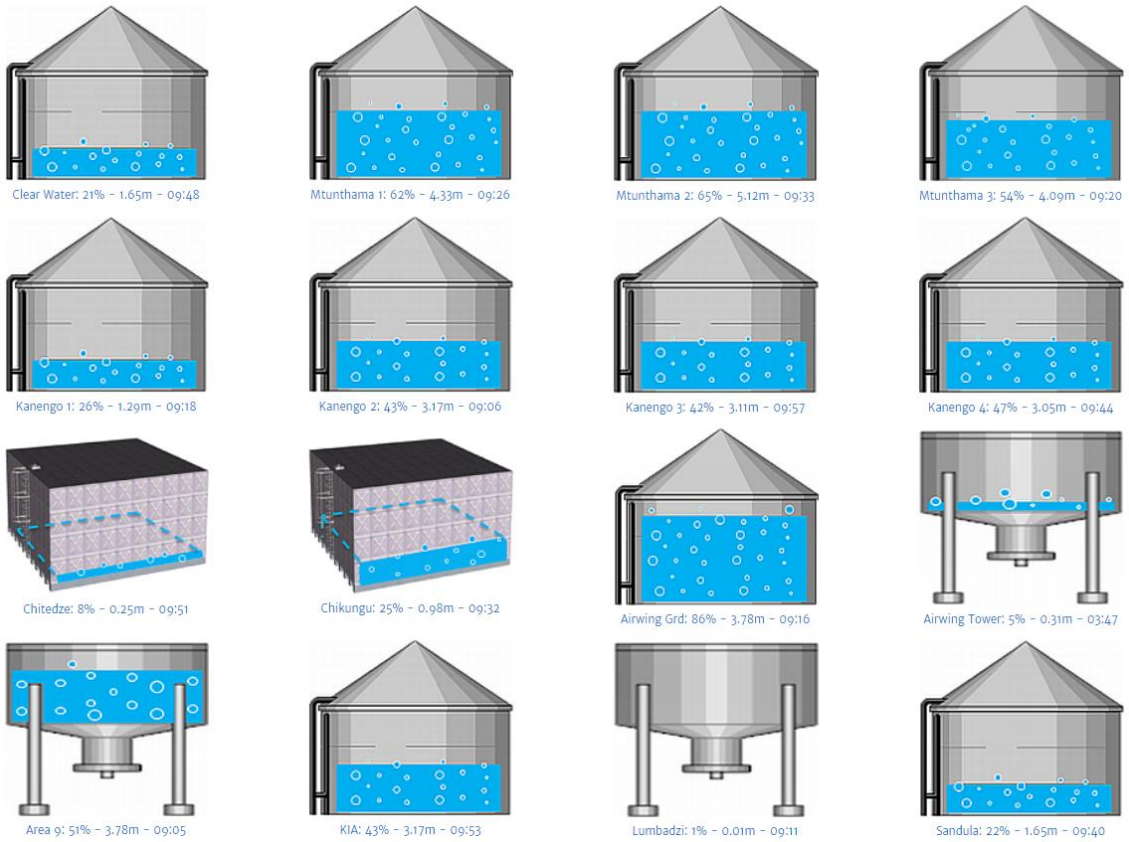
- How will the data be transmitted from remote sites to engineers/ operators/ decision makers?
  - Most of the land covered with cellular network
    - More than 80% of the land in Malawi has mobile network coverage (one of the least developed countries)
  - We can build smart water management solutions on top of the available mobile network infrastructure
    - Water parameters can be transmitted as an SMS or data packets through the GPRS/ 3G/ 4G network.
    - Traffic can be in real time or send in intervals depending on importance or need

Key elements to consider for such projects

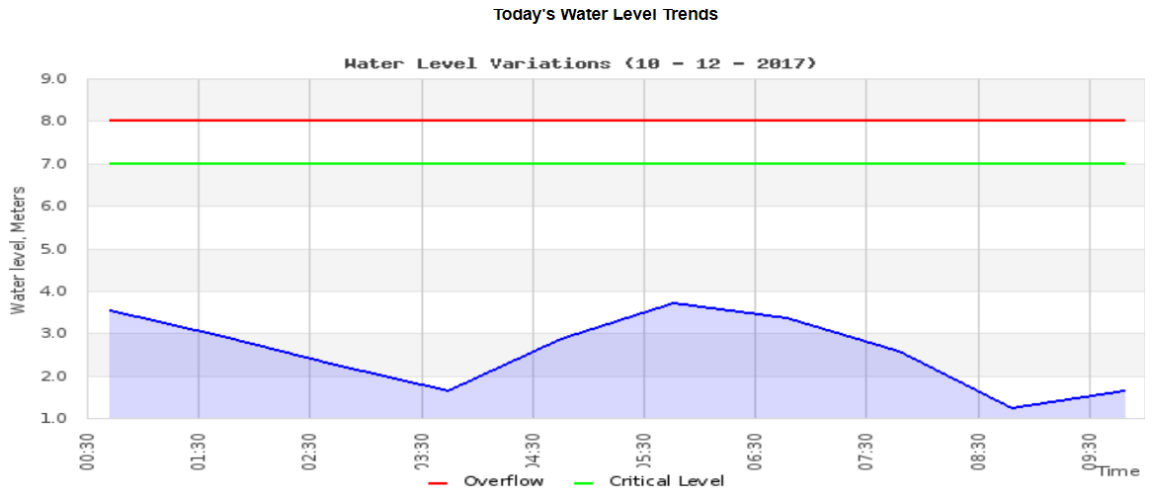


- Traffic description
  - Real time
  - On demand
    - Alerts/ notifications
- End user interaction with the system
  - Computer
  - Smart phone
  - Consider connectivity
- Design with security issues in mind

Key elements to consider for such projects



Presentation of water systems should be simple and straight forward to enable quick and accurate strategic decisions



Tabulated Summary (10 - 12 - 2017)																	
Time	00:42	01:42	02:43	03:44	04:44	05:45	06:46	07:47	08:47	09:48	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Level	3.54	2.93	2.26	1.65	2.87	3.72	3.36	2.57	1.23	1.65								

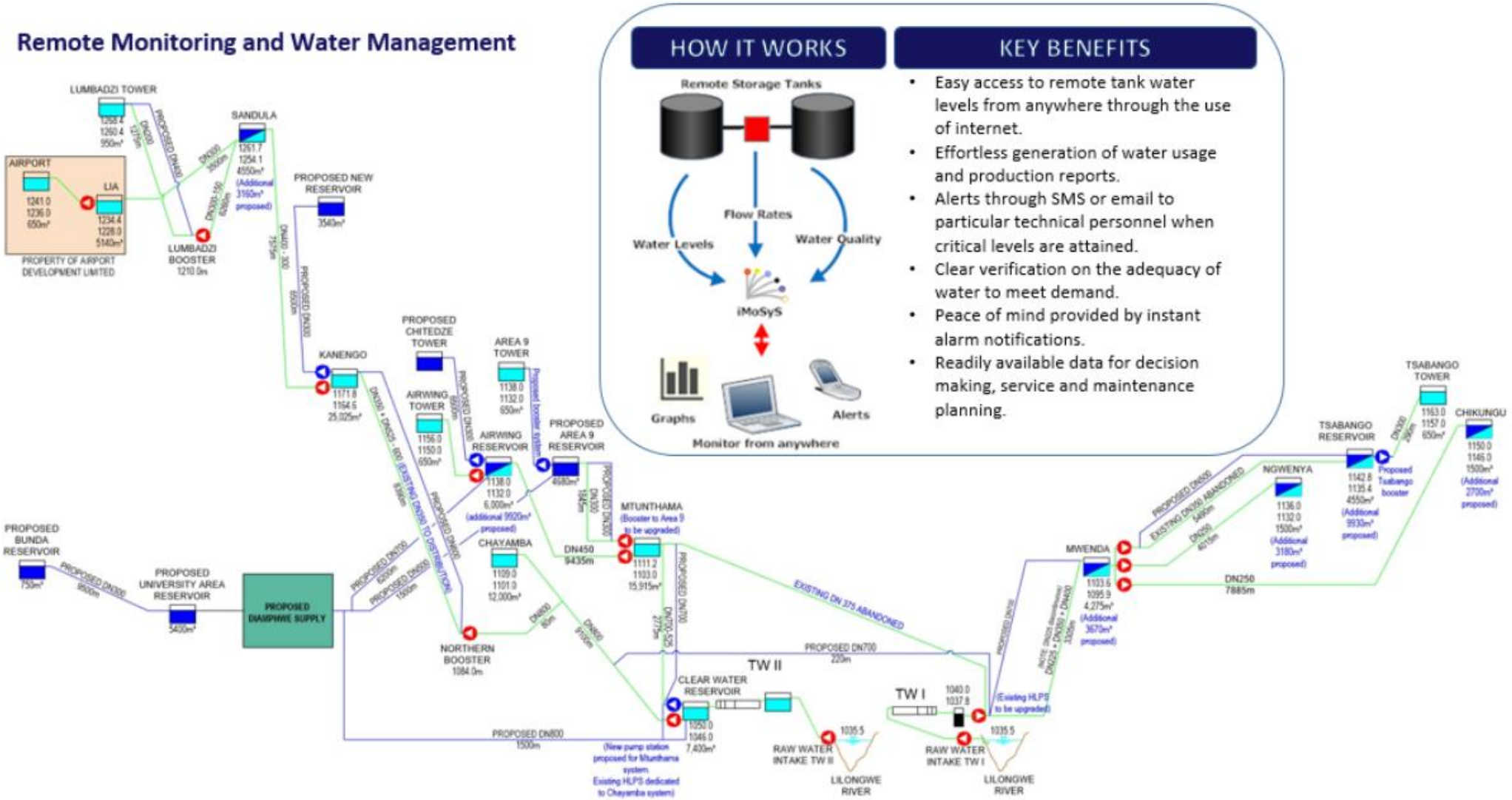
Trend of the tanks on a particular day

Why web based?

Key elements to consider for such projects

- Management issues
  - Project capital
    - Costly to replace the ‘whole’ water system
      - Distribution flow meters
      - pumps and valves
    - Need to come up with innovative techniques that use most of the existing water components
      - Ultrasonic flow meters vs electromagnetic meters
  - Mind set of operators
    - Management need to ensure that operators accept new technologies
      - Its seen as a tool that will replace human resources
        - System sabotage
    - Train engineers and operators on new ways of managing water resources

System benefits



Conclusion

- Key elements that can assist in successfully deploying a smart water management project has been discussed.
- It has to be designed to solve challenges met on daily basis
- Management/ decision makers are instrumental in facilitating training of staff
  - From engineers to technicians
  - Facilitate new ways of doing things, in this case the use of technology to ensure that water problems are solved

Thank You