Knowledge-Sharing Sessions for Mongolia:
Developing the Economic Cooperation Zone Project

Adopting water-saving technology in zone operations.

Asia's experience in water-saving technology

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OUTLINE OF THE PRESENTATION:

1. **introduction to smart water systems**

2. **Some Smart water experiences in Asia**
   1. *Ho Chi Minh City (HCMC), Vietnam*
   2. *Kathmandu Valley, Nepal*
   3. *United Water Supply Company of Georgia*
   4. *Shenzhen Water Group, China*

3. **Smart water in Zamyn-Uud Free Zone. Goals and recommendations.**

1- INTRODUCTION TO SMART WATER SYSTEMS

What is "smart water"?

Smart "something" is the buzzword for the confluence of three different but related technological advances in any aspect of reality:

- **Big data** generated by cheaper and more powerful **Sensors** (IoT)
- Fast, cheap and reliable **Communication** technologies
- Advanced statistical **Algorithms** (inlcuding Artificial Intelligence) to process and analyze big data

Sensors → Communication → Big data → Algorithms and AI
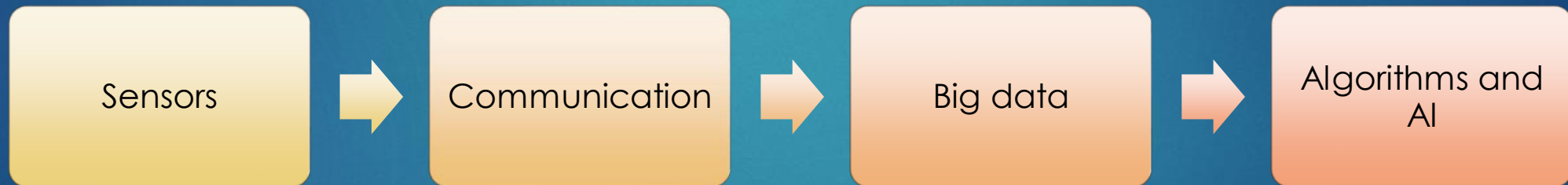
Smart water is the buzzword for the confluence of these processes in the water sector, disrupting water utilities, water agencies, hydropower companies, etc.

Technical applications of "smart water"

- ✓ Optimal design of monitoring and control networks.

- ✓ Numerical detection of physical and apparent water losses

- ✓ Energy saving strategies.

- ✓ Definition of contingency plans and protocols.

- ✓ Classification of consumption patterns and demand forecasting.

- ✓ Network expansion design with optimal configuration.

- ✓ Active asset management programs.

"Smart" business processes in water utilities

Business Intelligence

- ✓ Data Integration. This involves consolidation of different types of data coming from various sources (operations, customers, financial, marketing, competitors, market, etc.). Analyze trends of KPIs.
- ✓ Smart visualization. A picture is worth a thousand words. Tools customized to create the most useful graphs and dashboards for operation staff, as well as decision makers.
- ✓ Advanced trend forecasting (AI platform)

Knowledge Management

- ✓ Human resources management.
- ✓ Collaborative and knowledge-sharing platforms.
- ✓ E-learning platforms.

Corporate Image and public sector branding

Water utilities are customer-oriented companies and can use social media as a competitive advantage, even in the monopolistic environment of the water sector.

Cybersecurity

All types of organizations require active and up-to-date protection measures against external attacks.

TYPICAL COMPONENTS OF A SMART WATER PROJECT

MASTER PLANNING

OPERATING PROCEDURES

GIS SYSTEM

SENSORS AND VALVES

BRAND AND PUBLIC IMAGE

HYDRO MODELING

SCADA SYSTEM

ASSET MANAGEMENT

TECHNICAL CMS

CONTINUOS TRAINING & KNOWLEDGE MANAGEMENT
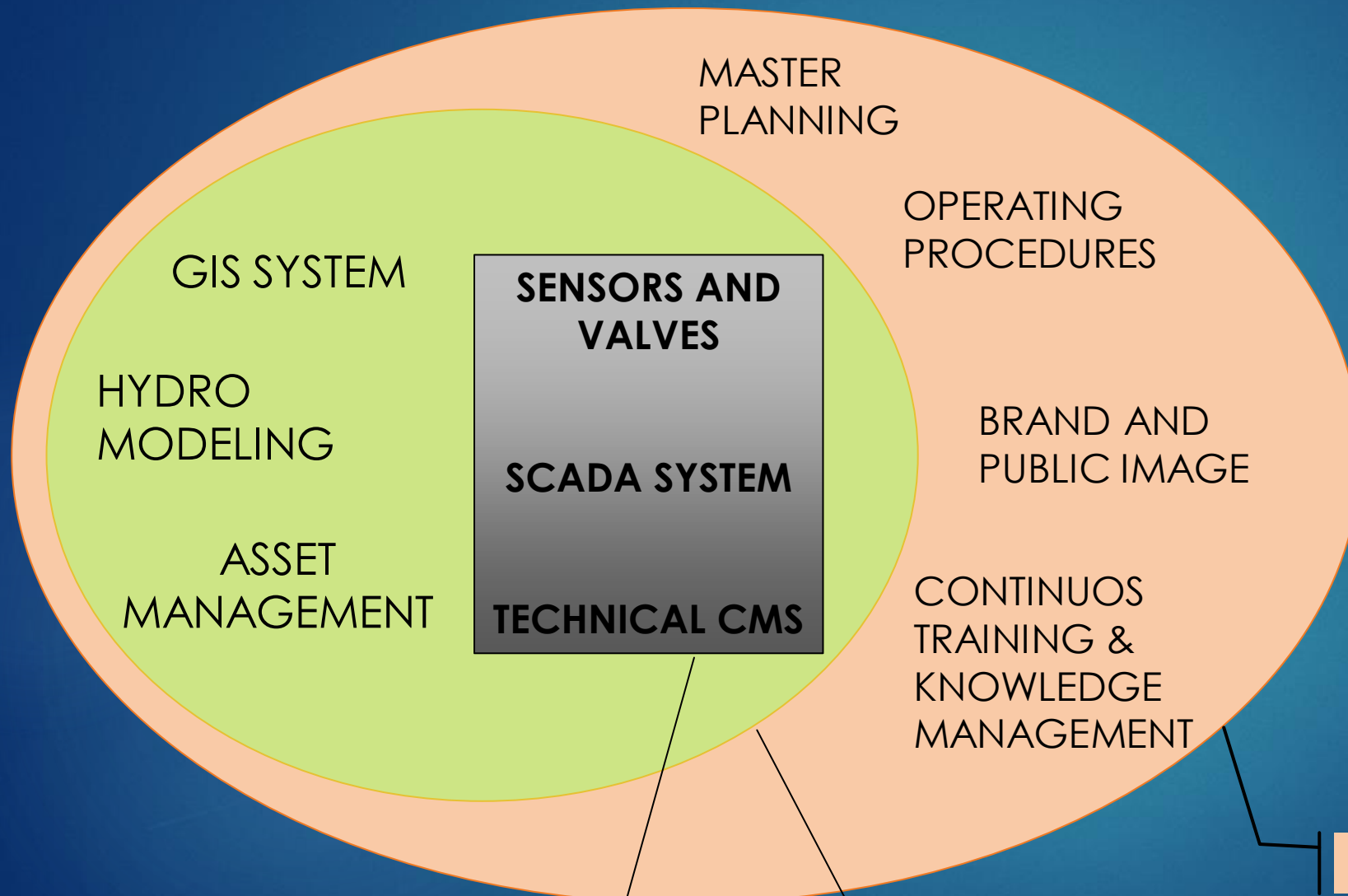
THREE LAYERS:

1) Physical and ICT infrastructure (hardware and software)

2) Analysis tools

3) Integration tasks

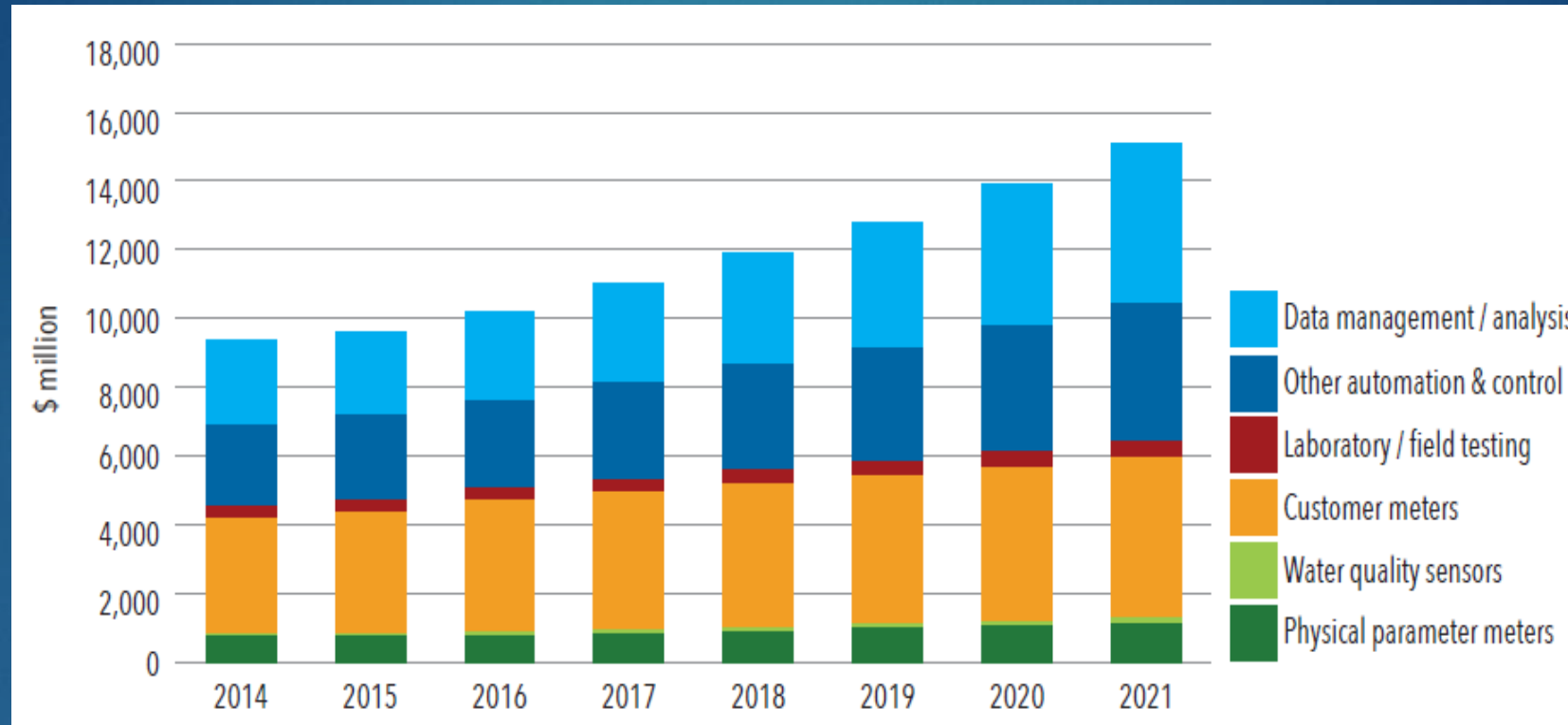Each utility is different, so it is each Smart water Project. Not all the components are necessary in all places.

3) Integration tasks

1) Physical and ICT infrastructure

2) Analysis tools

EVOLUTION OF THE GLOBAL "SMART WATER" MARKET

Currently the annual global investment in "Smart water" is estimated at USD 15 billion, with y-o-y growth above 8% (USD 30 billion by 2030)
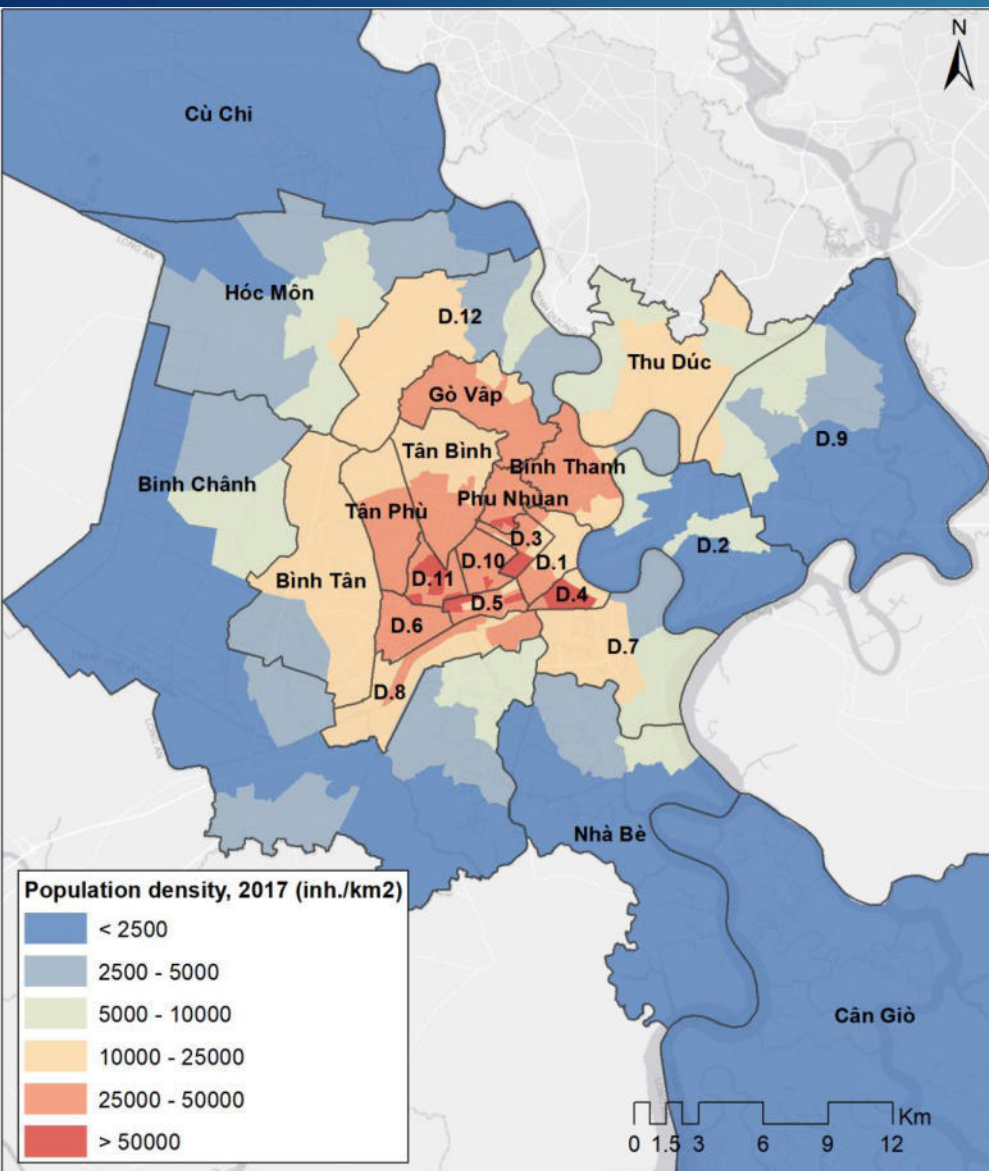
2- SMART WATER EXPERIENCES IN ASIA*

I. Ho Chi Minh City (HCMC), Vietnam
II. Kathmandu Valley, Nepal
III. United Water Supply Company of Georgia
IV. Shenzhen Water Group, China

SAIGON WATER COMPANY (HCMC, VIETNAM)

Population density, 2017 (inh./km2)
- < 2500
- 2500 - 5000
- 5000 - 10000
- 10000 - 25000
- 25000 - 50000
- > 50000

▶ Around 9 million people and 1,600,000 customers.

▶ Water quality problems

▶ Low pressures in some areas (specially during the day)

▶ NRW around 30%

▶ A smart water project is being developed (MUSD 25)

SAIGON WATER COMPANY (HCMC, VIETNAM)

10 PROJECT COMPONENTS (9+ PROJECT MANAGEMENT):

CUSTOMER MANAGEMENT SYSTEM (CMS)

SCADA

Installation of 200 new sensors (flowmeters and others)

IT equipment

BASIC INFRASTRUCTURE

GIS

NETWORK ANALYSIS SYSTEM

ASSET MANAGEMENT SYSTEM

NETWORK ANALYSIS SYSTEM

Standard operating procedures
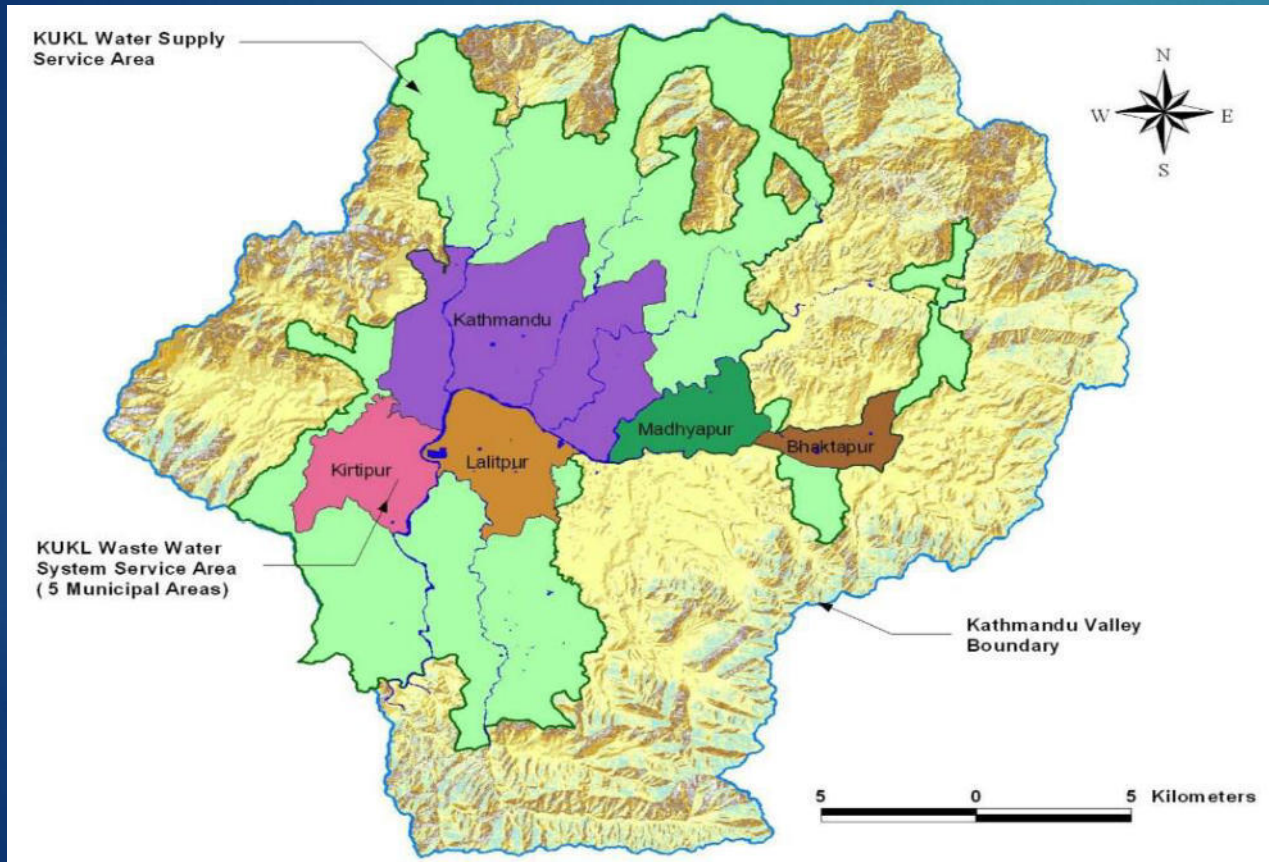
Creation of a Network Operation Center with a social agenda

Review of the master plan

Knowledge management and continuous training

INTEGRATION COMPONENTS

Kathmandu Water Co. (KUKL)

- Around 3.5 million people and 204,000 customers.

- The current water supply is on average 114 MLD

- Intermittent service in most areas

- New water transfer under commissioning (Melamchi project)

- A new water network is being built after the earthquake in April 2015

Kathmandu Water Co. (KUKL)

ADVANCED FUNCTIONALITIES DRIVEN BY SMART TECHNOLOGY:

➢ Guarantee a minimum pressure of 10 m (1 bar) at the most critical locations and flow conditions.

➢ Guarantee equitable supply of water to all reservoirs irrespective of levels /pressure.

➢ Prevent any overflow from the reservoirs.

➢ Reduce water hammer and minimize dynamic pressure effects in the BDS.

➢ Automatically warn about potential pipe bursts in BDS/DNI System
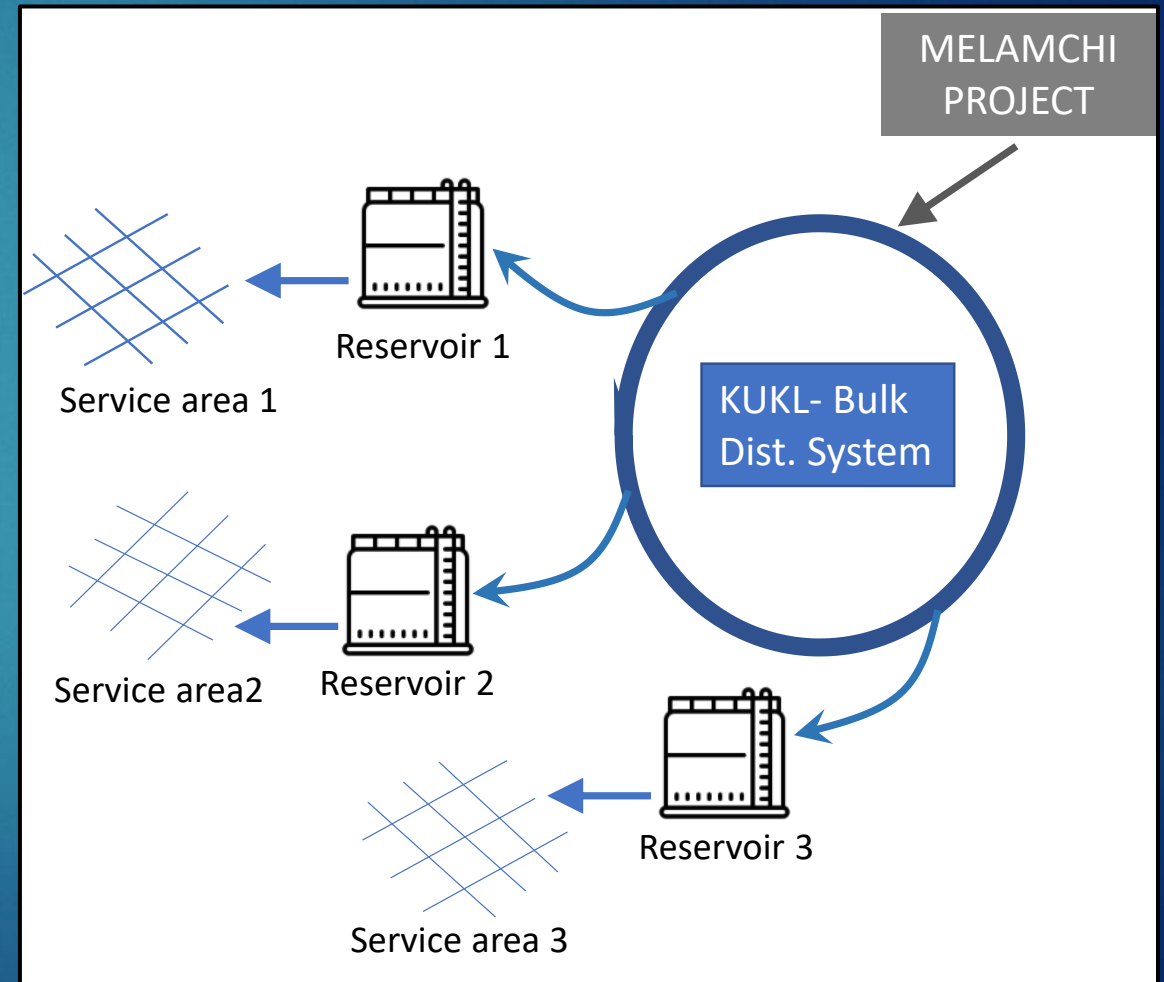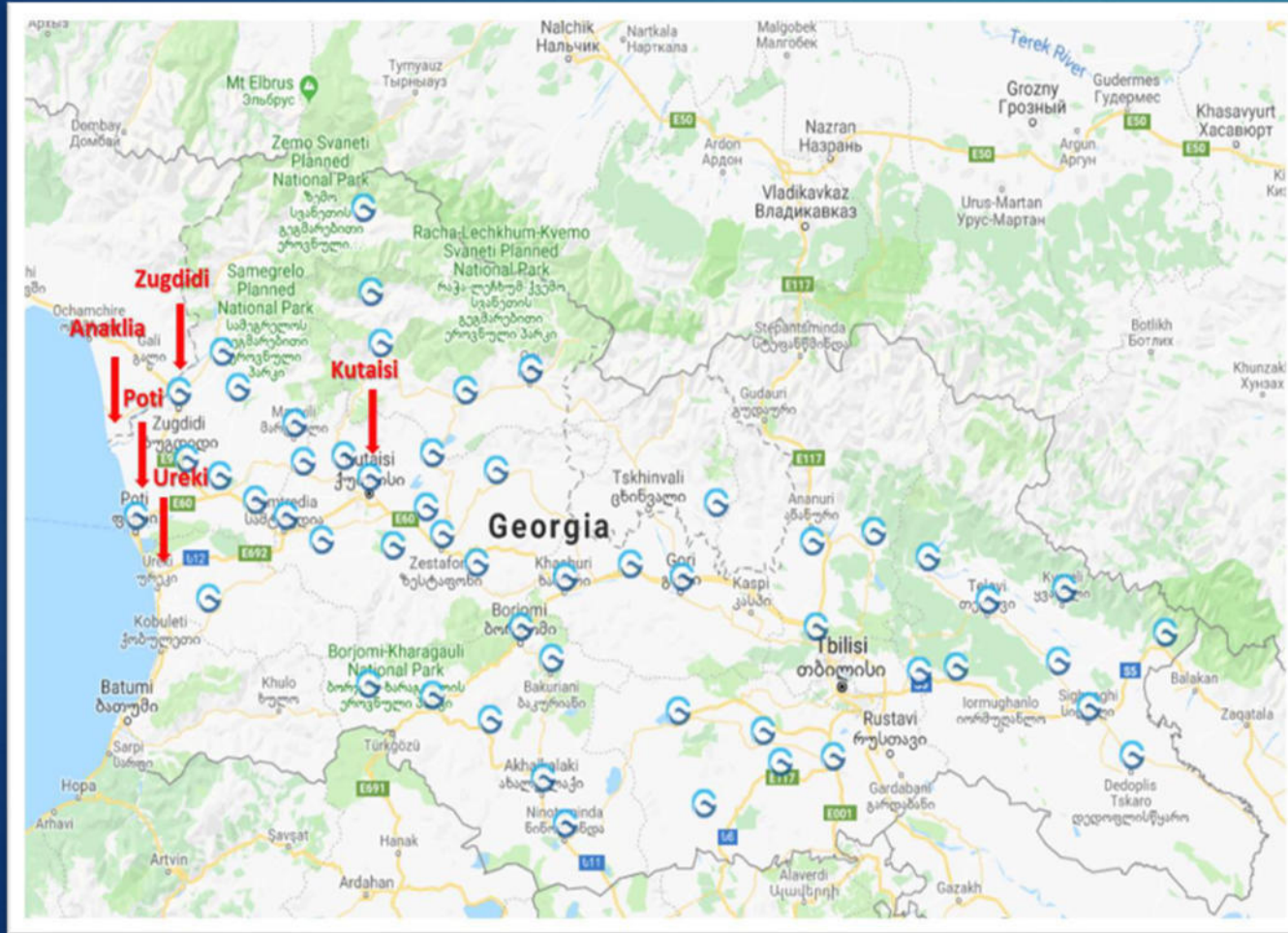
- 100% State-owned company
- It covers 57 towns and 315 villages (58.5% of the population in Georgia, or around 2.2 million people)
- Central offices in the capital city in Tblisi (which is not supplied by UWSCG)
- High NRW and low-efficiency in operations.
- Need for an ICT overhaul with central supervision and local operational control.
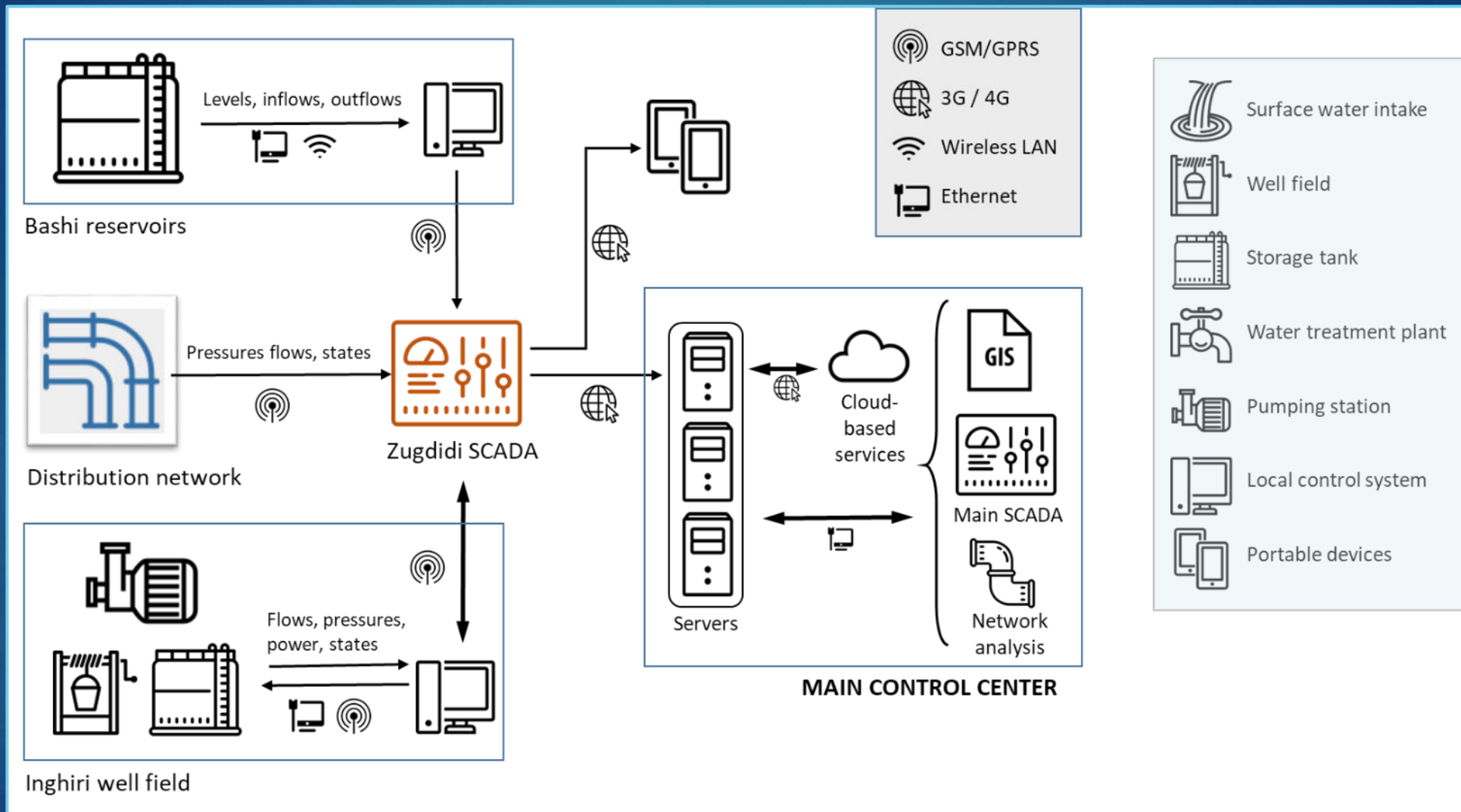
Proposed diagram of ICT systems in Zugdidi (Georgia)

- Shenzhen: 1st Special Economic Zone & innovation hub in China.
- SZWG (2001) Concession 50 years. Shenzhen Population is around 12.5 M.
- PPP in 18 other cities (20 M people).
- SOE Reform (2003): 45% private & 55% SZ Municipal Government.
- First water company with customer satisfaction certif. (ISO10002).
- R&D: 35 patents & 43 utility models & Innovation platform.
- Smart water initiatives since 2006 – NRW 13% (2016).
- 8.4 M m3/d (82 water treatment plants) & 3.5 M m3/d (28 sewage treatment plants)

O&M MOBILE APP FOR TREATMENT PLANTS

▶ Standardized, paperless, mobile-assisted inspection work at the treatment plants.

▶ Improved efficiency: time-out inspection or non-patrol.

▶ Incidence reporting and fast response in O&M.

SHENZHEN WATER GROUP

Module
Micro motion Sensor
Pressure Monitor
Anti collision
RFID
Communication

Functions
Biological indicators
Temperature: 0-40°C
Accuracy: 0.05 - 0.1 TU
Alert: 5 mins

Functions
Real time Monitor
Data Analysis
Authorized staff ID
GIS Location
Alert Message

Aquatic Toxicity Bio-monitoring system of SZWG

Smart Fire Hydrants

BUSINESS AS USUAL	DISRUPTIVE STRATEGY
✓ Losing the technological edge may hinder detection of potential hazards and business opportunities.	✓ Low return on investments and financial stress/uncertainty due to technological trials and errors.
✓ Some processes cannot be taken to higher levels of efficiency or productivity without the new technologies.	✓ Errors can help competitors by making public critical information regarding product design and consumer behavior.
✓ Some technologies can become obsolete before a company has developed in-house capacities to replace them.	✓ Depending on organizational cultures, failures can damage the corporate image among employees and general public.
✓ Ultraconservative companies tend to attract less young and motivated staff, which in turns creates a less creative working environment.	✓ Key technological decisions can have high opportunity costs and be difficult to reverse.
✓ In some cases, business as usual is not a strategy in itself, but the way in which a lack of strategy is handled. Proactive change management fosters strategic thinking.	✓ Change management (and particularly ICT-related) requires a very strong management.
	✓ Although technological change can be driven by the senior staff, the generational divide can produce entropy.

Risks

Business as usual   Selective modernization   Disruptive strategy

Laggards ⟷ Innovators
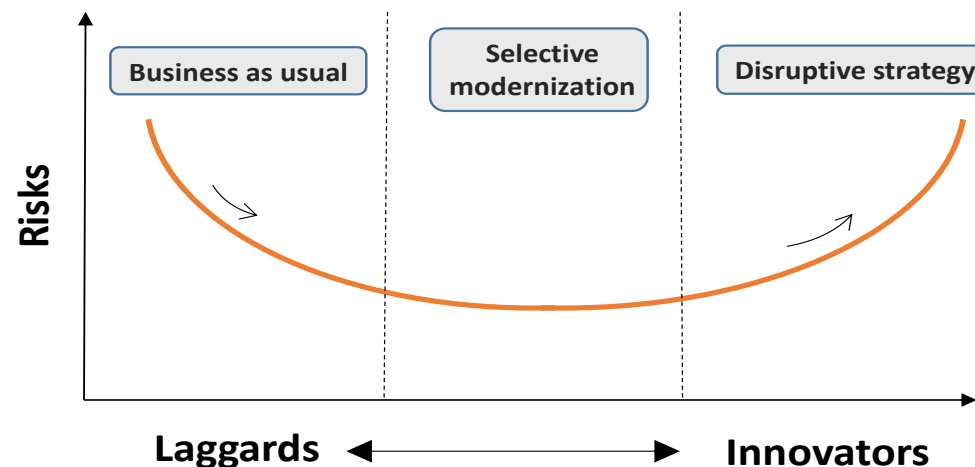
3- SMART WATER IN ZAMYN-UUD FREE ZONE. GOALS AND RECOMMENDATIONS.

MAIN GOALS OF A SMART WATER SYSTEM IN ZAMYN-UUD

- Reduce NRW (physical and apparent losses)

- Enable an equitable (or at least rational) distribution of the available water

- Reduce water-related energy consumption and water costs in general

- Improve the quality of the water served

- Increase the life span of infrastructures

- Improve the public perception of the Zamyn-Uud Free Zone Project by projecting an image of efficiency and advanced technology

RECOMMENDATIONS

- Keep things simple. If you cannot understand how the system will work, don't buy it.

- Learn by doing: do not try to buy all the knowledge. Try to create some and make sure to preserve it.

- Order all you can eat, but not more. An excess of technology may harm the learning process

- Have a long-term plan and stick to it. Smart water is a process/culture, not an event or a bunch of gadgets.

- Integration with operations is the greatest challenge, and the only way in which Smart water projects can pay off.

THANK YOU !