Potential of ICT in Water Sector

Use of ICT (information & communication technology) in water sector has a significant role in improving the water use efficiency in agriculture sector, urban water supply and industrial sector, and can help in addressing the challenges of water scarcity and vulnerabilities in water sector. Efficient water resources management calls for a comprehensive & reliable information/data with their timely access and dissemination for effective decision making. Lack of timely information on water quantity and quality has since long been the limitation in water management decision making. Use of IT based technologies (e.g. softwares and sensors) can automate monitoring and database sharing for improving water services with nationwide coverage. This would help in improving the performance benchmarks of the water use and would promote accountability and transparency in the water sector as well. Some of the potential areas of ICT interventions in water sector are as follows:

1. **Water Supply & Wastewater Management**: Implementation of various ICT based solution/tools such as sensors, smart meters, SCADA & advanced communication tools can bring about real-time data base and information management and thus improving the performance of Urban Local Bodies (ULBs) and water utilities. Following areas can be targeted
   - Urban & rural water supply and distribution network; real-time monitoring of flows/quantum and water quality; leak detection & water pressure monitoring; Asset management with use of GIS, sensor and web tools; monitoring of energy consumption & pump efficiency; Smart billing system and tariff collection with online support; Online grievance redressal system
   - Smart Meters and ICT tools are much likely to benefit both, the water utilities and final consumers, thus promoting efficient use of water both at the supply and demand side. Besides, it shall improve the credibility of the utilities thus improving revenue collection and reducing non-revenue water (NRW).
   - The ability to monitor water supply & distribution system on a real-time basis shall enable quick identification, prediction and prevention of potential problems such as a burst water main, a slow leak, a clogged drain or a hazardous sewage overflow/contamination. It shall thus ultimately ensure water conservation and reduction in losses and UFWs. Such systems can improve the efficacy of **water and wastewater treatment system.**

2. **Industrial water management:** IT industry can target water intensive industries (such as power plant, textile, pulp and paper industries etc.) to provide automation, advanced monitoring & control system in their processes/units on a real time basis. Sensor and SCADA or cloud computing based automation with real time water flows & water quality monitoring can provide substantial opportunities for reducing leakages/losses and specific water consumption while also optimizing water conservation, recycle and reuse. Some of the processes/units that can be focused for ICT tools application include
   - Raw water reservoir, storage & treatment system; Cooling Towers, Boilers, DM water units, ash handling units; Process/product water use; GIS based asset management system; Wastewater generation and discharge system; Residential township water supply

3. **Agricultural water management:** IT industry has potentially largest opportunity in the agriculture sector for data generation, real-time monitoring and decision making to bring about significant changes in agricultural water use by focusing on some of the following areas
   - Agriculture field monitoring for humidity, soil moisture, crop water retention, weather information, plant characteristics etc.
   - Irrigation water reservoirs, canal & command area
   - ICT can help in scheduling the optimal time of irrigation along with optimal water use for agriculture, which helps in preventing damage due to drought stress or over irrigational practices.
   - Use of ICT tools and communication network like the internet, mobiles, GPS, etc. can help in remote management of irrigation activities, fertilizer usage, groundwater extraction pumps.
   - Use of ICT tools in irrigation management system can help water authorities in regulating allocation of irrigation water from reservoirs and minimizing the distribution losses in command areas.

4. **IWRM and River basin management**
   IT tools can also be used at basin level to provide early warning system, weather prediction as well as decision making for water allocation & river basin management. This includes
   - Use of smart sensors and associated data to enhance the early warning system during extreme events such as flash flooding etc. besides also managing infrastructure and reservoir systems.
   - Use of integrated monitoring and sensing system & data at river & canals to help in profiling the water flow and quality on a real-time basis and help undertake immediate interventions to curb **water pollution;** maintain flows and help address the upstream and downstream issues thus providing opportunity for optimizing water allocation on a dynamic basis.
   - Interlinking the real-time data on river and groundwater with a GIS platform can help identify several interventions in a synchronous way to effectively implement IWRM (integrated water resources management) at basin & watershed level.
   - Groundwater: Collating and disseminating the information/data on groundwater level, aquifer status, and groundwater contamination for enhancing decision making for improved groundwater management.

5. ICT tools can help in information/data dissemination at different level viz. community, policy makers, field level water managers, centre and state. ICT assisted interface between various government agencies can foster effective decision support system for wider use of database and timely decision making thus improving the coordination between the institutions.

6. The ICT industries can invest in the R&D with lab scale design and development of specialized tools for water sector and later develop full scale products for implementation in the abovementioned areas.

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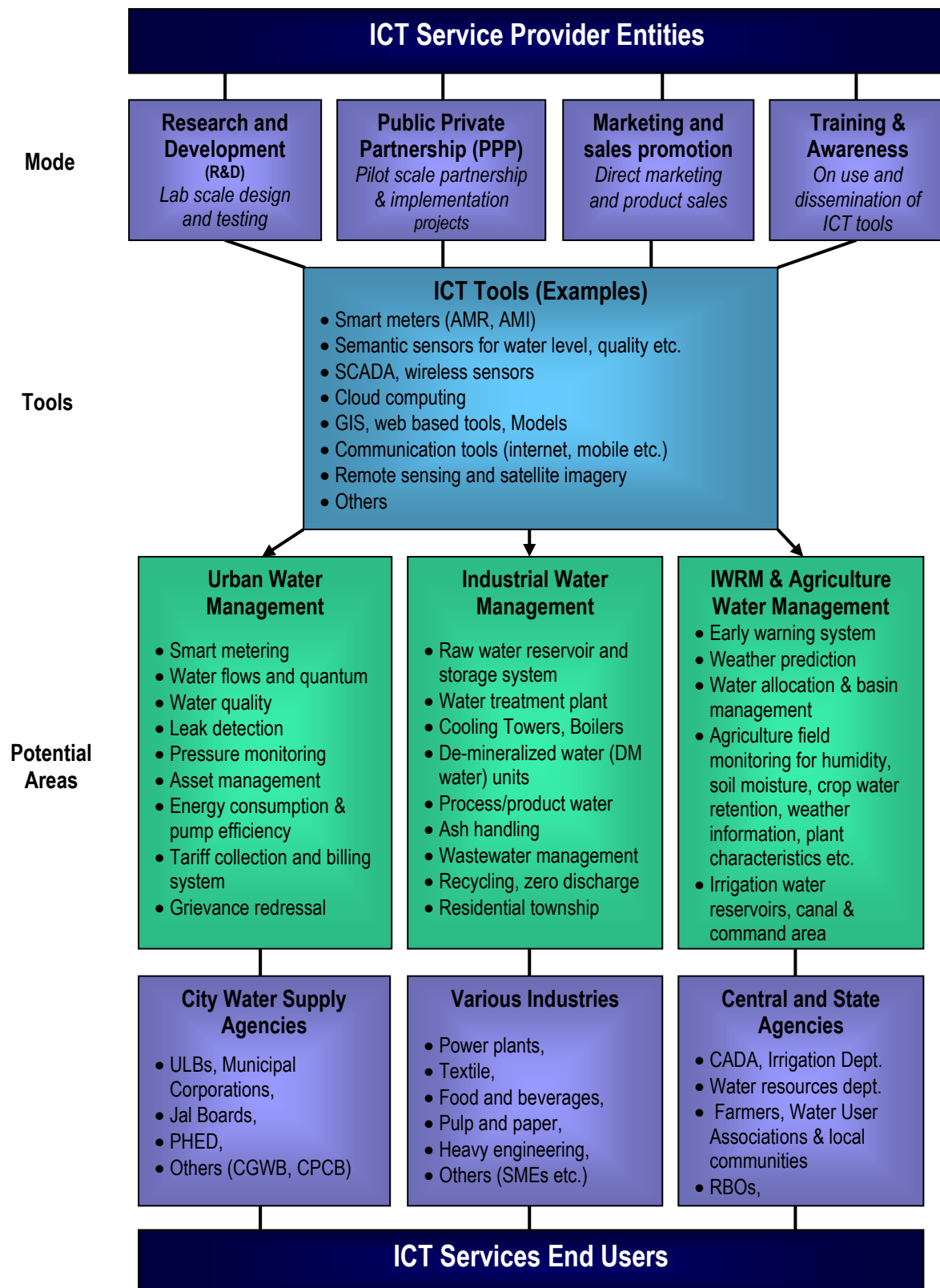Figure below depicts a brief on the role and prospects of ICT industry in water sector and a possible roadmap for future interventions.

Figure: Prospects of ICT in water sector