TERMS OF REFERENCE FOR A SOLICITED WRC PROJECT

KEY STRATEGIC AREA	Water Use, Wastewater Resources and Sanitation Futures
THRUST	**1. WATER SENSITIVE AND RESILIENT SETTLEMENTS**
PROGRAMME	***Programme 1: Smart water supply management***
TITLE	Development of an approach towards digitalization of water services sector in SA

Objectives

Development of an approach towards digitalization of water services sector in SA

General

Rapid urbanization across the African continent is impacting water demand and it is estimated that by the year 2030, the world will need 40% more purified water. In South Africa, local municipalities are losing up to 45% of bulk water supplies, mainly due to pipe leaks and misuse. Global research and insights into the current successes of the introduction of Industry 4.0 in the various industrial sectors, specially from Germany, as a strategic inventiveness the German government adopted a "High-Tech Strategy 2020 Action Plan" in 2011. Industry 4.0 has gained popularity in many countries globally and is viewed as the extension of the previous third industrial revolution that is based on mechanization. Internet of Things (IoT), Industrial Internet of Things (IIoT), Big Data, and Cyber Physical Systems (CPS) are adopted in the manufacturing sphere to move manufacturing towards the 4th Industrial Revolution (4IR) .

A key South African opportunity on water management would be skills development, maturity analysis, the development of technologies that would minimize water losses, energy losses and deliver on business optimization by adopting current technology opportunities. Current global trends in Industry 4.0 is proving beneficial to various industry sectors including petrochemical, logistics, aerospace, pharmaceutical, etc. Industry 4.0 includes the integration of all aspects under consideration, this includes the opportunity to manage/automate in "real time" all aspects influencing the system. Industry 4.0 delivers an opportunity to apply current technologies to maximize the opportunities in the water sector.

Smart water management technologies and digital management systems combined with faster response times could dramatically increase water reliability and significantly reduce losses. Globally, the water industry has been focused on ushering in a new era of water management,

with an emphasis on automation, the Internet of Things (IoT) and more sophisticated data management and analysis software that enables the water end user or plant operator to have valuable, actionable information .

This is a much needed transition required in the South African water services environment against the several challenges associated with ongoing operation and maintenance associated with the lack of skills and capacity. However, this is a long term process of bringing the value proposition and efficiency to the water services sector, and its introduction must be well coordinated and smartly introduced.

Specific

The specific objectives are:

- Develop and undertake an analysis framework, including skills development, through a co-generation approach seeking to establish the digital maturity of the water entities in SA with a focus on the IT/OT maturity.
- Review international best practice and develop the Water 4.0 digital framework
- Development of a training pack on best practice in digital water best practices
- Define a structured framework for water 4.0. based on digital knowledge management.
- Develop a data model for a Central Management Data Base (CMDB), build a theoretical data model (Software, Hardware, connectivity, network, other specification).
- Development of a training pack for data collection
- Undertake skills development in the digital water, IT/OT, digital business models, digital enablement, systems and tools for digital, digital maintenance, digital operations.

Special Requirements

Ideally, this study must be undertaken with a water services institution and leverage in terms of financial support will be encouraging.

Expected outcomes and impacts:

- Research report
- Strategy and guidelines
- Position paper
- A structured training protocol on digital water
    - How to asses current and future skill
    - Framework for skill auditing and forecasting based on tech
    - Decision on what skills is required for what system

Lighthouse:

- Water-Energy-Food Nexus
- Climate Change

Impact Areas:

- Water and the Economy; Water and the Environment; Water and Society

Knowledge Tree

- Sustainable Development Solutions

Time Frame: 2 years

Total Funds Available: R750 000.00 inclusive of VAT. (2022 – 450k, 2023- 300k)