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Advisor to the Custodian of the Two Holy Mosques & Governor of Makkah Region

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المؤتمر الدولي الثاني والعشرون لإدارة الأصول والمرافق والصيانة
The 22nd International Asset, Facility & Maintenance Management Conference

Digitization - Excellence - Sustainability

The Challenge of Digitilization of The Water Sector

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Introduction

As water industry is the most industry need to be safe and sustainable.

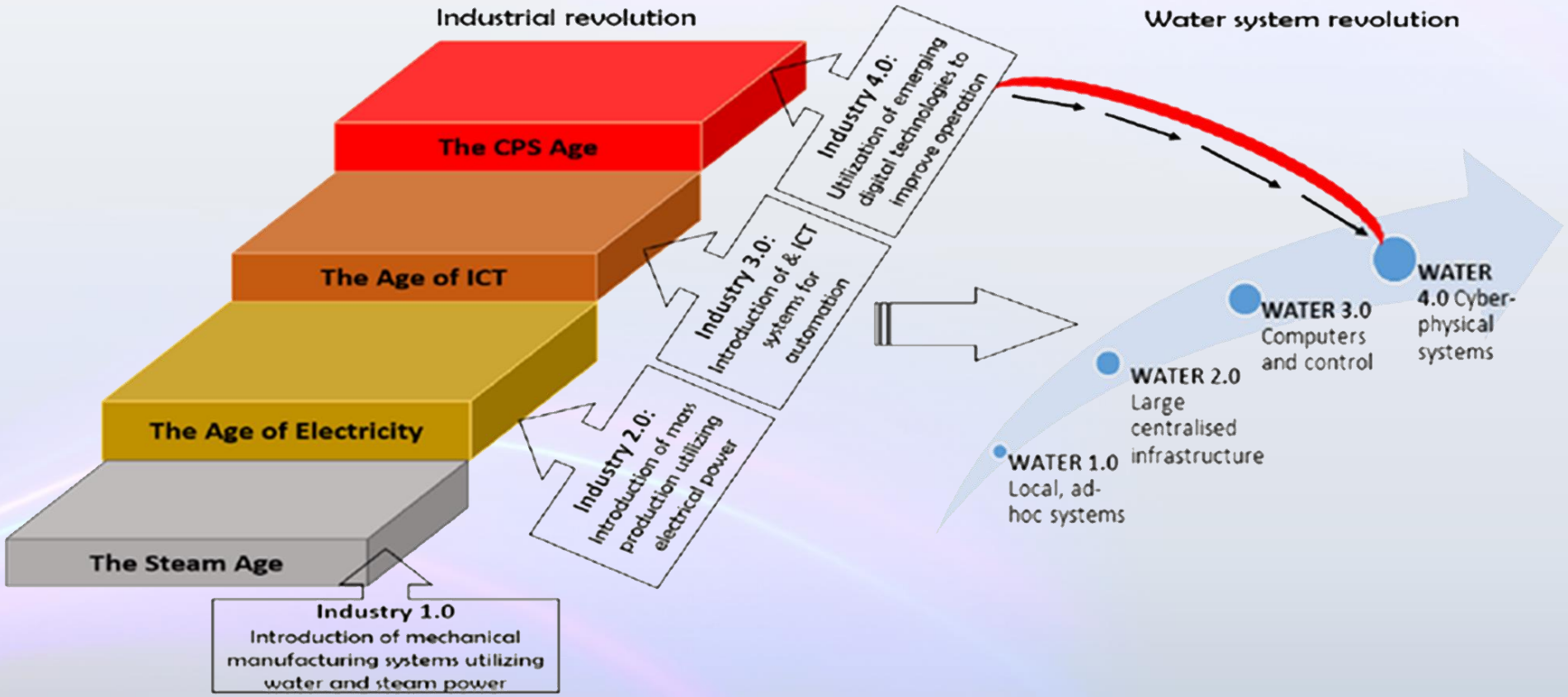
So, there is a need to revolutionize the water industry with the current parading shift in technology to better monitoring and control capabilities.

With the increasing of growth in technology, the water sector is moving to the full phase of digitalization to enhance the sustainability.

Thus, a new industrial revolution is being researched.

Moving from industrial revolution industry 4.0 to water system revolution (water 4.0) the four stages of the industrial and water supply system revolution.

The four stages of the industrial and water supply system revolution



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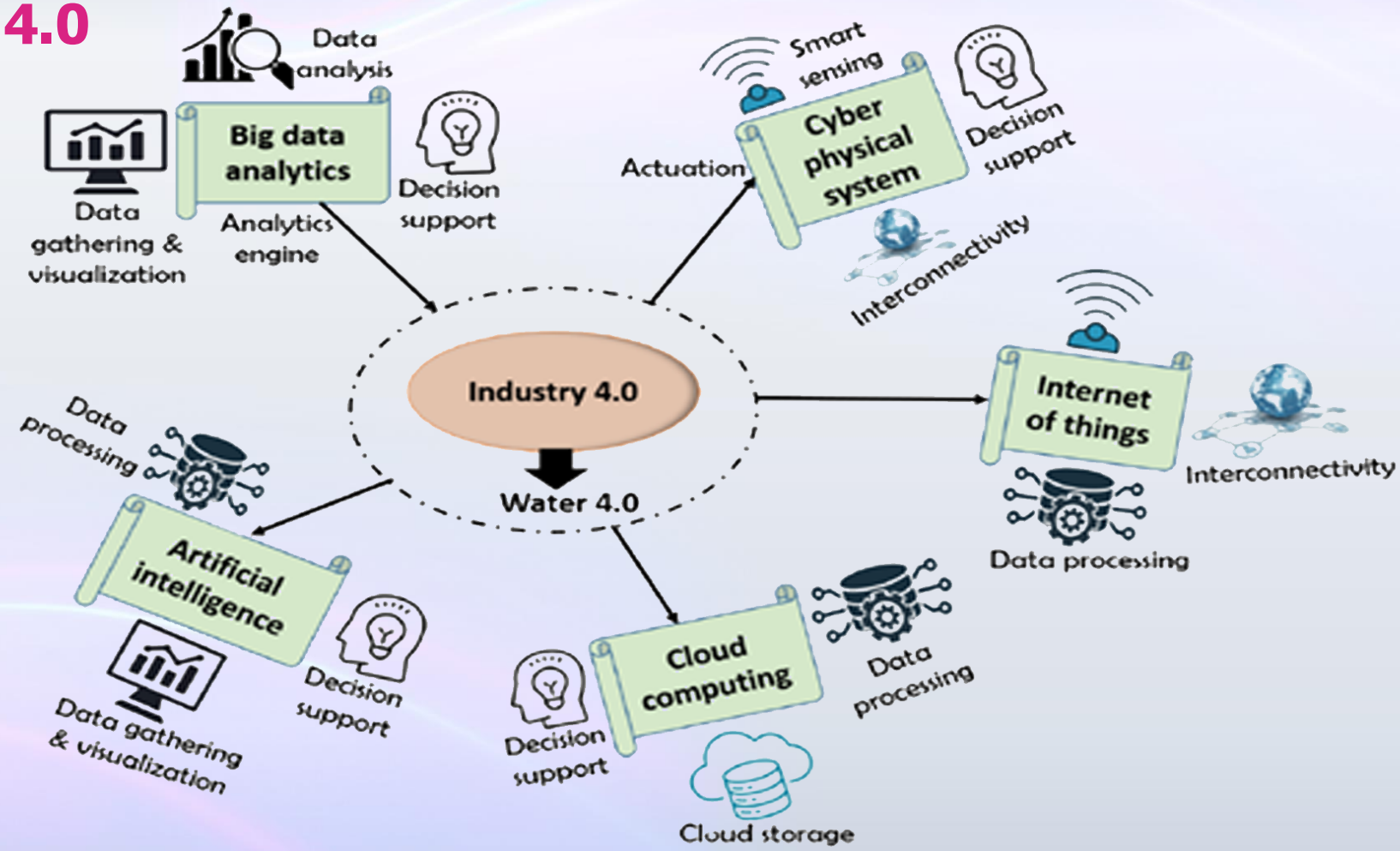
Key drives of water 4.0



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Application of Water 4.0

1. Pipe line health monitoring:

Pipe line health monitoring involves monitoring of pipe for corrosion, deformation and vibration as well leaks.
A typical example is the use of smart robotics for pipe health monitoring.

2. Pressure control and monitoring:

In water distribution network, pressure sensors are mounted at nodes of the network to measure water pressure along the pipe and at each node, pressure and water demand share a good relationship.

3. In water quality application:

The deployment of integrated sensing devices is required to provide continuous real-time measurement of data related PH, temperature, turbidity, dissolved oxygen concentration, and chlorine residual level along the distribution network.

4. Leakage detection and monitoring:

In this system, an integrated number of sensors such as pressure, vibration, acoustic, and flow sensors and actuators are deployed for measurement and control activities.

Conclusion

Digital transformation of the water system for sustainable water supply to a necessity owing to the dynamic nature of water system and consumer demand uncertainties, among others, Digital technology have the potential to transform the operation and accordingly the maintenance of water systems by providing day-to-day water management and addressing long-term challenges and water security.

therefore, water 4.0 is seen as a revolutionary methodology for improving operation and maintenance performance and provide real-time monitoring capabilities to complex water system

Case Study Talkha WWTP Aeration System

- Current situation:

Large quantity of power is used during the operation due to the following reasons:

✓Failure of flow meter that responsible for oils play and control the water quantity.
✓Manual operation for aeration system.
✓Manual operation for the entrance gate.
✓The aeration system to working without any control.
✓The 12 gearbox's working without any sequence.
✓Failure of 4 DO devices from 6 Do device that are responsible for display and control the dissolved oxygen percent.

Solution of Misr For Science and Technology

- Critical parameters:

1. Quantity of the entrance water to be the actual value that the station was designed for it.
2. Sequence between the 3 gearbox’s in each tunnel.
3. The operation time of the gearbox’s.
4. The dissolved oxygen to be suitable for aeration system.
5. The aeration system output gate.
6. The gate of the bypass system.

Advantage of solution of Misr for Science and Technology Research

1. Saving more that 25% of the absorbed power of the aeration system.
2. Saving more than 20% of the absorbed power of station component.
3. Saving the life time of the system component.
4. Make sure that the quantity will be the quantity that the station was designed for not more.
5. Safety on the system component.
6. Alert in case of any system error.
7. Automatic operation for the aeration system.
8. Provided also manual operation in case of system failure.
9. Ensure that the ventilation process will be done properly
10. Safty on the motors in case operation error.

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