2024 MRIWA Research Showcase

Wetland in a Box (EnPhytoBox®) - A smart water treatment system to support the decarbonisation of water in mining

Simon Hadley

SYRINX

enphyto BOX

HOW IT CAME ABOUT

SYRINX

Syrinx

- Privately owned, 25 years young.
- Purpose-driven, solution-focused & innovation.
- Impactful, sustainable, nature-based.
- Extensive portfolio of constructed wetland and bio-filter projects for the treatment of a diverse range of wastewater sources.

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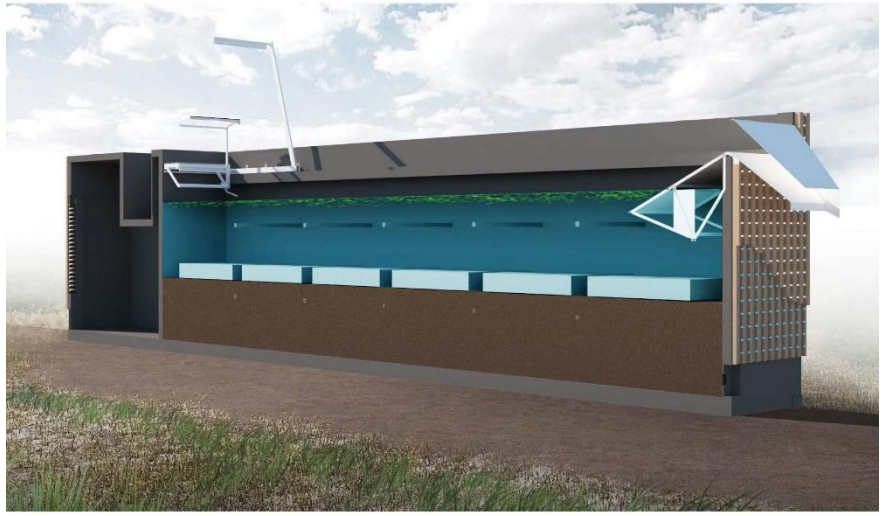
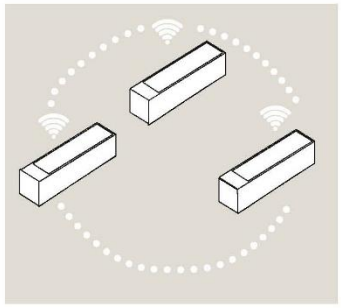
WHAT IS IT ?

SYRINX

- ‘Wetland-in-a-box’
- Modular and remotely deployable mobile water treatment unit.
- Net zero for waste and emissions and generates reuse products (water, biomass).
- Remote monitoring and operation remote locations.





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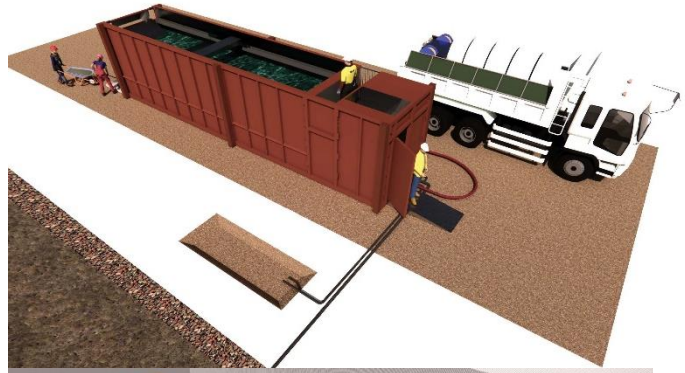
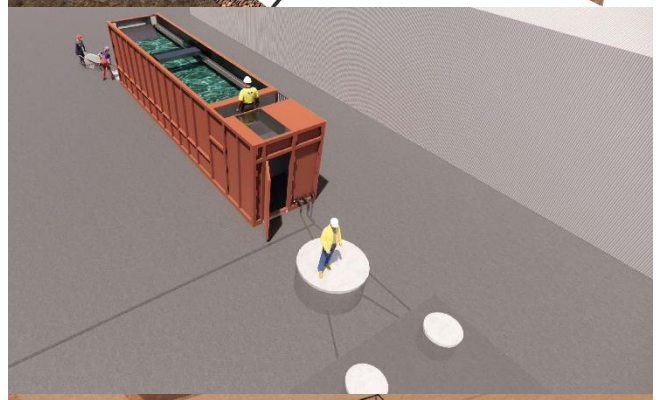
WHAT CAN IT TREAT?

SYRINX

- Mining, industrial and municipal wastewater
- Contaminated surface water and groundwater
- Range of pollutants including nutrients, metals and metalloids, BOD,TSS, organic compounds, pathogens.
- Up to 100kL/day, multiple units for greater capacity.





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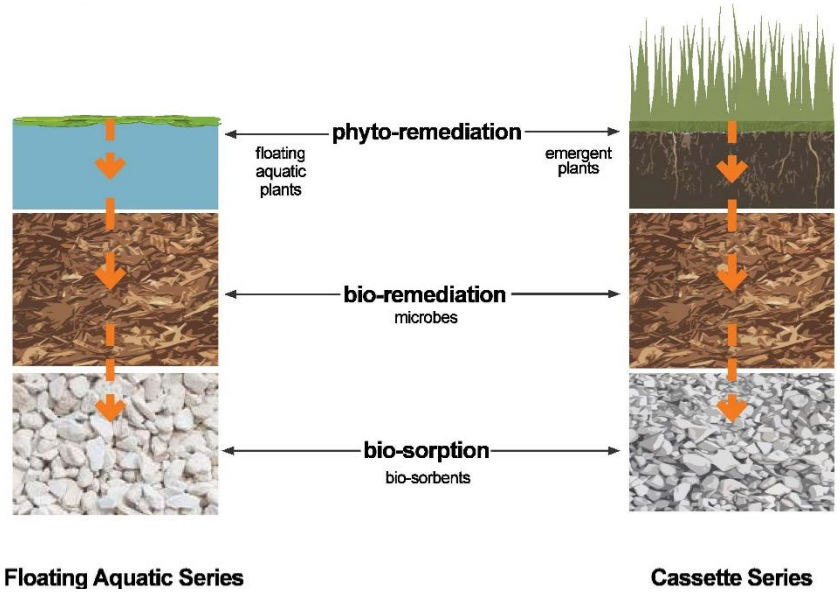
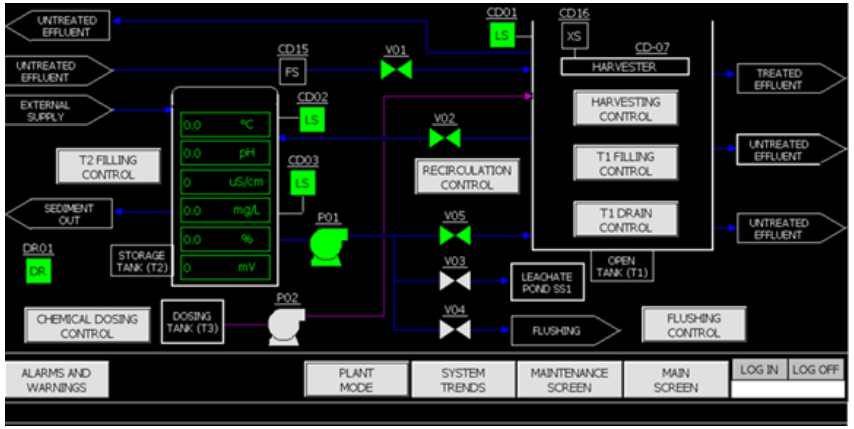
HOW IT WORKS ?

SYRINX

- Vertical sequence of plants, water, biosorbents and natural filtration media
- Uses processes similar to natural wetlands
- Automation (pumping, harvester)
- Sensors to monitor water quality, levels and flows.





THE MRIWA PROJECT

- Participation in the CSIRO/MRIWA Net Zero Emission Mining Innovate to Grow program
- Research proposal developed to address two key issues identified by prototype:
  - Need to integrate data extraction, analysis, monitoring and control into a single interface.
  - Need for ‘fit-for-purpose’ communication technologies for any given deployment.

THE MRIWA PROJECT

- March 2022, MRIWA grant received to support Syrinx in the development of an IIoT system for the EnphytoBox® to enable deployment of the EnphytoBox® in remote locations, including mine tailings storage facilities.

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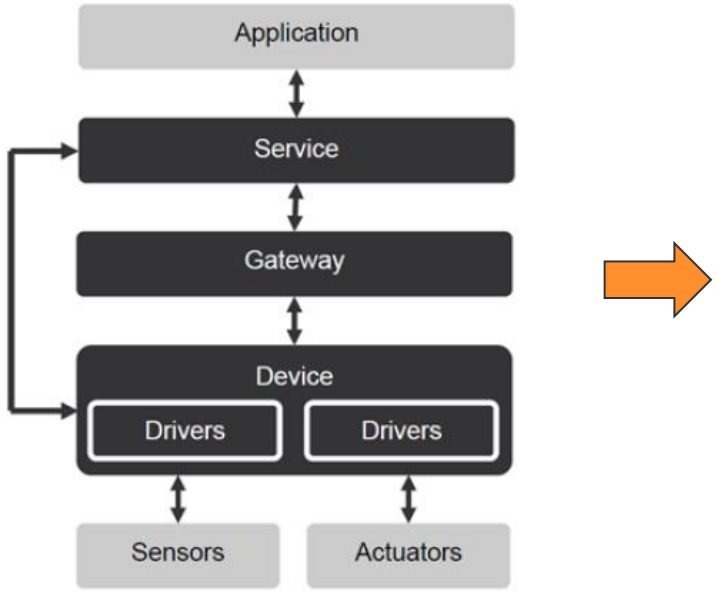
LEARNINGS

SYRINX

- System Architecture
- Achieving communications reliability



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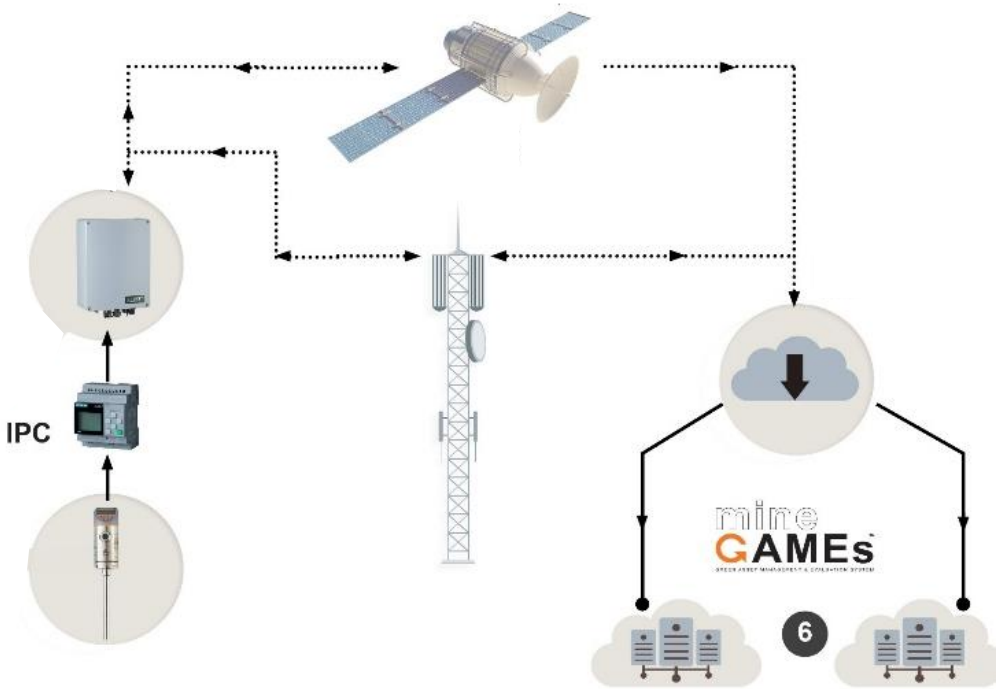
LoRaWAN®



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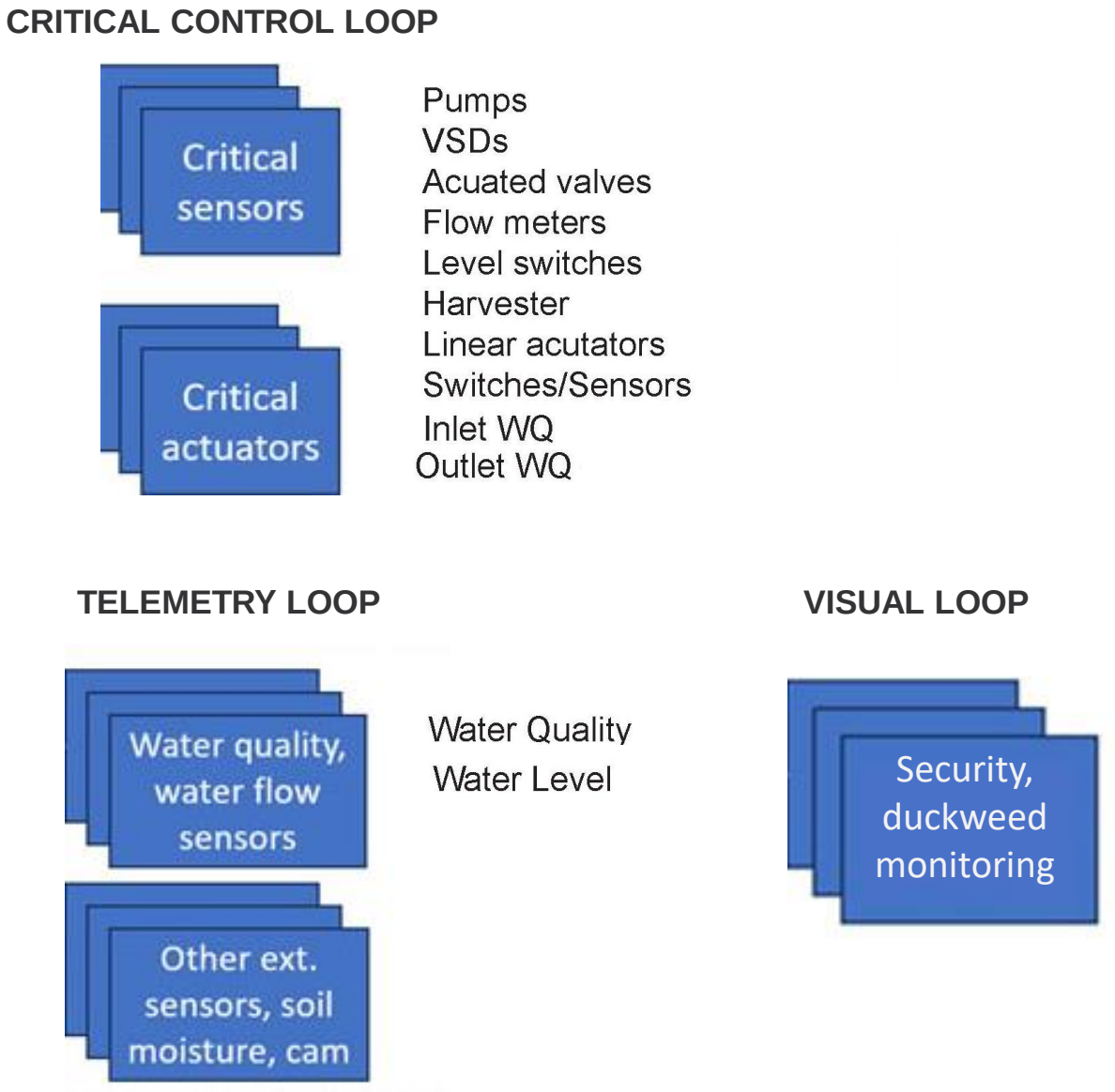
LEARNINGS

SYRINX

- Device hierarchy
  - role (operational vs monitoring)
  - frequency that data is needed
  - sensor technology
  - data transfer limitation



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LEARNINGS

SYRINX

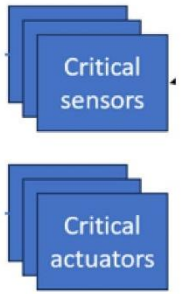
APPLICATION

REMOTE OPERATION AND MONITORING

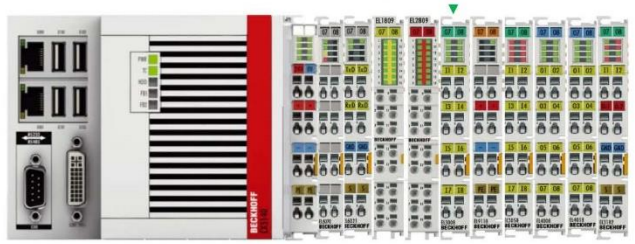
API

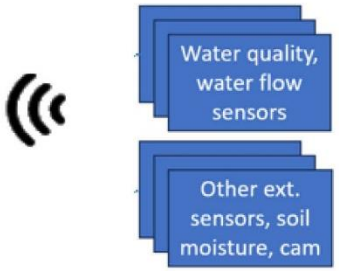
CRITICAL CONTROL LOOP

SMART GATEWAY



LoRaWAN





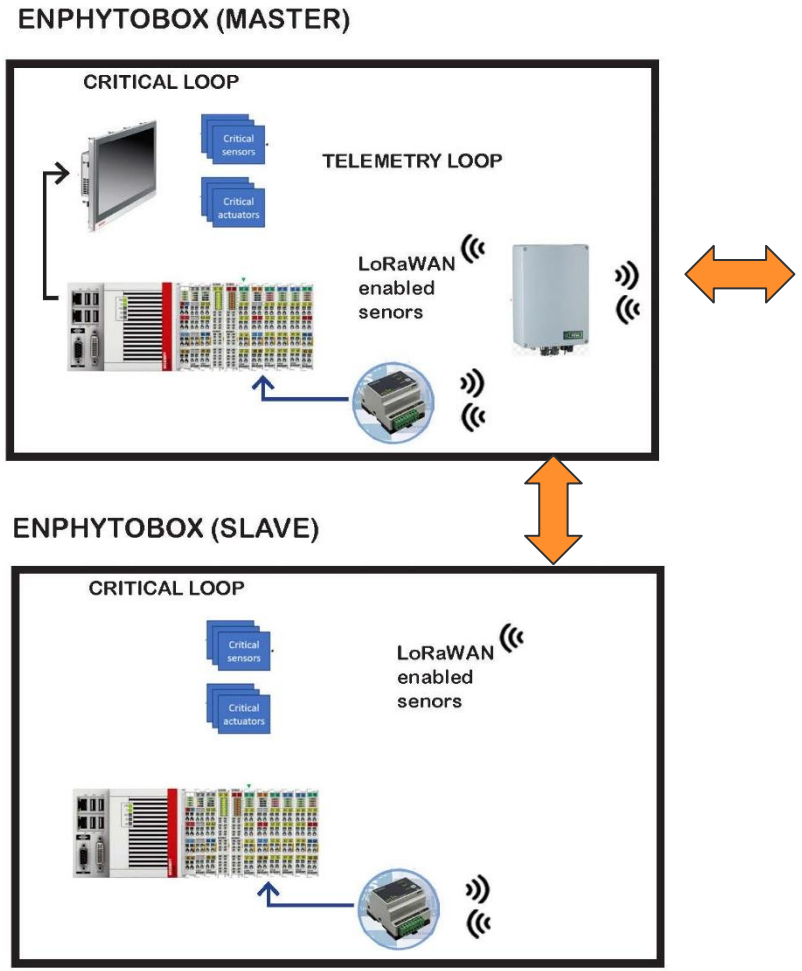
TELEMTERY LOOP

BRIDGE

LOCAL IPC

KEY OUTCOMES

- Communications continuity (cellular / satellite).
- Multiple devices reporting to a single location.
- Two-way data transfer (remote system control and optimisation).
- Multiple unit control and scalability.
- Adaptable to innovation in sensor technology.



KEY OUTCOMES

- Unlocks value from polluted water resources.
- Supports decarbonisation targets.
- Mobile, scalable & suited to remote sites.
- Treats water to meet requirements (reuse, discharge).

THANKYOU

- MRIWA for your funding and ongoing support of the EnPhytoBox ®
- Contributions of Associate Professor Rachel Cardell-Oliver and Ben Longbottom from UWA

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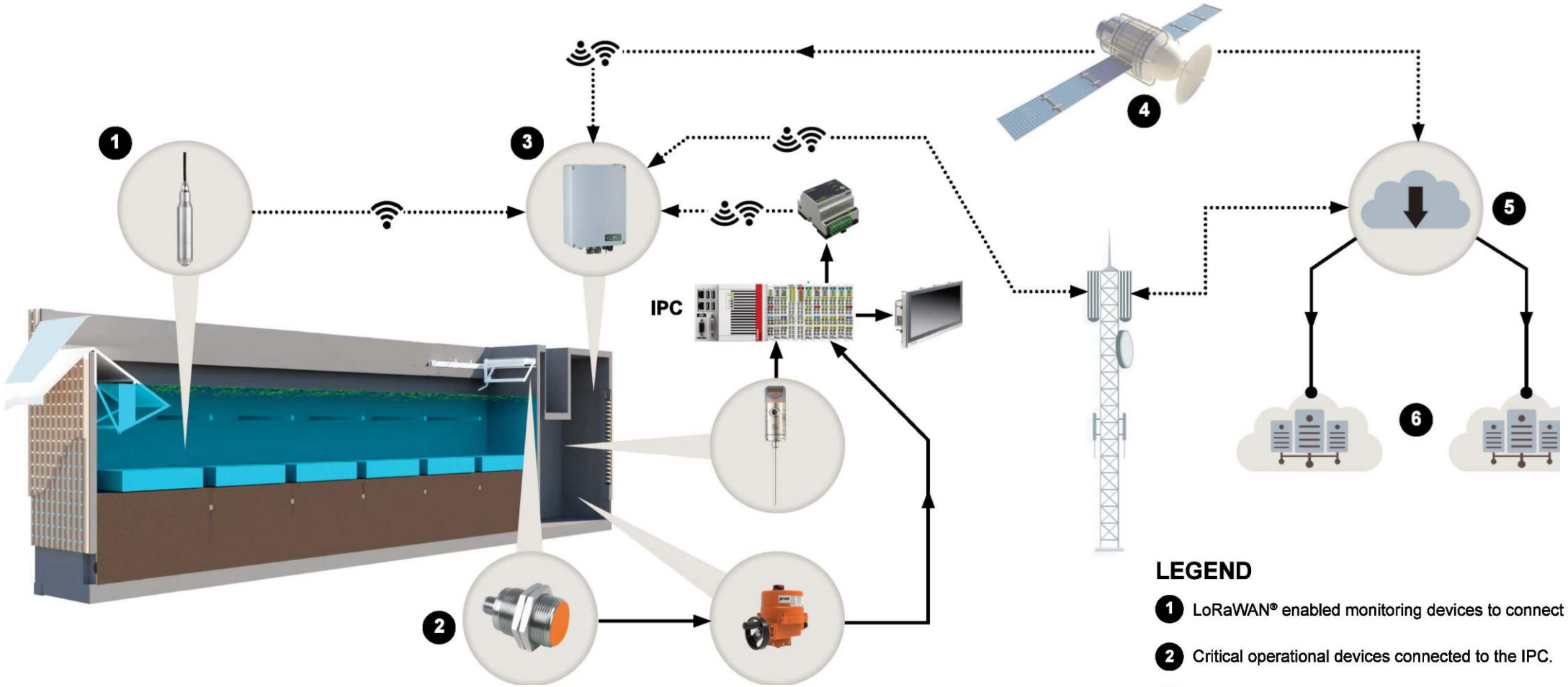
BOX

SYRINX



LEGEND

1. LoRaWAN® enabled monitoring devices to connect to the gateway wirelessly.
2. Critical operational devices connected to the IPC.
3. Smart gateway processes and transmits data to/from the cloud.
4. Combined dual satellite and dual cellular enables resilience and reach.
5. Cloud platform enables access via API
6. Customer can enable different securitity levels to enable data and remote controls