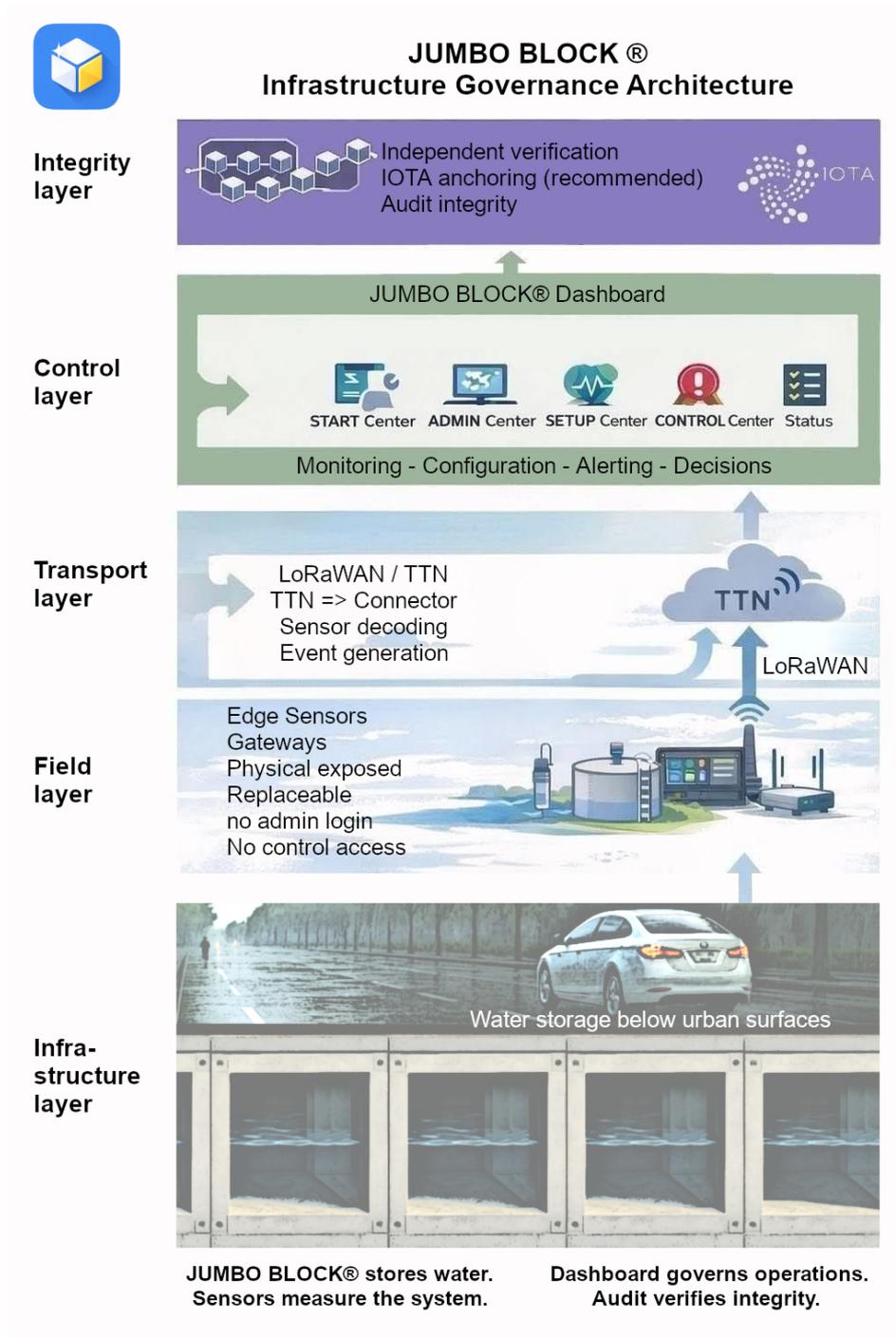


JUMBO BLOCK® Dashboard

Digital Monitoring Platform for Urban Water Retention Infrastructure

Monitoring · Audit · Operational Infrastructure Governance
for JUMBO BLOCK® Retention Systems



“The combination of physical and digital infrastructure creates a new level of urban resilience.”

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Why JUMBO BLOCK® is Infrastructure-Ready

KRITIS · NIS-2 · Cyber Resilience Act

Modern urban infrastructure must meet increasing requirements for **resilience, transparency and cybersecurity governance**.

In Europe, several regulatory frameworks are defining these expectations, including:

- **KRITIS requirements** for critical infrastructure protection
- **NIS-2 Directive** for cybersecurity governance and risk management
- **Cyber Resilience Act (CRA)** for secure digital systems and products

The **JUMBO BLOCK® system** has been designed with these principles in mind by combining **physical resilience infrastructure with digital operational governance**.

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1. Context

Introduction

The **JUMBO BLOCK® Dashboard** is the digital monitoring and governance platform for urban water retention infrastructure based on the **JUMBO BLOCK® system**.

While the **JUMBO BLOCK® module** strengthens the **physical resilience of urban infrastructure**, the **JUMBO BLOCK® Dashboard** represents the **digital response to this physical resilience**.

The platform combines:

- sensor technology
- infrastructure monitoring
- traceable operational decisions

into a **transparent digital operational layer for modern urban infrastructure**.

This creates a new form of infrastructure oversight:

Urban Water Infrastructure Governance.

2. Problem Statement

Cities around the world are facing increasing infrastructure challenges.

In particular, three developments are increasing the pressure to act:

- increasing extreme rainfall events
- overloaded drainage and sewer systems
- lack of transparency regarding the condition of critical infrastructure

While physical infrastructure can provide solutions, there is often a lack of a **digital monitoring and documentation layer** that makes operations transparent and traceable.

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Modern infrastructure therefore additionally requires:

- continuous monitoring
- structured documentation
- traceable operational decisions
- transparent system history

The **JUMBO BLOCK® Dashboard** therefore complements the physical retention infrastructure with a **digital monitoring, operational and documentation layer**.

3. The Overall System

The **JUMBO BLOCK® approach** combines physical infrastructure, sensor technology and digital governance.

System Structure

JUMBO BLOCK® System

Physical Infrastructure

↓

Sensors

↓

JUMBO BLOCK® Dashboard

↓

Monitoring · Audit · Decisions

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The Three Layers

Layer	Function
Infrastructure	JUMBO BLOCK® retention system for rainwater storage
Sensor Layer	IoT sensors measuring water levels and system conditions
Dashboard	Monitoring, documentation and operational decision support

This combination enables, for the first time, **fully traceable infrastructure monitoring**.

4. What the Dashboard Enables

The **JUMBO BLOCK® Dashboard** forms the **digital operational layer of the infrastructure**.

Key capabilities include:

- real-time monitoring of the installation
- visualization of filling levels, inflow and trends
- continuous sensor status monitoring
- documentation of operational decisions
- audit-ready system history
- structured infrastructure documentation (*Plant Model*)

This creates **complete transparency regarding the condition and development of the infrastructure**.

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5. The Four System Centers

The dashboard is intentionally structured into **four clearly separated functional areas**.

Center	Function
START CENTER	public infrastructure transparency
ADMIN CENTER	system operation and maintenance
SETUP CENTER	infrastructure configuration
CONTROL CENTER	operational decision-making

This structure reduces operational risks and establishes a **clear responsibility and governance structure**.

6. Infrastructure Monitoring

The dashboard enables **continuous monitoring of the retention system**.

Among other aspects, the system monitors:

- system filling levels
- inflow and outflow development
- sensor status
- historical development of the installation

The data is **continuously collected, documented and visualized**.

This creates a **digital twin of the infrastructure**, making the current system state transparent at any time.

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7. Audit and Documentation System

A central component of the system is the integrated **audit ledger**.

Among other things, the following are documented:

- sensor data
- operational decisions
- system states
- infrastructure developments

The data is stored in an **append-only audit ledger**.

This creates an **immutable system history** that can be verified at any time.

This increases transparency and supports **traceable infrastructure management**.

8. Governance & Compliance

The architecture of the **JUMBO BLOCK® Dashboard** supports key requirements of modern infrastructure governance.

In particular, the system addresses principles derived from:

- **Critical Infrastructure (KRITIS)** requirements
- **NIS-2 Directive** (cybersecurity governance)
- **Cyber Resilience Act (CRA)**

This is achieved, among other measures, through:

- role-based access control
- structured audit protocols
- deterministic system configuration
- transparent system states
- traceable operational decisions

This enables **responsible and audit-ready infrastructure management**.

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9. Operation

The dashboard is designed for **edge infrastructure environments**.

Typical System Architecture

- ARM-based edge systems
- Linux-based operating systems
- Node.js runtime environment

Key Characteristics

- low hardware requirements
- local data storage
- minimal external dependencies
- robust operational architecture

This architecture enables **stable, energy-efficient and scalable infrastructure monitoring**.

10. Benefits for Municipalities

The **JUMBO BLOCK® Dashboard** offers several advantages for municipalities and infrastructure operators.

It enables:

- transparent infrastructure monitoring
- structured documentation of decisions
- improved situational awareness during heavy rainfall events
- traceable operational processes
- clear overview of system structure and capacity

This supports **modern, responsible and transparent infrastructure management**.

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Conclusion

The **JUMBO BLOCK® Dashboard** represents the **digital governance layer of the JUMBO BLOCK® infrastructure**.

It combines:

- monitoring
- documentation
- audit transparency
- operational decisions

into a structured system for **modern urban water infrastructure**.

The combination of **physical infrastructure, sensor technology and digital governance** creates a new form of infrastructure oversight that unites **transparency, traceability and resilience**.