Innovation Building Blocks

ITS Washington Annual Conference and Exhibit

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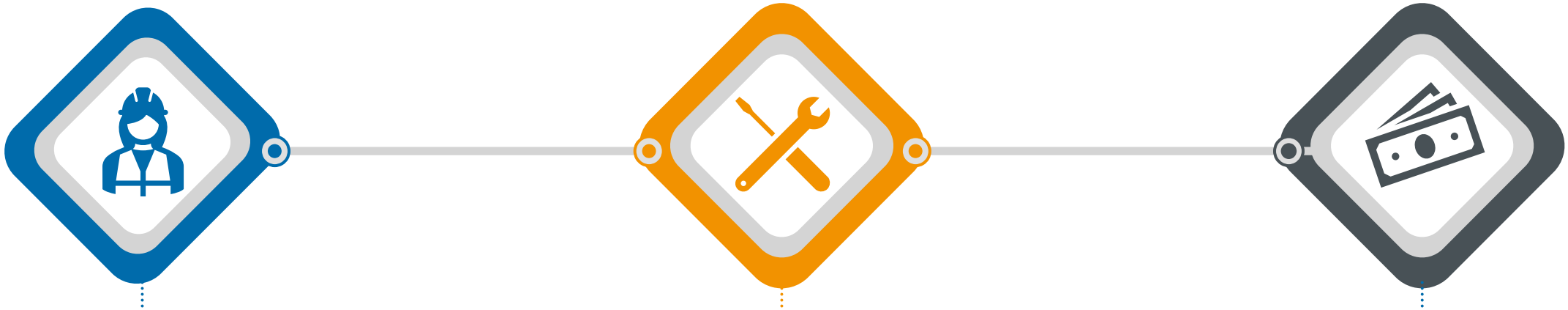
AGENDA

1. Raise the Floor
2. A day in Paradise
3. Critical Components
4. Building the Architecture

Raise the Floor

Challenges to the future of signal operations – Big picture



Workforce

Massive retirement

Staff qualifications

Availability of training

Tools

Legacy equipment

Inadequate standards

Flashy technologies

Funding

Varied across operators

Recurring revenue models

Unrealistic expectations

Raise the Floor

Innovating solutions for sustainable signal operations

Consideration of audience

- Owners and operators
- Highly specialized
- Broad responsibilities

Application of technology

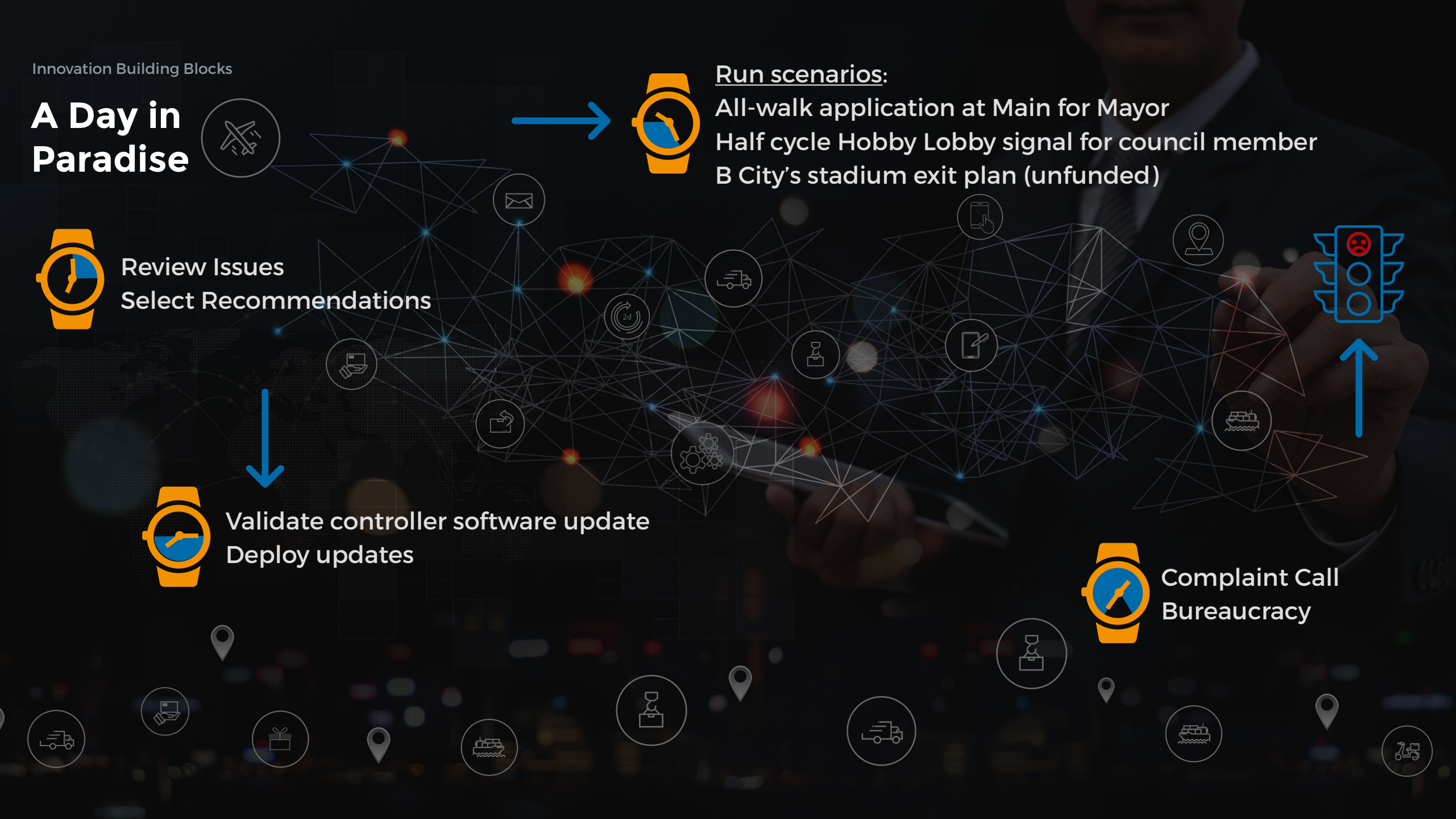
- Compliment current state
- Approachable methods
- Modernize and improve

Realistic deployment

- Inclusive licensing
- Rapid integration
- Immersive OJT

Innovation Building Blocks

A Day in Paradise



Run scenarios:
All-walk application at Main for Mayor
Half cycle Hobby Lobby signal for council member
B City's stadium exit plan (unfunded)

Review Issues
Select Recommendations

Validate controller software update
Deploy updates

Complaint Call
Bureaucracy

Critical Components

Building a digital twin

practical

System components

- Traffic management system
- Simulation system
- Signal controller software

Later…

- Edge compute platform
- AI algorithms
- Hosting subscription

Critical Components

Building a practical digital twin

~~Big~~ data

- Traffic Loading
- Geometry
- Event snap-shots

Later…

- Data fusion
- Trajectory injections
- WX, Env., HCM, Freight, WZX, AIS, ROFL

Critical Components

Building a practical digital twin

Work-flow

- Near real-time APIs
- Decouple traditional simulation
- Geometry schema
- Software in the loop
- *Fastimum* analysis

Soon?

- Self learning geometry

Later…

- Automated rec.
- Predictive algorithms

Building the Architecture

Target use-cases and objectives

1 Validate software updates

Test a new software update against the customers entire system using up-to-date configurations, current traffic conditions, and emulated conflict monitors.

2 Ad-hoc, scenario-based analysis

Using current device configurations and near real-time or historical snap-shot of traffic loading, analyze impacts of timing configuration changes, operations updates, or incident plans in an operations environment.

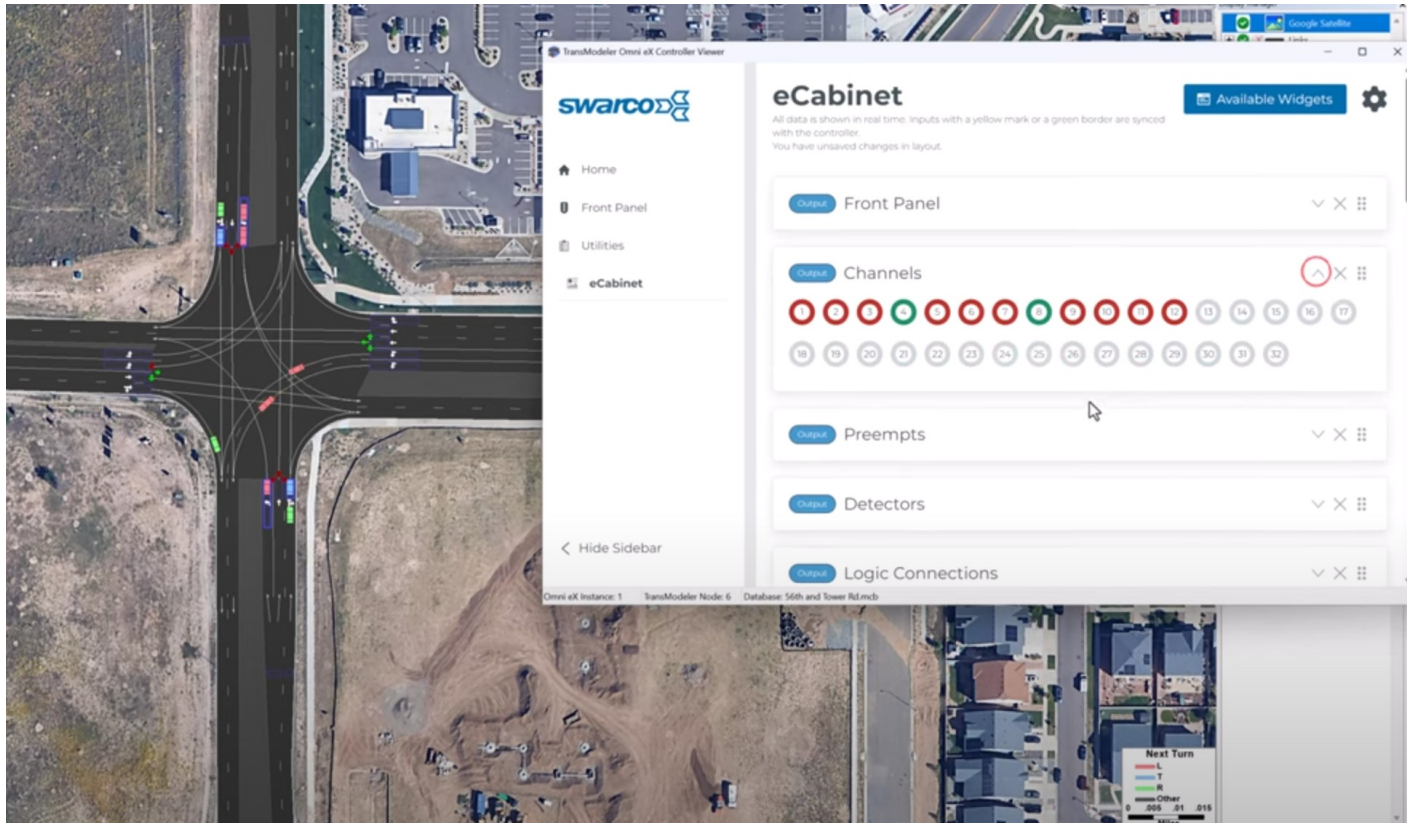
3 Open-source data models

Further the sharing and synchronization of data throughout the full ITS solution. Add new devices, associated meta-data, and connect via streaming APIs.

Building the Architecture

Simulation in the loop

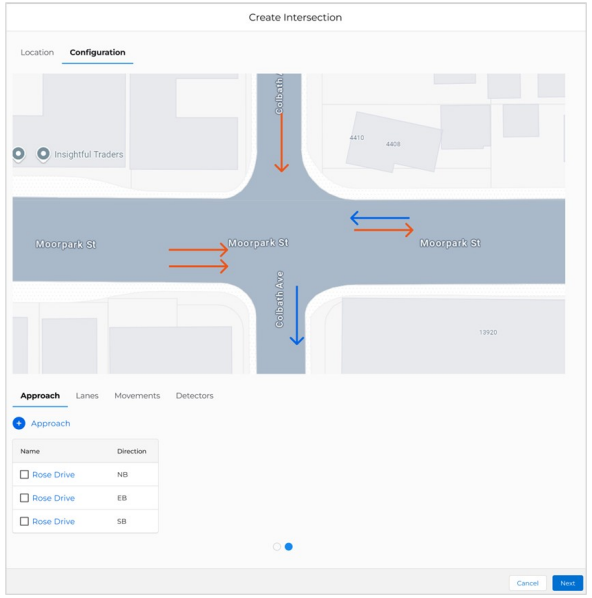
- Run 1000's of virtual intersections
- 1000x speed
- Full functionality
- Integrated controller I/O
- Auto-configure

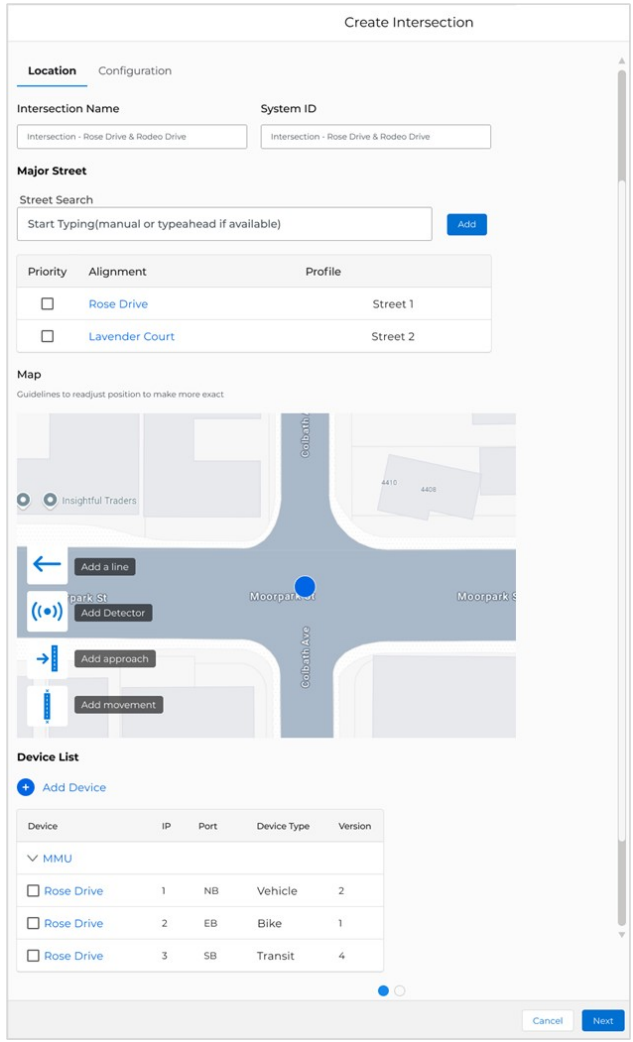


Building the Architecture

System Location Configuration – Not your Grandma's graphic

- Detailed geometry
- Movement-based
- Single source of truth



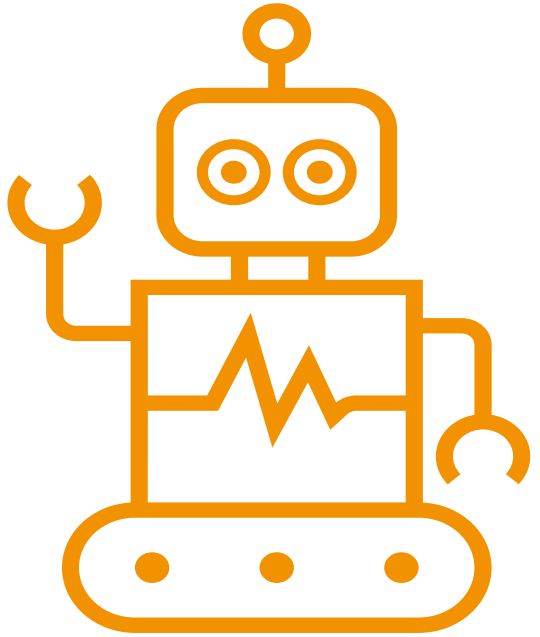


Building the Architecture

Enhancing hardware with software

High Resolution Data Logger

- Logs every state/tick in control logic
- Reconstruct operations and issues
- Replay in regression testing
- Enable data-driven decisions



Edge computing BOTS

- Use-case driven, autonomous functions
- Lamp-out monitoring and prediction

Thank you for your time.

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The Better Way. Every Day.