Retail Innovations with Generative AI and IoT

Future Solutions with Case Studies

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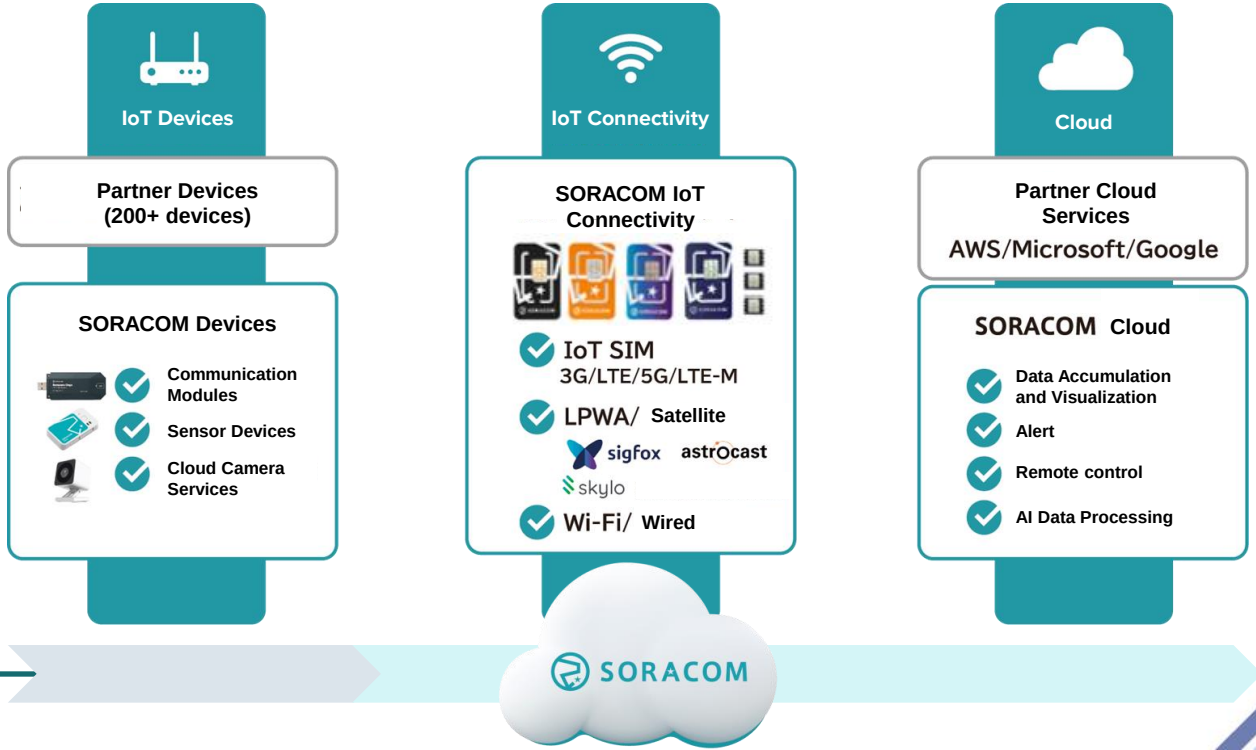
SORACOM'S VISION

The best possible human future is ***connected***.

SORACOM'S MISSION

We are **the most customer centric company** that enables everyone to realize their passions and visions by **democratizing IoT technology, and accelerates innovations.**

A global platform that accelerates IoT product development with a focus on data communications for IoT



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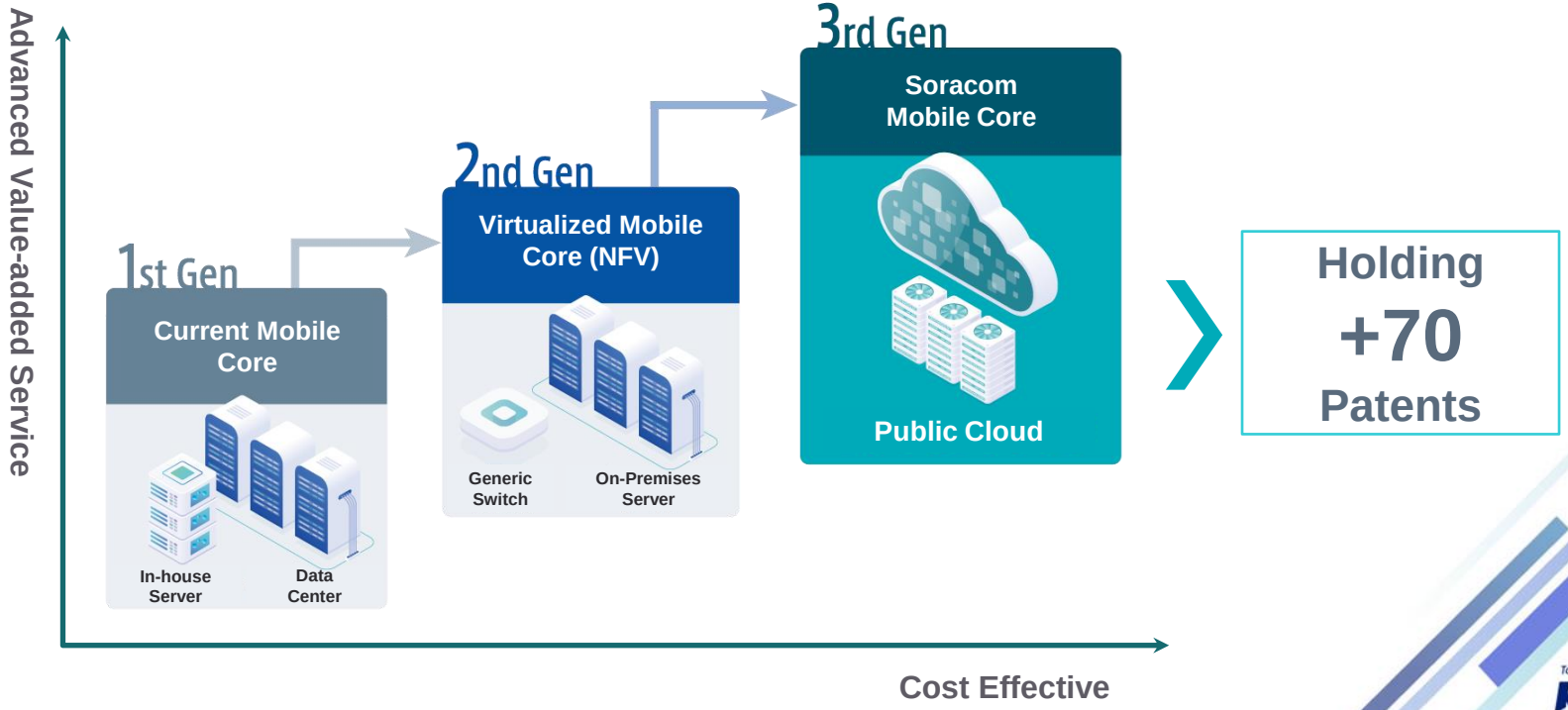
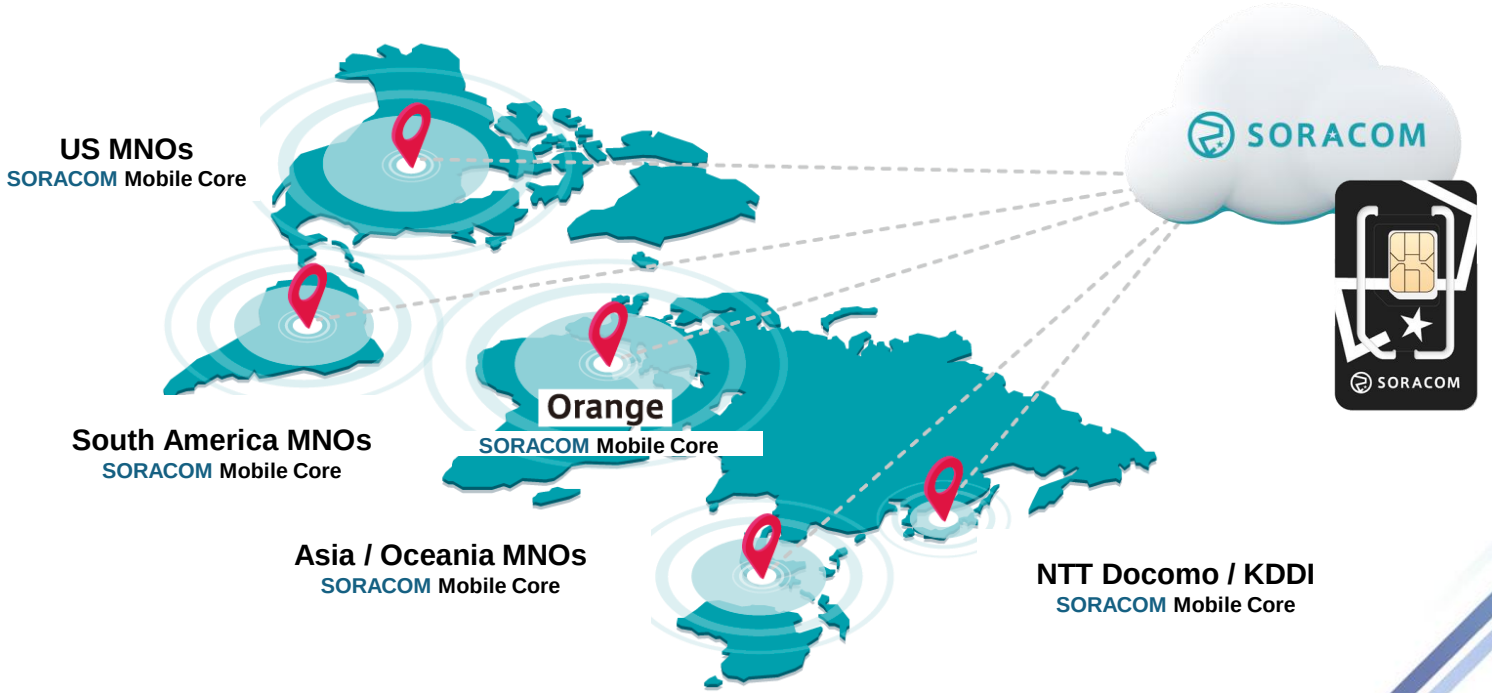
Innovative Technology

Soracom enables its advantages by its proprietary "Mobile Core" technology running directly on public cloud



Global Ready

Seamless Multiple Access only with SORACOM
< 428 Carriers / 185 Countries & Regions >



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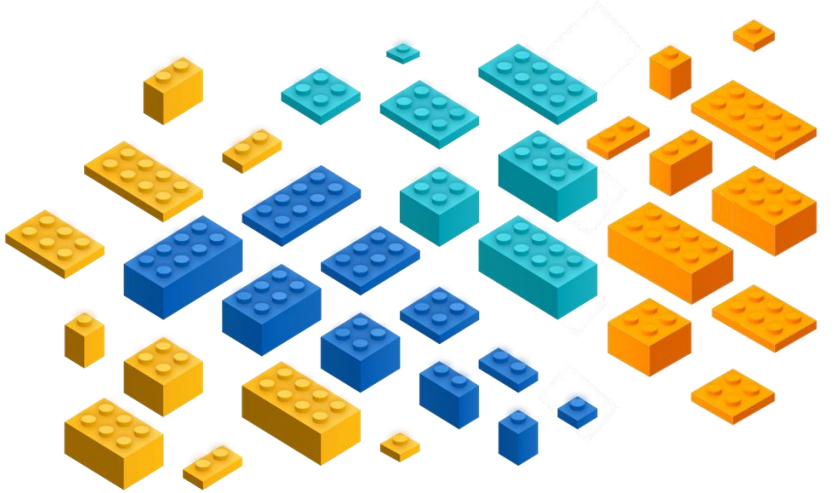
Value of Platform - No need to Reinvent the Wheel -

Soracom provides fundamental +20 building blocks for IoT



Device | Connectivity | Cloud | Solution

Allowing customers to choose as needed

Customer A

Smart Metering

- Cloud Integration
- Data formatting
- Connectivity

Using services

Customer B

Payment Terminal

- Private Connectivity
- Security
- Global Connectivity

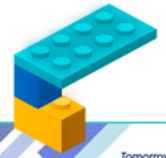
Using services

Customer C

Vehicle Management

- Data Visualization
- Cloud Integration
- Connectivity

Using services



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Use Cases

Numerous customer cases across a wide range of industries

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30,000+ customers World Wide Enterprise

Note: As of March 2024

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30,000+ customers World Wide Global Deploy

30,000+ customers World Wide SMB/StartUp

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Internet of Things

The future that we have envisioned

When we say IoT, we think of a future
People, things, and events associated with them organically connect and interact with each other to achieve a better world, together

What has become reality today

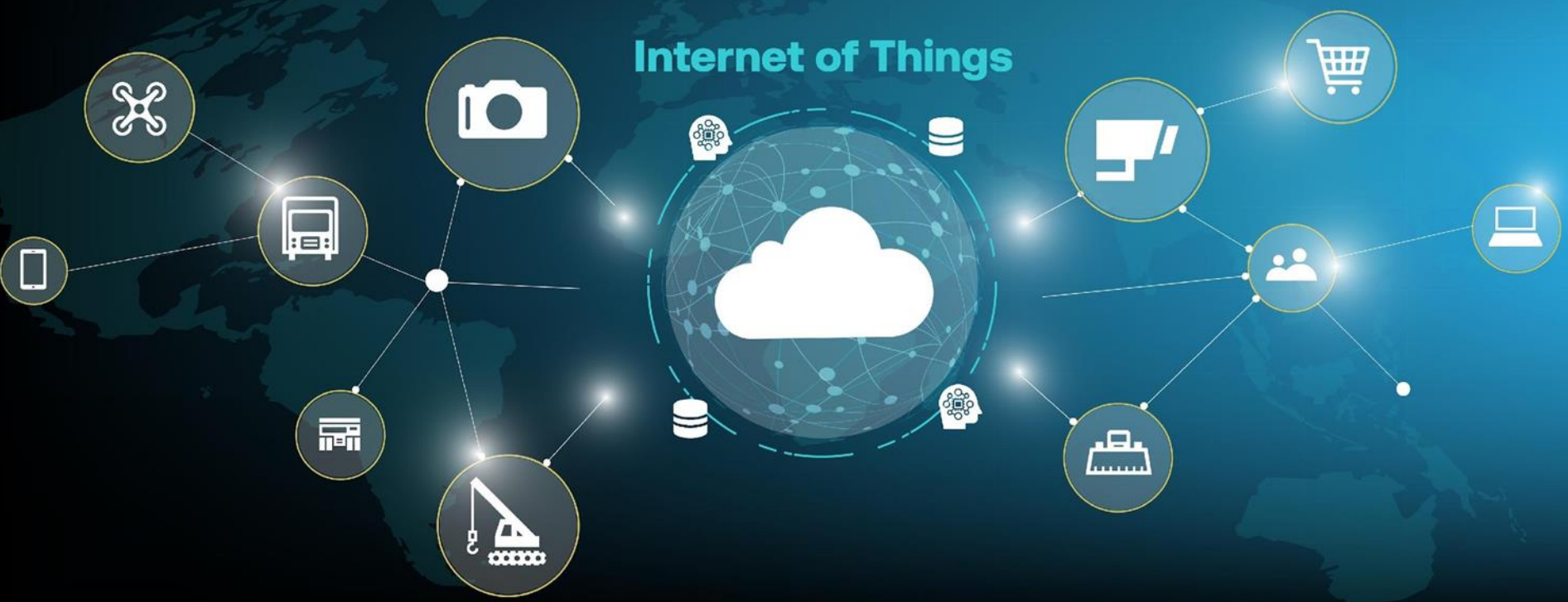
Devices can be securely connected to their respective cloud environments

What to aim next, together

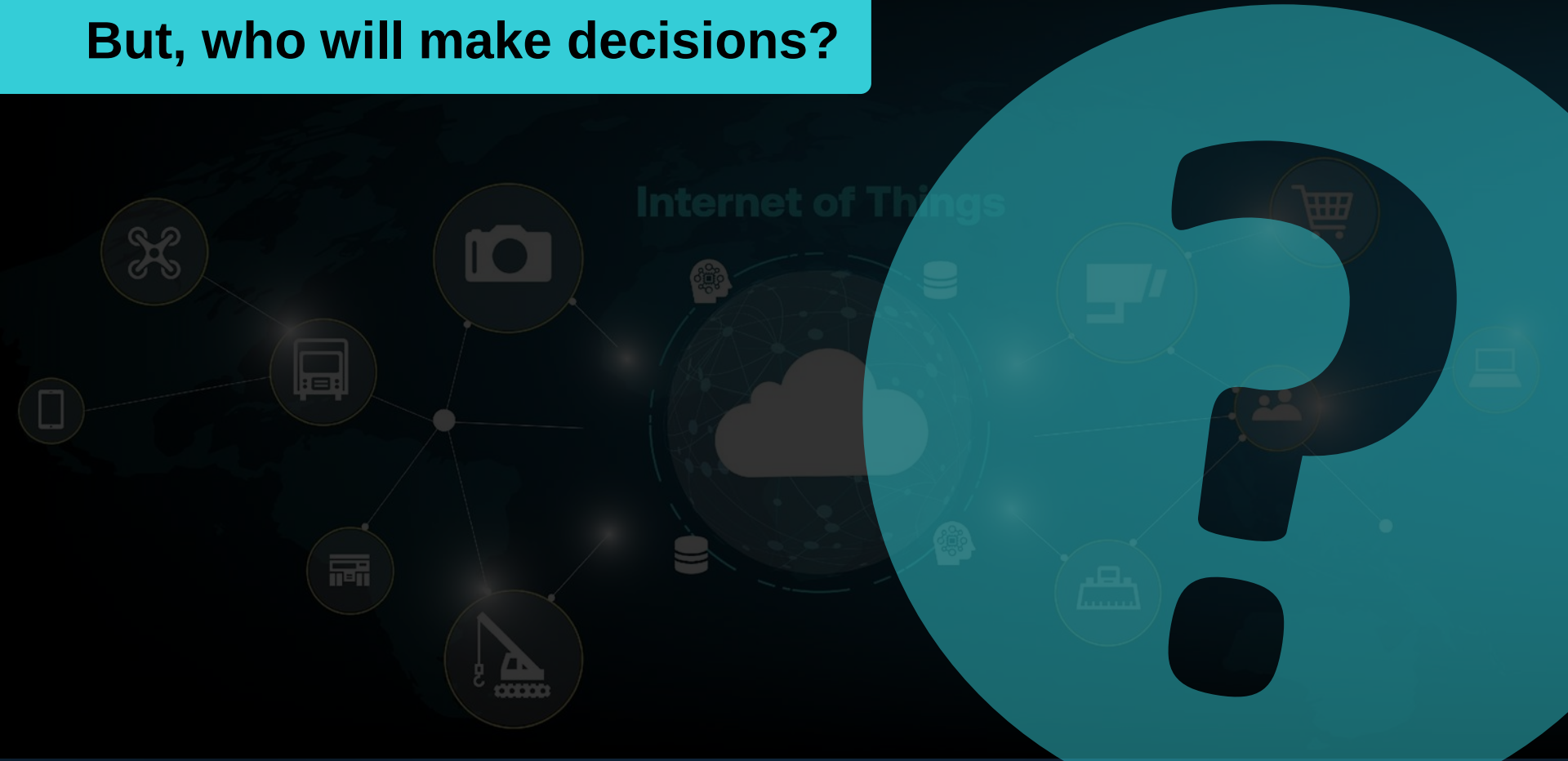
Data is shared beyond organizations and used for taking actions

A true IoT vision where everything and everyone collaborates to make the world a better place

Data is collected.
Devices are there to actuate.



But, who will make decisions?



Case Study

Retail & Stores

Beisia Co., Ltd

Capture fresh food shelves across multiple supermarket locations with **“SoraCam”**, analyze images using AI, and display stock levels in percentages to determine restocking timing.

Service used: Soracom Cloud Camera Services

Device used: ATOM Cam 2

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Case Study

Retail & Stores

How it is used?

Beisia

- Food Shelf
- Products
- Stock
- Store Congestion status

協力:株式会社AID様

[As Is] Decision is made by “Human”

[To Be] Decision is made by “Images x AI “

With cloud-based cameras “SoraCam”and AI, decisions are made based on data, not intuition.

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Case Study

Retail & Stores

Co-op Sapporo

Using **“SoraCam”** to record and analyze images of the prepared food sales floor at night by time of day. The amount of food on display and discounting methods were reviewed to reduce waste, increase sales, and improve profit margins.

Service used: Soracom Cloud Camera Services

Device used: ATOM Cam 2, ATOM Cam Swing

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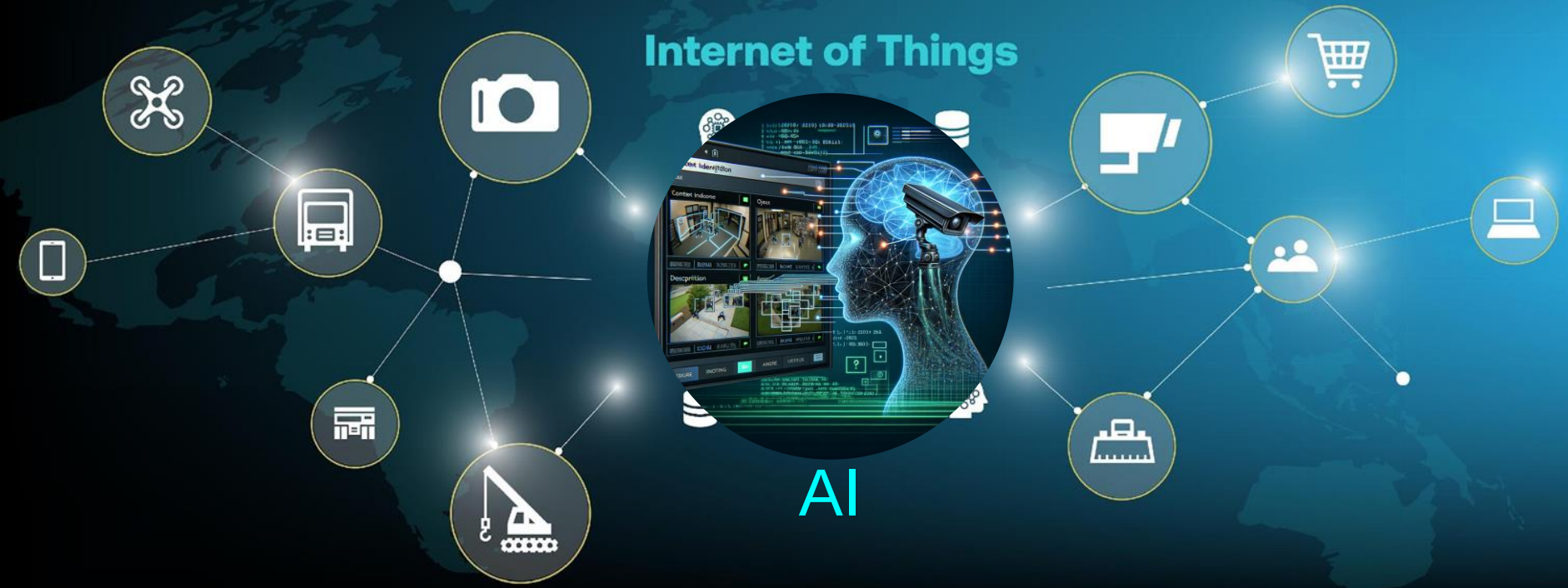
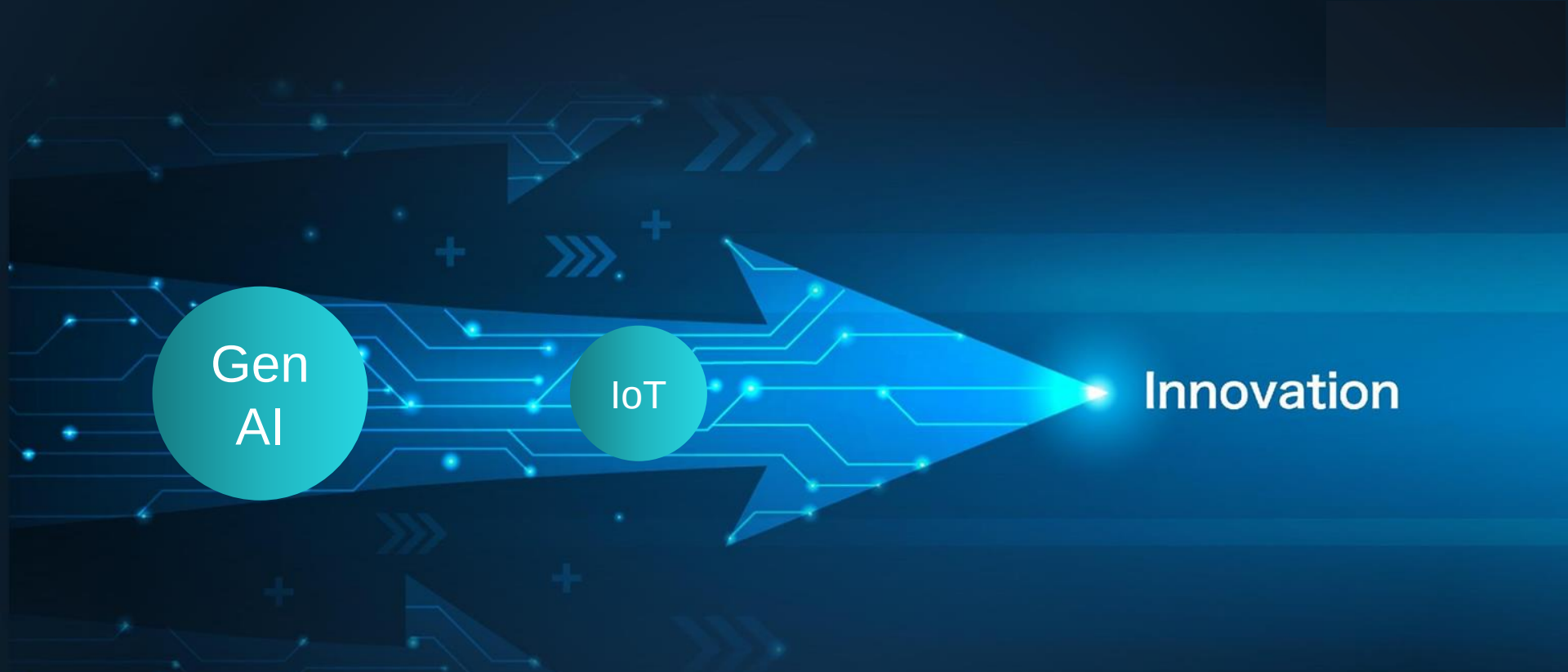
Seeing the rise of generative AI in 2023, we have believed we finally have an answer





By adapting Generative AI in IoT,
Customer innovation will accelerate to the next level

IoT x GenAI Lab

Established IoT x GenAI Lab in Collaboration with Matsuo Research Institute

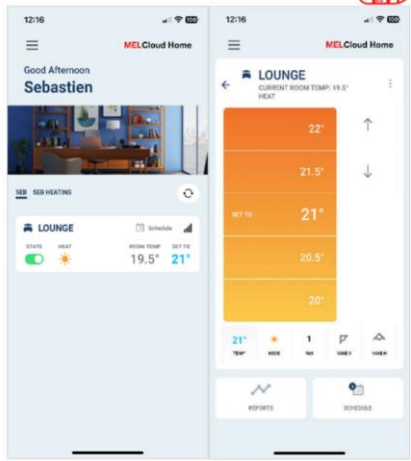
- Jointly established in 2023 with Matsuo Research Institute, Tokyo University
- Specializing in areas of Generative AI, including IoT and Large Language Models (LLM)
- Formed a team to develop new products, conduct research and development, and provide professional services to customers

Case Study

Energy

Mitsubishi Electric Europe B.V. “MELCloud."

SORACOM is used for a system to remotely optimize heating efficiency, etc. in Europe, where demand for energy conservation is rising. The system can be used in homes without a communication environment.

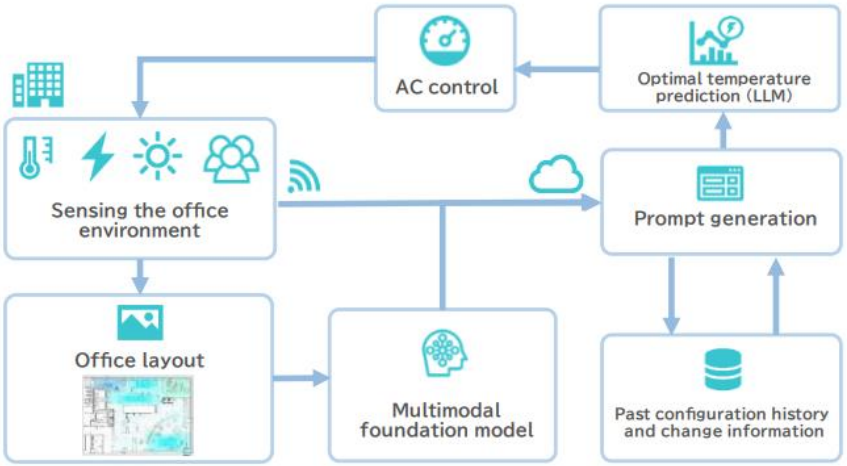


Service used: SORACOM Air

PoC for HVAC Control Utilizing IoT and Gen AI

Optimize air conditioning settings, achieving an average 48% reduction in electricity consumption with IoT x GenAI

MITSUBISHI ELECTRIC
Changes for the Better



Collected Data

1. **Environmental data from sensors :** Measured every minute: indoor temperature and humidity
2. **Environmental data from external weather information :** Outdoor temperature, humidity, and solar radiation)
3. **Air conditioning settings**
4. **Air conditioning utilization detection system data**
   - Images and indoor temperature heat maps
   - Number of office occupants
   - Occupant position and distribution information
5. **Sensory information**
   - Regular feedback from office occupants regarding comfort levels

Generative AI Engine and Data Visualization Tools Used
- OpenAI - GPT-4/4V (gpt-4-1106-preview/gpt-4-1106-vision-preview)
- Dataiku (ver.12.1) Dataiku was utilized through discussions with generative AI experts to efficiently visualize

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How could anyone build advanced IoT applications, combining device-generated data and domain expertise?

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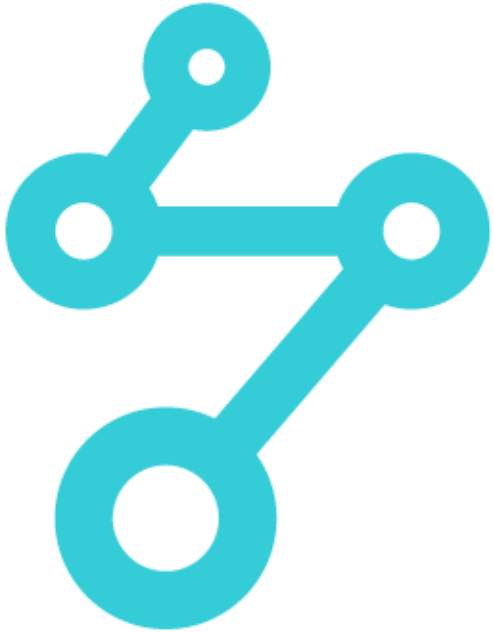

SORACOM Flux

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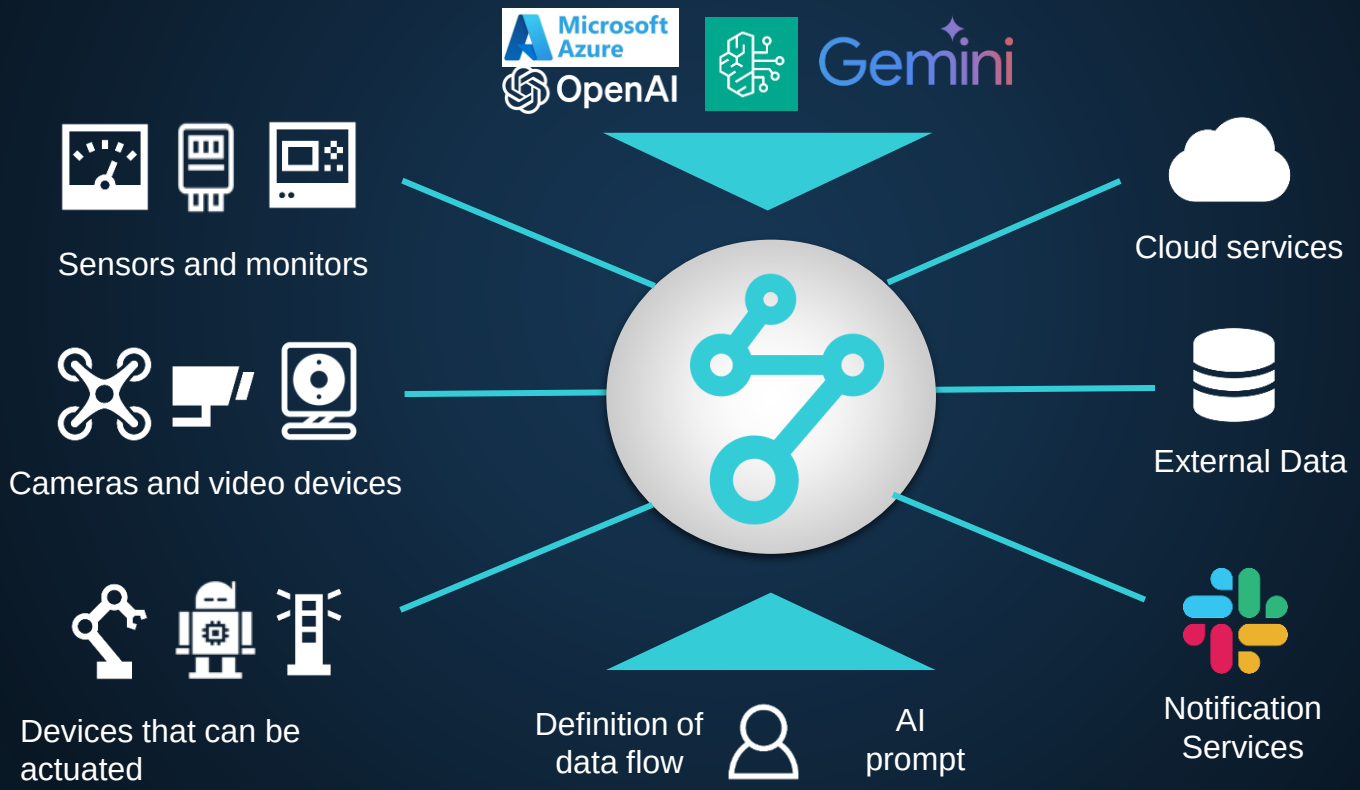
SORACOM Flux: Build IoT Applications by defining data flows among Devices, AI and Cloud



Example: Monitoring protective equipment usage at warehouse

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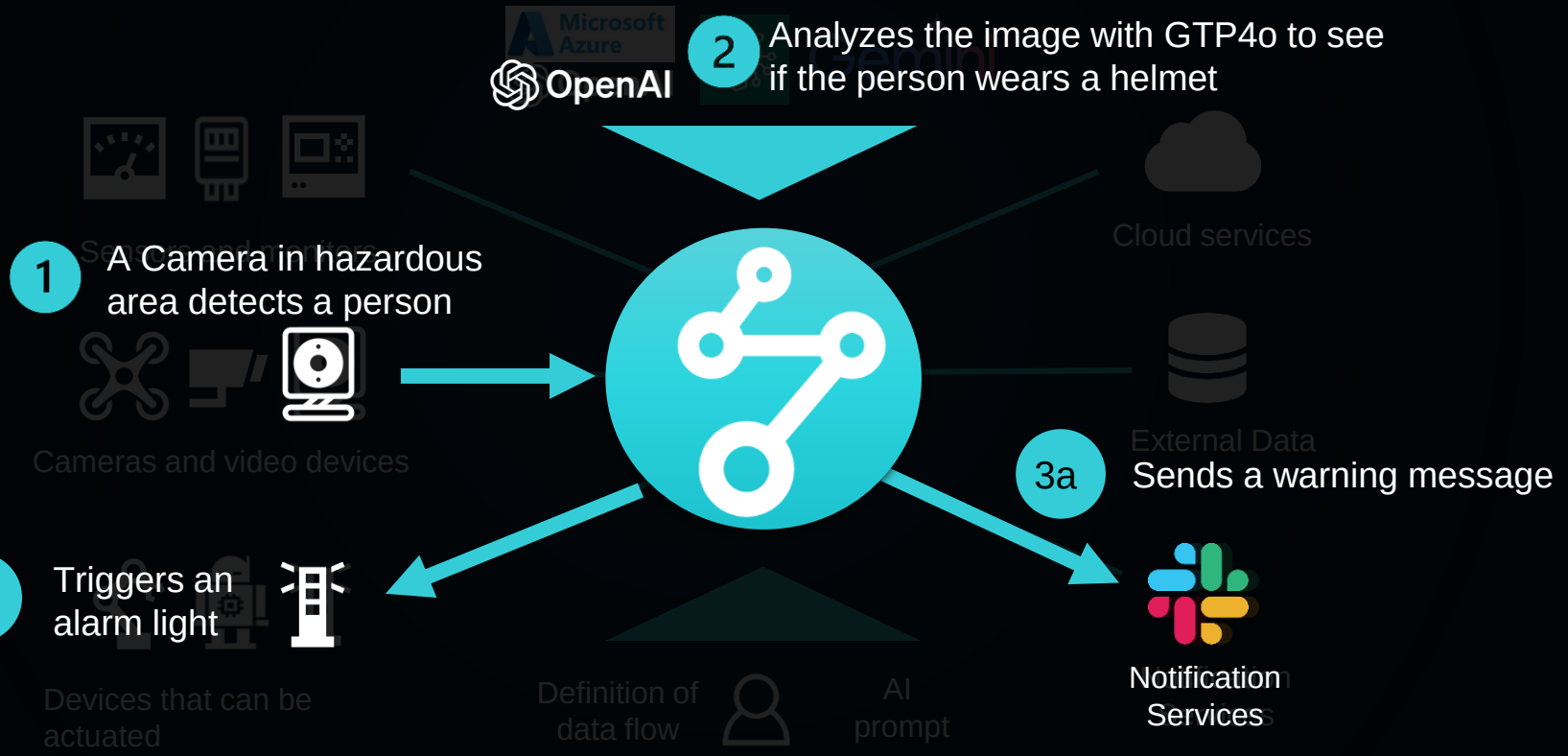
SORACOM Flux: Build IoT Applications by defining data flows among Devices, AI and Cloud



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Dashboard > SORACOM Flux > Apps

Flux Apps

You don't have any Flux apps yet

By using the low-code IoT application builder "SORACOM Flux," you can build IoT applications that integrate generative AI by combining conditions and actions on sensor data sent from devices and images sent from cameras.

Create a new Flux app

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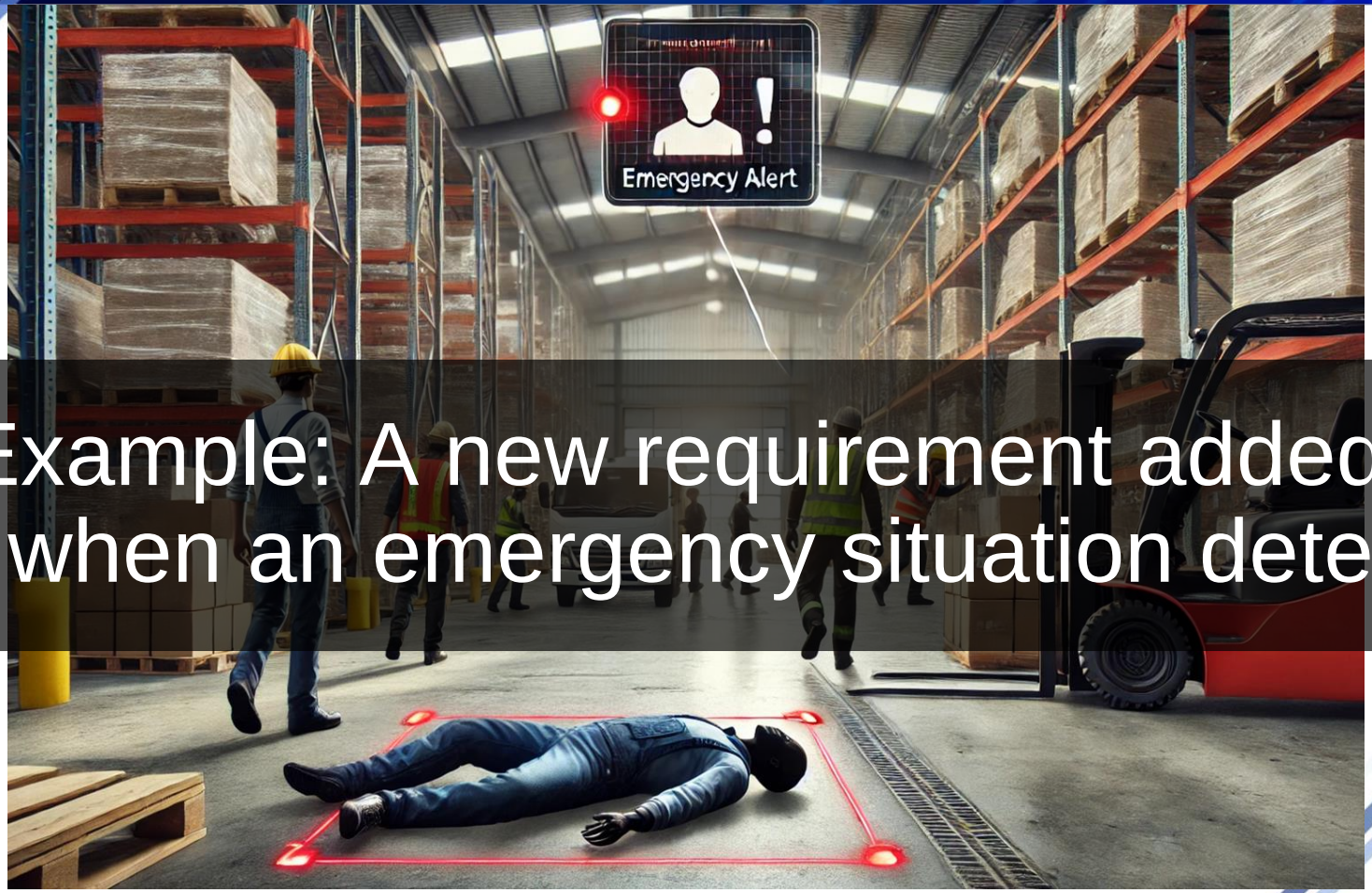

Example: A new requirement added!
Call when an emergency situation detected

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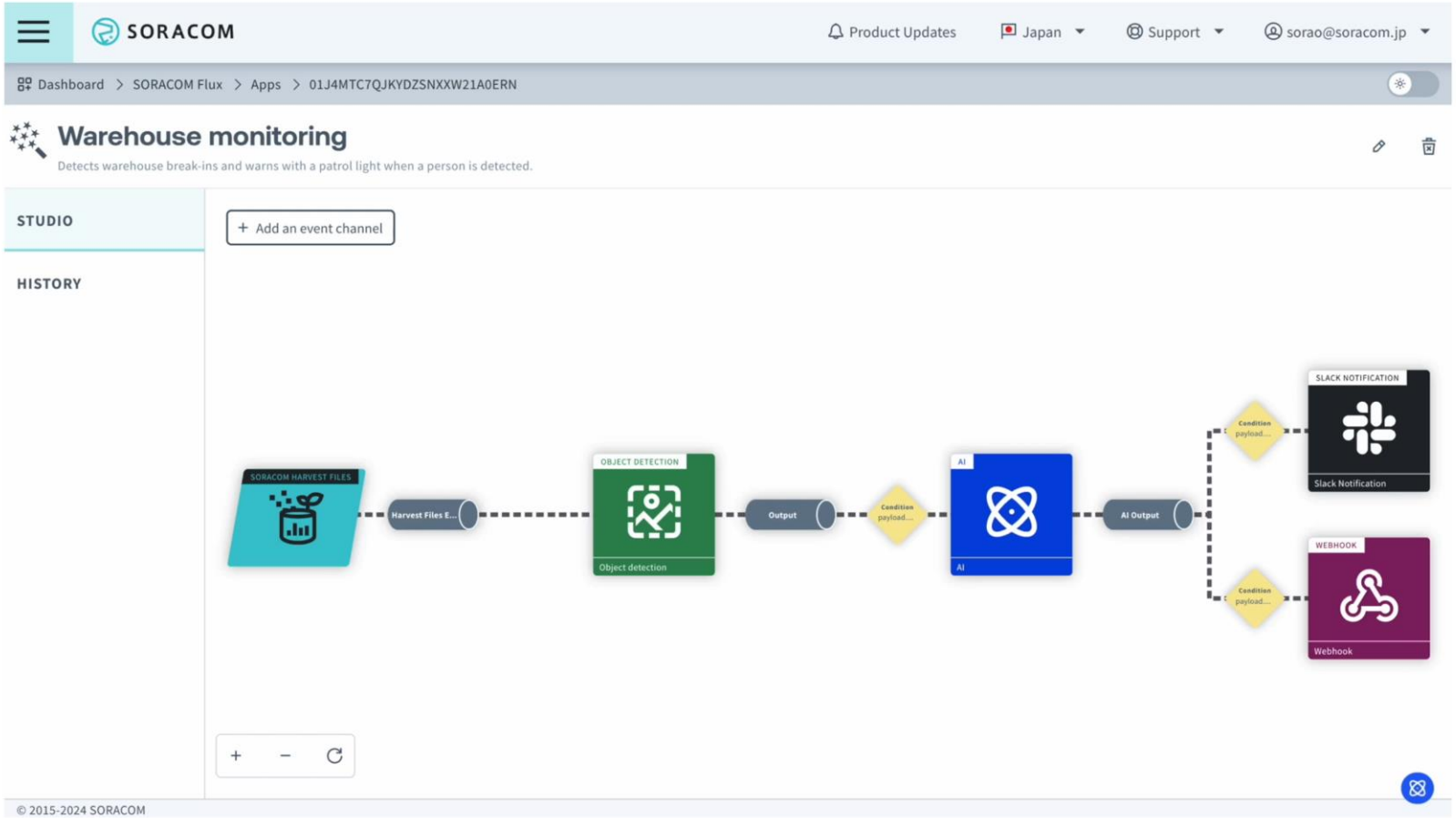
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Dashboard > SORACOM Flux > Apps > 01J4MTC7QJKYDZSNXXW21A0ERN
Warehouse monitoring
Detects warehouse break-ins and warns with a patrol light when a person is detected.
STUDIO
HISTORY
+ Add an event channel
SORACOM HARVEST FILES
Harvest Files E...
OBJECT DETECTION
Object detection
Output
Condition
payload....
AI
AI
AI Output
Condition
payload....
SLACK NOTIFICATION
Slack Notification
Condition
payload....
WEBHOOK
Webhook
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SORACOM Flux

Low-Code IoT Application Builder

- Apply rules to data sent from devices and images sent from cameras
- Combine multiple data sources and generative AI to analyze and make decisions
- Take actions based on the decisions, e.g. sending notifications and actuating IoT devices
- Achieve these without complex coding