SMART FEEDBACK
Managing Entropy at Scale

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Agenda

1. Gaia Overview

2. SAAS – Solution As A Service offering

3. Scale and Disorder

4. Overcoming Disorder

Spectrum of Operation

86%

Of India's **Butter** Cold Supply Chain Effectiveness

40%

Of India's **Airport Passengers** Experience

71%

Of India's **Cheese** Cold Supply Chain Effectiveness

10%

Of **Indian Railways** Outsourced Housekeeping Tech

Monitored & Managed by Gaia Smart Feedback

Smart Sites Monitored By Gaia

Campuses & Buildings

Warehouses

Railway/ Metro Station

Airports

Hospitals & Pharma

Food & Retail

City Public Infra

Railway Coaches

Clients choose SmartFeedback to get unified view of site performance and multiple benefits

1 Real time, unified visibility into site performance

2 Action Engine for alerts on status and breaches

3 Optimize operations and experience

4 Digitalize opaque manual process, reduce costs

5 Governance monitoring of contracts

gaia

Gaia Business Impact

~ 70 Million
Discrete User Interaction
Data Points Collected

~ 150 Million
Streaming Sensor
Data Points Collected

~ 7 Million
Citizens or Users
Touched Daily

$40+ Million
Annual Contract
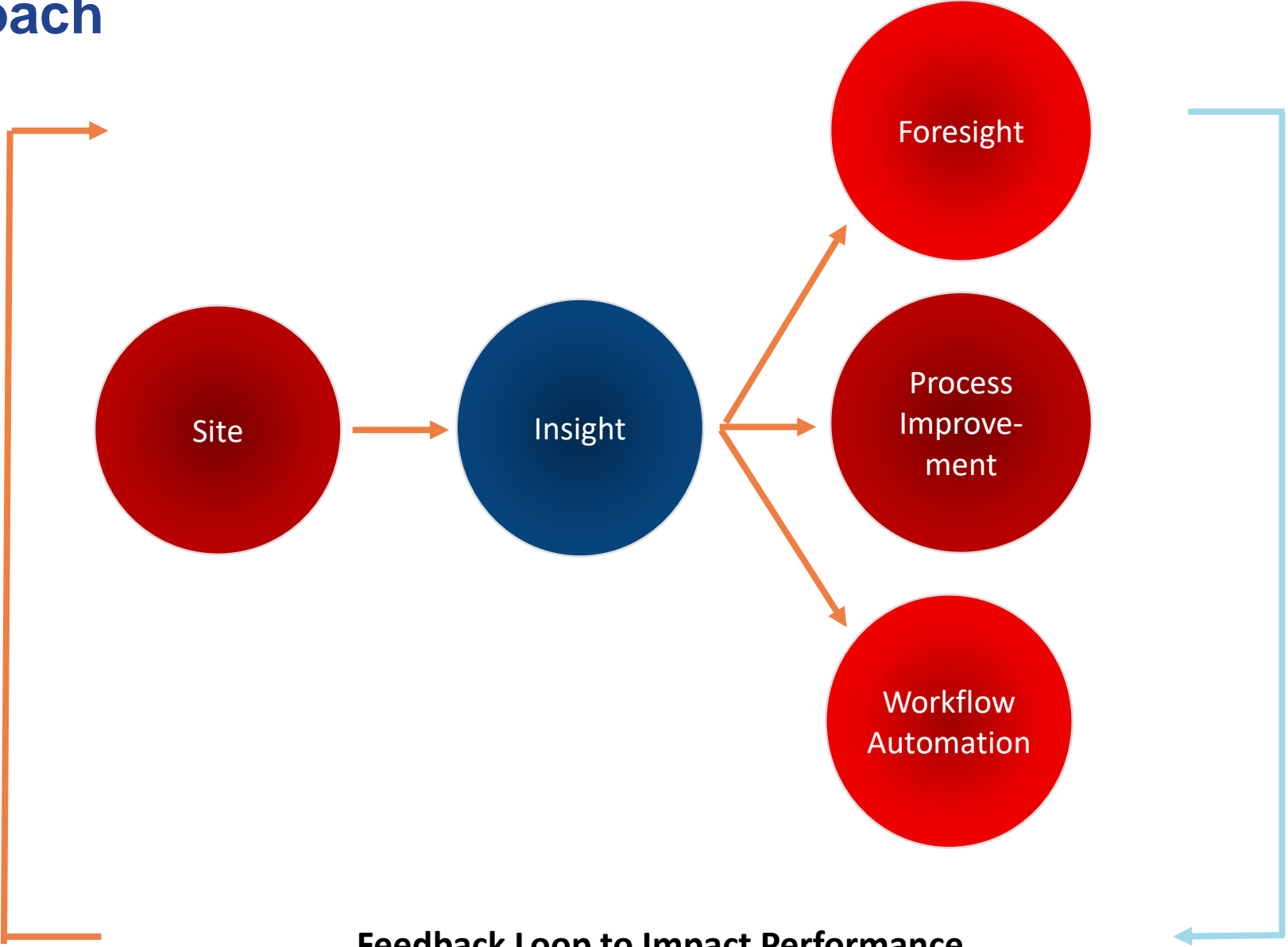Value Monitored

90+ Million
Square Feet
Built Space Monitored

440+ Million
Square Feet
City Urban Area Monitored

30%
Improvement in Efficiency
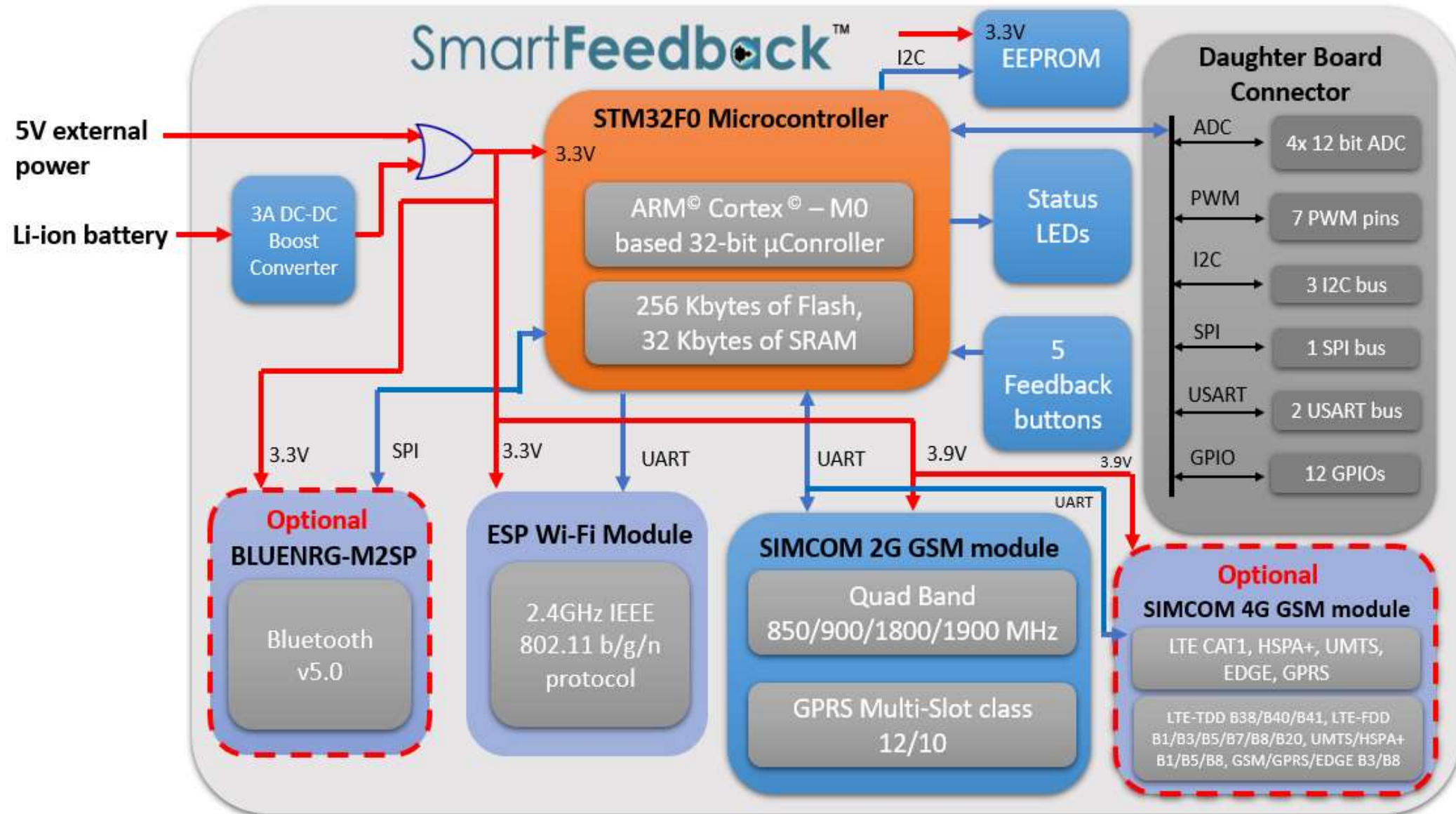Or Service Levels

Gaia Approach

Site → Insight → Foresight / Process Improve-ment / Workflow Automation

Feedback Loop to Impact Performance

The Intelligent Edge

Customer Intelligence. Site Intelligence

SENSE	CLICK	SCAN	TAP	BEAM

IOT Unit - Multiple Sensors Integrated

Streaming Data

Discrete Event Based Data

Block Diagram

Daughter board for sensors

- 1 SPI (SPI2)
- 3 I2C (I2C, I2C1, I2C2)
- 2 USART (USART1, UART6)
- 4 ADC 12bit (ADC_IN4, ADC_IN5, ADC_IN6, ADC_IN7)
- 7 PWM pins (PA4, PA6, PA7, PA9, PA10, PA11, PB13)
- 12 Digital I/O

Daughter board & Sensors on BLE mesh

Feedback to Process Improvement and Workflow Automation

Action and Automation
From sensing & people

Measure Proximity
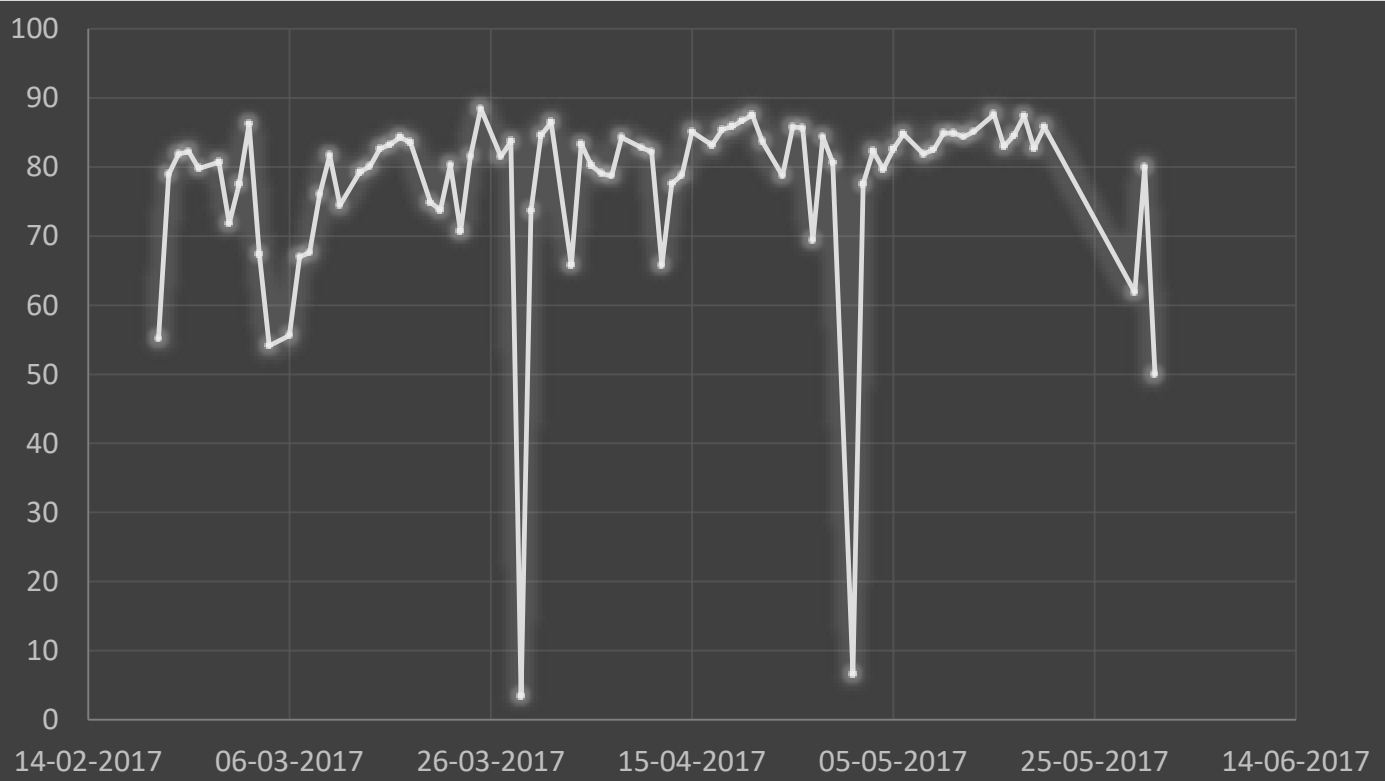**Enhance Productivity**

Monitor contact & temperature
Ensure Quality

Detect gases
Enforce Cleanliness

Measure voltage & current
Ensure Efficiency

Feedback to Foresight

Analytics and Prediction
From sensing & people

Measure Voltage at
Manufacturing Plant

Predict Productivity

Barriers to Scale: Disorder

Second Law of Thermodynamics

ENTR⬤PY

The relentless march of disorder

Entropy Relationships

1 | **Entropy of an IoT SAAS** → **Increases with** (is directly proportional) → **Number of devices.**

2 | **Entropy of an IOT SAAS** → **Increases with** (is directly proportional) → **Number of locations.**

3 | **Entropy of an IoT SAAS** → **Decreases with** (is inversely proportional) → **Security and Control Features**

Maxwell's Demon

To Violate Entropy

Maxwell's Demons – an IoT perspective

FOTA & COTA

Applied Information Theory

Device Versatility

Device Level

Efficient Operations

Middle-ware & Platform

Supply Chain
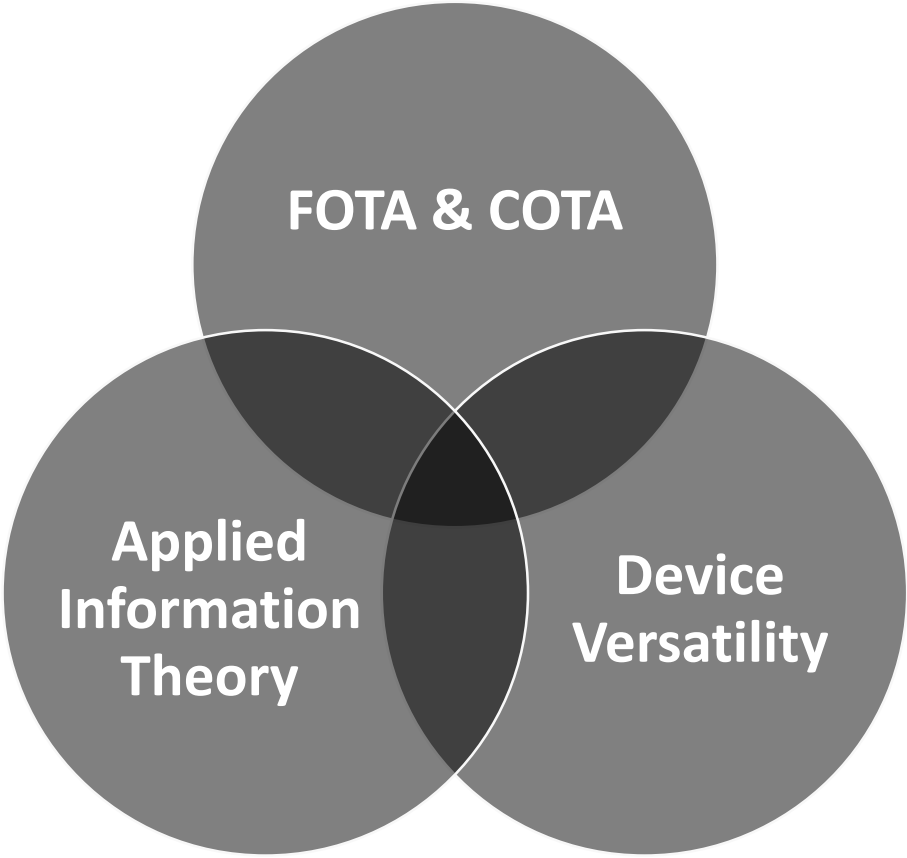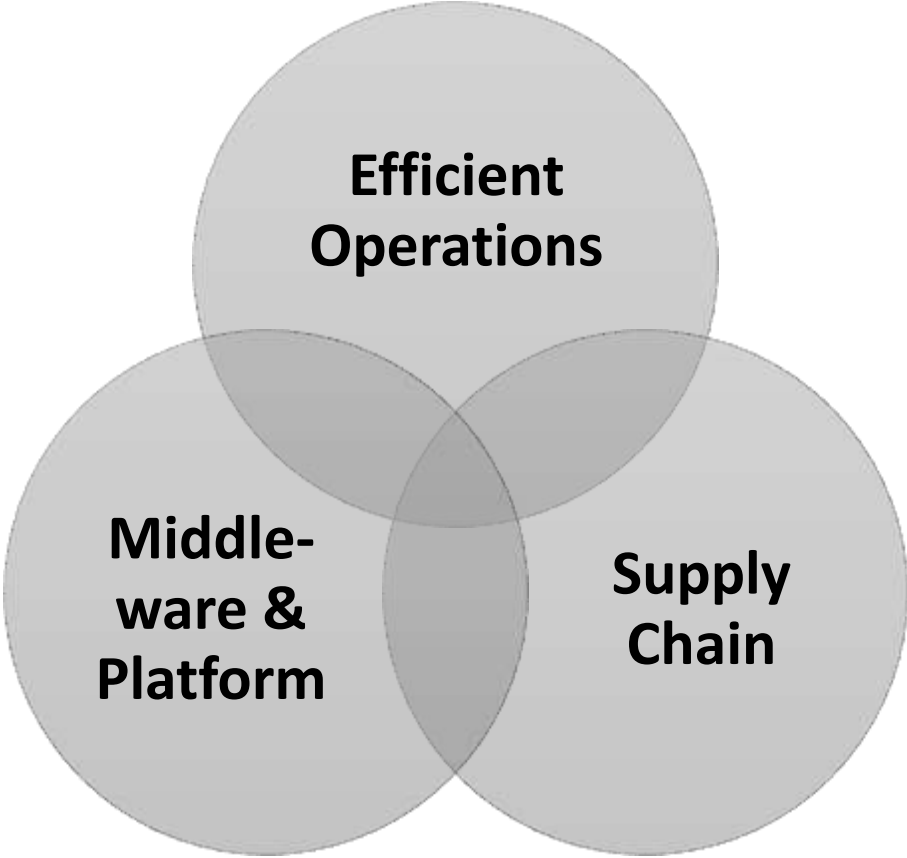
Other Important stuff

FOTA

Database management,
Information about the firmware & devices,
Error Identification & Reporting

Mainboard

2G, 4G,
WiFi

Backend Server

2G, 4G,
WiFi

Firmware
Publishing

Decreases disorder by increasing Remote Management

COTA
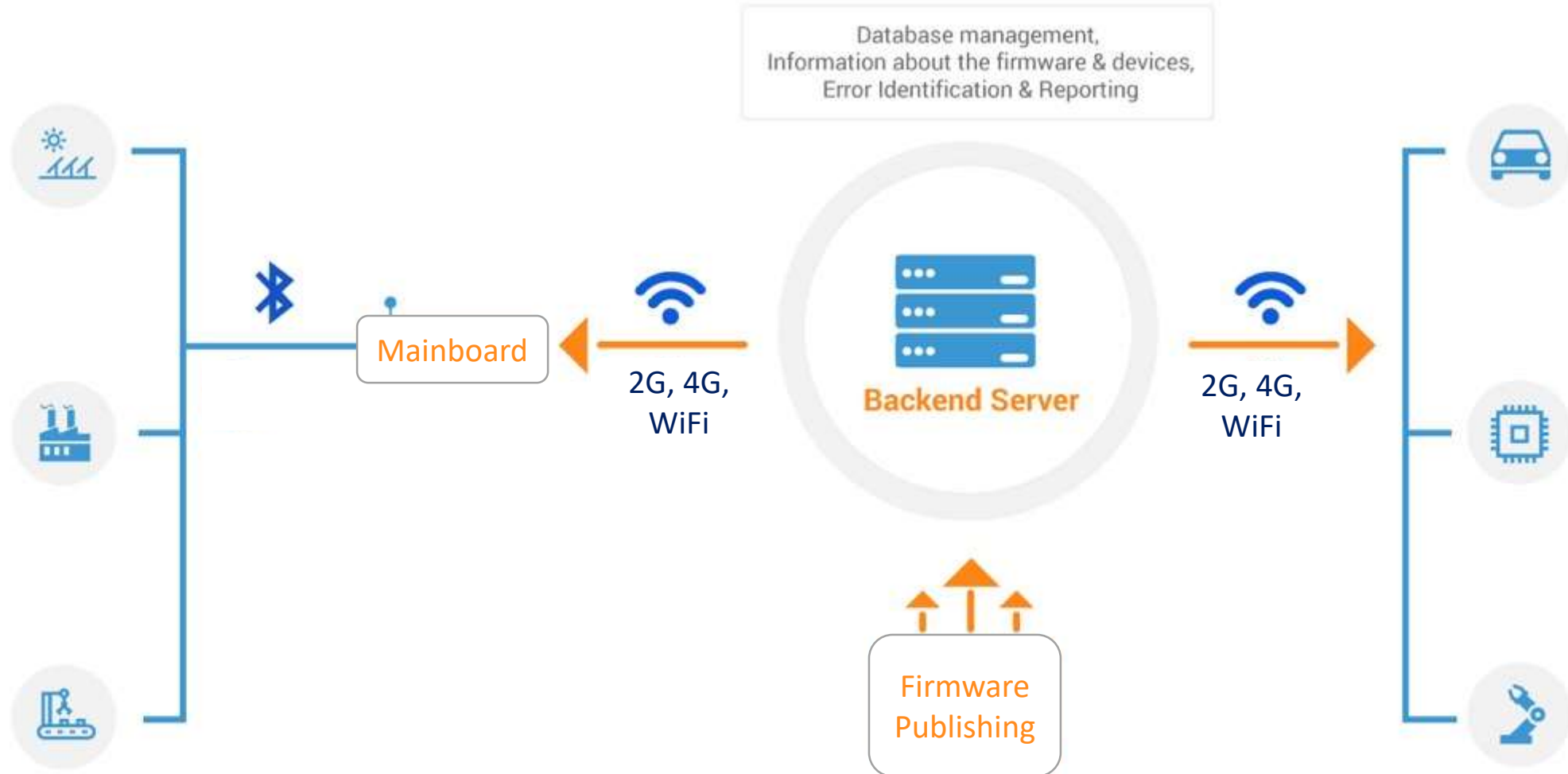
1 **Configuration Parameters**

a) Connection Details

b) Server Details

c) Intervals

d) WiFi Details
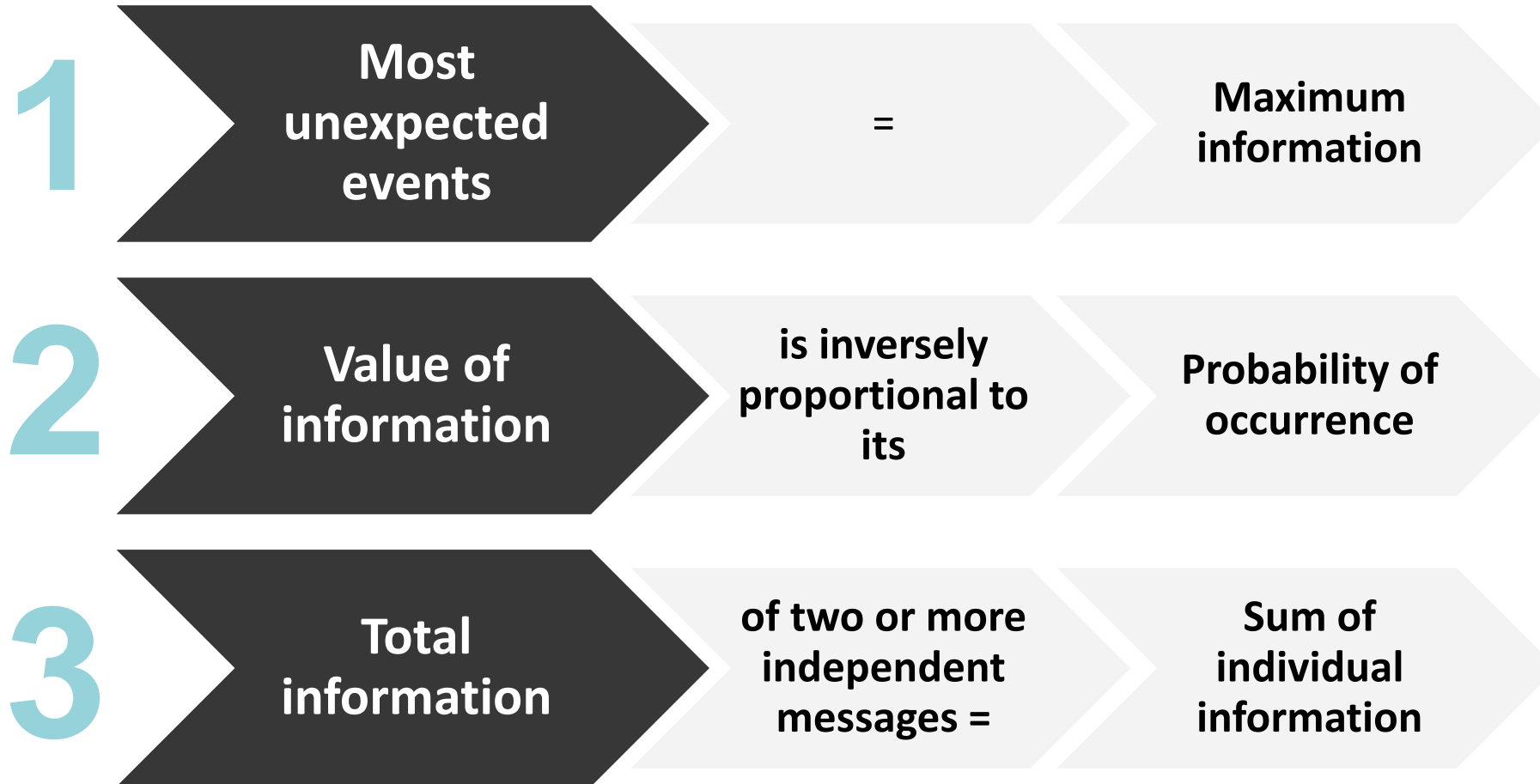
e) Indicator & Notification Details

f) FOTA Details

2 **Control Parameters**

a) Activation/Deactivation

b) Switching modes

c) Sensor Activation

d) Reset

Decreases disorder by increasing Remote Management

Applied Information Theory

1 | **Most unexpected events** | = | **Maximum information**

2 | **Value of information** | **is inversely proportional to its** | **Probability of occurrence**

3 | **Total information** | **of two or more independent messages =** | **Sum of individual information**

Decreases disorder by increasing Edge Intelligence

Device Versatility

Communication

- [ ] 2G
- [ ] 3G
- [ ] 4G
- [ ] WiFi
- [ ] BLE

Interfaces

- [ ] SPI
- [ ] I2C
- [ ] Digital IO
- [ ] USART
- [ ] PWM
- [ ] ADC

Protocols

- [ ] JSON
- [ ] REST
- [ ] MQTT

Storage

- [ ] On-board
- [ ] External

Decreases disorder by increasing Capabilities

Middleware and Platform

Devices

Mobile App

Browser

Load Balancer   (Std)

VMSS App
StdDS3 v2
(4 VCPUs 2 inst)

VMSS Devices
(4 VCPUs 2 inst)

Load Balancer

Image storage
(4 VCPUs, 14 GB RAM)

VMSS DB
(8 VCPU 1 inst)
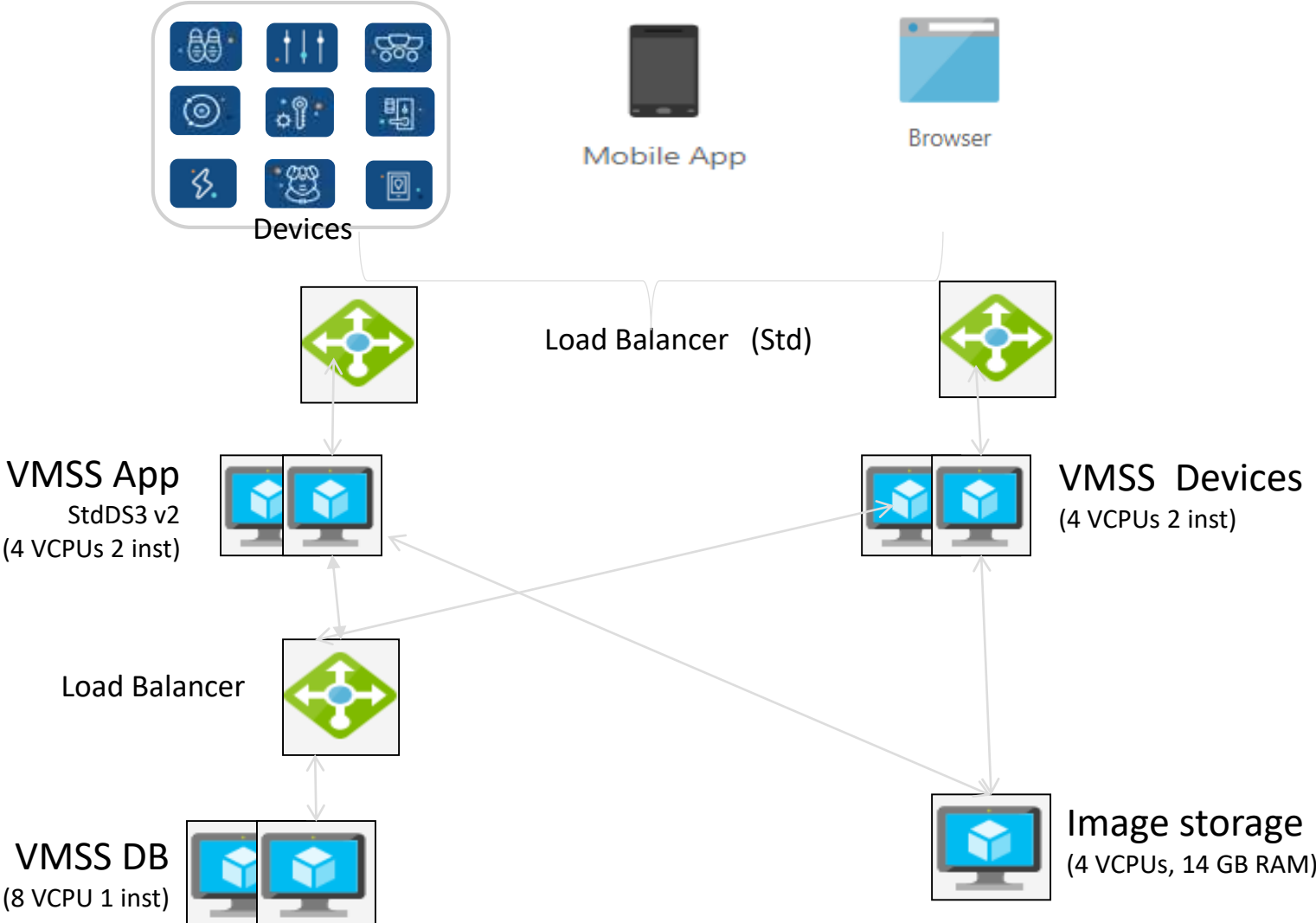
Decreases disorder by ensuring Stability

To Conclude

Entropy is Essential

Devices

Processes

Middleware

Platform

Supply Chain

Operations
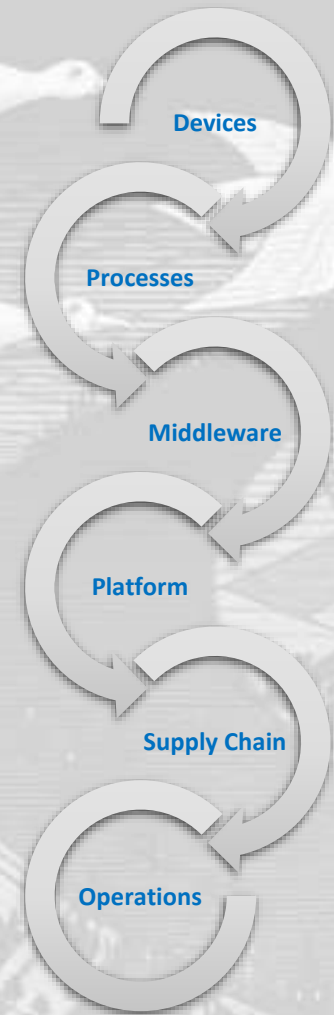
Steady
Deterministic Evolution **1**

Optimise
Exiting Business **2**

Destruction
To Create **3**

Thank You

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