How to use IoT Platforms for the Smart Buildings and Data Centers

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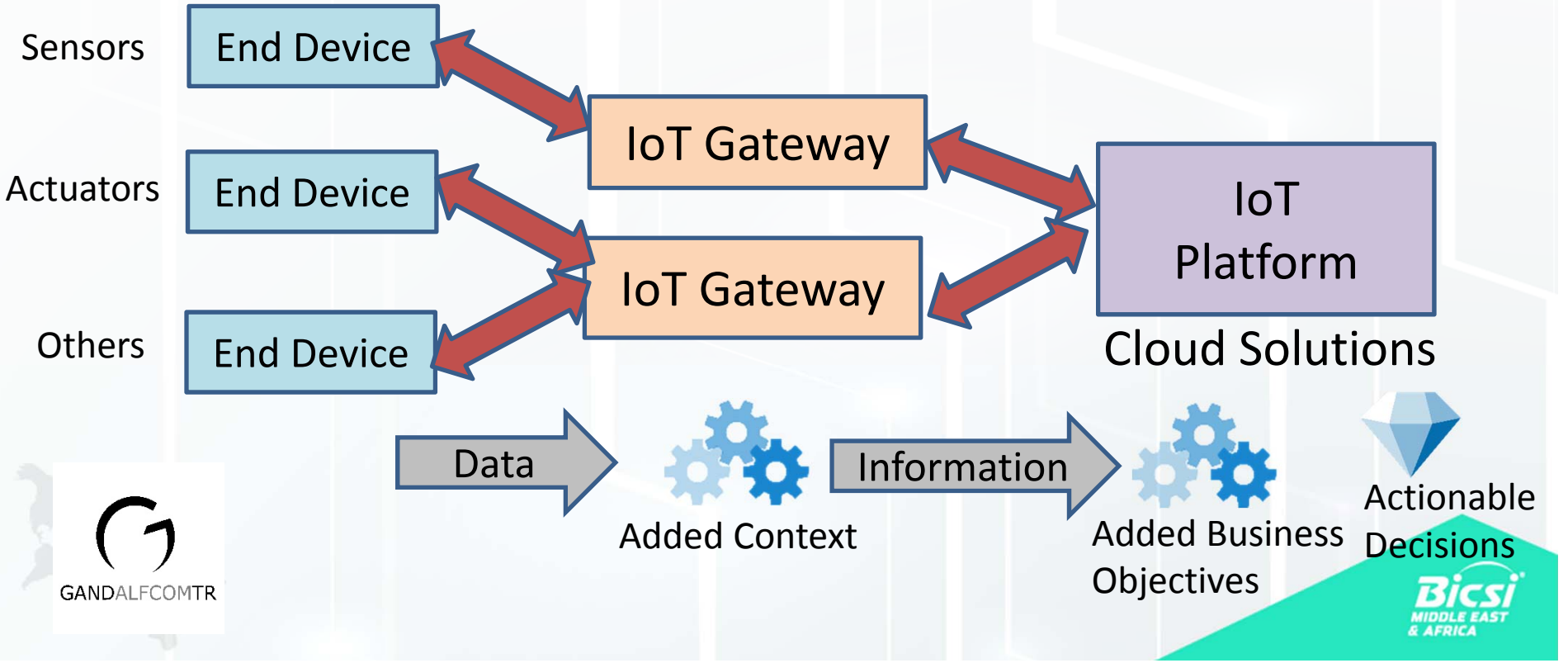
What does IoT look like?

What does IoT look like?

Its not the device, it's the pattern



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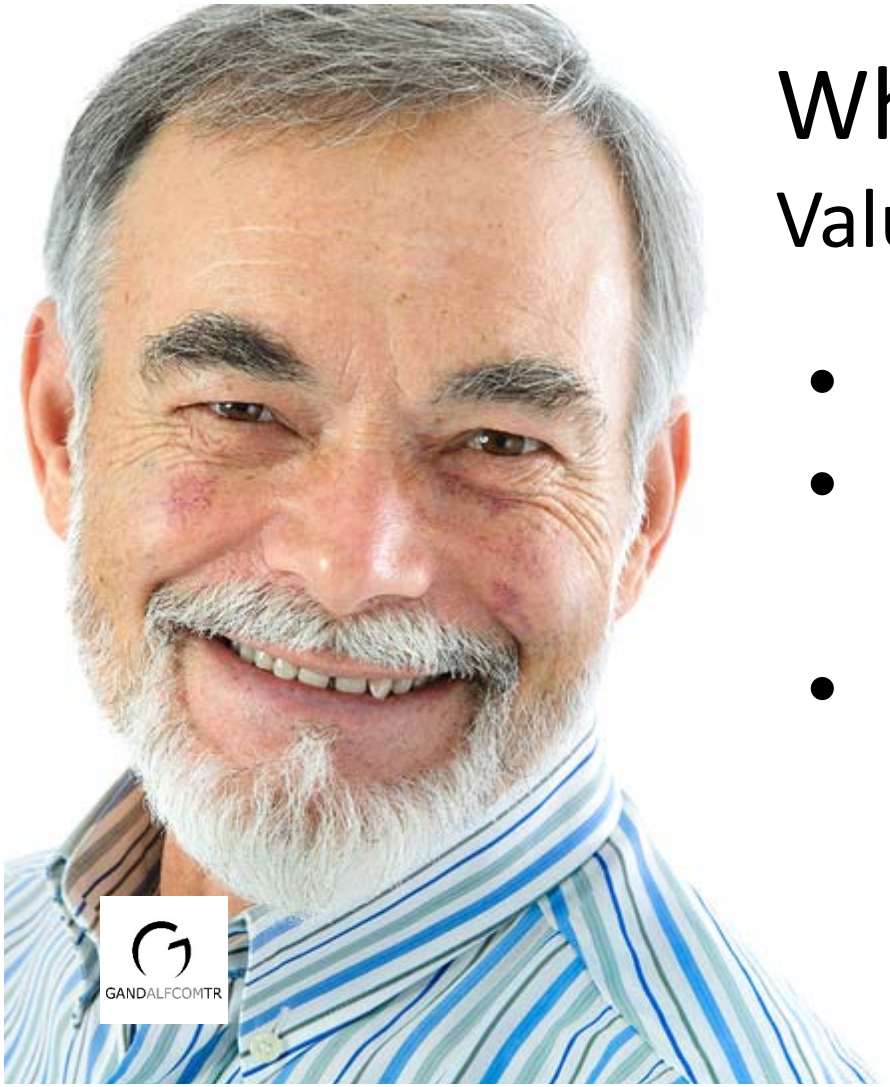

What does IoT look like?

Value comes from …

- Understanding the data
- Optimizing the whole, not the parts
- Delegation of decision making to the edge

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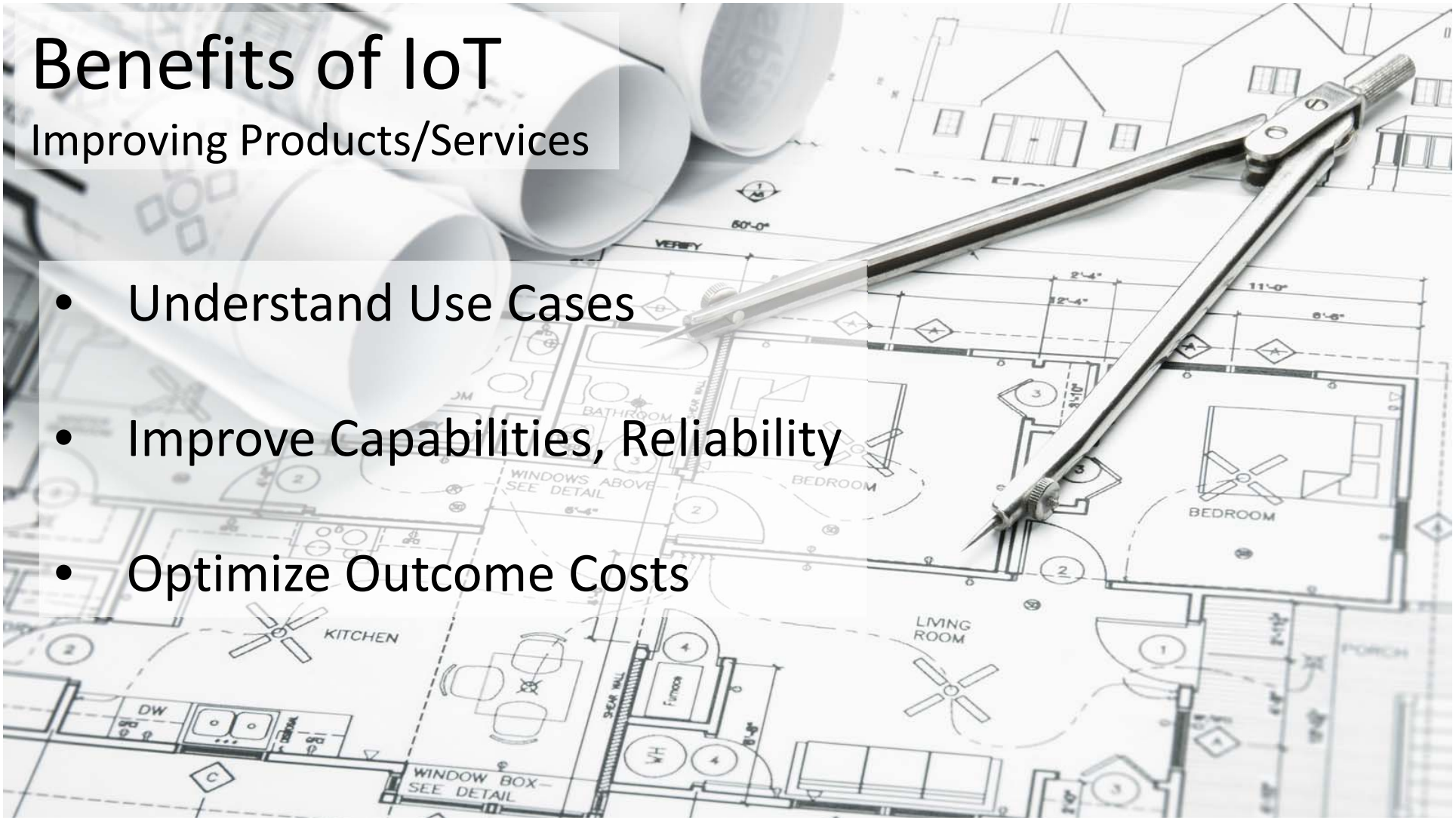
Benefits of IoT

Improving Products/Services

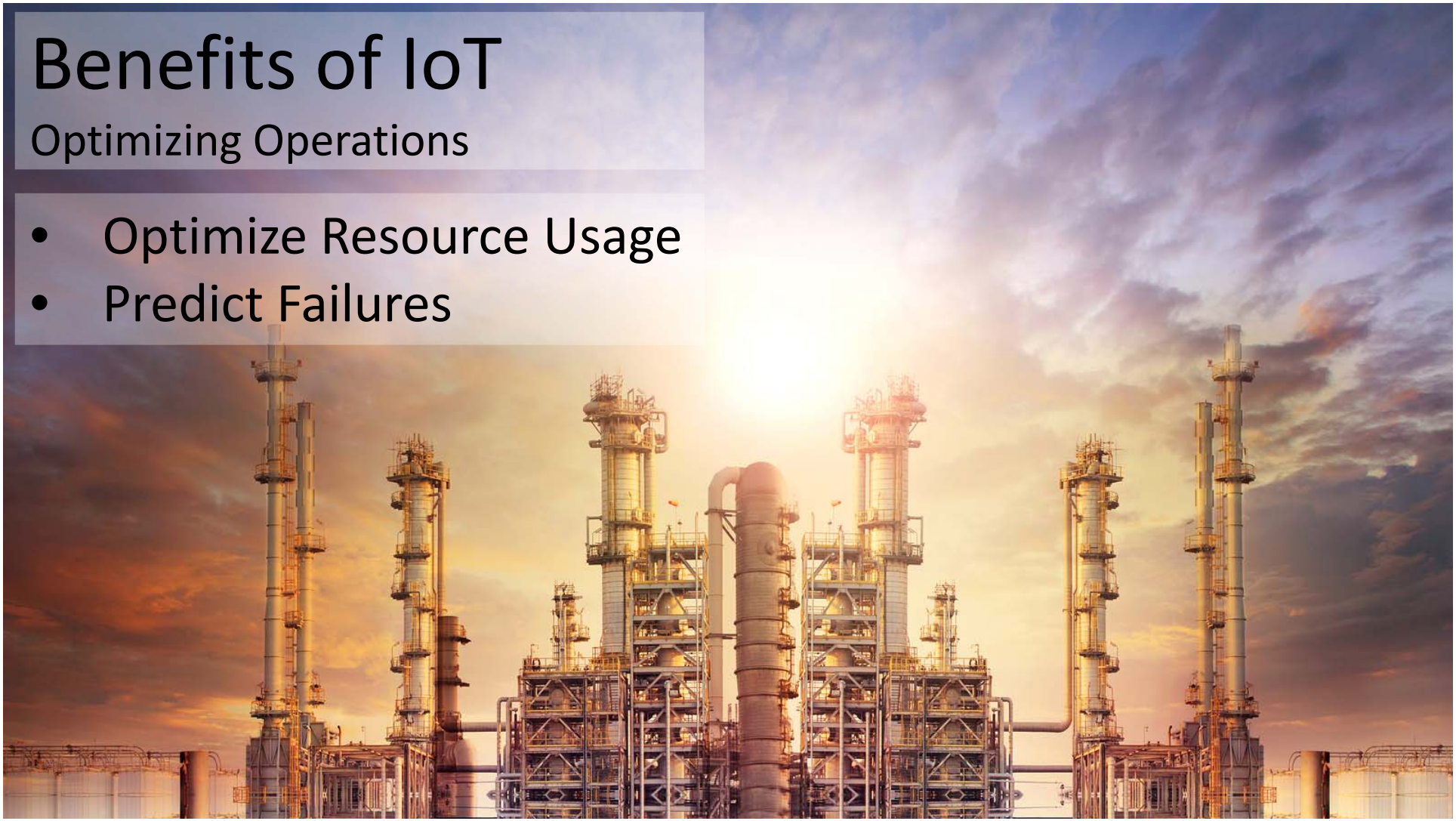


- Understand Use Cases
- Improve Capabilities, Reliability
- Optimize Outcome Costs

Benefits of IoT

Optimizing Operations

- Optimize Resource Usage
- Predict Failures



Benefits of IoT

Support Experience

- Understand Issues better
- Faster Response

Benefits of IoT

Discovering new Markets

- Understand untapped needs
- Assess business opportunity

Pre-IoT Automation

The Landscape

Pre-IoT Automation

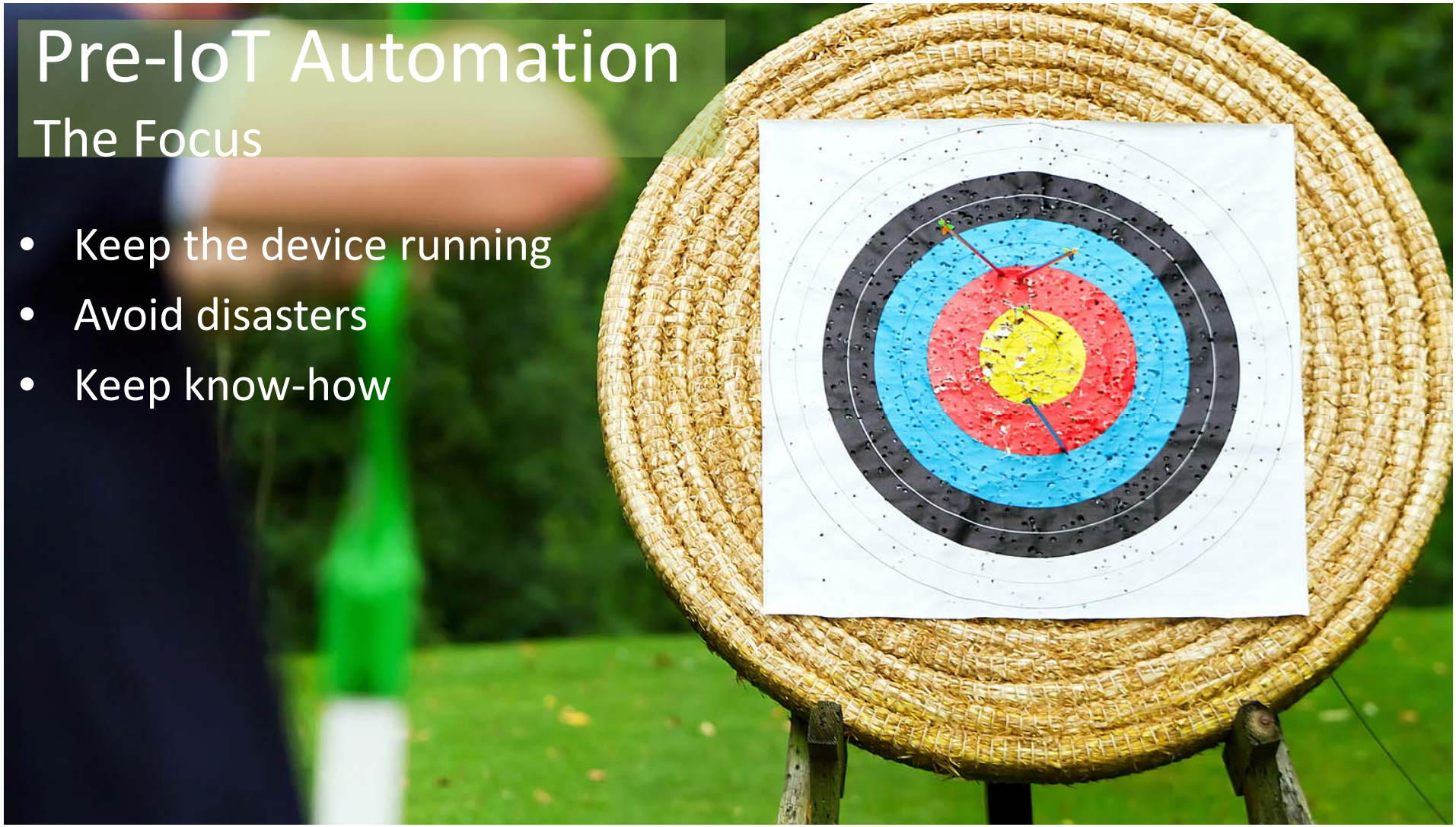
The Landscape

- Only specialists know how to operate
- Brittle Operations
- Tightly Coupled
- Security was not a concern

Pre-IoT Automation

The Focus

- Keep the device running
- Avoid disasters
- Keep know-how



Evolution of IoT

Standard Connectivity

Hardware

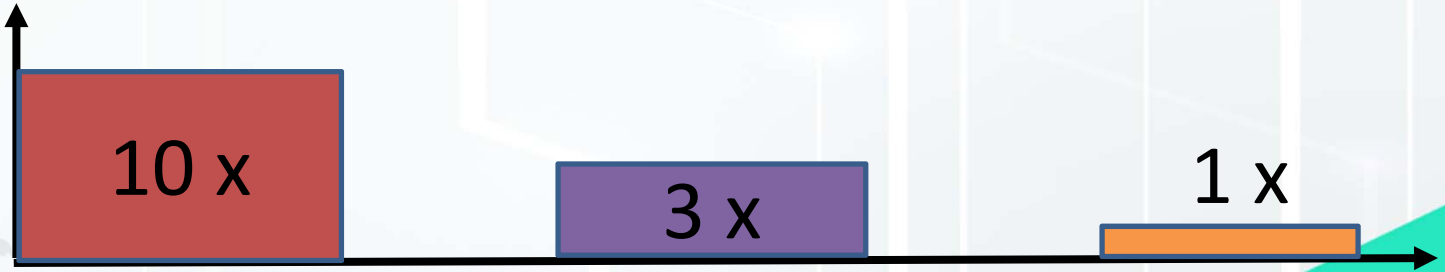
Software

Peripheral Programming

Network Programming

Web API's

Effort



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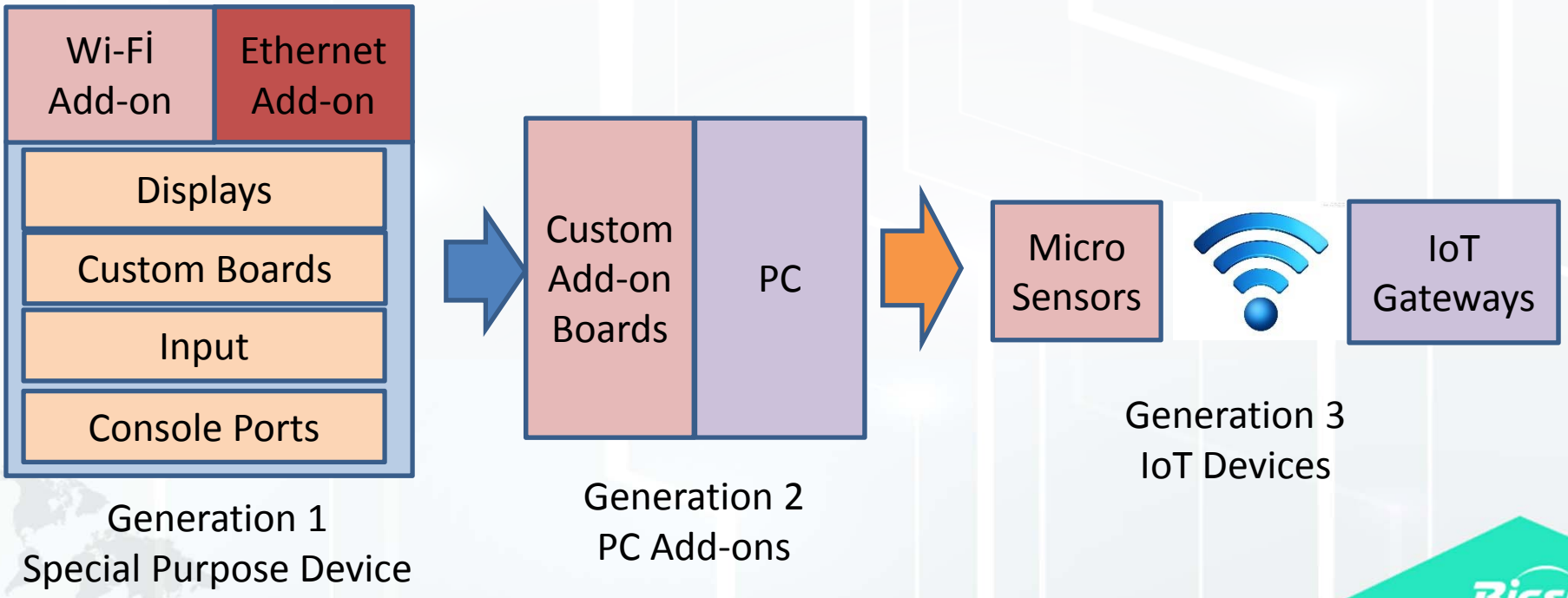
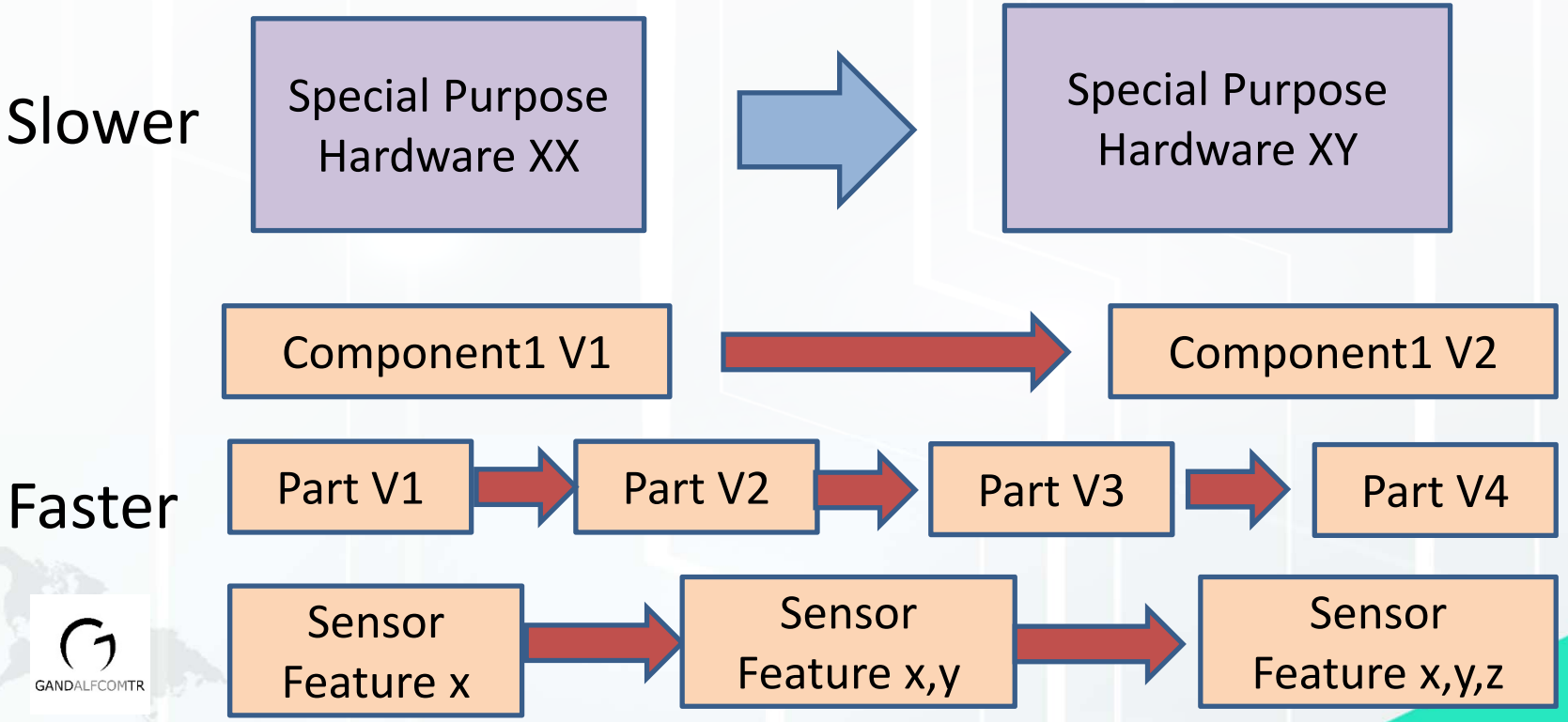
Evolution of IoT

Standardized Components



Evolution of IoT

Simultaneous Improvements



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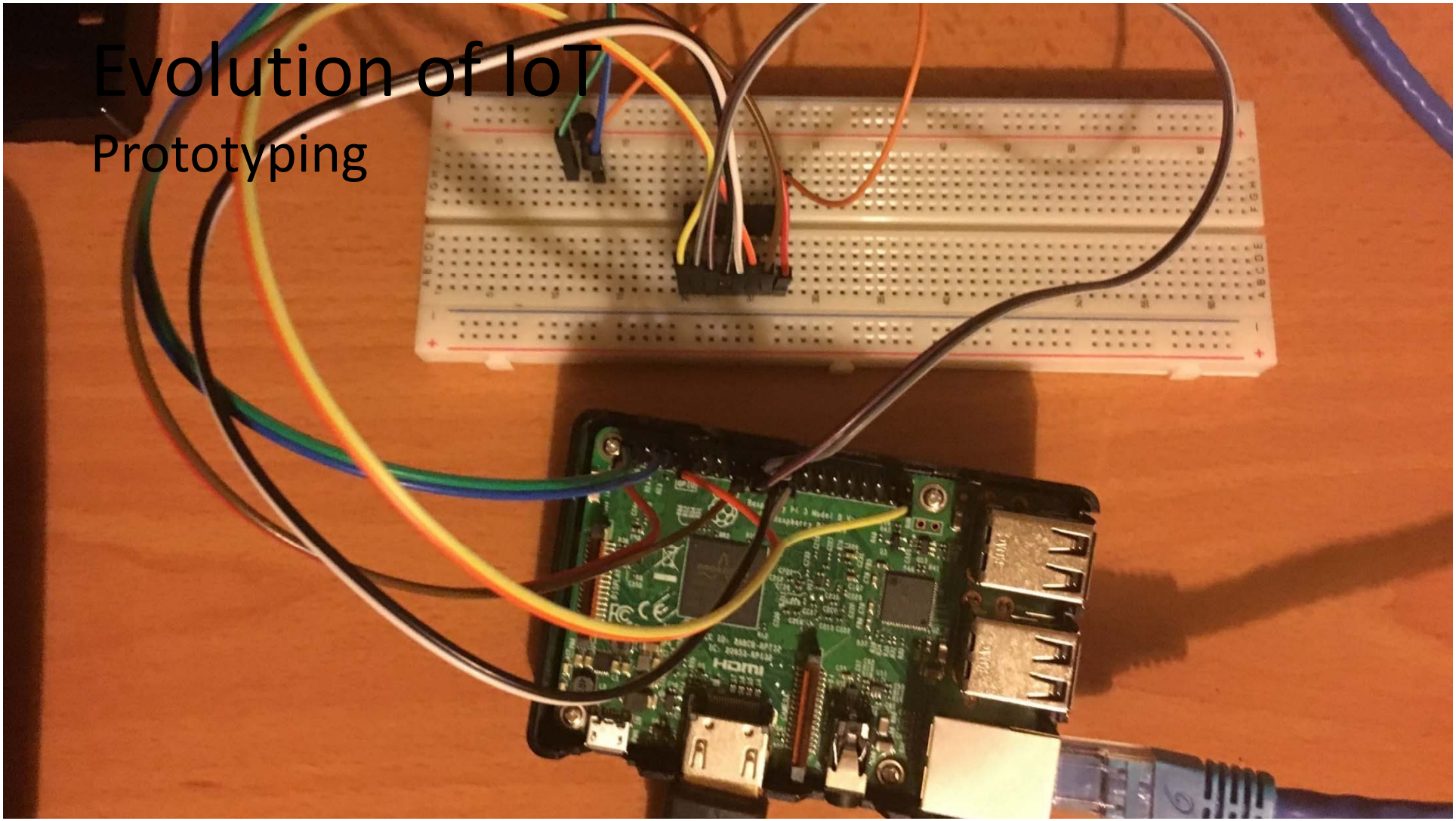
Evolution of IoT

Prototyping



Evolution of IoT

Lots of Sensors

- Proximity Sensor
- Motion/Accelerometer
- Ambient Light Sensor
- Moisture Sensors
- Gyroscope
- Compass
- Barometer
- Touch ID
- Face ID
- Thermal Sensors

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Evolution of IoT

Lots of Sensors

- Analog->Digital output
- Less power usage
- Auto Calibration
- More sensitivity
- Quicker Response

Huge Data from Physical World!

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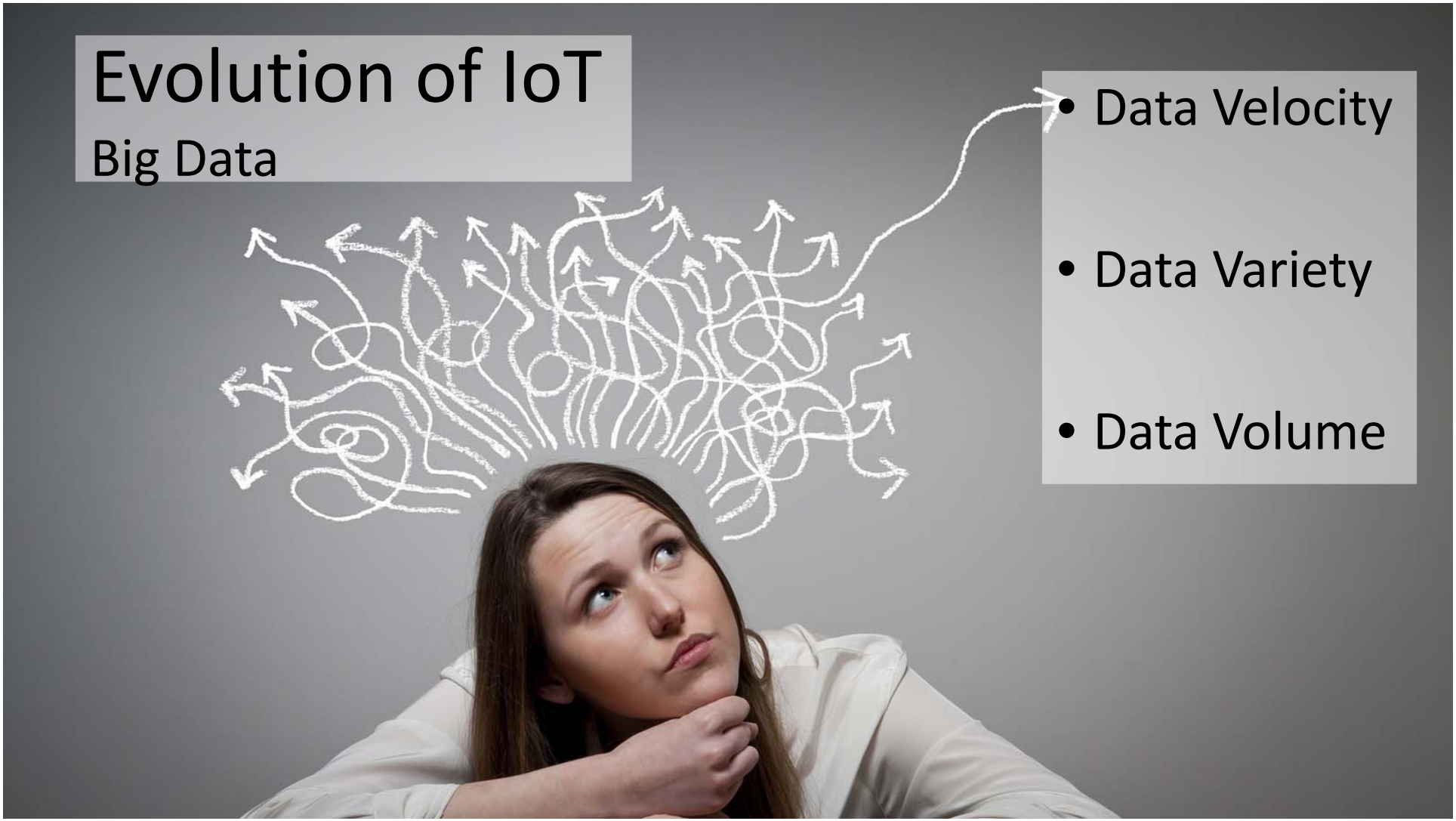
Evolution of IoT

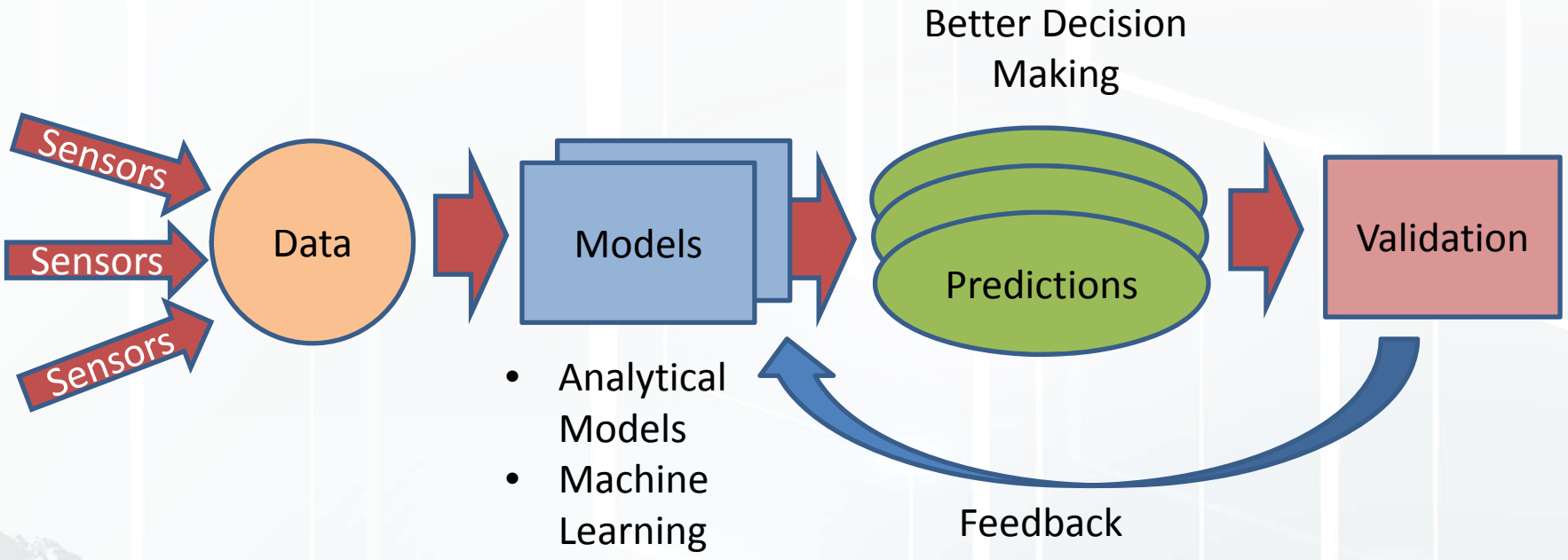
Big Data



- Data Velocity
- Data Variety
- Data Volume

Evolution of IoT

Predictive Power



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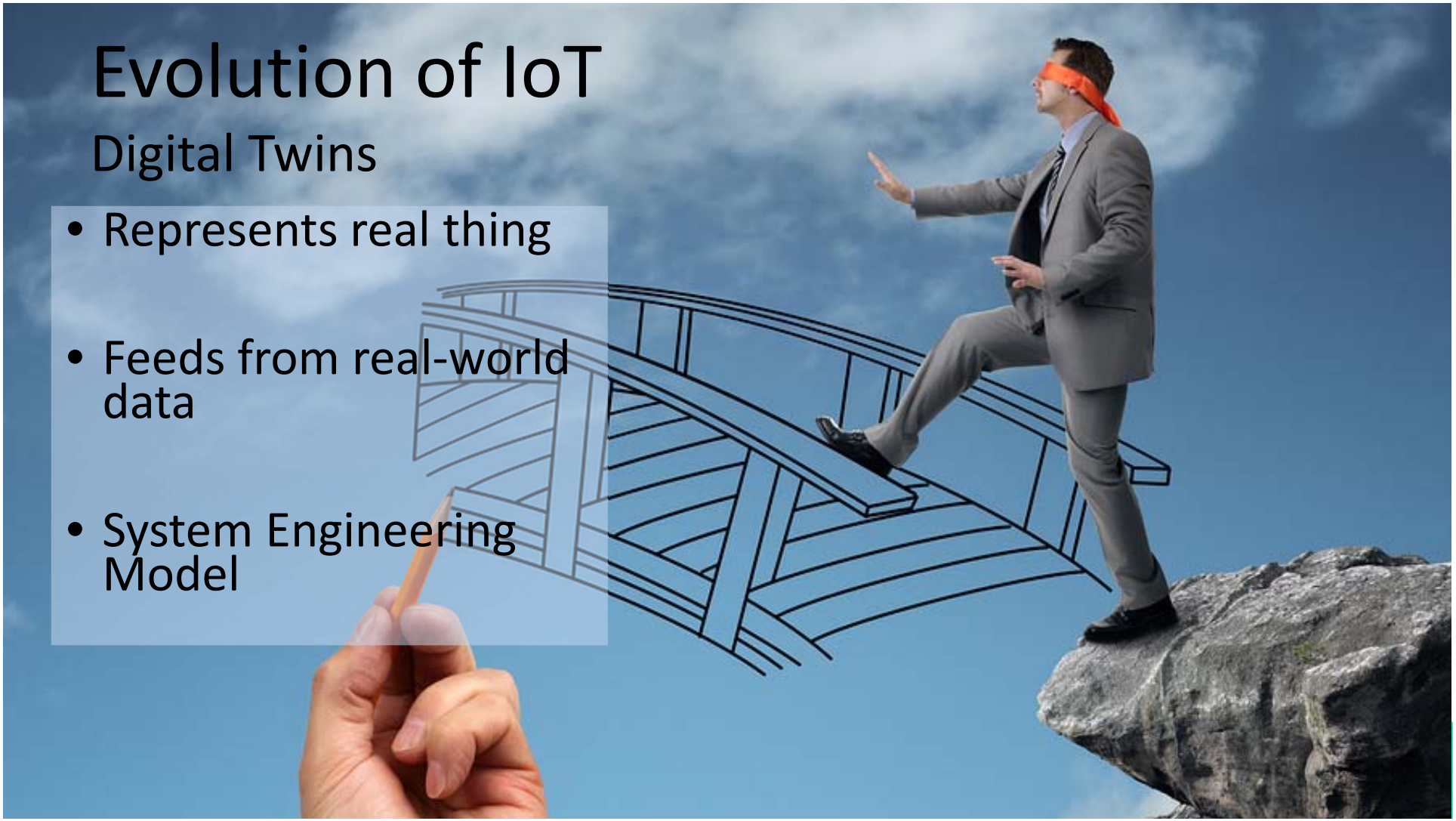
Evolution of IoT

Digital Twins

- Represents real thing
- Feeds from real-world data
- System Engineering Model



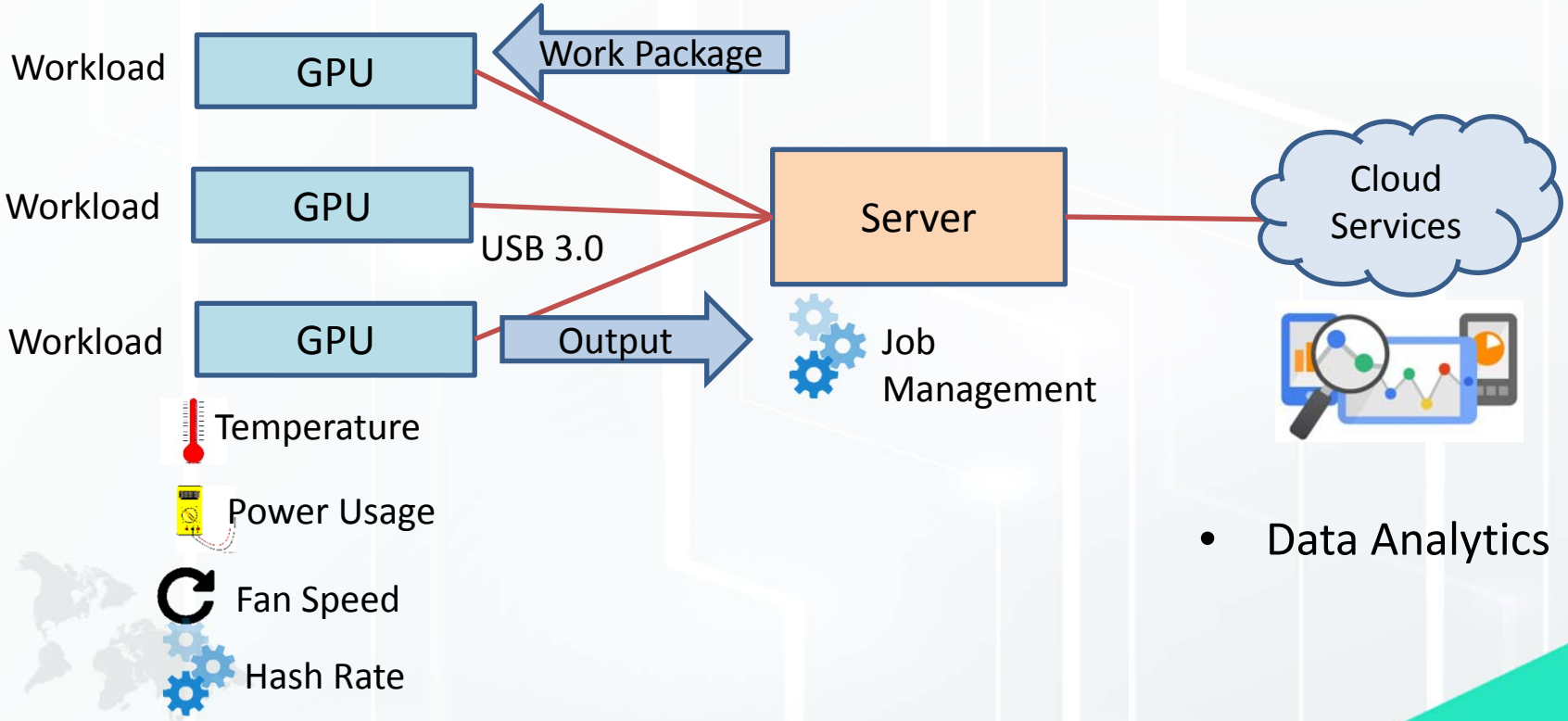
Evolution of IoT

Data Analytics

- Better Analysis Tools
- Machine Learning
- Predictions

Example IoT Scenarios

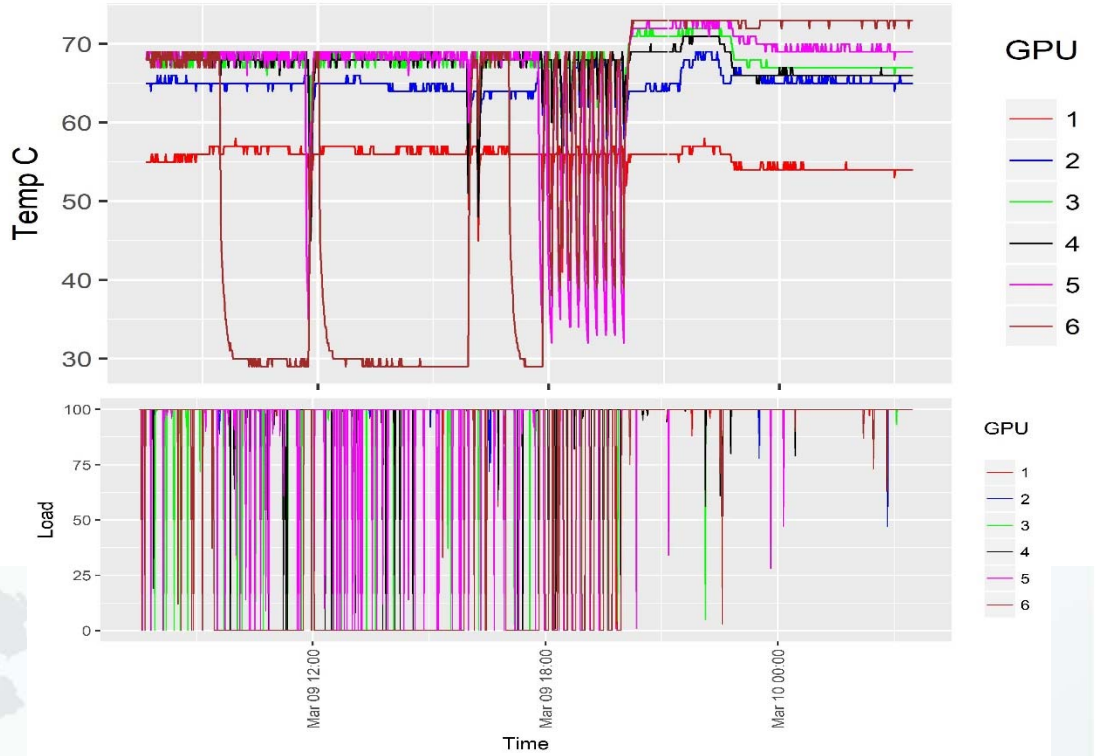
Scenario 1 – Crypto Currency Rig monitoring



- Data Analytics

Example IoT Scenarios

Scenario 1 – Crypto Currency Rig monitoring



- Reality, not fiction
- Scalability
- Predicting Failures
- Optimized Performance
- Cloud Monitoring Platform

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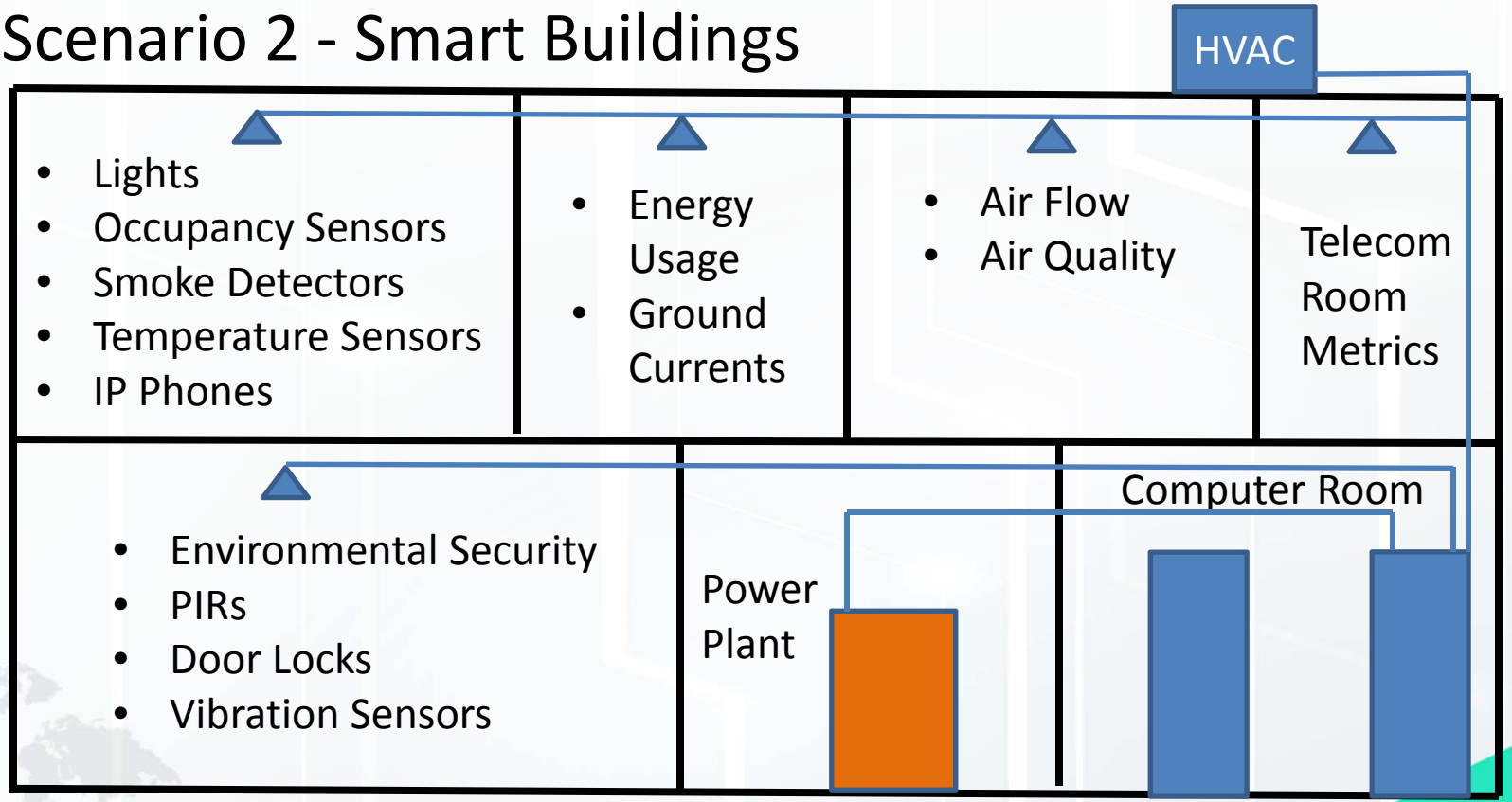
Example IoT Scenarios

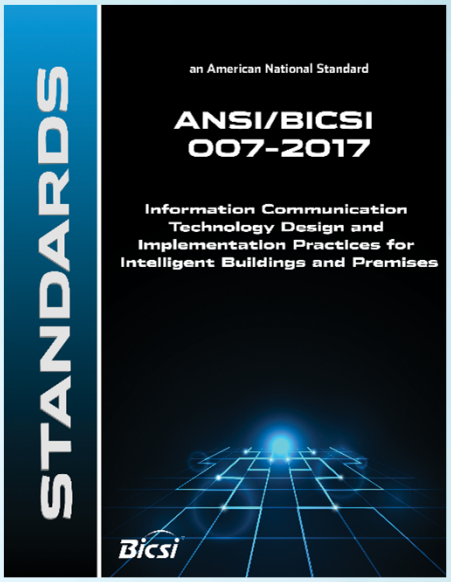
Scenario 2 - Smart Buildings



Example IoT Scenarios

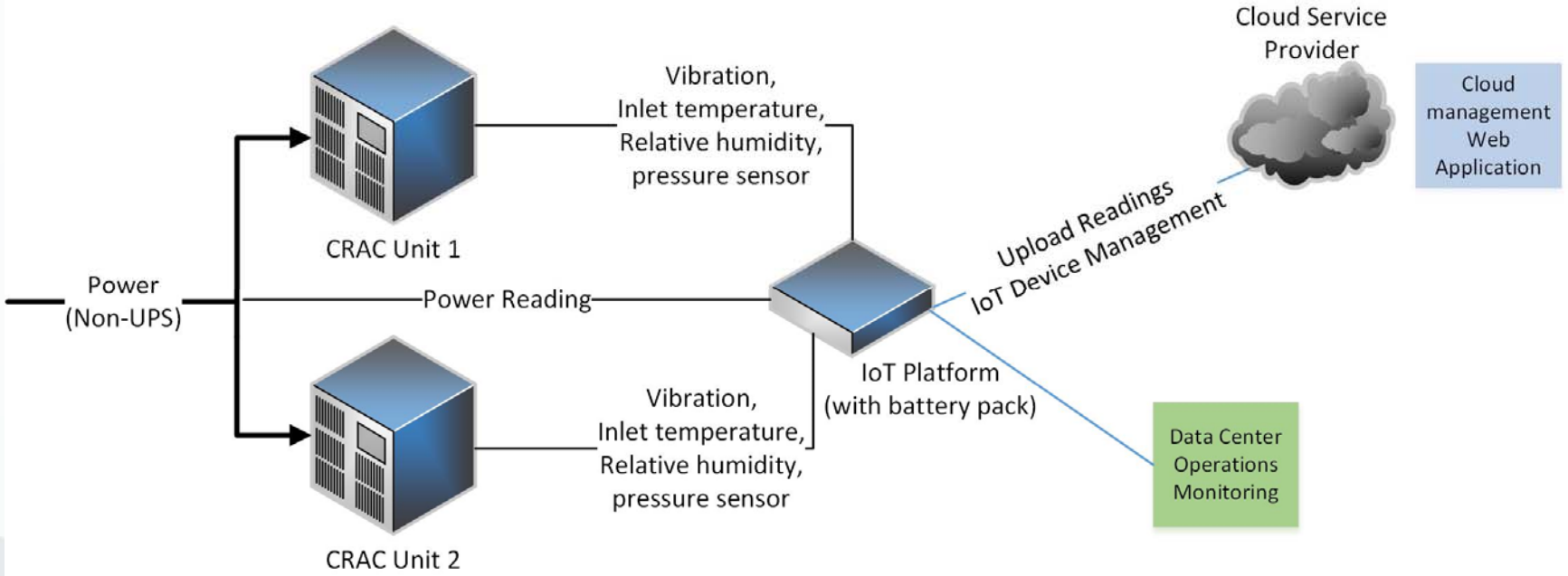
Scenario 2 - Smart Buildings

- Benefits
  - Occupancy Metrics
  - Room level comfort monitoring
  - Cross discipline analytics
- Risks
  - Cybersecurity



Example IoT Scenarios

Scenario 3 - Computer Room Air Conditioning Unit



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Example IoT Scenarios

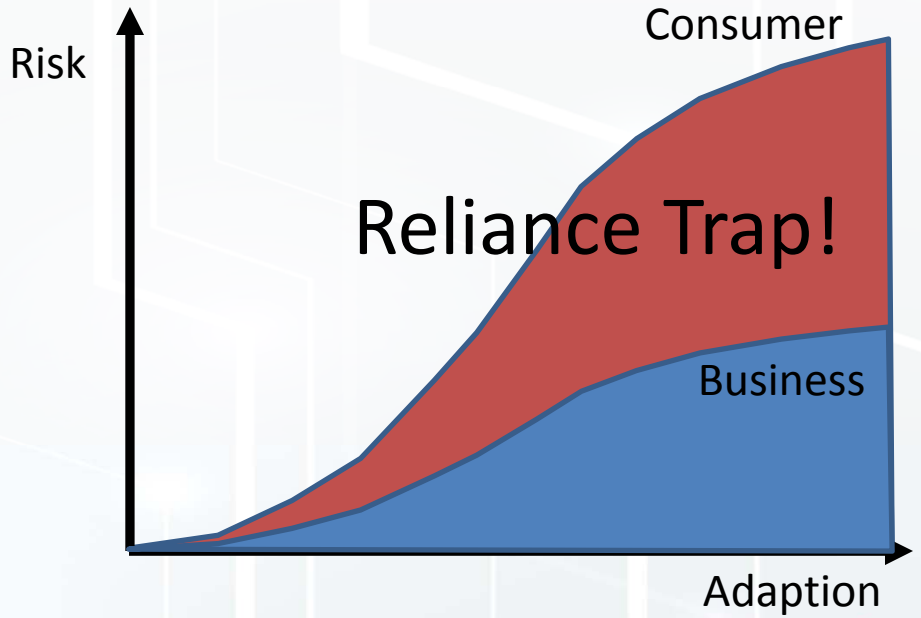
Scenario 3 - Computer Room Air Conditioning Unit

- Benefits
  - Operational Analytics
  - Predictive Maintenance
  - Capacity Planning

IoT Security

Consumer vs Business Approach

- Consumer
  - Functionality
- Business
  - Manageability
  - Return on Investment
  - Reliability
  - Security



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IoT Security

Device/IoT Gateway Security

- Software
  - Strong Authentication
  - Network encryption
- Firmware
  - Secure boot
  - Secure Updates
- Hardware
  - Voltage/Temperature monitoring
  - Tamper resistance

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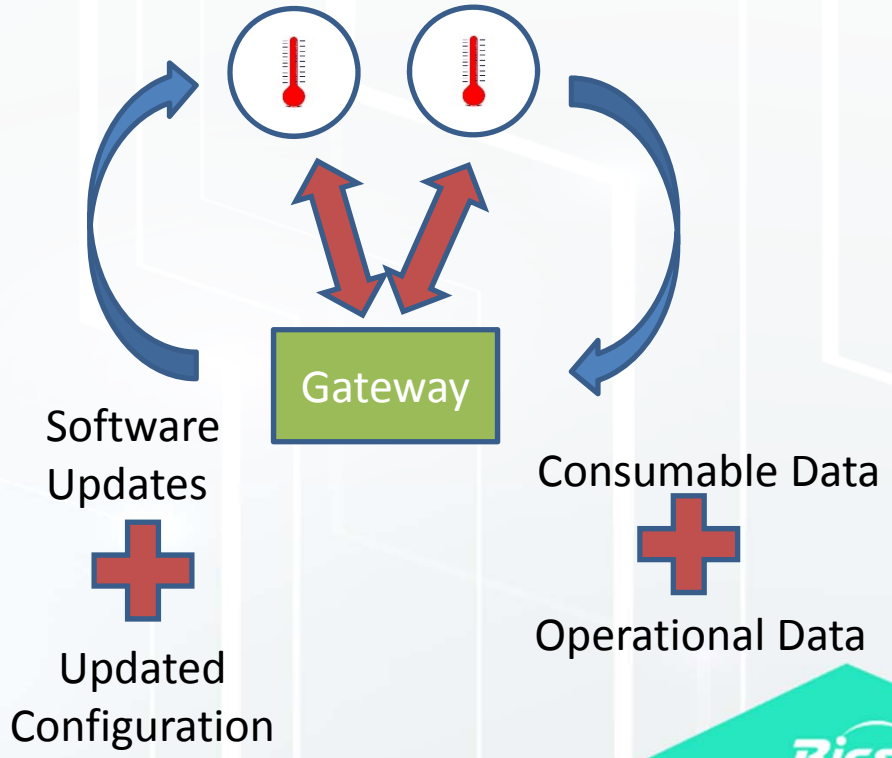
IoT Design and Selection Guidelines

Device/IoT Gateway Security

- Device management.
  - Secure Data storage on network outages
  - Remote firmware and application software updates
  - Remote configuration
- Easy Integration
  - Easy to consume API's
  - Standard application protocols



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IoT Design and Selection Guidelines

Device/Sensor Selection

- Recommended native TCP/IP network connectivity
  - Bluetooth (min BLE Version 4.1) in short range
  - PoE ethernet for larger devices/longer distances
  - Device density is important for wireless

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IoT Design and Selection Guidelines

Device/Sensor Selection

- Not recommended
  - Serial cabling: Stability AND Security is hard to maintain
  - Wi-Fi: High energy consumption
- Security should NOT be optional/add-on

IoT Design and Selection Guidelines

Gateway Selection

- Remote management platform
  - Remote firmware and application software updates
  - Remote configuration and KPI monitoring

IoT Design and Selection Guidelines

Gateway Selection

- Resistant to physical tampering.
- Firmware/OS end to end encryption
- Use TCP/IP, prefer PoE

IoT Design and selection guidelines

Gateway Selection

- Easy software development platforms
  - Linux or Windows
  - Phyton, or .NET development platforms
- No BacNET and Modbus, hard to secure

IoT Design and selection guidelines

Cloud Services Selection

- Central device management
  - API's for easy development
  - Geo distributed
  - Resilient for failures

IoT Design and selection guidelines

Cloud Services Selection

- Machine learning
  - Use it when you need it
  - API's for Machine learning
  - Ease of change
  - Analysis tools

IoT Design and selection guidelines

Cloud Services Selection

- Big data storage
  - Geo Replication
  - Cheap Storage
  - Data management tools
- Data Governance

Further Reading

- Cyber Security in Data Centers , BICSI Fall 2017
- Are you ready for IoT to change our buildings?, BICSI Winter 2018

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Questions?

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