



IoT in Action

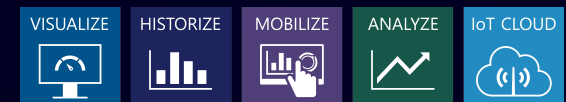
#IoTinActionMS



Intelligent Buildings Enabling Smart Sustainable Cities

Arthur Blom
Software Business
Development Manager

IoT in Action



About ICONICS

A Mitsubishi Electric Group Company



Headquartered in Foxboro, MA
Since 1986



80+ Countries
400+ Partners



350,000+
Installations Worldwide

Gold
Microsoft Partner



Six-time Microsoft
Partner of the Year

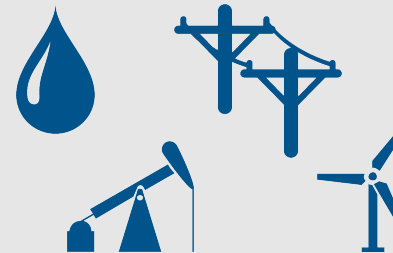
Manufacturing, Education, Health, Government, Financial
Services, Media & Communications & Retail Industry Maps



Energy Smart Buildings
Smart Cities



Manufacturing Intelligence
and Industrial Automation



Power & Water Utilities
Oil & Gas



Public Infrastructure

Enabling Digital Transformation



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Automation Software for Any Industry



Automotive



Building Automation



Food & Beverage



Government & Military



Manufacturing



Oil & Gas



Materials & Mining



Pharmaceutical



Sustainability



Transportation



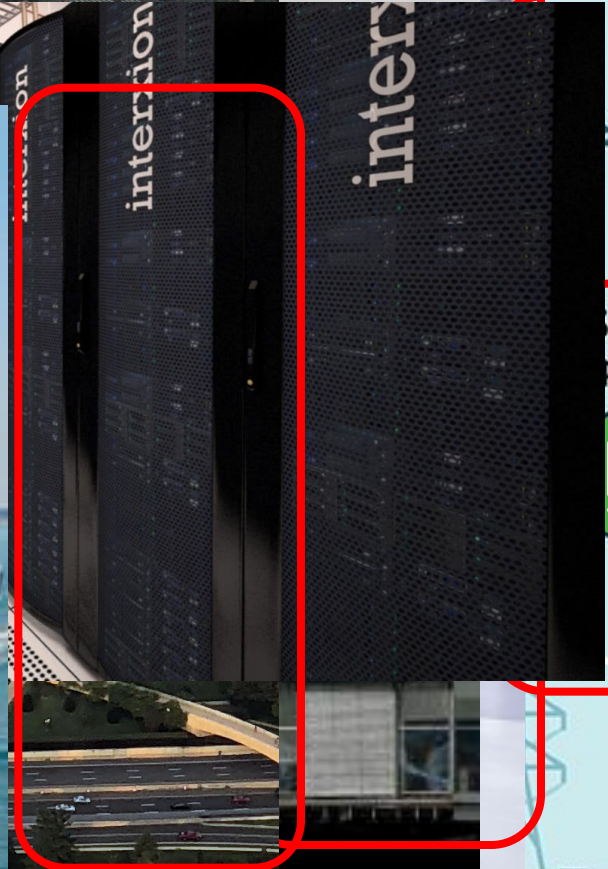
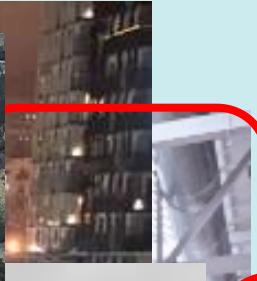
Utilities & Energy



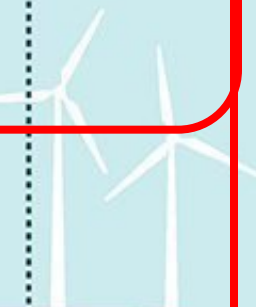
Water

Smart
gov

BANE N



Smart
Transportation



The background of the slide is a composite image. It features a dark blue, starry night sky with numerous bright yellow and white stars. Overlaid on this sky is a map of the world, where the continents are represented by the same starry pattern, making them stand out against the darker background of the oceans.

**An estimated 15 trillion watts of power are
being used across our planet at any one time**

Buildings – including offices, homes, and stores –
use 40% of our energy





IoT in action for Intelligent Buildings



ICONICS Empowers Intelligent Buildings

- Cut **Energy** consumption by **20%**
- Reduce **Comfort**-related service calls by **40%**
- Increase **Occupancy** rates by **30%**
- Improve **Productivity**
- Reduce maintenance costs
- Reduce greenhouse gases
- Improve experience for tenants and guests



50,000+ Intelligent Buildings Operate with ICONICS



Microsoft 138 Bldgs



Heathrow Terminal 5



Defense Info System Agency



Malpensa Airport



Hong Kong Inter. Airport



US Pentagon



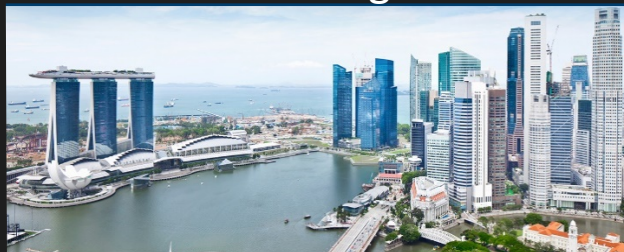
Ascendas 33 High Rises



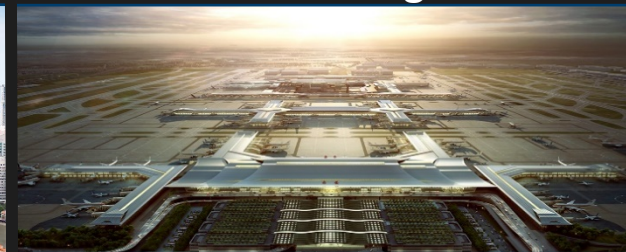
LGA – Terminal 3 Delta



ExxonMobil Houston 23 Bldgs



JTC Singapore 32 Bldgs



Xian Xianyang Airport



Cadillac Fairview 21 High Rises



Schiphol Airport



AT&T 900+ Bldgs



Raytheon 60+ Bldgs



Target Store 1830 Bldgs

50,000+ Intelligent Buildings Operate with ICONICS



5 Million Data Points

- Building Automation
- Security
- Lighting
- Jetways
- Baggage Handling
- Moving Walkways
- Billing Systems
- Elevators / Escalators
- Electrical



Intelligent BUILDING

- 6.5 Million sq. ft. Building
- 5 Million Data Points
- 3D Graphical Representations
- Effective Building Management
- Real-time Alarming
- Remote Monitoring and Control
- Integrates Disparate Systems



The Intelligent Building Vision



Buildings tell you when there's going to be a problem



You plan maintenance instead of responding to emergencies



Improved tenant wellbeing



Productivity measures increase



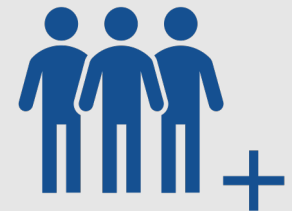
You reduce your energy consumption



Space utilization is optimized based on real-time data



Your building evolves as your occupants change



Occupant User Experience is enhanced

Intelligent building scenarios



Fault Detection and
Enhanced Maintenance



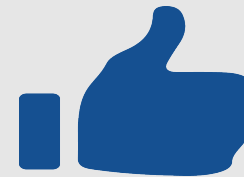
Single
Pane of Glass



Energy
Optimization



Workplace
Optimization



Enhanced
User Experience



Occupant
Comfort

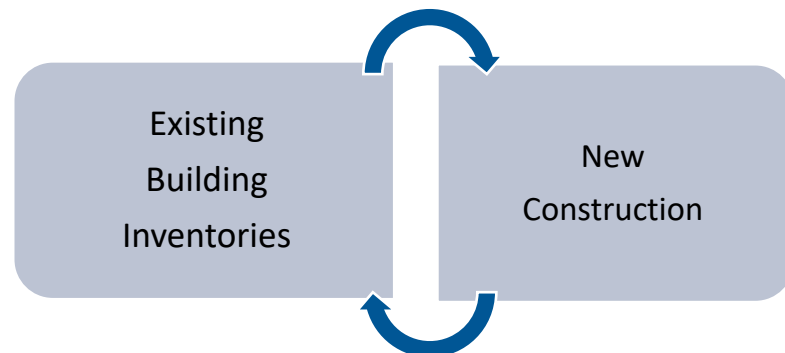
Creating Value in Intelligent Buildings

Key Challenges

- Prioritizing Work
- Understanding the ROI
- Estimating the level of Effort
- Connect to Existing Systems
- Instrument Disconnected Assets

Use cases

- Improve efficiency
- Reduce energy consumption
- Reduce operating costs
- Reduce tenant complaints
- Reduce insurance claims
- Reduce accidents and lawsuits

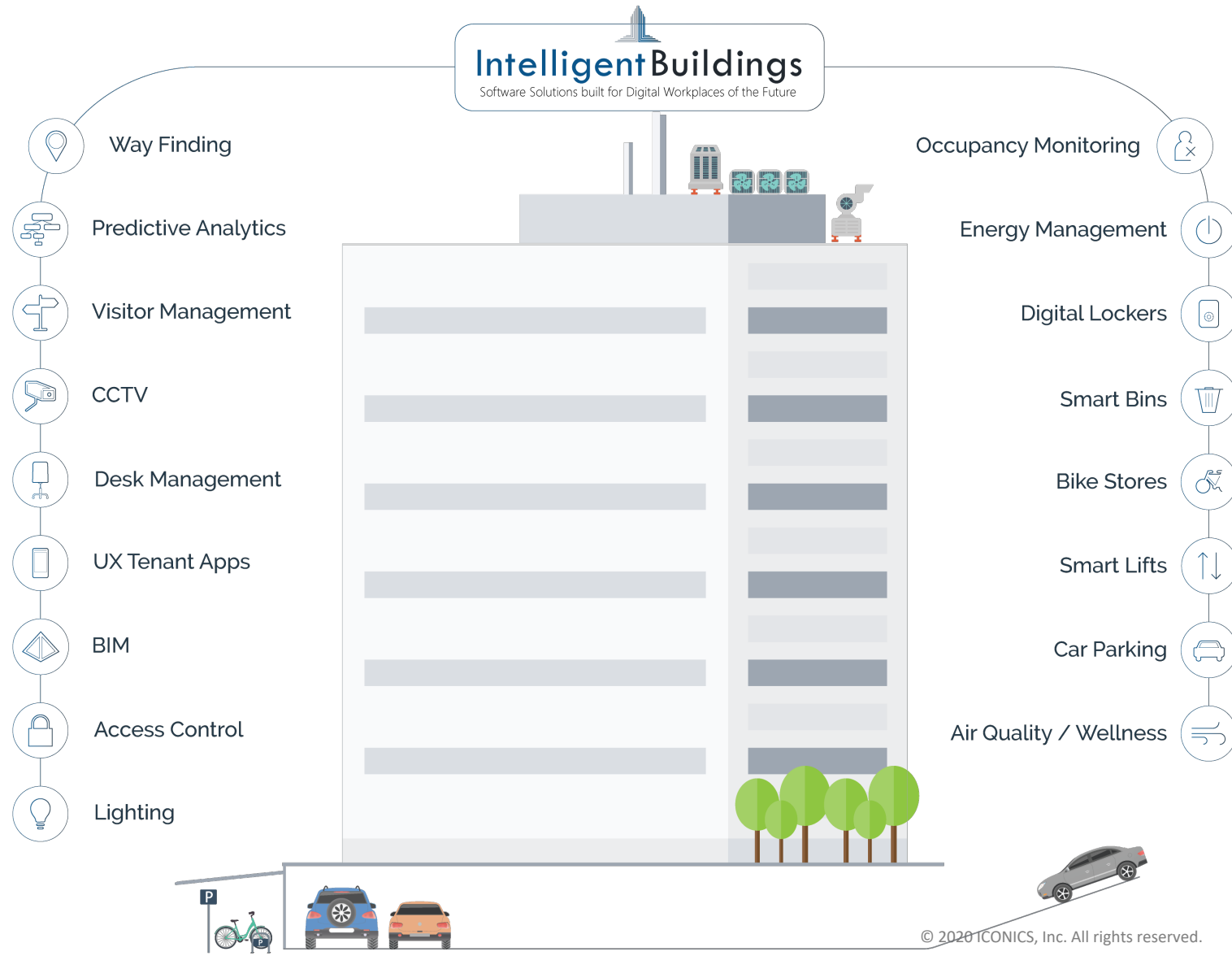


Why do I need an Intelligent Building Software Platform (IBSP)?

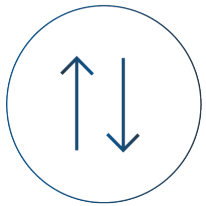


An Intelligent Building requires an Intelligent Building Software Platform for Top-End Integration

- An IBSP implementation is not an enhanced BMS.
- It requires
 - integration programming
 - analytics data specialist programmers
 - user interface design skillsets
 - not simply BMS standard control programming.
- Incorporates far more than energy management



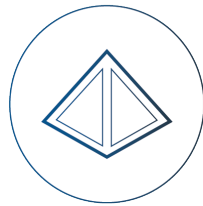
Why IBSP? Typical Building:



Smart Lift



Vehicle
Charging



BIM



Smart
Access
Control



Smart
Lighting

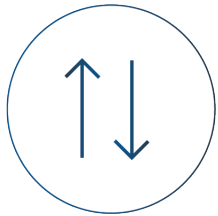


BMS



Smart
Environment
Sensors

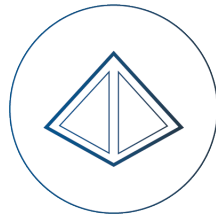
Why IBSP? “Smart” Building:



Smart Lift



Vehicle
Charging



BIM



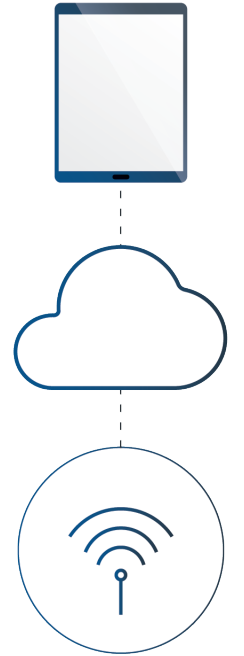
Smart
Access
Control



Smart
Lighting



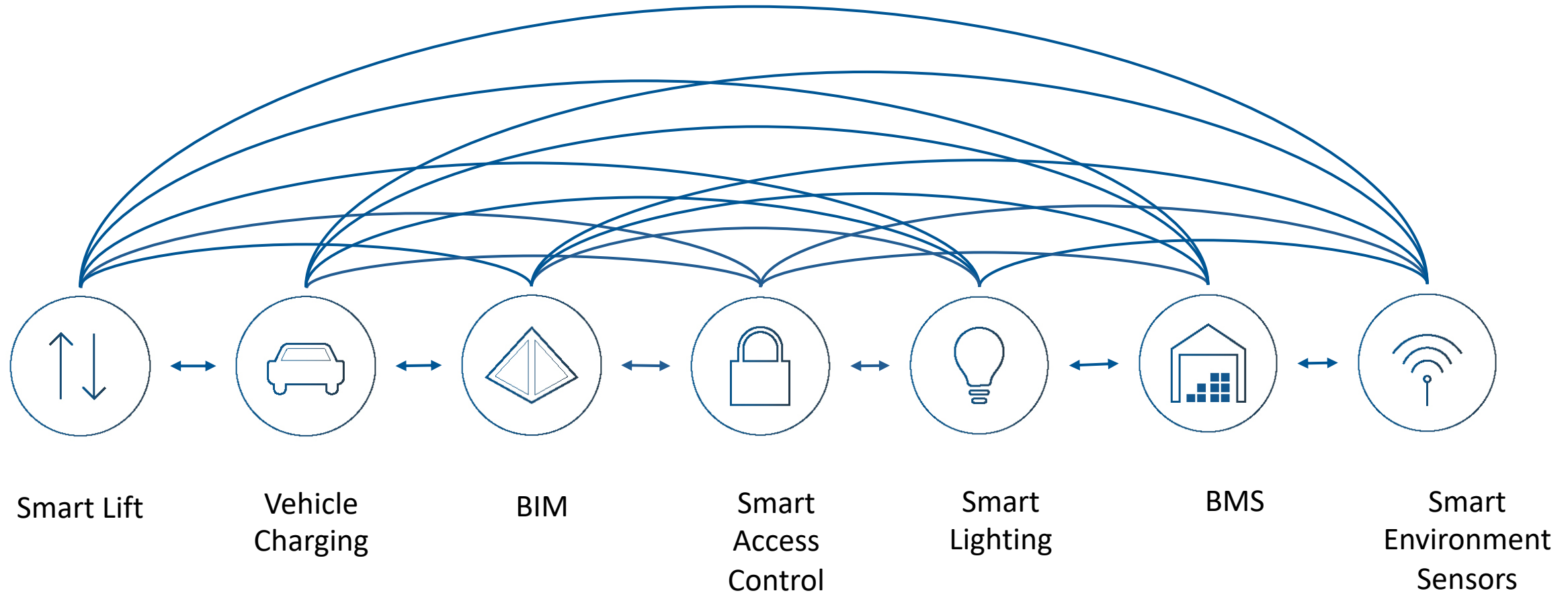
BMS



Smart
Environment
Sensors

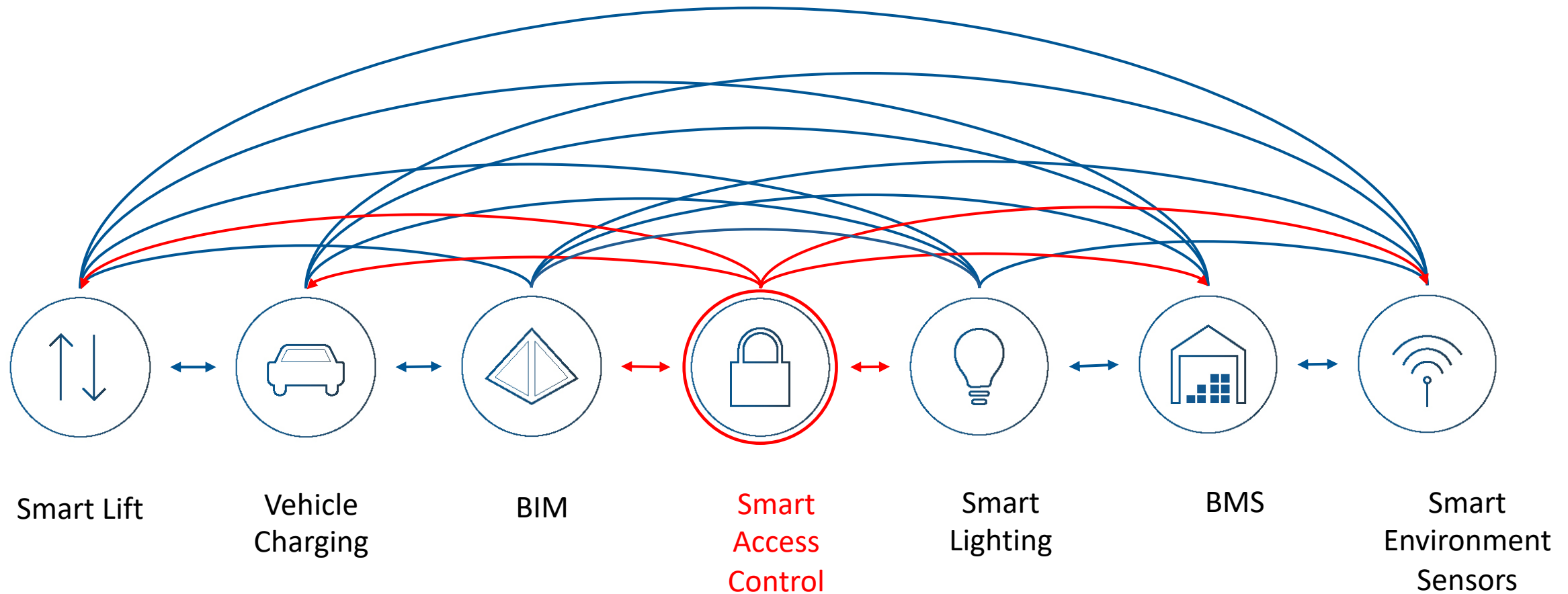
Why IBSP? Integrated “Smart” Building

The traditional approach to building integration is a point to point solution:



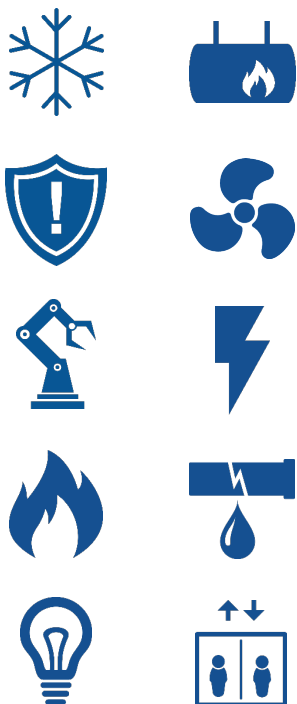
Why IBSP? Integrated “Smart” Building

Changes to a single system result in **multiple interface updates:**



Universal Connectivity

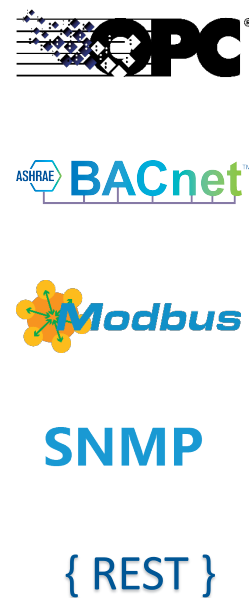
Equipment



Sub Systems



Open Protocols



Centralized, Uniform
Platform delivered on a
Single Pane of Glass



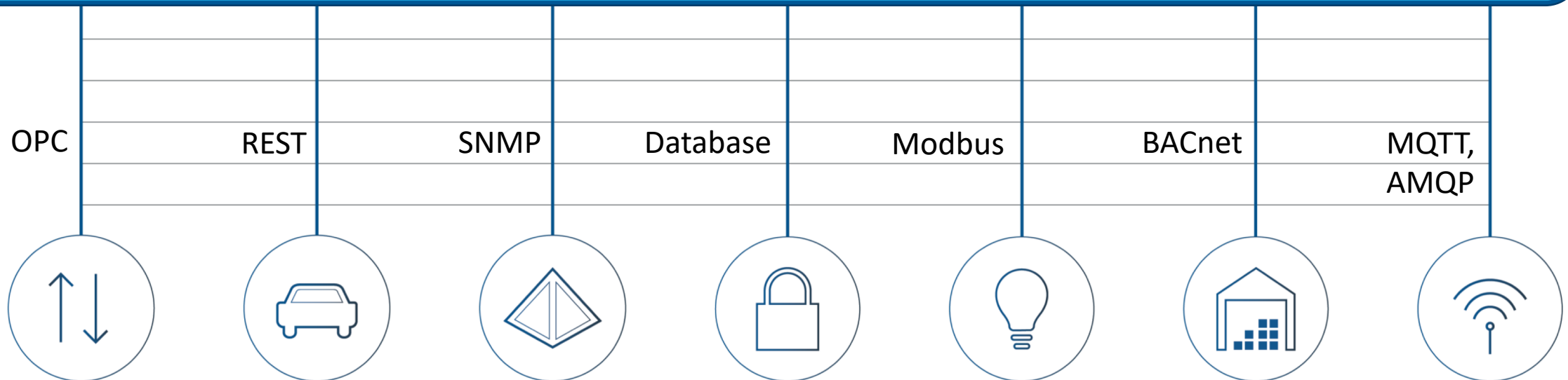
Why IBSP: single “socket”

Single API (Application Programming Interface)

Intelligent Building Software Platform (IBSP)

ingest, normalize, enrich and facilitate

Microsoft Azure Digital Twin



What's in the ICONICS Intelligent Building Software Platform



01

Data
Connectivity

02

Data
Normalisation

03

Analytics and
AI Strategies











04

Presentation

Components of ICONICS IBSP




















01

Extensive Data Connectivity Capability

- ▲  Data Connectivity
 - ▶  BACnet
 - ▶  Databases
 - ▶  Modbus
 - ▶  SNMP
- ▲  Web Services
 - ▲  External
 - ▲  CMX
 - ▶ *f(x)* ActiveClients
 - ▶ *f(x)* ClientCount
 - ▶ *f(x)* Clients
 - ▶ *f(x)* FloorSpecific
 - ▶ *f(x)* MapImage
 - ▶ *f(x)* Maps
 - ▲  EMS
 - ▶ *f(x)* RoomHistory
 - ▲  TfL
 - ▶ *f(x)* LineStatus

02

Create normalized
data structures for
easier consumption

- ▲  Assets
 - ▲  Equipment
 - ▲  Organisation
 - ▲  Building 01
 - ▲  01
 - ▲  01_01
 - ▶  _IRDCP_Booking_RoomID
 - ▶  _IRDCP_Booking_TypeID
 - ▶  Bookable
 - ▶  BusinessUnit
 - ▶  Capacity
 - ▶  Description
 - ▶  Fixed
 - ▶  FurnitureType
 - ▶  Height
 - ▶  LocationX
 - ▶  LocationY
 - ▶  Occupancy
 - ▶  OccupancyStatus

03

Create AI strategies based on multiple sub-system inputs

- Set HVAC heating dead bands based on multiple input sources
 - Real-time Occupancy
 - Room Booking Information
- Turn off HVAC on absence detection
 - 1min occupancy sensor data vs 15min PIR saves 14 minutes per meeting room of HVAC energy
 - Power Savings: Assume 10kW fan motor per FCU, 30 per floor, 10 floors
 - € 0.26 per unit per 1 hour meeting → € 79 saving per hour excluding chillers/heaters
 - **€119,500 a year saving** for 8 hours in a day in a 38 week working year

04

Presentation ICONICS showcase project IBSP



1 New Street Square

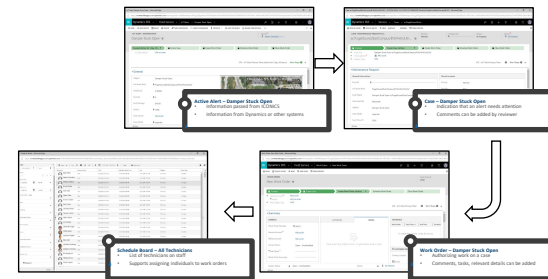
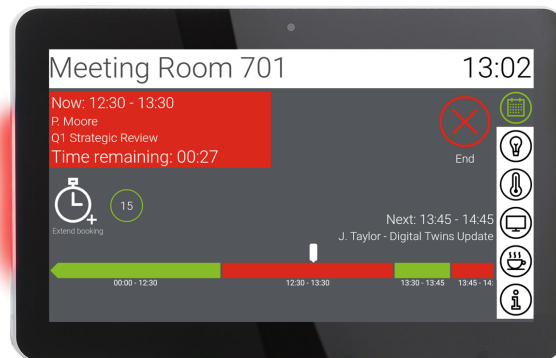
Deloitte's flagship

London, England

1NSS Project

- **20** base build and fit-out **subsystems integrated.**
- **Single Pane of Glass** view of building across multiple roles
 - Facility Mgt
 - Workplace Services
 - Technical Services
- **Digital Signage** and **Wayfinding** powered by IBSP
- **In Room Digital Control Panels** replace multiple traditional meeting room controls

- **Cause and Effect logic**
 - E.g. use Occupancy sensing to drive HVAC and Lighting to setback mode when Room Booking System says meeting running but no occupants.



The Results

Before



45%

of offices unused
at any one time –
nearly 200 empty,
some locked



30%

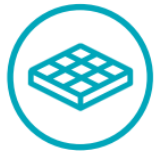
of desks unused
at any one time –
1600 empty

After



30%

more people,
3% less space



60%

reduced on-
floor storage



10

client environment
choices



10

working
environment
choices



67%

millennial, Deloitte's
average age is 32



650

additional informal
teaming spaces



390

additional alternative
work settings

Deloitte has attained an **Outstanding BREEAM rating** – the highest accreditation level awarded to ~1% of building projects prioritising environmental efficiency.

Deloitte have also achieved **WELL Gold**. The first in the UK to attain both certifications – a significant achievement.

Typical Intelligent Building Use Cases



Fault Detection and Enhanced
Maintenance

Equipment
based



Energy Optimization



Enhanced User Experience

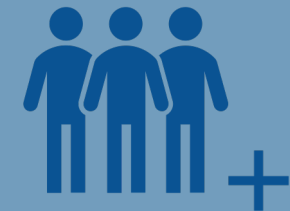


Single Pane of Glass

Wellness, increased productivity based



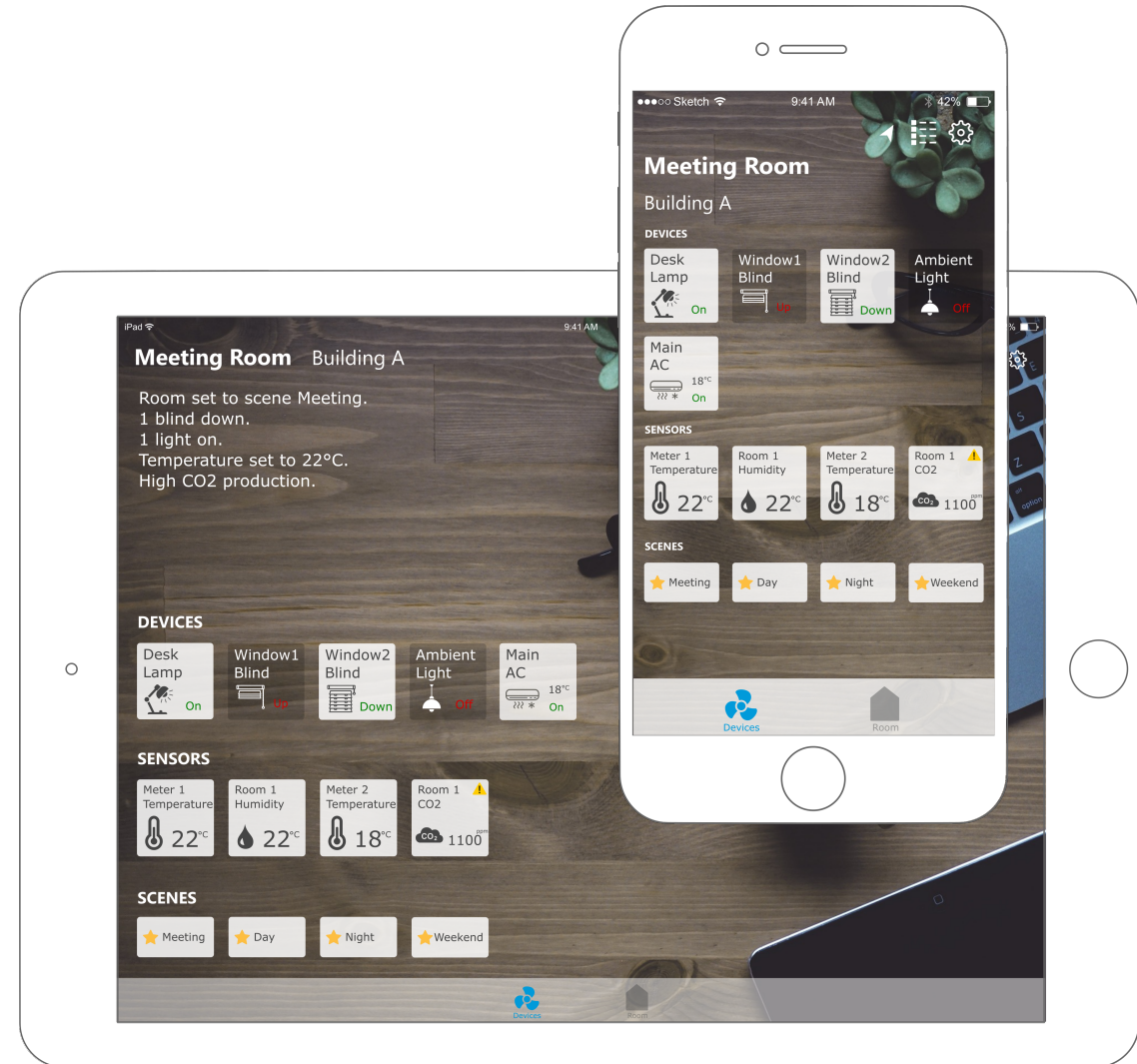
Workplace Optimization



Occupant Comfort

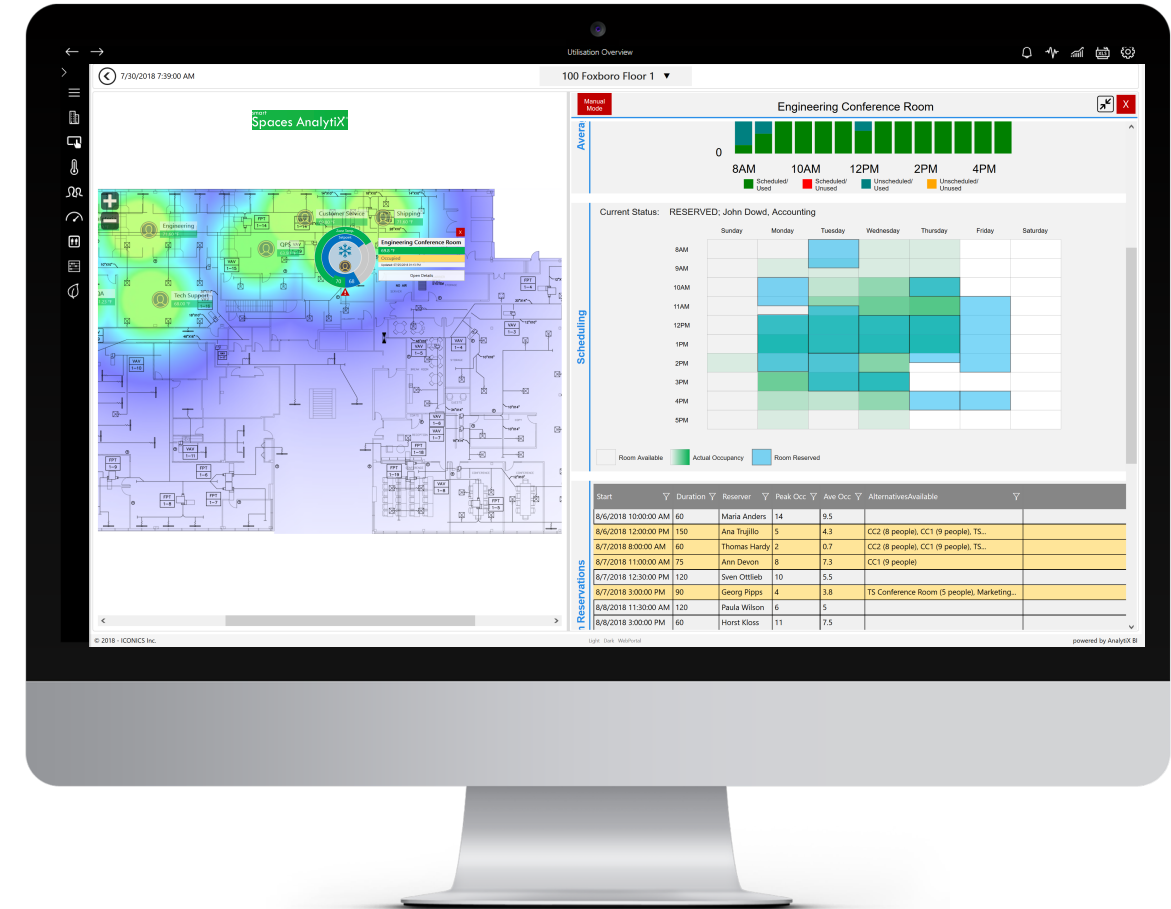
Deliverable Capability of use case Comfort Optimisation

- Monitor temperature of spaces
- Monitor occupancy of spaces
- Zone temperature vs setpoint
- Comfort based exceptions
 - Failed discharge temp sensor
 - Inadequate heating



Deliverable Capability of use case Workplace Utilisation

- Tie-in to occupancy sensors
- Integrate to Outlook for meeting room schedules
- Generate faults for occupancy violations
 - Meeting room booked but not occupied
 - Meeting room not booked but occupied
 - Meeting room too big or too small
- Space usage efficiency and history



Typical Intelligent Building Use Cases



Fault Detection and Enhanced
Maintenance

Equipment
based



Energy Optimization



Enhanced User Experience

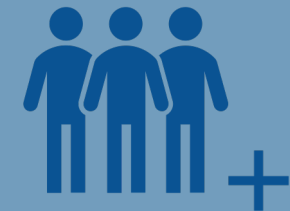


Single Pane of Glass

Wellness, increased productivity based



Workplace Optimization



Occupant Comfort

Deliverable Capability of use case Energy Management

- Energy use by building, floor & room
- Energy use intensity visualized on the floor plan
- Consumption trends
- Building level energy usage
- Campus wide energy usage
- Automated reports
- Long term data storage
- Utility reporting
- Predictive models

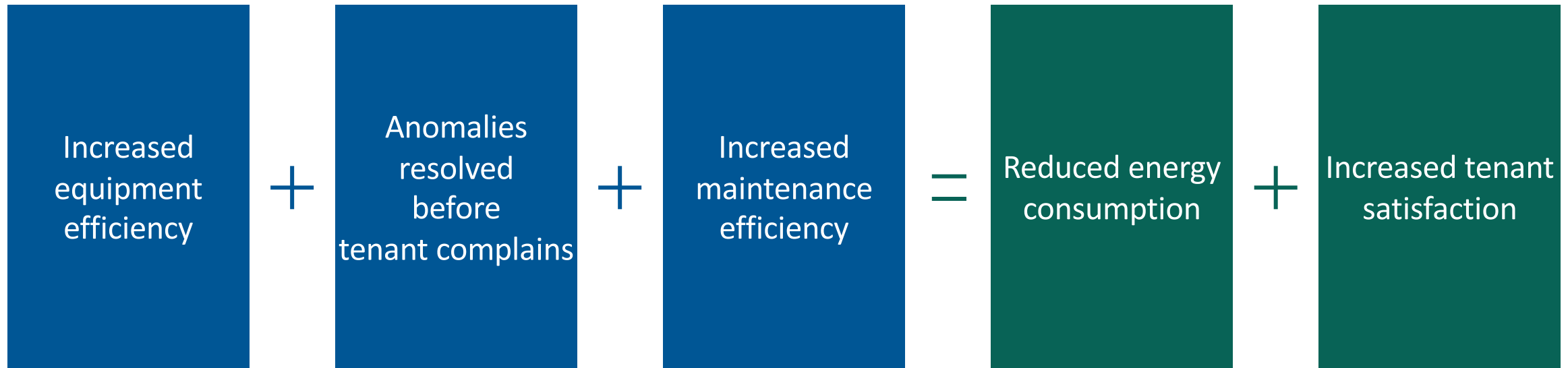


Fault Detection and Enhanced Maintenance use case



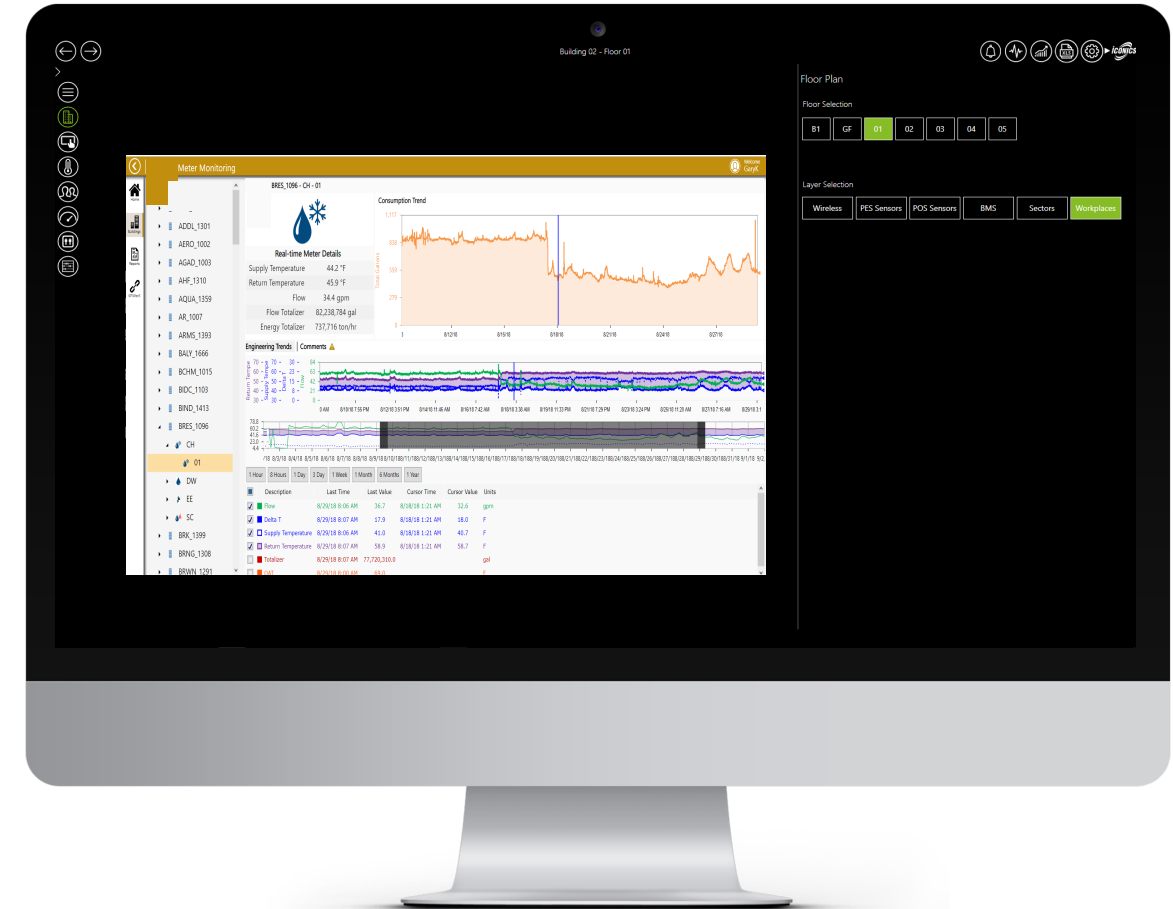
What is FDD and why should you have it?

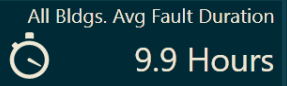
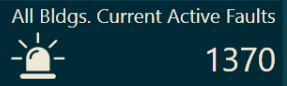
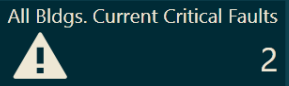
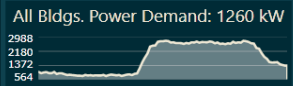
FDD (Fault Detection and Diagnostics) is the detection of inefficiencies and anomalies in space and equipment.



Deliverable Capability of use case FDD

- Utilize in-house expert knowledge to build faults
 - Mechanical and commissioning engineers
- Prioritize faults
 - Energy cost
 - Operational cost
 - Criticality
- Change setpoints
- Submit workorders





ac:SUMMIT/ X

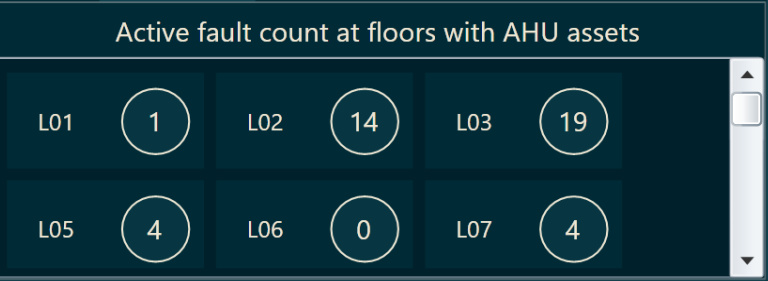
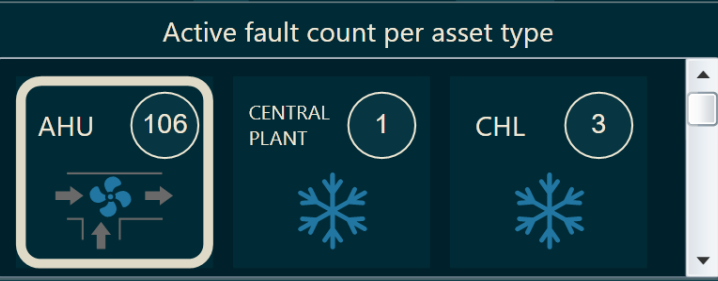


- JTC
- CleanTech
- MedTech H
- Summit

Summit GFA: 56527 sq. m EEI: 104.5 Critical Faults: 0 Active Faults: 1184 Avg. Fault Duration: 9.6 Hours



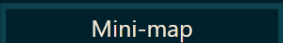
Cumulative Fault Count by Day



Critical Faults (0) | AHU Active Faults | AHU Fault Statistics

Drag a column header and drop it here to group by that column

Asset Path	Fault Name	Total Fault Count	Total Active Duration (Hours)	Total Estimated Lost Opportunity
SUMMIT/ACMV/AHU/L18/2	Manual Override - Supply Fan Speed	104	3,442.27	1,491.64
SUMMIT/ACMV/AHU/L01/4	Manual Override - Supply Fan Speed	35	887.82	769.10
SUMMIT/ACMV/AHU/L05/2	Under-Pressurization	82	785.11	667.83
SUMMIT/ACMV/AHU/L22/2	Under-Pressurization	71	712.06	540.37
SUMMIT/ACMV/AHU/L02/5	Manual Override - Supply Fan Speed	74	1,319.43	519.69
SUMMIT/ACMV/AHU/L22/1	Under-Pressurization	71	711.69	499.16
SUMMIT/ACMV/AHU/L20/2	Manual Override - Supply Fan Speed	107	706.03	457.40
SUMMIT/ACMV/AHU/L26/2	Under-Pressurization	82	741.42	455.07
SUMMIT/ACMV/AHU/L20/1	Manual Override - Supply Fan Speed	106	779.50	427.61
SUMMIT/ACMV/AHU/L26/1	Manual Override - Supply Fan Speed	83	743.67	415.61
SUMMIT/ACMV/AHU/L02/5	Failed Control Reset - Supply Static...	51	484.39	399.79
SUMMIT/ACMV/AHU/L19/2	Manual Override - Supply Fan Speed	86	641.50	381.82
SUMMIT/ACMV/AHU/L03/1	Failed Control Reset - Supply Static...	40	338.28	377.58
SUMMIT/ACMV/AHU/L25/2	Under-Pressurization	80	558.35	374.10
SUMMIT/ACMV/AHU/L10/1	Manual Override - Manual Mode Enabled	33	1,106.87	370.80
SUMMIT/ACMV/AHU/L23/2	Under-Pressurization	80	613.62	365.55
SUMMIT/ACMV/AHU/L08/2	Under-Pressurization	76	562.24	347.03

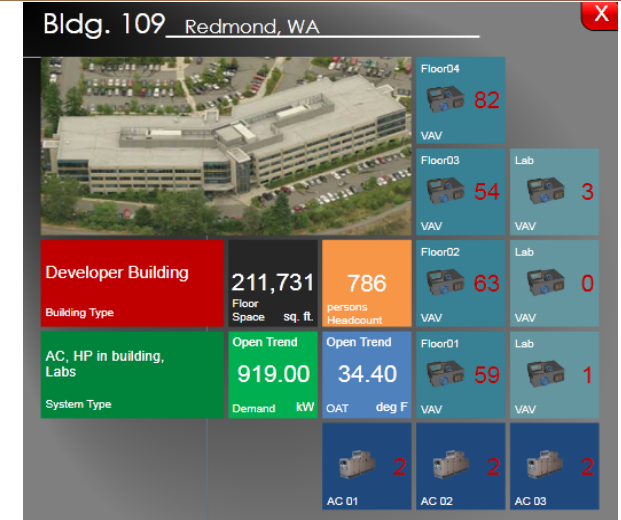


ICONICS showcase project Microsoft Redmond Campus



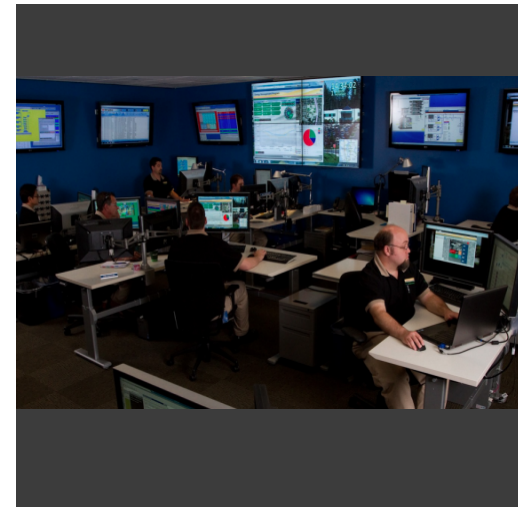
Why ICONICS?

- Centralized Situational Awareness
- Drill-down capabilities
- Integrate and normalize disparate systems
- Data Analytics and IoT
- Efficiently Scale Globally



Business Drivers:

- Find software to replace clipboard management
- Single view of all building systems (45,000 assets)
- Increase Occupant Comfort
- Reduce Operating Costs
- Optimize Building Utilization
- Condition-based Monitoring
- Integrate (CMMS, Work Orders)



Results

- More efficient System Co-ordination
- Reduced Energy Consumption
- Cost savings

ICONICS showcase project Microsoft Redmond Campus

Easier system
coordination



Improved technician
efficiency with
**32,300 work
orders per quarter**



**48% of faults are corrected
within 60 seconds**

Lower energy
consumption



Forecasted
energy savings
of **15-22%**
over three years

**55 megawatts have been
reduced 43 megawatts**

Reduced
cost



**Saved
\$2 million**
in its first year



**\$56M saved by
aggregating data
from **sensors** vs.
retrofitting
equipment**

ICONICS showcase project Smart Nation JTC & Country of Singapore



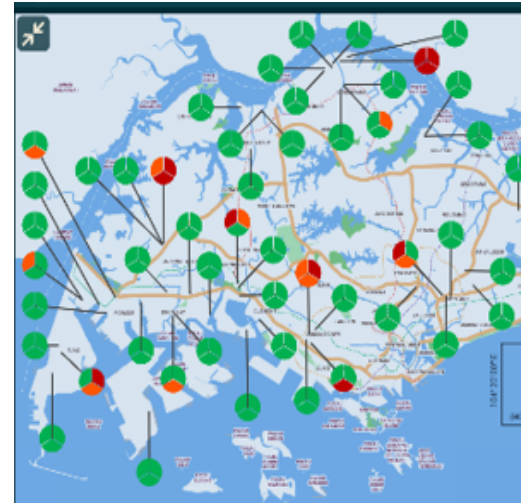
Why ICONICS?

- Visualization for clear overview dashboards
- Drill-down capabilities to better identify issues
- Normalize Disparate BAS
- Offered Cloud Computing
- Efficiently Scale
- Fulfill Business Outcome



Business Drivers:

- Develop Smart Nation to be competitive
- Develop Brand in Smart Nation
- Centralize and Streamline Operations
- Monitor, analyze and control buildings across country
- Improve productivity 15%
- Drive ENERGY SAVINGS of 15%++
- Reduce carbon emissions by 36% by 2030



Results

- Central Monitoring of all Assets
- Provide real-time visibility of Building Efficiency
- Improve productivity

The implementation of intelligent and sustainable buildings is also a key step in the journey to smart sustainable cities



How ICONICS can help

- Intelligent software and interoperable data sharing between systems, sensors and people, solves many of the common issues associated with finding and booking space.
- By uniting through cloud-based interoperable data standards:
 - Room Booking
 - Occupancy Sensing
 - Location Services
 - Digital Signage
 - Apps & Concierge services
- from multiple vendors and multiple technologies, an intelligent building can serve an enhanced, but unified, experience to occupants.



Intelligent Buildings Enabling Smart Sustainable Cities

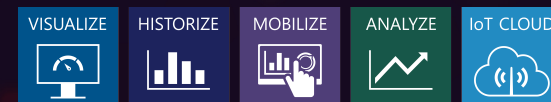
IoT in Action

Thank you!

Arthur Blom

Software Business Development Manager

arthur.blom@iconics.com



TRANSFORM

2020 WORLDWIDE CUSTOMER SUMMIT

74d 1h 58m 22s

March 31 - April 3, 2020 • Foxwoods Resort Casino • Mashantucket, CT, USA

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WHAT TO EXPECT

<https://iconics.com/WWCS>

