CONNECTING AN ALL-ELECTRIC WORLD

SIEMENS
Ingenuity for life

Digital Twin

"Enabler for energy efficiency"

Kevin Bauer I Digital Portfolio Manager

siemens.at/future-of-energy

"People spend up to 90% of their life indoor"

– Everybody

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Employee:
... I want to:
Have access to rooms
Book rooms quickly
Individual comfort
Find my colleagues/assets

Investor:
... I want to:
Minimize risk/operational costs
Maximizing growth
Optimize employee productivity

Facility Manager:
... I want to:
Optimize efficiency
Lower down costs

Building Data

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Typical Office Building

~200 Gigabytes static data

~60 Sensor types

~2,000 Datapoints

>500 MB data per day or ~200 GB per year

Goal:

500,000 commercial buildings → 100 Petabytes per year

~30 years operation phase → 3 Exabytes

Availability in 4 regions, 160 countries

Access for 12,000 service engineers and millions of users

Current situation: @DLC

>20 buildings connected/digitalized

Buildings and people are generating data
and they talk to us

Let's turn this data into knowledge in order to enhancing building performance and improve user experience

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WHAT (IoT)   is going on   WHERE? (BIM)
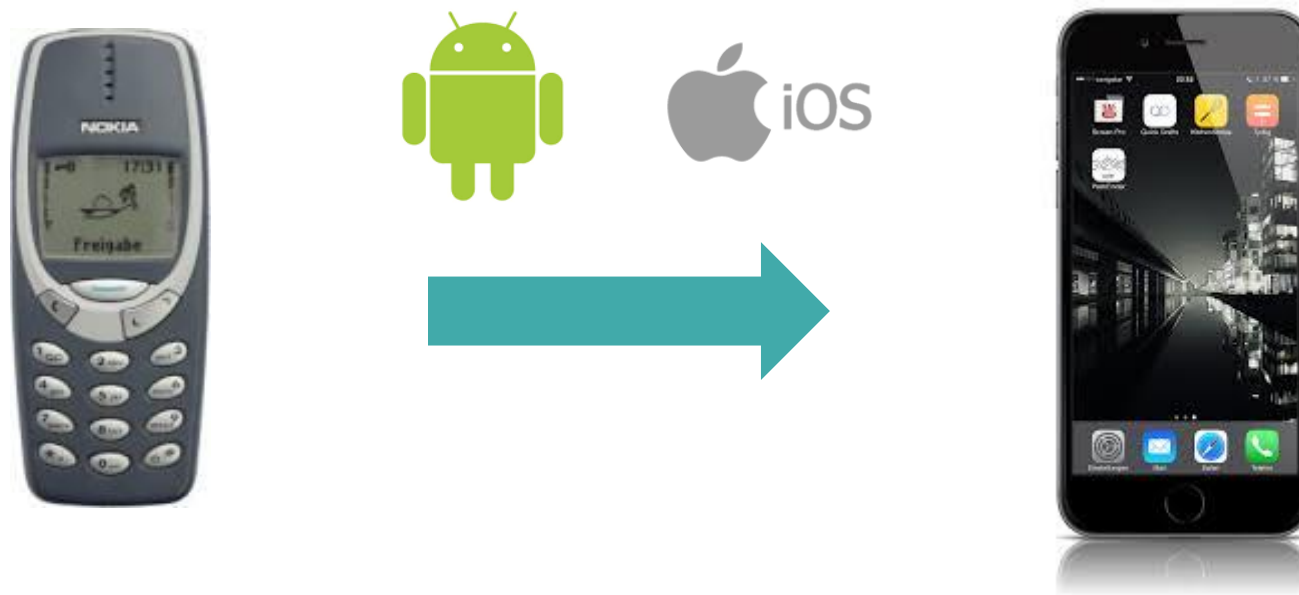

Safety

Security

HVAC

Lighting

Power

CO2

Digital Twin
Connecting BIM and IoT

What differentiates a mobile phone from a smartphone?

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What differentiates a building from a smart building?

APPS

API

Building Operating System

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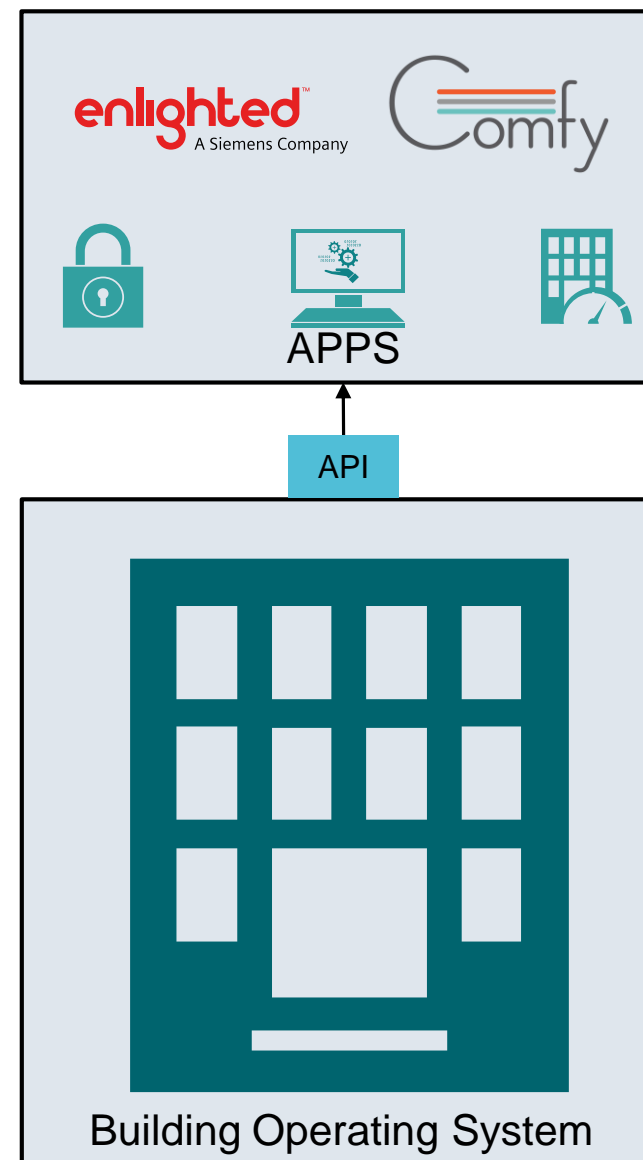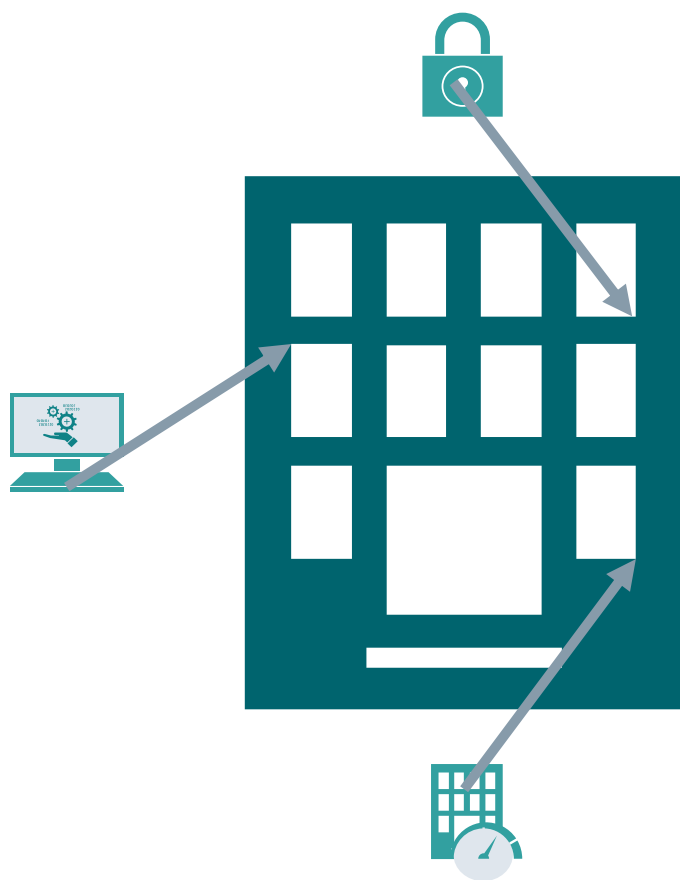
enlighted

Digitizes buildings...

To give **visibility** into use of space and location of people & things...
That improves **workplace experience** and **operational efficiency**.

Bluetooth

Motion

Light
(multi-channel)

Temperature

Power
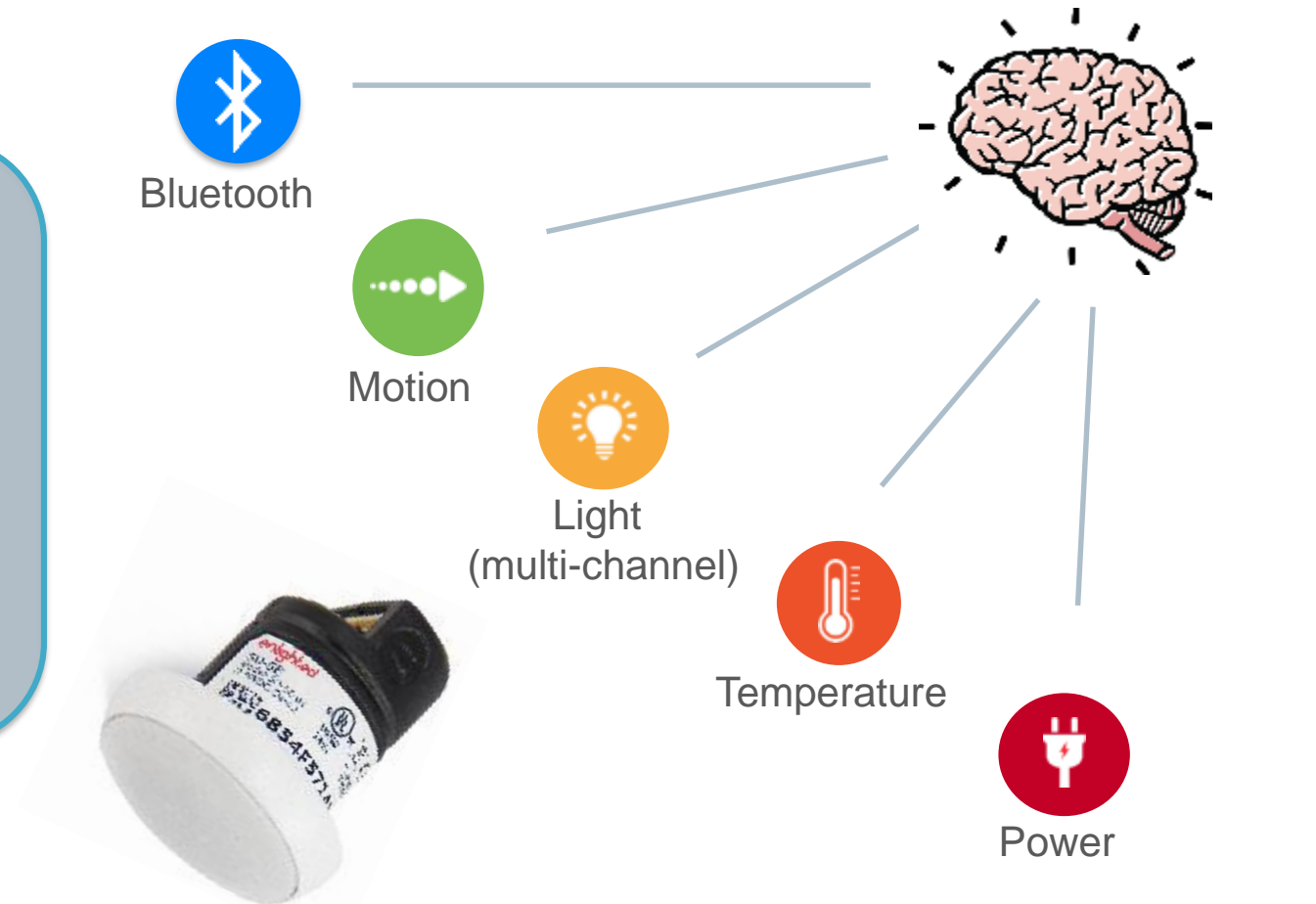
IfcSensor – Type: USERDEFINED
http://www.buildingsmart-tech.org/ifc/IFC4/final/html/

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Connect data
Architectural shift to building operating systems

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Cloud Applications

Building Operating System — MindSphere

IoT Devices / Plans

90°

- Modular APP approach
- Enhance user experience
- Decrease building IT operation costs
- Digital Twin ready / Future Proof
- Securely connected buildings

1
- UI 1
- Database 1
- Connectivity
- Devices

2
- UI 2
- Database 2
- Connectivity
- Devices

3
- UI 3
- Database 3
- Connectivity
- Devices

Yesterday:
Vertical silos with individual architecture

Today:
ONE horizontal approach

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Use data and deliver value

via (your own) applications

Navigator

Easily deploy applications matching the needs of the building type and people

Personalized comfort, Flexible workspaces, Wayfinding and asset tracking, Space and Energy Optimization

SIEMENS digital twin ecosystem

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Ingenuity for life

Navigator — SIEMENS

enlighted™ — A Siemens Company

Comfy

DC Hub — SIEMENS

Applications (SaaS)

| CAFM | Access Control | Energy Management | Service Management | Building Management (Security, Fire, HVAC…) | Space Management | Workplace experience | new 3rd party Services |

Use Data and deliver value

3

Building Operating System

Digital Lifecycle Core (DLC)

2

Connect Data Digital Twin Platform (PaaS)

1

| Public Data (e.g., Weather, Energy) | Building Structure (e.g. BIM IFC, 2D Plans, 3D Scans) | Live-building Data (e.g. Location, Temperature, Occupancy) — enlighted™ A Siemens Company | new 3rd party Data |

www

Create and collect Data

Solutions (Products & Services)

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Digital Lifecycle Plattform – Digital Twin AEP
Our building blocks to enable development of applications

SIEMENS
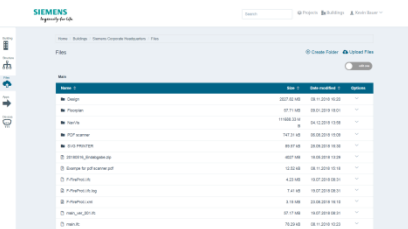*Ingenuity for life*

DLC IoT
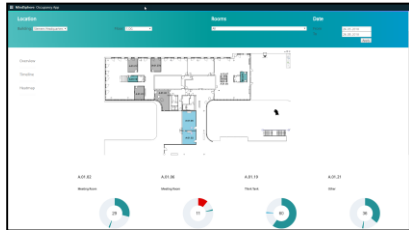
- IoT data integration
- API & SDK to enable you to develop your own applications
- Synchronization of data graphs
- Real-time orchestration of processes and analytics

DLC BIM/2D

- Integrated BIM & 2D Scan Viewer via API
- Visualize, zoom in, measure …
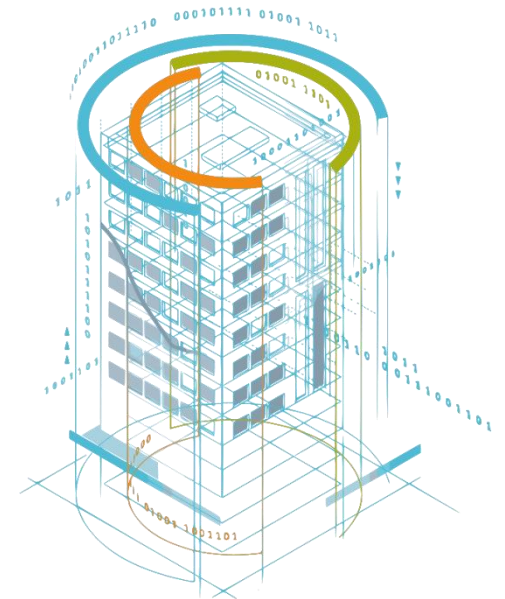- Use your own applications
- Autodesk, Bentley, Nemetschek, NavVis etc…

DLC Drive

- Upload your files
- Share your files
- Manage access rights at each file level
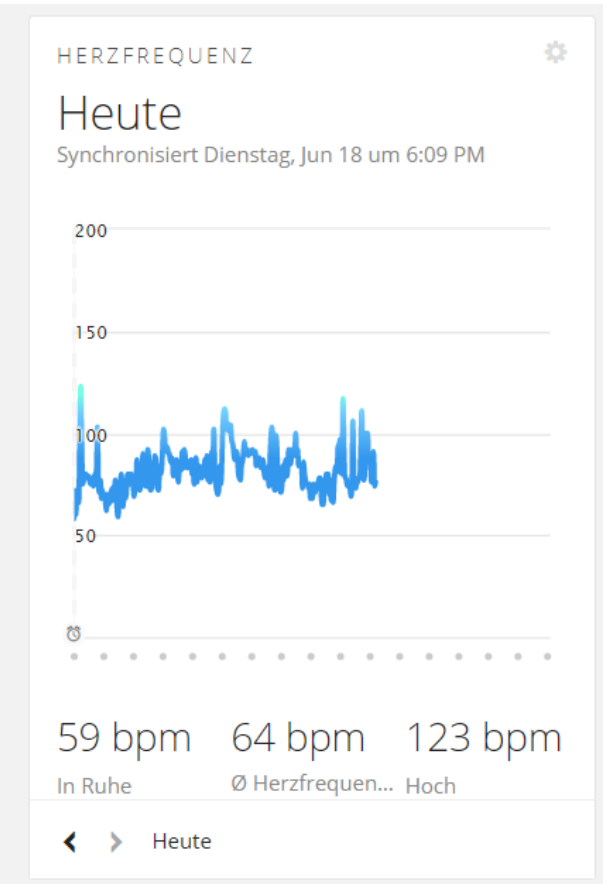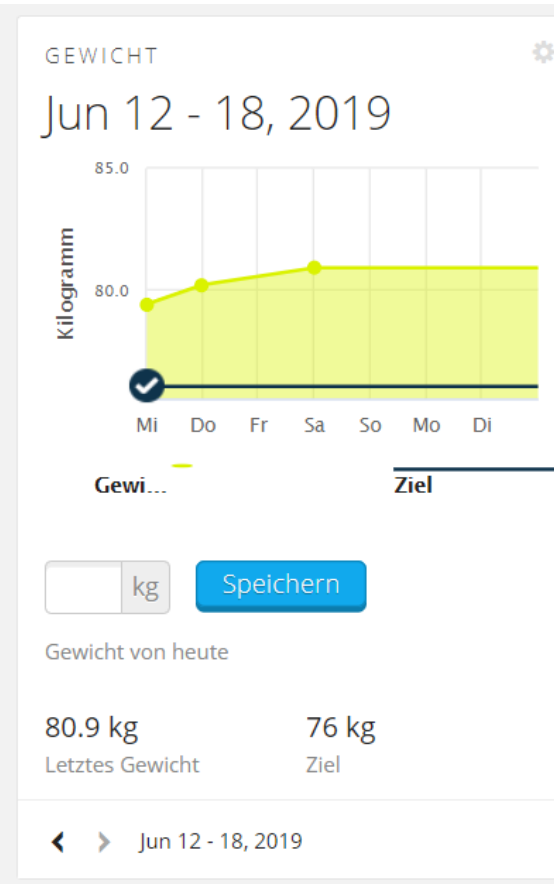
*AEP = application enablement platform

Building Technologies

MindSphere

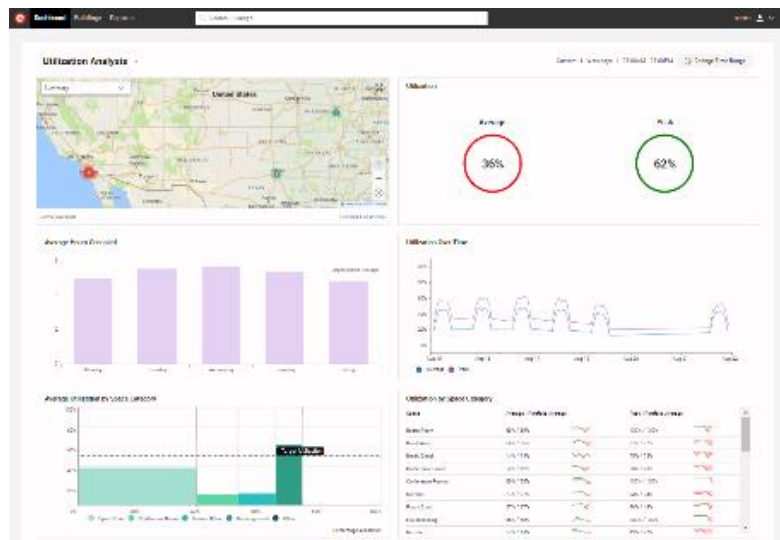# Use data and deliver value – Kevin Bauer
Quicker, slimmer and more relaxed…

Use data and deliver value – Nantes Hospital France
## Increase of building performance, asset value and also user satisfaction

Key Performance Indices

Cooling consumption

Overview

Documentation Data

Performance Data

*L'ingéniosité au service de la vie

4D Reports – Features - Patient room occupancy rate

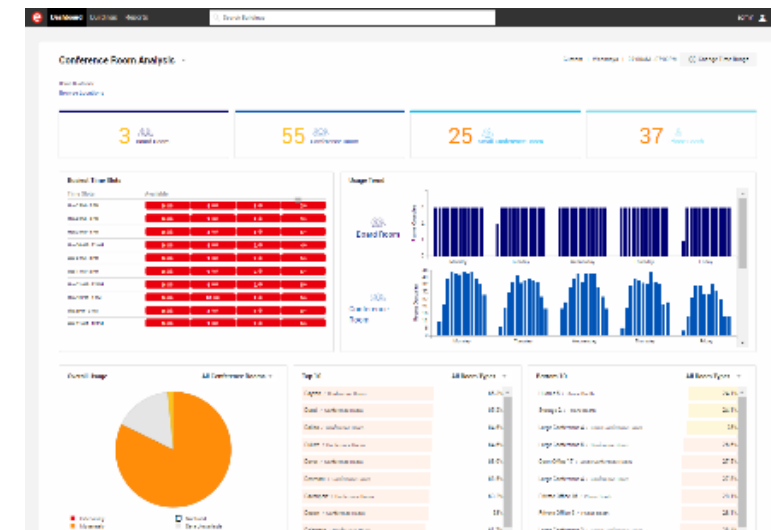# Use data and deliver value – Occupancy & space analytics

Executive Dashboards

Highlight
Key Metrics at
Portfolio, Campus, Bldg levels
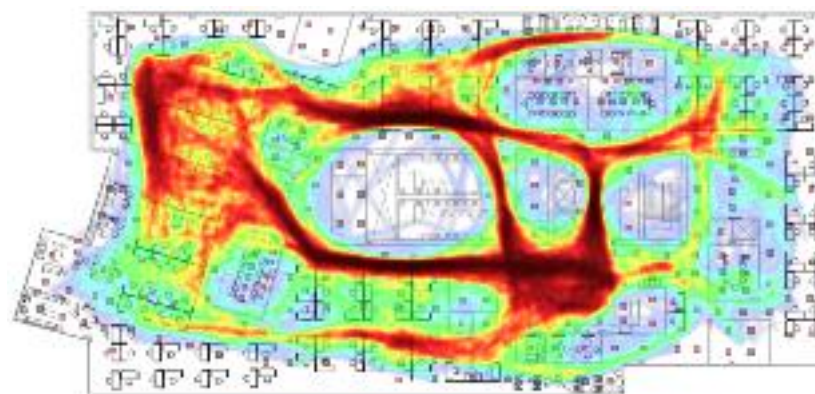
Analyze

Space Utilization, Motion, Occupancy
Per Zone and/or Floor with Visualizations and Reports

Data Driven Actions

Increase CRE Utilization

Optimize Room Usage

Improve Space Design

Facilities Management

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Use data and deliver value – Asset tracking

- Live – Display real-time live view of the organization's asset locations
- Search by location, asset category, and status
- Customize settings to select floors, asset names, geofence areas, and length of the trail
- Geofencing - draw virtual boundaries on the floor map
- Tag, Event and status management

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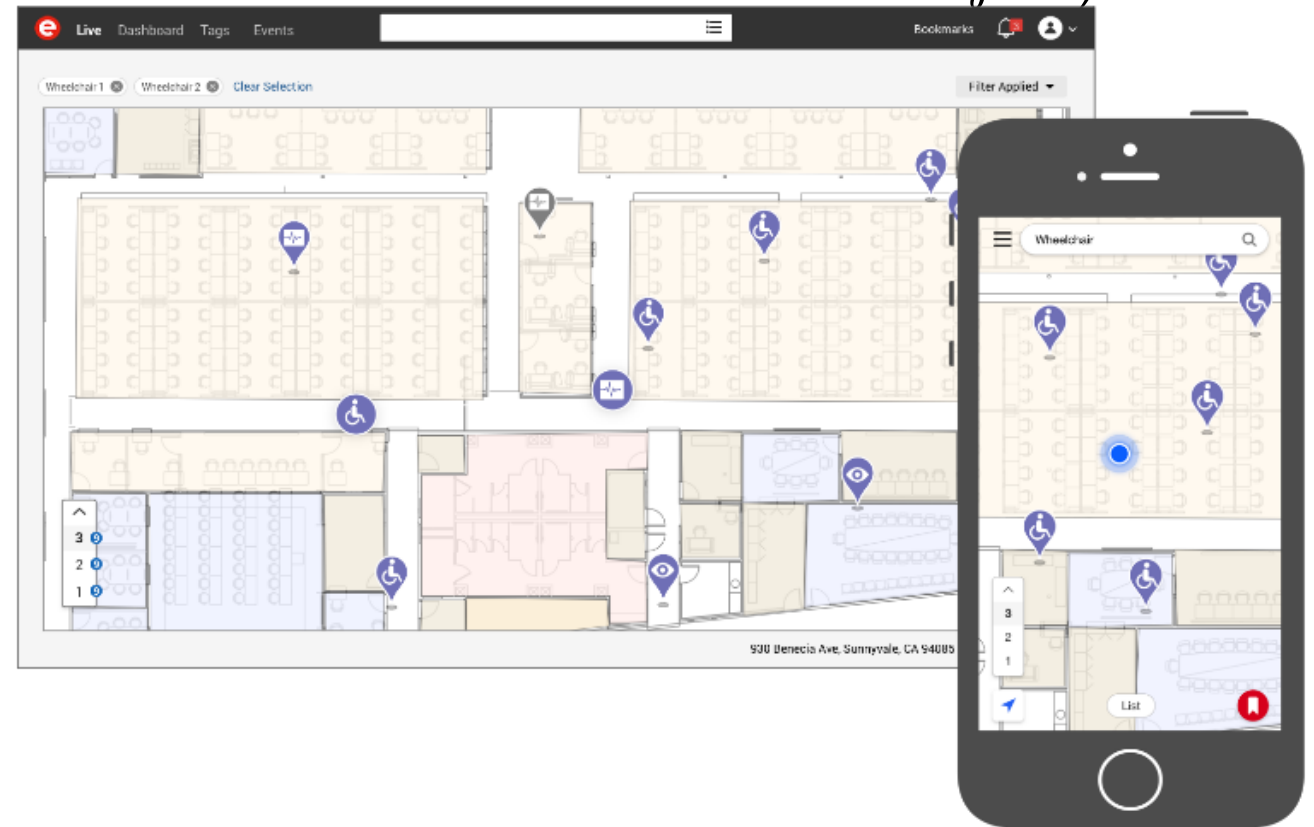
Use data and deliver value
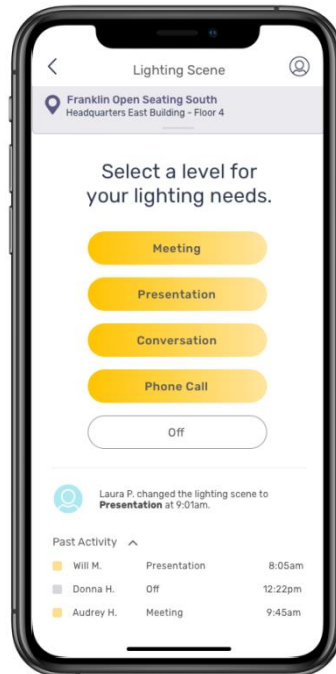# Productivity increase and individual comfort

Temperature

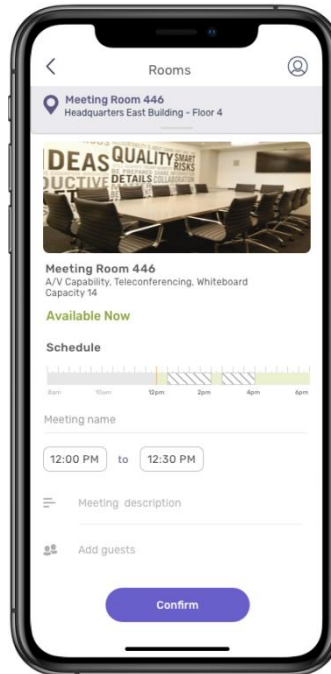Warm or cool workspaces on-demand
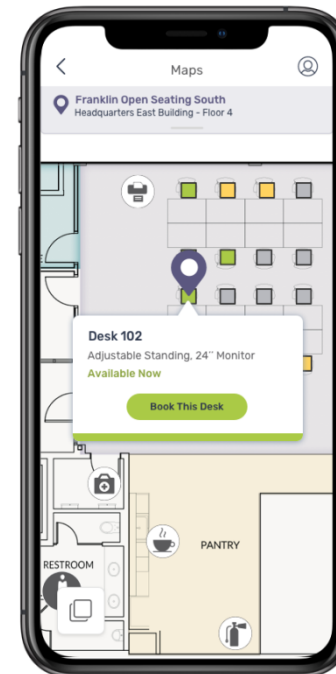
Lighting

Adjust workspace lighting & shading
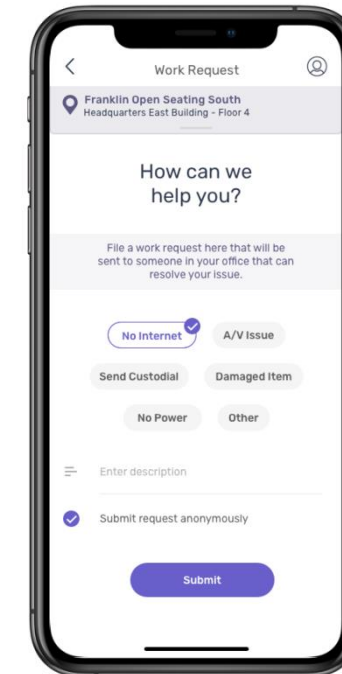
Rooms

Find and book available meeting rooms

Desks

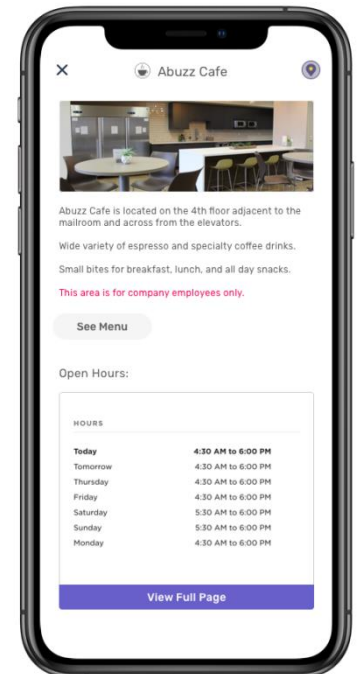Find and book available desks

Work Requests

Submit work requests or flag issues

Amenities

Find nearby amenities

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Combining the Digital Twins with our live data
The Digital Twin becomes the basis of new digital services

Live data of the building technology

Digital Performance Twin

- **Online image of the building is created**

- **Digital Twin becomes "Data Hub"**

- **Integration of different systems**

- **Increase in building performance**

- **New digital services become possible**

Temp. Sensor
AB-02-T074
Room 713

Smoke Detector
AB-02-T078
Room 704

Temp. Sensor
AB-02-T074
Room 702

Temp. Sensor
AB-02-T074
Room 702

Actuator
AB-02-T074
Room 702

Humidity Sensor
AB-02-T074
Room 702

Temp. Sensor
AB-02-T079
Room 712

Charter
of Trust

We are signing
for Cybersecurity

SIEMENS digital twin ecosystem

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Ingenuity for life

Navigator
SIEMENS

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Comfy

DC Hub
SIEMENS

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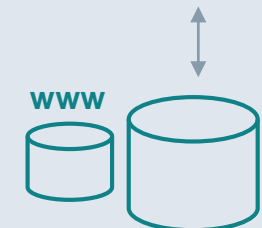
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Digital Lifecycle Core (DLC)

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Connect Data Digital Twin Platform (PaaS)

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Create and collect Data
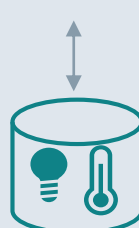
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Solutions (Products & Services)

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Digital Twin

"Scale your asset performance"

Kevin Bauer

Digital Portolio Manager

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