



Data Driven Facilities

Improving Building Performance

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What if a building could tell you when ...

... it will not be able to maintain a safe & compliant environment well before it happens?

... it needs regular maintenance?

... it's energy performance is degrading?

... a major system or component is going to fail well before it does?

The new “black box” ?



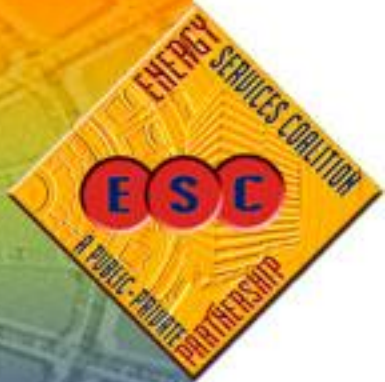
Navigant 2015

Big data in intelligent buildings is defined as:

The next generation in business and operational intelligence derived from the analysis of data integrated across multiple streams or sources for the purposes of overall system understanding, performance, and optimization.

Gartner (www.gartner.com)

The Internet of Things ([IoT](#)) is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.



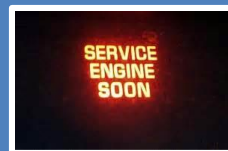
Analytics & Fault Detection Definition

Analytics - The systematic analysis of building performance data over time to improve building performance.

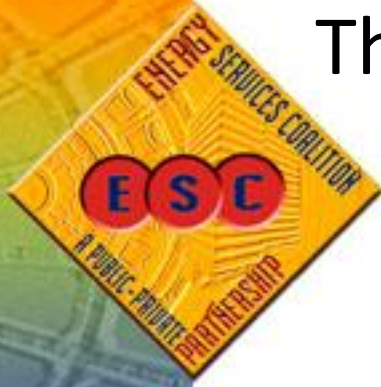
- System reliability and maintenance process
- Energy and sustainability conservation measures.
- Comfort, safety and compliance issues.

Fault Detection & Diagnostics –

A methodology and software toolset for monitoring and applying condition based “rules” to improve building performance.



The Evolution of Data Driven Facilities



Core Functions of a Smart Building

- *Collecting & Communicating* Data
- *Analyzing and Presenting* actionable information.

Control

Integrate

Digitalize

Smart Building Outcomes

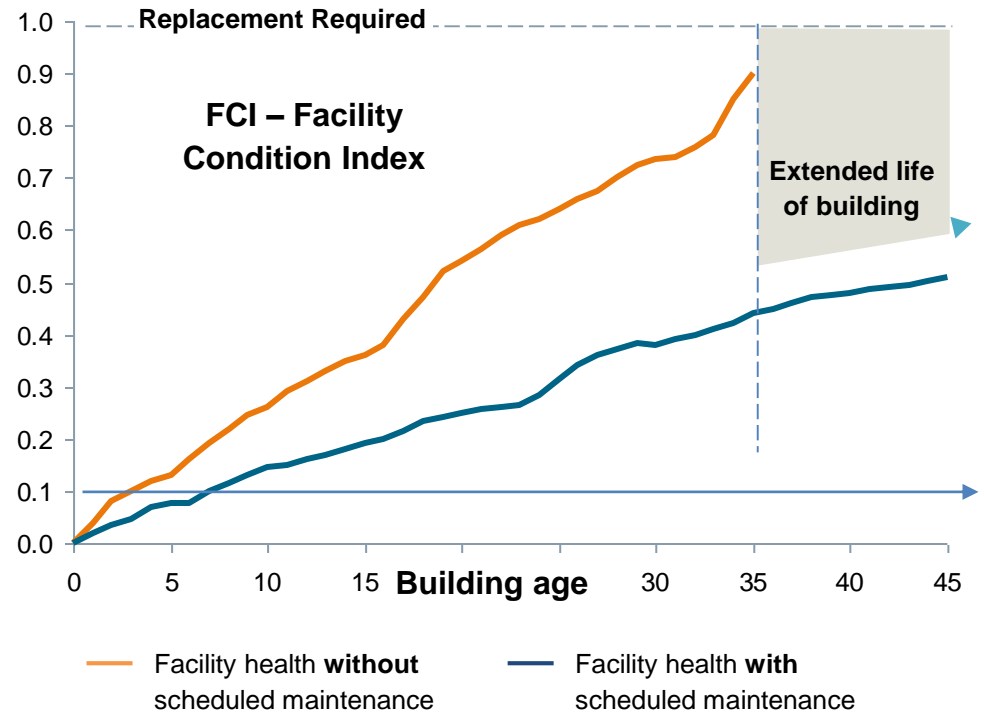
Optimize ... maintenance, operations, energy and sustainability.

Improve ... comfort, safety and compliance, **lifecycle**

Dynamics driving the adoption of Data Driven Facilities



- Demographic changes in the workforce
- Increasing energy & sustainability goals
- Increased complexity of technology in buildings
- Short term financial priorities
- Reactive maintenance culture
- Manual time based PM maintenance culture



$$FCI = \frac{\text{Maintenance, Repair, and Replacement Deficiencies of the Facility(-ies)}}{\text{Current Replacement Value of the Facility(-ies)}^1}$$

1) Source: National Association of College and University Business officers

Using Data to Mature the Maintenance Process



Constant Surprises

Maintain Before Surprised

Use System Data to better plan PMs

Use System data to predict maintenance

An overall systematic balanced approach

Reactive

Preventative Planned

Proactive

Condition (Predictive) Based

Reliability Driven

Asset Optimization

Preemptive Action to optimize reliability, eliminate defects, avoid failure

- Most effective
- Minimizes failures
- Reduce capital
- Saves energy

Analytics and Fault Detection Applications



Mature Maintenance Processes

- Lifecycle Based
- Condition/Predictive based maintenance processes.

Commissioning

- New buildings (Cx)
- Retro & Re (Rx, RCx)
- Monitoring Based (MBx)

Energy & Sustainability Programs

- Initial benchmarking/audit evaluation
- Performance Assurance

Questions?

