INTELLIGENT INFRASTRUCTURE DRIVES BETTER BUSINESS OUTCOMES IN SMART BUILDINGS

September 2018

Greg Cline Research Analyst Manufacturing and Product Innovation & Engineering

ABERDEEN

Facilities management has risen to the top of the operational hierarchy — moving beyond cost control — as users implement intelligent infrastructure to enable the creation of smart buildings. This report explores how Best-in-Class organizations implement intelligent infrastructure, and the benefits they receive for doing so, such as better business outcomes in occupant experience, energy usage, space management, and performance.

The New Role of Facilities Management

Companies are moving away from the notion of facilities management as a set of back-office, day-to-day activities. Instead, they are beginning to see this function as a strategic value driver for specific areas within the organization. Today, facilities and managers are building on their gains by implementing an intelligent infrastructure (see sidebar).

An intelligent infrastructure enables digital applications and services to create a smart building. Whether you are creating a smart building from scratch or retrofitting an existing facility, an intelligent infrastructure is the first step that allows you to begin the digital transformation of the facility. An intelligent infrastructure allows you to collect and analyze data from sources both inside and outside your building.

An intelligent infrastructure is the foundation of a smart building, delivering integrated systems to leverage data- and analytics-driven insight. Implementing the right technology ensures an adaptive building that drives positive business outcomes and creates a competitive advantage. By implementing the right smart building technology, the organization can optimize occupant experiences and leverage building data to gain valuable insights and optimize efficiency. Through the capture and analysis of building data, organizations boost their operational effectiveness and accelerate their ability to adapt to change.

Pressures Driving Firms to Adopt An Intelligent Infrastructure

Numerous pressures are driving managers to install an intelligent infrastructure (Figure 1). These include the need to harness the power of building data to drive better operational efficiency (i.e., maximized return on assets and minimized operating costs). Another critical pressure is the prohibitively high cost of facilities maintenance, which, when

Definition: Intelligent Infrastructure

An intelligent infrastructure consists of three main components:

- IoT / smart devices collect and capture building data.
- An advanced analytics platform mines data and finds hidden value.
- An Integrated building management system (IBMS) provides centralized command and control.

unaddressed, may drive some to defer necessary maintenance. This all takes place in an environment of increasing regulatory compliance concerns and an aging asset base where facilities managers must optimize facilities management (FM) operations (productivity, services, maintenance, sustainability) and more accurately predict future maintenance needs.

Figure 1: Pressures Driving Facilities Managers



% of Respondents n = 173, Source: Aberdeen, September 2018

As seen throughout Aberdeen research, improving the occupancy experience is the major issue impacting a smart building's competitive advantage. As the highest ranked strategy for effective FM, 67% of Bestin-Class respondents ensure that facilities conditions and appearance is in line with customer and employee needs. The Best-in-Class are 40% more likely than All Others to measure the impact of facilities on workforce productivity. Employees, tenants, and customers want technology to improve their experiences within your building. They decide where they work, spend their money, and devote their time accordingly. Thus, you need an intelligent infrastructure that meets your customers' and building occupants' needs and increasing expectations.

Due to these pressures, there is a need for a well-planned intelligent infrastructure from a provider that has broad expertise, with not only the right technology, but the right people and processes to create a smart building.

Defining the Best-in-Class

To identify best practices in FM and asset performance management, Aberdeen used three key performance indicators (KPIs) to distinguish the Best-in-Class from Industry Average and Laggard organizations: yearover-year (YOY) maintenance cost reduction, operating margin, and overall equipment effectiveness (OEE).

Respondents were divided among three categories based on their aggregate performances in these three metrics: the top 20% (Best-in-Class), the middle 50% (Industry Average), and the bottom 30% (Laggards). Table 1 summarizes the aggregate performance of Best-in-Class, Industry Average, and Laggard organizations.

Table 1: Top Performers Earn Best-in-Class Status

Definition of Maturity Class	Mean Class Performance
Best-in-Class Top 20% of aggregate performance scorers	11% maintenance cost reduction, YOY14% operating margin outperformance against plan90% OEE
Industry Average Middle 50% of aggregate performance scorers	5% maintenance cost reduction, YOY 6% operating margin outperformance against plan 84% OEE
Laggard Bottom 30% of aggregate performance scorers	0% maintenance cost reduction, YOY4% operating margin outperformance against plan70% OEE

Source: Aberdeen, September 2018

Best-in-Class firms achieve superior results, garnering an 11% reduction in maintenance costs over the past year, 3.7x better than All Others. They also realize higher performance results in financial metrics by outperforming operating margin plans by 14%. Finally, they do very well in internal metrics by effectively utilizing assets (90% OEE).

Looking at it another way, Best-in-Class firms do much better than Laggards, earning higher performance results in all three metrics by The Aberdeen maturity class framework identifies three groups of survey respondents. The data determines overall company performance, based on self-reported performance across several key metrics. Each respondent falls into one of three categories:

- Best-in-Class: Top 20% of respondents based on performance
- Industry Average: Middle 50% of respondents based on performance
- Laggard: Bottom 30% of respondents based on performance

Sometimes we use a fourth category, All Others, which is a combination of Industry Average and Laggard.

delivering more than 11x better YOY maintenance cost reduction, 3.5x better operating margin outperformance against plan, and 29% better OEE.

Clearly, the Best-in-Class enjoy significantly better performance through FM best practices. However, the key to better understanding this benchmark report is to determine just how the Best-in-Class achieve these results via an intelligent infrastructure.

Best-in-Class Planning for Smart Buildings

Best-in-Class firms follow a four-step process that incorporates best practices in planning, implementation, and utilization (Figure 2).

Figure 2: Capabilities for Smart Buildings



[%] of Respondents n = 173, Source: Aberdeen, September 2018

- 1. The Best-in-Class are defining business objectives and KPIs; 53% are standardizing operational KPIs across the enterprise.
- Using these defined objectives and KPIs to prioritize core building systems, Best-in-Class firms then implement an intelligent infrastructure that connects to a variety of building systems and collects data from each via IoT / smart devices. This is the lynchpin of the smart building, and 70% cite this convergence of information technology (IT) and operational technology (OT, which includes IoT) as a key capability.
- 3. Next, the Best-in-Class implement an advanced analytics platform that enables ongoing monitoring of systems so experts can analyze data and create meaningful reports and actionable insights; 57%

say that analytics are used to provide predictive insights based on information captured from IoT / smart devices.

4. Finally, Best-in-Class organizations use an integrated building management system (IBMS) to simplify technology integration, connecting building and business systems. The IBMS is the command and control hub for the smart building, and 57% say they leverage the IBMS for actionable intelligence for optimized decision making.

Together, these four steps enable facilities managers to leverage data to intelligently run their smart buildings. However, to do that, they must install the right intelligent infrastructure; let's examine this in greater detail.

How They Do It: Best-in-Class Enablers for Smart Buildings

Best-in-Class organizations report why they are implementing smart building technology (Figure 3).

Figure 3: Why Best-in-Class Implement a Smart Building



In partnership with their technology provider, Best-in-Class organizations implement an intelligent infrastructure consisting of three main components: IoT / smart devices, an advanced analytics platform, and an IBMS.

IoT / smart devices: The initial step in outfitting a new or existing building with the right infrastructure is to understand customer goals and to identify the right data that will create value for customers and help them achieve their goals. Best-in-Class firms work with the right technology partner to identify and connect their facility's most critical core systems via IoT/smart devices. (Figure 4).

Figure 4: Core Building Systems

FIRE: Fire alarm panels Smoke detectors

SECURITY: Card readers Cameras Intrusion detectors Access management controllers

ENERGY: Electric, gas, heating

LIFTS: Elevators



LIGHTING

COMMUNICATIONS: Communications systems Operators station

HVAC: Heating units Cooling coils Air filters Air handling unit controllers Zone control units Fans Diffusers Thermostats

Source: Aberdeen, September 2018

Based on specific KPIs / goals and the information needed to meet them, the technology partner applies their digital expertise to evaluate current supporting infrastructure and analytics readiness. Via this comprehensive approach, they develop a technology roadmap that meets current needs and future needs for years to come.

It takes the right IoT / smart devices to pull the correct data from your critical building systems and equipment. A smart building provider knows how to access the correct data and turn it into information that improves decision making. The provider also knows what infrastructure needs to be in place to obtain it. After their evaluation, the provider assesses and recommends current or new intelligent infrastructure elements, (e.g., sensors, meters, actuators, card readers, fire pull stations,) to collect data from critical assets.

Throughout the technology planning process, the smart building provider guides the facility manager as they select and install the right technology to enable their building's infrastructure to connect and capture data. For example, the Best-in-Class are 30% more likely to cite heating, ventilation, and air conditioning (HVAC) systems as the most requested facilities job or work order completed by their organization. In that case,

installing IoT / smart devices to address that issue may be strongly indicated.

Advanced analytics platform: An advanced analytics platform mines data and finds hidden value. It provides powerful analytical and reporting capabilities that continuously translate building data into actionable information. It also imparts visibility into the long-term performance of the facilities and infrastructure. Best-in-Class organizations are almost 3x more likely than All Others to implement an advanced analytics platform (Figure 5).

Industrial IoT Platform to enable industrial scale Industrial IoT Platform to collect device data 11%

Figure 5: Best-in-Class Implement an Advanced Analytics Platform

% of Respondents n = 173, Source: Aberdeen, September 2018

Analytics and IoT can improve core systems (e.g., HVAC, lighting, elevators, fire, security). These systems can all be monitored for performance and peak efficiency as well as to predict maintenance issues before they happen. All of this is very attractive to the Best-in-Class; they are 33% more likely than All Others to improve asset visibility and decision making through analytics.

Integrated building management system: The IBMS provides command, control, and visibility; it reduces costs by simplifying technology integration between OT and IT (i.e., building systems such as automation, fire, security, lighting **and** business systems such as scheduling, space management, asset management).

Melding OT and IT provides numerous benefits in the form of better business outcomes:

- Better occupant experience via a more proactive service model. Promoting well-being via a better occupancy experience is vital in today's hotly competitive market. A smart building allows managers to utilize data more intelligently for more proactive FM and greater competitive advantage. For example, sensing repetitive conference room usage allows management to proactively pre-cool a conference room susceptible to overheating. As another example, security systems can be monitored to identify any potential risks in a high-traffic side door of the building. The Best-in-Class are 2x as likely to proactively develop new services tied to facility usage and performance, which leads to a better occupant experience.
- Better energy usage. Optimizing the environmental controls of plants, facilities, and office buildings is a distinct advantage of smart buildings. IBMS connects with environmental controls to provide a more granular view of how natural resources and energy are being used. This promotes energy and asset efficiency; Bestin-Class FM practices lower energy costs by an average of 10%.

Improved resource tracking for smart space managment. Building space is often underutilized. Smart building technology enables companies to create a user-centric building experience by optimizing space more efficiently. Providing a reservation system to eliminate inefficiencies associated with conflicts in common-use space improves worker productivity and employee satisfaction. Better space management is also within reach. Newer features allow companies to detect previously unrecognized usage patterns to better predict the needs for space and amenities (e.g., rooms, whiteboards). These insights can be shared with building maintenance and office managers for further improvements. Aberdeen research shows that 40% of the Best-in-Class use spatial technologies in FM. The Best-in-Class adoption rate of spatial technologies is 1.5x that of All Others.

Better maintenance. Outfitting equipment with sensors results in enhanced diagnostic information for more relevant service resolution. Advanced analytics can also aid in preventative and prescriptive maintenance. When human intervention is not necessary, the ability to conduct repairs remotely is still the holy grail of FM advances. Aberdeen finds that Best-in-Class FM practices lower maintenance costs by an average of 14%, and these firms have 9% better unplanned downtime.

In addition, the Best-in-Class fully expect that IoT-enabled smart buildings will contribute to their bottom line in the form of insights that deliver increased facility performance as well as new building services they will develop based on these insights.

Best-in-Class Outcomes in Facilites Management

Best-in-Class companies are pursuing a better strategic path than All Others, and have achieved superior FM results compared to All Others (Figure 6).

Figure 6: Facilities Management Metrics, YOY Change



n=173, Source: Aberdeen, September 2018

The Best-in-Class's **total** YOY cost reduction for FM costs, compliancerelated costs, facilities energy costs, and unplanned downtime speaks for itself.

Summary

Facilities management has evolved beyond cost control to become a strategic value driver for specific areas within the organization. Best-in-Class facilities managers are building on this change. By outfitting their new and existing buildings with an intelligent infrastructure, they create a highly competitive smart building, which delivers a superior occupancy experience that is comfortable and safe while driving higher energy and asset efficiency. In addition, the smart building created is both space- and user-efficient.

An intelligent infrastructure's transformative role embodies the sprit and definition of digitalization:

- It collects, integrates, and elevates core building systems data to enterprise-level visibility, for real-time reporting and management, utilization of operations, energy, and occupant comfort.
- It provides actionable information regarding the performance of building systems and facilities.
- It proactively monitors and detects errors or deficiencies in building systems.

The Best-in-Class accomplish this in partnership with their technology partner, whose comprehensive approach begins with defined KPIs and business goals. These KPIs / goals lead to a technology roadmap that not only meets current needs but future-proofs the smart building for years to come. The result is better business outcomes: a better occupant experience, better energy usage, smart space management, and improved performance.

Related Research

Digital Services Transform Smart Building Data into Actionable Insights; September 2018

Facilities Management: Smart Buildings Combine IoT and Analytics for Operational Excellence; November 2017

Smart Buildings: Combining IoT and Analytics To Improve Facilities Management Operations; July 2015

IoT and Analytics: Better Manufacturing Decisions in the Era of Industry 4.0; August 2017

About Aberdeen Group

Since 1988, Aberdeen Group has published research that helps businesses worldwide to improve their performance. Our analysts derive fact-based, vendor-neutral insights from a proprietary analytical framework, which identifies Best-in-Class organizations from primary research conducted with industry practitioners. The resulting research content is used by hundreds of thousands of business professionals to drive smarter decision-making and improve business strategies. Aberdeen Group is headquartered in Waltham, Massachusetts, USA.

This document is the result of primary research performed by Aberdeen Group and represents the best analysis available at the time of publication. Unless otherwise noted, the entire contents of this publication are copyrighted by Aberdeen Group and may not be reproduced, distributed, archived, or transmitted in any form or by any means without prior written consent by Aberdeen Group.