



# The Smartness Of Smart Buildings

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## Introduction (What)

Buildings play a major role in our life. They provide shelter, temperature control, and safety. Buildings are evolving, getting digital, and turning smart. This has opened newer dimensions to maximize efficiency and improve productivity. The advances in software and IoT technology have enabled us to convert existing structures into smart buildings with agility and within timely budgets.

Smart buildings are Structures that use automation to control operations like heating, lighting, security amongst others. A smart building uses sensors to collect data and manage it according to a business' functions and services. This helps facility managers improve the building's reliability, and performance and reduce energy usage and optimize how space is used, and completely enhance the user's experience. The remainder of this paper focuses on how Persistent Systems can help you make your existing structures smart with a software-driven approach.



## Why Smart buildings

Smart buildings can give the confidence to reopen buildings in this current COVID pandemic. With features like Contactless arrival and departure. Can also assist in running on changed capacities and following new norms, From physical distancing and space optimization.

People spend most of their time in buildings, around 90% of it. The Why of Smart buildings is obvious.

From cutting the time a visitor spends in finding a parking spot, to improving the experience at the arrival gate with features to welcome and print visitors pass. Securely capturing the user information and helping him way find the office he wants to go to. Users can locate food stalls and food truck availability, check menu available in different cafes and also book cabs, interoffice shuttles to commute. Crowd tracking and indicators can help maintain social distancing.

To the facility managers, smart buildings can help manage, lighting, and temperature in an energy-efficient way and also help track people count which can help in an eventuality like fire or emergency. All this can help facility managers make the buildings more comfortable, safe, productive, efficient, energy-efficient, and secure while maintaining the business focus. The operational efficiency focus along with people-centric features can improve the productivity of all building occupants and enhance their experience.

The why of Smart buildings is obvious. A software-driven agile development approach loosely coupled with hardware and Azure services like digital twin can help kick start a journey to turn your existing structures smart.



**Software  
Driven Focus  
with Cloud  
Enabled IOT  
Platforms  
will Enable  
your Existing  
Structures  
Turn Smart**

## Smart Services Tech Deep dive (The How)

Decoupling hardware from Software along with cloud base IOT services can help you build smarter services that can make most operations of building smart. For illustration purposes, three such services are explained in this paper.

The centrally controlled dashboard can help you illuminate your entire building from a desktop or mobile app. This can help track faulty lights, initiate maintenance, and more. For the software development to start you could use Azure digital twin to mimic the infrastructure while software services care being built. Many services can also run as programs on Kiosks but can read data filled by the sensors in central databases

Access card readers capturing arrival and departure data. A Dashboard built over this can help cafes plan the food need for the day.

Smart lifts, fire extinguishers, fire panels, cameras, vents generate a lot of data. Gathering it in a Central application and help us learn and gather actionable insights which can help predict false alarms, detect faults, initiate maintenance, Conserve energy and maximize savings.

The services can be made independent of one another and rolled out incrementally. Some services can be made to run on commodity hardware like a Kiosk

We have explained few services below which can be easily build for starters.



### Arrival

Kiosk based service that allows visitors to print visitor pass. Key in meeting information and Authenticate themselves. This is a simple service that connects to IoT database and can be built with simple integrations



### Departure

A kiosk-based service that help visitors find shuttle service, book cabs, find cafes nearby. Here too the service just needs a simple connection to the IOT database and can work on integrated systems. Incrementally more features can be added to this



### People Counting

A must feature in this era. Keeps count of all the visitors/occupants. Helps in many operations like cafeteria planning

# Services & Benefits

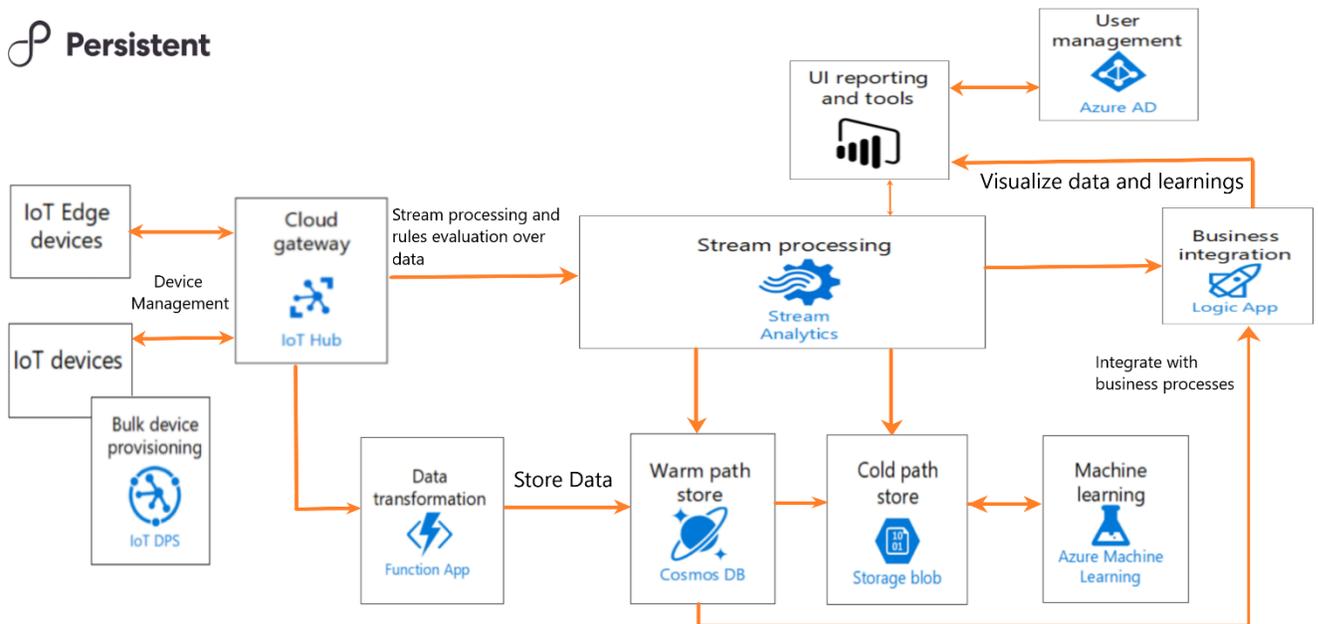
Service	Service details	Benefits
Arrival	<p>Airport like arrival experience for all guests.</p> <p>Once authenticated with QR code and pin the visitor gets a welcome kit with Wi-Fi password, and the dispenser also dispenses an access card with instructions</p> <p>The system is tied to the central attendance system of the building to track presence</p>	<ul style="list-style-type: none"> <li>• Airport like arrival experience</li> <li>• 50% reduction in time taken</li> <li>• 50% reduction in security overhead</li> </ul>
Departure system	<p>Hotel lobby like systems that help all residents to find, maps, shuttle service, shuttle timings book cabs, find cafes nearby. Return access cards</p>	<ul style="list-style-type: none"> <li>• Security checkpoint</li> <li>• 50% reduction in time taken</li> <li>• 50% reduction in security overhead</li> </ul>
Wayfinding	<p>Helps users find way from point a to point b within campus</p>	<ul style="list-style-type: none"> <li>• Huge saving in time and productivity</li> </ul>
People counting	<p>Help get accurate count of people in building</p>	<ul style="list-style-type: none"> <li>• Helps in security</li> <li>• Food planning</li> </ul>
Lighting control	<p>Central dashboard to check lighting in entire premises and centrally control the same</p> <p>Turn</p>	<ul style="list-style-type: none"> <li>• Huge improvement in operations</li> <li>• Power saving</li> <li>• Cron based control on timings</li> </ul>
AC Control	<p>Central dashboard to check air-conditioning and temperature in entire premises and centrally control the same</p>	<ul style="list-style-type: none"> <li>• Huge improvement in operations</li> <li>• Power saving</li> </ul>
Video analytics	<p>The use of sensors and cameras provides precise data on how the building is being used, which can be converted into insightful decision making. Space utilization can be improved based on actual data, as the building generates actionable, living intelligence automatically.</p>	<ul style="list-style-type: none"> <li>• Building analytics</li> <li>• New feature design</li> <li>• Personal requirements tracking</li> </ul>

# Reference Architecture

How to get started is one question that can overwhelm our customers. For starters Persistent has designed a simple questionnaire that determines the current smartness of the buildings. The Questionnaire also includes aspirational questions which determines the customers' needs. The response help Persistent team determine a delta and come up with a backlog of features and services to be developed.

Persistent proposes an architecture on below lines where services are not tightly coupled and Azure digital twin is used wherever needed.

A mobile and web app which acts as endpoints for customers and facility managers which can run on individual devices or kiosks. An API layer which connects with Facility management APIs and learns from the telemetry and provides the info which help a ML layer which classifies, regresses and give actionable insights.



# Conclusion

Moving towards Smart buildings is no longer the question. It is like building a website in the 90s or Building the mobile app in 2010. It is a must and rather than spending huge Capex and one-time investment. Customers can experiment and incrementally make the existing structures Smart in agile and software driven approach. We at Persistent, as a partner who understands your business and with Over 10+ years of IOT expertise have built accelerators, to implement seamless Smart migration projects to address business continuity requirements.

We hope to leverage the experience and skills in first helping you in evaluating & choosing suitable alternate IoT platform, and then designing services that completely tailor made to your needs

## Get in Touch

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### About Persistent Systems

Persistent Systems (BSE & NSE: PERSISTENT) builds software that drives our customers' business; enterprises and software product companies with software at the core of their digital transformation. For more information, please visit: [www.persistent.com](http://www.persistent.com)

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