



## ATTRACT TALENT AND CONSERVE RESOURCES WITH SMART SPACES

Companies can use data from millions of connected objects and sensors to create Smart Spaces such as buildings or campuses that are more efficient, sustainable, and comfortable. Smart Spaces enable companies to attract and retain talent while delivering substantial cost savings. In a world competing for talent and conserving finite resources, Smart Spaces offer the promise to realize the potential of the digital age for the betterment of people, profit, and planet.

## Attract talent and conserve resources with Smart Spaces

Where the physical and digital worlds merge, Smart Spaces come to life.

In these Smart Spaces, humans and technological systems interact within connected, coordinated, increasingly open, intelligent, and sustainable ecosystems.

Smart Spaces can occur at many different scales. A vehicle can be a Smart Space. Or a Smart Space could take the form of a building, a corporate or university campus, a neighborhood, or even an entire city.

Beyond the hype, the challenge – and the opportunity – is how to convert these intelligent, human-friendly environments into spaces that deliver measurable value for each stakeholder group.

## Smart Spaces depend on data to transform built environments

All functional Smart Spaces have a three-tiered structure:

- At the base level, a technical foundation enables data collection to monitor the performance of systems and integrate up to millions of connected objects and sensors.
- At the middle level, organizations analyze the collected data, placing it into business contexts to derive useful insights.
- At the highest level, organizations then take actions based on those insights.

These actions can take many forms. Organizations can act to make their physical spaces more efficient, more sustainable, and more comfortable. They can improve their building systems in ways that lower energy consumption, save water, and reduce waste. They can also use Smart Spaces insights to make their business systems work better, so that the people are more productive and healthier. In certain specialized environments, such as healthcare facilities, Smart Space insights and actions can be used to improve the built environment in ways that fulfill core goals, such as promoting more rapid healing in a patient population.

In taking all these actions, organizations send a strong signal to a wide range of stakeholders including current and future employees, investors, and consumers, that the organization cares about issues like conservation, stewardship, and wellness. These types of actions can generate goodwill, support corporate missions, and reinforce value propositions.

## Bringing Smart Spaces to life

For years, the concept of smart cities has generated plenty of buzz.

But practically speaking, Smart Spaces will be built first at more manageable scales encompassing individual buildings, corporate campuses, perhaps up to the neighborhood scale.

Smart Spaces open a world of possibilities. Suppose that a major hospital decided to implement Smart Space technologies and investigated how digital systems could interface with its physical infrastructure. By analyzing data from a network of sensors, that hospital might uncover insights that help it do a better job of managing climate and lighting systems, thus making the physical environment more comfortable for employees and patients alike. By becoming a Smart Space, the hospital could improve efficiency, conserve resources, reduce utility costs — all while dramatically improving the way that people experience its spaces.

“Smart Space can help boost efficiency, lower utility expenses and optimize use of resources.”

As this hypothetical hospital dove deeper into the full potential of Smart Spaces, it would find opportunities to combine technology, data, and the built environment to advance its core mission of preserving life and promoting health.

## Smart Spaces save energy – and money

Smart Spaces offer companies and governmental organizations opportunities to achieve massive improvements in efficiency, which can translate into 25-30% reductions in energy usage.

Commercial buildings use massive amounts of energy. In the United States, commercial buildings account for more than a third of all electricity consumption, which adds up to more than \$190 billion in energy costs every year<sup>1</sup>. By the year 2025, [buildings will be the top energy consumers](#).

Right now, up to 50% of the energy and water in buildings often goes to waste. That means companies have vast opportunities to improve their resource efficiency and reap cost savings by implementing Smart Spaces solutions.

## Smart Spaces attract talent

Smart Spaces provide information that companies need to make their built environments more comfortable, safer, secure, and productive. All of these improvements help organizations stay competitive in attracting and retaining highly valued employees.

The millennial generation will constitute [at least half the workforce by 2020](#). 63% of Millennials say they want to work for companies that offer personalized work experience and flexible work environment — just the sort of qualities that Smart Space technology can enable.

Millennials are not just looking for comfort. Many of them also want to work someplace where they can embrace the values of their employer and feel proud of its commitment to sustainability. According to a recent survey by [Swytch](#), nearly 40% of millennials have accepted one job offer over another because that company was sustainable. The same survey found that nearly 70% of all respondents across generational lines agreed that a strong sustainability plan would affect their decision to stay with a company long term. Smart Spaces can help companies prove their commitment to the sustainable ethos that an increasing number of workers expect from an employer.

“About 40% millennials prefer a sustainable work environment, and Smart Spaces offer just that!”



# Smart Space implementation – six keys to success

Pioneers have been striving to implement Smart Space solutions for decades, but until recently the technology was not available or cost-effective.

Now organizations finally have access to all the tools they need to make Smart Spaces a reality – affordable and sophisticated sensors, cloud computing and storage, and fast wireless data transfer are finally enabling Smart Spaces to become a reality.

As a result, Smart Spaces will have an impact on every industry and every sector over the next five years.

That said, not every Smart Space implementation project will be equally successful. To avoid pitfalls and get the most value from Smart Spaces, organizations should follow these six guidelines:

1

## Don't try to go it alone

Creating a successful Smart Space can require expertise in construction,

IT, DevOps, project management, data science, sensors, IoT, cloud and edge computing, AR/VR (augmented reality/virtual reality), blockchain, 5G networks, open standard architecture, and next-generation power systems. No single company can realistically claim to have masterful command of all these fields. To achieve the full potential of Smart Spaces, organizations need to assemble an ecosystem of highly skilled specialists.

3

## Leverage Digital Twin capabilities

Infosys uses Digital Twin platforms to create real-time, interactive models that capture every piece of data across an entire building lifecycle.

The Digital Twin approach collects vast amounts of data and applies modeling and analytics to maximize key performance metrics such as efficiency, sustainability, and user experience. The Digital Twin provides a unified portal to view all opportunities, revealing powerful insights that help organizations develop Smart Spaces that have higher efficiency, better compliance, and improved standards of building construction and operation.

5

## Define the right success metrics

IoT products and sensors make it easy for companies to measure improvements in energy efficiency and sustainability. It can be more of a challenge to develop key performance indicators (KPIs) to track developments in productivity, employee wellness, and user experience.

KPIs for wellness and productivity should be structured using an outcome-based model that tracks both short-term impact and long-term results 10 or 20 years into the future. Infosys' SCALE framework provides guidelines for creating these KPIs and validating them through a mix of proof-of-concept and pilot programs.

2

## Choose a partner with the scale and experience to deliver global solutions

Look for global system integrators with the scale and expertise to orchestrate all phases of a Smart Spaces program, from concept through delivery and operations.

Scale is important, especially for large initiatives like campuses or cities. As an example, Infosys employs 500 systems designers and 16,000 mechanical and system engineers, has more than three decades of experience managing systems for global enterprises, and can call on 10,000 people trained in Smart Spaces solution technologies. Regardless of the partner selected, scale and expertise matter, with systems thinking critical for success.

4

## Find the right partners

These can be complex programs, so look for expertise in DevOps and program management, and adept at working across multiple partners with important niche skills.

As an example, Infosys is collaborating with Microsoft to deliver Smart Buildings & Spaces (SB&S) solutions by leveraging Microsoft's Cloud Services and Infosys' experience design skills, expertise in building connected ecosystems, and global network for innovation hubs.

Together, Microsoft and Infosys will develop SB&S solutions that will increase energy efficiency, optimize space utilization, boost human productivity, and help organizations create differentiated user experiences. Microsoft technologies will support Infosys' proprietary SCALE (Sustainable-Connected-Affordable-Livable-Experiential) framework for smart buildings to optimize the use of resources such as energy, water, and lighting through a combination of human intelligence, predictive analytics, and AI. Infosys and Microsoft are opening an Innovation Lab in Redmond, Washington to develop and co-create new, cross-industry solutions for Smart Buildings & Spaces. There are other potential partner combinations as well – the main thing is to work effectively across complementary skills for the common objective.

6

## Make sure your Smart Spaces are secure

The wireless devices that form the digital foundation for Smart Spaces are connected to corporate networks. These devices provide new points of entry that hackers can exploit. Without proper security for connected devices and sensors, companies could suffer data theft, property damage, invasion of privacy, and financial loss.

Endpoint detection and response (EDR) solutions minimize these risks by enabling companies to quickly detect and resolve problems. Some automated incident response platforms can spot and prevent attacks far faster than humans could intervene. With four international cyberdefense centers, Infosys helps clients around the world gain the benefits of Smart Spaces while controlling the cybersecurity risks.



## Making Infosys spaces smarter at its Mysore campus

The benefits of Smart Spaces have been demonstrated firsthand at the Infosys corporate campus in Mysore, India. From 2007 to 2018, the internal team used Smart Spaces methods to achieve the following results at the campus:



We reduced per capita electricity consumption by 34%.



We lowered per capita water consumption by almost 60%.



We are on track to cut plastic consumption to half by 2020.



We increased the share of renewables in our campus energy mix from 30% to 80%.

All of these milestones were achieved across a sprawling campus covering 350 acres with 120 buildings totaling 12 million square feet. These buildings contain office space for up to 20,000 employees, a food court with seating for 14,000 people, plus housing, training space, and a recreation center.

We implemented Smart Spaces at Mysore using a human-centered design process that relied on numerous sensors combined with real-time user feedback from employees, visitors, and customers. Throughout the process, we maintained our focus on four clear objectives:

- Attract and retain employees.
- Impress current and potential customers.
- Promote sustainable usage of scarce resources, including water and energy.

- Meet and exceed all applicable regulations.

To achieve these objectives, Infosys employed a three-dimensional approach to develop a smart campus:

- We built **smart infrastructure and operations** using an array of elements including smart water metering, irrigation, street lighting systems, visitor management, and surveillance systems.
- We designed a **smart user experience** that included smart cards for access, cashless transactions, smart parking management, and smart store/kiosks. All of these features were deployed to give both employees and visitors a comfortable, convenient experience.
- We prioritized sustainability via **smart environmental design**. Our efforts in this field were recognized when our campus achieved the highest ratings for green design and building standards.

Our success in making the Mysore campus a smart space depended both on technology and human input. We used a combination of sensors and employee feedback to push for continuous improvement. A smart campus depends on data, which in this case was generated by tens of thousands of smart sensors installed in various types of machinery including air handling units (AHUs), energy meters, water meters, turnstiles, and RFID card readers.

All these sensors generate data, which flows into a central, off-site Command Center that can monitor and manage the systems on our Mysore campus remotely. This Command Center applies data analysis to optimize everything from thermal comfort and indoor air quality to energy and water usage.

The benefits of Smart Spaces do not stop at the borders of the Mysore

campus. The Command Center can take lessons learned and best practices from Mysore and apply them remotely to other Infosys facilities, extending the impact of the smart systems and helping Infosys to achieve economies of scale.

Sophisticated digital twin models played an important role in enabling Infosys to optimize systems efficiency on the Mysore campus. For example, we created a Digital Twin of the Mysore chiller plant that monitored various parameters, including water flow rates and temperatures at different stages of the operations. As sensors on the actual chiller plant collected and fed data to the Digital Twin, Infosys engineers could use this information to experiment safely with the Digital Twin, finding the best ways to reduce operating and maintenance costs while consuming less power. They could then apply these findings to the

actual machinery, which allowed them to reduce power consumption at that chiller plant by 46%.

## Low bids rarely lead to Smart Spaces

The contracts, approvals, and bidding processes for infrastructure projects are complex and expensive. As the market evolves, multiple players are pushing the adoption of their standards for smart systems. Due to slim margins in physical engineering and management, contracts often go to the lowest bidder. This path typically does not lead to the creation of successful Smart Spaces.

Companies can overcome these challenges by establishing a network architecture based on partnerships with top technology companies. As an example, Infosys has partnered with Microsoft, JCI, and Qualcomm, along



with smaller rising stars including Willow, Iconics, and RealWear. Anticipating the disruptive power of 5G, we have also established partnerships with AT&T and Verizon.

Smart Spaces projects will succeed based on solid engineering, strong project management, and the integration of complementary technologies, sensors, and systems. This requires partnerships we have forged and relevant, real-world experience like the initiatives at Infosys Mysore. If these prerequisites are in place, Smart Spaces will deliver insights, produce results, and improve both efficiency and human experiences.

## A marathon that begins now

The technologies including sensors, cloud computing, analytics, data storage, and wireless data transfer that enable Smart Spaces are becoming more advanced, more affordable, and more ubiquitous than ever before. As a result, organizations now have unprecedented opportunities to fundamentally rethink how buildings, campuses, neighborhoods, and cities should function.

Organizations that seize these opportunities can reap massive advantages – lower costs, resource savings, more comfortable and enjoyable experiences, higher efficiency, and greater transparency. Those companies that build Smart Spaces can gain a significant edge in the war for talent among employees (especially millennials)

who want highly customizable work environments and appreciate organizations that use resources wisely.

Achieving the full potential of Smart Spaces is a long-term prospect that will take decades to realize. The technologies that power Smart Spaces will no doubt continue to evolve. If the past is a trustworthy guide, the sensors that power Smart Spaces will soon become even smaller, less expensive, and more powerful.

But organizations cannot afford to sit back and wait while others rush ahead. Companies should start developing Smart Spaces strategies and implementing pilot projects now – to build up their own expertise, to establish relationships with companies which can make their Smart Spaces strategy come to life, and to gain the operational benefits that are already achievable with existing technologies.

## References

- <sup>1</sup>. "About the Commercial Buildings Integration Program," Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, <https://www.energy.gov/eere/buildings/about-commercial-buildings-integration-program>. Retrieved on July 27, 2019.

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