

Smarter, Better, Faster: The future of connectivity in homes and buildings



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Introduction

We are embarking on a journey that truly will transform how we live. Connected technologies across industries are creating a reality that we didn't think possible.

The intelligence and automation in the homes and buildings in which we live and work are rapidly evolving. As we adopt these new technologies for simple to complex tasks, we are building datasets and uncharted courses for interactions that are yet to be defined. Connectivity is certainly not new. What is new is the ability to store and consume the massive amounts of data generated and derive meaningful connections, patterns and outcomes. This is where endless data points create infinite possibilities, especially with more connected

devices than people on Earth.

The internet initially enabled the growth of interconnected devices, but now the interconnectivity explosion is redefining the internet itself. The “world-spanning information fabric” known as the Internet-of-Things (IoT) has been predicted by many technology experts to be as – if not more – transformational than the internet itself on the way people live. This will thrust us into technological innovation across a global marketplace.

The new world of ubiquitous connectivity has altered how and where people associate, gather and share information and consume media. Connectivity has created incredible volumes of data.



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Big Data and Datafication

The Advent of Big Data

The rate of growth of data generated and stored has been increasing exponentially, with data volumes more than doubling every eighteen months. Simultaneous advances in computer science, software and systems engineering, networking, sensing and artificial intelligence have made it possible to process large amounts and various types of information. Big Data leverages datafication to create new ways of extracting value.

“What’s ‘big’ in Big Data isn’t necessarily the size of the datasets, it’s the big number of data sources we have, as digital sensors and behavior trackers migrate across the world.”

– QUENTIN HARDY, DEPUTY TECH EDITOR, THE NEW YORK TIMES

“What’s ‘big’ in Big Data isn’t necessarily the size of the datasets, it’s the big number of data sources we have, as digital sensors and behavior trackers migrate across the world,” said Quentin Hardy, the Deputy Tech Editor for *The New York Times*. “As we triangulate information in more ways, we will discover hitherto unknown patterns in nature and society – and pattern-making is the wellspring of new art, science and commerce.”

Acceleration of Innovation via Data-Driven Analytics

“Demand is growing for analytical tools that seamlessly connect to and combine a wide variety of cloud-hosted data sources. Such tools enable businesses to explore and visualize any type of data stored anywhere,” according to Tableau’s whitepaper on [Top 10 Big Data Trends for 2017](#).

These data-driven analytics can accelerate innovation and enhance decision making. An increasing number of companies are crowdsourcing and analyzing data as diverse as behavioral, social media and segmentation to better target customer segments for utility programs. Big Data analytics makes it possible for utilities to create customized services and energy efficiency product offerings for all customer segments. For example, a utility can leverage Big Data to understand empty nesters or early adopters and target program messaging specific to that customer segment. Knowing usage data and the age of the home can also give insight to utilities to target certain customers for equipment upgrades or energy efficiency programs.

The amount of data can be overwhelming, but understanding how to use it is extremely beneficial to any utility.



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Honeywell Connected Utility

RESHAPING THE WAY THE WORLD USES ENERGY

Across connected homes, buildings, utilities and cities; data, analytics, machine learning and artificial intelligence are enabling a reality that will change how we live.

Honeywell Smart Energy offers solutions and services to enable utilities and energy service providers globally to harness the power of data across advanced grid automation and management technologies that transform operations, reliability and environmental sustainability, while also providing solutions to engage customers in a more meaningful way.

The Power of Connected technologies from Honeywell includes a robust data platform, open architecture and intelligent sensors driving an expanded vision for smart energy solutions and industry leadership, leading utilities into the future.



SMART HOME

SMART BUILDING

SMART UTILITY

SMART CITY

SMART ENERGY

Connectivity in the Home

The Importance of the Home

The home is a central structure in our everyday lives that offers not only physical comfort and safety, but provides us with a sense of stability and belonging. The concept of a connected or smart home has been around for some years and has a variety of definitions, though is referred to here as a home in which household appliances and services are enhanced by internet connectivity. We have just uncovered the tip of what the connected home can do for Big Data and enhancing the analytical power of machine learning and automation.

When household appliances and devices are interconnected and used across multiple applications or systems, their value is significantly increased.

Connected homes contribute to the widespread deployment of communicating equipment and devices that help inform decisions, enhance comfort and enable delivery of new services and products that cater to the “Four Cs”: control, comfort, convenience and cost. When household appliances and devices are interconnected, and used across multiple applications or systems, their value is significantly increased.

The new age of behavioral and disaggregated data opens possibilities of programs for utilities, not even conceptualized yet. New solutions provide alerts, ease of maintenance, self-healing and automation. Using

data to understand when an appliance has unusual run time can provide early visibility to issues or concerns. With connected devices, consumers can easily manage their homes on mobile devices when home or away. The genius of the connected home is that it makes it possible for consumers to customize their experiences and control how they interact with their environment.

Drivers Behind the Connected Home

A pervasive network of interconnected “smart” devices provides information about our daily activities. Smart home appliances, wearables, digital health devices, robots, 3D printers, entertainment systems, car electronics and other sensors and trackers are creating previously unimaginable possibilities. A smart watch can alert your family of your estimated arrival time. A smart plate can identify exactly what food is on it and calculate how many calories you will be consuming.

Home security, energy management, domestic chores, entertainment, and even health monitoring will be seamlessly integrated into our daily lives. The combination of technological advances, the widespread availability of smartphones, and data-driven innovation is enabling connected home services. Enhanced control, improved security, interest in advanced technology and the ability to streamline and simplify the “stuff of daily life” are critical drivers for the adoption and usage of connected or automated home services.

Data Security and Consumer Privacy

In the wake of numerous high-profile data breaches, concerns over data security and consumer privacy have



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been described as potential barriers for the future of Big Data. As Big Data rapidly expands into new fields and economic sectors, traditional security mechanisms tailored to securing small-scale, static data on firewalled and semi-isolated networks are becoming increasingly inadequate. Big Data introduces new challenges which are multiplied because of the high volume and velocity of data, diverse streaming input sources and massive-scale cloud infrastructure.

It is thus vital that businesses embracing Big Data also strive to implement next-generation data security solutions. Robust security features which address data confidentiality and integrity, and verify the authenticity of the data producer, should always be included in the design of Big Data platforms.

Connectivity Today and Tomorrow

The number and diversity of connected devices is proliferating, many of which are equipped with embedded intelligence or onboard computing capabilities, including appliances, televisions, thermostats, lights, locks, phones and computers in the built environment. The core value of connected household appliances and smart devices does not reside in the objects themselves, but in the service they provide. These services are not rendered by the object themselves, but by the backend intelligence that is built into the processing and analytics logic by the vendor.

For example, a smart thermostat periodically measures room temperatures and shares the information with a cloud-based backend intelligence service. The

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backend service combines information about the room temperature, weather service data, humidity and the daily routines of family members to optimize the furnace or air conditioning settings accordingly so the room temperature feels just right. Bringing connectivity into the home is creating new ways for consumers to customize how they interact with their living spaces and facilitating more efficient and effective ways of addressing the needs of new and long-time homeowners.



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Beyond Motion Lighting: How Connectivity is Bringing Buildings to Life

It has often been said that a building's value was a function of three factors: location, location and location. While a building's proximity to customers, employees or suppliers still affects the building's value, location is rapidly losing the monopoly it once had on real estate valuations. Now, data-driven building applications enabled by connectivity are affecting real estate prices



as much as location. Building connectivity coupled with information-based applications is massively improving the efficiency of building operations while also moving the needle on the comfort, safety and productivity of building occupants and even providing new opportunities for generating revenue.

Bridging the Gap Between Energy Efficiency and Demand Response

In the past, the lack of ubiquitous connectivity in buildings made holistic approaches to managing energy efficiency (EE) and demand response (DR) programs impractical and expensive. Despite the potential benefits of integrating demand side management programs, EE and DR developed into institutional silos that pursued energy savings and revenue generation opportunities separately. The dramatic growth of connected devices in recent years has effectively eliminated the barriers to the integration of demand side management programs.

Integrated Demand Side Management (IDSMS) creates new energy savings opportunities, provides for more effective consumer engagement and increases efficiency in operations. IDSMS also streamlines development and management of large DSM portfolios by leveraging greater access to customer data and using more effective tools for consumer engagement. IDSMS represents the long-anticipated fusion of EE and DR programs. It is enabling a step change in how buildings participate in energy supply and demand. IDSMS is making it possible for utility customers to take an increasingly active role in managing both their energy production and consumption.



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Customizing the Building Owner Experience

Building automation can prove to be very beneficial and cost effective. Software and analytics platforms that leverage data from across the building to reduce total FM and energy costs via a closed loop control are quickly becoming a widespread option for building owners. Prior to FacilityView Software by Honeywell, building owners would have to manually and physically perform and schedule maintenance and manage and monitor energy usage. These legacy systems were expensive and carried a long integration timeframe. Now, with a cloud-based, remote platform, building owners can perform these tasks automatically and remotely. Analytics are sent to a secure cloud location where algorithms are used to monitor and analyze performance. Results flow to building owners to proactively flag any issues or concerns. This solution of energy optimization allows for much quicker installation and integration at a reduced cost while benefiting from energy savings.

Customizing the Building Occupant Experience

In smart buildings, sensors located throughout the building are capturing data about occupants and analyzing it to understand the preferences and needs of individual occupants. Similarly, combining analytics with data gathered from sensors makes it possible for

building owners to enhance occupant productivity by designing more comfortable and convenient workspaces based on the routines and habits of building occupants. Smart buildings have proven to be more efficient and are a win-win for both the utility and the building owner.

The confluence of IDSM and intelligent building management systems has made it possible for occupants to directly interact with a building's systems through mobile apps, creating dynamic and customized experiences for building occupants. The Honeywell Vector Occupant App is a case in point; turning a building occupant's smartphone into the workspace equivalent of a Swiss Army knife. Equipped with the Vector Occupancy App, a building occupant can use his or her smartphone to unlock controlled access doors, adjust the temperature in his or her workspace and pass through security check points more efficiently.

Imagine an office building that interacts with you and understands when and how you prefer to work. The building knows your schedule, so the elevator is waiting for you when you arrive to take you to the floor where your next meeting is scheduled. When the meeting ends, the building tells you what hot desks are available nearby for your use until lunchtime. In buildings, the combination of more data and better analytics promises to improve the occupant experience across the board.



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Conclusion

Smart applications are automating data-driven decision making processes across residential and commercial industrial sectors. On a consumer level, connected technologies increase the ease of understanding energy use and how to use less energy. For the building owner, connected technologies offer more energy saving methods without impacting productivity or occupant comfort.

For energy companies, data driven solutions that provide integrated capabilities to balance distributed resources and overall grid management technologies are essential. Additionally, engagement platforms connecting residential consumers to commercial buildings, provide opportunities to better serve customers. ●



Together, Honeywell Smart Energy, its partners and its customers, are fundamentally reshaping the way the world uses energy.

Honeywell Smart Energy is enabling utilities to deploy advanced capabilities that transform operations, reliability, and environmental sustainability; while also providing solutions to engage their customers in a more meaningful way.

Honeywell Smart Energy dynamically manages energy, improves efficiency and reliability cost effectively.

Honeywell

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