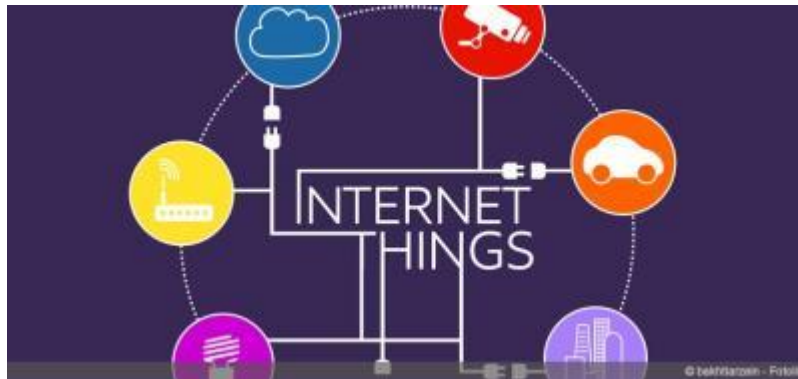# Real Estate and the Internet of Things

A growing web of connectivity among people, devices, and homes will upend the way we interact with the world. Here's a glimpse into how the changes may affect your business and your life.

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The buzz is escalating about the "Internet of Things." The catchphrase refers to the next wave of technology but also to a mindset, one that's already evident in the moment a four-year-old tries to operate a paperbound book by tapping on an illustration.

The concept behind the Internet of Things, or "IoT" (also known as the "Cloud of Things" or "real world web"), is that we'll rely on actual computers less and less over the next decade as technological interfaces are woven directly into products.

"The next generation is not going to understand computers as separate things," says technology consultant and author Christina Kerley. "When a lightbulb burns out in their house, they're going to wonder why it didn't give them a heads-up."

Tech watchers say 2015 is the year IoT will start to go mainstream. Indeed, many products already whir constantly in the background of our lives, gathering information on us and the environment. Increasingly, devices will make connections with each other, transferring data and coming to conclusions about how they should operate based on that data. "We are looking at re-instrumenting the physical world, [and] 2015 through 2020 are going to be transformative," Kerley says.

IoT tools—at a rudimentary stage today—have yet to gain a significant foothold in real estate, but the potential for game-changing progress, along with disruption, is huge. Think of IoT in 2015 as analogous to the Internet in 1995. Over time, technology advances have taught us that we could part with certain aspects of our privacy and autonomy. But concerns are mounting that the coming decade may see security breaches and leaks of private information on a scale that was never before possible.

How IoT Works

Smart home devices that record and transmit data are already creating a buzz in the marketplace. Perhaps the most familiar such product is the Nest thermostat (made by a company recently purchased by Google), which can be controlled from a smartphone but over time learns a household's schedule.

Nest settings can be operated by individual users (who can set baselines for water or electricity use) and integrated with data from institutional hubs like the National Weather Service or a city's electrical grid. Such devices can serve as a helpful go-between for consumers and municipal smart grids, moderating energy use at peak times to minimize service disruptions. For example, Nest marries its understanding of a household's habits with data about energy use to make decisions about the best time to run a load of laundry.

Beacon technology is another facet of the IoT world. Beacons are small devices, usually powered by Bluetooth, that can be mounted virtually anywhere. They transmit information to nearby receptors (often a mobile device that is set up to receive Bluetooth data). Beacons can be used to track the movements of people in a home—perhaps to automatically turn lights to a specific preset when a particular person enters the room or to transmit information about the activities of an older adult to a caregiver outside the home.

Making Home Buying Smarter

With the help of beacon technology, house hunting could require a lot less effort in the near future. Buyers looking at real-time listings broadcast on a brokerage's Internet-enabled window display could be asked if they want to have a video of a certain property sent to them, for example. An early version of this technology exists in an app from Realty Beacon LLC. The Jeffersonville, Ind. based company pairs Apple's iBeacon devices with For Sale signs. Daniel Island Real Estate in Charleston, S.C., partnered with Realty Beacon to produce a branded version of the app for its high-end development. Because the community doesn't allow For Sale signs, the beacons are usually mounted on a home's front porch. The lack of For Sale signs can present a challenge to buyers, says Julie Dombrowski, Daniel Island Real Estate communications director, but the beacons present "an interesting opportunity to circumvent that. It gives buyers a way to explore the island on their own."

Today, these beacons aren't much different from QR codes on For Sale signs; buyers near beacon-enabled homes must launch the Realty Beacon app to learn more about the listing. In the future, beacons may not need apps but will likely still require consumers to be open to notifications pushed to their phone via Bluetooth or similar technology. But tech observers believe consumers will be happy to engage if the information is truly useful. "The real innovation happens when we use [IoT] to solve problems," says Kerley. "The best place to start is by asking, 'How can I infuse intelligence, connectivity, and data into this customer journey to save myself and my prospects time?' "

Though modern beacon technology was developed only a few years ago, it's already being used to augment home tours. Avid Ratings, a customer loyalty management firm for homebuilders based in Madison, Wis., launched an updated version of its home tour software at the International Builders' Show in Las Vegas in January. Called GoTour Onsite, the new version uses beacon technology to enable house hunters to tour a model home on their mobile device. As they enter each room, customers can immediately access floor plans, customization options, and videos that explain hidden aspects of the home, such as building materials and HVAC systems.

"Looking at home options is kind of like drinking from a fire hose, so categorizing [options] by room makes the process more manageable," says Avid Ratings founder and CEO Paul Cardis. And it's more in

line with the way the next generation of consumers want to shop. "Millennials don't want to be sold to," he says. "This kind of 'museum tour' option is really self-driven."

House hunters aren't the only ones who see value in smart home tours. Dombrowski says tech-savvy sellers on Daniel Island appreciate the edge. "They see [the Realty Beacon app] as an added service," she says.

Sky's the Limit for Marketing

External sources, such as municipal data, can augment the house hunting experience. In Chicago, researchers from the Urban Center for Computation and Data, Argonne National Laboratory, and the University of Chicago have partnered with local officials to launch the Array of Things. It's a network of interactive sensors collecting both passive data, such as weather and air quality, and data about how people are using the area, by measuring ambient noise and counting nearby Wi-Fi– and Bluetooth-enabled devices (without identifying users). Researchers plan to make the data freely available as a "public utility." Tech developers can then use the data to create helpful tools. Imagine an app that combines air quality data with traffic patterns, telling allergy sufferers the best time for a bike ride. Such tools could someday be the difference between extreme buyer's remorse and happily ever after, says Chad Curry, managing director of NAR's Center for REALTOR® Technology.

Eventually, Internet-connected devices may help you stay connected with buyers after the sale. Home monitoring systems on the market today, for example, can contact both owners and a list of professionals in case of a flood or other household problems. Conceivably, "the real estate professional could be notified and reach out with recommended contractors or information," Curry says.

While it's one thing to market a home that's augmented with smart technologies, it's another to be able to use data from those devices to craft more intelligent marketing. "As you have more connected devices, you build a diary for the home," says Todd Carpenter, NAR's managing director of data analytics. "One thing that could become really effective is being able to say 'My house is more energy efficient, and I can prove it.' "

Of course, having all that data available raises red flags concerning consumer privacy. But as the collection of data becomes more widespread, home owners are going to become more comfortable sharing it, Carpenter says. "Think about the world before Facebook. Fifty years ago, people would not talk about themselves that much," he says. "If that [data] can help sell the home, people are going to want to start publishing it."

Bill McCaughey, IoT consultant and CEO of Home Energy and Maintenance LLC, a home data management company based in Houston, agrees with the cost-benefit assessment, noting that eventually the data itself could affect pricing: "If you've got five, ten years of operating data, your home will be a little more valuable."

"It's hard to know exactly how this technology will develop," Dombrowski says, "but people seem enthusiastic about it, so you know there will be applications out there."

For example, Internet-enabled lockboxes could help manage showing schedules and provide information to sellers and listing agents about the duration of home tours. Beacons could even record how much time buyers spent in any given room and note whether or not they watched a supplementary video, perhaps hinting at which spots need more attention in terms of staging or upgrades, or demonstrating the true selling points that deserve extra emphasis in marketing campaigns.

Targeting Retail Shoppers

Beacon technology has some clear applications for commercial property as well, particularly in the retail environment. Because beacons have a long battery life, are portable, and don't rely on GPS to pinpoint one's location, they may be able to replace the more expensive and intrusive "geofencing" technology that many stores are using to reach out to nearby customers via their smartphones. Macy's, Walmart, American Eagle, Walgreens, and Hudson's Bay Co. were among the first retailers to use beacons in stores to offer shoppers special incentives via their phones. The technology has also been applied by companies in the hotel and airline sectors. In late January, Facebook announced it would begin testing its new "Place Tips" service in New York, where its beacons—installed in eight iconic shops—will notify nearby users via their Facebook mobile app when they're near these retail options.

It's only a matter of time before malls and retail centers consider offering beacon technology to their tenants. Westfield Group, an Australian firm that owns, develops, and manages shopping centers in the United States and around the world, has a subsidiary (Westfield Labs) that is currently testing beacon technology for possible use in its locations across the world.

"You're going to have retail properties going gaga for this," says Kerley. "You'll be able to demonstrate what the foot traffic is like at certain times of day, and what parking is available, and just flow that information to them on their smart devices."

Smart Isn't Always Safe

In a Ray Bradbury short story, published by Colliers in 1950, a fully automated house burns to the ground, despite all the technology designed to keep it safe. Bradbury's story was a comment on nuclear proliferation rather than the perils of home automation, but the idea that technology requires human oversight is more resonant than ever. If a smart home energy system decides that the best time to wash your clothes is when you're away from home or asleep, does it put you at risk?

Alex Filip is deputy communications director for the Consumer Product Safety Commission, which is closely monitoring smart product designs. Filip says a potentially unsafe product is just as risky when consumers push the start button as it is when triggered by automation. "Whether you start your car, slow cooker, or furnace remotely is not an issue unless [it] behaves in an unsafe manner," Filip said in an e-mail to REALTOR® Magazine. The agency already cautions against operating certain household appliances, including clothes dryers and dishwashers, when no one is home or awake. That warning will continue to apply as smart versions of those products are rolled out.

"In the Internet of Things, the expectation is that your smoke alarm and kitchen camera would signal your phone if there were an issue. We are not all in that future yet. Hopefully the hazard will stay in science fiction," he says.

One common fear for consumers is that their house could be hacked into the same way e-mail and credit card accounts are today. Not only could thieves gain physical access to the home, but they could also be privy to a large volume of information about the owners that might be stored on devices or in the cloud. McCaughey says individual homes would be less appealing to hackers than the prospect of a wider invasion involving "a back door that is known to all hackers," putting all consumers who own a vulnerable product at greater risk.

At least one example of a breach has prompted action by the Federal Trade Commission. In February 2014, the commission settled charges against TRENDnet Inc., which makes security cameras that can be monitored via the Internet. The company had not secured passwords or online feeds of security videos—exposing the private lives of customers—though it had made statements in its marketing that implied the feeds were safe.

"The type of consumer harm we saw in the TRENDnet case . . . feeds concerns about the Internet of Things overall," Federal Trade Commissioner Maureen Ohlhausen told the U.S. Chamber of Commerce shortly before the final settlement. But the FTC's "unique set of policy and enforcement tools" can help ensure new technologies safely achieve their promise, she said.

The Inevitable Let-Down

Beyond security, smart devices have other kinks that need working out. In the short term, IoT is destined to disappoint, according to Chad Davis, senior director of digital media at the National Association of Home Builders. "Right now the Internet of Things is hyped," Davis told attendees at the International Builders' Show. As these new products fail to live up to their promise of freeing consumers, there's bound to be a feeling of disillusionment, he says. Still, IoT is here to stay. "This is a fundamental shift in what is going to happen with our industry," he said. Builders attending the show were cautioned by other speakers to watch the development of smart home technology carefully, using the auto industry as a bellwether, and to be cautious about where they hitch their proverbial wagons.

The hype will likely lead to oversaturation in the market, with countless companies rolling out smart home offerings. There's little agreement about which platforms to use and how—or even whether—devices should communicate with each other. "Not everyone will survive," says McCaughey. "You don't want to pick the Betamax provider for your home."

Kerley agrees that there are limitations due to the many competing systems but predicts that will begin to change soon. "2015 will be the year where we have to make the call that there has to be an open system," she says. "Much like the web uses the same scripting language, that's going to have to happen."

Regardless of bumps in the road ahead, early observers of IoT are optimistic. "Our digital and physical worlds are converging," Kerley says. She predicts that 75 years from now, historians will look back at 2010–2025 as a time of exponential change. "We're going through a renaissance," she says.

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