



The future delivery/business models for Smart Home services and infrastructure

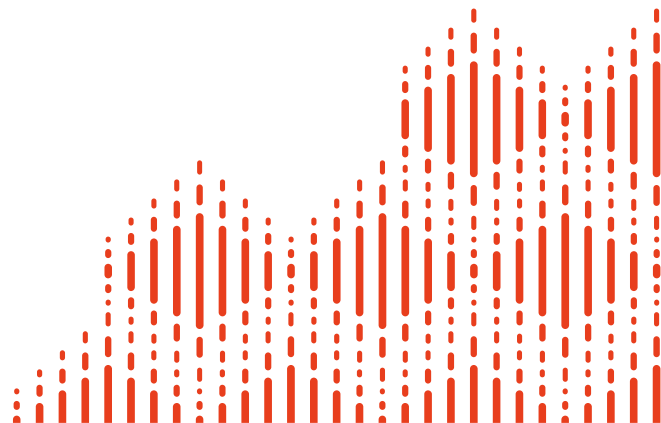
A CABA WHITE PAPER

Roberta Gamble
Frost & Sullivan



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**The future
delivery/business
models for Smart
Home services and
infrastructure**

A CABA White Paper

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ABOUT CABA

The Continental Automated Buildings Association (CABA) is an international not-for-profit industry association, founded in 1988, and dedicated to the advancement of intelligent home and intelligent building technologies. The organization is supported by an international membership of over 390 organizations involved in the design, manufacture, installation and retailing of products relating to “Internet of Things, M2M, home automation and intelligent buildings”. Public organizations, including utilities and government are also members. CABA's mandate includes providing its members with networking and market research opportunities. CABA also encourages the development of industry standards and protocols, and leads cross-industry initiatives. CABA's collaborative research scope evolved and expanded into the CABA Research Program, which is directed by the CABA Board of Directors. The CABA Research Program's scope includes white papers and multi-client market research in both the Intelligent Buildings and Connected Home sectors. www.caba.org

ABOUT CABA'S CONNECTED HOME COUNCIL (CHC)

Established in 2004, the CABA Connected Home Council initiates and reviews projects that relate to connected home and multiple dwelling unit technologies and applications. Connected homes intelligently access wide area network services such as television and radio programming, data and voice communications, life safety and energy management/control information and distribute them throughout the home for convenient use by consumers. The Council also examines industry opportunities that can accelerate the adoption of new technologies, consumer electronics and broadband services within the burgeoning connected home market. www.caba.org/chc

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PUBLISHED
September 2018

TABLE OF CONTENTS

1.	SMART HOMES GAIN MOMENTUM.....	6
2.	MARKET EVOLUTION.....	6
3.	DEFINING THE SMART HOME MARKET	7
4.	INDUSTRY GROWTH PROJECTIONS AND CHALLENGES	10
5.	NEW WAYS WE WORK, COMMUTE, SOCIALIZE AND LIVE DRIVE CHANGE.....	12
6.	A RENEWABLE REVENUE MODEL THROUGH NEW CHANNELS, NEW CONSUMER DYNAMICS	13
7.	CONTINUING GROWTH WHILE IDENTIFYING NEED FOR CHANGE	15

1. SMART HOMES GAIN MOMENTUM

The smart home market is a vibrant and rapidly expanding market. Once predominantly the realm of expensive systems for luxury homes, a multitude of devices, apps and solutions are now allowing everyday consumers to “smarten up” their living spaces. Frost & Sullivan research calculates that the market will top \$150 billion globally in 2018. This rapidly growing market provides great opportunities across the value chain, from equipment manufacturers, telecom companies and DIY stores to software providers to app developers, among others.

Technological advancements and rapidly expanding data capabilities are enabling new business models that have been disrupting many consumer markets. However, the smart home market is still largely dominated by equipment sales. While industry participants would welcome growth of any solution – be they in the form of equipment or service – innovating business models could help create additional renewable revenue streams. Notable examples of this in consumer markets include music subscription services, car and ride sharing, and cell phone plans. In the smart home industry, however, new business models as delivery mechanisms such as subscription services or a “smart home-as-a-service” are rare. In the view of this paper’s authors, we believe the time has come for the industry to devise and implement additional revenue streams through intelligent and inventive new business models for the smart home.

2. MARKET EVOLUTION

Early solutions for the smart home market often combined technology with a service, as the home security industry was one of the first to provide comprehensive smart-home solutions decades ago. However, the growth of smart home-related technologies, such as appliances, thermostats, doorbells and the like, swung the pendulum away from an on-going, service-integrated solution to one that focused more on a one-time purchase of equipment. The growth of the DIY trend further helped to further divest a service or subscription from the equipment, as even security equipment, such as Web-enabled cameras, now included motion detectors that automatically record the event and alert the owner without the intervention of a third-party.

But the market continues to broaden as many types of industry players enter the space. Equipment is still largely purchased through home DIY stores and Websites, or on-line at the manufacturer sites or marketplaces, such as Amazon. Yet, telecom operators, cable providers, and tech companies have been expanding into the space, often through partnerships. These companies

are moving beyond their core services of communications, entertainment services, and portable electronics, and into ones that integrate well with more comprehensive value propositions, such as energy savings, rooftop solar power, and, once again, home security. These vendors bring to the market a background in offering – even pioneering – subscription services. But even these services could be made more innovative. Could an Airbnb or Uber model work for smart home solutions, and help solve the quandary of repeatable revenues currently faced by the industry? Could “smart home as a service” be a viable solution in the future? And, what challenges do providers face in expanding their reach to consumers? Now is the time for the industry to leverage new technologies and growing consumer comfort level with new business models, to forge ahead with innovative ways to sell smart home solutions.

3. DEFINING THE SMART HOME MARKET

To understand the opportunities and challenges in the market, it helps to understand how to define this fragmented and dynamic market. One way to view the market is as the trend of residential technologies and services progressing towards advanced, connected, and interactive capabilities. Hence a “smart home” could include the following:

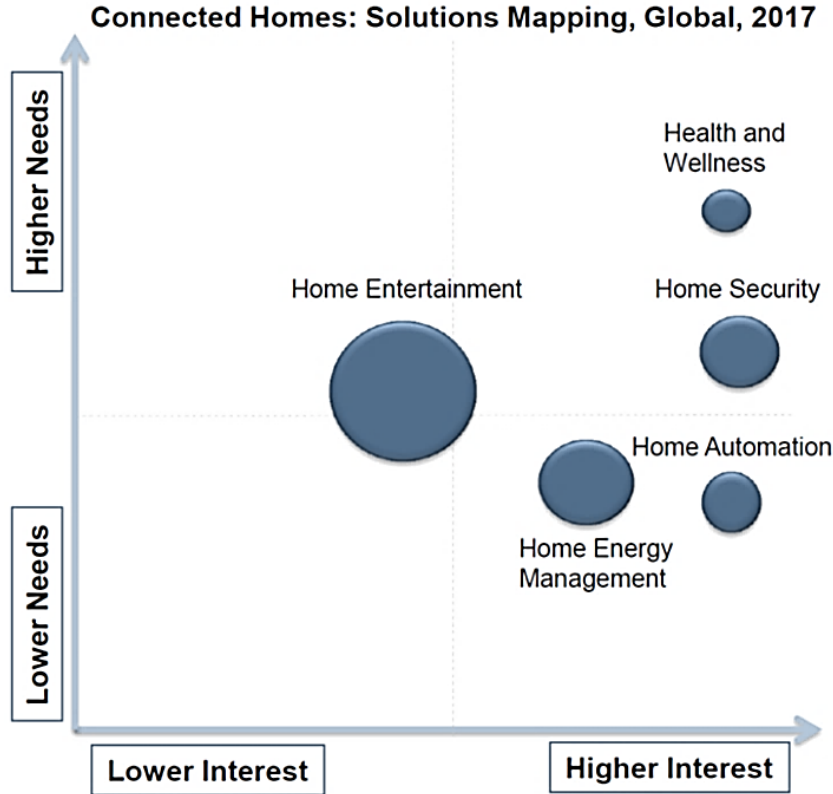
- **Connected Technologies:** Web-enabled devices and/or systems that connect, operate, and intelligently manage multiple facets of a home, such as home security, entertainment, heating and cooling, appliances, and lighting.
- **A Layer of Responsive Intelligence:** Increasing use of artificial intelligence and sensor technologies that react and respond to situations in an appropriate manner, for example by controlling appliance, lights or other devices inside and outside of the home. Examples may include predictive and learning devices, such as lawn sprinklers that moderate irrigation based on recent rainfall and weather forecasts, or more advanced thermostats that learn the occupant’s daily habits and adjust temperatures accordingly.
- **Eventual Integration of Lifestyle Patterns:** Longer term, smart homes may be increasingly connected and responsive to broader aspects of life such as work and school schedules, leisure activities outside the home, commuting, travel, and city systems such as traffic and public safety.

The market definition has been evolving as consumer needs shift. Frost & Sullivan has been researching the smart home market for several years, and

through different perspectives such as energy management, safety and security, IT options and solutions, and health and wellness. Our research has indicated the following key trends in the market, which have been confirmed by the Continental Automated Buildings Association's (CABA) smart home working group members:

1. Traditional areas of focus for smart home solution providers have been energy management, home automation, entertainment, and security.
2. However, other home aspects such as health and wellness will become a growing priority for homeowners, driven by the aging population.
3. Security will accelerate as a concern for home owners, moving beyond physical security to include cybersecurity, due to the convergence of more connected devices and growth in cyberthreats.
4. The market is currently relatively fragmented, with hundreds of devices and dozens of software platforms and solutions to help connect these devices. While this can be a challenge for any supplier wanting to compete with a comprehensive solution, it can also create opportunities for partnerships and inventive new business models for the home.

- 5. There is a trend towards simple DIY/self-install products. Ten years ago, the self-install home automation customer was a “tech geek” – in today’s world, the installation and connectivity process for many devices is simplified, intuitive and understandable to a broader range of customers.

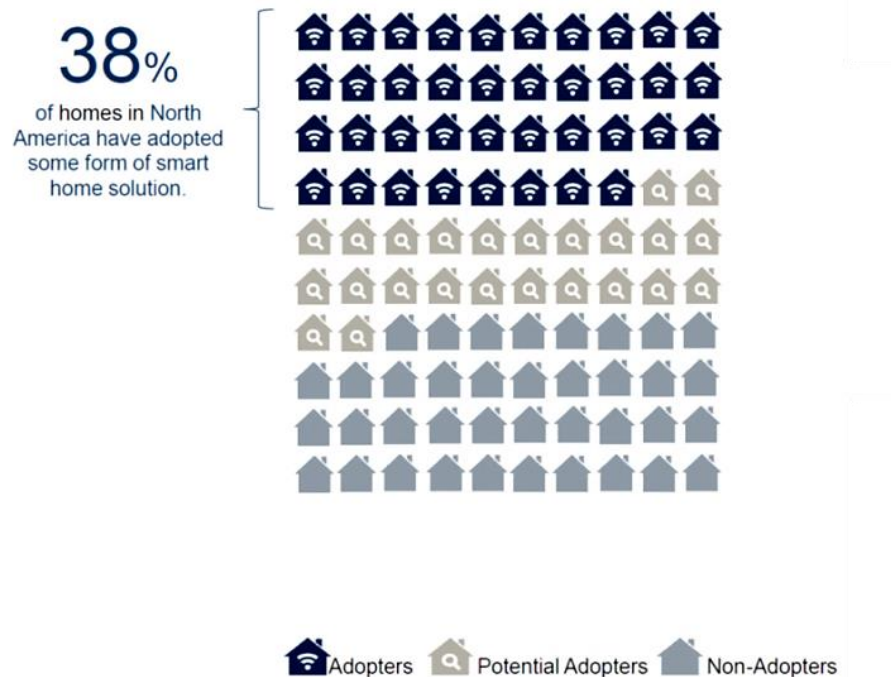


Key: Bubble size represents the market size of each segment

Figure 1: Connected Homes Solution Mapping, Global, 2017

4. INDUSTRY GROWTH PROJECTIONS AND CHALLENGES

The smart home market has been of great interest across different sectors as vendors recognize its huge growth potential and good visibility with consumers. A 2016 consumer survey in the US and Canada by Frost & Sullivan showed that over one-third of respondents already owned smart-home solutions. This indicates that smart home awareness is relatively high. However, due to the wide breadth of services and products available, the market is also far from saturated: Our research also indicates that no one smart home solution (security, energy, etc.) had more than 20 percent market penetration in North America. It is also likely that as even early adopters with comprehensive systems could still find ways to add more solutions to their smart home portfolio. Hence, this market has an ideal mix



of good customer awareness with low penetration – an ideal recipe for continued growth.

Figure 2: Proportion of Homes With Smart Home Solutions, North America, 2017. Source: Frost & Sullivan

Yet the growth is not without its roadblocks. While a significant proportion of North American households have some form of smart home solution, challenges persist in the industry. Frost & Sullivan’s consumer survey

showed that high on the list of barriers for consumers to adoption smart home solutions included:

- Cost and security concerns topped the list, with over half of responders being “extremely” or “very concerned” of numerous cost- and security-related scenarios.
- Cost perceptions also ranked high: the top two concerns were high initial set up costs and how costs (not just monetary costs but also time, effort and risk) outweighed anticipated benefits. Number five on the list was concern about on-going costs, which can be a deterrent to adopting a renewable revenue solution.
- Next on the list were security concerns: the third and fourth highest concerns were unauthorized access of personal information and smart home network breaches, respectively.
- Rounding out the rest of the top 10 concerns were issues surrounding system failures. This could, however, give suppliers a pain point on which to promote a service that reduces down time, includes on-going monitoring and fixing of challenges and can even future-proof a home to more easily adopt new innovations and consumer demands.

	Overall (n=1,263)		
High initial setup costs	40%	27%	67%
The costs (time, money, effort, risks) outweigh the benefits	34%	27%	61%
Potential access to personal information from home network	30%	30%	60%
Security breaches on the smart home network	29%	30%	59%
High management/ maintenance costs	29%	30%	59%
Risk of loss of privacy and personal integrity	30%	28%	58%
Security breaches of smart home cloud services	29%	28%	57%
Effect of power systems failure on the system	28%	28%	56%
Effect of system failure on the ability to manage the home	24%	29%	53%
Insecure smart home apps	24%	28%	52%
More likely to fail than manual systems (due to greater complexity)	24%	28%	52%

Figure 3: Consumer Barriers to Adopting Smart Homes, North America, 2017

These findings help support what many solution providers may be well accustomed to hearing: that the market is price sensitive, and security is a key concern with any connected device. In identifying new business models and revenue streams, vendors should keep these concerns in mind when communicating their value propositions.

From the supplier perspective, the initial and on-going costs can be particularly problematic as the industry is struggling to move to a repeatable-revenue model. At present, the typical smart home solution purchase will involve a one-time purchase of equipment with the expectation that remote managing of it, through a cell phone app for example, will be free. A homeowner will pay \$200 for a new thermostat, but he or she is not yet accustomed to pay a monthly charge for Web-enabled features or for better energy management through that thermostat. However, that same homeowner may willingly pay a monthly fee for a TV or music service, and may regularly make in-app purchases for games or to read on-line magazines. Hence, the challenge for the smart home solutions industry is to tap into the consumers existing comfort level with subscription-based paid services, and redirect it toward the smart home solutions.

5. NEW WAYS WE WORK, COMMUTE, SOCIALIZE AND LIVE DRIVE CHANGE

One avenue vendors have is to leverage new ways that people use their living spaces. The need for a smart home is now moving beyond the desire to improve one's comfort level or reduce one's energy bills, and is increasingly driven by the way our lives are changing. The home has always been the center of family life and entertaining. But thanks to several additional trends – the aging population driving “telehealth” and aging in place, Millennials rejecting car ownership, the increasing ability and acceptance of working remotely and an increase in live/work “spaces” – the home will need to evolve and adapt to an even more concentrated hub for life.

Telecommuting is a good example of where the smart home is going to have to reach well beyond the confines of our private lives. A CABA white paper on this topic was published in December, 2014 by Albert So, Kwok Wong, Kenneth Wacks and David Katz, "On Intelligent Home Offices – A Model and Potential Impacts" suggested that the concept of home office would expand even more quickly based on telecommuting assuming two key factors:

- a) Employer encouragement for employees to establish a designated workspace at home, possibly with some financial support by the employer as employer costs would be lower with a smaller office footprint.
- b) Improved real-time super high speed Internet access and high-quality video conferencing available for the employee to access corporate servers or other information infrastructures, whether local or in the cloud, and to see and talk to supervisors, peers, subordinates, and clients as if the employee was working at the corporate campus.

The difference these factors can bring is a new way to view the home office, as an extension of the employer's domain, and not the employee's. The reasons why such an arrangement could be attractive to employer/employee are many: reductions in traffic congestion and related emissions, reduced stress and wasted time commuting, reduced office space costs for the employer, and subsidized living space for the employee can all provide more momentum to this trend. And, all this will require more sophisticated communication, data, and even security features at the home. Simply the act of spending more time at home itself may also drive more desire to upgrade to the enhanced comfort and conveniences of a smart home.

6. A RENEWABLE REVENUE MODEL THROUGH NEW CHANNELS, NEW CONSUMER DYNAMICS

Along with understanding customer concerns and new ways the home is being viewed and used, finding new channels to market can also open the door to more innovative and steadier streams of revenue.

Early adopters to the market tended to fall into two camps: professional installers, especially for higher end homes, and those taking a DIY approach to outfitting their smart homes. The DIY method began to move from the fringes to the mainstream, as appliances and devices could increasingly be connected via apps developed by the product manufacturers or third-parties.

Moving the consumer mind-set from a one-time equipment purchase with free management tools, to a one that lends itself to a repeatable revenue model may require a rewiring of how the smart home – and possibly the home itself – is viewed. This may not be an easy task but there are market conditions, and even some precedence in the industry, that can be leveraged:

- Generational and geographic trends may help this progression. Frost & Sullivan research has indicated that Millennials have lower interest in car ownership than the generations who preceded them, both boosted by and helping to further grow car-sharing and ride-sharing business models.

Suburban home ownership is also a lower priority than among older age groups, and urban population centers are growing. Cities tend to be more conducive to renting residences rather than owning them, which could, arguably, be considered “home as a service.” Some real estate companies and home builders already find a competitive advantage in offering homes outfitted with smart and connected home solutions. Creating a “smart home as a service” may become an easier sell as this generation matures, if it keeps some of its same preferences of leasing over ownership. An early example of this may be IOTAS, based in Portland, Oregon. This company specializes in “smart rental homes” where the renter’s preferences and information can be moved to the IOT devices in a new home, though the physical devices in the homes themselves.

- On the other side of the generational spectrum, aging baby boomers typically want to remain in their homes as long as possible, but may require telehealth-related smart home services. Life Alert and related products that monitor and alert family or first responders to an emergency situation have been on the market for decades. A smart home could not only provide health alarm service, but could incorporate solutions for preventing health emergencies and improving occupant comfort. Offering peace-of-mind to seniors and their families may be a very powerful value proposition that helps show cost considerations in a different light.
- Leveraging home-related solutions where the consumer already expects a monthly costs, such as entertainment, energy, and security monitoring, may be another way to move more home systems to repeatable revenue streams. For example, the solar industry has grown at double digit levels due, in part, to new business models wherein homeowners do not pay for the up-front costs of the system but instead lease the panels that are owned, operated, and maintained by the solar panel provider. In the homeowner’s eyes however they are not leasing panels, but rather substituting their electric bill for clean and green power generated on their rooftop. Hence, whereas in the past the homeowner would have paid thousands upfront, the homeowner now can substitute utility payments and paying the solar company, thereby lowering their overall energy costs. This application could be expanded to include smart home solutions, where energy costs are high and there is a strong business case to be made by utilities for curtailment programs.
- Similarly, cable and satellite providers have been working to leverage their place in the home as an expected monthly payment for entertainment, and expand into other home services such as security and energy. Some of their core services are under threat from Internet TV providers such as Netflix or Hulu, however these are paid services as well. Hence, while

these models may have to evolve in light of new competitive forces, the overall theme of leveraging a repeatable revenue model remains.

7. CONTINUING GROWTH WHILE IDENTIFYING NEED FOR CHANGE

There's no doubt that the smart home market has a bright future of growth and evolution thanks in large part to ongoing technological advances in equipment and appliances. It only makes sense for the industry to continue to develop and drive the equipment side of the equation. However, the market could be leaving money on the smart kitchen table if it doesn't try to develop the market beyond one-time equipment sales.

Vendors could also be doing a disservice to their customers: smart homes based on on-going solutions can be more dynamic to changing customer needs, responsive to incorporating new features and technologies, easier to protect against security threats and quicker to respond to any such threats or malfunctions. It behooves the industry to create a focus around customized and innovative solutions that benefit both supplier and consumer. The larger building technology industry has historically been active in developing and implementing innovative business models such as "X-as-a-service" for everything from facility and energy management to rental power to lighting, performance contracting, and shared risk/shared savings business models. As many of the same players who address the commercial space serve (or, could serve) the residential market, conducting research on advanced, renewable solutions could put a vendor ahead of the market. The growing threat from market participants outside the traditional building space – such as from the telecom, electronics, healthcare, or automotive industry – should further drive any smart home solution provider to think well outside the equipment box. The industry should look to other consumer business models, partnerships across verticals, and new channels, as well as customized solutions for key buyer personas to take the industry from 'healthy growth' to exponential opportunity.



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