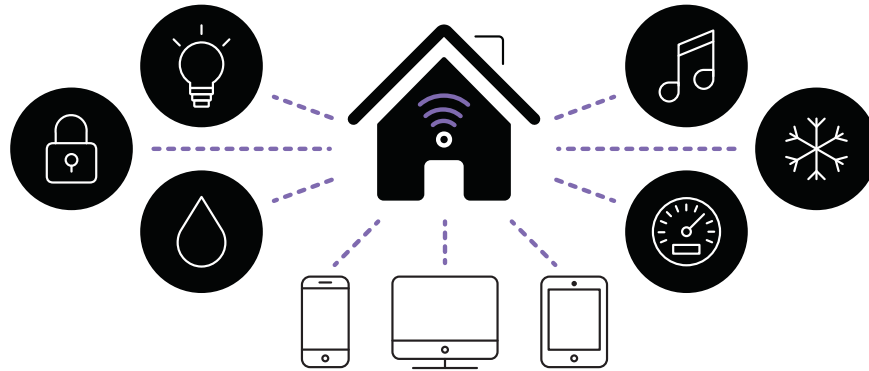# UNLOCKING VALUE IN THE SMART HOME MARKET

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Unlocking Value in the Smart Home Market

ABSTRACT

The "Smart Home" is an idea that represents the culmination and connection of many consumer-focused technologies—a residence equipped with lighting, heating, electronic devices, information, entertainment and other home components interacting together seamlessly and controlled remotely. This concept has fueled the imagination of entrepreneurs and homeowners for generations, and the recent development in the Internet of Things technologies makes this dream closer than ever.

Formation 8 has conducted two years of proprietary research with hundreds of companies in the Smart Home industry. This paper details our findings and lays out six criteria that innovative companies must overcome in order to bring Smart Home technologies to reality.

INTRODUCTION

The promise of the "smart home"—a residence equipped with lighting, heating, electronic devices, and other home components that interact and integrate seamlessly with one another and can be controlled remotely—has fueled the imagination of entrepreneurs and homeowners alike for generations. Since the advent of affordable appliances in the mid-20th century, inventors and science fiction authors have stoked the hunger of consumers for a fully automated home in which homeowners can control every facet of their dominion with the touch of a few buttons. Smart homes are no longer 20 years away; indeed, many of these concepts are technically possible today, thanks to the proliferation of sensors in products that collectively make up the Internet of Things. Investors are also betting big on smart homes with over $500M in venture funding since 2012.[1] Yet, despite these promises, smart home technologies currently only represent a niche market largely limited to tech-savvy early adopters. Most consumers view these products as luxury items, so companies in this industry will need to demonstrate that their products can deliver tangible value to drive adoption.

Over the past two years, Formation 8 has conducted proprietary research and market analysis on hundreds of smart home companies. We identified six key criteria that companies must overcome for smart home technologies to be embraced by the mass market:

PROTECT DATA PRIVACY AND SECURITY

CREATE ELEGANT DESIGN AND EASE OF USE

DEVELOP TECHNICAL COMPATIBILITY AND INTEROPERABILITY

PERSONALIZE THE EXPERIENCE

BUILD A COMPELLING USE CASE

MARKET TOTAL COST OF OWNERSHIP

Due to cost, privacy concerns, worries about security breaches, and a lack of products on the market, we expect that consumers will ease into smart home solutions rather than jumping in with two feet through a mass changeover from existing hardware. By developing products that address these six criteria, smart home companies can accelerate the rise of this young but high-potential industry.

CURRENT STATE OF THE MARKET

Despite the "future is now" proclamations by entrepreneurs and industry observers, smart home technologies have been in the works for years. Innovation is not a linear process: incremental improvements can suddenly give way to breakthroughs that transform the landscape. After a decade of core technology development in the Internet of Things space, the industry has seen a rash of early products that have raised already soaring expectations and contributed to an expanding universe of ideas.

Smart home technologies cover a range of products and services: utilities and energy management, smart appliances, security, health monitoring, and entertainment systems, among others. On their own, these categories have been growing rapidly, and analysts forecast exponential growth. ABI research estimates that the global number of smart devices will increase to nearly 41 billion by 2020.[2] The worldwide Internet of Things market, which includes smart home consumer products, could top $1.4 trillion

[1] CB Insights, "Analyzing the Internet of Things Investment Landscape", December 2013
[2] Archana Venkatraman, "IoT-enabled devices to top 40 billion by 2020, say researchers," Computer Weekly, August 22, 2014.

that same year.[3] Smart home technologies have the potential to be a disruptive force by combining categories such as smart appliances, health care, security, and entertainment into one ecosystem.

To date, progress has been underwhelming due to a misalignment of goals among entrepreneurs and consumers. Innovative companies have been focused on developing products that push the envelope without first determining whether these additional features will actually attract consumers. In addition, the lack of industry standards, app fatigue, and technology harmonization have inhibited adoption. Our research found that consumers are seeking products that can deliver a holistic experience, provide seamless control over their house, and deliver a better quality of life. Thus far, the relatively high cost of products and systems combined with low perceived benefits have given individuals little reason to adopt smart home technologies.

SIX CRITERIA COMPANIES MUST OVERCOME TO WIN IN THE SMART-HOME SECTOR

While some companies have created products and services that represent early wins for the sector, we believe their appeal won't extend beyond early tinkerers. To reach the masses, companies must fundamentally change their strategy. We have identified six critical criteria that products must meet to win in this sector:

CRITERIA 1: PROTECT DATA PRIVACY AND SECURITY

Consumers have gotten used to the idea that third parties, whether retailers or social media platforms, are collecting data on their transactions and using publicly available information to inform marketing campaigns and engagement. Until recently, incursions into personal privacy stopped at a person's front door. The proliferation of smart devices and the tracking and monetization of sensor data put this basic right in danger. Google, for

example, has been explicit in its intentions to own the data generated by devices that integrate with the NEST platform. Although it has been circumspect about how it might use that data, recent strategic moves hint that it already has a firm idea of how it can monetize this information.[4] New devices will have the capabilities of determining what television shows consumers watch,

"Since this level of information has not been available through products before, companies need to tread carefully to avoid strong consumer backlash."

how often they drink a Coca-Cola from the refrigerator, how often homeowners are away from their residences – these observations need to be carefully governed.

Feelings about privacy and information sharing vary markedly along generational lines. Notably, Pew Research found that consumers aged 30 to 49 are most concerned about controlling access to their personal information.[5] Since this demographic is a prime target for smart home companies, we believe hardware manufacturers and consumers will have a significant issue with companies that seek to use individual behavioral patterns in the home to tailor advertising for goods and services. At the least, businesses must allay privacy concerns so that consumers feel confident and secure in buying certain products. Therefore, companies operating in the smart home space need to be more upfront and transparent with their intentions for the data.

Smart Home devices will enable the collection of large amount of data inside a consumer's last bastion of perceived privacy. Since this level of information has not been available through products before, companies need to tread carefully to avoid strong consumer backlash that

will impede further business development.

CRITERIA 2: CREATE ELEGANT DESIGN AND EASE OF USE

Consumer products revered for their ability to combine functionality and a sophisticated design aesthetic—think Rolex watches, the Tesla S, or the iPhone—have also set a higher bar for smart home products. Rather than telegraphing their technology and complexity, devices should be simple and timeless; blend in with multiple decors, from upscale modernist homes to raised ranch dwellings; and use a single dial or multifunction button or tactile screens to remove clutter. Companies might also aim to latch onto the "conspicuous conservation" phenomenon, in which consumers engage in environmentally responsible activities with the hopes of receiving social acceptance. Smart home technologies focused on energy efficiency might draw a certain segment of progressive individuals who want accolades for their prudent use of resources.

By making elegant design a priority, developers will also avoid the temptation to pack a multitude of sensors and devices into a package without any rhyme or reason – a strategy we have coined "feature bingo." Each sensor results in increased cost from hardware, and designers must figure out how to extract value from the data generated from sensors, resulting in additional costs for advanced microprocessors rather than less complicated microcontrollers. As with any successful design, companies should clearly articulate the use case they are addressing and add only the features needed to support this strategy.

Beyond appearance, successful products must be easy to use. Systems should be controlled by a single device—most likely the mobile phone, since it presently serves as a personalized input mechanism. In addition, the user interface needs to pass the "grandmother test": the typical older consumer should be able to figure

[3] Internet of Things technology and application market by communication technology, application vertical, and geography: Global trends and forecasts, 2014 to 2020, Markets and Markets, May 2014. http://www.marketsandmarkets.com/Market-Reports/iot-application-technology-market-258239167.html

[4] David Auerbach, "Google's master plan," Slate.com, June 26, 2014. http://www.slate.com/articles/technology/bitwise/2014/06/google_s_master_plan_turn_everything_into_data.html

[5] Anonymity, privacy, and security online, Pew Research Internet Project, September 5, 2013.

it out intuitively without having to rely on customer service or tech support. Ease of use should also be reflected in installation and set-up. Our research indicates that users are searching for instant gratification from the unboxing process, rather than having to schedule installation from a certified installer. Consumers should be able to simply plug a device into a wall socket rather than devoting time to its location.

This functionality also has important implications for a company's business model. By alleviating implementation costs—not just a network of technicians but also the substantial costs to manage product distribution and fleet maintenance—early market entrants can devote their resources to scaling the business and increasing sales.

CRITERIA 3: DEVELOP TECHNICAL COMPATIBILITY AND INTEROPERABILITY

The smart home market must solve a particularly vexing challenge: even while technological advances proceed at an unprecedented pace, companies must design systems that can interact with products along three time horizons: past, present, and future. As a result, interoperability—the capacity of a smart home system to accommodate a range of other systems or products without additional programming or configuration—will be vital for adoption. Consider that the typical consumer's home will have legacy hardware such as A/C units, humidifiers, and lights that will be replaced or upgraded over a period of years. In addition, many existing manufacturers of home products today lack the capability to develop smart product lines, so they will continue to put traditional devices on the shelves of Best Buy and Target. Therefore, winning companies will develop command-and-control capabilities to interface with legacy and newly purchased devices that lack smart technologies.

Integration with current mobile platforms, including hardware and software, presents another obstacle. If a system's preferred device is a smartphone, for example, the control app must compete for limited real estate. Once the wide range of devices is factored in, companies must devote significant time and resources to achieve true interoperability. To give consumers peace of mind that any system they invest in won't quickly become obsolete as emerging technologies come online, products need to emphasize their flexibility and adaptability.

CRITERIA 4: PERSONALIZE THE EXPERIENCE

Consumers increasingly want their products to create personalized experiences. For example, the feeling of importance that individuals derive from entering a hotel and finding their preferred memory foam pillow on the bed—an indication that the hotel remembered their preferences and prepared for their stay—may seem minor, but in a world of seven billion people where identity is often reduced to monetization value, these personal touches reinforce a consumer's uniqueness. Such experiences can also be an indicator of one's stature and accomplishments, enabling aspirational customers to showcase their success.

"Address a core human need: the ability to personalize an environment and create an experience based on one's tastes and preferences."

Similarly, the endless array of cases and accessories that personalize mobile devices also speak to the value consumers place on individuality.

We believe smart devices address a core human need: the ability to personalize an environment and create an experience based on one's tastes and preferences. Imagine getting home after work before your spouse; your home automatically turns on the lights five minutes before you arrive (home access and geolocation). Arcade Fire is playing on the sound system as a cable news channel is displayed on the television (smart AV). The temperature in the living room is warm while saving energy upstairs since you won't head up until after 9 PM (smart thermostat). Since the second bedroom is the baby's bedroom, the HVAC system automatically knows to keep that room a bit warmer than the rest of the house, and purges the air when particulates or VOCs are in high concentration.

Now imagine that you can take your preferences with you to any dwelling—housesitting for a friend, staying at a rental house on vacation, or even in a hotel room. Consumer preferences and the corresponding comfort they provide could be entirely portable, enabling individuals to maintain this personalized environment wherever they go.

CRITERIA 5: BUILD A COMPELLING USE CASE

While smart home technologies have attracted tech-savvy consumers, a persuasive use case has yet to be made to drive mass adoption. Consider the current spate of smart light bulbs: three-channel lights that can change color but require a dedicated app that fights for real estate on a consumer's smartphone. Beyond demonstrations to impress friends or set the right lighting for dance parties, consumers likely don't view a lack of lighting options as an impediment to a better life. As smart light bulbs illustrate, the initial wave of smart home devices are aimed at the early-adopter market and have been positioned mainly as "nice-to-haves" instead of "need-to-haves." The challenge is that with discretionary income, "nice-to-have" products and expenditures are dropped immediately when people have to make trade-offs. For instance, if the choice is food or a $199 set of light bulbs, it's an easy decision for most consumers.

To qualify as a need-to-have item, smart devices must address a distinct problem with an innovative solution. Continuing the light bulb example, research has found that blue light is more disruptive to sleep patterns than other colors of light.[6] A five-channel light that can facilitate revitalizing sleep by eliminating blue light could have significant appeal to the sleep-deprived population. Another pain point—and a potentially lucrative opportunity—is the care and monitoring of infants and toddlers. Many

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[6] "Blue light has a dark side," Harvard Health Publications, May 2012. http://www.health.harvard.edu/newsletters/Harvard_Health_Letter/2012/May/blue-light-has-a-dark-side/

parents will appreciate having their fears and concerns addressed thanks to product that could, for example, interface with a home's HVAC system and humidifier to purge air high in particulate matter or volatile organic compounds and create a healthy environment for young children.

One test to determine whether the product addresses a compelling use case is the "toothbrush test" that Google CEO, Larry Page, devised. When deciding which products to fund, Page will ask "Is this something you will use once or twice a day, and does it make your life better?"[7] Products that fail to provide compelling use cases get shut down as Google demonstrated with Revolv, a smart home control system, they acquired and discontinued this year.

Smart home companies should ensure that their products actually address pain points for consumers. So rather than focusing solely on pushing the technology envelope, businesses should seek to monitor consumer needs and

"Is this something you will use once or twice a day, and does it make your life better?"

develop products to address them rather than assuming a market exists for the next breakthrough. In addition, companies could rely more heavily on consumer insights and focus groups in the ideation and prototype stages. Last, a more realistic view of the addressable market—to use the example above, not all lightbulbs sold but the smaller segment of lightbulbs bought by consumers who identify themselves as technologically advanced or environmentally conscious—could help identify the most promising and practical ideas.

CRITERIA 6: MARKET TOTAL COST OF OWNERSHIP

To date, the mass market generally perceives smart home technologies as higher-end novelties reserved for those with enough discretionary income to implement them. It's important to remember two facts: Outside of Silicon Valley and upscale enclaves in urban areas, the average income for U.S. residents is $50,000; and, as successive releases of the iPhone have proved, consumers around the globe are willing to pay a premium for a product if it can deliver quantifiable benefits.

"Total cost of ownership could provide a compelling business case and drive purchases."

Therefore, the challenge for companies is to create products that are evaluated not on price but on total cost of ownership. Emphasizing the cost savings of smart technologies—for instance, lower energy costs—rather than convenience would reinforce the overall value a product can deliver. We maintain that consumers rarely make efficiency based buying decisions unless they see clear payback periods under one year.

Smart home technologies are also well positioned to provide critical services at a lower cost. Consider that consumers routinely pay un-networked home security companies $50 a month for basic systems, to say nothing of add-on services for fire and carbon monoxide detection. Similarly, smart voltage monitoring in appliances can use sensors to detect equipment failure and order preventative maintenance. For anyone who has experienced an air-conditioning problem in the middle of summer, when repair technicians aren't available, the value of such offerings can't be underestimated. If consumers could buy a $400 device to unify these services—security, proactive appliance repair, and thermostats—the consumer would save $200 a year on the cost of home security alone. Product information that helps individuals calculate total cost of ownership could provide a compelling business case and drive purchases.

CONCLUSION

As the smart home industry evolves, the six criteria we have outlined provide some guideposts for companies that are focused developing products with the potential for mass adoption. Total cost of ownership, compelling use case, and interoperability will be critical if smart home products are to reach a broader market. At the same time, certain consumer segments will be much more attuned to criteria such as elegant design, a personalized experience, and issues around data privacy. As we've seen with other technologies such as hybrid cars, these criteria can shift considerably and alter the formula that products need to follow to gain mass appeal.

The rewards for businesses that crack the code will be substantial. The application of IT to the home has the power to transform daily life on a broader scale than any technology since mobile devices. Over the next several years, Formation 8 will continue to invest resources and capital to building winners in this important sector.

Jim Kim
Founding Partner, Formation 8

Tanguy Chau, Ph.D.
Partner, Formation 8

[7] "Here is the toothbrush test", Business Insider, August 2014. http://www.businessinsider.com/larry-page-toothbrush-test-google-acquisitions-2014-8