



SMART BUILDING TECHNOLOGY IN MULTIFAMILY HOUSING

A guide to smart building technology investments
and how to underwrite them

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INTRODUCTION

At the time of the release of this white paper (Summer 2020), multifamily housing, like most industries, is subject to considerable change. We live in a time when many new and exciting technologies are helping to deliver ever-improving living experiences to increasingly digitally native renters. It is hard to think of any technology with as much potential to revolutionize multifamily housing operations than smart home technology.



Long before the COVID-19 lockdown disrupted our industry, smart home technologies were transforming operating models. Forward-thinking operators were already reaping the benefits, removing friction from the day-to-day lives of their residents and site teams, and creating new automation opportunities.

THE APPETITE FOR AUTOMATION

Self-show provides an excellent example of an innovation that both streamlines multifamily operations and improves prospect experience. To deliver self-show, multifamily operators must solve for access control, a foundational component of the smart community.

In our March 2020 “20 for ‘20” white paper (based on 20 interviews with senior multifamily operators), we noted the remarkable acceleration in the industry’s acceptance and adoption of self-show in the previous 12 months. As social distancing measures have forced operators to find ways to show apartments without human interaction, adoption has accelerated more quickly than anyone would have anticipated.

While self-show is not the main subject of this paper, it is contextually important to understanding the change in attitudes towards smart home technology. During the recent lockdown, residents have become increasingly dependent on delivery services, which has placed a higher priority on smart locks and building access.

ABOUT THIS PAPER

Smart home technology has such broad applications that the sources of potential benefits seem almost unlimited. It nevertheless comes at a cost, and to justify the considerable investment in evaluating, deploying and operating the technology, we must identify the sources of potential benefits and predict their return on investment.

In this paper, we discuss the numerous sources of benefit from smart building technologies. We outline the trade-offs inherent in different technology types and the potential implications for return on investment (ROI). Finally, we have created five case studies, featuring five fictitious companies, each estimating ROI based on a different source of financial benefit and underwriting their smart home investments accordingly.

Our intention in publishing this paper is to promote a greater understanding of how to underwrite smart home technology investments. The benefits are manifold and compelling, as you will see. As with any technology investment, multifamily operators must enter smart home projects with a clear vision of how it will improve their business. We hope that this paper will clarify that vision, and ultimately lead to more successful projects.

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RETURN ON SMART HOME INVESTMENTS

For some multifamily developers and property types, smart thermostats, locks or leak sensors look increasingly like a cost of providing an experience that is simply in line with resident expectations. As the technology becomes commonplace, it may be regarded as a cost of doing business in their market segment. One could argue, therefore, that investments in smart home technology need not be viewed any differently from investments in washer/dryers, for example.



However, when a company is making an implementation decision on behalf of an entire portfolio, the considerable cost must be justified, which calls for operators to identify sources of return on investment (ROI). For this white paper, we have assumed the perspective of an owner or investor considering the technology and how to underwrite it. In the following sections, we will address the three main sources of ROI that most operators consider when making their smart home investment decisions.

- **Operating efficiencies** associated with two main sources of cost: improved productivity and reductions in utility costs
- **Damage avoidance** resulting from early detection and intervention in the case of, for example, water leaks
- **Ancillary revenue** from rent premiums achieved through smart home amenity packages

Each category entails different aspects of the technology, processes and ROI dynamics, with some sources more measurable than others. Each is described in more detail in the following sections.

OPERATING EFFICIENCIES

Unsurprisingly, this is the broadest category of potential benefits, as it covers both energy and labor savings. Operators can control utility consumption in public areas and vacant units. They can also realize opportunities to save associates' time and, in some cases, remove the need for associates to perform certain tasks.

Of the many benefits that smart home technologies can bring to multifamily operators, perhaps the most transformational are those that affect the operations of site teams. When operators can manage vacant units and control access to both buildings and individual units, they can

remove considerable friction from the day-to-day lives of maintenance and leasing teams.

THE RISE OF SELF-SHOW

In the introduction, we mentioned the rapid acceleration in the adoption of self-guided tours. Smart locks are an essential component of self-show. With keyless entry, a community can grant access to a prospect, without having to be accompanied by a leasing agent. For the foreseeable future, the ability to offer a self-show option is at least a potential differentiator for apartment communities as prospects increasingly expect self-provision services rather than interaction with agents. In many cases, it may remain an essential requirement as COVID-19 charts its unpredictable course.

Self-show also extends the hours during which tours can take place, as the window for tours no longer needs to be defined by a leasing agent's working hours; and, in the case of northern markets, touring hours no longer need to be shortened in the winter for safety reasons. Since leasing agents tend to work similar hours to most prospects, self-show can remove a long-standing suboptimality with leasing. In addition, speed of tour adds to the potential volume of tours, with many prospects taking less than 30 mins to self-show, a considerably shorter duration than most agent-guided tours.

As smart access control and other emerging property technologies like AI-leasing agents reduce the workload on leasing agents, further potential efficiencies emerge. Leasing agents can be deployed across multiple buildings in the same neighborhood, reducing labor costs, and potentially bringing new types of property acquisition into consideration.

For example, a 40-unit property close to an existing community may previously have been infeasible, with too few units to cover the cost

of full-time staff. However, enabled with access control to both properties, the need for full-time staff at the new property can be eliminated because the leasing associate at the existing property can also cover the new one.

STREAMLINING PROPERTY MAINTENANCE

The same dynamic is true of maintenance technicians, with the new technology enabling operators to deploy technicians across multiple neighboring properties. But even without changing the maintenance staffing model, the benefits of smart locks are considerable.

At a typical garden-style community, for example, it is not hard to imagine the amount of time a maintenance technician spends obtaining keys to apartment doors. On receiving a maintenance call, a technician has to leave the job that they are finishing to get to the office to pick up a key. They then make their way to the unit and address the issue before returning the key to the office. With several such trips each day, the inefficiency mounts up.

When a community adds smart locks, there is no longer any need to travel around the property to retrieve keys. A temporary code can grant access to the technician. The use of the code makes access to the unit trackable, and, because the code is temporary, it reduces the risk to the resident. A smart lock enables a community to organize access as quickly as a work order can be issued, establishes a digital audit trail for unit

When a community adds smart locks, there is no longer any need to travel around the property to retrieve keys.

access and, most importantly, saves time that can be spent on more value-adding projects.

ENERGY CONSUMPTION

The addition of smart thermostats and the ability to control them remotely brings exciting opportunities to multifamily operators and residents. The more precisely operators can control temperatures in public areas, for example, the greater their ability to minimize waste in their communities.

The waste associated with vacant units is another significant driver of benefits. Operators routinely waste money air conditioning or heating empty units - especially in markets with cold winters and hot summers. The costs of a vacant unit's air conditioning being set to 60°F accrue very quickly in an Arizona garden-style community during the summer, for example.

The magnitude of vacant unit savings varies with the vacancy level at a given community - the higher the occupancy the lower the potential wasted utility spend. The savings are nevertheless considerable given the estimated 20-30% in vacant utility savings. For a large, nationwide platform spending an estimated \$3-4 million on vacant utilities, that savings can equate to \$1 million or more annually.

In addition to the money saved in both public areas and vacant units, there are two more important intangible benefits to the value proposition of an adopting community. First, by pursuing the reduction of waste, communities demonstrate a commitment to sustainability, an important consideration for increasingly environmentally-aware and values-driven residents.

Finally, as we will discuss in more detail in the case study section of this paper, the ability to reduce utility bills can be materially important to a prospective resident. As our example will show, a saving of \$40 per month can be the dif-

The considerable inconvenience to other residents affected by the leak and the potential for catastrophic financial losses mean that, often, an ounce of (leak) prevention is better than a pound of cure.

ference between leasing at a smart community and leasing elsewhere.

ASSET PROTECTION

Water damage has, for most of the history of the multifamily industry, been an unavoidable cost of doing business in a sector whose product includes functional baths, toilets and sinks. At more or less every community in a portfolio in a typical year, operators can expect at least one episode where serious damage is done by an overflowing bath or toilet or, in cooler climes, a burst pipe.

If the leak occurs on a high floor then, of course, there is additional risk of damage to the apartments below. There is a natural incentive, therefore, to solve two problems: early leak detection and rapid access to the apartment to stop the leak and minimize the damage.

In the last section, we described the time wasted by maintenance staff in retrieving keys to apartments. In the case of leak detection, the time saved translates not only to staff productivity, but also to the limitation of potentially expensive damage.

The extent of the losses can vary wildly from hundreds to millions of dollars, depending on the property. A rapid response may result in damage

that can be contained by water extraction and use of drying equipment by maintenance staff. A slower response may necessitate the removal of carpets and pads. When a leak causes water to flow down multiple stories, a community may need to replace drywall and dehumidify multiple apartments.

While insurance policies offer some protection, deductibles are typically high for water-related losses. In the case where the resident is at fault, there is also some possibility that renter's insurance will offer some recovery. But the considerable inconvenience to other residents affected by the leak and the potential for catastrophic financial losses mean that, often, an ounce of (leak) prevention is better than a pound of cure.

While water leaks are the most obvious and salient source of asset protection benefits, there are others for communities to consider. For example, where thermostats are part of the smart home implementation, monitoring of occupied apartments could provide a service benefit to residents.

A resident accidentally leaving their window open before leaving their mid-western apartment for a week in the winter may prefer to receive an alert about the temperature in their apartment than to return to the damage caused by a burst pipe.

Installing leak sensors, thermostats and smart locks in apartments, therefore, has the ability to reduce a community's exposure to significant losses and highly negative customer experiences. As we shall see in our case study section, the prevention of damage from leaks can, by itself, justify the cost of a smart home implementation.

ANCILLARY REVENUE

According to the 2017 NMHC-Kingsley report, a survey of 250,000 apartment residents, there

is a strong appetite for smart home amenities in multifamily communities. Survey respondents indicated that they would pay \$30 per month for some smart devices, suggesting the potential to drive incremental revenue through the adoption of the technology. This survey, and others like it, reflected this, even before COVID-19 greatly increased the demand among multifamily residents for delivery services.

As we will demonstrate in detail in the case study section of this paper, a relatively modest rent increase can easily justify the costs of smart home implementation, and there are reliable ways to capture the increases. It is therefore worth considering the reasons that residents are increasingly willing to pay for these amenities and the ways that they can impact leasing and revenue performance.

With residents increasingly expecting to use technology to remove friction from their lives - from ride-sharing to grocery delivery to dog-walking - great living experiences must continually support this changing lifestyle. As residents source more services through their smartphones, access should be as easy to organize as the services that necessitate it.

In many of the more affluent, coastal markets where early demand for the technology has been high, residents are happily paying to remove the friction associated with apartment access from their lives. In preparing this study, we have learned of numerous cases where residents are paying significantly higher premiums than those indicated in the NMHC study. Where residents' time is at a premium, the value of the technology increases.

Time savings are not the only reason why residents will pay a premium for the technology. As discussed above, smart thermostats provide potential utility savings, a guardrail against weather-related unit damage and the sense of enabling a more environmentally sustainable

lifestyle. Finally, our interviews with companies who had implemented smart home technology revealed an industry consensus on the most important why residents will pay for it: It's cool!

Beyond the rent upcharge, the "cool" factor has important benefits to the leasing process. One operator spoke of the impact of playing with the smart home features when touring prospects through a property. In some cases, smart home features complemented other technology, like augmented reality, allowing the prospect to see their unit furnished.

The operator in this example felt that they were creating an experience more consistent with something like the Apple Store than a conventional property tour. Leasing agents were trained to joke about it, drawing attention to the amenity, and forming a bond between the prospect and the community. While hard to measure, it is easy to see this use of the technology as a source of advantage.

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COMMON SMART HOME TECHNOLOGY TRADEOFFS

Multifamily housing, with its varied property types and the service element to its operations, represents a new set of challenges to smart home technology. To be most effective, platforms should provide control and an enhanced customer experience to residents, while creating opportunities for the operational improvements described in the previous section.



TO HUB OR NOT TO HUB

In approaching smart home implementation projects, operators must decide whether or not to architect the infrastructure around a hub, which is a device installed to operate IoT devices within the unit. Each hub is connected to the internet and controls smart home devices in that unit, leveraging IoT protocols.

In its 2018 white paper: "Smart Communities: The Internet of Things and The Apartment Industry," NMHC cites four examples of IoT protocols: Z-Wave, Zigbee, Bluetooth and Insteon. Of these protocols, Z-Wave and Zigbee are true IoT protocols, with Z-Wave emerging as the de facto industry standard for smart home devices. Bluetooth, as we shall discuss, is too limited in communication range to deliver certain IoT benefits. Finally, Insteon is a hybrid wired/wireless protocol for devices that it manufactures, meaning its interoperability is inadequate for an industry whose needs are as varied as those in multifamily. For the remainder of this paper, we will assume a smart home infrastructure based on Z-Wave protocols.

To use a simple example, a door with a smart lock connected to a hub can be opened or locked from another city using secure Z-Wave protocols. The hub is critical in this transaction as smartphones do not have Z-Wave chips, so they have no way to communicate directly with the lock. In the absence of a hub, then, an operator would require a different protocol. Bluetooth, for example, would enable the secure locking and unlocking of the apartment door but would require that the device (typically a phone or a key fob) be close enough to the lock to make it work.

While this may seem like a technical nuance, it has the potential to make or break some of the sources of potential benefit that we discussed in the previous section. Taking self-tour as an example, where individual, time-boxed access

has to be arranged in a highly fluid environment, a Bluetooth-based lock would require a device to open the door. A prospect would, therefore, need to download an app to operate the (Bluetooth) lock. A more elegant solution is to have a hub-controlled lock issue a one-time key code to the prospect via SMS, removing friction from the experience.

Finally, security is an important consideration in the selection of smart home architecture. The implementation of individual hubs restricts security access to individual units, as access to each apartment's smart devices is through its own hub. Alternative configurations aggregate multiple units into hubs, or worse, control access across an entire property network. In the event of a breach, these arrangements could leave many apartments compromised.

The individual hub architecture reduces the problems inherent in aggregating control by establishing security at the lowest possible level - the individual unit. In this scenario, a hacker would need to hack two levels to exploit a vulnerability: first, the cellular or Wi-Fi network to gain control of the individual unit's hub, then the Z-Wave protocol to gain access to the hub itself. In this way, the individual hub architecture enables access, while adding a second layer of security to protect it.

THE IMPACT OF CONNECTIVITY

Connectivity is a related consideration: without a hub, the smart home technology would be dependent upon Wi-Fi provided either by the property or the resident. If a property were to rely on resident Wi-Fi to connect to the smart devices in their units, it would lose the efficiency associated with managing vacant units which, as discussed in the previous section, is a substantial source of potential benefits.

It is helpful to consider connectivity from the

resident's perspective, particularly the impact it has on the community's value proposition. Where residents can only access the technology through a Wi-Fi connection that they must obtain themselves, the impression is of a consumer solution similar to what an individual might purchase and install for their own household. By solving connectivity, the operator creates the kind of total solution that many residents have come to expect of a multifamily operator.

With 24/7 access to all units a prerequisite for delivering both customer experience and ROI, operators must make connectivity available throughout their communities. This is normally achieved through a cellular network, however, many multifamily communities' cellular coverage is too weak to make that feasible.

In this case, a private Wi-Fi network, i.e., one that is used both for smart technology accessibility and for company employees, should be factored into the cost of the smart home implementation. Enhanced network coverage is critical for the kinds of streamlining that we described in the previous section. For example, there is little point in making keyless entry available for maintenance technicians if they still have to go to the office to get each new work order because that's the only place where Wi-Fi is accessible at the property.

THE GROWING CHALLENGE OF "APP FATIGUE"

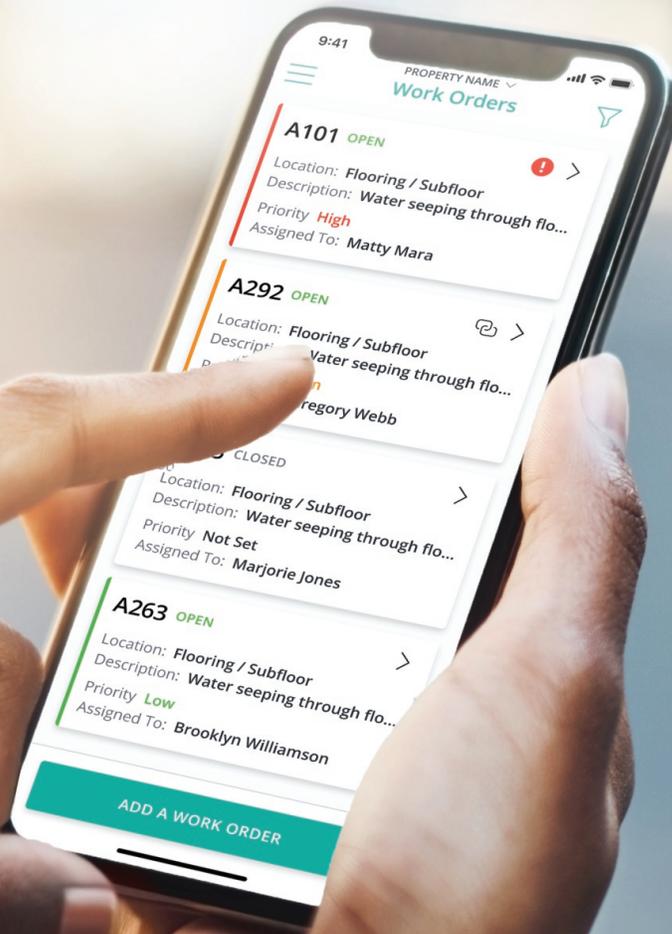
Previously we mentioned the resident's perception of connected smart home technology compared to devices that they must connect themselves. That is not the only customer experience consideration in choosing system architecture. Where components are simply connected to a Wi-Fi network (without the use of a hub and internet protocols to operate the technology), each application or device often needs an individual account.

Resident apps, maintenance apps, and myriad service apps are already creating feelings of "app fatigue" amongst residents.

To operate a Honeywell thermostat, for example, the user must use a Honeywell account; similarly, a Yale lock requires a Yale account, Hue Lights a Hue account, and so on. The user experience of multiple apps is, of course, highly unsatisfactory. It is particularly problematic in the world of rental housing, where resident apps, maintenance apps, and myriad service apps are already creating feelings of "app fatigue" amongst residents.

Z-Wave protocols help safeguard against this problem, as they stipulate that no device connected to a Z-Wave hub can require the user to have a separate account. Instead, devices must pair to the Z-Wave hub, meaning that residents can easily add as many devices as they want in their apartments, all controlled through one hub and, critically, a single app.

The efficiency of one app and hub controlling all of the smart devices in a unit is appealing in and of itself. There are further customer experience opportunities where smart devices can be run together as part of a true "smart home" regime. Imagine, for example, a single button that says "I'm home" and thus turns on the lights, changes the thermostat, opens the drapes and unlocks the door. This level of coordination would not be attainable with multiple different apps controlling the devices.



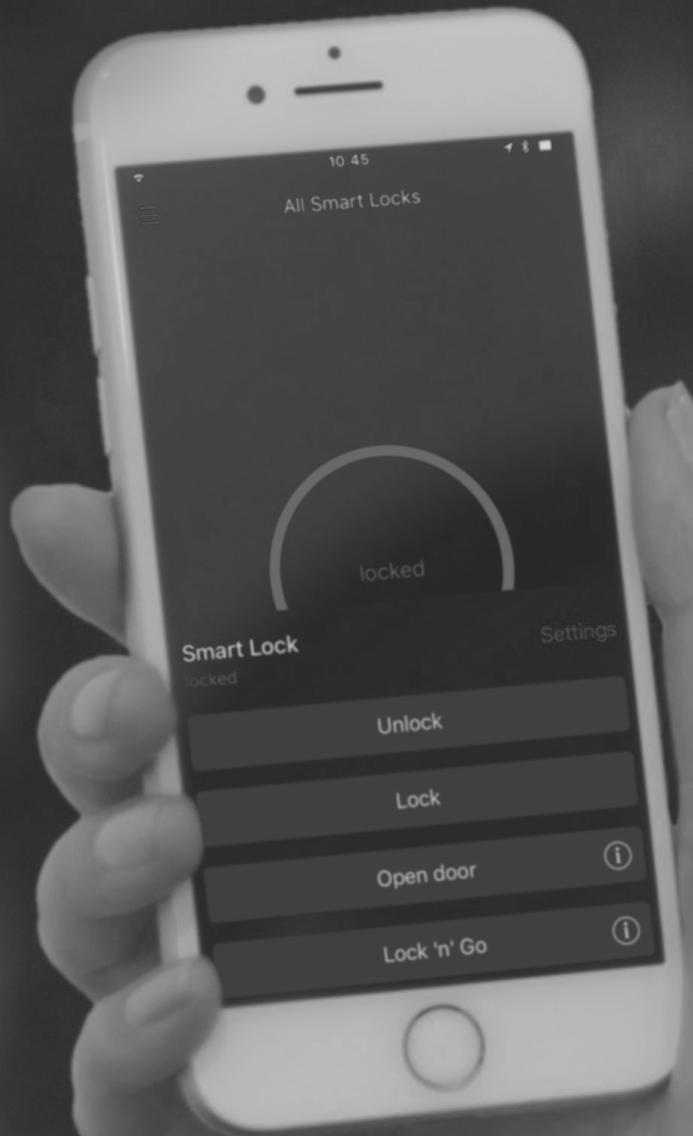
Smart Apartments. Connected Communities.

- ✓ Self-Guided Tours
- ✓ Access Control
- ✓ Automated Move In/Out
- ✓ PMS Integration
- ✓ Parking Management
- ✓ Asset Protection
- ✓ Operational Efficiency
- ✓ Work Order Maintenance

4

FIVE WAYS TO UNDERWRITE SMART HOME TECHNOLOGY INVESTMENTS

So far, we have described a technology environment with multiple technology types, deployment options and sources of financial benefit. Operators have much to think about when approaching smart home investment decisions. Each firm's individual circumstances - portfolio size, ownership structure, property style and investment thesis to name but a few - impact the necessity and methodology for measuring tangible benefits.



For example, many operators already have strong reputations and track records for cost management, so their success depends more on identifying revenue growth opportunities. They may thus be drawn to smart home technology as it offers an opportunity to drive increased rent.

Meanwhile, a portfolio in the more fashionable coastal markets may view the technology as table stakes in competing for increasingly tech-savvy residents. A portfolio of garden communities in markets where hot or cold weather are common may justify the expense based on the energy savings from vacant units, and the halo effect from following this environmentally-friendly policy. We will elaborate on examples like these in this section.

To capture the range of benefits from these technologies, in this section, we present five case studies. The case studies are based on fictitious multifamily owner/operators as a means to frame the five different investment decisions, involving different styles of communities and different underwriting rationales. There is a quantification of benefits for each case, and a discussion of the intangible benefits at play.

To keep the examples as simple as possible, we have assumed a common set of costs for the smart community technology components included in the case studies. Figure 1 summarizes the estimated costs, including ongoing service and one-off implementation costs for both the community and the individual units.

For the reasons outlined in the previous sections, we have assumed in each of the following case studies that operators select a hub-based architecture and dedicated high speed internet for the smart home network. Although this is not always necessary, it is required frequently enough to merit inclusion in the baseline models in the following sections. Finally, for the cases where access control is necessary to deliver the benefits described, we have assumed a standard package based on the community type described in the case.

	Unit Cost	Total Cost (250 units)
Recurring Costs		
Software	\$4	\$1,000
High-speed internet		\$50
One-Off Costs		
Installation	\$200	\$50,000
Hub	\$200	\$50,000
Lock	\$200	\$50,000
Thermostat	\$100	\$25,000
Leak sensor	\$60	\$15,000
Doorbell	\$149	\$37,250
Access control package	N/A	\$9,000

Figure 1: Indicative implementation costs

1. THE WIN-WIN: INCREASED RENT THROUGH UTILITY SAVINGS

Fororweck Residential, a growing, mid-size portfolio of mostly west coast-based properties decided to test smart home packages at two workforce housing properties in secondary markets in Bakersfield, California and Portland, Oregon. Both properties had been running high occupancies with consistently high review scores, indicating well-run communities with happy residents.

Rent growth had nevertheless been slow; and

with the specter of rent control in both markets, Fororweck looked to smart home packages as a potential way to drive incremental revenue. With highly price-sensitive residents, neither community had an opportunity to increase base rents. However, by introducing smart thermostats, Fororweck’s management believed that it could cut utility bills by an average of \$40 per unit per month. These savings would be achieved by tailoring HVAC activity to each resident’s individual needs, reducing the power expended on heating or cooling the unit while the resident was away.

	Cost/ROI (250 units)
Lift at \$20 PU PM (assuming 95% occupancy)	\$57,000
Annual recurring costs	\$12,000
Annual NOI impact	\$45,000
Setup costs	\$125,000
Payback (years)	2.78
IRR (7 years)	52%

Figure 2: ROI Analysis for Fororweck Apartments

The value proposition seemed compelling: if the technology could save \$40/month, the property could justify a rent increase of \$20/month, meaning that each resident - after the rent increase - would save an average of \$20/month, creating a win/win for both landlord and resident. Based on this prediction, Fororweck produced the ROI analysis that is summarized in Figure 2.

Assuming a 95% occupancy and a unit count of 250 (in order to relate Fororweck’s experience

to a “typical” community), the rent increase would equate to \$57,000 in annual incremental revenue. With \$12,000 in recurring annual costs, the \$45,000 in NOI uplift would take only 2.78 years to pay back the \$125,000 in setup costs, for a 7-year IRR of 52%.

The investment analysis stacked up, clearing Fororweck’s IRR hurdle for the smart home technology investment, based on the utility savings alone. However, Fororweck believed that the intangible benefits to its residents would be greater still. In the workforce housing sector, the appeal of “curb-to-couch” access control is a high-value amenity in and of itself as Fororweck’s residents are busy, with relatively little flexibility in their work schedules.

Having the flexibility to organize deliveries or essential services to their apartments without having to be there in person significantly improves their living experience. And Fororweck knew that its energy-efficient value proposition would be a winner in markets where environmental sensibilities are generally high.

2. THE LIFESTYLE UPGRADE

Lassac Properties operates a portfolio of A-class properties in coastal markets. Extensive research with its current residents and prospects identified a strong desire for smart home capabilities. Further, residents had indicated that they would pay an additional \$30 in monthly rent on average for the technology package.

With properties in markets like San Jose, Seattle and San Francisco, Lassac felt that demand for smart apartments and buildings was inevitable, based on the fluid expectations of their residents and prospects. As seamless technology-enabled experiences typified by the Apple store and airline or rideshare apps have become ubiquitous, residents increasingly expect technology to remove friction from all aspects of their lives.

To meet and exceed these expectations Lassac committed to offering true “curb-to-couch” access control, with keyless building and unit access, easily controlled by the resident through a single app. Lassac decided to underwrite the investment using a \$25 average rent increase for every unit where the packages were implemented. Figure 3 summarizes the ROI analysis: assuming the property sustained 95% occupancy, with the \$25 average rent increase, the property would achieve payback in 3.73 years based on the rent increase alone, with a 7-year IRR of 28%.

The successful pilot convinced Lassac that it would easily capture the \$25 rent increase it had targeted. But the benefits did not end there: by incorporating the technology into the script for property tours, the technology became an important selling point for their properties. Prospects were issued codes for the property and the unit in real time, demonstrating a seamless experience which could easily be extended to guests and service providers. Leasing agents showed them how they could manage their

	Cost/ROI (250 units)
Lift at \$25 PU PM (assuming 95% occupancy)	\$71,250
Annual recurring costs	\$12,000
Annual NOI impact	\$59,250
Setup costs	\$221,250
Payback (years)	3.73
IRR (7 years)	28%

Figure 3: ROI Analysis for Lassac Properties

apartment through the community mobile app.

Leasing agents enjoyed using the technology on tours and found that it improved conversions, as tours became more fun and helped to deepen the relationship with the prospect. While Lassac was sure that the technology would become ubiquitous in their markets, the experience of testing the technology convinced them that it would also confer a significant advantage. The revenue gains, coupled with the long-term benefit to Lassac’s brand as a forward-thinking, customer experience-focused operator, justified a full implementation.

3. THE INSURANCE POLICY

With a growing pipeline of high-rise properties in eight urban US markets, Shighrie Equities had begun to explore smart home technologies when it became clear that other developers were routinely installing the technology in their new buildings. It seemed clear that the technology was popular in most of their markets, but Shighrie’s leadership wanted to ensure that the expense of installing the technology was justified.

In the previous two years, Shighrie had suffered serious damage to four of its buildings resulting from water leaks. The costs of repairing the damage had been significant, and the introduction of leak sensors and keyless entry could allow Shighrie to detect leaks more quickly and maintenance staff could be deployed immediately to address the leak. Serious water intrusion could therefore be stopped before it affected additional apartments.

To understand the likely impact of the implementation, Shighrie conducted an analysis of the historical costs of major leak-related damages, arriving at a conservative estimate that, on average, if a major leak could be stopped before it affected the floors below, \$50,000 per

HOW TO MEASURE REVENUE UPSIDE

Rent growth is a complicated thing, particularly when it's the variable that justifies an investment decision. Correlation does not equal causation, and given the typically broad range of factors that influence rent growth, it is never easy to isolate the role of a single factor in driving it.

The challenge for multifamily executives considering smart home investments is to find evidence of the impact of the technology on rent growth. That means getting comfortable with estimates of future rent increases and, assuming they justify moving forward with implementation, conducting tests to prove revenue lift.

The most efficient way to project revenue lift is to review a peer or competitor who has conducted appropriate testing. If you don't know of any operators who have conducted formal testing, your smart home technology vendor should know somebody who has. The most reputable vendors have referential customers who have done legitimate testing, an added benefit in any source selection process.

Different operators approach investments in different ways, however, the attractiveness of the upside and the need to differentiate properties provide a natural impetus for roll-out. Yet for some operators, there is a need for a formal proof point on the benefits. Imagine the skeptical owner who wants a proof point on rent increases. In our view, the best way to do that is run a formal A/B test.

In the case of smart home technology, A/B testing measures the results experienced by a cohort of rental units using the technology against those of a cohort that does not use it. Running an A/B test requires two main decisions:

1. What metric(s) will you use as the key results indicators?
2. What will define the test and control cohorts?

The simplest metric to use is the change in exposure. We could compare the exposure of a test set of homes against a control set, given a set rent premium on the test homes. However, exposure can change due to notices which have nothing to do with the technology being tested. For that reason, a better metric to focus on is "days on market" (DOM).

DOM measures the time between the notice to vacate of the departing resident and the application date of the arriving resident. This "time in play" is an excellent proxy for market response to price. If the test homes are leasing at a lower DOM than the control, then we can charge more; if the test homes are leasing more slowly, then the price premium is too high; and of course, if they are statistically equivalent, then the price differential is just right.

For defining test and control cohorts, best practice is to put the smart home tech on half of the available units and compare DOM to the other half without the tech (and the premium). In a situation where it is imperative to install the technology in all homes, the next best option is to pick an appropriate sister community. You then can compare the rent growth of the test community against the rent growth of the control community. In choosing a control property, you should opt for one that is as geographically close as possible and starts with somewhat comparable rents and similar availability.

You may not be able to get a perfect match, but by testing several communities against pre-selected sister communities, any differences are likely to average out across all that data. There may not be a perfect test, but they provide a good enough test from which to make smart business decisions.

year could be saved for every 250 units. Figure 4 summarizes the cost/benefit analysis based purely on reducing damage from major leaks. On this basis alone, the cost of the technology would achieve payback in 4.34 years, with a 7-year IRR of 20%.

Cost/ROI (250 units)	
Lift at \$20 PUPM (assuming 95% occupancy)	\$50,000
Annual recurring costs	\$12,000
Annual NOI impact	\$38,000
Setup costs	\$165,000
Payback (years)	4.34
IRR (7 years)	20%

Figure 4: ROI Analysis for Shighrie Equities

But this was not the whole story. Besides saving money each year for Shighrie, their proactive detection and maintenance was seen as a value-add by residents. A reduction in the extent of the damage from a leak in their own apartment and - more importantly - a lower likelihood that they would suffer damage if a leak were to occur on a higher floor, served as an quasi-insurance policy. It also saved other “soft” costs like the time site and corporate staff spent managing resident communications, service and rehab projects. Given that Shighrie did not plan to charge residents for the upgraded technology, they believed that market-beating rent growth and elevated renewal rates were also attributable to their smart home implementation.

4. THE DEALMAKER

The acquisitions team of Dalda Vue Investments was interested in purchasing a 250-unit community in Tampa, Florida. The community was a great fit with the firm’s growing value-add portfolio, but at a cap rate of 6%, Dalda Vue’s valuation of \$57m did not meet the seller’s expectations, so the deal did not work.

In competitive markets, the team would often seek different and creative ways to make deals work. In the Tampa submarket where this property was situated, some initial research suggested that by introducing smart home packages, monthly rent could be increased by an average of \$25 per unit from its \$2,000 average base. By building a pro forma that included the predicted rent increase from the new technology, Dalda Vue discovered that they could hit their internal cap rate, while also allowing the seller to hit theirs.

Figure 5 summarizes the deal for the property first with, and then without, the smart home technology. At Dalda Vue’s original valuation, a cap rate of 6% meant that the deal did not work at any price above \$57m. However, the smart home packages were predicted to add \$59,800 in rent lift. The additional predicted NOI meant that Dalda Vue could increase its offer by almost one million dollars, maintaining the 6% cap rate in its pro forma, while bringing the apparent cap rate for the seller to 5.897%, enabling both parties to complete the deal.

After they succeeded in using smart home technology to secure a deal that would previously have been infeasible, the acquisitions team began to look at other ways in which the technology could help in securing deals. With a presence in several Florida locations, Dalda Vue had been aware of numerous deals for smaller properties that were nevertheless financially appealing. The challenge had always been to make the economics of staffing palatable: with one full-time site associate typically servicing

100 apartment units, the costs associated with a 40-unit building, for example, would make the deal infeasible.

There were also important learnings about the nature of the investment: while similar to the customary value-add approach in many ways, some important differences emerged with the

Without smart home	
Units	250
Occupancy	95%
Average monthly rent	\$2,000
Total annual rent	\$5,700,000
NOI (40% expense ratio)	\$3,420,000

With smart home	
Average monthly rent	\$2,025
Annual rent	\$71,250
Recurring smart home expenses	\$11,450
Rent lift	\$59,800
Buyer's NOI Estimate	\$3,479,800
Offer at 6% cap rate	\$57,996,667
Seller's apparent cap rate	5.897%
Advantage to buyer	\$996,667
Advantage to buyer (cap rate in bps)	10.31

Figure 5: Deal analysis for Dalda Vue

deployment of smart home tech. The execution risk of a smart home implementation is significantly lower than for a renovation. The speed with which the technology can be deployed also reduces the risk of cap rate fluctuation between the time of the deal and the time of the completion of renovations.

Several of the efficiencies discussed earlier in this paper (self-show and shared leasing and maintenance staff, for example) enable operators to pool resources between buildings in the same area. By including smart home technologies in more of its pro formas, Dalda Vue had been able not only to value engineer potential deals, but also change its investment thesis. By competing for different asset types with different competitors, it secured the kind of differentiation that would deliver higher returns for years to come.

5. THE VISIONARY

Narob Buce is a private REIT with a stabilized portfolio of multifamily communities, focused on six urban core markets across the U.S. For years its COO had been pursuing the opportunity to break the industry's "1/100 paradigm" - which sets the floor on staffing and hence staffing cost at a minimum of one member of site staff per 100 units.

To change that model permanently, the REIT would have to implement a way for prospects to book and execute a tour without having to interact with a property-based associate. The changes to industry procedures and norms enforced by the COVID-19 pandemic, has turned this aspiration into a necessity.

A year earlier, Narob Buce had outsourced all communications with properties to a third-party call center provider, so the part of the process between the initial inquiry and tour booking was no longer dependent on property-based staff. The longer-term desire was to move to

an AI-driven leasing model, but the success of automated leasing was not dependent on that implementation.

The immediate challenge, therefore, was to deliver a property tour in a fully-automated environment. Narob Buce had noticed that other early adopters of self-show were failing to deliver a complete solution to their prospects, with awkward work-arounds for building access control, for example. They set up their test property with full access control and hub-controlled smart locks in all individual units. A single system granted temporary access through a single app which put the prospect in control of their tour experience.

Figure 6 outlines the ROI associated with changing the cost model of Narob Buce’s properties. Assuming an annual full-time equivalent (FTE) saving, from removing one FTE, based on no longer having to answer the phone or conduct tours, \$60,000 could be cut from each property’s budget. The setup costs, based on locks and unit-based hubs would amount to \$159,000 for a 250-unit property. On that basis, the payback on the smart home investment would be just over 3.3 years, with a 7-year IRR of 37%.

The numbers, based on the cost saving alone, were compelling enough for Narob Buce to proceed with their implementation. As an established presence in the markets where it had built its reputation, the company saw this implementation as a way to burnish its reputation as a forward-thinking operator. Today, an increasing share of the potential market expects to buy its goods and services in a self-serve environment. Narob Buce implemented the technology to enable the 21st century leasing experience that would delight its increasingly tech-savvy prospects and residents.

Cost/ROI (250 units)	
Annual FTE savings	\$60,000
Annual recurring costs	\$12,000
Annual NOI impact	\$48,000
Setup costs	\$159,000
Payback (years)	3.31
IRR (7 years)	37%

Figure 6: Deal Analysis for Narob Buce

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CONCLUSION

The case studies in the previous section demonstrate the unusually broad range of benefits of adopting smart community technology. As the industry adapts to the post-COVID-19 world, many of these potential benefits have increased in urgency. While the pace of adoption is accelerating, we feel that it is important to highlight two common misconceptions about how the industry approaches smart home technology.



The first is that the technology appeals only to residents of upscale properties in the urban core. The appeal of the technology is obvious to those developing homes for the less price-sensitive and most traditionally tech-hungry demographics. But, as we demonstrated in the previous section, the efficiencies that technology brings have a much broader appeal.

Case #1 demonstrated the impact of energy savings to residents in workforce housing. However, this sector is often neglected for smart home technology implementation on the basis that residents cannot easily afford the rent increases associated with the technology package. But, in our view, this is the wrong way to look at the value proposition, as the potential cost savings from reduced energy bills are likely more impactful to a workforce housing resident in a tertiary market than they would be to an affluent millennial in a primary market like Seattle. In many cases, saving \$25 on \$900 in rent has a more meaningful financial impact on the workforce housing resident than saving

\$50 on a \$2200 rent would have on the urban professional.

And while affluent millennial and Gen-Z residents tend to be the recipients of developers' attention in the urban core, they are also the basis for the second great misconception affecting this technology: that it appeals primarily to a young demographic.

Anyone with young children will have noticed the alacrity with which they embrace digital home assistants and eschew the desktop technologies often preferred by their parents. At the same time, however, grandparents are adopting mobile-driven experiences more quickly than previous technologies.

Figure 7 summarizes Pew research on mobile phone and tablet ownership. In each case, the prevalence of mobile devices amongst boomers should remind us of the breadth of the potential appeal of technologies operated through a phone or a tablet. The appeal of smart home technology can extend to anyone with a mobile device - operators and investors should bear this in mind as they consider which communities are candidates for smart technology.

In researching this white paper, we discussed the investment decisions with many different companies adopting smart home technology. While the degree of focus ROI measurement varies from company to company, all reported experiencing value far beyond the tangible benefit they had used to justify implementation. The excitement about smart community technology and its transformational potential is clear, and so is the view that it will change our industry forever. **D2**

% of U.S. adults in each generation who say they ...

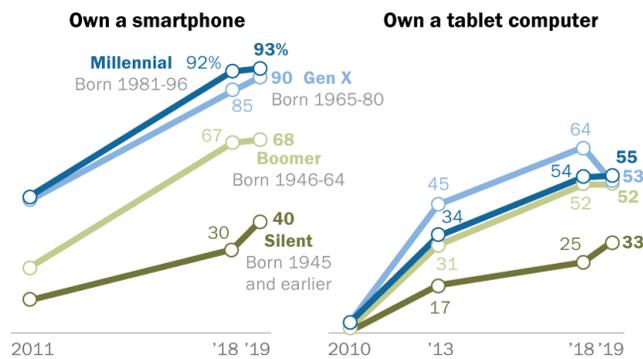


Figure 7: Smartphone and tablet computer ownership by generation. Data from the Pew Research Center in 2019.

ABOUT THE AUTHORS



Dom Beveridge is a Principal with D2 Demand Solutions and has more than 20 years' experience in leadership and consulting roles in revenue management, sales and marketing. Before joining D2, Dom spent six years working with multifamily companies in a variety of roles with the Rainmaker Group, until and through the company's sale to RealPage, Inc. Dom was previously a strategy consultant for Capgemini Ernst and Young after spending much of his early career designing and implementing revenue management systems and consulting projects, with Talus Solutions (the creators of LRO), Manugistics, Inc. and JDA Software, Inc.



Donald Davidoff is the Founder and President of D2 Demand Solutions. He is recognized throughout the rental housing industry as a thought leader in pricing, marketing, leasing, business intelligence and related areas. Donald is perhaps best known for leading the development and implementation of Lease Rent Options™ (LRO), the industry's first automated demand forecasting and price optimization system. A former Senior Vice President at Archstone and Executive Vice President with Holiday Retirement, Donald works with C-suite clients to assess their operational and technology platforms and implement impactful projects.

ABOUT D2 DEMAND SOLUTIONS

D2 Demand Solutions has more than a century of experience bridging the gap between technology and people whether it's prospects, customers or associates (or all three). We've delivered game-changing programs in pricing and revenue management, sales performance, marketing and business intelligence. We focus on analysis rather than opinions, and we know how to identify and capitalize on opportunities, designing and building intuitive solutions. We've "seen the cultural change management movie" and show you the "script" to equip a modern, adult workforce.

ABOUT SMARTRENT

SmartRent is a smart home automation provider for owners, operators and residents of multifamily properties. Our proprietary software integrates with third-party hardware and software providers to help owners and operators efficiently manage their properties and assets from one, enterprise-level platform while providing residents with an exceptional smart home experience. Our fully-customizable platform caters to each property's unique needs and includes the ability to add several stand alone solutions, like community-wide access control, parking management and self-guided tours. We take pride in providing spectacular support and training, and our deep industry knowledge has led us to create a platform that empowers users while increasing safety, revenue and efficiency.